# Oracle Financial Service Stress Testing and Scenario Analytics

## User's Guide



Release 8.1.2.8.0

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Oracle Financial Service Stress Testing and Scenario Analytics User's Guide, Release 8.1.2.8.0

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# About This Guide

### Audience

This guide is intended for:

- Technical Analyst: This user ensures that required data is populated in the appropriate tables according to the defined specifications. This user also executes, schedules, and monitors runs and batch jobs to support regular operations and analysis cycles.
- Business Analyst: This user reviews and validates functional requirements, examines reporting outputs, and helps ensure that the system's output aligns with business expectations. This user might work closely with both technical and data analysts to bridge business needs and technical implementations.
- Data Analyst: This user is involved with cleaning, validation, and importing of data into the OFSAA Download Specification Format.
- Administrator: The Administrator maintains user accounts and roles, archives data, loads data feeds, and so on. The administrator controls the access rights of users.
- Stress Testing Analyst: This user sets up and manages stress testing projects within the system. This includes creating stress testing scenarios, defining assumptions, executing runs, and analyzing the results to ensure compliance with regulatory and internal risk assessment requirements.

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# Introduction to Stress Testing and Scenario Analytics

Oracle Financial Service Stress Testing and Scenario Analytics (OFSSTSA) empowers banks and financial institutions with an integrated and centralized solution for enterprise-wide stress tests and scenario analysis. Compliance with regulatory requirements is streamlined, while enabling ad-hoc impact assessments and scenario analysis as part of routine business processes and decision-making. Fully integrated with Model Management & Governance (MMG), Process Modelling Framework (PMF), Data Pipelines, and a net new Data Catalog, OFSSTSA allows citizen and business users to effortlessly define variables, metrics, portfolios, scenarios, and stress testing projects. The product is vendor-agnostic and orchestrates centralized scenarios across Oracle and third-party models, providing a comprehensive view of impacts across revenue growth assumptions, credit risk, market risk, operations risk, and capital & liquidity impacts.

### Key Capabilities

In today's rapidly evolving financial landscape, regulatory compliance, strategic planning, and risk management are critical for success. OFSSTSA offers a comprehensive solution to empower financial institutions in navigating these challenges successfully.

- **Centralized Repository**: A centralized repository facilitates the definition and management of various objects such as variables, models, metrics, datasets, orchestration process flows, and business-relevant scenarios. This repository allows users across the organization to refer to, share, compare, and utilize essential resources effectively.
- **Model Management and Governance**: The platform is embedded with robust model management and governance capabilities, enabling the creation, upload, execution, and management of a suite of in-house, Oracle, and third-party models with ease.
- **Extensible Data Catalog**: Equipped with a versatile data catalog, the system can seamlessly incorporate various datasets, including in-house, Oracle, third-party, or external data. The data catalog ensures logical linking of data elements to data structures, promoting data harmonization and synchronous perturbation of data elements across the enterprise.
- **Intelligent Process Modeling Engine**: The platform features an intelligent process modeling engine that facilitates the sequential scheduling of all processes across the enterprise. This enables seamless orchestration based on a harmonized set of scenarios, data, and methodologies, empowering users to run multiple complex scenarios simultaneously and develop actionable solutions.
- **Intuitive Stress Testing and Scenario Analysis**: A user-friendly interface guides business users through an intuitive step-by-step process for stress testing and scenario analysis. Validation routines and auto-recommendations minimize errors, reduce runtime, and expedite decision-making.
- **Vendor Agnostic Framework**: The product offers a vendor-agnostic framework supporting the registration, scheduling, and usage of existing business-as-usual (BAU) models and engines, whether from Oracle or otherwise, thereby leveraging the existing digital assets for stress testing and scenario analytics.


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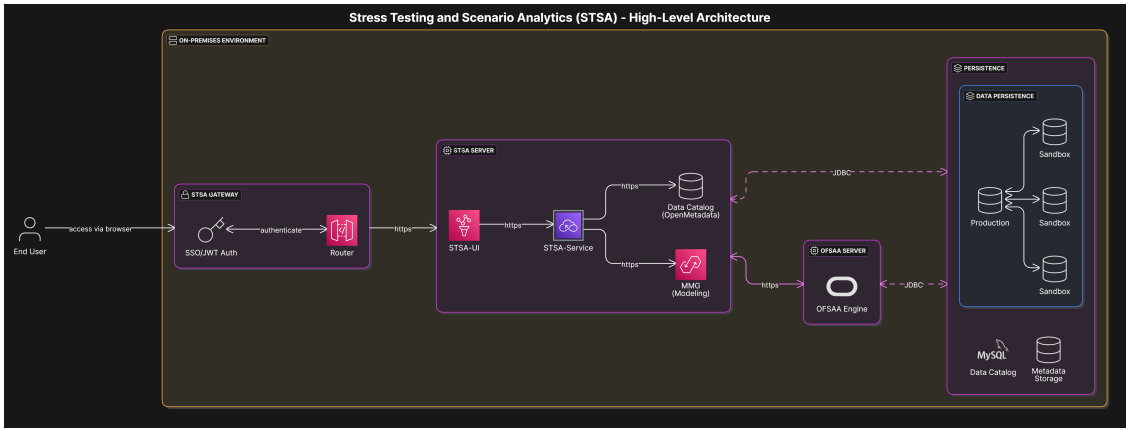
- **Seamless BAU Integration**: With its intuitive and robust capabilities, coupled with the ability to analyze a holistic view of scenario impacts across various risk domains, the platform enables seamless integration of stress testing and scenario analytics into day-to-day operations. This facilitates ad-hoc, frequent, and routine use of stress testing and scenario analytics, empowering organizations to make informed decisions promptly.
- **Analytical Dashboards**: The product features out of box analytical dashboards across four key reporting areas. These dashboards provide actionable insights based on results, enabling data-driven, informed, and timely decision-making by stakeholders across the enterprise. They integrate stress testing, financial planning, capital planning, liquidity planning, risk appetite planning, strategic business planning and other measures that positively impact business, profitability and return metrics.

### Architecture Information

The following figure depicts the various frameworks and capabilities that make up the STSA Infrastructure.

**Figure 2-1 STSA Topology**





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# 3
# User Roles and Privileges

A function code or function name is a basic unit. Each function name can be assigned to a role. Each role can then be assigned to a group. And, then a group is assigned to a user.

After installing STSA, a set of predefined user groups are created. These user groups can be assigned to application users where each user can be assigned certain roles and responsibilities.

**Table 3-1 List of predefined user groups**

| Group Name | Description |
|---|---|
| IDNTYAUTH | Identity Authorizer group |
| MDLUSR | Modeling User Group |
| MDLREV | Modeling Reviewer Group |
| MDLAPPR | Modeling Approver Group |
| PMFADMIN | Object migration admin group |
| WKSPADMIN | Workspace Administrator Group |
| DSUSRGRP | Datastudio User Group |
| SIMULATIONUSR | Simulation User Group |
| AYCFGADMIN AY_CFG | admin group |
| PORTFOLIOADMIN | Portfolio admin group |
| PROJECTADMIN | Project admin group |
| SCENARIOADMIN | Scenario admin group |
| METRICSADMIN | Metrics admin group |
| PROCESSADMIN | Process admin group |
| VARIABLEADMIN | VARIABLE admin group |
| CONFIGADMIN | Config admin group |
| HCYUSRGRP | Hierarchy User Group |
| DOCUMENTADMIN | Document admin group |
| TEMPLATEADMIN | Template admin group |
| SYNPORTADMIN | Aggregation Studio administrator group. |
| ESTMMGADMIN | Audit User Group |

An application user is mapped to a user group and a user group is mapped to the following roles and internally user roles are mapped to role functions such as view, create, modify approval and so on.

Ensure that you map the application user to one or more of the following user roles.

The basic roles defined in STSA are:

- Regulatory Role - You can create a project with Regulatory role and configurations that are approved.
- Project Manager Role - A project manager in STSA creates or edits and manages a repository of projects.
- Analysis Configuration Manager Role - A Project Configuration Manager in STSA creates or edits or manages all configurations in all the projects.


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- Variable Manager Role - Manages all the variables.
- Metric Manager Role - Manages all the metrics defined in STSA or projects.
- Scenario Manager Role - Manages all the scenarios defined in STSA or projects.
- Portfolio Manager Role - Manages all the portfolios and asses them as part of stress testing in STSA.
- Document Manager Role - Manages all the documents in STSA.
- Template Builder Role - Manages all the templates in STSA.
- Data Aggregation Studio Manager Role - Manages all Aggregation Studio definitions in STSA

**Table 3-2 List of features and their roles and functions**

| Feature Name | Role | Function Code | Function Code Description |
|---|---|---|---|
| Metadata Browser | MDB Access | MDBACCESS | The user mapped to this function can access metadata browser. |
| | MDB Read-only | MDBREAD | The user mapped to this function can view metadata browser. |
| | MDB Write | MDBWRITE | The user mapped to this function can create metadata browser. |
| | Publish Metadata | METADMIN | The user mapped to this function can publish the metadata browser. |
| Object Migration | Obj Migration Access | MIGACC | Object Migration Role |
| | Obj Migration Advanced | MIGADVND | Object Migration Advanced Role |
| | Obj Migration Authorize | MIGAUTH | Object Migration Authorize Role |
| | Obj Migration Phantom | MIGPHTM | Object Migration Phantom Role |
| | Obj Migration Read | MIGREAD | The user mapped to this function can view the migrated objects. |
| | Obj Migration Write | MIGWRITE | Object Migration Write Role |
| | ObjectAdmin advanced | OBJADMADV | ObjectAdmin advanced access |
| Migration Export Advanced | Migration Export Advanced | OMEXADVND | Migration Export Advanced Role |
| | Migration Export Phantom | OMEXPHTM | Migration Export Phantom Role |
| | Migration Export Read | OMEXREAD | Migration Export Read-only Role |
| | Migration Export Write | OMEXWRITE | Migration Export Write Role |
| | Migration Import Advanced | OMIMADVND | Migration Import Advanced Role |
| | Migration Import Phantom | OMIMPHTM | Migration Import Phantom Role |


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**Table 3-2 (Cont.) List of features and their roles and functions**

| Feature Name | Role | Function Code | Function Code Description |
|---|---|---|---|
| | Migration Import Read | OMIMREAD | Migration Import Read-only Role |
| | Migration Import Write | OMIMWRITE | Migration Import Write Role |
| Configuration Manager | CONFIG_READ | EST_CONFIG_VIEW | The user mapped to this function can view the configuration manager. |
| | | EST_CONFIG_SUMM | The user mapped to this function can create configuration manager summary. |
| | CONFIG_WRITE | EST_CONFIG_VIEW | The user mapped to this function can view configuration manager. |
| | | EST_CONFIG_SUMM | The user mapped to this function can view configuration manager summary. |
| | | EST_CONFIG_MOD | The user mapped to this function can modify configuration manager. |
| Portfolio | PORTFOLIO_READ | EST_PORTFOLIO_VIEW | The user mapped to this function can view portfolio. |
| | | EST_PORTFOLIO_SUMM | The user mapped to this function can view portfolio summary. |
| | PORTFOLIO_WRITE | EST_PORTFOLIO_VIEW | The user mapped to this function can view portfolio. |
| | | EST_PORTFOLIO_SUMM | The user mapped to this function can view portfolio summary. |
| | | EST_PORTFOLIO_ADD | The user mapped to this function can create portfolios. |
| | | EST_PORTFOLIO_MOD | The user mapped to this function can modify portfolios. |
| | | EST_PORTFOLIO_COPY | The user mapped to this function can replicate portfolios. |
| | | EST_PORTFOLIO_DEL | The user mapped to this function can delete portfolios. |
| Metrics | METRICS_READ | EST_METRICS_VIEW | The user mapped to this function can view metrics. |


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**Table 3-2 (Cont.) List of features and their roles and functions**

| Feature Name | Role | Function Code | Function Code Description |
|---|---|---|---|
| | | EST_METRICS_SUMM | The user mapped to this function can view metrics summary. |
| | METRICS_WRITE | EST_METRICS_VIEW | The user mapped to this function can view metrics. |
| | | EST_METRICS_SUMM | The user mapped to this function can view metrics summary. |
| | | EST_METRICS_ADD | The user mapped to this function can add metrics. |
| | | EST_METRICS_MOD | The user mapped to this function can modify metrics. |
| | | EST_METRICS_COPY | The user mapped to this function can replicate metrics. |
| | | EST_METRICS_DEL | The user mapped to this function can delete metrics. |
| | METRICS_WF | EST_METRICS_CMT | The user mapped to this function can provide their comments for metrics. |
| | | EST_METRICS_REV | The user mapped to this function can review metrics. |
| | | EST_METRICS_AUTH | The user mapped to this function can approve metrics. |
| Variable | VARIABLE_READ | EST_VARIABLE_VIEW | The user mapped to this function can view variable. |
| | | EST_VARIABLE_SUMM | The user mapped to this function can view variable summary. |
| | VARIABLE_WRITE | EST_VARIABLE_VIEW | The user mapped to this function can view variable. |
| | | EST_VARIABLE_SUMM | The user mapped to this function can view variable summary. |
| | | EST_VARIABLE_ADD | The user mapped to this function can create variable. |
| | | EST_VARIABLE_MOD | The user mapped to this function can modify variable. |


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**Table 3-2 (Cont.) List of features and their roles and functions**

| Feature Name | Role | Function Code | Function Code Description |
|---|---|---|---|
| | | EST_VARIABLE_COPY | The user mapped to this function can replicate variable. |
| | | EST_VARIABLE_DEL | The user mapped to this function can delete variable. |
| | VARIABLE_WF | EST_VARIABLE_CMT | The user mapped to this function can provide their comments for variable. |
| | | EST_VARIABLE_REV | The user mapped to this function can review variable. |
| | | EST_VARIABLE_AUTH | The user mapped to this function can approve variable. |
| Model | MDLREAD | MDLVIEW | The user mapped to this function can view models. |
| | MDLACCESS | MDLSUMM | The user mapped to this function can view model summary. |
| | MDLWRITE | MDLVIEW | The user mapped to this function can view models. |
| | | MDLSUMM | The user mapped to this function can view model summary. |
| | | MDLADD | The user mapped to this function can create models. |
| | | MDLEDIT | The user mapped to this function can modify models. |
| | | MDLCOPY | The user mapped to this function can replicate models. |
| | | MDLDEL | The user mapped to this function can delete models. |
| Process | PROCESS_READ | EST_PROCESS_VIEW | The user mapped to this function can view processes. |
| | | EST_PROCESS_SUMM | The user mapped to this function can view process summary. |
| | PROCESS_WRITE | EST_PROCESS_ADD | The user mapped to this function can create processes. |


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**Table 3-2 (Cont.) List of features and their roles and functions**

| Feature Name | Role | Function Code | Function Code Description |
|---|---|---|---|
| | | EST_PROCESS_MOD | The user mapped to this function can modify processes. |
| | | EST_PROCESS_COPY | The user mapped to this function can replicate processes. |
| | | EST_PROCESS_DEL | The user mapped to this function can delete processes. |
| Scenario | SCENARIO_READ | EST_SCENARIO_VIEW | The user mapped to this function can view scenarios. |
| | | EST_SCENARIO_SUMM | The user mapped to this function can view scenario summary. |
| | SCENARIO_WRITE | EST_SCENARIO_VIEW | The user mapped to this function can view scenario. |
| | | EST_SCENARIO_SUMM | The user mapped to this function can view scenario summary. |
| | | EST_SCENARIO_ADD | The user mapped to this function can add scenario. |
| | | EST_SCENARIO_MOD | The user mapped to this function can modify scenario. |
| | | EST_SCENARIO_COPY | The user mapped to this function can replicate scenario. |
| | | EST_SCENARIO_DEL | The user mapped to this function can delete scenario. |
| | SCENARIO_WF | EST_SCENARIO_CMT | The user mapped to this function can provide their comments on scenario. |
| | | EST_SCENARIO_REV | The user mapped to this function can review scenario. |
| | | EST_SCENARIO_AUTH | The user mapped to this function can approve scenario. |
| Analysis Configuration | AY_CFG_READ | EST_AY_CFG_VIEW | The user mapped to this function can view analysis configuration. |
| | | EST_AY_CFG_SUMM | The user mapped to this function can view analysis configuration summary. |


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**Table 3-2 (Cont.) List of features and their roles and functions**

| Feature Name | Role | Function Code | Function Code Description |
|---|---|---|---|
| | AY_CFG_WRITE | EST_AY_CFG_VIEW | The user mapped to this function can create analysis configuration. |
| | | EST_AY_CFG_SUMM | The user mapped to this function can view analysis configuration summary. |
| | | EST_AY_CFG_ADD | The user mapped to this function can add analysis configuration. |
| | | EST_AY_CFG_MOD | The user mapped to this function can modify analysis configuration. |
| | | EST_AY_CFG_COPY | The user mapped to this function can replicate analysis configuration. |
| | | EST_AY_CFG_DEL | The user mapped to this function can delete analysis configuration. |
| | AY_CFG_WF | EST_AY_CFG_CMT | The user mapped to this function can provide their comments on analysis configuration. |
| | | EST_AY_CFG_REV | The user mapped to this function can review analysis configuration. |
| | | EST_AY_CFG_AUTH | The user mapped to this function can approve analysis configuration. |
| Hierarchy | BUHCY_AUTH | HCYATH | The user mapped to this function can authorize hierarchies |
| | BUHCY_ACSS | HCYSUMM | Business Hierarchy Summary |
| | BUHCY_ROLY | HCYVIW | The user mapped to this function can view hierarchies |
| | BUHCY_WRIT | HCYADD | The user mapped to this function can add hierarchies |
| | | HCYMOD | The user mapped to this function can modify hierarchies |
| | | HCYDEL | The user mapped to this function will have rights to delete hierarchies |
| | BUHCY_BRVIEW | HCYBRVIEW | The user mapped to this function can view hierarchy browser |


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**Table 3-2 (Cont.) List of features and their roles and functions**

| Feature Name | Role | Function Code | Function Code Description |
|---|---|---|---|
| Document Management | DOCUMENT_READ | EST_DOCUMENT_VIEW | The user mapped to this function can view documents. |
| | DOCUMENT_WRITE | EST_DOCUMENT_MOD | The user mapped to this function can modify documents. |
| | | EST_DOCUMENT_DEL | The user mapped to this function can delete documents. |
| | | EST_DOCUMENT_ADD | The user mapped to this function can add documents. |
| Template Builder | TEMPLATE_READ | TEMP_STSA_CONF_VIEW | The user mapped to this function can view templates. |
| | | TEMP_STSA_CONF_SUMM | The user mapped to this function can view template summary information. |
| | TEMPLATE_WRITE | TEMP_STSA_CONF_ADD | The user mapped to this function can add/create templates. |
| | | TEMP_STSA_CONF_COPY | The user mapped to this function can copy templates. |
| | | TEMP_STSA_CONF_MOD | The user mapped to this function can modify/edit templates. |
| | | TEMP_STSA_CONF_DEL | The user mapped to this function can delete templates. |
| Hierarchy | BUHCY_AUTH | HCYATH | The user mapped to this function can authorize hierarchies |
| | BUHCY_ACSS | HCYSUMM | Business Hierarchy Summary |
| | BUHCY_ROLY | HCYVIW | The user mapped to this function can view hierarchies |
| | BUHCY_WRIT | HCYADD | The user mapped to this function can add hierarchies |
| | | HCYMOD | The user mapped to this function can modify hierarchies |
| | | HCYDEL | The user mapped to this function will have rights to delete hierarchies |


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**Table 3-2 (Cont.) List of features and their roles and functions**

| Feature Name | Role | Function Code | Function Code Description |
|---|---|---|---|
| | BUHCY_BRVIEW | HCYBRVIEW | The user mapped to this function can view hierarchy browser |
| Aggregation Studio | SYN_PORT_READ | EST_SYN_PORT_VIEW | The user mapped to this function can view Aggregation Studio definitions and aggregation run results. |
| | | EST_SYN_PORT_SUMM | The user mapped to this function can view the Aggregation Studio summary. |
| | SYN_PORT_WRITE | EST_SYN_PORT_ADD | The user mapped to this function can create an Aggregation Studio definition. |
| | | EST_SYN_PORT_MOD | The user mapped to this function can modify an Aggregation Studio definition and start an aggregation run. |
| | | EST_SYN_PORT_DEL | The user mapped to this function can delete an Aggregation Studio definition. |
| | | EST_SYN_PORT_COPY | The user mapped to this function can copy an Aggregation Studio definition. |
| | SYN_PORT_WF | EST_SYN_PORT_CMT | The user mapped to this function can comment on an Aggregation Studio definition. |
| | | EST_SYN_PORT_REV | The user mapped to this function can review an Aggregation Studio definition. |
| | | EST_SYN_PORT_AUTH | The user mapped to this function can approve an Aggregation Studio definition. |
| Audit Logs | META_AUDIT_READ | META_AUDIT_VIEW | The user mapped to this function can view Audit Logs reports. |


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**Table 3-3 List of STSA screens and their associated access codes**

| Screen | Functionality | Function Code | Description |
|---|---|---|---|
| Project | Summary | EST_PROJECT_SUMM | Access to view project summary |
| | Add | EST_PROJECT_ADD | Access to create new project |
| | Delete | EST_PROJECT_DEL | Access to create delete project |
| | Edit | EST_PROJECT_MOD | Access to edit a project |
| | Copy | EST_PROJECT_COPY | Access to copy a project |
| | View | EST_PROJECT_VIEW | Access to view a project |
| | Comment | EST_PROJECT_CMT | Access to comment on a project |
| | Review | EST_PROJECT_REV | Access to review a project |
| | Approve | EST_PROJECT_AUTH | Access to approve a project |
| | Execute | EST_PROJECT_EXEC | Access to run a project |
| | View Run Results | EST_PROJECT_VIEW_RES | Access to view results |
| | Make execution parameter latest | EST_PROJECT_RUN_LAT | For an execution, provide execution parameter |
| Analysis Configuration | Summary | EST_AY_CFG_SUMM | Access to view analysis configuration summary |
| | Add | EST_AY_CFG_ADD | Access to create new an analysis configuration |
| | Delete | EST_AY_CFG_DEL | Access to create delete an analysis configuration |
| | Edit | EST_AY_CFG_MOD | Access to edit an analysis configuration |
| | Copy | EST_AY_CFG_COPY | Access to copy an analysis configuration |
| | View | EST_AY_CFG_VIEW | Access to view an analysis configuration |
| | Comment | EST_AY_CFG_CMT | Access to comment on analysis configuration |
| | Review | EST_AY_CFG_REV | Access to review an analysis configuration |
| | Approve | EST_AY_CFG_APPR | Access to approve a analysis configuration |
| Scope and Portfolio | Summary | EST_PORTFOLIO_SUMM | Access to view portfolio summary |


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**Table 3-3 (Cont.) List of STSA screens and their associated access codes**

| Screen | Functionality | Function Code | Description |
|---|---|---|---|
| | Add | EST_PORTFOLIO_ADD | Access to create new a portfolio |
| | Delete | EST_PORTFOLIO_DEL | Access to create delete a portfolio |
| | Edit | EST_PORTFOLIO_MOD | Access to edit a portfolio |
| | Copy | EST_PORTFOLIO_COPY | Access to copy a portfolio |
| | View | EST_PORTFOLIO_VIEW | Access to view a portfolio |
| Metrics | Summary | EST_METRICS_SUMM | Access to view metrics summary |
| | Add | EST_METRICS_ADD | Access to add a new metrics |
| | Delete | EST_METRICS_DEL | Access to delete a metrics |
| | Edit | EST_METRICS_MOD | Access to edit a metrics |
| | Copy | EST_METRICS_COPY | Access to copy a metrics |
| | View | EST_METRICS_VIEW | Access to view the created metrics |
| | Review | EST_METRICS_REV | Access to review the metrics |
| | Approve | EST_METRICS_APPR | Access to approve a metrics |
| Model | Summary | EST_MODEL_SUMM | Access to view Models summary |
| | Add | EST_MODEL_ADD | Access to add a model |
| | Delete | EST_MODEL_DEL | Access to delete a model |
| | Edit | EST_MODEL_MOD | Access to modify a model |
| | Copy | EST_MODEL_COPY | Access to copy a model |
| | View | EST_MODEL_VIEW | Access to view a model |
| | Review | EST_MODEL_REV | Access to review a model |
| | Approve | EST_MODEL_APPR | Access to approve a model |
| Variable | Summary | EST_VARIABLE_SUMM | Access to view a variable summary |
| | Add | EST_VARIABLE_ADD | Access to add a variable |
| | Delete | EST_VARIABLE_DEL | Access to delete a variable |
| | Edit | EST_VARIABLE_EDIT | Access to edit a variable |
| | Copy | EST_VARIABLE_COPY | Access to copy a variable |
| | View | EST_VARIABLE_VIEW | Access to view a variable |
| | Review | EST_VARIABLE_REV | Access to review a variable |


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**Table 3-3 (Cont.) List of STSA screens and their associated access codes**

| Screen | Functionality | Function Code | Description |
|---|---|---|---|
| | Approve | EST_VARIABLE_APPR | Access to approve a variable |
| Process Flow | View | EST_PROCESS_VIEW | Access to view a workflow |
| | Summary | EST_PROCESS_SUMM | Access to view a workflow summary |
| | Add | EST_PROCESS_ADD | Access to add a workflow |
| | Modify | EST_PROCESS_MOD | Access to modify a workflow |
| | Copy | EST_PROCESS_COPY | Access to copy a workflow |
| | Delete | EST_PROCESS_DEL | Access to delete a workflow |
| Configuration Summary | Summary | EST_CONFIG_SUMMARY | Access to view a workflow summary |
| | View | EST_CONFIG_VIEW | Access to view a configuration |
| | Add | EST_CONFIG_ADD | Access to add a configuration |
| | Modify | EST_CONFIG_MOD | Access to modify a configuration |
| | Copy | EST_CONFIG_DIM_HRCHY_MAP | Dimension and hierarchy mapping |
| | Search | EST_CONFIG_DIM_SEARCH | Access to search a configuration |
| | Edit | EST_CONFIG_DIM_SAVE | Access to save a configuration |
| Scenario Management | Scenario Summary | EST_SCENARIO_SUMM | Access to view Scenario Summary screen |
| | Add | EST_SCENARIO_ADD | Access to Add new Scenario Definition |
| | Delete | EST_SCENARIO_DEL | Access to Delete Scenario Definition |
| | Edit | EST_SCENARIO_MOD | Access to Edit Scenario Definition |
| | Copy | EST_SCENARIO_COPY | Access to Copy Scenario Definition |
| | View | EST_SCENARIO_VIEW | Access to View Scenario Definition |
| | Review | EST_SCENARIO_REV | Access to Review Scenario Definition |
| | Approve | EST_SCENARIO_APPR | Access to Approve Scenario Definition |
| | Export | EST_SCENARIO_EXP | Access to Export Scenario Definition |
| Document Management | View | EST_DOCUMENT_VIEW | Access to view the document |


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**Table 3-3 (Cont.) List of STSA screens and their associated access codes**

| Screen | Functionality | Function Code | Description |
|---|---|---|---|
| | Modify | EST_DOCUMENT_MOD | Access to modify the document |
| | Delete | EST_DOCUMENT_DEL | Access to delete the document |
| | Add | EST_DOCUMENT_ADD | Access to add the document |
| Hierarchy | Authorize | HCYATH | |
| | Summary | HCYSUMM | |
| | View | HCYVIW | |
| | Add | HCYADD | |
| | Edit | HCYMOD | |
| | Delete | HCYDEL | |
| | Hierarchy Browser View | HCYBRVIEW | |
| Template Builder | View | TEMP_STSA_CONF_VIEW | Access to view a template. |
| | Summary | TEMP_STSA_CONF_SUMM | Access to view template summary information. |
| | Add | TEMP_STSA_CONF_ADD | Access to create a new template. |
| | Copy | TEMP_STSA_CONF_COPY | Access to copy a template. |
| | Modify | TEMP_STSA_CONF_MOD | Access to edit or modify a template. |
| | Delete | TEMP_STSA_CONF_DEL | Access to delete a template. |
| Aggregation Studio | Summary | EST_SYN_PORT_SUMM | Access to view the Aggregation Studio summary. |
| | Add | EST_SYN_PORT_ADD | Access to create an Aggregation Studio definition. |
| | Delete | EST_SYN_PORT_DEL | Access to delete an Aggregation Studio definition. |
| | Edit | EST_SYN_PORT_MOD | Access to edit an Aggregation Studio definition. |
| | Copy | EST_SYN_PORT_COPY | Access to copy an Aggregation Studio definition. |
| | View | EST_SYN_PORT_VIEW | Access to view an Aggregation Studio definition. |
| | Comment | EST_SYN_PORT_CMT | Access to comment on an Aggregation Studio definition. |
| | Review | EST_SYN_PORT_REV | Access to review an Aggregation Studio definition. |


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**Table 3-3 (Cont.) List of STSA screens and their associated access codes**

| Screen | Functionality | Function Code | Description |
|---|---|---|---|
| | Approve | EST_SYN_PORT_AUTH | Access to approve an Aggregation Studio definition. |
| | Run Aggregation | EST_SYN_PORT_MOD | Access to start an aggregation run for an Aggregation Studio definition. |
| | View Run Results | EST_SYN_PORT_VIEW | Access to view aggregation run history, status, and per-table results. |

After installing STSA, predefined groups are created where OFSAA users can be tagged to these predefined groups and these predefined groups are mapped to STSA roles and functions internally.

**Table 3-4 List of predefined groups in STSA**

| Predefined Group | Description |
|---|---|
| IDNTYAUTH | Identity Authorizer group |
| MDLUSR | Modeling User Group |
| MDLREV | Modeling Reviewer Group |
| MDLAPPR | Modeling Approver Group |
| PMFADMIN | Object migration administrator group |
| WKSPADMIN | Workspace administrator Group |
| DSUSRGRP | Datastudio User Group |
| SIMULATIONUSR | Simulation User Group |
| AYCFGADMIN AY_CFG | Analysis Configuration administrator group |
| PORTFOLIOADMIN | Portfolio administrator group |
| PROJECTADMIN | Project administrator group |
| SCENARIOADMIN | Scenario administrator group |
| METRICSADMIN | Metrics administrator group |
| PROCESSADMIN | Process administrator group |
| VARIABLEADMIN | Variable administrator group |
| CONFIGADMIN | Configuration administrator group |
| HCYUSRGRP | Hierarchy User Group |
| DOCUMENTADMIN | Document administrator group |
| TEMPLATEADMIN | Template administrator group |
| SYNPORTADMIN | Aggregation Studio administrator group. |


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# 4

# High level work flow for STSA

Before starting with stress testing:

1. Create sandbox.

   Set up a new workspace to isolate and manage configurations, data, and metadata specific to your analysis.

2. Migrate production metadata to sandbox.

   Migrate production metadata components including:

   - Data Models
   - Process Pipelines
   - Model Pipelines

3. Set Up Data Catalog (DC)
   - Register database services
   - Ingest schema metadata
   - Map metadata to physical sources

4. Ensure Master Data (MD) Availability

   Verify that relevant master data is ingested and published in the Data Catalog.

5. Create Business Glossary and Glossary Terms.

   Add relevant terms under the EST Global Glossary for logical-physical data mapping.

6. Establish Metadata Relationships in DC
   - Configure mappings and relationships
   - Handle configuration elements such as:
     - Glossary Term to Table/Column mapping
     - Metadata rule dependencies

7. Create STSA-Specific Metadata.

   Define and register metadata needed for STSA including variables, models, metrics, and portfolios.

8. Manage Dimensions

   Configure dimensions for both:

   - Portfolios
   - Results reporting

9. Onboard Metrics
   - Define new metrics or import existing ones
   - Validate and approve metric definitions

10. Map Metrics to Processes and Models


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Link metrics to corresponding processes and/or model pipelines to facilitate accurate computation.

11. Create Variables

    Define required variables including input, derived, and time series variables.

12. Set Up Additional Configurations

    Include any configuration elements necessary for workflow execution such as analysis configurations and scenario associations.

13. **Create a Stress Testing Project.**

    Combine portfolios, variables, metrics, models, and scenarios into a cohesive project and define execution logic.


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# 5
# Stress Testing

To perform stress testing create all the following STSA objects:

## 5.1 Portfolios

A portfolio serves as a structured collection of financial assets or liabilities held by a bank or financial institution. These portfolios are subjected to various analysis and stress tests to assess their performance under different scenarios and to manage risks effectively.

Portfolio definitions can vary widely based on a user's preferences and the specific objectives of stress testing. You can define portfolios broadly, encompassing a diverse range of assets or liabilities, or opt for more granular definitions focusing on specific sectors, industries, regions, or types of financial products.

The primary purpose of subjecting portfolios to stress tests is to evaluate their resilience and performance under adverse economic conditions or unexpected events. This helps banks and financial institutions identify potential vulnerabilities and develop strategies to mitigate risks.

### 5.1.1 Creating New Portfolios

To create a portfolio, perform the following steps:

Ensure that you configure the required dimensions in **Configuration Manager**.

1. Login to STSA.

   The **Workspace Summary** page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Building Blocks** and click **View** in the Portfolio section.

   The Portfolio Summary section is displayed.
4. Click **Create New**.
5. Provide a portfolio name and description in the **Basic Details** section and click **Next**.
6. Select the required hierarchies from the dimensions in the **Select Dimensions** section and click **Next**.

   The dimensions and hierarchies that are listed here are the OFSAA hierarchies and these are maintained in the OFSAA environment. These are imported to STSA when creating the sandbox and migrating the metadata from production to sandbox. Configure or add the list of dimensions required only for stress testing from the **Configuration Manager** section)

> **Note**
>
> You can add only one hierarchy from the selected dimension. If you select another hierarchy from the same dimension the previously selected hierarchy gets replaced with the latest selection.


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7. Select the heirearchy nodes for the dimensions that you selected in the previous step and click **Next**.
8. All the selections made are displayed in the **Review** section.
9. To add a tag, click **Tag** tab in the **Audit Log** pane and provide a tag and click **Add Tag**.
10. To add a comment, click **Comments** tab in the **Audit Log** pane and provide the comment and click **Add Comment**.

**Cloning or Creating Portfolios from Existing Portfolios**

To create a new portfolio from an existing portfolio, perform the following steps:

11. Login to STSA.
12. Click **Building Blocks** and click **View** in the Portfolio section.

    The Portfolio Summary section is displayed.
13. To replicate and modify an existing portfolio with minor changes, select an existing portfolio, click **More Actions** and then click **Copy**.
14. Provide a name and update the description and click **Next**.
15. Update (add or remove) the hierarchies from the dimensions and click **Next**.
16. Review the details in the **Review** section and click **Save**.
17. Review the entries and click **Save**.

    The **Audit** tab in the **Audit Log** section is populated after the Portfolio is created.

> **Note**
>
> Portfolio components are auto-approved.

## 5.1.2 Cloning or Creating Portfolios from Existing Portfolios

To create a new portfolio from an existing portfolio, perform the following steps:

1. Login to STSA.
2. Click **Building Blocks** and click **View** in the Portfolio section.

   The Portfolio Summary section is displayed.
3. To replicate and modify an existing portfolio with minor changes, select an existing portfolio, click **More Actions** and then click **Copy**.
4. Provide a name and update the description and click **Next**.
5. Update (add or remove) the hierarchies from the dimensions and click **Next**.
6. Review the details in the **Review** section and click **Save**.
7. Review the entries and click **Save**.

   The **Audit** tab in the **Audit Log** section is populated after the Portfolio is created.

> **Note**
>
> Portfolio components are auto-approved.


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# 5.2 Models

Models consist of a broad range of calculations or algorithms designed to output metrics based on specific inputs or variables. They play a vital role in decision-making, scientific research, and problem-solving by providing a structured framework for analyzing complex systems and phenomena. Models range from simple equations to complex simulations, serving to simplify real-world phenomena for better understanding and prediction.

In the banking domain, stress testing models are crucial for assessing the resilience of financial institutions to adverse scenarios. These models simulate potential economic downturns or crises to evaluate how banks' assets, liabilities, and overall financial health would be affected. The complexity of models can vary significantly depending on the nature of the problem they are designed to address. Some models may involve straightforward mathematical formulas, while others may require advanced computational techniques, algorithms, or simulations to accurately represent intricate systems or processes.

For VAR model provisioning and scenario generation, see the Appendix C, VAR Model.

## 5.2.1 Creating Models

To create a new model:

1. Login to STSA.

   The **Workspace Summary** page is displayed.

2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.

3. Click **Building Blocks** and then click **Models**.

   The **Models Summary** page is displayed, listing the available models with details such as **Name**, **Version**, **Scope**, **Purpose**, **Object Champion & Status**, **Tags**, and **Onboarding Status**.

4. Click **Create New**.

   The Model Definition page is displayed.

5. Select an existing or create a new objective (is a folder within which you can create the models) from the **Objective** drop-down menu.

   To create a new objective:

   a. Click the **Add in new objective** button.

   b. In the **Objective Details** pane:

      i. Provide a name, description and tag for the objective.


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> **Note**
>
> The objective tag is listed as scope in the model summary page.

6. In the **Draft Details** pane, provide a name, description and tag for the model.

> **Note**
>
> The model description is displayed as purpose in the model summary page.

7. (Optional) In the **Add Comments** field, specify any additional notes or administrative comments related to the model draft.
8. (Optional) To prepopulate the draft details for a model, click the **Use Templates** option.

   The **Use Template** page is displayed.

> **Note**
>
> If you have saved the details in the ftpshare path, these files are available for selection.

   Select the file from the **Templates** drop-down menu.
9. (Optional) To automatically prepopulate the draft details using components that already exist in the workspace, click the **Pull from Workspace** option.

   The **Pull from Workspace** page is displayed.

   This option retrieves available model-related definitions (such as instruments, assumptions, calculation rules, or other relevant artifacts) from the currently active workspace.

   Select the required items from the list to populate the corresponding fields in the model draft.
10. Click **Submit**.

    A draft record is created in the database and the model is set to draft state with version number as zero.
    Then, the pipeline designer page is displayed where you can build the model.


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For more information, see the Oracle Financial Services Model Management and Governance User Guide.

11. To save the model with the current status and build it later, click the save icon on the pipeline designer page.
12. After building or creating the model, click **Publish**.

    In the publish pipeline:

    a. Provide a description and the model technique name and a run version.
    b. (Optional) To attach any parameters, enable the toggle button and select parameters from the drop-down menu.
    c. Click **Publish**.
    The pipeline is published successfully.

    After publishing a model, a version number of the model is incremented to one from zero and the status of the model is changed to **Published**. And, this model is published to Data Catalog.

    However, the draft version of the model is still intact and the version number remain zero.


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> **Note**
>
> You cannot edit the published versions.

d. To view the published version, return to the **Models Summary** screen.

> **Note**
>
> You can send only the published models for **Model Acceptance** (for approval). For more information, see the Workflows for Models section.

## 5.2.2 Importing existing models from other domain or third-party product

1. Login to STSA.

   The **Workspace Summary** page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Building Blocks** and then click **Models**.

   The Models Summary page is displayed.
4. Click **Create New**.

   The Model Definition page is displayed.
5. Click the **Import** toggle button.

   The import file page is displayed.
6. Click **Import Archive File** and select the file for import.
7. Click **Submit**.

   The file is imported successfully and you are redirected to the pipeline designer page.

**Postrequisite:**
After importing the model, remap or reconfigure all the resources used in this model to the current workspace.

## 5.2.3 Cloning or Creating Models from Existing Models

1. Login to STSA.

   The **Workspace Summary** page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Building Blocks** and then click **Models**.

   The Models Summary page is displayed.
4. Select the model, click Actions and then select **Copy**.

   The model definition page is displayed with all the details.
5. Select another objective and provide a name, description and tag if required, and click **Submit**.


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# 5.2.4 Onboarding Models

The models onboarding process depends on the data ingestion and mapping activities performed in the workspace. Models available for onboarding are driven by the source pipelines and processes configured during workspace preparation.

Model onboarding supports two modes:

- Automated Onboarding – Upload Excel specification files at the start of onboarding. The system uses these files to pre-select and auto-recommend asset-to-column mappings across the relevant onboarding steps, reducing manual effort.
- Manual Onboarding – Configure each step individually by selecting tables and columns without uploading specification files.

> **Note**
>
> - You cannot onboard models in Draft state.
> - If mappings already exist in the Data Catalog (DC), they are automatically shown when you onboard for the first time.

**Onboarding a Model Using Automated Onboarding**

Automated onboarding uses uploaded Excel specification files to generate recommendations across the onboarding steps. The guided process includes an additional first step, Model Specifications Set Up, where you upload the files before proceeding.

The Model Specifications Set Up screen contains two upload sections:

- Input Specifications – Upload an Excel file (.xlsx or .xls) that automates the configuration of Step 2 (Source Data Selection), Step 3 (Date Management), and Step 4 (Input Variable Mapping). The status indicator changes to “Uploaded” once the file is successfully uploaded, and a confirmation message is displayed below the upload area. •
- Output Specifications – Upload an Excel file (.xlsx or .xls) that automates the configuration of Step 5 (Output Table Selection) and Step 6 (Output Metric Mapping). The status indicator changes to “Uploaded” once the file is successfully uploaded.

> **Note**
>
> Uploading specification files is optional. If you do not upload files, you can still proceed and complete onboarding manually.

After uploading specification files, a Show Recommendations toggle appears at the top right of the Source Data Selection, Date Management, Input Variable Mapping, and Output Table Selection pages. The toggle controls whether automated recommendations are displayed.

- First visit (first-time onboarding): The toggle is ON by default. Recommended items are displayed with a “Recommended” chip and are auto-selected.
- Subsequent visits (returning to a step in the same session): The toggle remains ON, and recommendations continue to display.


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- Returning after closing the guided process: The toggle is OFF by default. You can turn it on manually to view recommendations, but previously saved selections are retained. Recommendations are shown but not auto-selected.

To onboard a model using automated onboarding:

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. Click **Building Blocks** and under the **Model** tile, click **View**.
   The **Model** Summay page is displayed.
4. To onboard a model, click **Actions** and then click **Onboard** against the model.
   The **Model Specifications Set Up** page opens.

> **Note**
>
> If mappings already exist in the Data Catalog (DC), they are automatically shown when you onboard for the first time.

5. In the **Input Specifications** section, drag and drop or click to browse and upload the Excel file (.xlsx or .xls) that defines your model's input specifications.
   When the upload is complete, the status changes to Uploaded and a confirmation message is displayed.
6. In the **Output Specifications** section, drag and drop or click to browse and upload the Excel file (.xlsx or .xls) that defines your model's output specifications.
   When the upload is complete, the status changes to Uploaded and a confirmation message is displayed.


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> **Note**
>
> For Input Specifications and Output Specifications, the automated onboarding works only when the uploaded Excel file follows one of the supported template formats. Uploading a generic Excel file or an Excel file with unsupported column headers may prevent the system from generating recommendations as expected. The following Excel template structures are currently supported for pipeline onboarding automation:
>
> **Table 6-1 Excel template supported for pipeline onboarding automation**
>
> | Template | Supported Column Headers |
> |---|---|
> | Template 1 | Logical Table Name, Physical Table Name, Description |
> | Template 2 | Subject Area, Physical Table Names, Description |
> | Template 3 | Column, Table |
> | Template 4 | Entity Name, Column Name |
> | Template 5 | Entity Name, Column Name1, Column Name2, Column Name3 |
> | Template 6 | Entity Name, Table Name, Table Description, Attribute Name, Column Name, Column Description, Column Domain, Column Is PK, Column Is FK, Null Allowed, Column Datatype, LLFP |
>
> Use only these supported Excel templates for Input Specifications and Output Specifications uploads. The column names in the file must match the accepted template structure so that onboarding automation can read the file and generate table, column, and mapping recommendations.

7. Click **Continue**.
   The **Source Data Selection** page opens.
8. In the **Source Data Selection** page, the **Show Recommendations** toggle is ON by default when an input Excel file is present. Recommended tables are auto-selected with a "Recommended" chip. Do the following:
   a. Review the pre-selected tables. Deselect any tables you do not want to include, or select additional tables as required.
   b. Click **Continue**.
      An Information dialog is displayed with the message: "**The assets selected in this step will be considered for generating auto-suggestions for asset-to-column level mappings in the subsequent steps: Date Management and Input Variable Mapping**."
   c. Click **OK** to proceed.
9. In the **Date Management** page, the **Show Recommendations** toggle is ON by default. The **Assets Mapped Status** column displays the mapping status and the number of new suggestions for each logical reference. Do the following:
   a. To map assets, click the **Actions** menu for a logical reference and select **Map Assets**.


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> **Note**
>
> The preseeded **Logical Reference Mapping**called Reporting Date will be available by default for FIC MIS Date column.

The **Logical Reference Mapping** panel opens, displaying recommended source table and column combinations with a “Recommended” chip. The recommended entries are pre-selected.

b. Review the pre-selected recommendations. Deselect any entries you do not want, or add additional entries manually using the Source Table and Column Name drop-down lists.

c. Click **Save**.

d. Repeat for each logical reference as required.

e. Click **Continue**.

> **Note**
>
> - The Reporting Date is always present by default in the summary, as it is mandatory.
> - If the source tables contain a `FIC_MIS_DATE` column, the mapping for Reporting Date is pre-suggested automatically.
> - For any other date-related logical references, you must manually select the table and column.
> - To delete the logical reference, you must click **Unmap Logical Reference** > **Yes**.
> - After you create a logical reference, the newly created logical reference is automatically selected in the Add Logical Reference screen.

10. In the **Input Variable Mapping** page, the **Show Recommendations** toggle is ON by default. The Assets Mapped column displays the mapping status and the number of new suggestions for each logical reference. Do the following:

    a. To map assets, click the **Actions** menu for a logical reference and select **Map Assets**. The **Logical Reference Mapping** panel opens, displaying recommended source table and column combinations with a “Recommended” chip. The recommended entries are pre-selected.

    b. Review the pre-selected recommendations. Deselect any entries you do not want, or add additional entries manually using the Source Table and Column Name drop-down lists.

    c. Click **Save**.

    d. Repeat for each logical reference as required.

    e. Click **Continue**.

11. In the **Output Table Selection** page, the **Show Recommendations** toggle is ON by default and recommended output tables are displayed with a “Recommended” chip. Do the following:

    a. Review the recommended output tables. Select or deselect as required.


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b. Click **Continue**.
An Information dialog is displayed with the message: "**The assets selected in this step will be considered for generating auto-suggestions for asset-to-column level mappings in the Output Metric Mapping step**."

c. Click **OK** to proceed.

12. In the **Output Metric Mapping page**, do the following:

a. To map assets, click the **Actions** menu for a logical reference and select **Map Assets**. The **Logical Reference Mapping** panel opens, displaying recommended source table and column combinations with a “Recommended” chip. The recommended entries are pre-selected.

b. Review the recommended entries and select or deselect as required.

c. Click **Save**.

d. Repeat for each logical reference as required.

e. Click **Continue**.

13. In the **Portfolio Mapping** page that opens, do the following.

- To create a new Portfolio:

a. Click **Create New**

b. In the confirmation dialog that appears, select **Yes**.

c. Provide a portfolio name and description in the **Basic Details** section and click **Next**.

d. Select the required hierarchies from the dimensions in the **Select Dimensions** section and click **Next**.

e. Select the heirearchy nodes for the dimensions that you selected in the previous step and click **Next**.

f. Review the entries and click **Save**.

- To use an existing Portfolio:

a. Select the required portfolio.

b. Click **Continue**.

14. In the **Review & Submit** page that opens, verify all defined configurations and finalize the model onboarding process. Do the following:

a. Review the **Alert** section to identify any configuration issues.

b. If Critical alerts are displayed, click the corresponding **Actions** icon.

c. Complete the required mappings on the relevant configuration pages.

d. Return to the **Review & Submit** page and verify that all alerts are resolved.

15. Do either of the following:

- Click **Save** or **Save and Close** to save and continue later.
- Click **Submit** to complete the onboarding process..


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> **Note**
>
> - When you click **Onboard** on the Process Summary screen, the process is published to Data Catalog (DC).
> - For models, publishing happens separately from the Model Definition screen when you click **Publish Model**.

### Onboarding a Model Using Manual Onboarding

Manual onboarding allows you to configure each step individually by selecting tables and columns without uploading specification files. You can skip the Model Specifications Set Up step or upload files for only one of the two specification types.

To onboard a model using manual onboarding:

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. Click **Building Blocks** and under the **Models** tile, click **View**.

   The **Models Summary** page is displayed.
4. To onboard a model, click **Actions** and then click **Onboard** against the model.

   The **Model Specifications Set Up** page opens.

> **Note**
>
> If mappings already exist in the Data Catalog (DC), they are automatically shown when you onboard for the first time.

5. Click **Continue** without uploading any files to skip the automated specification setup and proceed with manual configuration.
6. In the **Source Data Selection** page that opens, select the input data tables or files the model requires to execute its calculations and click **Continue**.
7. In the **Date Management** page, do either of the following:
   - To create a new logical reference, do either of the following:
     - Click **Add New** and do the following:
       a. In the page that opens, select the logical references to add.
       b. Click **Select**.
     - Click **Create New** and in the **Create Date Logical Reference** page that opens, do the following:
       a. In the **Name** field, enter a name.
       b. In the **Display Name** field, enter a display name.
       c. In the **Description** field, enter a description.


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> **Note**
>
> * The Reporting Date is always present by default in the summary, as it is mandatory.
> * If the source tables contain a `FIC_MIS_DATE` column, the mapping for Reporting Date is pre-suggested automatically.
> * For any other date-related logical references, you must manually select the table and column.
> * To delete the logical reference, you must click **Unmap Logical Reference** > **Yes**.
> * After you create a logical reference, the newly created logical reference is automatically selected in the Add Logical Reference screen.

- To map the assests:
  a. In the **Actions** column, select **Map Assests**.
  b. In the **Coulmn Name** field, select the desired value from the drop-down list.
  c. In the **Date Format** field, select the desired date format from the drop-down list.
  d. Click **Continue**.

8. If you click **Continue**, the **Input Variable Mapping** page opens..
   - To create a new Input Variable Mapping:
     a. Click **Add New**
     b. In the **Add Logical Reference For Input** page that opens, do either of the following:
        – Select logical references to add and click **Select**.
        – Click **Create New** and do the following:
          i. In the **Create Input Logical Reference** page that opens, add a name display name, and description in the respective fields.
          ii. Click **Save**.

     > **Note**
     >
     > After you create a logical reference, the newly created logical reference is automatically selected in the Add Logical Reference screen.

     c. Click **Continue**.
   - To map the assets:
     a. In the **Actions** column, select **Map Assets**.
     b. In the **Asset** field, select the desired table name from the drop-down list
     c. In the **Column Name** field, select the desired column name from the drop-down list.
     d. Click **Add** to add the entry.


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e. Click **Save**.

> **Note**
>
> To unmap the logical reference, you must click **Unmap Logical Reference** > **Yes**.

9. In the **Output Table Selection** page, select the target output table for the pipeline results and click **Continue**.
10. In the **Output Metric Mapping** page that opens, do the following.
    - To create a new Output Metric Mapping:
      a. Click **Add New**
      b. In the **Add Logical Reference** page that opens, do either of the following:
         – Select logical references to add and click **Select**.
         – Click **Create New** and do the following:
           i. In the **Add Glossary** page that opens, add a name, display name, and description in the respective fields.
           ii. Click **Save**.

> **Note**
>
> After you create a logical reference, the newly created logical reference is automatically selected in the Add Logical Reference screen.

      c. Click **Continue**.
    - To map the assets:
      a. In the **Actions** column, select **Map Assets**.
      b. In the **Asset Name** field, select the desired table name from the drop-down list.
      c. In the **Column Name** field, select the desired column name from the drop-down list.
      d. Click **Add** to add the entry.
      e. Click **Save**.

> **Note**
>
> To unmap the logical reference, you must click **Unmap Logical Reference** > **Yes**.

11. In the **Portfolio Mapping** page that opens, do the following.
    - To create a new Portfolio:
      a. Click **Create New**
      b. In the confirmation dialog that appears, select **Yes**.
      c. Provide a portfolio name and description in the **Basic Details** section and click **Next**.


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d. Select the required hierarchies from the dimensions in the **Select Dimensions** section and click **Next**.

e. Select the heirearchy nodes for the dimensions that you selected in the previous step and click **Next**.

f. Review the entries and click **Save**.

> **Note**
>
> The portfolios created during Pipeline Onboarding are automatically saved and displayed in the **Portfolio Summary** screen.

- To use an existing Portfolio:

  a. Select the required portfolio.

  b. Click **Continue**.

12. In the **Review & Submit** page that opens, verify all defined configurations and finalize the model onboarding process. Do the following:

    a. Review the **Alert** section to identify any configuration issues.

    b. If Critical alerts are displayed, click the corresponding **Actions** icon.

    c. Complete the required mappings on the relevant configuration pages.

    d. Return to the **Review & Submit** page and verify that all alerts are resolved.

13. Do either of the following:

    - Click **Save** or **Save and Close** to save and continue later.
    - Click **Submit** to complete the onboarding process.

## 5.2.4.1 Editing Model Onboarding

Edit Onboarding allows you to modify a previously submitted configuration for a model. If the original onboarding used the automated mode, your uploaded specification files and generated recommendations are retained. You can choose to refresh these by uploading new files or proceed with the existing data.

To edit model onboarding:

> **Note**
>
> - You can only select Edit Onboarding if the model is in the **Approved** state.
> - In **Edit** mode, the Show Recommendations toggle defaults to OFF on every previously completed step. Turning it ON displays recommendations, but they are NOT auto-selected; your previously saved selections remain unchanged unless you manually update them.

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. Click **Building Blocks** and under the **Models** tile, click **View**.

   The **Models Summary** page is displayed.


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4. To onboard a model, click **Actions** and then click **Edit Onboarding** against the model.

   The Model Specifications Set Up page opens.

   > **Note**
   >
   > If mappings already exist in the Data Catalog (DC), they are automatically shown when you onboard for the first time.

5. Do either of the following:
   - **For Automated Onboarding**: Previously uploaded files show an "Uploaded" status. To update, click Clear next to the file and upload the new version. To keep existing data, click **Continue**.
   - **For Manual Onboarding**: If no files were previously used, you may upload them now to enable recommendations or click **Continue** to remain in manual mode.
6. In the **Source Data Selection** page, do the following:
   - **To view recommendations:** Turn the Show Recommendations toggle ON. Previously saved selections are retained, and recommended assets are displayed with a "Recommended" chip.
   - **To update assets:** Select or deselect assets as required and click **Continue**.
   - **Confirm selection:** If assets are selected, click **OK** on the Information dialog to allow the system to generate auto-suggestions for subsequent mapping steps.
7. In the **Date Management** and **Input Variable Mapping** pages, do the following:
   - **To view recommendations:** Turn the Show Recommendations toggle ON for the specific logical reference.
   - **To update mappings:** Click the **Actions** menu and select **Map Assets**.
   - **To manage entries:** Select or deselect entries as required. To remove mappings, deselect the relevant entries and click **Save**. Removal is processed automatically in the background.
8. In the **Output Metric Mapping** page, do the following:
   - **To update mappings:** Click the **Actions** menu and select **Map Assets** for the relevant logical reference.
   - **To manage entries:** Select or deselect entries as required. For bulk removal, select multiple entries using the check boxes and click **Delete**.
   - **Save changes:** Click **Save** after updating each reference, then click Continue.

   > **Note**
   >
   > When you click **Map Assets**, the Configure mapping for the selected input table/column page is displayed. Select or deselect mapping entries as required, then click **Save**. Deselected entries are removed automatically in the background.

9. In the Portfolio Mapping page, do either of the following:
   - Select the required portfolios.
   - Select **Bank-Wide** if the model must be applicable across all portfolios.

   If you select the **Bank-Wide** check box:


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- Individual portfolio selection is not required.
- The portfolio mapping step is automatically considered complete.
- The model scope is treated as Bank-Wide.

10. In the **Review & Submit** page that opens, verify all defined configurations and finalize the model onboarding process. Do the following:
    a. Review the **Alert** section to identify any configuration issues.
    b. If Critical alerts are displayed, click the corresponding **Actions** icon.
    c. Complete the required mappings on the relevant configuration pages.
    d. Return to the **Review & Submit** page and verify that all alerts are resolved.

    If Bank-Wide was selected in the Portfolio Mapping page, the Review and Submit summary displays the following:

    - Model Scope Type: Bank-Wide
    - Number of Associated Portfolios: N/A
11. Do either of the following:
    - Click **Save** or **Save and Close** to save and continue later.
    - Click **Submit** to complete the onboarding process.

## 5.2.4.2 Viewing Model Onboarding

To view model onboarding:

The View Onboarding feature allows you to inspect the configurations of an onboarded process in read-only mode. This is useful for auditing mappings, checking specification files, or verifying portfolio scope without making changes.

> **Note**
>
> - You can select View Onboarding only if the model is in the **Approved** state.
> - All toggles, check boxes, and drop-down lists are disabled. You cannot modify any data in this mode.

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. Click **Building Blocks** and under the **Models** tile, click **View**.

   The **Models Summary** page is displayed.
4. To onboard a model, click **Actions** and then click **View Onboarding** against the model.

   The **Model Specifications Set Up** page opens in read-only mode.
5. In the **Model Specifications Set Up** page, review the onboarding mode:
   - **For Automated Onboarding:** The Input Specifications and Output Specifications sections display the uploaded filenames, "**Uploaded**" status, and the last-updated date.
   - **For Manual Onboarding:** If no specification files were used during the initial onboarding, both sections display a "**Not Uploaded**" status.


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6. In the **Source Data Selection** page, review the following:
   a. Review the list of selected assets.
   b. Review the list of selected assets. In View Mode, no Recommended chips or Show Recommendations toggle are displayed.
   c. Click **Continue** to move to the next page.
7. In the **Date Management** and **Input Variable Mapping** pages, review the following:
   a. Review the logical references and their mapped source tables and columns.
   b. Review the mapped source tables and columns. No Recommended chips are displayed in View Mode.
   c. To see specific mapping entries, click the **Actions** menu and select **Map Assets** (this opens the panel in read-only mode).
   d. Click **Continue**.
8. In the Output Table Selection page, review the selected output tables. No changes can be made in View Mode. Click **Continue** to proceed.
9. In the **Portfolio Mapping** and **Review & Submit** pages, review the following:
   a. View the selected portfolios or confirm if the model is set to **Bank-Wide**.

      > **Note**
      >
      > If Bank-Wide is selected, the summary displays Model Scope Type: **Bank-Wide** and Number of Associated Portfolios: **N/A**.

   b. In the **Review & Submit** page, review the overall configuration summary and the status of any alerts.
10. Click **Cancel**.
11. In the **Leave Pipeline Onboarding?** dialog box that appears, with the description "**Do you want to return to the summary page**?", click **Yes** to return to the summary screen.


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# 5.3 Process

Process flow is a structured sequence of tasks, data pipelines, models and applications organised to ensure smooth, error-free, and efficient scenario analysis orchestration.

## 5.3.1 Onboarding Process Pipeline

The process onboarding process depends on the data ingestion and mapping activities performed in the workspace. Process available for onboarding are driven by the source pipelines and processes configured during workspace preparation.

Pipeline onboarding supports two modes:

- Automated Onboarding – Upload Excel specification files at the start of onboarding. The system uses these files to pre-select and auto-recommend asset-to-column mappings across the relevant onboarding steps, reducing manual effort.
- Manual Onboarding – Configure each step individually by selecting tables and columns without uploading specification files.


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> **Note**
>
> - For composite pipelines, onboarding is disabled.
> - Pipeline onboarding is supported only for RRF Process and RRF Run Process types.
> - If mappings already exist in the Data Catalog (DC), they are automatically shown when you onboard for the first time.

### Onboarding a Process Pipeline Using Automated Onboarding

Automated onboarding uses uploaded Excel specification files to generate recommendations across the onboarding steps. The guided process includes an additional first step, Model Specifications Set Up, where you upload the files before proceeding.

The **Model Specifications Set Up** screen contains two upload sections:

- Input Specifications – Upload an Excel file (.xlsx or .xls) that automates the configuration of Step 2 (Source Data Selection), Step 3 (Date Management), and Step 4 (Input Variable Mapping). The status indicator changes to “Uploaded” once the file is successfully uploaded, and a confirmation message is displayed below the upload area. •
- Output Specifications – Upload an Excel file (.xlsx or .xls) that automates the configuration of Step 5 (Output Table Selection) and Step 6 (Output Metric Mapping). The status indicator changes to “Uploaded” once the file is successfully uploaded.

> **Note**
>
> Uploading specification files is optional. If you do not upload files, you can still proceed and complete onboarding manually.

After uploading specification files, a Show Recommendations toggle appears at the top right of the Source Data Selection, Date Management, Input Variable Mapping, and Output Table Selection pages. The toggle controls whether automated recommendations are displayed.

- First visit (first-time onboarding): The toggle is ON by default. Recommended items are displayed with a “Recommended” chip and are auto-selected.
- Subsequent visits (returning to a step in the same session): The toggle remains ON, and recommendations continue to display.
- Returning after closing the guided process: The toggle is OFF by default. You can turn it on manually to view recommendations, but previously saved selections are retained. Recommendations are shown but not auto-selected.

To onboard a process pipeline using automated onboarding:

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. Click **Building Blocks** and under the **Process** tile, click **View**.
   The **Process** Summary page is displayed.
4. To onboard a process pipeline, click **Actions** and then click **Onboard** against the model.
   The **Model Specifications Set Up** page opens.


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> **Note**
>
> - For composite pipelines, onboarding is disabled.
> - If mappings already exist in the Data Catalog (DC), they are automatically shown when you onboard for the first time.

5. In the **Input Specifications** section, drag and drop or click to browse and upload the Excel file (.xlsx or .xls) that defines your model's input specifications.
When the upload is complete, the status changes to Uploaded and a confirmation message is displayed.
6. In the **Output Specifications** section, drag and drop or click to browse and upload the Excel file (.xlsx or .xls) that defines your model's output specifications.
When the upload is complete, the status changes to Uploaded and a confirmation message is displayed.

> **Note**
>
> For Input Specifications and Output Specifications, the automated onboarding works only when the uploaded Excel file follows one of the supported template formats. Uploading a generic Excel file or an Excel file with unsupported column headers may prevent the system from generating recommendations as expected. The following Excel template structures are currently supported for pipeline onboarding automation:
>
> **Table 6-2 Excel template supported for pipeline onboarding automation**
>
> | Template | Supported Column Headers |
> |---|---|
> | Template 1 | Logical Table Name, Physical Table Name, Description |
> | Template 2 | Subject Area, Physical Table Names, Description |
> | Template 3 | Column, Table |
> | Template 4 | Entity Name, Column Name |
> | Template 5 | Entity Name, Column Name1, Column Name2, Column Name3 |
> | Template 6 | Entity Name, Table Name, Table Description, Attribute Name, Column Name, Column Description, Column Domain, Column Is PK, Column Is FK, Null Allowed, Column Datatype, LLFP |
>
> Use only these supported Excel templates for Input Specifications and Output Specifications uploads. The column names in the file must match the accepted template structure so that onboarding automation can read the file and generate table, column, and mapping recommendations.

7. Click **Continue**.
The **Source Data Selection** page opens.
8. In the **Source Data Selection** page, the **Show Recommendations** toggle is ON by default when an input Excel file is present. Recommended tables are auto-selected with a "Recommended" chip. Do the following:


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a. Review the pre-selected tables. Deselect any tables you do not want to include, or select additional tables as required.

b. Click **Continue**.
An Information dialog is displayed with the message: "**The assets selected in this step will be considered for generating auto-suggestions for asset-to-column level mappings in the subsequent steps: Date Management and Input Variable Mapping**."

c. Click **OK** to proceed.

9. In the **Date Management** page, the **Show Recommendations** toggle is ON by default. The **Assets Mapped Status** column displays the mapping status and the number of new suggestions for each logical reference. Do the following:

a. To map assets, click the **Actions** menu for a logical reference and select **Map Assets**. The **Logical Reference Mapping** panel opens, displaying recommended source table and column combinations with a “Recommended” chip. The recommended entries are pre-selected.

b. Review the pre-selected recommendations. Deselect any entries you do not want, or add additional entries manually using the Source Table and Column Name drop-down lists.

c. Click **Save**.

d. Repeat for each logical reference as required.

e. Click **Continue**.

> **Note**
>
> - The Reporting Date is always present by default in the summary, as it is mandatory.
> - If the source tables contain a `FIC_MIS_DATE` column, the mapping for Reporting Date is pre-suggested automatically.
> - For any other date-related logical references, you must manually select the table and column.
> - To delete the logical reference, you must click **Unmap Logical Reference** > **Yes**.
> - After you create a logical reference, the newly created logical reference is automatically selected in the Add Logical Reference screen.

10. In the **Input Variable Mapping** page, the Show Recommendations toggle is ON by default. The Assets Mapped column displays the mapping status and the number of new suggestions for each logical reference. Do the following:

a. To map assets, click the **Actions** menu for a logical reference and select **Map Assets**. The **Logical Reference Mapping** panel opens, displaying recommended source table and column combinations with a “Recommended” chip. The recommended entries are pre-selected.

b. Review the pre-selected recommendations. Deselect any entries you do not want, or add additional entries manually using the Source Table and Column Name drop-down lists.

c. Click **Save**.

d. Repeat for each logical reference as required.


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e. Click **Continue**.

11. In the **Output Table Selection** page, the Show Recommendations toggle is ON by default and recommended output tables are displayed with a “Recommended” chip. Do the following:
    a. Review the recommended output tables. Select or deselect as required.
    b. Click **Continue**.
    An Information dialog is displayed with the message: “**The assets selected in this step will be considered for generating auto-suggestions for asset-to-column level mappings in the Output Metric Mapping step**.”
    c. Click **OK** to proceed.
12. In the **Output Metric Mapping page**, do the following:
    a. To map assets, click the **Actions** menu for a logical reference and select **Map Assets**. The **Logical Reference Mapping** panel opens, displaying recommended source table and column combinations with a “Recommended” chip. The recommended entries are pre-selected.
    b. Review the recommended entries and select or deselect as required.
    c. Click **Save**.
    d. Repeat for each logical reference as required.
    e. Click **Continue**.
13. In the **Portfolio Mapping** page that opens, do the following.
    - To create a new Portfolio:
        a. Click **Create New**
        b. In the confirmation dialog that appears, select **Yes**.
        c. Provide a portfolio name and description in the **Basic Details** section and click **Next**.
        d. Select the required hierarchies from the dimensions in the **Select Dimensions** section and click **Next**.
        e. Select the heirearchy nodes for the dimensions that you selected in the previous step and click **Next**.
        f. Review the entries and click **Save**.
    - To use an existing Portfolio:
        a. Select the required portfolio.
        b. Click **Continue**.
14. In the **Review & Submit** page that opens, verify all defined configurations and finalize the model onboarding process. Do the following:
    a. Review the **Alert** section to identify any configuration issues.
    b. If Critical alerts are displayed, click the corresponding **Actions** icon.
    c. Complete the required mappings on the relevant configuration pages.
    d. Return to the **Review & Submit** page and verify that all alerts are resolved.
15. Do either of the following:
    - Click **Save** or **Save and Close** to save and continue later.
    - Click **Submit** to complete the onboarding process..


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> **Note**
>
> When you click **Submit**, the process is published to Data Catalog (DC). For models, publishing happens separately from the Model Definition screen when you click Publish Model.

### Onboarding a Process Pipeline Using Manual Onboarding

Manual onboarding allows you to configure each step individually by selecting tables and columns without uploading specification files. You can skip the Model Specifications Set Up step or upload files for only one of the two specification types.

To onboard a process pipeline using manual onboarding:

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. Click **Building Blocks** and under the **Process** tile, click **View**.

   The **Process Summary** page is displayed.
4. To onboard a process pipeline, click **Actions** and then click **Onboard** against the model.

> **Note**
>
> - For composite pipelines, onboarding is disabled.
> - If mappings already exist in the Data Catalog (DC), they are automatically shown when you onboard for the first time.

5. In the **Source Data Selection** page that opens, select the input data tables or files the model requires to execute its calculations and click **Continue**.
6. In the **Date Management** page, do either of the following:
   - To create a new logical reference, do either of the following:
     - Click **Add New** and do the following:
       a. In the page that opens, select the logical references to add.
       b. Click **Select**.
     - Click **Create New** and in the **Create Date Logical Reference** page that opens, do the following:
       a. In the **Name** field, enter a name.
       b. In the **Display Name** field, enter a display name.
       c. In the **Description** field, enter a description.


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> **Note**
>
> * The Reporting Date is always present by default in the summary, as it is mandatory.
> * If the source tables contain a `FIC_MIS_DATE` column, the mapping for Reporting Date is pre-suggested automatically.
> * For any other date-related logical references, you must manually select the table and column.
> * To delete the logical reference, you must click **Unmap Logical Reference** > **Yes**.
> * After you create a logical reference, the newly created logical reference is automatically selected in the Add Logical Reference screen.

- To map the assests:
  a. In the **Actions** column, select **Map Assests**.
  b. In the **Column Name** field, select the desired value from the drop-down list.
  c. In the **Date Format** field, select the desired date format from the drop-down list.
  d. Do either of the following:
     – To save the configuration and work on it later, click **Save** or **Save and Close**.
     – Click **Continue**.

7. If you click **Continue**, the **Input Variable Mapping** page opens..
   - To create a new Input Variable Mapping:
     a. Click **Add New**
     b. In the **Add Logical Reference For Input** page that opens, do either of the following:
        – Select logical references to add and click **Select**.
        – Click **Create New** and do the following:
          i. In the **Create Input Logical Reference** page that opens, add a name display name, and description in the respective fields.
          ii. Click **Save**.

> **Note**
>
> After you create a logical reference, the newly created logical reference is automatically selected in the **Add Logical Reference** screen.

     c. Do either of the following:
        – To save the configuration and work on it later, click **Save** or **Save and Close**.
        – Click **Continue**.
   - To map the assests:
     a. In the **Actions** column, select **Map Assets**.


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b. In the **Asset** field, select the desired table name from the drop-down list.

c. In the **Column Name** field, select the desired column name from the drop-down list.

d. Click **Add** to add the entry.

e. Click **Save**.

> **Note**
>
> To delete the logical reference, you must click **Unmap Logical Reference** > **Yes**.

8. In the **Output Table Selection** page, select the target output table for the pipeline results and click **Continue**.
9. In the **Output Metric Mapping** page that opens, do the following.
   - To create a new Output Metric Mapping:
     a. Click **Add New**
     b. In the **Add Logical Reference** page that opens, do either of the following:
        – Select logical references to add and click **Select**.
        – Click **Create New** and do the following:
          i. In the **Add Glossary** page that opens, add a name, display name, and description in the respective fields.
          ii. Click **Save**.

> **Note**
>
> After you create a logical reference, the newly created logical reference is automatically selected in the Add Logical Reference screen.

     c. Do either of the following:
        – To save the configuration and work on it later, click **Save** or **Save and Close**.
        – Click **Continue**.
   - To map the assests:
     a. In the **Actions** column, select **Map Assests**.
     b. In the **Asset Name** field, select the desired table name from the drop-down list.
     c. In the **Column Name** field, select the desired column name from the drop-down list.
     d. Click **Add** to add the entry.
     e. Click **Save**.

> **Note**
>
> To delete the logical reference, you must click **Unmap Logical Reference** > **Yes**.

10. In the **Portfolio Mapping** page that opens, do the following.


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- To create a new Portfolio:
  a. Click **Create New**
  b. In the confirmation dialog that appears, select **Yes**.
  c. Provide a portfolio name and description in the **Basic Details** section and click **Next**.
  d. Select the required hierarchies from the dimensions in the **Select Dimensions** section and click **Next**.
  e. Select the heirearchy nodes for the dimensions that you selected in the previous step and click **Next**.
  f. Review the entries and click **Save**.
- To use an existing Portfolio:
  a. Select the required portfolio.
  b. Click **Continue**.

11. In the **Review & Submit** page that opens, verify all defined configurations and finalize the model onboarding process. Do the following:
    a. Review the **Alert** section to identify any configuration issues.
    b. If Critical alerts are displayed, click the corresponding **Actions** icon.
    c. Complete the required mappings on the relevant configuration pages.
    d. Return to the **Review & Submit** page and verify that all alerts are resolved.
12. Do either of the following:
    - Click **Save** or **Save and Close** to save and continue later.
    - Click **Submit** to complete the onboarding process..

> **Note**
>
> When you click **Submit**, the process is published to Data Catalog (DC). For models, publishing happens separately from the **Model Definition** screen when you click **Publish Model**.

## 5.3.1.1 Editing Process Onboarding

To edit process onboarding:

> **Note**
>
> - You can select Edit Onboarding only if the process is in the **Approved** state.
> - Pipeline onboarding is supported only for the following process types:
>   – RRF Process
>   – RRF Run Process
> - Pipeline onboarding is not applicable for Composite processes.


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Edit Onboarding allows you to modify a previously submitted onboarding configuration. If the original onboarding was completed using automated onboarding (with uploaded specification files), those files and the recommendations they generated are retained when you re-enter the flow. You can upload a new or updated specification file to refresh recommendations, or continue without re-uploading.

When you return to any previously completed step, the behaviour of the Show Recommendations toggle differs from first-time onboarding:

- The toggle defaults to OFF on every previously completed step (Source Data Selection, Date Management, Input Variable Mapping, and Output Table Selection).
- Turning the toggle ON displays the recommendations list, but recommended items are NOT auto-selected. Previously saved selections remain as-is.
- You must manually select any recommendations you want to apply before saving.

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. Click **Building Blocks** and under the **Process** tile, click **View**.

   The **Process Summary** page is displayed.
4. To onboard a model, click **Actions** and then click **Edit Onboarding** against the model.

   The **Model Specifications Set Up** page opens.
5. Do either of the following:
   - **For Automated Onboarding**: Previously uploaded files show an "Uploaded" status. To update, click Clear next to the file and upload the new version. To keep existing data, click **Continue**.
   - **For Manual Onboarding**: If no files were previously used, you may upload them now to enable recommendations or click **Continue** to remain in manual mode.
6. In the **Source Data Selection** page, do the following:
   - **To view recommendations:** Turn the Show Recommendations toggle ON. Previously saved selections are retained, and recommended assets are displayed with a "Recommended" chip.
   - **To update assets:** Select or deselect assets as required and click **Continue**.
   - **Confirm selection:** If assets are selected, click **OK** on the Information dialog to allow the system to generate auto-suggestions for subsequent mapping steps.
7. In the **Date Management** and **Input Variable Mapping** pages, do the following:
   - **To view recommendations:** Turn the Show Recommendations toggle ON for the specific logical reference.
   - **To update mappings:** Click the **Actions** menu and select **Map Assets**.
   - **To manage entries:** Select or deselect entries as required. To remove a mapping, deselect the entry and click Save. Removal is processed automatically in the background.
   - **Save changes:** Click Save and then click Continue once all updates are finalized.
8. In the **Output Table Selection** page, do the following:
   - **To view recommendations:** Turn the Show Recommendations toggle ON to see suggested output tables.
   - **To update selection:** Select or deselect output tables as required and click **Continue**.


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- **Confirm selection:** Click **OK** on the Information dialog to enable auto-suggestions for the Output Metric Mapping step.

9. In the **Output Metric Mapping** page, do the following:
   - **To update mappings:** Click the **Actions** menu and select **Map Assets** for the relevant logical reference.
   - **To manage entries:** Select or deselect entries as required. To remove mappings, deselect the relevant entries and click Save. Removal is processed automatically in the background.
   - **Save changes:** Click **Save** after updating each reference, then click Continue.

   > **Note**
   >
   > When you click **Map Assets**, the Configure mapping for the selected input table/column page is displayed. Select or deselect mapping entries as required, then click Save. Deselected entries are removed automatically in the background.

10. In the **Portfolio Mapping** page, do either of the following:
    - Select the required portfolios.
    - Select **Bank-Wide** if the model must be applicable across all portfolios.

    If you select the **Bank-Wide** check box:
    - Individual portfolio selection is not required.
    - The portfolio mapping step is automatically considered complete.
11. In the **Review & Submit** page that opens, verify all defined configurations and finalize the model onboarding process. Do the following:
    a. Review the **Alert** section to identify any configuration issues.
    b. If Critical alerts are displayed, click the corresponding **Actions** icon.
    c. Complete the required mappings on the relevant configuration pages.
    d. Return to the **Review & Submit** page and verify that all alerts are resolved.

    If Bank-Wide was selected in the Portfolio Mapping page, the Review and Submit summary displays the following:
    - Model Scope Type: Bank-Wide
    - Number of Associated Portfolios: N/A
12. Do either of the following:
    - Click **Save** or **Save and Close** to save and continue later.
    - Click **Submit** to complete the onboarding process.

## 5.3.1.2 Viewing Process Onboarding

To view process onboarding:

The View Onboarding feature allows you to inspect the configurations of an onboarded process in read-only mode. This is useful for auditing mappings, checking specification files, or verifying portfolio scope without making changes.


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> **Note**
>
> - You can select View Onboarding only if the model is in the **Approved** state.
> - All toggles, check boxes, and drop-down lists are disabled. You cannot modify any data in this mode.

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. Click **Building Blocks** and under the **Process** tile, click **View**.

   The **Process Summary** page is displayed.
4. To onboard a model, click **Actions** and then click **View Onboarding** against the model.

   The **Model Specifications Set Up** page opens in read-only mode.
5. In the **Model Specifications Set Up** page, review the onboarding mode:
   - **For Automated Onboarding:** The Input Specifications and Output Specifications sections display the uploaded filenames, "**Uploaded**" status, and the last-updated date.
   - **For Manual Onboarding:** If no specification files were used during the initial onboarding, both sections display a "**Not Uploaded**" status.
6. In the **Source Data Selection** page, review the following:
   a. Review the list of selected assets.
   b. Review the list of selected assets. In View Mode, no Recommended chips or Show Recommendations toggle are displayed.
   c. Click **Continue** to move to the next page.
7. In the **Date Management** and **Input Variable Mapping** pages, review the following:
   a. Review the logical references and their mapped source tables and columns.
   b. Review the mapped source tables and columns. No Recommended chips are displayed in View Mode.
   c. To see specific mapping entries, click the **Actions** menu and select **Map Assets** (this opens the panel in read-only mode).
   d. Click **Continue**.
8. In the **Output Table Selection** page, review the selected output tables. No changes can be made in View Mode. Click **Continue** to proceed.
9. In the **Portfolio Mapping** and **Review & Submit** pages, review the following:
   a. View the selected portfolios or confirm if the model is set to **Bank-Wide**.

      > **Note**
      >
      > If Bank-Wide is selected, the summary displays Model Scope Type: **Bank-Wide** and Number of Associated Portfolios: **N/A**.

   b. In the **Review & Submit** page, review the overall configuration summary and the status of any alerts.


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10. Click **Cancel**.
11. In the **Leave Pipeline Onboarding?** dialog box that appears, with the description "**Do you want to return to the summary page**?", click **Yes** to return to the summary screen.

# 5.4 Variables

A variable is a user-defined term that links the logical definition in the Data Catalog (DC) to physical definitions in the database referenced by applications. In stress testing, variables act as data inputs that you can modify in a scenario to assess the impact on one or more metrics.

Use the following terms to distinguish the choices in **Variable Profile**.

| Term | Meaning |
|---|---|
| Variable Type | Numeric or Categorical; determines the available subtypes. |
| Variable SubType | The configuration category, such as Matrix, PD Term Structure, Nominal, or Ordinal. |
| Value Type | The representation of a Numeric value: Count, Percentage, Ratio, Value, or Date, where the subtype offers it. Direct Ingestion and Categorical subtypes do not use this selector. |
| Variable Group | A default or custom business grouping used to organize variables. It does not replace the type or subtype. |

There are different types of variables supported by STSA based on the type of values you want to change. The various types of variables are:

- Categorical Variables - represent categories. Select **Nominal** for an unordered values list, **Ordinal** for an ordered values list, or **Direct Ingestion** for categorical attributes from registered source tables.
  - Ordinal Variables- An ordinal variable is a type of categorical variable that can save ordered or ranked values. Examples are rating, asset classification, stage classification and so on.
  - Nominal Variables- A nominal variable is a type of categorical variable that does not have any ordering or ranking among them.
- Numeric Variables-The numeric variables can comprise of general macro-economic variables, micro-economic variables, interest rates, commodity derivatives, other derivatives, idiosyncratic variables and so on. Select the subtype that matches the structure of the value:
  - Term Structure Variables - These variables have a term structure attached to them. They are defined along a term structure with an as of date value for each point in the term structure. Select **PD Term Structure**, **CCF Term Structure**, or **LGD Term Structure** for the corresponding credit measure, or **Interest Rate Curves** for an interest-rate curve. A **Micro/Macro Economic Variable** can also be configured as term-structure based. There is no separate generic Term Structure choice in the subtype list.
  - Matrix Variables - These variables are represented in the form of a matrix to showcase movement across a certain ordinal pre-determined hierarchy. Examples are rating transition matrix, credit score transition matrix and so on. Rating and credit score bands are categorical ordinal values. A transition matrix represents movement of obligors


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across the ratings or credit score bands during two time points as a matrix variable. Select **Numeric** and **Matrix**, choose **Count**, **Percentage**, **Ratio**, or **Value**, and select the **Default Hierarchy** in **Refine Variable Structure**.

- Other Dependent Granular Variables - These numeric variables are stored in a specific data entity at a relatively low level of granularity, such as an account, obligor, or portfolio. Select this subtype for a mapped value such as an account-level outstanding balance when no matrix, currency-pair, or term-structure configuration is needed.
- Exchange Rate Variable - This numeric variable represents the value of one currency in another currency. For example, select **From Currency** as USD and **To Currency** as INR to represent USD in INR. The pair is directional; INR to USD is a different pair. The **Value Type** is **Value**.
- Interest Rate Curve - The interest rate curve, also known as the yield curve, is a graphical representation of the relationship between interest rates (or yields) and the time to maturity of debt instruments, typically government bonds. It provides insights into how investors perceive future interest rates, inflation, and economic growth.
- Direct Ingestion - Select the physical source tables associated with one or more logical references, then ingest all attributes or selected attributes from each table. This subtype is available for both Numeric and Categorical variables.

Computed and indirect values can be supplied through their configured source mappings. The variable configuration process does not provide a general expression or formula editor.

- Micro/Macro Economic Variable - Select this subtype for ordinary economic observations or a frequency-based term structure. Examples include:
  - Macro-Economic Variables - These are variables that signal the general trend of the macro-economy. A few examples of these variables are GDP, unemployment, inflation, industrial production and so on.
  - Micro-Economic Variables - These are variables that are industry specific variables such as occupancy rates, air traffic, toll road traffic and so on.

Variable groups organize variables by business purpose. The various types of variable groups are:

- Macro-Economic Variables - These are variables that signal the general trend of the macro-economy. A few examples of these variables are GDP, unemployment, inflation, industrial production and so on.
- Micro-Economic Variables - These are variables that are industry specific variables such as occupancy rates, air traffic, toll road traffic and so on.
- Idiosyncratic Variables - These are variables that can negatively impact individual securities or a very specific group of assets.

## 5.4.1 Creating Variables

**Administrator prerequisites:**

- Ensure that Pipeline Onboarding is completed before creating a variable.
- Configure the required dimensions and the connections to other OFSAA applications. Register the required Data Catalog business terms, physical tables and columns, hierarchies, and primary-key and foreign-key metadata.

**Before user configuration:** Confirm access to the intended workspace and the required input logical references. For an existing definition, identify its source entity, identifier attribute, and definition ID. For optional dimensions, confirm that the source attributes are available.


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To create a variable:

1. Login to STSA.

The **Workspace Summary** page is displayed.

2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Building Blocks** and then click **View** in the **Variables** section.

The Variables Summary page is displayed.

4. Click **Create New**.

The Create a New Variable page is displayed.

5. In **Variable Profile**, enter a unique variable **Name** and an optional **Description**. Follow the name validation message. A missing description is a review warning; an existing name cannot be reused.
6. Select a default or custom variable group from the **Variable Group** drop-down menu.
7. Select the **Variable Type** and **Variable SubType**.
8. Complete the applicable profile fields: **Value Type**, **Input Logical Reference** (or **Logical References** for Direct Ingestion), **Select Values List** for Nominal or Ordinal, and any existing-definition or term-structure decisions. Configure currencies, hierarchies, and term rows later in **Refine Variable Structure**, where applicable.

> **Note**
>
> For all variable types, complete model or process onboarding, including **Input Variable Mapping**, before selecting a logical reference in **Variable Profile**. The corresponding input logical references are then available in **Input Logical Reference** (or **Logical References** for Direct Ingestion).

9. Click **Continue**. For a new variable, this first forward action saves the profile before moving to the next step.
10. In **Configure Downstream Usages**, map each logical variable value to the required physical source column and add the downstream usages that consume the variable.
11. For Matrix, PD Term Structure, CCF Term Structure, LGD Term Structure, Exchange Rate, Interest Rate Curves, Micro/Macro Economic Variable, and Ordinal variables, complete **Configure Downstream Mappings**. Configure the displayed metadata, table relationships, source filters, and required default values. The Ordinal drawer contains metadata and relationships only; it has no **Default Values** screens.

- Select **Numeric** for the available numeric measures and structures, or **Categorical** for categories. Direct Ingestion is available under both types.

If you select **Numeric** type of variable, you have the following sub-type of variables:

- Interest Rate Curves
- Direct Ingestion
- Matrix
- PD Term Structure
- CCF Term Structure
- LGD Term Structure


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- Exchange Rate
- Other Dependent Granular Variables
- Micro/Macro Economic Variable

For more information to create a variable with the **Interest Rate Curves** subtype, see Interest Rate Curve.

For more information to create a **Direct Ingestion** type variable, see Direct Ingestion Type Variable.

For more information to create a **Matrix** type variable, see Matrix Type Variable.

For more information to create a **PD Term Structure** type of variable, see, PD Term Structure Type Variable.

For more information to create a **CCF Term Structure** type of variable, see, CCF Term Structure Variable Type.

For more information to create a **LGD Term Structure** type of variable, see LGD Term Structure Type Variable.

For more information to create a **Exchange Rate** type of variable, see Exchange Rate Variable Type.

For more information to create a **Other Dependent Granular** type of variable, see Other Dependent Granular Type Variable.

For more information to create a **Micro/Macro Economic** type of variable, see Micro/Macro Economic Type Variable.

If you select **Categorical** type of variable, you have the following sub-type of variables:

- Direct Ingestion
- Nominal
- Ordinal

For more information to create a **Nominal** type of variable, see Nominal Type Variable.

For more information to create a **Ordinal** type of variable, see Ordinal Type Variable.

12. In **Refine Variable Structure**, complete the configuration for Matrix, PD, CCF, LGD, Exchange Rate, Interest Rate Curves, or Direct Ingestion. For a Micro/Macro Economic Variable, this step is enabled only when **Is it based on the Term Structure?** is **Yes**. For Direct Ingestion variables, select the physical source tables, choose whether ingestion occurs at attribute level, and select the applicable attributes.
13. In **Configure Analysis Dimensions (Optional)**, leave the selection empty if no additional dimensions are needed. Otherwise select the required dimensions and complete **Source to Attribute Mapping** for every applicable source table. This step applies to Matrix, PD, CCF, LGD, Micro/Macro Economic Variable, Other Dependent Granular Variables, Nominal, and Ordinal. It does not apply to Direct Ingestion, Exchange Rate, or Interest Rate Curves.
14. In **Review and Validate**, review the variable profile, downstream usages, mappings, variable structure, dimensions, comments, and tags. Wait for validation to finish. Inspect the **Alert** section and use the corresponding **Actions** icon to return to the configuration that needs correction. Return to **Review and Validate** after making changes. Resolve all Critical alerts before submitting.
15. (Optional) To add any comments, click the **Comments** tab and provide your comments and click **Add Comment**.


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16. (Optional) To add this variable to a tag, click **Tags** tab and provide the tag name and click **Add Tag**.
17. Click **Save** to retain the variable and continue later, or **Save and Close** to save and leave the Guided Process. When configuration and validation are complete and the workflow permits it, click **Submit for Review**. Depending on the permitted workflow state, the final action can instead be **Submit for Approval** or **Done**. Required checks that are pending, unavailable, failed, or contain Critical alerts block submission. Use **Retry** where offered after resolving an unavailable check.

> **Note**
>
> For more information about sending objects for review and approval, see the Workflow for STSA Objects section.

> **Note**
>
> When a new variable has the same subtype and metadata as an existing variable, the system can display a similar-definition confirmation. Review the existing definition and click **Yes** only when a separate definition is intended. This confirmation does not allow a duplicate variable name; provide a unique name.


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### Applicable Guided Process steps

Follow the enabled steps in this order: **Variable Profile**, **Configure Downstream Usages**, **Configure Downstream Mappings**, **Refine Variable Structure**, **Configure Analysis Dimensions (Optional)**, and **Review and Validate**. Profile, usages, and review apply to all subtypes. The remaining steps are conditional:

| Type and subtype | Downstream mappings | Refine structure | Analysis dimensions |
|---|---|---|---|
| Numeric / Matrix | Yes | Yes | Optional |
| Numeric / PD Term Structure | Yes | Yes | Optional |
| Numeric / CCF Term Structure | Yes | Yes | Optional |
| Numeric / LGD Term Structure | Yes | Yes | Optional |
| Numeric / Exchange Rate | Yes | Yes | No |
| Numeric / Other Dependent Granular Variables | No | No | Optional |
| Numeric / Micro/Macro Economic Variable | Yes | Term structure Yes only | Optional |
| Numeric / Interest Rate Curves | Yes | Yes | No |
| Numeric / Direct Ingestion | No | Yes | No |
| Categorical / Direct Ingestion | No | Yes | No |
| Categorical / Nominal | No | No | Optional |
| Categorical / Ordinal | Yes | No | Optional |

### Existing definitions and manual configuration

For Matrix, PD, CCF, LGD, and Interest Rate Curves, choose **Link to an existing definition?** in **Variable Profile**. For **Yes**, select **Referenced Entity**, then **Referenced Attribute**, then **Definition ID**. Wait for the dependent lists to load. If **Select Source Record** is displayed because multiple rows match the ID, choose the intended record. The identifier attribute identifies the definition; map the variable value separately.

For **No**, configure the new definition manually. Complete the enabled mandatory metadata and default values. Changing from an existing definition to manual configuration resets dependent imported data after confirmation. Changing the entity, attribute, ID, logical reference, or hierarchy can also invalidate later selections. Recheck affected mappings and structure before review.

### Mappings and Population Method

In **Configure Downstream Usages**, use **Map** for each required logical reference and select the correct physical table and attribute. Use **View Map** to inspect saved mappings. Complete the required terms shown for the selected subtype. Their available names and columns depend on the workspace catalog.

In **Configure Downstream Mappings**, open the configuration drawer for each input table. The drawer is titled **Configure Source Filters - {table}**. Complete **Metadata Glossary Terms** and


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**Relationship Builder** when shown, followed by **Default Values for {table}** for each participating table. The steps vary with the configured tables; they are not a fixed three-screen procedure. Ordinal has no Default Values screens.

Review suggested primary-key/foreign-key relationships or specify the input-table column, support table, and support-table column. Retain every column pair needed for a composite relationship. Supply enabled required values, then click the drawer's **Save**. Drawer saves and mapping actions can persist separately from the main variable save. If a partial-save message appears, reopen the affected tables, inspect their saved state, and correct the remaining mappings.

**Population Method** explains how a column is populated. It is informational, not a switch for changing ownership. Requiredness and editability depend on the column metadata, mapping, import state, and current mode. A disabled blank field is not necessarily missing user input.

| Population Method | How to handle the value |
|---|---|
| Scenario value | Supplied through the variable input mapping; do not enter a fixed default in a disabled cell. |
| Variable field | Maintained in the owning variable configuration step. |
| Runtime context | Supplied by the runtime context; a disabled default may remain blank. |
| Copy baseline | Preserved from the selected imported record and can be read-only. |
| Reference lookup | Select an allowed governed code or foreign-key value. |
| Constant | Enter an appropriate value when the field is enabled. |
| Generated identifier | The configured generation rule owns the identifier; follow the displayed controls and requiredness. |
| Database default | The database supplies the value according to registered metadata. |
| Derived expression | Configured mapping logic supplies the value; this is not a formula editor in the variable form. |

Do not assume that every ID is editable on import or automatically generated for a manual definition. Likewise, do not assume that all other columns are editable. Use the displayed Population Method, required markers, and enabled controls. Text length and numeric precision or scale follow the physical column metadata. Foreign-key controls require a valid referenced value.

### Optional dimension mappings

Where **Configure Analysis Dimensions (Optional)** is enabled, select up to nine additional catalog dimensions and complete their source-attribute mappings. A selected checkbox alone does not complete the mapping. For Matrix and for PD, CCF, or LGD with a default hierarchy, the dimension that owns the primary hierarchy is excluded from the optional choices. The primary values list for Nominal or Ordinal remains separate from additional dimensions. Resolve catalog errors and use **Retry** where offered before proceeding.


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### Saving and correcting configuration

**Continue** and mapping-drawer actions can save configuration during the Guided Process; final review is not the first persistence point. **Save** and **Save and Close** are subject to applicable validation. In view mode, configuration is read-only. After editing dependencies, revisit the affected steps and run **Review and Validate** again. Reopen the saved variable to confirm the intended selections and workflow status.

## 5.4.1.1 Cloning or Creating Variables from Existing Variables

To create a new variable from an existing variable, perform the following:

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. Click **Building Blocks** and then click **View** in the **Variables** section.

The Variables Summary page is displayed.

4. To replicate and modify an existing variable with minor changes, select an existing variable, click **More Actions** and then click **Copy**.
5. Provide a new unique **Name**, update the copied definition, and use **Continue** to complete the enabled steps.

For a copied imported Matrix, PD, CCF, LGD, or Interest Rate Curves variable, **Link to an existing definition?** is reset to **No**. The imported entity, attribute, definition ID, and selected source record are cleared, and the imported downstream table mappings are not retained. Configure the manual definition, or select **Yes** and choose an eligible existing definition again. Review downstream usages, table mappings, relationships, required defaults, hierarchy or currency, term rows, and any analysis dimensions before saving. Recheck inherited settings for other copies as well.

6. In **Review and Validate**, review the changes and resolve required validation issues. Save or submit using the common instructions in Creating Variables.

For more information about sending objects for review and approval, see the Workflow for STSA Objects section.

> **Note**
>
> A similar-definition warning can be confirmed with **Yes** when a separate definition is intended. It does not waive the unique-name requirement. See Creating Variables for the distinction and for saving and validation recovery.

## 5.4.1.2 Direct Ingestion Type Variable

To define a **Direct Ingestion** type variable:

1. In **Variable Profile**, select **Numeric** or **Categorical** as the **Variable Type**, then select **Direct Ingestion** as the **Variable SubType**. There is no Value Type selector for this subtype.
2. In **Variable Profile**, select one or more Logical References.


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3. In **Configure Downstream Usages**, map each selected logical reference to the required physical source column. Complete required mappings before proceeding; these mappings determine which source tables are available.
4. Continue to **Refine Variable Structure**. The system displays physical source tables mapped to the selected Logical References.
5. Select the required source tables.
6. In **Do you want to ingest at attribute level?**, select **Yes** to choose specific non-primary-key attributes, or **No** to ingest all attributes from each selected table.
7. If you select **Yes**, click **Select Attributes** and select the required attributes for each table. Primary-key attributes are selected by default and cannot be removed.

For a table with a composite primary key, all primary-key columns are retained and cannot be removed. Configure each table separately; its keys and selected non-key attributes belong to that table. For example, if a table has key columns ACCOUNT_ID and AS_OF_DATE, both remain selected when you add OUTSTANDING_BALANCE. These names are illustrative; use registered columns from your workspace.

8. Review the selected tables and each table's attribute scope in **Review and Validate**, then follow Creating Variables to save or submit. Direct Ingestion does not have a separate **Configure Downstream Mappings** or analysis-dimensions step.

> **Note**
>
> Changing the selected Logical References resets the Direct Ingestion attribute-level selections. Reconfigure table and attribute selections after changing the Logical References.

## 5.4.1.3 Matrix Type Variable

To define a **Matrix** type variable:

1. In **Variable Profile**, select **Numeric** as the **Variable Type** and **Matrix** as the **Variable SubType**.
2. Select one of the value type listed in the **Value Type** drop-down menu.

Select one of the following options:

- Count
- Percentage
- Ratio
- Value

3. In **Variable Profile**, select the **Input Logical Reference** for the matrix value. In **Link to an existing definition?**, choose **Yes** to select an existing definition or **No** to configure a new one.

For **Yes**, select **Referenced Entity**, **Referenced Attribute**, and **Definition ID**, in that order. Select the intended source record if prompted. For **No**, complete the manual structure and enabled required table values. See Creating Variables for shared import and field-ownership rules.

4. Click **Continue**.

The **Configure Downstream Usages** step is displayed.


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5. Map the Input Logical Reference and all displayed required metadata to the appropriate physical source columns. Distinguish the source category, target category, and transition value. Map definition identity to its identifier column; do not use it as the variable-value mapping. Required terms and physical columns depend on the workspace catalog.
6. Click **Continue**.

The **Configure Downstream Mappings** step is displayed. Open each relevant input table's **Configure Source Filters - {table}** drawer. Complete **Metadata Glossary Terms** when shown and continue through the displayed relationship and default-value screens. See Creating Variables for the shared drawer sequence.

7. Define the relationship between the detail (input) table and the master (support) table. The system suggests relationships based on primary key / foreign key (PK/FK) constraints. To do so, do either of the following

- Select a suggested relationship.

The relationship fields are auto-populated.

- Manually define the relationship by specifying:
  - Detail table column
  - Master table
  - Master table column

8. In each **Default Values for {table}** screen, supply the enabled required values for the participating input and support tables. Review **Population Method** to identify variable-owned, runtime-owned, imported, generated, or database-supplied fields. Follow the shared requiredness and read-only guidance in Creating Variables.
9. Save and close each drawer after its required metadata, relationships, and enabled mandatory values are complete.
10. In **Refine Variable Structure**, select the mandatory **Default Hierarchy**. For an imported matrix, inspect the resolved hierarchy and correct a missing or incompatible selection here. The selected hierarchy defines the matrix domain.
11. In **Configure Analysis Dimensions (Optional)**, select any additional dimensions and complete their source mappings. The dimension that owns the Default Hierarchy is excluded from the optional choices. See Creating Variables.
12. Review the definition in **Review and Validate**, resolve the alerts, and save or submit as described in Creating Variables.

> **Note**
>
> - Changing the imported definition or the default hierarchy selection can reset dependent selections. Recheck the current **Default Hierarchy** in **Refine Variable Structure** and the affected mappings before submitting.
> - The **Name** and **Description** fields are not overridden during import.

## 5.4.1.4 PD Term Structure Type Variable

To define a PD Term Structure type variable:

1. In **Variable Profile**, select **Numeric** as the **Variable Type** and **PD Term Structure** as the **Variable SubType**.


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2. Select one of the value types listed.

Select one of the following options:

- Percentage
- Ratio

3. In **Variable Profile**, select the **Input Logical Reference** for the PD value. In **Link to an existing definition?**, choose **Yes** to select an existing definition or **No** to configure a new one.

For **Yes**, select **Referenced Entity**, **Referenced Attribute**, and **Definition ID**, in that order. Select the intended source record if prompted. For **No**, complete the manual structure and enabled required table values. See Creating Variables for shared import and field-ownership rules.

4. Answer **Does this variable have a default business hierarchy?** explicitly. Choose **Yes** when a primary business hierarchy applies, or **No** when it does not. Leaving the decision unanswered is not equivalent to No. Select the actual hierarchy later in **Refine Variable Structure**.

5. Click **Continue**.

The **Configure Downstream Usages** step is displayed.

6. Map the Input Logical Reference and all displayed required metadata to the appropriate physical source columns. Distinguish the PD value, Term Point, Term Unit, definition identifier, and hierarchy metadata when applicable. Map definition identity to its identifier column; do not use it as the variable-value mapping. Required terms and physical columns depend on the workspace catalog.

7. Click **Continue**.

The **Configure Downstream Mappings** step is displayed. Open each relevant input table's **Configure Source Filters - {table}** drawer. Complete **Metadata Glossary Terms** when shown and continue through the displayed relationship and default-value screens. See Creating Variables for the shared drawer sequence.

8. Define the relationship between the detail (input) table and the master (support) table. The system suggests relationships based on primary key / foreign key (PK/FK) constraints. To do so, do either of the following

- Select a suggested relationship.

The relationship fields are auto-populated.

- Manually define the relationship by specifying:
  - Detail table column
  - Master table
  - Master table column

9. In each **Default Values for {table}** screen, supply the enabled required values for the participating input and support tables. Review **Population Method** to identify variable-owned, runtime-owned, imported, generated, or database-supplied fields. Follow the shared requiredness and read-only guidance in Creating Variables.

10. Save and close each drawer after its required metadata, relationships, and enabled mandatory values are complete.

11. In **Refine Variable Structure**, select **Default Hierarchy** if the default-business-hierarchy decision is **Yes**. With **No**, no default hierarchy is selected.


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12. Review imported **Term Points** and **Term Unit** pairs, or enter the manual rows. Provide at least one complete row. Each term must be a positive whole number and each unit must be **Days**, **Months**, or **Years**. Zero, negative, fractional, incomplete, and exact duplicate term/unit rows are invalid.

For example, 1 Months, 3 Months, and 1 Years are distinct illustrative rows. A second 3 Months row is a duplicate. Preserve the pairing between each term and its unit. If imported rows cannot be resolved, check the mapped term and unit columns and their table relationships before correcting the rows.

13. In **Configure Analysis Dimensions (Optional)**, select any additional dimensions and complete their source mappings. When a Default Hierarchy is selected, its owning dimension is excluded from the optional choices. With the hierarchy decision set to No, that exclusion does not apply. See Creating Variables.
14. Review the definition in **Review and Validate**, resolve the alerts, and save or submit as described in Creating Variables.

> **Note**
>
> - Changing the imported definition or a hierarchy decision can reset dependent selections. Recheck the current **Default Hierarchy** in **Refine Variable Structure** and the affected mappings before submitting.
> - The **Name** and **Description** fields are not overridden during import.

## 5.4.1.5 CCF Term Structure Variable Type

To define a **CCF Term Structure** type of variable:

1. In **Variable Profile**, select **Numeric** as the **Variable Type** and **CCF Term Structure** as the **Variable SubType**.
2. Select one of the value types listed.

Select one of the following options:

- Percentage
- Ratio

3. In **Variable Profile**, select the **Input Logical Reference** for the CCF value. In **Link to an existing definition?**, choose **Yes** to select an existing definition or **No** to configure a new one.

For **Yes**, select **Referenced Entity**, **Referenced Attribute**, and **Definition ID**, in that order. Select the intended source record if prompted. For **No**, complete the manual structure and enabled required table values. See Creating Variables for shared import and field-ownership rules.

4. Answer **Does this variable have a default business hierarchy?** explicitly. Choose **Yes** when a primary business hierarchy applies, or **No** when it does not. Leaving the decision unanswered is not equivalent to No. Select the actual hierarchy later in **Refine Variable Structure**.
5. Click **Continue**.

The **Configure Downstream Usages** step is displayed.


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6. Map the Input Logical Reference and all displayed required metadata to the appropriate physical source columns. Distinguish the CCF value, Term Point, Term Unit, definition identifier, and hierarchy metadata when applicable. Map definition identity to its identifier column; do not use it as the variable-value mapping. Required terms and physical columns depend on the workspace catalog.
7. Click **Continue**.

The **Configure Downstream Mappings** step is displayed. Open each relevant input table's **Configure Source Filters - {table}** drawer. Complete **Metadata Glossary Terms** when shown and continue through the displayed relationship and default-value screens. See Creating Variables for the shared drawer sequence.

8. Define the relationship between the detail (input) table and the master (support) table. The system suggests relationships based on primary key / foreign key (PK/FK) constraints. To do so, do either of the following

- Select a suggested relationship.

The relationship fields are auto-populated.

- Manually define the relationship by specifying:
  - Detail table column
  - Master table
  - Master table column

9. In each **Default Values for {table}** screen, supply the enabled required values for the participating input and support tables. Review **Population Method** to identify variable-owned, runtime-owned, imported, generated, or database-supplied fields. Follow the shared requiredness and read-only guidance in Creating Variables.
10. Save and close each drawer after its required metadata, relationships, and enabled mandatory values are complete.
11. In **Refine Variable Structure**, select **Default Hierarchy** if the default-business-hierarchy decision is **Yes**. With **No**, no default hierarchy is selected.
12. Review imported **Term Points** and **Term Unit** pairs, or enter the manual rows. Provide at least one complete row. Each term must be a positive whole number and each unit must be **Days**, **Months**, or **Years**. Zero, negative, fractional, incomplete, and exact duplicate term/unit rows are invalid.

For example, 1 Months, 3 Months, and 1 Years are distinct illustrative rows. A second 3 Months row is a duplicate. Preserve the pairing between each term and its unit. If imported rows cannot be resolved, check the mapped term and unit columns and their table relationships before correcting the rows.

13. In **Configure Analysis Dimensions (Optional)**, select any additional dimensions and complete their source mappings. When a Default Hierarchy is selected, its owning dimension is excluded from the optional choices. With the hierarchy decision set to No, that exclusion does not apply. See Creating Variables.
14. Review the definition in **Review and Validate**, resolve the alerts, and save or submit as described in Creating Variables.


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> **Note**
>
> - Changing the imported definition or a hierarchy decision can reset dependent selections. Recheck the current **Default Hierarchy** in **Refine Variable Structure** and the affected mappings before submitting.
> - The **Name** and **Description** fields are not overridden during import.

## 5.4.1.6 LGD Term Structure Type Variable

To define an LGD Term Structure type of variable:

1. In **Variable Profile**, select **Numeric** as the **Variable Type** and **LGD Term Structure** as the **Variable SubType**.
2. Select one of the value types listed.

Select one of the following options:

- Percentage
- Ratio

3. In **Variable Profile**, select the **Input Logical Reference** for the LGD value. In **Link to an existing definition?**, choose **Yes** to select an existing definition or **No** to configure a new one.

For **Yes**, select **Referenced Entity**, **Referenced Attribute**, and **Definition ID**, in that order. Select the intended source record if prompted. For **No**, complete the manual structure and enabled required table values. See Creating Variables for shared import and field-ownership rules.

4. Answer **Does this variable have a default business hierarchy?** explicitly. Choose **Yes** when a primary business hierarchy applies, or **No** when it does not. Leaving the decision unanswered is not equivalent to No. Select the actual hierarchy later in **Refine Variable Structure**.
5. Click **Continue**.

The **Configure Downstream Usages** step is displayed.

6. Map the Input Logical Reference and all displayed required metadata to the appropriate physical source columns. Distinguish the LGD value, Term Point, Term Unit, definition identifier, and hierarchy metadata when applicable. Map definition identity to its identifier column; do not use it as the variable-value mapping. Required terms and physical columns depend on the workspace catalog.
7. Click **Continue**.

The **Configure Downstream Mappings** step is displayed. Open each relevant input table's **Configure Source Filters - {table}** drawer. Complete **Metadata Glossary Terms** when shown and continue through the displayed relationship and default-value screens. See Creating Variables for the shared drawer sequence.

8. Define the relationship between the detail (input) table and the master (support) table. The system suggests relationships based on primary key / foreign key (PK/FK) constraints. To do so, do either of the following

- Select a suggested relationship.

The relationship fields are auto-populated.


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- Manually define the relationship by specifying:
  - Detail table column
  - Master table
  - Master table column

9. In each **Default Values for {table}** screen, supply the enabled required values for the participating input and support tables. Review **Population Method** to identify variable-owned, runtime-owned, imported, generated, or database-supplied fields. Follow the shared requiredness and read-only guidance in Creating Variables.
10. Save and close each drawer after its required metadata, relationships, and enabled mandatory values are complete.
11. In **Refine Variable Structure**, select **Default Hierarchy** if the default-business-hierarchy decision is **Yes**. With **No**, no default hierarchy is selected.
12. Review imported **Term Points** and **Term Unit** pairs, or enter the manual rows. Provide at least one complete row. Each term must be a positive whole number and each unit must be **Days**, **Months**, or **Years**. Zero, negative, fractional, incomplete, and exact duplicate term/unit rows are invalid.

For example, 1 Months, 3 Months, and 1 Years are distinct illustrative rows. A second 3 Months row is a duplicate. Preserve the pairing between each term and its unit. If imported rows cannot be resolved, check the mapped term and unit columns and their table relationships before correcting the rows.

13. In **Configure Analysis Dimensions (Optional)**, select any additional dimensions and complete their source mappings. When a Default Hierarchy is selected, its owning dimension is excluded from the optional choices. With the hierarchy decision set to No, that exclusion does not apply. See Creating Variables.
14. Review the definition in **Review and Validate**, resolve the alerts, and save or submit as described in Creating Variables.

> **Note**
>
> - Changing the imported definition or a hierarchy decision can reset dependent selections. Recheck the current **Default Hierarchy** in **Refine Variable Structure** and the affected mappings before submitting.
> - The **Name** and **Description** fields are not overridden during import.

## 5.4.1.7 Exchange Rate Variable Type

To define an Exchange Rate type of variable:

1. In **Variable Profile**, select **Numeric** as the **Variable Type** and **Exchange Rate** as the **Variable SubType**.
2. Select **Value** from the **Value Type** drop-down menu. This is the only supported representation for Exchange Rate. Select the **Input Logical Reference** for the exchange-rate value.
3. Complete **Configure Downstream Usages** and **Configure Downstream Mappings**. Map the exchange-rate value and the required currency/context metadata to the appropriate columns, and complete the displayed relationships and required values as described in Creating Variables.


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4. In **Refine Variable Structure**, select the registered currency hierarchy from **Select list of values for the currency**.
5. Select a currency from the **From Currency** drop-down menu.
6. Select a different currency from the **To Currency** drop-down menu. The choices exclude the selected From Currency.

For example, From Currency USD and To Currency EUR identifies the value of USD in EUR. Reversing the pair changes its meaning. These currency codes are illustrative; select members of the registered hierarchy. Changing the hierarchy clears both currency selections. Changing From Currency can also invalidate To Currency, so reselect the pair and review its mappings.

7. Review the pair and required mappings in **Review and Validate**, then save or submit using Creating Variables. Exchange Rate does not support optional analysis dimensions.

## 5.4.1.8 Other Dependent Granular Type Variable

To define an Other Dependent Granular type of variable:

1. In **Variable Profile**, select **Numeric** as the **Variable Type** and **Other Dependent Granular Variables** as the **Variable SubType**.
2. Select the required representation from the **Value Type** drop-down menu.

Select one of the following options:

- Count
- Percentage
- Ratio
- Value
- Date

3. Select the **Input Logical Reference** that represents the granular input value. For example, an account-level outstanding balance can use **Value** and the registered business term mapped to its balance column. This example is illustrative.
4. In **Configure Downstream Usages**, map the selected logical reference to its physical source columns. The separate downstream-mappings and structure steps are not enabled for this subtype.
5. In **Configure Analysis Dimensions (Optional)**, leave the selection empty or select the required dimensions and complete **Source to Attribute Mapping** for the applicable source tables. See Creating Variables for shared dimension and validation rules.
6. Review the configuration in **Review and Validate**, then save or submit as described in Creating Variables.

## 5.4.1.9 Micro/Macro Economic Type Variable

To define a **Micro/Macro Economic** type of variable:

1. In **Variable Profile**, select **Numeric** as the **Variable Type** and **Micro/Macro Economic Variable** as the **Variable SubType**.
2. Select a value from the **Value Type** drop-down menu.


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Select one of the following options:

- Count
- Percentage
- Ratio
- Value

3. Select the **Input Logical Reference** for the economic observation before answering the term-structure question.
4. In the Is it based on the Term Structure? field, select either of the following options:

- **Yes**
- **No**

5. Complete **Configure Downstream Usages** and **Configure Downstream Mappings** for either branch. Map the input value and all metadata marked as required. For a term-structure variable, map its observation-date metadata to a **DATE**, **DATETIME**, or **TIMESTAMP** source column and complete the required table relationships. A reporting date and an observation date have different roles; select the column appropriate to the displayed metadata term.
6. For **No**, configure an ordinary economic variable. Frequency, observation-start period, and Time Frame do not apply, and **Refine Variable Structure** is disabled. Continue to optional analysis dimensions and review.
7. For **Yes**, continue to **Refine Variable Structure**. In **Frequency**, select one of the following options:
    - Daily
    - Monthly
    - Quarterly
    - Weekly
    - Yearly
    - 5 Yearly
8. For a non-Daily frequency, use **Choose when observations should start** to select one of the following. For **Daily**, this field is disabled and does not require a selection:
    - **Beginning of the period**
    - **End of the period**
9. For a term-structure variable, enter a **Time Frame** between **1 and 100**. The field becomes available after selecting Daily, or after selecting the observation-start period for a non-Daily frequency. When changing frequency to Daily, re-enter the Time Frame after the dependent selections are reset.

For example, an illustrative GDP-growth variable can use Percentage, term structure Yes, Quarterly, End of the period, and Time Frame 4. For ordinary GDP-growth observations without a configured frequency-based structure, choose No and omit Frequency, observation-start period, and Time Frame.

10. In **Configure Analysis Dimensions (Optional)**, select any additional dimensions and complete their source-attribute mappings. Leave the selection empty if none are needed.
11. Review the applicable branch in **Review and Validate**, then follow Creating Variables to save or submit.


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## 5.4.1.10 Interest Rate Curve

To define an Interest Rate Curve type variable:

1. In **Variable Profile**, select **Numeric** as the **Variable Type** and **Interest Rate Curves** as the **Variable SubType**.
2. Based on the source representation, select **Percentage** or **Ratio** from **Value Type**. Select the **Input Logical Reference** for the interest-rate value.
3. In **Link to an existing definition?**, choose **Yes** to link an existing curve or **No** for manual configuration. For Yes, select **Referenced Entity**, **Referenced Attribute**, and **Definition ID**, then select the intended source record if prompted. See Creating Variables for dependency-reset and import rules.
4. Complete **Configure Downstream Usages** and **Configure Downstream Mappings**. Map the rate value separately from definition identity, currency, Term, and Unit metadata, and complete the relationships needed to resolve term/unit pairs. Review the enabled required values for each participating table using **Population Method**.
5. In **Refine Variable Structure**, use **Select Currency Hierarchy** and then **IRC Currency** for a manual definition. Changing the currency hierarchy resets the selected currency. For an imported definition, the resolved currency hierarchy and currency are read-only. **IRC Structure Type**, when supplied by the imported definition, is also read-only.
6. In the term table, provide at least one complete **Term** and **Unit** pair. Terms must be positive whole numbers. The standard unit choices are **Days**, **Months**, and **Years**; use the Unit choices supplied by the configured metadata. Exact duplicate pairs and incomplete or nonpositive terms are invalid.

For an existing curve, inspect the imported term/unit pairs. The term grid can be maintained in an editable mode; view mode is read-only. Do not infer a unit from a term number or assume that the read-only currency behavior also applies to the term grid.

- Add multiple Term and Unit pairs using the add action.
- Delete an entry using the delete action against the row.
- Edit a Term or Unit and save the row changes.

For example, an illustrative manual USD curve can contain 1 Months, 3 Months, and 1 Years. A second 3 Months row is a duplicate. If imported rows or currency cannot be resolved, check the selected definition, metadata mappings, and table relationships.

7. In **Review and Validate**, verify the curve identity, currency, term/unit pairs, and mappings. Resolve required errors before saving or submitting as described in Creating Variables. Interest Rate Curves does not have an optional analysis-dimensions step.

## 5.4.1.11 Nominal Type Variable

To define a **Nominal** type of variable:

1. In **Variable Profile**, select **Categorical** as the **Variable Type** and **Nominal** as the **Variable SubType**.
2. Select the **Input Logical Reference** for the category value or code, then choose its registered hierarchy or domain in **Select Values List**. The values list identifies the allowed categories; it does not assign ranks or an order.

For example, an illustrative Industry values list can contain Manufacturing, Retail, and Services. The source column should contain the category values or codes represented by that domain.


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The order in which labels are displayed does not turn a Nominal variable into an Ordinal variable.

3. In **Configure Downstream Usages**, map the Input Logical Reference to the physical category column in each intended source table. Nominal does not have separate downstream-mappings or structure configuration.
4. In **Configure Analysis Dimensions (Optional)**, select any additional dimensions and complete **Source to Attribute Mapping** for the applicable tables. Leave the selection empty if no additional dimensions are needed.
5. Review the values list and input and dimension mappings in **Review and Validate**, then follow Creating Variables to save or submit.

## 5.4.1.12 Ordinal Type Variable

To define an Ordinal subtype of variable:

**Prerequisites:**

- A registered ordered values list or hierarchy with a resolvable physical hierarchy table, an Input Logical Reference mapped to the category code or value, and the metadata and table relationships needed to establish its ordering.
- A source mapping for **Rating Rank**. **Rating Source Code** and **Short/Long Term** mappings are also required when their workspace metadata marks them as mandatory.

1. In **Variable Profile**, select **Categorical** as the **Variable Type** and **Ordinal** as the **Variable SubType**.

> **Note**
>
> Ordinal variables support only rating-type variables.

Ordinal represents rating categories with a defined order or rank, such as credit ratings. The mapping screens use rating-oriented metadata labels. Alphabetical sorting of labels is not a substitute for the business order.

2. Select the **Input Logical Reference** for the ordinal value or code, then choose the ordered domain in **Select Values List**.
3. In **Configure Downstream Usages**, map the input logical reference to the physical ordinal-value or code column for each intended input table.
4. In **Configure Downstream Mappings**, open each input table's configuration drawer. Map **Rating Rank** to the source column that supplies the order. Map **Rating Source Code** and **Short/Long Term** when required by the configured metadata. A required metadata mapping must identify a table and column without ambiguous duplicate mappings.
5. In **Relationship Builder**, complete the direct relationships from each input table to the selected hierarchy and any other required support tables. Include all key-column pairs needed for composite relationships, then save the drawer. The Ordinal drawer has no **Default Values** screens.

For example, an illustrative credit-rating domain might use category codes AAA, AA, and A with rank values 1, 2, and 3. Map the rank column explicitly. Use the rank convention defined in the registered source data; this example does not establish a universal rating direction.

6. In **Configure Analysis Dimensions (Optional)**, select any additional dimensions and complete their source-attribute mappings. The primary ordered values list remains


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separate from those additional dimensions. **Refine Variable Structure** is not enabled for Ordinal.

7. Review the domain, rank and conditional metadata, relationships, and optional dimension mappings in **Review and Validate**. Follow Creating Variables to resolve errors and save or submit.

# 5.5 Metrics

Metrics is one of the basic components in STSA that stores the outcomes of the processes run in Configuration Analysis.

Metrics are the outcomes that the user would like to assess as part of a scenario analysis. The user would like to assess the impact of a particular scenario on the metric or also compare the metrics across different scenarios to understand how their portfolio fares under different scenarios. Placing the metrics under different scenarios against internal, regulatory or market benchmarks will help drive decision insights for planning, strategy, and policy. Metrics are linked to their computation engines or models. Choosing a metric as part of the project will schedule the course process/model as part of the project.

## 5.5.1 Creating New Metrics

To create a new metric:

1. Login to STSA.

The Workspace Summary page is displayed.

2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Building Blocks** and under the **Metrics** tile, click **View**.

The Metrics Summary page is displayed.

4. Click **Create a new Metric**.


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The Metrics Definition page is displayed.

5. In the **Name** field, provide a name for the metric.
6. In the **Description** field, provide a description for the metric.
7. In the **Metrics Output** section:
   a. Select the mapped output glossary term (created in Data Catalog) from the **Logical Reference** drop-down menu. After you select the output glossary term, the system retrieves the pipelines mapped to that term.
   b. Select an aggregation rule (to map various metrics outputs to a common scale) for the metrics output from the **Aggregation rule** drop-down menu.

      To aggregate the results, you can select one of the following options:

      - Minimum - computes and shows the Minimum of average values across time periods value of the all the metric.
      - Maximum - computes and shows the Maximum of average values across time periods value of the metric.
      - Sum - computes and shows the sum of the metric.
      - Average - computes and shows the average value of the metric.

      The Pipeline mappings for the metric (which shows the process/model associated) are displayed in the **Metrics Details** page.
8. To save the metric and continue later, click **Save**.
9. To submit the metric for review, click **Submit for Review**.

   For more information about sending objects for review and approval, see the Workflow for STSA Objects section.

## 5.5.2 Viewing the Details of the Existing Metrics

To view the details of the existing metrics, perform the following steps:

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. Click **Building Blocks** and under the **Metrics** tile, click **View**.

   The **Metrics Summary** page is displayed.
4. Select the metric, click **Actions** and then select **View** to view the metrics details.

   The metric's details is displayed with the name, selected process or model, and selected logical and physical references.
5. To return to the summary screen, click **Metrics Summary** or click **Cancel**.

## 5.5.3 Modifying the Details of the Existing Metrics

To modify the details of the existing metrics, perform the following steps:

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. Click **Building Blocks** and under the **Metrics** tile, click **View**.

   The **Metrics Summary** page is displayed.


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4. Select the metric, click **Actions** and then select **Edit**.

   The metric definition page is displayed with all the details.

> **Note**
>
> You can only modify the metrics that are in **Approved** or **Draft** State. You cannot edit the metrics in **In Review** state.

5. Modify the selections if required and then click **Update**.
6. To submit the metric for review, click **Submit for Review**.

## 5.5.4 Cloning or Creating Metrics from Existing Metrics

To create a new metric from an existing metric, perform the following steps:

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. Click **Building Blocks** and under the **Metrics** tile, click **View**.

   The **Metrics Summary** page is displayed.
4. Select the metric, click **Actions** and then select **Copy**.

   The metric definition page is displayed with all the details.
5. Provide a name and modify the selections if required and then click **Save**.
6. To submit the metric for review, click **Submit for Review**.

## 5.5.5 Submitting the Existing Metrics for Comments

To submit an existing metric for comments, perform the following steps:

> **Note**
>
> You can submit an existing metric in **Draft** state for comments.

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. Click **Building Blocks** and under the **Metrics** tile, click **View**.

   The **Metrics Summary** page is displayed.
4. Select the metric, click **Actions** and then select **Submit for Comments**.

   The **Send for Comments** page is displayed with all the details.
5. Select the Metrics from the list and to submit the metric for review, click **Send**.

## 5.5.6 Deleting the Details of the Existing Metrics

To delete the details of the existing metrics, perform the following steps:

1. Login to STSA.


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2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. Click **Building Blocks** and under the **Metrics** tile, click **View**.

   The **Metrics Summary** page is displayed.
4. Select the metric details you want to delete and click **Delete**.

   The **Confirm Delete** dialog box opens
5. Click **Yes** to confirm the deletion.

## 5.5.7 Onboarding Metrics

The metrics onboarding process depends on the data ingestion and mapping activities performed in the workspace. Metrics available for onboarding are driven by the source pipelines and processes configured during workspace preparation.

**Prerequisites**
To onboard a metric, you must map a Output Glossary on the respective process or model. To do so:

1. In the STSA Screen, go to **Data Catalog** > **Glossary tile** and click the **Glossary Sumamry** icon.
2. In the page that opens, go to **Glossary** drop-down and select **Glossary Term Upload** and click **Add**.
3. Select **Select Glossary**.
4. Click **Download template** and create a glossary.
5. Click **Upload** to upload the glossary.
   The system creates a glossary with two child glossaries: `INPUT_GLOSSARY` and `OUTPUT_GLOSSARY`. To create metrics, map the `OUTPUT_GLOSSARY` to a pipeline (process or model) from the **Pipeline Mapping** screen in STSA.

To onboard the existing metrics, perform the following steps:

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. Click **Building Blocks** and under the **Metrics** tile, click **View**.

   The **Metrics Summary** page is displayed.
4. Click **Onboard Metrics**.
5. Optional: In the page that opens, click the **Edit** icon to edit the metric details.

   Metrics are displayed in categories for each pipeline during onboarding. The categories now include New and Existing metrics.
6. Optional: Uncheck the required metrics to unmap the logical reference (glossary term) from the pipeline.

   Unchecking a metric ensures the metric is not created as part of the specific process/ model.
7. Click **Continue**.

   The **Review and Validate** page becomes accessible only after visiting and completing all the preceding onboarding steps.
8. In the **Review and Validate** page, review the selected metrics and click **Submit** to onboard the metrics.


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# 5.6 Scenario

Scenarios are structured narratives that describe potential future states in a coherent and believable manner. These narratives help stakeholders understand the implications of different possible outcomes.

Scenarios explore a range of possible futures by considering various factors and their potential interactions by considering a multitude of variables, such as economic, social, technological, and political factors, and how these variables might evolve over time and explore different pathways these variables could take, leading to diverse future conditions.

Scenarios can take on various forms, such as baseline scenarios (reflecting current trends), stressed scenarios (examining extreme or adverse conditions), historical scenarios (exploring past trends and their potential continuation), hypothetical scenarios (imagining alternative realities), and more.

You can tailor scenarios for specific purposes and contexts, such as strategic planning, risk management, or policy development by creating them based on the needs and objectives of the project or organization. Evaluate multiple scenarios for a single project to better understand the range of possibilities and their implications leading to informed decision-making by providing a more comprehensive view of the potential future. Hence, scenarios offer a valuable tool for exploring uncertainty and complexity, allowing organizations to anticipate and prepare for a range of possible futures rather than relying solely on a single forecast enhancing organizational resilience and agility in dynamic environments.

For scenario generation using the VAR model, see the Appendix C, VAR Model.

## 5.6.1 Creating a Scenario

To create a scenario:

Ensure that you have defined a variable.

1. Login to STSA.

   The **Workspace Summary** page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Scenario**.

   The Scenario summary page is displayed.
4. Click **Create New**.

   The Scenario Details wizard is displayed.
5. Provide a name and description for the scenario you are creating.
6. In source details section:
   a. To classify the source of the scenario based on its origin (by market requirements or internally in the bank), select the source as external or internal from the **Source** drop-down menu.
   b. Provide the source links or the details of the source in **Source Details**.


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> **Note**
>
> You can source a scenario from a wide variety of market sources or generate it internally (by the bank).

c. Select a theme (the subjects that are covered by the scenario) for the scenario you are creating from the **Theme** drop-down menu.

   The following list of themes are available for a scenario:

   - Climate
   - Industry Specific
   - Macro Economic
   - Market

7. In the **Time Horizon Details** section:

> **Note**
>
> For more information about instantaneous frequency behavior, see the Time Horizon Detailed Behavior section.

a. Provide the number of times you want to calculate the scenario in the **Time Frame** field.

b. Select the frequency for how frequently you want to run this scenario and click the **Add** icon.

   You can select from one of the following frequencies:

   - Daily
   - Instantaneous
   - Monthly
   - Quarterly


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- Weekly
- Yearly
- 5 Yearly

You can now specify multiple combinations of frequency and timeframe to generate scenario dates. Previously, only one combination was allowed. This enhancement enables more flexible scenario timelines—for example, applying monthly shocks at first, then switching to yearly intervals.

Frequency refers to the interval between scenario dates. Supported values include:

- **Daily** – Generate dates every day
- **Monthly** – Generate dates every month
- **Quarterly** – Generate dates every quarter
- **Yearly** – Generate dates once per year
- **Instantaneous** – Generate a single event on the current value date
- **5 years** – Generate dates every five years

Timefrrame specifies the number of dates to generate for the selected frequency.


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> **Note**
>
> Frequency entries are processed in the order added. After selecting a frequency, you cannot add the same or a lower frequency later. Delete and re-add an entry to change the sequence.
>
> For **Instantaneous** frequency, the timeframe is fixed at 1. The Scenario Start Date and First Forecast Date are aligned to the Base Reference Date and cannot be edited independently.

c. Select the source-data date in **Base Reference Date**.

d. Review **Current Value Date**. It is automatically populated from the Base Reference Date and is read-only; it is not a separately entered date.

e. For a non-instantaneous scenario, select **Scenario Start Date**. It must be later than the Current Value Date.

f. Select **First Forecast Date**. It must be on or after the Scenario Start Date. For Instantaneous frequency, review the automatically aligned dates.

8. Select the required configuration in **Reference Configuration Details** and click **Continue**. Do either of the following:

If you select **Configuration Analysis**:

a. In the Select Configuration Analysis page, select the required analysis configuration.
b. Click **Select**.

If you select **Project**:

a. In the Select Project page, select the required Project. Its reference date populates the Base Reference Date, which you can subsequently update if required.
b. Click **Select**.

> **Note**
>
> When a reference configuration is selected, its variables and dimension mappings are populated from the Analysis Configuration. Review and, if required, update these selections on the Variable Selection page.

9. In the **Variables** section, the variables created and approved in the workspace are listed.


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If you have selected an analysis configuration or project, then the variables are preselected. Review the selection and click **Continue**.

> **Note**
>
> In the Variables section, review the auto-populated variables (if a project or analysis configuration is referenced). You can add or remove variables as needed. If no project or analysis configuration is referenced, you can select variables freely.

> **Note**
>
> Selecting a variable for a scenario is a mandatory step.

10. In the Map Dimensions section, if dimensions are not applicable for the selected variables, then the **Map Status** is listed as **NA**. Click **Continue**.

    If dimensions are applicable for the selected variables, then the **Map Status** is listed as **NOT MAPPED**. Map the dimensions and then click **Continue**.
    To map the dimensions,:

    a. Click More Actions and select **Map Dimensions**.

       The **Variable Dimension Mapping** page is displayed.

    b. Do either of the following:and so.

       i. To create a new mapping:

          i. Select **Create New**.

          ii. In the **Variable Dimension Mapping** page, select the dimension in the **Dimensions Selection** field and click **Next**.

          iii. Select the desired values in the **Members Selections** field and click **Next**.

          iv. Select the desired values in the **Dimension Mapping Combinations** field and click **Save**.

       ii. To copy a dimension from an existing scenario:

          i. Select **Copy From Scenario**.

          ii. On the **Copy Dimension Mapping from Scenario** page, select the associated scenario, and click **Next**.

       iii. To copy a dimension from an existing analysis configuration:

          i. Select **Copy From Analysis Configuration**.

          ii. In the **Copy Dimension Mapping from Analysis Configuration** field, select the analysis configuration, and click **Next**.

          > **Note**
          >
          > The dimensions, bands, and combinations are automatically selected. You can manually select additional items, and then click **Next**.

    c. To save this selection, click **Save**.

    d. Click **Continue**.


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11. In **Variable Pathways**, add the variable values and click **Continue**.

- From the user interface, click **Actions** against each variable, select its shock type, and provide the stress values.
- Alternatively, export the selected variables to Excel, enter values in the workbook, and import it.

> **Note**
>
> Direct Ingestion variables do not require shock types because their input data is expected to contain the perturbed values.

A variable remains **Pending** until the required shock values are entered and validations pass. It then becomes **Completed**. Correct invalid numeric entries before closing Shock Details; a previous valid value is not a substitute for an invalid edit.

12. Optionally, click a variable to view the effect of its shock values. Select the required period and dimension or hierarchy combination where available. Term-structure curves must be reviewed for the intended combination, not as one combined curve across all dimensions.

**Table 6-3 Graph Types, Filters, and Display Behavior by Variable Type**

| Variable type | Graph and axes | Display behavior and filters |
|---|---|---|
| Micro/Macro Economic and Exchange Rate | Line graph; periods against values | Without dimensions, one series. With dimensions, select the required combination and period; the first combination is selected initially. |
| CCF, LGD and PD Term Structure | Curve graph; term points/units against values | Select the period and the hierarchy/dimension combination, where configured. The initial view uses the first available combination and period. |
| Interest Rate Curve | Curve graph; term points/units against values | Select the period. Where the variable has mapped dimensions, select the dimension combination as well. Initially, the first available combination and period are displayed. |

For term-structure row identities, current values and Excel handling, see **Term-Structure Variable Pathways** and **Reviewing Term-Structure Curves and Excel Values** later in this section.


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**Table 6-3 (Cont.) Graph Types, Filters, and Display Behavior by Variable Type**

| Variable type | Graph and axes | Display behavior and filters |
|---|---|---|
| Other Dependent Granular | Line graph; periods against values | Without dimensions, one series. With dimensions, select the required combination and period; the first combination is selected initially. |
| Ordinal | Curve graph; periods against computed ratings | Select source code, short/long term, rating and the dimension combination, where applicable, and period. The initial view uses the first available source, term and rating. |

When you request a graph, STSA generates the computed preview for the selected shock values. Where the preview uses an assumed current value of 100, treat it as an illustration of the shock effect, not as evidence of the actual source-data value.

For categorical variables, ratings are calculated for the selected source-code and short/long-term combination. Select the combination to inspect rather than expecting all ratings to be displayed together.

> ⓘ **Note**
>
> Graphs are not available for categorical **Change of Class** pathways or for metrics variables. Source-code and short/long-term graph filters do not apply to Change of Class input.

13. In **Scenario Narrative**, enter the scenario description and click **Continue**.

- Use **Auto-Generate Narrative** to add a detailed description of the scenario.
- For supporting attachments, see **Document Management**.

14. Review the inputs and address the validation messages.

- Critical validations must be resolved before you can submit the scenario.


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- Non-critical validations can be left unresolved, but they may affect results.

When ready, click **Save** to keep a draft, or **Submit For Review** to send the scenario for review and approval. Submission requires completed validation and no critical errors. If validation cannot complete, correct the issue and validate again before submitting.

For review and approval procedures, see **Workflow for STSA Objects**. Notifications about changes to underlying metadata help you keep scenarios and their configurations valid.

### 5.6.1.1 Multiple Frequency and Duration Combinations

Specify frequency and timeframe combinations in the required order to generate the scenario dates. For example, apply monthly shocks first, followed by yearly intervals. **Timeframe** is the number of dates generated for a frequency.

Supported frequencies are Daily, Weekly, Monthly, Quarterly, Yearly, 5 Yearly and Instantaneous. Instantaneous generates one event on the Base Reference Date.

- A frequency cannot be followed by the same or a lower frequency. To change the order, delete and re-add the entry.
- For Instantaneous frequency, the timeframe is fixed at 1, and the start and first forecast dates are aligned to the Base Reference Date.

**Changing an existing frequency or timeframe combination is different from changing only a date.** When STSA warns that pathways will reset, confirming the change clears the existing pathway selections and values. Cancel retains the previous settings. After a reset, re-enter or import the pathways and validate them.

### 5.6.1.2 Providing Shock Values from User Interface

To provide shock values from the user interface:

1. In **Variable Pathways**, click **Actions** against the required variable.


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The **Variable Shock Detail** page is displayed.

2. Select a **Shock Type**. The grid is built for the variable's configured hierarchy, mapped dimensions and term points, where applicable, and the scenario dates.

For the supported calculations, see **Shock Types for Variables**. For term structures, preserve each row's term point and unit when entering current values and shocks.

For macro and currency variables, use **Browse Current Value**, where available, to review current values from the database.

3. After providing values, click **Compute input values**, where available, to populate the **Computed Values** table. This option does not apply to Absolute Value and Change of Class shock types.

Resolve required-field and numeric validation messages before closing the details. Apply the bounds for the selected variable and shock type; do not assume a universal -100 to +100 range for all numeric shocks.

### 5.6.1.3 Providing Shock Values in Excel

1. In **Variable Pathways**, click **Export**. In the Select Variables page, select the variables to include and click **Export**.

2. Open the downloaded **.XLSM** workbook. The filename identifies the scenario, version and export time. Enable macros as required by your organisation's security policy.

The **Scenario Details** tab contains the scenario source and time-horizon details and the **Variable Pathways** list. Each selected variable has its own tab.

3. Enter the variable values:

a. Open a variable using its name in Scenario Details or its worksheet tab.
b. Select the required shock type for that variable type and subtype.
c. Use the **Display Name** selection to control whether the hierarchy code is included in the displayed name.

Keep the exported structure, row identities, dimension values, term points and units intact. Use a fresh export after changing variable structure or resetting the scenario pathway.


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d. Enter values in the generated **Actual Value** columns for the selected shock type and scenario dates. The workbook validates inputs and displays calculated results in **Computed Value**.
e. Save the workbook.

For calculation details, see **Shock Types for Variables**.

4. Click **Import**, browse to the updated workbook, and select it. Review the **Excel Data Import Report** for every variable, including its version, shock type and import status. Click **OK** to continue.

Empty or partially imported values are not complete pathways. Correct the affected rows, import again if required, and complete validation before proceeding.

## 5.6.1.4 Updating Time Horizon Details While Preserving Variable Pathways

### 5.6.1.4.1 Overview

Date-only updates can refresh existing pathways while preserving matching user-entered values. This is not a guarantee that every time-horizon change preserves the pathway. Changing frequency or timeframe combinations can require a full reset, as described in Multiple Frequency and Duration Combinations.

Where a confirmation is displayed, review it before continuing. Cancel retains the previous date or time-horizon settings. After accepting a change, review the refreshed grids and validate the scenario again.

### 5.6.1.4.2 Base Reference Date Update

Changing **Base Reference Date** also updates the read-only **Current Value Date**. STSA checks the affected pathways and refreshes the grids according to variable type and shock type.

- Matching actual-grid inputs are retained where the refresh supports them. Review current values against the new source date.
- Computed values that depend on the changed dates are recalculated. Review them rather than assuming the previous calculated values still apply.
- Changing First Forecast Date regenerates the relevant forecast-date columns. Check that retained values are aligned to the intended dates.


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For Absolute Value pathways that use a reference grid, review both the refreshed current values and the resulting absolute values after a date change. A graph or computed grid is a preview; it does not replace validation of the saved inputs.

Categorical pathways do not use the same numeric date-difference calculations. Review their mapped hierarchy and scenario-date columns after changes.

**Start Date Change**

For a non-instantaneous scenario, maintain the required ordering between Current Value Date, Scenario Start Date and First Forecast Date. Review any resulting change to the forecast grid. If the change requires a reset, do not confirm it unless you are ready to re-enter the pathway values.

## 5.6.1.4.3 Time Horizon Detailed Behavior

The four dates identify the source-data cut-off and the forecast horizon. For **Instantaneous** frequency, all four dates align to the Base Reference Date and only one scenario date is generated.

**Table 6-4 Four-Date Framework**

| Date parameter | Description |
|---|---|
| Base Reference Date | Source-data date used for the scenario. Changing it also changes Current Value Date. |
| Current Value Date | Read-only date for current, unstressed values. Automatically aligned to Base Reference Date. |
| Scenario Start Date | Start of the stress horizon. For non-instantaneous scenarios, it must be later than Current Value Date. For Instantaneous, it equals Base Reference Date. |
| First Forecast Date | First stressed forecast date. For non-instantaneous scenarios, it must be on or after Scenario Start Date. For Instantaneous, it equals Base Reference Date. |

Use the frequency-specific entry rules in Table 6-5. After changing dates, review the actual and computed grids for each affected variable before submitting the scenario.


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**Table 6-5 Scenario Date Entry Behavior by Frequency**

| Frequency | Editable fields | Auto-filled / read-only | Validation |
|---|---|---|---|
| Non-instantaneous | Base Reference Date; Scenario Start Date; First Forecast Date | Current Value Date equals Base Reference Date | Current Value Date < Scenario Start Date; Scenario Start Date <= First Forecast Date |
| Instantaneous | Base Reference Date | Current Value Date; Scenario Start Date; First Forecast Date; timeframe = 1 | All four dates are equal |

### 5.6.1.5 Term-Structure Variable Pathways

For **PD, LGD and CCF Term Structure** variables, the scenario grid uses the term points and term units defined for the variable. A term unit can be Days, Months or Years. Each term point/unit pair identifies a tenor and must be retained when values are entered or imported.

The pathway rows also reflect the selected analysis dimensions and the default business hierarchy, where one is configured:

- **With a default business hierarchy:** retain the hierarchy value, dimension combination and term point/unit for each row.
- **Without a default business hierarchy:** use the term point/unit rows for each selected dimension combination. A hierarchy must not be invented merely to populate the grid.

For example, 1 Month and 1 Year are different term identities. Enter the current value and shock for the intended row and forecast date; do not combine them solely because both term-point numbers are 1.

Enter values for every required structural row. Where a constant shock is supported, it is applied within the relevant row's calculation; each row retains its own current value and identity.

These tenor-based structures are different from a Micro/Macro Economic term structure organised by observation dates. Use the grid appropriate to the selected variable subtype.


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## 5.6.1.6 Reviewing Term-Structure Curves and Excel Values

**Review the input and computed grids**

After selecting a shock type and entering values, compute the pathway where supported. Check the current value, the entered shock and the computed value for each hierarchy/dimension/term combination and each scenario date. Distinct actual rows must remain distinct in the computed grid.

For an **Interest Rate Curve** variable that already has mapped analysis dimensions, the grid and curve retain those combinations along with term point and unit. This does not mean that every Interest Rate Curve definition is dimensioned.

**Review the curve**

Select the required period and, where present, hierarchy or dimension combination. The initial curve shows the first available combination and period. Change the filters to inspect other combinations; do not interpret the initial curve as an aggregate across all dimensions.

Term-structure curves plot values against tenor. Confirm both term point and unit when comparing positions on a curve. The same combination-aware review applies when the Interest Rate Curve is viewed from a Project.

**Export and import**

Use the scenario's exported workbook so that its structure matches the selected variables. Keep dimension values, hierarchy information, term points and term units in their corresponding rows. Do not rename structural columns or collapse different term-unit rows.

After import, review the Excel Data Import Report and then reopen the pathway. Confirm that values were restored to the correct structural rows, including dimensioned Interest Rate Curve rows. Resolve missing, partial or invalid values before proceeding.

**After a date or definition change**

For a supported date-only refresh, matching pathway inputs can be retained while computed values and forecast columns are refreshed. Check all affected combinations. After a frequency/timeframe reset or a change to the variable's dimensions or terms, use a fresh export and complete the required inputs again.

**Before submission**

Complete scenario validation and resolve critical messages. Invalid numeric edits or an unavailable validation result must not be treated as a successful validation. Save a draft if further work is required; submit only after the pathway is complete.


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## 5.6.2 Document Management

The **Scenario Narrative** screen includes Document Management for attaching supporting documents during scenario creation. Documents provide context, evidence or reference material and remain linked to the scenario in the STSA database.

The **Attachments** option supports:

- **Upload from local machine:** drag and drop files or select them manually.
- **Multiple document upload:** upload several documents at once.
- **Download on demand:** click the document name to download an uploaded file.
- **Commenting:** enter an optional comment of up to 200 characters for each document.
- **Delete support:** remove a document before saving by clicking Delete.

The following sections describe attaching, viewing, deleting and downloading documents in Scenario Narrative.


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## 5.6.2.1 Attaching Documents in Scenario Narrative

You can use the **Drag and Drop** option in the **Document Manager** screen to upload supporting documents to a scenario during its creation or update.

To attach the documents in **Scenario Narrative** screen:

1. Login to STSA.

   The Workspace Summary page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Scenario**.

   The **Scenario** summary page is displayed.
4. Click **Create New**.

   The Scenario Details wizard is displayed.
5. Complete steps **5** through **11** as described in the Creating a Scenario section.
6. In the **Scenatio Narrative** screen, click **Attachments**.
7. In the **Document Manager** page that opens, click **Drag and Drop** to either select or drag and drop the file you want to attach.

   > **Note**
   >
   > - The following file types are supported:
   >   - PDF files
   >   - Word documents
   >   - Excel spreadsheets
   >   - .CSV
   >   - Image files (PNG, JPEG)
   > - The Maximum file size to attach the file is 5 MB per file.
   > - Only one document with the same name can exist at a time. Uploading a document with an existing name will replace the older version.
8. Click **Save** to save your changes.
9. In the **Successfully Added Documents** dailog box that opens, click **OK**.


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> **Note**
>
> You can also add the attachments, using the **Edit** option in the **Scenario Summary** page. To do so:
>
> a. Click the scenario or click actions against the scenario and then click either **View**or **Edit**.
>
> b. In the page that opens, click **Scenario Narrative**.
>
> c. Click **Attachments**.
>
> d. In the **Document Manager** page that opens, click **Drag and Drop** to either select or drag and drop the file you want to attach.

## 5.6.2.2 Viewing Documents in Scenario Narrative

You can view all documents attached to a scenario directly from the Scenario Narrative screen.

To view the documents attached in **Scenario Narrative** screen:

1. Login to STSA.

   The Workspace Summary page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Scenario**.

   The **Scenario summary** page is displayed with details about the scenario such as scenario name, version, source, time frame, frequency, theme, status, start date, and first forecast date. If there are multiple versions of an object, the latest version of the object is listed at the top of the hierarchy.
4. To view the attachments:
   a. Click the scenario or click actions against the scenario and then click **View**.
   b. In the page that opens, click **Scenario Narrative**.
   c. Click **Attachments**.
   d. In the **Document Manager** page that open, you can view the list of attachments

## 5.6.2.3 Deleting Documents in Scenario Narrative

You can delete all documents attached to a scenario directly from the **Scenario Narrative** screen.

To delete the documents attached in **Scenario Narrative** screen:

1. Login to STSA.

   The Workspace Summary page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Scenario**.

   The **Scenario Summary** page is displayed with details about the scenario such as scenario name, version, source, the time frame, frequency, theme, status, the reference and the start date information. If there are multiple versions of an object, the latest version of the object is listed at the top of the hierarchy.


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4. To delete the attachments:
    a. Click the scenario or click actions against the scenario and then click **Edit**.
    b. In the page that opens, click **Scenario Narrative**.
    c. Click **Attachments**.
    d. In the **Document Manager** page that open, click the **Delete** icon next to the attachment.
    e. Click **Save** to save your changes.

### 5.6.2.4 Downloading Documents in Scenario Narrative

You can download all documents attached to a scenario directly from the **Scenario Narrative** screen.

To download the documents attached in **Scenario Narrative** screen:

1. Login to STSA.

   The Workspace Summary page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Scenario**.

   The **Scenario Summary** page is displayed with details about the scenario such as scenario name, version, source, the time frame, frequency, theme, status, the reference and the start date information. If there are multiple versions of an object, the latest version of the object is listed at the top of the hierarchy.
4. To dowmload the attachments:
    a. Click the scenario or click actions against the scenario and then click **Edit**.
    b. In the page that opens, click **Scenario Narrative**.
    c. Click **Attachments**.
    d. In the **Document Manager** page that opens, click the document name hyperlink to download any previously uploaded file.
    e. Click **Keep** to download the document

## 5.6.3 Date Management

The system now uses a day-based method to adjust financial dates during stress testing. This change ensures accurate results, even when date shifts include partial months or end-of-month scenarios.

Depending on the Maintain Constant Maturity/Date Profile setting, the number of days added to each date is calculated as follows:

- If set to **No:**
  The date is adjusted by the difference in days between the **Pseudo Date** and the **Projected FIC MIS Date**.
- If set to **Yes:**
  The date adjustment depends on whether the original date is after the Reference Date:

This logic applies to all relevant financial dates, such as **Maturity Date**, **Cashflow Date**, and **Observation Date**, as defined under the DATEMANAGEMENT glossary term.


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It improves accuracy and consistency across different scenario types by eliminating rounding errors from older month-based calculations.

## 5.6.4 Shock Types for Variables

**Shock Type for numeric variables**

If you have selected numeric type of variable select from one of the shock type and provide your inputs.

> **Note**
>
> For MEVTS variables, only the following shock types are applicable:
>
> - Absolute Values
> - Constant Absolute Growth per Annum
> - Constant Growth in Percentage per Annum

- **Absolute Value** - the formula to calculate this is:

$$Absolute\ Value = Input\ Value$$

Where,

Input Value is the value entered on the User Interface (UI).

- **Absolute Growth on Current value (AGC)** - the formula to calculate this is:

$$Absolute\ Growth\ on\ Current\ Value = Current\ Value + Input_Grid_Value$$

Where,

Current Value - is the reference value entered on the UI

Input Grid Value - percentage or absolute value you enter by which you want to increase or decrease the current value of reference date.

- **Absolute Growth on Future value (AGF)** - the formula to calculate this is:

$$Absolute\ Growth\ on\ Future\ Value = Current\ Value + Input_Grid_Value$$

Where,

*For each iteration the Current Value is updated based on the previous calculation.

Current Value - is the reference value entered on the UI

Input Grid Value - is the percentage or absolute value you enter by which you want to increase or decrease the current value of reference date.

- **Constant Absolute Growth Per Annum (CAGPA)** - the formula to calculate this is:


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$$Constant\ Absolute\ Growth\ Per\ Annum = Current\ Value + (Input\ Percentage * (\frac{Date\ Difference}{Calendar\ Days}))$$

Where,

Current Value - is the reference value entered on the UI

Input Percentage - is the percentage value of growth or deprecation

Date Difference - is the frequency selected.

- **Constant Growth in Percentage Per Annum (CGPPA)** - the formula to calculate this is:

$$Constant\ Growth\ in\ Percentage\ Per\ Annum = Current\ Value * \left(1 + \frac{Input\ Percentage}{100}\right)^{Date\ Difference/Calander_Days}$$

Where,

Current Value - is the value entered on the UI.

Input Percentage - is the percentage value of growth or deprecation

Date Difference - is the frequency for the calculations

- **Percentage Growth Per Annum over Current Value (PGPAC)** - the formula to calculate this is:

$$Percentage\ Growth\ Per\ Annum\ over\ Current\ Value = Current\ Value * (1 + (\frac{Input\ Grid\ Percentage}{100}))$$

Where,

Current Value - is the value entered on the UI.

Input Grid Percentage - is the percentage you enter by which you want to increase or decrease the current value of reference date.

- **Percentage Growth Per Annum over Future value (PGPAF)** - the formula to calculate this is:

$$Percentage\ Growth\ Per\ Annum\ over\ Future\ Value = Current\ Value \left(1 + \frac{Input\ Grid\ Percentage}{100}\right)^{Date\ Difference/Calendar_Days}$$

Where,

*For each iteration the Current Value is updated based on the previous calculation

Input Grid Percentage - is the change per annum


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Data Difference - is the difference between the frequency of dates mentioned

**Examples of Shock Types**

Below is a list of examples for all the shock types with details:

For example, you enter the following values in the **Time Horizon Details** section of the scenario wizard:

```
Frequency: monthly

Time Frame: 2

Reference Date: 21/May/2024

Start Date: 31/May/2024
```

For **Absolute Value** shock type, the calculations are as follows:

1. The start date is displayed as part of the first sequence that is `31/May/2024` and the next date is calculated based on the frequency type (in this case, monthly or 30 days difference). Hence, the next date is `30/June/2024`.
2. In this case, you can define the current value and the absolute values for the variables on 31st may and 30th June as `10, 50` and `10`.

For **Absolute growth on Current value** shock type, the calculations are as follows:

1. The start date is displayed as part of the first sequence that is `31/May/2024` and the next date is calculated based on the frequency type (in this case, monthly or 30 days difference). Hence, the next date is `30/June/2024`.
2. In this case, you can define the current value and the absolute values for the variables on 31st may and 30th June as `10, 50` and `10`.
3. When you click **Compute input values**, then the growth on the absolute values for 31st may and 30th June are `60` and `20`.
   Since,
   - Absolute Growth on Current value on `31/May/2024` (60) = Current Value (10) + Input Value on `31/May/2024` (50)
   - Absolute Growth on Current value on `30/June/2024` (20) = Current Value (10) + Input Value on `30/June/2024` (10)

For **Absolute growth on future value** shock type, the calculations are as follows:

1. The start date is displayed as part of the first sequence that is `31/May/2024` and the next date is calculated based on the frequency type (in this case, monthly or 30 days difference). Hence, the next date is `30/June/2024`.
2. In this case, you can define the current value and the absolute values for the variables on 31st May and 30th June as `10, 50` and `10`.
3. When you click **Compute input values**, then the growth on the absolute values for 31st May and 30th June are `60` and `70`.
   Since,
   - Absolute Growth on future value on `31/May/2024` (60) = Current Value (10) + Absolute Value (or Input Value) on `31/May/2024` (50)
   - Absolute Growth on future value on `30/June/2024` (70) = Current Value (60) + Absolute Value (or Input Value) on `30/June/2024` (10)

For **Constant absolute growth per annum** shock type, the calculations are as follows:


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1. The start date is displayed as part of the first sequence that is 31/May/2024 and the next date is calculated based on the frequency type (in this case, monthly or 30 days difference). Hence, the next date is 30/June/2024.
2. In this case, you can define the **Absolute** value or Constant Absolute Value(FOR ALL DATES) percentage as 50% and the **Current Value** as 10.
3. When you click **Compute input values**, then the absolute growth for 31st May and 30th June are 11.3889 and 15.5556.
   Since,
   - DDC1: Date Difference From Current Value (D1-D0)=10
     DDC2: Date Difference From Current Value(D2-D0)=40
   - Constant Absolute Growth Per Annum on 31/May/2024 (11.3889) = 10 +(50*(10/360))
   - Constant Absolute Growth Per Annum on 30/June/2024 (15.5556) = 10+(50*(40/360))

For **Constant growth in percentage per annum** shock type, the calculations are as follows:

1. The start date is displayed as part of the first sequence that is 31/May/2024 and the next date is calculated based on the frequency type (in this case, monthly or 30 days difference). Hence, the next date is 30/June/2024.
2. In this case, you can define the percentage or the Constant Percentage Value as 50% and current value as 10.
3. When you click **Compute input values**, then the growth rate on 31st May and 30th June are 10.1133 and 10.4608.
   Since,
   - DDC1: Date Difference From Current Value (D1-D0)=10
     DDC2: Date Difference From Current Value(D2-D0)=40
   - Constant growth in percentage per annum on 31/May/2024 (10.1133) = $10*(1+(50/100))^{(10/360)}$
   - Constant growth in percentage per annum on 30/June/2024 (10.4608) = $10*(1+(50/100))^{(40/360)}$

For **Overall Percentage Growth over current value** shock type, the calculations are as follows:

1. The start date is displayed as part of the first sequence that is 31/May/2024 and the next date is calculated based on the frequency type (in this case, monthly or 30 days difference). Hence, the next date is 30/June/2024.
2. In this case, you can define the current value and the growth over current value percentages on 31st may and 30th June as 10, 50% and 10%.
3. When you click **Compute input values**, then the growth rate on 31st May and 30th June are 10.1133 and 10.1065.
   Since,
   - DDC1: Date Difference From Current Value (D1-D0)=10
     DDC2: Date Difference From Current Value(D2-D0)=40
   - Percentage Growth per annum over future value on 31/May/2024 = 10*(1+50/100) (10/360)
   - Percentage Growth per annum over future value on 30/June/2024 = 10*(1+10/100) (40/360)


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For **Percentage Growth per annum over future value** shock type, the calculations are as follows:

1. The start date is displayed as part of the first sequence that is `31/May/2024` and the next date is calculated based on the frequency type (in this case, monthly or 30 days difference). Hence, the next date is `30/June/2024`.
2. In this case, you can define the current and the growth over future percentages on 31st may and 30th June as `10, 50%` and `10%`.
3. When you click **Compute input values**, then the growth rate on 31st May and 30th June are `10.1133` and `10.1939`.
   Since,
   - Overall Percentage Growth over current value on `31/May/2024` = 10*(1+(50/100))
   - Overall Percentage Growth over current value on `30/June/2024` = 10*(1+(10/100))

### Categorical Shock Type

If you have selected categorical type of variable select from one of the shock type and provide your inputs:

- **Change of Class** - based on the frequency entered you can select the value for this variable from the existing values
- **Constant Notch Up/Down on Current Value** - based on the current value, the variable value is increased or decreased by a notch.
- **Constant Notch Up/Down on Future Value** - based on the value entered, the next value that is the future value is calculated by increasing or decreasing the value by a notch (or by one value).
- **Notch Up/Notch Down on Current Value** - based on the current value, the variable value is increased or decreased by a notch (or by one value).
- **Notch Up/Notch Down on Future Value** - based on the value entered, the next value that is the future value is calculated by increasing or decreasing the value by a notch (or by one value).
- **Universal**
  - When dimension is added to the selected variable- the grid maps each node in the dimension. Your input for each dimension node impacts all variable hierarchy nodes within that specific dimension node.
  - When there are no dimensions in the selected variable - there is a single row of mapping for each variable hierarchy. Your input for that row affects all the nodes within the variable hierarchy.
- **Local**
  - When dimension is added to the selected variable- the grid maps each node in the variable hierarchy to every node in the dimension.
  - When there are no dimensions in the selected variable - the grid maps each node within the variable hierarchy individually.

### Shock Type for MEVTS variable

This is a numerical variable with either a Micro or Macro subtype. Additionally, the *tsBased* flag is enabled, which allows the variable to capture its frequency, timeframe, and the start/end of the period during its creation.


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**Table 6-6 Scenario Grid Generation**

| Country | Observation Date | CV | 03-06-2025 | 03-07-2025 | 03-08-2025 |
|---|---|---|---|---|---|
| India | 30-04-2025 | 5% | 4.75% | 4.75% | 4.75% |
| India | 31-07-2025 | 5% | 4.50% | 4.50% | 4.50% |
| India | 31-10-2025 | 5% | 4.25% | 4.25% | 4.25% |
| India | 31-01-2026 | 5% | 4.00% | 4.00% | 4.00% |
| India | 30-04-2026 | 5% | 3.75% | 3.75% | 3.75% |
| India | 31-07-2026 | 5% | 3.50% | 3.50% | 3.50% |
| US | 30-04-2025 | 5% | 4.75% | 4.75% | 4.75% |
| US | 31-07-2025 | 5% | 4.50% | 4.50% | 4.50% |
| US | 31-10-2025 | 5% | 4.25% | 4.25% | 4.25% |
| US | 31-01-2026 | 5% | 4.00% | 4.00% | 4.00% |
| US | 30-04-2026 | 5% | 3.75% | 3.75% | 3.75% |
| US | 31-07-2026 | 5% | 3.50% | 3.50% | 3.50% |

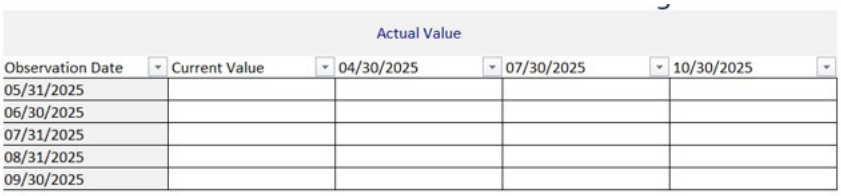
- **Observation Date Calculation**
  The Observation Date column is unique to MEVTS variables and is calculated as follows:
  - The **first observation date** is set as the scenario reference date.
  - The **total number of observation dates** is equal to the variable's timeframe.
  - The interval between observation dates is determined by the variable's frequency.
  - The **Start-of-Period / End-of-Period** setting determines whether the observation dates align with the beginning or end of each period.

**Shock Types for MEVTS Variables**

Three types of shocks are supported:

- **Absolute Values**: Users manually input absolute values in the scenario grid.

**Figure 5-1 MVETS Absolute Values**




- **Constant Absolute Growth per Annum:**
  The formula and other configurations remain unchanged. However, in this case, the values are calculated based on observation dates corresponding to future periods. Minimum and maximum bounds are also applied for time series (TS)-based variables.

  For example, if the user provides a current value of 5%, the calculation for the first future date (for example, 03/06/2025) will be based on the observation period from 30/04/2025 to 31/05/2025.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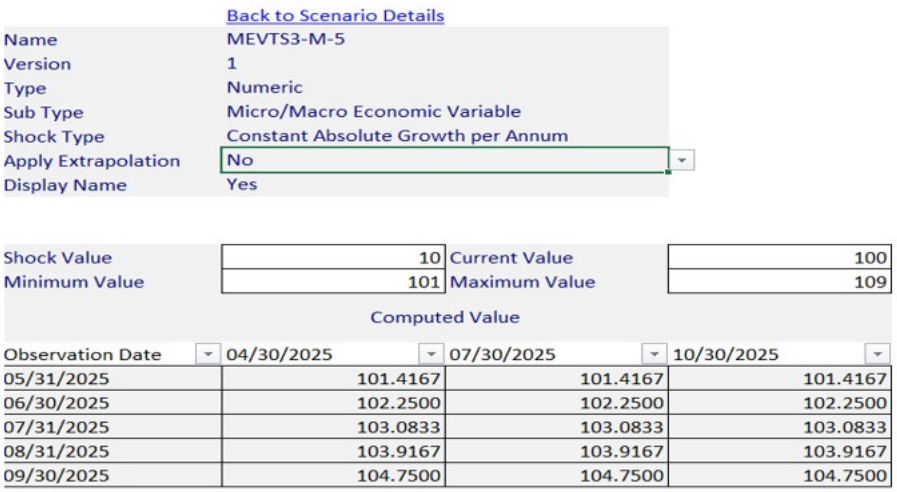
For the next future date (03/07/2025), the value from 03/06/2025 will be carried forward through interpolation, which, in this case, remains unchanged. As a result, the values across all future dates remain consistent, as shown in the scenario grid.

**Figure 5-2 Constant Absolute Growth per Annum**



Back to Scenario Details

| | |
|---|---|
| Name | MEVTS3-M-5 |
| Version | 1 |
| Type | Numeric |
| Sub Type | Micro/Macro Economic Variable |
| Shock Type | Constant Absolute Growth per Annum |
| Apply Extrapolation | No |
| Display Name | Yes |

| | | | |
|---|---|---|---|
| Shock Value | 10 | Current Value | 100 |
| Minimum Value | 101 | Maximum Value | 109 |

Computed Value

| Observation Date | 04/30/2025 | 07/30/2025 | 10/30/2025 |
|---|---|---|---|
| 05/31/2025 | 101.4167 | 101.4167 | 101.4167 |
| 06/30/2025 | 102.2500 | 102.2500 | 102.2500 |
| 07/31/2025 | 103.0833 | 103.0833 | 103.0833 |
| 08/31/2025 | 103.9167 | 103.9167 | 103.9167 |
| 09/30/2025 | 104.7500 | 104.7500 | 104.7500 |

**Extrapolation Support**

Users can enable extrapolation to extend observation dates beyond the current timeframe.

- A new grid appears with extended future dates.
- The number of extra dates depends on the frequencies of the scenario and the variable.

Frequency Base Days:

- Yearly (Y): 360 days
- Quarterly (Q): 90 days
- Monthly (M): 30 days
- Weekly (W): 7 days
- Daily (D): 1 day

The formula to calculate this is:

**Figure 5-3 MVETS Variable formula**

$$\text{Scenario Frequency (in days)} \div \text{Variable Frequency (in days)} = \text{Number of extrapolated dates}$$

**Example:**

If the scenario frequency is Quarterly (90 days) and the variable frequency is Monthly (30 days):

Q/M = 90/30 = 3, therefore, 3 new dates are added per extrapolation step.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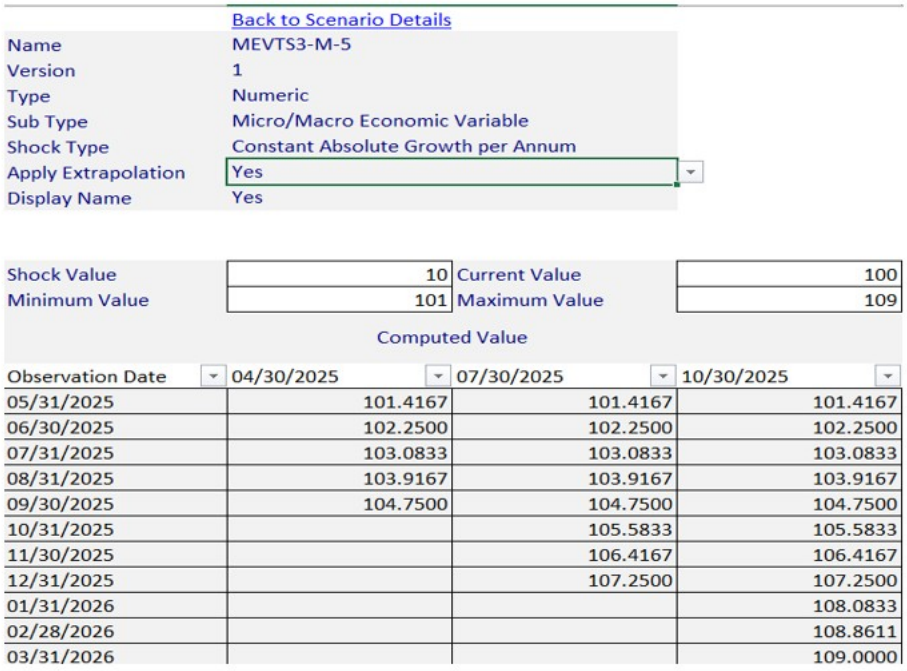
Extrapolated values are calculated using the same formula as defined for the selected shock type.

**Figure 5-4 MVETS Variable Example**



Back to Scenario Details

| | |
|---|---|
| Name | MEVTS3-M-5 |
| Version | 1 |
| Type | Numeric |
| Sub Type | Micro/Macro Economic Variable |
| Shock Type | Constant Absolute Growth per Annum |
| Apply Extrapolation | Yes |
| Display Name | Yes |

| | | | |
|---|---|---|---|
| Shock Value | 10 | Current Value | 100 |
| Minimum Value | 101 | Maximum Value | 109 |

Computed Value

| Observation Date | 04/30/2025 | 07/30/2025 | 10/30/2025 |
|---|---|---|---|
| 05/31/2025 | 101.4167 | 101.4167 | 101.4167 |
| 06/30/2025 | 102.2500 | 102.2500 | 102.2500 |
| 07/31/2025 | 103.0833 | 103.0833 | 103.0833 |
| 08/31/2025 | 103.9167 | 103.9167 | 103.9167 |
| 09/30/2025 | 104.7500 | 104.7500 | 104.7500 |
| 10/31/2025 | | 105.5833 | 105.5833 |
| 11/30/2025 | | 106.4167 | 106.4167 |
| 12/31/2025 | | 107.2500 | 107.2500 |
| 01/31/2026 | | | 108.0833 |
| 02/28/2026 | | | 108.8611 |
| 03/31/2026 | | | 109.0000 |

- **Constant Growth in Percentage per Annum:**
  This type follows the same rules as the Constant Absolute Growth per Annum shock type, but uses a percentage-based growth formula.

**Additional Information**

- **Interpolation (in Finance)**
  Used to estimate values within the range of known data points.

  **Example:**

  If a bond yields 4% for a 1-year maturity and 6% for a 3-year maturity, interpolation can estimate the 2-year yield.

- **Extrapolation (in Finance)**
  Used to estimate values beyond the range of known data points based on trends.

  **Example:**

  If a stock grows 10% per year over 3 years, extrapolation can estimate its price in the next year, assuming the trend continues.

**Shock Types for IRC Variables**

If you have selected numeric type of variable select from one of the shock type and provide your inputs.

- **Absolute Value** - the formula to calculate this is:

$$Absolute\ Value = Input\ Value$$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Where,

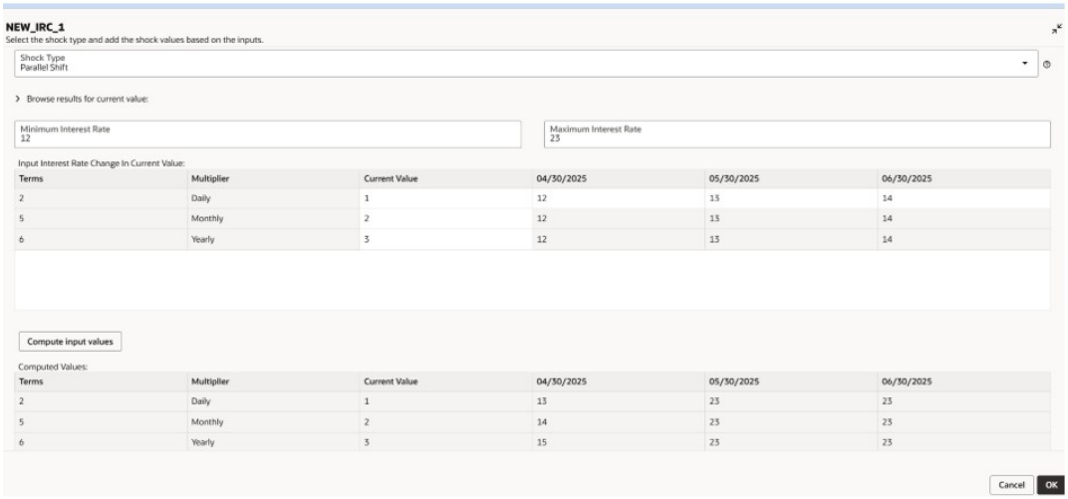
Input Value is the value entered on the User Interface (UI).

- **IRC Variable Grid Formation**
  During the variable creation process, terms and multipliers are defined for the IRC variable.

  Users can then enter current values, and the system will calculate corresponding future date values.

  The resulting grid appears as follows:

**Figure 5-5 IRC Variable Grid Formation**




IRC variable also has absolute value shocktype.

- **Flat:**: the formula to claculate this is as follows:

**Figure 5-6 IRC Variable Grid Formation**

```
CV + input_grid_value
```

In this shock type, the user provides input only for the current value.

All future values remain unchanged, resulting in a flat curve with no variation across time.

- **Parallel Shift:** the formula to claculate this is as follows:

**Figure 5-7 Parallel Shift formula**

```
max(min_value, min(CV + input_grid_value, max_value))
```

The user may optionally specify minimum and maximum bound values.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A single delta value is entered for all future dates and is uniformly applied to the current values.

This results in a parallel shift of the entire curve.

### 5.6.5 Cloning or Creating Scenario from Existing Scenario

To create a new scenario from an existing scenario, perform the following steps:

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. Click **Scenario**.

   The **Scenario Summary** page is displayed.

4. To create a scenario with similar settings, select the existing scenario, click **More Actions**, and then click **Copy**.
5. Provide a name and update the description and click **Continue**.
6. Review or update the selections and then click **Continue**.
7. To save your changes, click **Save**.
8. To save your changes and close the wizard, click **Save and Close**.
9. To share it for review, click **Save and Submit**.

## 5.7 Analysis Configuration

Analysis configuration serves as a foundational framework for conducting stress tests or scenario analysis within a project. It specifies the results or insights that the analysis aims to produce. These may include quantitative metrics, qualitative assessments, risk evaluations, or strategic recommendations. Defining clear outcomes helps align the analysis with the project's goals and stakeholders' needs. An analysis configuration is reusable across multiple projects, particularly when the same analytical approach or scenario framework is applicable. By linking a single configuration to multiple projects, organizations can streamline their analytical efforts, ensure consistency, and leverage past learnings and best practices. It provides a road map for researchers, analysts, and stakeholder, outlining the steps to be followed and the parameters to be considered. This ensures rigor and consistency in the analysis methodology. An analysis configuration consists of a scope, metrics, models, variables and an auto-created composite pipeline.

Scope - Outlines the boundaries and objectives of the analysis. It defines what aspects of the project or system are examined and what specific outcomes are sought. This ensures clarity and focus throughout the analysis process.

Metrics - The outcomes that users want to assess as part of a scenario analysis. Users can evaluate the impact of a particular scenario on metrics or compare metrics across scenarios to understand how their portfolio performs under different conditions.

Models and Processes - Defines the analytical models, methodologies, and computational processes used in the analysis. These may include mathematical models, statistical techniques, simulation methods, or scenario-building frameworks. Transparency in this section enhances the credibility and reproducibility of the analysis.

Variables - The factors or parameters that can be changed or observed during the analysis. They act as inputs to scenarios or conditions under which the analysis is conducted.


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Map Dimensions - Defines how variable dimensions are aligned and mapped within the configuration. All dimensions that are part of the selected variables are displayed in the **Variable Dimension Mapping** screen. Only the dimensions common to the selected metrics and variables are available for mapping.

Composite Pipelines - Generated automatically based on the selected metrics within the configuration. These pipelines facilitate execution of analytical processes, enhancing efficiency and automation.

## 5.7.1 Creating Analysis Configuration

**Prerequisites:**

- Ensure that all the objects (metrics, models, and variables) that you require for creating an analysis configuration are approved.

> **Note**
>
> Based on the metrics (process) and models you select, the variables are auto-populated. For this auto-population, you must map the `INPUT_GLOSSARY` of each variable to the pipeline (process or model).

To create an analysis configuration:

1. Login to STSA.

   The **Workspace Summary** page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Analysis Configuration**.

   The analysis configuration summary page is displayed.
4. Click **Create New** and then provide a configuration name, a description and select a analysis purpose type from the drop-down list.
   - **Ad hoc** - select to generate a general configuration
   - **Regulatory** - select to generate a configuration aligned to a geographic area or governmental jurisdiction which is governed by specific laws and regulations enforced by governments and regulators.
     If you select the **Regulatory** option, then perform the following:
     a. Select the governing jurisdiction from the **Jurisdiction** drop-down menu.
     b. Based on the selected jurisdiction, a list of the supported regulators are displayed. Select the required regulator from the **Regulator** drop-down menu.
     c. Based on the selected regulator, the regulation processes are listed. Select the required regulation from the **Regulation** drop-down menu.
     d. Select the run type as **Official** or **Nonofficial** based on the purpose of the run from the **Run Type** drop-down menu.

     > **Note**
     >
     > To submit the results to a regulatory board and compute results for defined governance rules, select the **Official** run.


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5. In the Scope page that opens, do either of the following:
   - Review and select the scope and click **Continue**.
   - Click **Create New** to create a scope.

> **Note**
>
> To select the entire portfolio, select the **bank-wide stress testing** option.

> **Note**
>
> For information about creating a portfolio, see Creating New Portfolios

6. In the Metrics page that opens, do either of the following:
   - Review and select the metrics and click **Continue**.
   - Click **Create New** to create a new portfolio.
     Based on the selected scope and metrics, the variables, models, and processes are automatically populated. You can also select them manually if needed.

> **Note**
>
> For information about creating metrics, see Creating New Metrics

7. In the Models page that opens, do either of the following:
   - Select the models for your analysis configuration and click **Continue**.
   - Click **Create New** to create a new models.

> **Note**
>
> – For information about creating the models, see Creating Models.
> – Based on the metrics you select, the models are auto-populated.

8. In the Variables page that opens, do either of the following:
   - Select the variable for your analysis configuration and click **Continue**.
   - If no scenario is referenced, select the variables for your analysis configuration, or click **Create New** to define new variables.

> **Note**
>
> – For information about creating the models, see Creating Variables.
> – Based on the process you select, the variables are auto-populated. However, However, auto-population of the Direct Ingestion variable is not currently supported.
> – Based on the models and process you select, the variables are auto-populated.


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9. Select the required variables and click **Continue**.

   All the dimensions that are part of the selected variables are displayed in the **Variable Dimension Mapping**.

   > **Note**
   >
   > Only the dimensions that are common to the selected metrics and variables are displayed for selection in the Map Dimensions for Variables screen.

   To map the dimensions for the required variables using the **Variable Dimension Mapping** screen.

   a. Click More Actions and select **Map Dimensions**.
   The **Variable Dimension Mapping** page is displayed.

   b. Do either of the following:

      i. To create a new mapping:

         i. Select **Create New**.

         ii. In the **Variable Dimension Mapping** page, select the dimension in the **Dimensions Selection** field and click **Next**.

         iii. Select the desired values in the **Members Selections** field and click **Next**.

         iv. Select the desired values in the **Dimension Mapping Combinations** field and click **Save**.

      ii. To copy a dimension from an existing scenario:

         i. Select **Copy From Scenario**.

         ii. On the **Copy Dimension Mapping from Scenario** page, select the associated scenario, and click **Next**.

      iii. To copy a dimension from an existing analysis configuration:

         i. Select **Copy From Analysis Configuration**.

         ii. In the **Copy Dimension Mapping from Analysis Configuration** field, select the analysis configuration, and click **Next**.

      > **Note**
      >
      > The dimensions, bands, and combinations are automatically selected. You can manually select additional items, and then click **Next**.

10. In the Process screen that opens, select the process for your analysis configuration and click **Continue**.

    The system creates a new composite pipeline named after the analysis configuration, with "_version" appended.

11. In the **Review & Validate** screen, review the configuration details and resolve all pending alerts.

    Click the **Action** icon for an alert to open the relevant resolution workflow.

12. After resolving all required alerts, click Save to complete the analysis configuration.


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> **Note**
>
> You must resolve all Critical alerts before you can submit the analysis configuration for review or approval. For information about resolving overlapping model outputs and result-metric alerts, see Resolving Output Overlaps and Result Metrics.

## 5.7.2 Cloning or Creating Analysis Configuration from Existing Analysis Configuration

To create a new analysis configuration from an existing analysis configuration, perform the following steps:

1. Login to STSA.

   The **Workspace Summary** page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Analysis Configuration**.

   The analysis configuration summary page is displayed.
4. Select an analysis configuration, click Actions and then select **Copy**.

   The analysis configuration definition page is displayed with all the details.
5. Modify the name and the selections if required and then click **Save**.
6. To save and close the wizard, click **Save and Close**.

## 5.7.3 Adding Additional Run Processes, Runs, and Models in Composite Pipeline

To add additional run processes, runs, and models in a composite pipeline:

1. Login to STSA.

   The **Workspace Summary** page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Analysis Configuration**.

   The **Analysis Configuration summary** page is displayed.
4. Open the required analysis configuration in edit mode.

   The **Review & Validate** screen is displayed, where you can add additional processes or models as needed.
5. Click **Process** on the right-hand side.

   The **Process** page and the selected composite pipeline is displayed.
6. Click actions against the pipeline and click **View**.

   The **Process Pipeline** page is displayed.
7. To add new processes, click the **Add New Processes** tab.

   Based on your previous selection, all the applicable processes are listed.
8. Select the required processes and click **Add**.


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A pop-up message is displayed for auto-sequencing option.

- If you want to continue with auto-sequencing, click **Yes**.
  If you select the auto-sequencing option, a confirmation message is displayed. Click **OK** and proceed to the **Process Pipeline** page.
- If you want to continue with manual sequence, click **No**.
  For more information on sequencing the runs, see the Sequencing Runs.

9. To save the changes, click **OK** and then click **Save and Close**.

## 5.7.4 Sequencing Runs

To sequence the runs using auto-sequencing or manual sequencing:

1. Login to STSA.

   The **Workspace Summary** page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Analysis Configuration**.

   The **Analysis Configuration summary** page is displayed.
4. Click the required analysis configuration.

   The **Review & Validate** screen is displayed.
5. Click **Process** on the right-hand side.

   The **Process** page and the selected composite pipeline is displayed.
6. Click actions against the pipeline and click **View**.

   The **Process Pipeline** page is displayed.
7. By default, the **Auto Sequence** option is selected and the runs are listed as per the default sequence.
8. (Optional) To sequence the runs manually, click **Manual Sequence**.
9. Under **Reorder** column, drag and drop the processes as per your requirement.
10. (Optional) To reset the order to the default auto-sequence mode, after changing the sequence manually, click the **Auto Sequence** option.
11. To save your selection, click **Save and Close**.

    A successful message is displayed.
12. (Optional) After rearranging the sequence manually, if you want to switch back to the auto-sequence mode, click the **Reset** option.

> **Note**
>
> In case of PMF mode, the auto-sequencing mode works only for the processes that are part of the composite pipeline that was created automatically. If you have added new processes through the **Add New Processes** screen, then these process are listed at the end of the list.


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> **Note**
>
> In case of Data Catalog (DC) mode, the processes are run in sequence as mapped in DC.

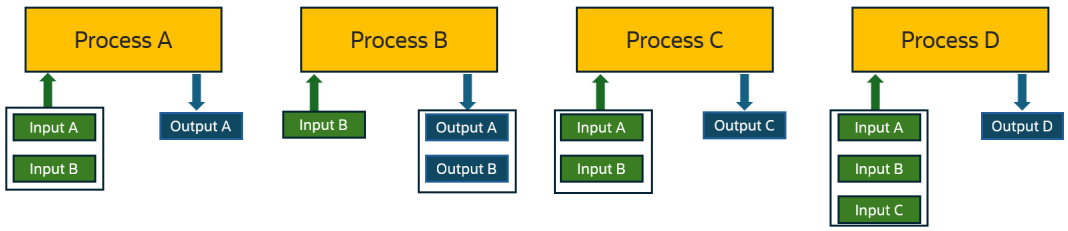
A glossary term on the data catalog has an input and output sub-glossary term. These sub-glossary terms are tagged to processes and models.
For example, Glossary terms A, B and C have input sub-glossary terms as Input_A, Input_B, Input_C and Output_A, Output_B and Output_C respectively.

These sub-glossary terms can be tagged to processes and models on the data catalog.

```
Assuming input_A is tagged to process A, process C and process D and
output_A is tagged to process B.
Input_B is tagged to process C, and output_B is tagged to process B.
Input_C is tagged to process A and process D and output_C is tagged to
process C.
Input_D is tagged to proceed D and output_D is tagged to process A.
```

This is represented in the below image.

**Figure 5-8 Glossary terms example**




Then, the processes are sequenced as below:

First process B is executed and then process C is executed followed by process A and finally process D is executed. The auto-sequencing is in this particular order since process B is not dependent on any inputs (or process) and can start immediately. However, process C has a dependency on process B (since the output of process B is an input to process C). Similarly, process A cannot run independently as it requires inputs from process C and process A's outputs are an input to process D.

The sequence of process is as per the below image:

**Figure 5-9 Process sequence example**





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To configure the component value (PMF or DC mode), refer to the **EST_CONFIGURATION** table mentioned in the Populating tables for Composite Pipeline components section.

13. To save the changes made, click **Save and Close**.

    A successful message is displayed. Click **OK**. The process section is displayed.

> **Note**
>
> Ensure that you save your changes and then exit the screen if you are changing the sequences manually.

## 5.7.5 Resolving Output Overlaps and Result Metrics

During Review & Validate, STSA identifies situations in which selected models produce outputs for the same metrics and overlapping scope. STSA also identifies situations in which multiple model outputs are mapped to the same result metric.

Resolve all required alerts before saving or submitting the analysis configuration.

### 5.7.5.1 Resolving Overlapping Model Outputs

When two or more models produce the same metric for the same or overlapping scope, STSA displays an overlapping model outputs alert.

To resolve overlapping model outputs:

1. In the **Review & Validate** screen, locate the overlapping model outputs alert.
2. Click the **Action** icon.
3. In the **Resolve Overlapping Model Outputs** drawer, review the shared metrics and scope.
4. To view the metrics and scope involved in the overlap, click **View Overlapping Details**.
5. Do one of the following:
   - If two models are involved, select the model that takes precedence.
   - If more than two models are involved, drag the models to define their run order.
6. Click **Next** to continue resolving additional overlaps.
7. On the **Review Model Run Order** step, verify the final model run order.

> **Note**
>
> Models lower in the run-order list run later. For metrics shared by the models, the result from the model that runs later is used.

8. Click **Save and Preview**.


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> **Note**
>
> STSA prevents an order that conflicts with a precedence decision made for an earlier overlap. If a conflict is displayed, it is shown in an alert to the user.

### 5.7.5.2 Reviewing Result Metrics

STSA automatically aggregates result metrics where model outputs can be combined. When model outputs cannot be automatically aggregated, STSA displays a Separate Metric Resolution alert.

To review result metrics:

1. In the **Review & Validate** screen, locate the New Separate Metric Resolution alert.
2. Click the **Action** icon.
   The Result Metric Review drawer opens.
3. Review the selected metric, contributing model, and result metric that STSA creates.
4. Click **Reviewed**.
   STSA creates a separate result metric for each affected model output that cannot be combined. Result metric names generated by STSA cannot be changed in the Result Metric Review drawer.

> **Note**
>
> Result-metric resolution is different from the Aggregation Rule configured for a metric. The Aggregation Rule determines how a metric value is calculated. Result-metric resolution determines whether outputs from multiple models are represented as one combined result metric or as separate result metrics.

## 5.8 Project

Project refers to any analysis the user proposes to undertake on the application through a scenario analysis, sensitivity analysis and so on. A project comprises of multiple objects such as an analysis configuration, one or more scenarios, datasets, and business rules per scenario.

### 5.8.1 Creating a Project

To create a project:

1. Login to STSA.

   The **Workspace Summary** page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Project**.

   The project summary page is displayed.
4. To create a project, click **Create New**.


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The project creation wizard is displayed.

5. Provide a name and description for the project.
6. Select a reference date (base production run date or when the data is available in sandbox for stress testing) for the project.

> **Note**
>
> Ensure that you provide the same reference date as provided in the scenario which you are planning to select for this project.

7. In the **Date Projection Mode** field, determine how the system handles time-sensitive dates (like maturity or payment dates) as the forecast moves forward in time. To do so, select either of the following options
   - **Rolling**: This option maintains the original time-to-event
     For Example,

     If an account is 6 months from maturity at the start, it will remain 6 months from maturity in every period of the forecast. Assume a Base Date of Jan 1st and a loan maturing on July 1st (6 months away). The maturity date shifts to Dec 1st (still 6 months away).
   - **Static**: This option original date as the base date.
     For Example,

     The maturity date stays July 1st (only 1 month away).
8. In the **Baseline Data & Results Source** field, choose how the system establishes the starting balances and metrics for your stress test. To do so, select either of the following options:
   - **Use Official Base from Production**: Imports the final, audited figures directly from the Production environment. This ensures your stress test starts from the 'official' numbers from the production run.
   - **Re-run Base in Sandbox**: Triggers a fresh calculation of the base date within this environment.
9. In the **Stress Impact View** field, select either of the following options to determine if the results should reflect the entire bank's position or just the specific area being tested.
   - **Show impact on Total Bank**: The system applies stress to portfolios you choose but generates the results for the entire bank.
   - **Show impact on Selected Portfolio only**: The report will ignore the rest of the bank and generates the results only for the portfolios you choose to stress.
10. Select an option for the **Maintain Constant Maturity/Date Profile**.

    This represents the date intervals in stress testing.
    - To maintain the same date interval throughout the stress testing period, click **Yes**.
      If you have added **Direct Ingestion** variables, then only the default date management calculation is applied for deriving the dates.

      If you have not added **Direct Ingestion** variables, then, STSA Date Management + Default Date Management calculation is applied for deriving the dates.
    - To use the default date calculation, click **No**.

    For more information about the Date Management logic, see the Preseeded Glossaries section.


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11. Select the **Analysis Type** as **Scenario**.

> **Note**
>
> Only the **Scenario** component is supported for this release.

12. Select the analysis purpose from the **Analysis Purpose** drop-down menu.

> **Note**
>
> For more information, see the *Analysis Configuration* section

13. In the **How would you like to continue with project creation?** field, select either of the following options and do the following:
    - (Optional) If you select **Configure Analysis Configuration**:
        a. (Optional) Click **Refer Scenario**.
        b. (Optional) In the **Select Scenario Configuration** page that opens, select the scenario and click **Select**.
    - If you select, **Continue with Scenario Setup**:
        a. (Optional) Click **Refer Analysis Configuration**.
        b. (Optional) In the **Select Analysis Configuration** page that opens, select the scenario and click **Select**.

> **Note**
>
> When creating a project, you can begin with either an analysis configuration or a scenario.
>
> - If a scenario is referenced from an analysis configuration, its variables are prepopulated.
> - If an analysis configuration is referenced from a scenario, variables in the scenario can now be a subset of the variables defined in the analysis configuration. STSA enforces validation to ensure that referenced scenario variables exist in the analysis configuration, but a full match of all analysis variables is no longer required.

14. Add an analysis configuration and click **Continue**.

    To add an analysis configuration, select from one of the available options:

    - Create a new analysis configuration - select the **Create New Configuration** option and provide a name and description. For more information, see create a new configuration section.


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> **Note**
>
> – Ensure that you select at least one metric while creating the configuration.
>
> – When creating a project, you may get two sets of variables:
>
> * Variables from the referenced scenario
>
> * Variables from the metric/model selection
>
> – If scenario variables are excluded from the configuration due to the selected scope, an **Alert** dialog is displayed listing the excluded variables. You can review each variable and choose whether to **Add** it to the configuration or **Remove** it from the scope.
>
> – This validation ensures that scenario variables can be a subset of the analysis configuration variables, and any excluded variables must be explicitly confirmed by the user before proceeding.

- Select from an existing analysis configuration - select the **Add an Existing Configuration** and do the following:
  a. In the **Select Analysis Configuration** screen that opens, select one of the configuration from the list.
  b. Review the selected portfolio, metrics, variables, mapped dimensions, and processes.
  c. Click **Add to Project**.
- Clone an existing analysis configuration - select the **Copy an Existing Configuration**, click **Select**, and then select one of the configuration from the list. Then provide a name and description and then review the selected portfolio, metrics, variables, mapped dimensions, and processes or make changes to the selections.
  a. In the **Select Analysis Configuration** screen that opens, select one of the configuration from the list.
  b. Click **Copy and Add to Project**.

15. In the **Configuration Added to Project** dailog box that opens, click **OK**.
16. In the Portfolio page that opens, do either of the following:
    - Review the porfolios and click **Continue**.
    - Click **Create New** to create a new portfolio.

> **Note**
>
> For information about creating a portfolio, see Creating New Portfolios

17. In the Metrics page that opens, do either of the following:
    - Review the metrics and click **Continue**.
    - Click **Create New** to create a new portfolio.

> **Note**
>
> For information about creating metrics, see Creating New Metrics


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18. In the Models page that opens, do either of the following:
    - Select the models for your analysis configuration and click **Continue**.
    - Click **Create New** to create a new models.

    > **Note**
    >
    > For information about creating the models, see Creating Models

19. In the Variables page that opens, do either of the following:
    - Select the variable for your analysis configuration and click **Continue**.
    - Click **Create New** to create a new variable

    > **Note**
    >
    > For information about creating the models, see Creating Variables

20. In the Map dimensions for Variables page that opens, do the following:
    a. In the Actions section, select **Map Dimensions**.
    b. Click **Continue**.
21. In the Process page that opens, review the process for your analysis configuration and click **Continue**.
22. In the **Review & Validate** page that opens, complete adding the analysis configuration, click **Save**.

    The **Alert** section displays the pending action. Click the relevant action item to complete the task before submitting the configuration for review.

    You can bulk select the metrics from the **Review and Validate** screen. To do so:

    a. In the **Alert** section, click the **Action** icon against the alert you want to modify.
    b. In the **Review Metrics** screen that opens, do either of the following:
        - Under the **Edit metrics selection** column, do either of the following:
            - Select **Include All** to select all available metrics.
            - Select **Choose Specific Metrics** to manually select metrics from the list.

            > **Note**
            >
            > When you select this option, a new screen opens where you can choose individual metrics.

            > **Note**
            >
            > You must click **Save** on that screen to return to the **Review Metrics** screen.

        - Click **Reset** to revert the selection to its initial state.
        - Click **Select All** to include all available metrics in bulk.


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c. Click **Save** on the Review Metrics screen to apply the changes.

d. Resolve output-related alerts in the Review & Validate screen as follows:

- For an overlapping model outputs alert, click the **Action** icon and define the required model precedence or run order.
- For a Separate Metric Resolution alert, click the **Action** icon to review the result metrics that STSA could not automatically aggregate.
- For more information, see Resolving Output Overlaps and Result Metrics. After adding the analysis configuration, the Project Activity pane is displayed on the right hand side listing the various stages of project creation. The status of the analysis configuration is displayed under the Definition Ready title.

After adding the analysis configuration, the **Project Activity** pane is displayed on the right hand side listing the various stages of project creation.

The status of the analysis configuration is displayed under the **Definition Ready** title.

a. If there are any errors in the analysis configuration they are shown as alerts. Fix then using the **Edit Analysis Configuration** after the **In-Progress** entry.
If the configuration is not complete, the status is displayed as **In-Progress**.

- To modify the selected analysis configuration, click the **Edit Analysis Configuration** link.
- To remove the analysis configuration, click the **Analysis Configuration** tab and then click **Remove Configuration**.

> **Note**
>
> Ensure to fix the errors before requesting for project approval.

> **Note**
>
> You can edit a configuration only if it is in a draft state.

b. After selecting a valid configuration or fixing the alerts in the selected configuration, the status is updated to **Completed**.

c. Add a scenario using the **Add Scenarios** link.

From the Project Status tab (in **Edit** or **Copy** mode), you can review and submit an Analysis Configuration or Scenario for further processing.

This action is enabled only under the following conditions:

- When the status is **Draft**, you can submit the item for review.
- When the status is **Reviewed**, you can submit the item for approval.

> **Note**
>
> For all other statuses, the **Actions** option is disabled.

Do the following:

a. Navigate to the **Status** tab.


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b. Locate the required Analysis Configuration or Scenario.

c. Verify that the status is either **Draft** or **Reviewed**.

d. 4. Click the **Actions** icon corresponding to the item.

e. The **Analysis Review** page opens. It displays the following:

- Alerts (Severity, Object, Description)
- Configuration/Scenario details
- Metrics and related setup

f. Review the alerts.
Resolve all Critical alerts (for example, Process is not defined) before proceeding.

g. Click the appropriate action:

- **Submit for Review** (for Draft status)
- **Submit for Approval** (for Reviewed status)

23. After the Analysis Configuration and Scenario are added to the project, in the Project Status tab, in the **Alerts** section for Analysis Configuration and Scenario, you can review and submit an Analysis Configuration or Scenario for further processing. To do so:

a. Navigate to the **Status** tab.

b. Locate the required Analysis Configuration or Scenario.

c. Verify that the status is either **Draft** or **Reviewed**.

d. 4. Click the **Actions** icon corresponding to the item.

e. The **Analysis Review** page opens. It displays the following:

- Alerts (Severity, Object, Description)
- Configuration/Scenario details
- Metrics and related setup

f. Review the alerts.
Resolve all Critical alerts (for example, Process is not defined) before proceeding.

g. Click the appropriate action:

- **Submit for Review** (for Draft status)
- **Submit for Approval** (for Reviewed status)

24. Create a pipeline.

To create a pipeline:

a. In the **Project Activity** pane, under the **Pipeline Reviewed** title, click **Create Pipeline**.

This activity to create the composite pipeline with a requisite data pipeline, analysis configuration, scenarios along with results pipeline to move the results from the production to sandbox.
After the composite pipeline is created, the canvas is loaded and the pipeline is displayed with all the components.

After the pipeline is created, the **Pipeline Reviewed** shows as **Completed**.

b. To view or edit the pipeline, click Actions against the **Pipeline Reviewed** and then click **View Pipeline** or **Edit Pipeline**.


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To edit the pipeline, see the Oracle Financial Services Analytical Applications Infrastructure Process Modeling Framework Orchestration Guide

25. Create a result dimension.

    To create a result dimension:

    a. In the **Project Activity** pane, under the **Result Setup** tab, click **Add Result Dimension** to open the dimension configuration screen.

       This option is available only if the analysis configuration contains metrics.

    b. In the **Choose the dimensions** screen, select the required dimension names from the drop-down list.

    c. Click **Next**.

    d. In the **Map Dimensions to Results** table, review the **Foreign Key Reference** for each selected dimension and table.

       - If STSA identifies one eligible reference column, it is selected automatically.
       - If STSA identifies multiple eligible reference columns, select the required column from the **Foreign Key Reference** drop-down list.
       - If no eligible reference column is available, no selection is displayed.

    e. Click **Save** to confirm the result-dimension mapping. After it is configured, the result dimensions are listed under the Result Setup tab.

    After it is configured, the result dimensions are listed under the **Result Setup** tab. These dimensions will be used in the results pipeline for mapping and analysis.

26. Submit the project for review and approval process.

    For more information about sending objects for review and approval, see the Workflow for STSA Objects section.

27. After the project is approved, open the project in view mode.

    The project page is displayed.
    The status of the project is updated to 100 percent complete at this stage.

28. When creating a project, you must define how its runs are executed: **Parallel** or **Sequential**. This selection determines whether multiple runs under a project execute at the same time or one after the other.

    > **Note**
    >
    > STSA supports delayed parallel execution. Ensure that the application you are working with also supports the parallel execution model.

    - **Parallel** (default): Multiple runs are executed simultaneously. This is the default selection for all new projects.
    - **Sequential:** Runs are executed one after the other, based on their defined order.

    To select the execution mode:

    a. Open the approved project in View mode. In Project Activity, click More Actions and then click **Select Execution Mode**.
       The Execution Setup page opens.

    b. Click **Select Execution Mode**.


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c. In the **Preview Execution Flow** dialog, select one of the following:

- **Parallel**
- **Sequential**

> **Note**
>
> If the project includes a Base Run, it will always execute first regardless of the selected execution mode. The base run acts as a foundational execution before subsequent runs in either flow mode.

29. (Optional) Configure an Aggregation Run

An Aggregation Run associates an approved Aggregation Definition with the project execution. Use this option when the project requires aggregation processing.

To configure an Aggregation Run:

a. Open the approved project in **View** mode.

b. In the Project Activity pane, under **Run Parameters Added**, click **Aggregation Run**. The **Execution Setup** page opens.

c. In the **Aggregation Run** section, answer the question **Do you want to use an Aggregation Run?**

- Select **No** if aggregation processing is not required. Any existing Aggregation Definition selection is cleared.
- Select **Yes** to associate an Aggregation Definition with the project.

d. When you select **Yes**, click **Select Aggregation Definition**.
The **Aggregation Definition Review** drawer opens.

e. Select an Aggregation Definition from the list.
Only approved Aggregation Definitions associated with the project's selected Analysis Configuration are available for selection. You can use the search field to locate a definition.

f. Review the selected Aggregation Definition. The review drawer displays the following information, when available:

- Aggregation Definition name, version, code, status, and description
- Associated Analysis Configuration and template details
- Field Treatment Plan, including configured tables, columns, statuses, and aggregation dimensions
- Aggregation Dimensions
- Decision Summary

g. Close the drawer after reviewing the definition.
The system associates the selected Aggregation Definition with the project. The selected definition is displayed in the **Select Aggregation Definition** field.

> **Note**
>
> If no approved Aggregation Definitions are available for the selected Analysis Configuration, create and obtain approval for an appropriate Aggregation Definition before configuring the Aggregation Run.


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30. Add the run parameters to capture the execution parameter values required for process or model execution.

    To add **Run Parameters**:

    a. Open the project in **View** mode.

    b. In **Project Activity** under **Run Parameters Added** click More Actions and then click **Add Run Parameters**.

       The **Add Run Parameters** screen is displayed.

    c. To add a parameter, click the add icon.

    d. Provide a name and description and the **FIC MIS Date**.

       For this release provide the **FIC MIS Date** as the project start date.

    e. Click **Next**.

    f. Select the required run parameters for the selected process.

    g. Click **OK** and then click the save icon.

    h. To save the parameter, click **Save**.

    In the **Run Parameters** tab, all the added run parameters are listed.

31. Make one of the execution run time parameter as the latest.

    > **Note**
    >
    > If only one run parameter is added, this is automatically set to **Make Latest**.

    To make an execution run parameter the latest:

    a. Click more actions against one of the run parameter

    b. Click **Make Latest**.

32. To run the project, click **Run Project**.

    > **Note**
    >
    > If **Aggregation Run** is set to **Yes**, you must select an Aggregation Definition before you run the project. The system prevents execution when Aggregation Run is enabled but no Aggregation Definition is selected.

33. In the confirmation, click **Yes**.

34. Click **Ok** after the project is run successfully.


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> **Note**
>
> - A project can have multiple scenarios, and pause components in the scenarios. So,ensure that you resume the run, if the pause component is present, after doing the required changes.
> - The system generates email notifications at the following stages of project execution:
>   - **Run initiation**: Indicates that project execution has started.
>   - **Completion**: Indicates that project execution completed successfully.
>   - **Error state**: Indicates that execution failed or was aborted.
>   - **Pause**: Indicates that project execution has paused.
>
>   These notifications enable users to track project execution status without actively monitoring the interface.

In the **Project Activity** pane under the **Results Ready** title the status is displayed as run completed.

During project execution, when scenario execution reaches the pause component, execution status will be Paused.

- To resume a run, click More Options against a run and click **Resume**.

35. To view the reports:
    a. Click the **Execution And Results** tab.
    b. Locate the required execution.
    c. Note the following columns for the execution: Name, Execution Id, Projected Date, Process Instance Id, Status, Pseudo Date, Run Skey, and Start Time.
    d. Click the **Actions** menu corresponding to the execution.
    e. Select one of the following options:
       - **View Results**
       - **Publish Results**
       - **View Published Results**
    f. Selecting any of the three options above opens the same secondary menu of report types.
    g. From this menu, select one of the following report types:
       - **Trend & Composition Reports** – Displays trend and composition analysis.
       - **Variance from Base Reference Date** – Shows variance compared to the base reference date.
       - **Variance Between Two Dates for a Given Scenario** – Compares results across two dates within the same scenario.
       - **Variance Between Scenarios** – Compares results across different scenarios.
    h. Click the required report to view the analysis.


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> **Note**
>
> - The secondary report menu is available for both View Results and View Published Results.
> - These report options are applicable only at the Analysis Configuration and Scenario levels.
> - Some report options may be disabled based on execution status or data availability.
> - Ensure the execution status is **Completed** to access all report types.
> - Abort Execution and Resume Execution also appear in this Actions menu, grayed out when the execution status doesn't allow that action.

i. (Optional)To refresh the page at specific intervals, provide the interval in the **Refresh Interval In Minutes** and click **Start Auto-Refresh**.

j. (Optional) To refresh the page after the execution, click **Refresh**.

k. To hide or view columns in the **Execution And Results** page,

   i. Click the column icon and rearrange the column names as per your preference.

   ii. To hide the column, move the column name below to the Hide section.

36. View the Aggregation Definition used for an execution

    In the Execution And Results tab, you can review the Aggregation Definition associated with a completed or historical execution.

    a. Locate the required execution.

    b. Click the Actions menu corresponding to the execution.

    c. Click **View Aggregation Definition**.

    The **Aggregation Definition Review** drawer opens and displays the definition details, alerts, field treatment plan, aggregation dimensions, and decision summary used by that execution.

    > **Note**
    >
    > The **View Aggregation Definition** option is available only when an Aggregation Definition is associated with the selected execution.

37. (Optional) To abort an approved project execution:

    a. In the Project Summary page, click the **Actions** button next to the entry and select **Edit**.

    b. In the **Project** screen that opens, go to the **Execution & Results** tab.

    c. In the **Latest Execution** section, click the **Actions** button next to the required entry and select **Edit**.

    d. Navigate to the **Results and Summary** screen.

    e. Click the **Actions** button and select **Abort Execution** to abort the project.


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> **Note**
>
> Aborting the execution will stop further processing for the current run. Use this action only when it is safe to terminate the process.

38. (Optional) To resume a paused project execution:

    When a project is paused, you will receive an email notification indicating the scenario status and required action.

    To resume execution:

    a. In the Project Summary page, click the **Actions** button next to the entry and select **Edit**.

    b. In the **Project** screen that opens, go to the **Execution & Results** tab.

    c. In the **Latest Execution** section, click the **Actions** button next to the required entry and select **Edit**.

    d. Navigate to the **Results and Summary** screen.

    e. Click the **Actions** button and select **Resume Execution** to abort the project.

> **Note**
>
> Resuming the execution will continue processing the scenario from where it was paused. Ensure all required tasks are completed before resuming.

39. After the project is approved, you can publish scenario results and view the publish results. To do so:

    a. In the Project Summary screen, click **View** under **Actions**.

    b. In the page that opens, click the **Execution And Results** tab.

    c. Locate an execution with the status **COMPLETED** and click the **Actions** menu.

    d. To publish scenario results, click **Publish Results**.
    The **Publish Results** window opens, allowing you to select the scenarios to be included in the official results.

    e. In the **Publish Results** page that opens, do the following:

        i. Use the search bar to find specific scenarios, if required.

        ii. Select the required scenarios or click **Select All**.

        iii. Review the scenario names and versions.

        iv. Click **Publish**.

    f. To view the published results, click the **Actions** menu for the same execution and select **View Publish**
    The system displays the results for the scenarios that were selected during publishing.

    .

## 5.8.2 Cloning or Creating Project from Existing Project

When you clone an existing project, the system retains the original project's flow—including whether it started with a scenario or an analysis configuration. You can modify this flow after cloning if required.


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> **Note**
>
> Referenced scenarios or analysis configurations in the original project are not automatically linked in the cloned project.
>
> You can choose to reference different objects or reconfigure the flow when editing the cloned project.
>
> Variables will auto-populate based on the referenced object, and validations are applied to ensure consistency.

To create a new project from an existing project:

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. Click **Project**.

   The project summary page is displayed.
4. To replicate and modify an existing project with minor changes, select an existing project, click **More Actions** and then click **Copy**.
5. Provide a name, update the description, review the selections made and click **Save**.

   The project summary page is displayed.
6. Review the selected analysis configuration and project or select new configuration and project or create new configuration and project.

   For more information about creating an analysis configuration, see the Creating Analysis Configuration section.
   For more information about creating a project, see the Creating a Project section.
7. Submit the project for review and approval process.

   For more information about sending objects for review and approval, see the Workflow for STSA Objects section.
8. After the project is approved, add the run parameters by clicking the **Add Run Parameters** (if required), else make one of the existing run parameters as the latest and then run the project.


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6

# Prerequisites and Postrequisites for STSA


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# 6.1 Prerequisites for STSA

> **Note**
>
> Ensure that all the objects are created on the same workspace.

## 6.1.1 Creating Sandbox

**Introduction**

A sandbox in STSA is an isolated workspace used for modeling, testing, and validating stress testing configurations, without affecting the live production environment. It acts as a controlled environment where analysts can ingest metadata, configure variables, simulate models, and preview outcomes.

A Sandbox is used for the following:

- To safely test new configurations and modeling scenarios.
- To perform impact analysis without influencing production data.
- To validate metadata and data catalog setups before actual stress testing execution.
- To manage project-specific data and metadata in a structured and independent context.

The uses of Sandbox in STSA are as follows:

- Hosts a cloned or migrated version of production metadata.
- Serves as the foundation for defining portfolios, metrics, models, variables, and process pipelines.
- Allows users to perform dry runs, trial configurations, or simulate project executions with custom data.
- Facilitates consistent, reproducible project setups across different teams.

For general queries such as purpose, frequency, and lifecycle of sandbox usage, see the following sections:

- FAQ A.3 – Workspaces and Data Management
- FAQ A.4 – Stress Testing and Scenario Analysis

To create a sandbox:

**Prerequisites**

1. Configure the Workspace Schema JNDI Datasource
   For every STSA workspace, configure the simulation infodom JNDI datasource before running the Create Workspace or Edit Workspace flow. This configuration is mandatory for model registration to complete successfully.

   Create a JNDI datasource named `jdbc/<infodom/workspace_name>`.


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a. Add the datasource to the application server configuration:
   - For Tomcat, add a <*Resource*> entry to *apache-tomcat/conf/server.xml*.
   - For WebLogic, configure an equivalent JNDI datasource using the WebLogic Administration Console.

b. Configure the datasource with the appropriate workspace schema credentials and JDBC connection URL.

c. Save the configuration.

d. Restart the application server.

2. Create a new empty DB schema.
Create a separate Oracle database user for each workspace schema. The workspace schema user is used as the Oracle schema for the sandbox/workspace. Run the following command as a DBA user:

```
CREATE USER <oracle_user_name> IDENTIFIED BY <password>
   DEFAULT TABLESPACE USERS
   TEMPORARY TABLESPACE TEMP
   QUOTA <quota_size>|UNLIMITED ON USERS;
```

> **Note**
>
> Ensure that the new database schema is created on the same database server as the OFSAA application database server.

In the following grants, replace *&schemaname* with the Oracle user name created in this step.

```
grant create SESSION to &schemaname;
   grant create PROCEDURE to &schemaname;
   grant create SEQUENCE to &schemaname;
   grant create TABLE to &schemaname;
   grant create TRIGGER to &schemaname;
   grant create VIEW to &schemaname;
   grant create MATERIALIZED VIEW to &schemaname;
   grant create SYNONYM to &schemaname;
   grant CREATE TYPE TO &schemaname;
   GRANT EXECUTE ON SYS.DBMS_CRYPTO TO &schemaname;
```

For OM Ingestion, run the following grants:

```
grant SELECT ON DBA_TABLES TO &schemaname;
   grant SELECT ON DBA_MVIEWS TO &schemaname;
   grant SELECT ON DBA_TAB_IDENTITY_COLS TO &schemaname;
   grant SELECT ON DBA_TAB_COLS TO &schemaname;
   grant SELECT ON DBA_TAB_COMMENTS TO &schemaname;
   grant SELECT ON DBA_VIEWS TO &schemaname;
   grant SELECT ON DBA_SOURCE TO &schemaname;
   grant SELECT ON DBA_CONSTRAINTS TO &schemaname;
   grant SELECT ON DBA_CONS_COLUMNS TO &schemaname;
   grant SELECT ON DBA_COL_COMMENTS TO &schemaname;
```


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For the AAI configuration schema, on the OFSAA server, navigate to the $FIC_HOME directory and execute the following script:

```
$FIC_HOME/config_table_privileges_for_atomic_user.sql
```

When prompted for the atomic user name, provide the workspace schema user name created in the first step. The atomic user name must be the same as *&schemaname*.

After running the script, execute the following additional grants:

```
grant select on CSSMS_USR_PROFILE to &schemaname;
   grant select on CSSMS_ROLE_MAST to &schemaname;
   grant select on CSSMS_GROUP_MAST to &schemaname;
   grant select on CSSMS_FUNCTION_MAST to &schemaname;
   grant select on CSSMS_USR_GROUP_MAP to &schemaname;
   grant select on CSSMS_USR_GROUP_DSN_SEG_MAP to &schemaname;
   grant select on CSSMS_ROLE_FUNCTION_MAP to &schemaname;
   grant select on cssms_usr_attrib to &schemaname;
   grant select on AAI_DB_DETAIL to &schemaname;
   grant select on CSSMS_GROUP_ROLE_MAP to &schemaname;
   grant select on CSSMS_SEGMENT_MAST to &schemaname;
   grant select on BATCH_TASK to &schemaname;
   grant select on CSSMS_USR_DSN_SEG_MAP to &schemaname;
   grant select on CSSMS_USR_ROLE_MAP to &schemaname;
   grant select on CSSMS_METADATA_SEGMENT_MAP to &schemaname;
   grant select on BATCH_RUN to &schemaname;
   grant select on PR2_FILTERS to &schemaname;
   grant select on PR2_TASK_FILTER_DETAIL to &schemaname;
   grant select on ST_STRESS_MASTER to &schemaname;
   grant select on BATCH_MASTER to &schemaname;
   grant select on ICC_MESSAGELOG to &schemaname;
   grant select on MF_MODEL_SCRIPT_MASTER to &schemaname;
   grant select on MF_INPUT_VALUES to &schemaname;
   grant select on MF_MODEL_OUTPUT_VALUES to &schemaname;
   grant select on DB_MASTER to &schemaname;
   grant select on DSNMASTER to &schemaname;
   grant select on pr2_rule_map to &schemaname;
   grant select on FORMS_LOCALE_MASTER to &schemaname;
   grant ALL PRIVILEGES on pr2_rule_map_pr to &schemaname;
   grant ALL PRIVILEGES on pr2_rule_map_pr_tmp to &schemaname;
   grant select on pr2_rule_map_exclude to &schemaname;
   grant ALL PRIVILEGES on pr2_rule_map_exclude_pr to &schemaname;
   grant ALL PRIVILEGES on pr2_rule_map_exclude_pr_tmp to &schemaname;
   grant select on pr2_run_object to &schemaname;
   grant select on pr2_run_object_member to &schemaname;
   grant select on pr2_run_map to &schemaname;
   grant select on pr2_run_execution_b to &schemaname;
   grant select on AAI_BACKDATED_EXEC_INFO to &schemaname;
   grant select on pr2_run_execution_filter to &schemaname;
   grant select on pr2_firerun_filter to &schemaname;
   grant select on pr2_filters to &schemaname;
   grant select on configuration to &schemaname;
   grant select on batch_parameter to &schemaname;
   grant select on component_master to &schemaname;
   grant select on MDB_OBJECT_TYPE_ATT_LAYOUT to &schemaname;
   grant select on REV_OBJECT_ATTRIBUTE_DTL to &schemaname;
```


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```
   grant select on mdb_object_dependencies to &schemaname;
   grant select on REV_STAT_DATA to &schemaname;
   grant select on REV_OBJECT_REPOSITORY_B to &schemaname;
   grant select on REV_OBJECT_REPOSITORY_TL to &schemaname;
   grant select on REV_OBJECT_ATTRIBUTE_DTL_MLS to &schemaname;
   grant select on REV_OBJECT_APPLICATION_MAP to &schemaname;
   grant select on MDB_OBJ_EXPR_DETAILS to &schemaname;
   grant select on MDB_EXECUTION_DETAILS to &schemaname;
   grant select on REV_OBJECT_TYPES_CD to &schemaname;
   grant select on REV_OBJECT_TYPES_MLS to &schemaname;
   grant select on REV_APPLICATIONS_CD to &schemaname;
   grant select on REV_APPLICATIONS_MLS to &schemaname;
   grant select on METADATA_BROWSER_LOCALE to &schemaname;
   grant select on MDB_STAT_DATA to &schemaname;
   grant select on MDB_OBJECT_TYPE_LAYOUT to &schemaname;
   grant select on ofsa_md_id_ref to &schemaname;
   grant select on MDB_ETL_MAPPING to &schemaname;
   grant select on setupinfo to &schemaname;
   grant select on LOCALEREPOSITORY to &schemaname;
   grant select on MF_MODEL_MASTER to &schemaname;
   grant select on MF_SANDBOX_MASTER to &schemaname;
   grant select on MF_VARIABLE_MASTER to &schemaname;
   grant select on MF_TECHNIQUE_MASTER to &schemaname;
   grant select on MDB_RULE_SOURCE_HEADER to &schemaname;
   grant select on MDB_RULE_TARGET_HEADER to &schemaname;
   grant select on MDB_RULE_TARGET_MEMBER_HEADER to &schemaname;
   grant select on MDB_RULE_GRID_DATA to &schemaname;
   grant select on MDB_MODEL_MAPPING to &schemaname;
   grant delete on AAI_MAP_MAPPER to &schemaname;
   grant insert on AAI_MAP_MAPPER to &schemaname;
   grant update on AAI_MAP_MAPPER to &schemaname;
   grant select on AAI_MAP_MAPPER to &schemaname;
   grant select on infodom_patches to &schemaname;
   grant select on MDB_OBJECTS_GROUP_MASTER to &schemaname;
   grant select on MDB_OBJECTS_GROUPING to &schemaname;
   grant select on aai_wf_filter_exec_map to &schemaname;
   grant select,insert,update on aai_wf_request_queue to &schemaname;
   grant select,insert,update on aai_wf_request_queue_hist to &schemaname;
   grant select,insert,update on aai_wf_request_parameter to &schemaname;
   grant select,insert,update on aai_wf_request_parameter_hist to
&schemaname;
   grant select,insert,update on AAI_WF_APP_REGISTRATION to &schemaname;

   -- Attribution Analysis
   grant select on AAI_WF_ATTR_ANALYSIS_DETAILS to &schemaname;
   grant select on AAI_WF_ATTR_COMPONENT to &schemaname;
   grant select on AAI_WF_RUNSKEY_MAPPING to &schemaname;
   grant select on AAI_WF_ATTR_VAR_MAPPING to &schemaname;
   grant select on AAI_WF_ATTR_COMP_VAR_MAPPING to &schemaname;
   grant select on AAI_WF_ATTR_EXECUTION to &schemaname;
   grant select on AAI_WF_ATTR_VAR_EXEC_INST to &schemaname;
   grant select on AAI_WF_RUN_EXEC_PARAMS to &schemaname;

   grant select on cssms_usr_group_map_view to &schemaname;
   grant execute on checkEnvForDataRedaction to &schemaname;
```


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```
   -- ABC 8.1 Grants
   grant select,references on AAI_ABC_DIM_PURPOSE to &schemaname;
   grant select,references on AAI_ABC_DIM_SB_EFFECTIVE to &schemaname;
   grant select,references on AAI_ABC_DIM_QTNR_TYPE to &schemaname;
   grant select,references on AAI_ABC_DIM_STATUS_QTNR to &schemaname;
   grant select,references on AAI_ABC_DIM_STATUS_QTNR_MLS to &schemaname;
   grant select,references on AAI_ABC_DIM_SIGNOFF_TYPES to &schemaname;
   grant select,references on AAI_ABC_DIM_QTNR_APP_TYPES to &schemaname;
   grant select,references on AAI_ABC_DIM_QTN_SEL_TYPE to &schemaname;
   grant select,references on AAI_ABC_DIM_QTN_TYPE to &schemaname;
   grant select,insert,update,delete,references on
AAI_ABC_DIM_QTN_CATEGORY to &schemaname;
   grant select,references on AAI_ABC_DIM_QTNR_RESP_TYPE to &schemaname;
   grant select,references on AAI_ABC_DIM_QTNR_DEPUTE_TYPE to &schemaname;
   grant select,references on AAI_ABC_DIM_RESULT_SET_CAT_OPT to
&schemaname;
   grant select,references on AAI_ABC_DIM_QTNR_CRITICALITY to &schemaname;
   grant select,references on AAI_ABC_SETUP_COMPONENTS to &schemaname;
   grant select,references on AAI_ABC_SETUP_QTN_CONF_TYP to &schemaname;
   grant select,references on AAI_ABC_SETUP_QTN_CONF_TYP_MLS to
&schemaname;
   grant select,references on AAI_ABC_FCT_QTNR_CONF to &schemaname;
   grant select,references on AAI_ABC_DIM_PURPOSE_MLS to &schemaname;
   grant select,references on AAI_ABC_DIM_QTNR_TYPE_MLS to &schemaname;
   grant select,references on AAI_ABC_DIM_EMPLOYEE to &schemaname;
   grant select,insert,update,delete,references on
AAI_ABC_DIM_QTN_CATEGORY_MLS to &schemaname;
   grant select,references on AAI_ABC_DIM_QTN_SEL_TYPE_MLS to &schemaname;
   grant select,references on AAI_ABC_DIM_QTN_TYPE_MLS to &schemaname;
   grant select,references on AAI_ABC_DIM_QTNR_APP_TYPES_MLS to
&schemaname;
   grant select,references on AAI_ABC_DIM_QTNR_CRITICAL_MLS to &schemaname;
   grant select,references on AAI_ABC_DIM_QTN_DEPUT_TYPE_MLS to
&schemaname;
   grant select,references on AAI_ABC_DIM_QTNR_RESP_TYPE_MLS to
&schemaname;
   grant select,references on AAI_ABC_DIM_RESSET_CAT_OPT_MLS to
&schemaname;
   grant select,references on AAI_ABC_DIM_SB_EFFECTIVE_MLS to &schemaname;
   grant select,references on AAI_ABC_DIM_SIGNOFF_TYPES_MLS to &schemaname;
   grant select,references on AAI_ABC_FCT_QTNR_ENTITY_MAP to &schemaname;
   grant select,references on AAI_ABC_SETUP_COMPONENTS_MLS to &schemaname;
   grant select,references on AAI_ABC_ENTITY_DOCUMENT_MAP to &schemaname;
   grant select,references on AAI_ABC_DIM_OR_STATUS_MLS to &schemaname;
   grant select,references on MESSAGES_EN_US to &schemaname;
   grant select,references on AAI_ABC_DIM_FREQUENCY to &schemaname;
   grant select,references on AAI_ABC_SETUP_PURPOSE_PROC_MAP to
&schemaname;
   grant select,references on AAI_ABC_DIM_FREQUENCY_MLS to &schemaname;
   grant select,references on AAI_ABC_SETUP_DOCUMENT_CLASS to &schemaname;
   grant select,references on AAI_ABC_SETUP_DOC_CLASS_MLS to &schemaname;
   grant select,references on AAI_ABC_DIM_OR_STATUS to &schemaname;
   grant select,references on DOCUMENT_MASTER to &schemaname;
   grant select,references on AAI_ABC_DIM_COND_OPERATORS to &schemaname;
   grant select,references on AAI_ABC_DIM_COND_OPERATORS_MLS to
&schemaname;
```


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```
   grant select,references on AAI_ABC_DIM_OPT_COND_SCOPE to &schemaname;
   grant select,references on AAI_ABC_DIM_OPT_COND_SCOPE_MLS to
&schemaname;
   grant select,references on AAI_ABC_DIM_QTN_OPT_TYPES to &schemaname;
   grant select,references on AAI_ABC_DIM_QTN_OPT_TYPES_MLS to &schemaname;
   grant select,references on AAI_APP_TL to &schemaname;
   grant select,references on AAI_ABC_DIM_QTN_DT_RST_CAT to &schemaname;
   grant select,references on AAI_ABC_DIM_QTN_DT_RST_CAT_MLS to
&schemaname;
   grant select,references on AAI_ABC_DIM_QTNR_AUDIT_STATUS to &schemaname;
   grant select,references on AAI_ABC_DIM_QTNR_AUDIT_STS_MLS to
&schemaname;
   grant select,references on AAI_ABC_DIM_QTNR_ERROR_CODE to &schemaname;
   grant select,references on AAI_ABC_DIM_QTNR_ERROR_COD_MLS to
&schemaname;
   grant select on AAI_WF_APP_REGISTRATION to &schemaname;
   grant select on CSSMS_PROFILE_HOLIDAY_MAP to &schemaname;
   grant select on CSSMS_PROFILE_MAST to &schemaname;
   grant select on WEB_SERVER_INFO to &schemaname;
   grant select,references on AAI_APP_B to &schemaname;
   grant select,references on AAI_USR_PREFERENCE_DETAIL to &schemaname;
   grant select on RTI_UI_EXCLUDE_PDM_LIST to &schemaname;
   grant select on RTI_VIR_PHY_TBL_NAME to &schemaname;
   grant select on RTI_DOMAIN to &schemaname;
   grant select on aai_wf_process_b to &schemaname;
   grant select on aai_wf_process_tl to &schemaname;
```

3. Create a wallet alias for the newly created schema in the STSA server wallet. Create the wallet alias for the workspace schema user created in Step 1 using the following command:

   ```
   mkstore -wrl <wallet_location> -createCredential <workspace_schema_alias>
   <workspace_schema_user>
   ```

   After creating the alias, verify the connection using:

   ```
   sqlplus /@<workspace_schema_alias>
   ```

   Once connected, confirm the user with:

   ```
   show user;
   ```

   For detailed instructions on wallet creation, configuring tnsnames.ora, sqlnet.ora, and verifying connectivity, see the *Setup Password Stores with Oracle Wallet* section in the Stress Testing and Scenario Analytics Installation Guide.

4. To enable the object migration, in **CONFIGURATION** table present in the AAI OFSAA setup, update the `PMF_OM_SANDBOX_ENABLED` parameter value from `N` to `Y`.

5. Create a data store object for the newly created data schema and the OFSAA production information domain schema from the **Add Data Store** pane in the Create Workspace wizard.

   - The newly created workspace (sandbox) schema. A wallet alias must be created for this schema as described in Step 3.


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- The OFSAA production information domain schema. A wallet alias must also be created for this schema before proceeding.

Ensure that all additional properties for the data store are completed if you are using single-click workspace provisioning. For more information about creating a **Data Store**, see the Adding a Data Store in the Oracle Financial Services Model Management and Governance User Guide.

6. Register the simulation and production environment details in the OFSAA Environment.

> **Note**
>
> To access the **Register Environment** menu link, the **ENVSUMM** function must be mapped to the user.

To register the environments:

a. Click the context menu representing the user name and click **OFSAA Environment**.

b. Click **Register Environment** and provide the name, description and select the type of environment from the **Type** drop-dowm menu.

Provide the following metadata for the production environment:

- PROD_infodom - provide the production workspace name. For example, OFSAA_PROD.
- PROD_instanceName - provide the production instance name.
- PROD_instanceAccessToken - generate and provide the instance access token from the production workspace.
- PROD_baseUrl - provide the production base URL.

Provide the following metadata for the simulation (sandbox) environment:

- SIM_instanceName - provide the simulation workspace name. For example, SANDBOX1.
- SIM_instanceAccessToken - generate and provide the instance access token.
- SIM_baseUrl - provide the simulation or sandbox base url.
- SIM_sys_auth_user - provide the simulation or sandbox user details.
- SIM_sys_admin_user - provide the admin user details.
- SIM_ftpshare_path - provide the ftpshare path details.

> **Note**
>
> Generate the instance name and instance access token from the application's OFSAA Environment. For more information, see the **Creating the Instance Access Token** section in the Oracle Financial Services Analytical Applications Infrastructure User Guide.

**Procedure**

1. Login to STSA.

   The **Workspace Summary** page is displayed.

2. Click **Add Workspace**.


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The **Create Workspace** wizard is displayed.

3. (Optional) To create a workspace from a template, click **Use Template** option.

   The zip files stored in the path: `<STSA Installation path>/scratch/ofsaadb/ftpshare/mmg/seeded/workspace-templates` is displayed in the **Library** drop-down menu. On selecting the template, any pre-filled values are overridden with the template provided values.

4. In the **Basic Details** pane, provide the following details and click **Next**:

   a. (Optional) If there is an imported file for the basic details, import the basic details using the **Import Archive File** option. Select the archived file or drag the file from its directory and drop it in the box.

      If you use this feature, the other fields described in the preceding rows are auto populated.

   b. In the **Workspace Code** field, enter the workspace ID.

      > **Note**
      >
      > Ensure that you provide a maximum of 12 characters for the workspace code and you can provide alphanumeric characters.

      > **Note**
      >
      > Ensure that you do not use the word "ALL" as a workspace code.

   c. In the **Purpose** field, provide a description for the workspace.

   d. In the **User-group** field, select the user groups who require access to this workspace.

      > **Note**
      >
      > In the **User-group** field, you must select the user-groups that are part of the OFSAA application (production environment).

   e. In the **Production** field, select the production OFSAA environment.

   f. In the **Simulation** field, select the sandbox OFSAA environment.

      The **Simulation Infodom** is auto-populated after you enter the same value in the **Workspace Code** field.

      Provide a **Simulation Segment Code**. This code specifies a unique segment or folder where you want to import objects. The code must meet the following requirements:

      - Maximum of 10 characters
      - No special characters (except underscore)
      - No extra spaces

   g. In the **Application Server IP/Hostname** field, provide the IP address or host name of the OFSAA application.


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> **Note**
>
> In the **Application Server IP/Hostname** field, the IP/hostname must match the production environment's host/IP address. Refer to the **V_DB_Server** column in the **AAI_DB_Details** table in the OFSAA Configuration schema.

h. Click **More Options**.

i. In the **Type** field, select the either of the following options:

- **Modeling**

  > **Note**
  >
  > Select this option to create the MMG workspace.

- **Simulation**
- **STSA**

  > **Note**
  >
  > This option is selected by default

  Select this option to provision the workspace. All data model objects from the production schema are copied to the sandbox schema.

  > **Note**
  >
  > If you want to proceed with selecting specific objects instead of replicating all objects, use the **More Option**s feature.

j. In the **Simulation DB Schema Name** field, provide the name of the newly created schema.

k. In the **Simulation DB Password** field, provide the password of the schema.

l. In the **Simulation Jdbc Connection String** field, provide the JDBC URL.

   The format is: `jdbc:oracle:thin:@host_name:port_number/service_name`

5. Click **Next**.
6. In the **Workspace Schema** section, select schema (sandbox) name or add a data schema in the **Data Schema** field and click **Next**.

   For more information about creating a **Data Store**, see the Adding a Data Store in the Oracle Financial Services Model Management and Governance User Guide.

7. To copy all the database objects from production to sandbox, provide the following details in the **Data Sourcing** section:

   a. In the **Source Data Schema** drop-down menu, select the atomic schema of the production environment.

   b. In the **Target Data Schema** drop-down menu, select the sandbox or newly created workspace.


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c. In the **Object Type** drop-down menu, select each object type and the database objects under each object type.

> **Note**
>
> If you select the child tables for import, the parent table is automatically selected.

8. Click the **Data Pipeline** tab. In the **Pipeline** field, select the pipeline you want to add and click **Next**
9. Skip the **Metadata Sourcing** step for this release. and click **Next**.

> **Note**
>
> Metadata migration is performed using the OFSA Object Migration option, not through the UI.

Import the metadata of the application, using the OFSA migration option.
For information about OFSAA metadata required for metadata migration see the Migrating Production Metadata to Sandbox from OFSAA Instance section.

For more information about the migration, see the *Object Migration* section in the Oracle Financial Services Analytical Applications Infrastructure User Guide.

10. In the **Validate** pane review all the selections and click **Finish** and then click **Physicalise Workspace**.

    The status of the workspace creation is displayed in the **Summary** screen.
    If the workspace is created sucessfully, the following message is displayed:

    ```
    Workspace creation successful.
    ```

    (Optional) To download the current configurations, click **Finish** and then click **Download Configuration Archive**.

    You can use this downloaded configuration for the **Import Archive File** option that is available in the **Create Workspace** wizard the next time you are creating a sandbox with similar configurations.
    If the sandbox creation fails, then check the mmg-ui.log and mmg-service.log, fix the errors, and then restart the sandbox creation process.
11. To return to the **Workspace Summary** page, click the **Close** button.

After the sandbox is created:


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> **Note**
>
> - The model upload or object registration process must be manually triggered in the OFSAA Application (production environment) for newly created workspace infodom.
> - Ensure that the `tnsnames.ora` file in the OFSAA production environment contains the correct entry for the workspace schema.
> - The connection pooling for the newly created JNDI name must be available in the web layer.

- A default **EST** (Display Name: EST - Global Glossary of STSA) glossary is created. For more information about mapping the global glossary to glossary terms, see the Uploading Glossary Terms Mapping to Table Columns and Tags section.
- A database service job is created internally and triggered automatically. For more information, see the Adding Database Service in STSA section.
- When **EST_ENABLED** attribute is enabled in the configuration file, the modelling and simulation type workspaces are listed along with STSA workspace.
- A background database service job is triggered post-sandbox creation for indexing and synchronization.
- If the **EST_ENABLED** attribute is set to **Y**, you will see STSA workspaces alongside modeling and simulation workspaces.

## 6.1.1.1 Adding data in sandbox

**Introduction**

After creating the sandbox workspace, users must populate it with relevant data from the production schema. This data population step ensures that the sandbox contains representative and consistent data needed for configuring and executing stress testing projects.

The data added typically includes source data from the atomic schema such as instrument-level exposures, reference dimensions, time series variables, lookup tables, and any other information required to compute metrics, run models, and analyze portfolios. Populating the sandbox with accurate and complete data is essential for meaningful simulations and valid output results.

Although the system provides a default data ingestion pipeline as part of sandbox creation, user intervention is still required to initiate the population process. Users can define whether to overwrite existing data (truncate and insert) or append to it. They can also apply global or table-level filters, specify SQL conditions (for example, based on MISDATE), and optimize performance using JDBC properties and rejection thresholds.

This activity is not fully automated and is not triggered automatically when a stress testing project is initiated. It must be explicitly executed by the user. However, once a sandbox is populated, it can be reused for multiple stress testing cycles, as long as the data remains relevant. If fresh data is required for a new reporting period or simulation scenario, users must manually re-populate the sandbox with the updated dataset.

Performing this step ensures that the sandbox environment mirrors the necessary production data landscape, enabling accurate testing, validation, and analysis.


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After creating the sandbox workspace, migrate the data from the production schema to sandbox schema.

1. Login to STSA.

   The **Workspace Summary** page is displayed.

2. To populate (or add) data in the workspace, click action next to the corresponding workspace and select **Populate** .

   The **Populate Workspace** page is displayed.
   The first section displays the Workspace name, purpose, data and time when the workspace was created and the source of the data.

3. Depending on the type of data loading job, select one of the following options:

   You can either overwrite the existing data (truncate and insert) or to append to the existing data.

   - **Overwrite:** In this mode, the underlying tables are truncated (overwritten on existing data) followed by an insert operation.
   - **Append:** In this mode, the underlying tables will be populated (added to the existing data) in the append mode.

4. Depending on what data you want to copy to the sandbox, select one of the following options:

   - **SELECTIVE**: In this mode, only the filtered tables (selected in the Table level Data Filters) are populated.
   - **ALL**: In this mode, all the underlying tables mapped to the workspace are populated along with the specified filters for specific tables.

5. In the **Data Filters - Global level**, enter the data filter that you want to apply on all the tables selected for data sourcing.

   For example: If MISDATE is equal to Today, then it is applied to all tables (wherever it is available) for selected Data Sources during population. If this field is not found (MISDATE) in the tables, it is not updated.

   Else, click **Use Template** to select a json file.
   After selecting the template, any pre-filled values is overridden with the template provided values.

   For more information, see the *Populate a Workspace* section in the Oracle Financial Services Model Management and Governance User Guide .

6. In the **Data Filters - Table level**, provide the data filters individually on the tables. Select the table and then enter the SQL filter.

   > **Note**
   >
   > You can provide multiple table names for the same SQL filter.

   > **Note**
   >
   > Global filters are not applicable for those tables on which filters have been applied individually.

7. In the **Data Filter - Hint**, you can provide database Hints at table-level and SQL prescripts at schema level for data load performance improvement during workspace population.


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8. To filter data from a large database, you can provide additional parameters in the **Additional Parameters** section.

   Provide a source and target prescript mentioning the fetch size of JDBC properties and the batch commit size of JDBC properties for data upload.

9. In the **Select Unlimited or Customize the Rejection Threshold** section, select one of the following options:

   - **Unlimited** - All the errors will be ignored during the data population.
   - **Custom Rejection Threshold** - Enter the maximum of number of inserts that may fail any of the selected tables. You can provide the maximum number of inserts that can fail while loading data to a given table from all the sources. In the case of threshold breach, all the inserts into the particular target schema will be rolled back. However, it will continue populating the next target schema.

10. To load the data from production to sandbox schema, click **Populate Workspace** and then click **Create and Execute batch**.

    The status of the job is displayed in the Execution History of the sandbox.

## 6.1.1.2 Viewing status of Data Population in Sandbox

1. Login to STSA.

   The **Workspace Summary** page is displayed.

2. Click **Action** next to the corresponding workspace and select **Details**.

   The **Workspace Details** page is displayed.

3. To view the status of data population in this sandbox, click the **Execution History** tab.

   The status of the job is displayed.

4. If there are any errors, click on the job to view the log messages.

   The **Task Details** tab is displayed.
   To view detailed error report, click **Log Details** tab and view the log file.

## 6.1.1.3 Migrating Production Metadata to Sandbox from OFSAA Instance

Object migration is the process of migrating or moving objects from one workspace to another workspace. In STSA, the production environment metadata is cloned and migrated to the provisioned workspace for performing stress testing.
Here is a list of OFSAA metadata required for metadata migration:

1. Alias
2. Dataset
3. Derived entity
4. Business measure
5. Business Hierarchy
6. Business Processor Rule
7. Icc Batch
8. Rule
9. ETL


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10. SCD
11. PMF Process

For information about metadata migration, see the *Object Migration* section in the Oracle Financial Services Analytical Applications Infrastructure User Guide.

**Postrequisite:**

To view the migrated rule object in the sandbox, after migrating the data successfully, update the rule page with the required **APP_ID** that is part of the sandbox mapping in **ofsa_object_application** map.

# 6.1.1.4 Seeding Sandbox Application Menu Using AAI Menu Tables from OFSAA Instance

## 6.1.1.4.1 Introduction

After creating a sandbox in STSA, a corresponding application ID (for example, *OFS_GEN121*) is generated. However, the application menu is not displayed by default in the sandbox environment.

To enable navigation and access to application features, the required menu structure must be manually seeded into the sandbox schema using the AAI menu tables.

To enable navigation and access to application features, the required menu structure must be manually seeded into the sandbox schema using the AAI menu tables.

This section describes how to identify, interpret, and seed application menus into the sandbox.

## 6.1.1.4.2 Prerequisites

Ensure the following prerequisites are met:

- Administrative database access to the `llfpConf schema`
- Access to the following tables:
  - *AAI_MENU_B*
  - *AAI_MENU_TL*
  - *AAI_MENU_TREE*
- Understanding of the application menus to be seeded
- Access to the OFSAA application

## 6.1.1.4.3 Identifying Application Menus

To identify the application menus:

1. Query the *AAI_MENU_B* table.
2. Filter records where *V_APP_ID* starts with *OFS_LLFP*.

   These records represent the base application menus that must be replicated for the sandbox application ID.


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## 6.1.1.4.4 Understanding Menu Tree Mapping and the Parent–Child Menu Structure

The menu hierarchy is defined in the AAI_MENU_TREE table using parent–child relationships.

Each row contains the following columns:

- *V_PACK_NAME* – Pack or product (for example, OFS_LLFP_PACK)
- *V_APP_ID* – Application or module (for example, OFS_LLFP)
- *V_PARENT_MENU_ID* – Parent menu ID
- *V_CHILD_MENU_ID* – Child menu ID
- *N_DISPLAY_ORDER* – Display order under the parent

The columns in the *AAI_MENU_TREE* table represent the following:

- *OFS_LLFP_PACK* – Identifies the pack or product
- *OFS_LLFP* – Identifies the application or module
- Third column – *V_PARENT_MENU_ID*, representing the parent menu
- Fourth column – *V_CHILD_MENU_ID*, representing the child menu
- Fifth column – *N_DISPLAY_ORDER*, representing the display sequence under the parent menu

Example:

```
OFS_LLFP_PACK | OFS_LLFP | OFS_LLFP_COM | AAI_DMM_DMM | 1
```

The menu hierarchy is implemented as a tree using the parent–child relationships defined in the *AAI_MENU_TREE* table.

The following structure illustrates how menus are logically organized and must be seeded in the sandbox:

```
OFS_LLFP_COM
  ├── OFS_LLFP_COM (self, order 1)
  ├── AAI_DMM_DMM (order 1)
  │    └── AAI_DMM_DMM_DMMAINTENANCE (order 1)
  ├── AAI_OA (order 2)
  │    ├── AAI_OA_OS (order 1)
  │    │    ├── AAI_OA_OS_BATCH_EXEC_RIGHT (1)
  │    │    ├── AAI_OA_UTIL_SAVE_MD (2)
  │    │    ├── AAI_OA_UTIL_MD_AUTH (3)
  │    │    ├── AAI_OA_UTIL_MD_DIFF (4)
  │    │    └── AAI_OA_OS_MD_SEG_MAP (5)
  │    └── AAI_OA_OM (order 2)
  │         ├── AAI_OA_OM_AM (1)
  │         └── AAI_OA_OM_RM (2)
  ├── AAI_DMF (order 3)
  │    ├── OFS_LLFP_DATAINT (1)
  │    │    ├── AAI_DMF_DMT_SRC_2102 (1)
  │    │    ├── AAI_DMF_DMT_DM_2104 (2)
  │    │    ├── AAI_DMF_DMT_PLC_2107 (3)
  │    │    └── AAI_DMF_DMT_SCD (4)
  │    └── AAI_DMF_DQF (2)
```


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```
│         ├── AAI_DMF_DQF_DQRULE_2108 (1)
│         └── AAI_DMF_DQF_DQGROUP_2109 (2)
├── AAI_DMF_DEFQ (order 4)
│    ├── AAI_DMF_DEFQ_FORMSDESIGNER (1)
│    ├── AAI_DMF_DEFQ_FORMSAUTH (2)
│    ├── AAI_DMF_DEFQ_DATAENTRY (3)
│    ├── AAI_DMF_DEFQ_ATOMICXLUPLOAD (4)
│    └── OFS_IFRS_SQL_RULE (5)
├── AAI_UAM_DM (order 5)
│    ├── AAI_UAM_DM_ATTR (1)
│    ├── AAI_UAM_DM_MEM (2)
│    └── AAI_UAM_DM_HM (3)
├── OFS_LLFP_BMM (order 6)
│    ├── AAI_UAM_DER_ENT (1)
│    ├── AAI_UAM_ALIAS (2)
│    ├── AAI_UAM_DS_4 (3)
│    ├── AAI_UAM_MSR_1 (4)
│    ├── AAI_UAM_DM_BH_3 (5)
│    ├── AAI_UAM_BP_59 (6)
│    └── AAI_UAM_MAP_MAIN (7)
├── AAI_OPER (order 7)
│    ├── AAI_OPER_BATCH_MAIN (1)
│    ├── AAI_OPER_BATCH_EXEC (2)
│    ├── AAI_OPER_BATCH_MONITOR (3)
│    └── AAI_OPER_BATCH_CANCEL (4)

OFS_LLFP_MGMT
├── OFS_LLFP_MGMT (self, order 1)
├── OFS_LLFP_MAINT (order 2)
│    ├── OFS_LLFP_EIR_PREF (1)
│    ├── OFS_LLFP_MULTIPLE_RATING (2)
│    └── OFS_LLFP_CUR (3)
├── OFS_LLFP_RUN_MANAG (order 3)
│    ├── AAI_RRF_RULE_501_502 (1)
│    └── AAI_RRF_RUN_701 (3)
├── OFS_LLFP_STAGE_MKR_REASSIGN (4)
├── OFS_LLFP_STAGE_CKR_REASSIGN (5)
├── OFS_LLFP_MODELLING (6)
│    ├── OFS_LLFP_TRANSMATRIX (1)
│    ├── OFS_LLFP_PDECOSCENARIO (2)
│    ├── OFS_LLFP_PDMODELPROC (3)
│    └── OFS_LLFP_SURVIVAL_MODEL (4)
├── OFS_LLFP_VINTAGE_MODEL (7)
├── OFS_LLFP_LGD_MODEL (8)
├── OFS_LLFP_RESERVE_DEFINE (9)
├── OFS_LLFP_RESERVE_MAP (10)
├── OFS_LLFP_AAAI (10)   -- duplicate display order (validate)
│    ├── OFS_AAAI_TECHREGISTER (1)
│    ├── OFS_AAAI_SBCREATION (2)
│    ├── OFS_AAAI_SBMAINTAIN (3)
│    ├── OFS_AAAI_VARDEF (4)
│    └── OFS_AAAI_MDLEXECUTION (5)
│         ├── OFS_AAAI_REQMDLEXECUTION (1)
│         └── OFS_AAAI_MDLOUTPUTS (2)
├── AAI_MDB (12)
├── OFS_LLFP_ANALYTICS (13)
```


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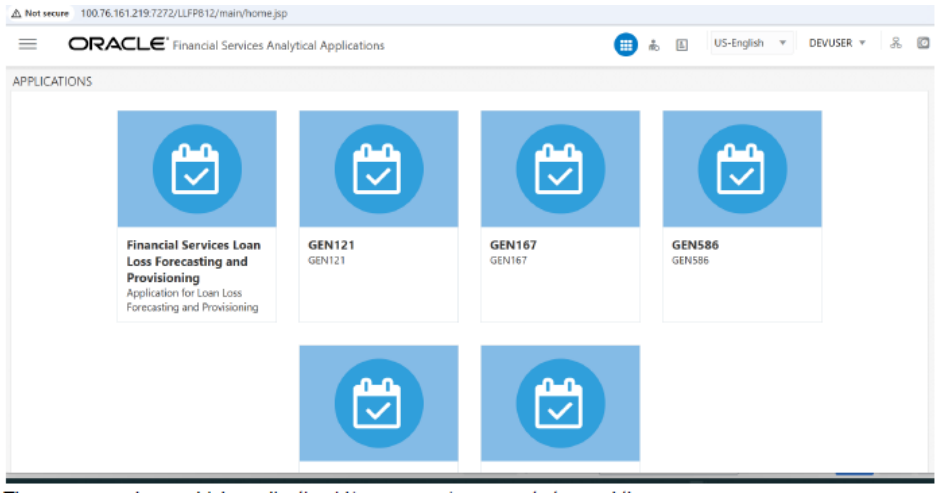
```
  ├── OFS_SUBLEDGER_ACCT_ATTR (14)
  ├── OFS_SUBLEDGER_DEF (15)
  └── OFS_SUBLEDGER_MAN_ADJ (16)

OFS_IIA_INBOX
  └── OFS_IIA_INBOX (self, order 2)
```

## 6.1.1.4.5 Seeding the Application Menu

Perform the following steps to seed the application menu into the sandbox environment:

1. Log in to the OFSAA application: http://100.76.161.219:7272/LLFP812/.

**Figure 6-1 LLFP Log In Screen**




2. Identify the Sandbox application ID (for example, **OFS_GEN121**).
3. For the sandbox application ID (for example, OFS_GEN121), query the *AAI_MENU_B* table to identify the required menu entries.
4. Insert the prepared menu mappings into the *AAI_MENU_TREE* table for the selected *V_APP_ID*.

**Figure 6-2 AAI_MENU_TREE**

| | | | | | |
|---|---|---|---|---|---|
| 82 | OFS_GEN121_PACK | OFS_GEN121 | OFS_LLFP_DATAINT | AAI_DMF_DMT_SRC_2102 | 1 |
| 83 | OFS_GEN121_PACK | OFS_GEN121 | OFS_LLFP_DATAINT | AAI_DMF_DMT_DM_2104 | 2 |
| 84 | OFS_GEN121_PACK | OFS_GEN121 | OFS_LLFP_DATAINT | AAI_DMF_DMT_PLC_2107 | 3 |
| 85 | OFS_GEN121_PACK | OFS_GEN121 | OFS_LLFP_DATAINT | AAI_DMF_DMT_SCD | 4 |
| 86 | OFS_GEN121_PACK | OFS_GEN121 | OFS_LLFP_DATAINT | OFS_LLFP_DATAINT | 2 |

5. Log out and log in again to refresh the application.


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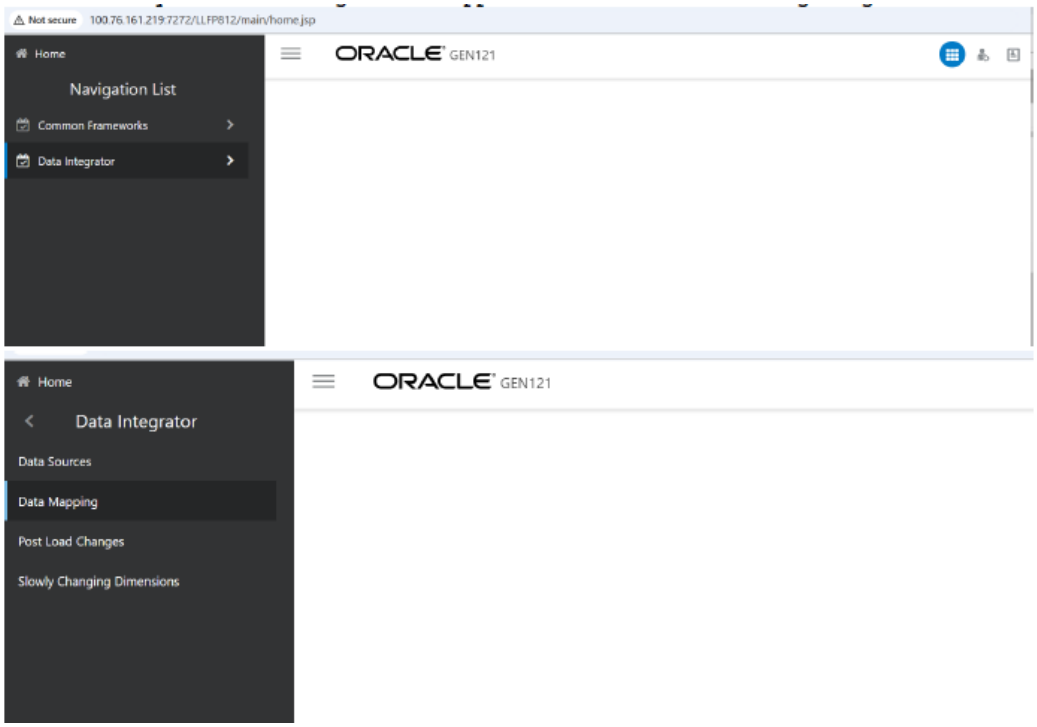
**Figure 6-3 LLFP ReLogin**




# 6.1.2 Adding Dimensions

Use this configuration to add the required business dimensions from production to the STSA workspace. These dimensions are consumed from the Advanced Analytical Infrastructure (AAI) and must contain at least one associated hierarchy to be visible in the list. The added dimensions are used in lower-level configurations such as Portfolio and Variable definitions. This metadata is exported while creating the sandbox.

**Prerequisites**

- Ensure that you configure other OFSAA products on the same information domain (or workspace).
- Ensure that you have replicated and migrated the hierarchy metadata from production to sandbox. For more information, see the *Creating Sandbox* section in the *Oracle Financial Service Stress Testing and Scenario Analytics User Guide*.

1. Login to STSA.

   The **Workspace Summary** page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click the Context Menu representing the user name and then click **Configuration Manager**.
4. Click **Configure** in the **Dimension Hierarchy** section.

   The **Dimension Configuration Summary** page is displayed.
5. Click **Create New**.
6. Select the required dimensions and click **Save**.

   Only dimensions that contain at least one hierarchy are displayed in the list.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7. On the Dimension Configuration Summary page, click a dimension hyperlink in the **Edit** column to view or modify the configuration details of that dimension.

   In **Edit** mode, you cannot completely unmap or remove a hierarchy that is already associated with a dimension. For example, if Dimension A is mapped to Hierarchy H1, H1 cannot be unmapped.

## 6.1.3 Configuring Data Catalog

Data Catalog (DC) serves as a central repository or logical layer within the STSA ecosystem.

DC allows registering of various data assets, which are essential components for conducting stress testing and scenario analytics within financial services. Data assets include various types of data such as tables, files, and databases that are registered within the Data Catalog. This registration process involves providing metadata and other relevant information about each data asset.

DC serves as a logical layer on top of the physical and logical layers for STSA application. It provides a unified and organized view of the underlying data assets, regardless of their location or format. Within DC, logical metadata is mapped to the physical metadata across different applications or data sources. This mapping ensures that you can easily understand and access the data assets as and when required, regardless of their underlying structure or origin.

DC plays a crucial role in managing and organizing data assets within STSA by providing a centralized repository, logical layer, and metadata mapping capabilities. This enables you to effectively utilize and analyze data for stress testing and scenario analytics while ensuring data consistency and quality.

For seamless functioning of DC with STSA ensure to:

1. Adding Database Service in STSA.
2. Adding Sandbox Schema Data Model Details through Data Ingestion.
3. Glossary.

### 6.1.3.1 Adding Database Service in STSA

After creating the sandbox, the workspace details are displayed in the **Database Services** screen.

Optionally, to add an existing database service in STSA if there are any unprovisioned workspace:

1. Login to STSA.

   The **Workspace Summary** page is displayed.

2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click the **Data Catalog**, and in the **Data Sources** tile click the preview button.

   The **Database Services** page is displayed.

4. To add the database service, click **Add**.

   The **Save View** page is displayed.

5. Select the schema name of the workspace from the **Workspace** drop-down menu and provide a description.


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> **Note**
>
> As part of the workspace creation the database schema is listed in the **Workspace** drop-down menu.

6. To create a database service for metadata ingestion, click **Apply**.

   The newly added database is listed in the **Database Services** summary page.

## 6.1.3.2 Deleting Database Service in STSA

After creating the sandbox, the workspace details are displayed in the **Database Services** screen.

To delete an existing database service in STSA if there are any unprovisioned workspace:

1. Login to STSA.

   The **Workspace Summary** page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click the **Data Catalog**, and in the **Data Sources** tile click the preview button.

   The **Database Services** page is displayed.
4. To delete the Database Service, in the **Database Services** page, click **Actions** and then click **Delete** against the Database Service you want to delete.

## 6.1.3.3 Adding Sandbox Schema Data Model Details through Data Ingestion

Data asset ingestion is the process of adding or copying metadata from an external database.

To create another data ingestion job for existing database service:

**Prerequisites**
After creating the sandbox, the data ingestion pipeline is created and listed in the **Data Ingestion** screen. To trigger the data ingestion job, ensure that you click the **Run Pipeline** option.

1. Login to STSA.

   The **Workspace Summary** page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. To ingest the metadata, click the **Data Catalog**, and in the **Data Asset Ingestion** section click the preview button.

   The **Data Asset Ingestion** summary page is displayed.
4. Click **Add**.

   The **Data Asset Ingestion** page is displayed.
5. Select a **Database Service** name, and provide a name and a description for the run.
6. To add data periodically or incrementally, schedule a recurring run by selecting the frequency and time depending on your requirement.
7. To run the pipeline for metadata ingestion, click **Apply**.

   The job details are displayed with its status on the **Data Asset Ingestion** summary screen.


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## 6.1.3.4 Glossary

A glossary is a collection of business terms with the detailed description such as usage, sample values, and usage of a business term.

In STSA, a global glossary (EST) is created after the installation. Hence, create all the glossary terms required for stress testing under the EST glossary.

To add and map glossary terms to physical tables:

1. Create glossary terms under the EST glossary using the Uploading Glossary Terms.
2. Uploading Glossary Terms Mapping to Table Columns and Tags the glossary terms (logical name) to the table and table columns (physical name) or tags using the template.
3. Download the mapping template provided in the UI. Fill in logical glossary terms and map them to the corresponding physical table and column names.
4. Upload this completed template under **Glossary** > **Mapping**.

## 6.1.3.5 Adding a Glossary

To add a glossary:

1. Login to STSA.

   The Workspace Summary page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Data Catalog**, and in the **Glossary** section, click the preview button.

   The glossary summary page is displayed.
4. In the **Glossary Summary** page, click **Add**.
5. In the **Add Glossaries** page that opens, do the following:
   a. In the **Name** field, provide a name.
   b. In the **Display Name** field, provide a display name for the glossary.
   c. In the **Description** field, provide a description of the glossary
6. Click **Apply**.

   The Glossary details are displayed with its status on the Glossary summary screen.

## 6.1.3.6 Preseeded Glossaries

After creating the sandbox a default glossary named EST, DL, and DIMENSION is created.

> **Note**
>
> Ensure that you create all the glossary terms related to STSA under the respective glossary because STSA does not support any user-created glossaries.

The following list of glossary terms are created under the EST and DIMENSION global glossary.


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**Table 5-1 List of glossary terms created in STSA**

| Name | Display Name | Description |
|---|---|---|
| DATEMANAGEMENT | Date Management | Map all required date columns |
| DIMENSION | Dimension | Create Dimension Glossary Terms |
| CREDIT_RATING | Credit Rating Dimension | This is credit rating dimension sample glossary term |
| DATE | Date Dimension | Map Date Columns |
| PRODUCT | Product Dimension | This is product dimension sample glossary term |
| CURRENCY | Currency Dimension | This is currency dimension sample glossary term |
| PDTS_VARIABLE_NAME | PDTS Variable Name | Map PDTS Variable Name Column |
| PDTS_VARIABLE_DESCRIPTION | PDTS Variable Description | Map PDTS Variable Description Column |
| PDST_SCENARIO_CODE | PDST Scenario Code | Map PDST Scenario Code Column |
| PDTS_DATA_SOURCE | PDTS Data Source | Map PDTS Data Source Column |
| PDTS_DEFAULT_PROBABILITY_TYPE | PDTS Default Probability Type | Map PDTS Default_Probability Type Column |
| PDTS_DETAIL_ID | PDTS Detail Id | Map PDTS Detail Id Column |
| PDTS_FICMISDATE | PDTS FICMISDATE | Map PDTS FICMISDATE Column |
| PDTS_FREQUENCY | PDTS Frequency Frequency | Map PDTS Frequency Frequency Column |
| PDTS_FREQUENCY_UNIT | PDTS Frequency Unit | Map PDTS Frequency Unit Column |
| PDTS_ID | PDTS Id | Map PDTS Id Column |
| PDTS_TERM_POINTS | PDTS Term Points | Map PDTS Term Points Column |
| PDTS_TYPE | PDTS Type Type | Map PDTS Type Type Column |
| PDTS_TYPE_HIERARCHY | PDTS Type Hierarchy | Map PDTS Type Hierarchy Column |
| PDTS_PERCENT | PDTS Percent | Map PDTS Percent Column |
| CCFTS_VARIABLE_NAME | CCFTS Variable Name | Map CCFTS Variable Name Column |
| CCFTS_VARIABLE_DESCRIPTION | CCFTS Variable Description | Map CCFTS Variable Description Column |
| CCFTS_CATEGORY | CCFTS Category | Map CCFTS Category Column |
| CCFTS_SCENARIO_CODE | CCFTS Scenario Code | Map CCFTS Scenario Code Column |
| CCFTS_DATA_SOURCE | CCFTS Data Source | Map CCFTS Data Source Column |
| CCFTS_DEFAULT_PROBABILITY_TYPE | CCFTS Default Probability Type | Map CCFTS Default Probability Type Column |
| CCFTS_DETAIL_ID | CCFTS Detail Id | Map CCFTS Detail Id Column |
| CCFTS_FICMISDATE | CCFTS FICMISDATE | Map CCFTS FICMISDATE Column |
| CCFTS_FREQUENCY_UNIT | CCFTS Frequency Unit | Map CCFTS Frequency Unit Column |
| CCFTS_ID | CCFTS Id | Map CCFTS Id Column |


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**Table 5-1 (Cont.) List of glossary terms created in STSA**

| Name | Display Name | Description |
|---|---|---|
| CCFTS_TERM_POINTS | CCFTS Term Points | Map CCFTS Term Points Column |
| CCFTS_TERM_VALUE | CCFTS Term Value | Map CCFTS Term Value Column |
| CCFTS_TYPE | CCFTS Type Type | Map CCFTS Type Type Column |
| CCFTS_TYPE_HIERARCHY | CCFTS Type Hierarchy | Map CCFTS Type Hierarchy Column |
| LGDTS_VARIABLE_NAME | LGDTS Variable Name | Map LGDTS Variable Name Column |
| LGDTS_VARIABLE_DESCRIPTION | LGDTS Variable Description | Map LGDTS Variable Description Column |
| LGDTS_CATEGORY | LGDTS Category | Map LGDTS Category Column |
| LGDTS_SCENARIO_CODE | LGDTS Scenario Code | Map LGDTS Scenario Code Column |
| LGDTS_DATA_SOURCE | LGDTS Data Source | Map LGDTS Data Source Column |
| LGDTS_DEFAULT_PROBABILITY_TYPE | LGDTS Default Probability Type | Map LGDTS Default_Probability Type Column |
| LGDTS_DETAIL_ID | LGDTS Detail Id | Map LGDTS Detail Id Column |
| LGDTS_FICMISDATE | LGDTS FICMISDATE | Map LGDTS FICMISDATE Column |
| LGDTS_FREQUENCY_UNIT | LGDTS Frequency Unit | Map LGDTS Frequency Unit Column |
| LGDTS_ID | LGDTS Id | Map LGDTS Id Column |
| LGDTS_TERM_POINTS | LGDTS Term Points | Map LGDTS Term Points Column |
| LGDTS_TERM_VALUE | LGDTS Term Value | Map LGDTS Term Value Column |
| LGDTS_TYPE | LGDTS Type Type | Map LGDTS Type Type Column |
| LGDTS_TYPE_HIERARCHY | LGDTS Type Hierarchy | Map LGDTS Type Hierarchy Column |
| TM_VARIABLE_NAME | TM Variable Name | Map TM Variable Name Column |
| TM_VARIABLE_DESCRIPTION | TM Variable Description | Map TM Variable Description Column |
| TM_COMPUTATION_BASIS | TM Computation Basis | Map TM Computation Basis Column |
| TM_COMPUTATION_INDICATOR | TM Computation Indicator | Map TM Computation Indicator Column |
| TM_DETAIL_ID | TM Detail Id | Map TM Detail Id Column |
| TM_DIM_SEGMENT_ID | TM Dim Segment Id | Map TM Dim Segment Id Column |
| TM_FICMISDATE | TM FICMISDATE | Map TM FICMISDATE Column |
| TM_FREQUENCY | TM Frequency | Map TM Frequency Column |
| TM_ID | TM Id | Map TM Id Column |
| TM_NSEGMENT_ID | TM Nsegment Id | Map TM Nsegment Id Column |
| TM_ROLL_RATE_APPLICABILITY_INDICATOR | TM Roll Rate Applicability Indicator | Map TM Roll Rate Applicability Indicator Column |
| TM_TYPE | TM Type Type | Map TM Type Type Column |
| TM_DIM_VSEGMENT_ID | TM Dim Vsegment Id | Map TM Dim Vsegment Id Column |
| TM_DIM_NSEGMENT_ID | TM Dim Nsegment Id | Map TM Dim Nsegment Id Column |


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**Table 5-1 (Cont.) List of glossary terms created in STSA**

| Name | Display Name | Description |
|---|---|---|
| TM_SOURCE_CREDIT_RISK_BASIS_CODE | TM Source Credit Risk Basis Code | Map TM Source Credit Risk Basis Code Column |
| TM_TARGET_CREDIT_RISK_BASIS_CODE | TM Target Credit Risk Basis Code | Map TM Target Credit Risk Basis Code Column |
| TM_TRANSITION_RATE | TM Transition Rate | Map Transition Rate Column |
| ER_FICMISDATE | ER FICMISDATE | Map ER FICMISDATE Column |
| ER_FROM_CURRENCY | ER FROM CURRENCY | Map ER FROM CURRENCY Column |
| ER_TO_CURRENCY | ER TO CURRENCY | Map ER TO CURRENCY Column |
| ER_RATE_DATA_SORUCE_CODE | ER RATE DATASOURCE CODE | Map ER RATE DATASOURCE CODE Column |
| ER_TENOR | ER TENOR | Map ER TENOR Column |

Here is a list of all the predefined glossary terms and their details:

- **DIMENSION** Glossary Term - create all your STSA dimension glossary terms for example currency, date, product under this glossary term.
  The **DIMENSION** glossary is used in variable, portfolios and scenario objects of STSA to map various glossary terms to dimensions.

  For example, you have a dimension table known as **DIM_CURRENCY** and a column inside that known as **V_ISO_CURRENCY_CD**.

  You have a stage table called **STG_INVESTMENTS** and a column inside that known as **V_CCY_CODE**.

  Another stage table called **STG_MM_CONTRACTS** and a column inside that known as **V_CCY_CODE**.

  A glossary term named DIMENSION is associated with dimension tables. This term must be tagged at the dimension table level.

  The following table provides the table and column names along with the dimension tags.

  **Table 5-2 Dimension Glossary Term Mapping**

  | Table Name | Column Name | Tag |
  |---|---|---|
  | DIM_CURRENCY | V_ISO_CURRENCY_CD | DIMNESION |
  | STG_INVESTMENTS | V_CCY_CODE | |
  | STG_MM_CONTRACTS | V_CCY_CODE | |

  You can now map all these tables and columns to the **Currency** glossary term created under **DIMENSION** glossary using the Glossary term mapping to table and columns.

  When the **Currency** glossary term is mapped to both the tables and columns, the currency term points to both **STG_INVESTMENTS** table, **V_CCY_CODE** column and **STG_MM_CONTRACTS** table and **V_CCY_CODE** column where, `Currency=DIM_CURRENCY.V_ISO_CURRENCY_CD=STG_INVESTMENTS.V_CCY_CODE=STG_MM_CONTRACTS.V_CCY_CODE`

  The following table shows the result of the tables after mapping the currency glossary term.


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**Table 5-3 Results of Dimension Glossary Term Mapping**

| Source Table | Source Column | Dimension Table | Dimension Column |
|---|---|---|---|
| STG_INVESTMENTS | V_CCY_CODE | DIM_CURRENCY | V_ISO_CURRENCY_CD |
| STG_MM_CONTRACTS | V_CCY_CODE | DIM_CURRENCY | V_ISO_CURRENCY_CD |

- **DATEMANAGEMENT** glossary term- use this glossary term to map the date columns of all the tables in the Data Catalog that are required for stress testing.
  To compute stress testing or identify the risks in future, the data is replicated from the base reference date along with futuristic dates. And since some of the other dates and calculations like renewal date, maturity date, expiry date also have to be calculated with respect to the future dates and cannot be the same as of the base reference date. If the dates are not updated, this would result to exposures with positive current outstanding whose maturity date has been passed or facility has been expired. Since the production data is of a past date, the stress testing results date is calculated for a future date. And, this calculation can be done in two ways:
  - Default Date Management - This is the standard method to move the date from the past to a future date. This is calculated as, `STG_INVESTMENTS.D_MATURITY_DATE + (Day difference between Reference Date and Pseudo Date)`

    > **Note**
    >
    > You can define a pseudo future date in the configuration file.

  - STSA Date Management - This is additional calculation to move the date from past to future date with combination of default date management.
    If the day difference between STG_INVESTMENTS.D_MATURITY_DATE and Reference Date > 0, then, `STSA Date Management = Default Date Management + Months between Pseduo Date and Reference Date`.

    If the day difference between STG_INVESTMENTS.D_MATURITY_DATE and Reference Date < 0, then, `STSA Date Management = Default Date Management + Day difference between Pseudo Date and Projected MIS Date`.

The **DATEMANAGEMENT** glossary is used in analysis configuration, scenario and project objects of STSA.

For example, a **STG_INVESTMENTS** table has a **D_MATURITY_DATE** column.

A **STG_LOAN_CONTRACTS** table has a **D_MATURITY_DATE**column.

And, we have a **DIM** tag to identify the tags.

The following information is represented in a tabular format.

**Table 5-4 DATEMANAGEMENT glossary term mapping**

| Table Name | Column Name |
|---|---|
| DIM_DATE | D_CALENDAR_DATE |
| STG_INVESTMENTS | FIC_MIS_DATE |

You can map all these tables and columns to the **DATEMANAGEMENT** glossary term using the Glossary term mapping to table and columns.


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After mapping the **DATE** glossary term, the table is updated as `DATE=DIM_DATE.D_CALENDAR_DATE=STG_INVESTMENTS.FIC_MIS_DATE`

**Table 5-5 Result for DATEMANAGEMENT glossary term mapping**

| Table Name | Column Name | Tag | Glossary Term |
|---|---|---|---|
| DIM_DATE | D_CALENDAR_DATE | DIM | DATE |

- **DL** glossary term - this glossary term represents the download specification or expectation for the given process. This is where you can map all the tables required for a process on Data Catalog at the table level. For example, you have a STG_PD_TERM_STRUCTURE table, then you can map the DL glossary to this table using the pipeline id such as {Pipeline_ID}_DL.
  For example, we have two tables known as **STG_PD_TERM_STRUCTURE** and **STG_PD_TERM_STRUCTURE_DTL**. Assuming we want to link a process for these two tables, we can do this using the DL glossary term using the process or model id in the following format: `{Pipeline_ID}_DL`.

  > **Note**
  >
  > You can get the process or model id from OpenMetadata.

  The following table represents the DL glossary term mapping.

**Table 5-6 Result of DL glossary term mapping**

| Table Name | Glossary Term |
|---|---|
| STG_PD_TERM_STRUCTURE | {Pipeline_ID}_DL |
| STG_PD_TERM_STRUCTURE_DTL | {Pipeline_ID}_DL |

After creating the DL glossary terms, the sub-glossary terms with INPUT_<GLOSSARYTERM> and the OUTPUT_<GLOSSARYTERM> sub-glossary terms are created.

For example, after creating a DL glossary term, INPUT_DIMESNION and OUTPUT_DIMENSION sub-glossary terms are created.

The **DL** glossary is used in metrics and auto-sequencing of process and model objects.

- **IRC** glossary term - this glossary term also known as a yield curve, is a graphical representation of the relationship between interest rates (or yields) and different maturities (time periods).
  The following table lists the glossary terms that are created for IRC.

**Table 5-7 IRC Glossary terms and their descriptions**

| Name | DisplayName | Description |
|---|---|---|
| IRC_CODE | IRC Code | Map IRC Code |
| IRC_CURRENCY_CODE | IRC Currency | Map IRC Currency |
| IRC_DESCRIPTION | IRC Description | Map IRC Description |
| IRC_FR_DI_FIC_MIS_DATE | IRC FIC MIS Date | Map IRC FIC MIS Date |
| IRC_FR_DI_RATE | Interest Rate | Map Interest Rate |


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**Table 5-7 (Cont.) IRC Glossary terms and their descriptions**

| Name | DisplayName | Description |
|---|---|---|
| IRC_FR_DI_RATE_CODE | Interest Rate Code | Map Interest Rate Code |
| IRC_FR_DI_RATE_MULT | Interest Rate Multiplier | Map Interest Rate Multiplier |
| IRC_FR_DI_RATE_TERM | Interest Rate Term | Map Interest Rate Term |
| IRC_MULT | IRC Multiplier | Map IRC Multiplier |
| IRC_NAME | IRC Name | Map IRC Name |
| IRC_TERM | IRC Term | Map IRC Term |
| IRC_TERM_CODE | IRC Term Code | Map IRC Term Code |

For example, consider three IRC tables, **EST_IRC_IRCS**, **EST_IRC_RATE_TERMS** and **EST_IRC_DIRECT_INPUT** with the following columns.

**Table 5-8 Details about the EST_IRC_IRCS table**

| COLUMN_NAME | DATA_TYPE | NULLABLE |
|---|---|---|
| N_INTEREST_RATE_CD | NUMBER(10,0) | No |
| V_IRC_NAME | VARCHAR2(100 CHAR) | No |
| V_IRC_DESC | VARCHAR2(1000 CHAR) | Yes |
| ISO_CURRENCY_CD | VARCHAR2(30 CHAR) | Yes |

**Table 5-9 Details about EST_IRC_RATE_TERMS table**

| COLUMN_NAME | DATA_TYPE | NULLABLE |
|---|---|---|
| N_INTEREST_RATE_CD | NUMBER(10,0) | No |
| N_INTEREST_RATE_TERM | NUMBER(5,0) | No |
| C_INTEREST_RATE_TERM_MULT | CHAR(1 CHAR) | No |

**Table 5-10 Details about EST_IRC_DIRECT_INPUT table**

| COLUMN_NAME | DATA_TYPE | NULLABLE |
|---|---|---|
| D_FIC_MIS_DATE | DATE | No |
| N_INTEREST_RATE_CD | NUMBER(10,0) | No |
| N_INTEREST_RATE_TERM | NUMBER(5,0) | No |
| C_INTEREST_RATE_TERM_MULT | CHAR(1 CHAR) | No |
| N_INTEREST_RATE | NUMBER(10,6) | No |

Then, map the following table column values to the IRC glossary terms this way:

**Table 5-11 Mapping table and column to IRC variables**

| TABLE_NAME | COLUMN_NAME | GLOSSARY_TERM |
|---|---|---|
| EST_IRC_DIRECT_INPUT | D_FIC_MIS_DATE | IRC_FR_DI_FIC_MIS_DATE |
| EST_IRC_DIRECT_INPUT | N_INTEREST_RATE_CD | IRC_FR_DI_RATE_CODE |
| EST_IRC_DIRECT_INPUT | N_INTEREST_RATE_TERM | IRC_FR_DI_RATE_TERM |


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**Table 5-11 (Cont.) Mapping table and column to IRC variables**

| TABLE_NAME | COLUMN_NAME | GLOSSARY_TERM |
|---|---|---|
| EST_IRC_DIRECT_INPUT | C_INTEREST_RATE_TERM_MULT | IRC_FR_DI_RATE_MULT |
| EST_IRC_DIRECT_INPUT | N_INTEREST_RATE | IRC_FR_DI_RATE |
| EST_IRC_IRCS | N_INTEREST_RATE_CD | IRC_CODE |
| EST_IRC_IRCS | V_IRC_NAME | IRC_NAME |
| EST_IRC_IRCS | V_IRC_DESC | IRC_DESCRIPTION |
| EST_IRC_IRCS | ISO_CURRENCY_CD | IRC_CURRENCY_CODE |
| EST_IRC_RATE_TERMS | N_INTEREST_RATE_CD | IRC_TERM_CODE |
| EST_IRC_RATE_TERMS | N_INTEREST_RATE_TERM | IRC_TERM |
| EST_IRC_RATE_TERMS | C_INTEREST_RATE_TERM_MULT | IRC_MULT |

Also, you can link different tables in different workspace to the same glossary term.

For example, you have two different workspaces, **SANDBOX1** and **SANDBOX2** with different tables.

**SANDBOX1** workspace has two tables:

- TABLE1.COLUMN1
- TABLE1.COLUMN2

**SANDBOX2** workspace has two tables:

- TABLE2.COLUMN1
- TABLE2.COLUMN2

You can map a single glossary term to both workspaces and to all four tables. In the analysis configuration and project creation, the tables and columns are picked up using the workspace linked to the glossary.

Map the physical tables and its columns to the preseeded glossary terms mentioned in the above table. For more information, see the Uploading Glossary Terms Mapping to Table Columns and Tags section.

## 6.1.3.6.1 Uploading Glossary Terms

To upload multiple glossary terms within one or multiple glossary categories:

Ensure that you create the glossary terms under the EST category.

1. Login to STSA.

   The **Workspace Summary** page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click the **Data Catalog**, and in the **Data Sources** tile click the preview button.

   The **Database Services** page is displayed.
4. In the Glossary summary page, click the drop-down and select **Glossary Term Upload**.

   The **Glossary Term Upload** page is displayed.
5. To create multiple glossary terms, click **Add** and download the template.


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6. Using this template add all the required information such as parent name, display name, description, synonyms, related terms, references, tags, reviewers, owner and status for all the terms in the `.CSV` file.
7. Select one or multiple glossary categories from the **Select Glossary** drop-down menu.
8. Browse for the `.CSV` file created in the earlier step and select this file for upload or drag and drop the file in the **Drag and Drop** field.
9. Click **Upload**.

   The file is verified and the status of the upload is displayed in the **Glossary Term Upload** summary screen.

## 6.1.3.6.2 Uploading Glossary Terms Mapping to Table Columns and Tags

To upload mapping of table columns and tags to glossary terms:

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. On the bottom, click **Data Catalog**, preview button on the **Glossary** section.

   The **Glossary Summary** page is displayed.
4. In the Glossary Summary page, click the drop-down and select **Glossary Term / Tag To Column Mapping (CSV)**.
5. Click **Add**.
6. Select the **Database Service** from the drop-down menu.
7. Download the template and fill in the details for the mapping such as table and column names, source of the glossary term and the Fully Qualified Name (FQN).

   > **Note**
   >
   > - If you are mapping the column name to a glossary term then mark the source as glossary and if the glossary term is a tag then mark the source as classification.
   > - Example for FQDN:<glossary.glossaryterm> STSA.TESTGLOSSARY

8. Upload the CSV file and click **Upload**.

   If the upload is successful, the uploaded status is displayed as **COMPLETED**. And, details like number of rows created, number of successful uploads, number of failed entries in the excel sheet is displayed along with when the excel sheet was created and by which user.

   If there are any errors, the status shows as **FAILED** and you can download the error report by clicking actions and then select **Download Error Report**. The excel file is appended with an error column that explains the error for the failure. Fix the errors and reupload the excel sheet.

## 6.1.3.6.3 Downloading Glossary Term / Tag To Column Mapping (CSV)

To download mapping of table columns and tags to glossary terms:

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.


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3. On the bottom, click **Data Catalog**, preview button on the **Glossary** section.

   The **Glossary Summary** page is displayed.

4. In the Glossary Summary page, click the drop-down and select **Glossary Term / Tag To Column Mapping (CSV)**.

5. In the Glossary Term / Tag To Column Mapping (CSV). Summary page, click **Actions** and then click **Download** against the Glossary Term / Tag To Column Mapping you want to download.

> **Note**
>
> If the Upload fails, you can download the error report. To do so, in the summary screen, click **Action**s and then click **Download Error Report** against the Glossary Term / Tag To Column Mapping you want to download.

## 6.1.3.6.4 Uploading Glossary Term/Tag To Table Mapping

To upload glossary of table term and tags to table mapping:

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. On the bottom, click **Data Catalog**, preview button on the **Glossary** section.

   The **Glossary Summary** page is displayed.

4. In the Glossary Summary page, click the drop-down and select **Glossary Term/Tag To Table Mapping**.
5. Click **Add**.
6. In the **Add Mappings – Tables** page that opens, do the following:
   a. Select the **Table Name** from the drop-down list.
   b. Select the **Column Name** from the drop-down list.
   c. Select the **Type** (either **Glossary** or **Classification**) from the drop-down list.
   d. Based on your selection, select the **Glossary/Classification** from the drop-down list.
   e. Select the **Tags** associated with the glossary.
7. Click **Upload**.

   The file is verified and the status of the upload is displayed in the **Glossary Term/Tag To Table Mapping** summary screen.

   If the upload is successful, the uploaded status is displayed as **COMPLETED**.

## 6.1.3.6.5 Downloading Glossary Term/Tag To Table Mapping

To download glossary of table term and tags to table mapping:

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. On the bottom, click **Data Catalog**, preview button on the **Glossary** section.

   The **Glossary Summary** page is displayed.


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4. In the Glossary Summary page, click the drop-down and select **Glossary Term/Tag To Table Mapping**.
5. In the **Glossary Term/Tag To Table Mapping** Summary page, click **Actions** and then click **Download** against the Glossary Term/Tag To Table Mapping you want to download.

> **Note**
>
> If the upload fails, you can download the error report. To do so, in the summary screen, click **Action**s and then click **Download Error Report** against the Glossary Term/Tag To Table Mapping you want to download.

## 6.1.3.6.6 Uploading Glossary Term/Tag To Pipeline Mapping

To upload glossary of table term and tags to pipeline mapping:

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. On the bottom, click **Data Catalog**, preview button on the **Glossary** section.

   The **Glossary Summary** page is displayed.
4. In the Glossary Summary page, click the drop-down and select **Glossary Term/Tag To Pipeline Mapping**.
5. Click **Add**.
6. In the **Add Mappings - Pipeline** page that opens, do the following:
   a. Select the **Pipeline Type** from the drop-down list.
   b. Select the **Pipeline Name** from the drop-down list.
   c. Select the **Type** (either **Glossary** or **Classification**) from the drop-down list.
   d. Based on your selection, select the **Glossary/Classification** from the drop-down list.
   e. Select the **Tags** associated with the glossary.
   f. Click **Add Row**.
7. Click **Upload**.

   The file is verified and the status of the upload is displayed in the **Glossary Term/Tag To Pipeline Mapping** summary screen.

   If the upload is successful, the uploaded status is displayed as **COMPLETED**.

## 6.1.3.6.7 Downloading Glossary Term/Tag To Pipeline Mapping

To download glossary of table term and tags to pipeline mapping:

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. On the bottom, click **Data Catalog**, preview button on the **Glossary** section.

   The **Glossary Summary** page is displayed.
4. In the Glossary Summary page, click the drop-down and select **Glossary Term/Tag To Pipeline Mapping**.


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5. In the **Glossary Term/Tag To Pipeline Mapping** Summary page, click **Actions** and then click **Download** against the Glossary Term/Tag To Pipeline Mapping you want to download.

> **Note**
>
> If the upload fails, you can download the error report. To do so, in the summary screen, click **Action**s and then click **Download Error Report** against the Glossary Term/Tag To Table Mapping you want to download.

## 6.1.3.6.8 Uploading Glossary Term/Tag To Model Mapping

To upload glossary of table term and tags to model mapping:

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. On the bottom, click **Data Catalog**, preview button on the **Glossary** section.

   The **Glossary Summary** page is displayed.
4. In the Glossary Summary page, click the drop-down and select **Glossary Term/Tag To Model Mapping**.
5. Click **Add**.
6. In the **Add Mappings - Model** page that opens, do the following:
   a. Select the **Model Type** from the drop-down list.
   b. Select the **Model Name** from the drop-down list.
   c. Select the **Type** (either **Glossary** or **Classification**) from the drop-down list.
   d. Based on your selection, select the **Glossary/Classification** from the drop-down list.
   e. Select the **Tags** associated with the glossary.
   f. Click **Add Row**.
7. Click **Upload**.

   The file is verified and the status of the upload is displayed in the **Glossary Term/Tag To Model Mapping** summary screen.

   If the upload is successful, the uploaded status is displayed as **COMPLETED**.

## 6.1.3.6.9 Downloading Glossary Term/Tag To Model Mapping

To download glossary of table term and tags to model mapping:

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. On the bottom, click **Data Catalog**, preview button on the **Glossary** section.

   The **Glossary Summary** page is displayed.
4. In the Glossary Summary page, click the drop-down and select **Glossary Term/Tag To Model Mapping**.
5. In the **Glossary Term/Tag To Model Mapping** Summary page, click **Actions** and then click **Download** against the Glossary Term/Tag To Model Mapping you want to download.


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> **Note**
>
> If the upload fails, you can download the error report. To do so, in the summary screen, click **Action**s and then click **Download Error Report** against the Glossary Term/Tag To Table Mapping you want to download.

## 6.1.3.7 Adding Lineage

STSA tracks data lineage, showing how data moves through the organization's systems. Users can visualize how data is transformed and where it is used, helping with data traceability and impact analysis. STSA supports lineage for Database, Dashboard, and Pipelines.

To add a lineage:

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. On the bottom, click **Data Catalog**, click the preview button on the **Lineage** section.

   The **Lineage Screen summary** page is displayed.
4. In the Lineage Screen summary, click **Add**.
5. In the **Lineage CSV Upload File** screen that opens, browse for the .CSV file created in the earlier step and select this file for upload or drag and drop the file in the **Drag and Drop** field.

   Download the template and fill in the details such as Type, Entity Name, Additional Attributes, and so on.
6. Click **Upload**.

   The file is verified and the status of the upload is displayed in the **Lineage Screen** summary screen.

   If the upload is successful, the uploaded status is displayed as **COMPLETED**.The details like number of rows created, number of successful uploads, number of failed entries in the excel sheet is displayed along with when the excel sheet was created and by which user.

   To download the lineage, in the **Lineage Screen** summary screen, click **Actions** and then click **View CSV** against the lineage report you want to download

   If there are any errors, the status shows as **FAILED** and you can download the error report by clicking actions and then select **Download Error Report**. The excel file is appended with an error column that explains the error for the failure. Fix the errors and reupload the excel sheet.

## 6.1.3.8 Managing Dashboards

To manage the STSA Dashboards:

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. On the bottom, click **Data Catalog**, click the preview button on the **Dashboard** section.
4. Enter your **Username** and **Password**.
5. Click **Login**.


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In the page that opens, you can view the pipelines, glossary and the tables that were added/imported.

## 6.1.3.9 Managing Glossaries Management

You can use the Glossaries Management screen to add, rename, delete, change the style, import, and export the glossary terms. To manage the glossary terms:

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. On the bottom, click **Data Catalog**, click the preview button on the **Glossaries Management** section.
4. Enter your **Username** and **Password**.

   Ensure that you enter the username and password of the Open MetaData account.
5. Click **Login**.

   In the **EST - Global Glossary of STSA** page that opens, you can view the glossary terms that were added.

### 6.1.3.9.1 Adding Glossary Terms

To add a glossary term:

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. On the bottom, click **Data Catalog**, click the preview button on the **Glossaries Management** section.
4. Enter your **Username** and **Password**.
5. Click **Login**.

   In the **EST - Global Glossary of STSA** page that opens, you can view the glossary terms that were added.
6. To add a glossary term, click **Add Term**.
7. In the **Add Glossary Term** page that opens, do the following:
   a. In the **Name** field, add a glssary term name.
   b. In the **Display Name** field, enter a display name for the glossary term.
   c. In the **Description** field, enter a description for the glossary term.
   d. (Optional): In the **Tags** field, select the tags associated with the glossary term.
   e. (Optional): In the **Synonyms** field, enter a synonym associated with the glossary term.
   f. (Optional): Provide the **Icon URL**.
   g. (Optional): Click the **Add** icon to add the **References**, **Owner**, **Reviewers** for the glossary term.
8. Click **Save**.

   The newly added glossary terms are displayed in the **EST - Global Glossary of STSA** page.


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## 6.1.3.9.2 Editing Glossary Terms

To edit a glossary term:

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. On the bottom, click **Data Catalog**, click the preview button on the **Glossaries Management** section.
4. Enter your **Username** and **Password**.
5. Click **Login**.

   In the **EST - Global Glossary of STSA** page that opens, you can view the glossary terms that were added.
6. Click the glossary term you want to edit.
7. In the page that opens, click the **three dots** icon and select **Rename**.
8. In the **Edit Name** page that opens, update the **Name** and **Display Name** as required
9. Click **Save**.

   The updated glossary term is displayed in the **EST - Global Glossary of STSA** page.

## 6.1.3.9.3 Deleting Glossary Terms

To delete a glossary term:

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. On the bottom, click **Data Catalog**, click the preview button on the **Glossaries Management** section.
4. Enter your **Username** and **Password**.
5. Click **Login**.

   In the **EST - Global Glossary of STSA** page that opens, you can view the glossary terms that were added.
6. Click the glossary term you want to edit.
7. In the page that opens, click the **three dots** icon and select **Delete**.
8. In the dailog box that opens, enter **DELETE** and click **Confirm** to delete the glossary term.

## 6.1.3.9.4 Editing the Style of Glossary Terms

To edit the style of the glossary term:

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. On the bottom, click **Data Catalog**, click the preview button on the **Glossaries Management** section.
4. Enter your **Username** and **Password**.
5. Click **Login**.


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In the **EST - Global Glossary of STSA** page that opens, you can view the glossary terms that were added.

6. Click the glossary term you want to edit.
7. In the page that opens, click the **three dots** icon and select **Style**.
8. In the **Edit Style** page that opens, update the **Icon URL** and **Color** as required.
9. Click **Save**.

   The updated glossary term is displayed in the **EST - Global Glossary of STSA** page.

### 6.1.3.9.5 Exporting Glossary Terms

You can use the **Export** option to download all your glossary terms as a CSV file. To do so:

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. On the bottom, click **Data Catalog**, click the preview button on the **Glossaries Management** section.
4. Enter your **Username** and **Password**.
5. Click **Login**.

   In the **EST - Global Glossary of STSA** page that opens, you can view the glossary terms that were added.
6. Click the **three dots** icon and select **Export** to export the glossary terms as a CSV file.

### 6.1.3.9.6 Importing Glossary Terms

You can use the **Import** option to upload a CSV file with multiple glossary terms. To do so:

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. On the bottom, click **Data Catalog**, click the preview button on the **Glossaries Management** section.
4. Enter your **Username** and **Password**.
5. Click **Login**.

   In the **EST - Global Glossary of STSA** page that opens, you can view the glossary terms that were added.
6. Click the **three dots** icon and select **Import** to import the glossary terms.

## 6.1.3.10 Managing Classifications Management

You can use the Classifications Management screen to add, edit, and delete tags in a INFODOM. To manage the classifications mangement:

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. On the bottom, click **Data Catalog**, click the preview button on the **Classifications Management** section.
4. Enter your **Username** and **Password**.


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5. Click **Login**.

   In the **EST - Global Glossary of STSA** page that opens, you can view the INFODOM tags that were added.

## 6.1.3.10.1 Adding tags to INFODOM

To add tags to INFODOM

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. On the bottom, click **Data Catalog**, click the preview button on the **Classifications Management** section.
4. Enter your **Username** and **Password**.
5. Click **Login**.

   In the page that opens, you can view the INFODOM tags that were added.
6. To add a tag, click **Add Tag**.
7. In the **Adding new tag on INFODOM** page that opens, do the following:
   a. In the **Name** field, add a INFODOM tag name.
   b. In the **Display Name** field, enter a display name for the INFODOM tag.
   c. In the **Description** field, enter a description for the INFODOM tag.
8. Click **Save**.

   The newly added INFODOM tag is displayed in the summary page.

## 6.1.3.10.2 Editing tags Added to INFODOM

To edit the tags added to INFODOM:

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. On the bottom, click **Data Catalog**, click the preview button on the **Classifications Management** section.
4. Enter your **Username** and **Password**.
5. Click **Login**.

   In the page that opens, you can view the INFODOM tags that were added.
6. To edit a tag, click the **Edit** icon.
7. In the page that opens, make the required updates.
8. Click **Save**.

   The updated INFODOM tag is displayed in the summary page.

## 6.1.3.10.3 Deleting the tags Added to INFODOM

To delete the tags added to INFODOM:

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.


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3. On the bottom, click **Data Catalog**, click the preview button on the **Classifications Management** section.
4. Enter your **Username** and **Password**.
5. Click **Login**.

   In the page that opens, you can view the INFODOM tags that were added.
6. To edit a tag, click the **Delete** icon.
7. In the dailog box that opens, enter **DELETE** and click **Confirm** to delete the INFODOM tag.
8. Click **Save**.

   The updated INFODOM tag is displayed in the summary page.

## 6.1.3.11 Managing Pipelines Management

You can use the Pipelines Management screen to add a new pipeline service. To manage the classifications mangement:

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. On the bottom, click **Data Catalog**, click the preview button on the **Classifications Management** section.
4. Enter your **Username** and **Password**.
5. Click **Login**.

   OIM creates a pipeline type when you publish a pipeline which is displayed on this page.

### 6.1.3.11.1 Adding a Pipeline Service

To add a new pipeline service:

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. On the bottom, click **Data Catalog**, click the preview button on the **Classifications Management** section.
4. Enter your **Username** and **Password**.
5. Click **Login**.

   OIM creates a pipeline type when you publish a pipeline which is displayed on this page.
6. To add a new pipeline service, click **Add New Service**.
7. In the page that opens, do the following:
   a. In the **Name** field, enter a name for the pipeline service.
   b. In the **Description** field, enter a description for the pipeline service.
   c. Select the **Type** from the drop-down list.
   d. Add the **Owner**.
8. Click **Save**.


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# 6.1.3.12 RWA Enterprise Stress Assessment Data Catalog Configuration

The Enterprise RWA Stress Assessment feature uses a dedicated set of Data Catalog objects, separate from the generic glossary terms described earlier in this chapter. This section lists the RWA tables and their Data Catalog classification.

**Table 5-12 RWA Source and Result Tables**

| Business purpose | Table |
|---|---|
| RWA run-control input data | STG_RWA_RUN_CONTROL |
| Party and jurisdiction reference data | DIM_RWA_ASSET_CLASS, DIM_RWA_PARTY_TYPE, DIM_RWA_JURISDICTION, DIM_RWA_RATING, DIM_RWA_CRM_COLLATERAL_CLASS, DIM_RWA_CODE_VALUE |
| Regulatory and routing reference data | DIM_RWA_REGULATOR, DIM_RWA_ROUTE, DIM_RWA_RATING_AGENCY, DIM_RWA_RATING_BUCKET, DIM_RWA_CURRENCY, DIM_RWA_RW_LOOKUP_KEY |
| RWA rule and lookup data | RWA_RATING_MAPPING, RWA_SOV_PARA10_OBLIGOR, RWA_MDB_QUALIFYING_RULE, RWA_PSE_TREATMENT_RULE, RWA_ROUTE_CATALOGUE, RWA_ROUTE_CONDITION_CATALOGUE, RWA_ROUTE_REQUIRED_INPUT, RWA_TEMPLATE_SOURCE_FIELD, RWA_JURISDICTION_CONFIG, RWA_CRM_COLLATERAL_ELIGIBILITY, RWA_CRM_HAIRCUT |
| Template physicalizations | STSA_TEMP_RWA_1783853320047_CARTESIAN2 and STSA_TEMP_RWA_1783854768261_CARTESIAN2 through STSA_TEMP_RWA_1783854768277_CARTESIAN2 |

Data Catalog classification

- The four staging tables (STG_RWA_RUN_CONTROL, STG_RWA_ACCOUNT_EXPOSURE, STG_RWA_COLLATERAL, STG_RWA_OBLIGOR_LEVEL) are registered as EST.DIRECT.
- All dimensions, facts, rules, lookup tables, and template physicalizations are registered as EST.Template.
- All registered tables are submitted to both Data Catalog and DMM.

## 6.1.3.12.1 RWA Model Pipeline Assets

Input assets

- STG_RWA_ACCOUNT_EXPOSURE
- STG_RWA_COLLATERAL
- STG_RWA_OBLIGOR_LEVEL
- Corporate Risk Weight template output
- Retail Risk Weight template output
- Residential Real Estate Risk Weight template output
- Commercial Real Estate Risk Weight template output
- CRM Haircut template output

Output assets

- FCT_RWA_AGGREGATE


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- FCT_RWA_RESULT_SLICE
- FCT_RWA_RUN

### 6.1.3.12.2 RWA Date Management Mapping

**Table 5-13 RWA DATEMANAGEMENT Glossary Term Mapping**

| Table Name | Column Name |
|---|---|
| STG_RWA_ACCOUNT_EXPOSURE | D_REPORTING_DATE |
| STG_RWA_COLLATERAL | D_REPORTING_DATE |
| STG_RWA_OBLIGOR_LEVEL | D_REPORTING_DATE |
| Corporate Risk Weight template output | FIC_MIS_DATE |
| Retail Risk Weight template output | FIC_MIS_DATE |
| Residential Real Estate Risk Weight output | FIC_MIS_DATE |
| Commercial Real Estate Risk Weight output | FIC_MIS_DATE |
| CRM Haircut template output | FIC_MIS_DATE |

> **Note**
>
> The Net Exposure aggregated RWA metric and the Eligible Collateral aggregated RWA metric both map to FCT_RWA_AGGREGATE.N_CRM_RECOGNIZED_AMOUNT. Confirm the intended business definition with the feature owner before treating this as an error in either the documentation or the mapping.

## 6.1.4 External Data Ingestion and Provisioning

For provisioning the packaged VAR model, see C.2 Provisioning the VAR Model.


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# 6.2 Post requisites for STSA

## 6.2.1 Populating tables for Composite Pipeline components

**EST_OBJECT_REQUISITE table**

A process or a model can have any number of prerequisites operations to run before running the process or model and any number of post-requisites after running the process or model. Hence, STSA provides a `EST_OBJECT_REQUISTE` table where you can maintain this list of prerequisites and post-requisites of all the selected processes and models for the composite pipeline that will be created while creating the analysis configuration.

This table has the following columns listed. Ensure that you enter the values of the prerequisites and post-requistes based on which the composite pipeline is created.

**Table 7-1 Details about EST_OBJECT_REQUISITE table**

| Column Name | Description | Example | Comments |
|---|---|---|---|
| V_OBJECT_INFODOM | Provide the workspace name where this object is present in. | STSAINFODOM | **Note:** Ensure that all the objects are created on the same workspace or workspace. |
| V_OBJECT_APP_PACKAGE_ID | Provide the application package ID of the process. | OFS_STSA | |
| V_OBJECT_TYPE | Provide the type of object for which prerequisite or postrequisite requisite is being configured. There are the following types of PMF and RRF objects:<br>• RUNPROCESS<br>• EMFNOTEBOOK<br>• RN | RUNPROCESS | |
| V_OBJECT_ID | Provide an id or code for the following objects:<br>• RUNPROCESS - id<br>• RN - code<br>• EMFNOTEBOOK - ID_version | PR_1865839290 | |
| V_REQUISITE_TYPE | This represents if the required object has to run before or after the object. Provide one of the values:<br>• PRE<br>• POST | POST | |


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**Table 7-1 (Cont.) Details about EST_OBJECT_REQUISITE table**

| Column Name | Description | Example | Comments |
|---|---|---|---|
| V_REQUISTE_OBJECT_TYPE | This is the type of the object configured for prerequisite or postrequisite.<br>• BATCH<br>• DATAPIPELINE<br>• RN<br>• RUNPROCESS<br>• T2T<br>• PAUSE<br>• EMFNOTEBOOK | BATCH | |
| V_REQUISTE_OBJECT_ID | This represents the unique id of the prerequisite or post requisite object. | OFSAAIINFO_Data | **Note:** If you are providing the value in the V_REQUISITE_OBJECT_TYPE column as:<br>• T2T, then mention the source details in the V_REQUISTE_OBJECT_ID column as <source_id>.<t2t_id><br>• RRF (RN), then mention the source details in the V_REQUISTE_OBJECT_ID column as <RRF_subtype>.<RRF_id><br>• PMF (RUNPROCESS), then mention the source details in the V_REQUISTE_OBJECT_ID column as <App_package_id>.<process_id><br>**Note**: The sub-types of RRF are BR, SR and IR. |
| V_REQUISTE_OBJECT_SEQUENCE | Provide the sequence of order to run these prerequisites and post-requisites.<br>**Note:** If same preference is given to two or more objects, they are run in parallel. | 1 | |

### EST_CONFIGURATION table

While building an analysis configuration, after selecting the metrics (process or model as a source) and additional models a composite pipeline is created.

If there is a similar composite pipeline created for an analysis configuration created earlier and it is approved, the existing pipelines are listed for selection.

Based on the models and processes selected the values in the `EST_CONFIGURATION` table is populated. And, this sequence is executed when the composite pipeline is executed. This is the auto sequencing mode.


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**Table 7-2 Details about EST_CONFIGURATION table**

| Column Name | Description | Example | Comments |
|---|---|---|---|
| V_COMPONENT_CODE | This represents the code of the component selected for the object. This value is prepopulated. | PROCESS_AUTOSEQUENCE_MODE | |
| V_COMPONENT_NAME | This represents the name of the object. This value is prepopulated. | EST_PROCESS | |
| V_COMPONENT_VALUE | This represents the configuration of operation. For auto-sequencing mode two options are available for selection:<br>• PMF - select this option to auto-sequence based on an already existing composite pipeline where the models and pipelines are already defined.<br>• DC- select this option to auto-sequence based on execution as per the glossary term mapped to published pipelines in DC.<br>**Note:**By default, the value is set to PMF. If required, you can change the value to DC.<br>If you are changing the source to DC then ensure that all the glossary terms are linked to the pipelines. | DC | |
| V_COMMENTS | This represents the description of the configuration. | Mode for autosequence of composite pipeline components | |

# 6.2.2 Configuring STSA tables for Reports

After installing the application some STSA tables are created. To view the reports in BI, ensure that you fill the following tables:

1. **EST_RESULTS_DIM_MAP**
2. **EST_RESULTS_DIM_VIEW_DETAILS**


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> **Note**
>
> You can add maximum of ten dimensions to view the stress reports in BI.

1. Fill the details in the **EST_RESULTS_DIM_MAP** table.

**Table 7-3 Details about EST_RESULTS_DIM_MAP table**

| Column Name | Description | Example | Comments |
|---|---|---|---|
| V_EST_RESULTS_DIM_KEY | List the dimensions that you want to view in the reports. | N_DIM1_SKEY | You can list a maximum of 10 dimensions in this column.<br>Ensure that the first five dimensions are simple dimensions and their format is:<br>N_DIM1_SKEY, N_DIM2_SKEY to N_DIM5_SKEY.<br>The next five dimensions are level-based dimensions. And their format is:<br>N_DIM6_SKEY, N_DIM2_SKEY to N_DIM10_SKEY. |
| V_DIM_TABLE_NAME | List the dimension table names that are required for viewing in reports. | DIM_INDUSTRY | |
| V_DIM_COLUMN_NAME | List the specific column names of the dimension table for viewing in reports. | N_D_CUST_INDUSTRY_SKEY | |
| V_LOGICAL_NAME | List the logical name of the dimension that will be displayed as a dimension filter in the BI. | Industry | |

2. Fill various details of each dimension in the **EST_RESULTS_DIM_VIEW_DETAILS** table.

**Table 7-4 Details about EST_RESULTS_DIM_VIEW_DETAILS table**

| Column Name | Column Description | Example Value | Comments |
|---|---|---|---|
| V_EST_RESULTS_DIM_COLUMN | This is the dimension column name. | N_DIM4_SKEY | |
| V_VIEW_NAME | This is a parameter for reports. | DIM_BI_PH_04 | |


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**Table 7-4 (Cont.) Details about EST_RESULTS_DIM_VIEW_DETAILS table**

| Column Name | Column Description | Example Value | Comments |
|---|---|---|---|
| V_VIEW_COLUMN_NAME | Each value represents an unique identifier for the dimension. For report generation, the skey, description, name, code and LRI is required. Hence the table is populated by defining these parameters for each dimension. | DIM_BI_PH_04_SKEY | Provide these values: DIM_BI_PLC_09_DIM_HCY_LEVEL_NAME_1, DIM_BI_PLC_09_DIM_HCY_LEVEL_CD_1, and DIM_BI_PLC_09_DIM_HCY_LEVEL_DISPLAY_ORDER_1 |
| V_VIEW_COLUMN_VALUES | Provide the unique value for each dimension. | N_PROD_TYPE_SKEY | |
| V_LOGICAL_COLUMN_NAMES | Provide the logical name for the column. | (null) | |

3. To initiate the table view creation after this configuration or any change in the configuration, run the following command:

```
EXECUTE VIEW_CREATION_PROCEDURE;
```

# 6.2.3 Configuring Application Token and NEXTGENEMF Settings

This section describes the configuration steps required to set up the Application Token for EST and update the NEXTGENEMF_CONFIG table entries in Oracle SQL Developer.

## 6.2.3.1 Configuring Application Token Maintenance

The Application Token Maintenance page allows you to register the EST application and provide OAuth token credentials required for communication between OFSAA and the EST service.

Ensure you have Administrator access to the OFSAA environment and valid OAuth client credentials for the EST application.

1. Log in to the Oracle Financial Services Analytical Applications (OFSAA) environment.
2. On the **Administration** page, click the **System Configuration** tile and select **Application Token Maintenance** from the drop-down menu.

   The **Application Token Maintenance** page is displayed, listing existing application entries.
3. Select the application entry for **EST** and click the **Edit** icon, or click **Add** to create a new entry.

   The **Application Token Details** dialog box is displayed.
4. In the **Application Token Details** dialog, provide the following details:

**Table 7-5 Application Token Details**

| Field | Description |
|---|---|
| Application Name | Select **EST** from the drop-down list. |


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**Table 7-5 (Cont.) Application Token Details**

| Field | Description |
|---|---|
| Client ID | Enter the OAuth client ID. For example, ofsauser. |
| Client Secret | Enter the OAuth client secret. For example, secret. |
| Application URL | Enter the EST service base URL. For example, http://<host>:<port>/estservice. |
| Token Endpoint | Enter the MMG token endpoint URL. For example, `http://<mmg-host>:<port>/<web_context>/rest-api/v1/token`, where <web_context> is the value configured for WEB_CONTEXT in the MMG config.sh file. |

5. Click **Save**.

   The Application Token details are saved and the dialog box closes.

> **Note**
>
> Users can verify these entries in the *LLFP_CONFIG_SCHEMA*, under the *AAI_SC_EXT_APP_CONF* table.

## 6.2.3.2 Configuring Instance Access Token

The Configure Instance Access Token page stores the authentication tokens associated with OFSAA instances. These tokens are required for sandbox and production workspace operations in STSA.

1. On the **Administration** page, click the **System Configuration** tile and select **Configure Instance Access Token** from the drop-down menu.

   The **Configure Instance Access Token** page is displayed, listing existing application entries.

2. To search for an existing instance, enter the `Instance Name` and click `Search`.
3. To add a new instance access token, click **Add**.
4. Provide the following details:

**Table 7-6 Configure Instance Access Token**

| Field | Description |
|---|---|
| Instance Name | Enter the name of the OFSAA instance. For example, ESTQA_SIMV1 or EST_8127. |
| Instance Access Token | Enter the UUID token generated for the instance. For example, *8d07cd8b-d7fa-4da4-ad29-eb3c094282f4*. |

5. Click **Save**.

## 6.2.3.3 Updating NEXTGENEMF_CONFIG Table Entries

After configuring the Application Token in OFSAA, verify the corresponding entries in the NEXTGENEMF_CONFIG table using Oracle SQL Developer.


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1. Open Oracle SQL Developer and connect to the *LLFP_CONFIG_SCHEMA*.
2. In the **Connections** panel, expand **Tables** and select **NEXTGENEMF_CONFIG**.
3. Click the **Data** tab to view the configuration rows.
4. Update that the following key entries:
   - MMG_SERVICE_URL
   - EST_SERVICE_URL

**Table 7-7 NEXTGENEMF_CONFIG Table Entries**

| V_NAME | Expected V_VALUE | V_DESC |
|---|---|---|
| IS_REMOTE | YES | Configuration for Remote MMG Application |
| EMFSTUDIO_SERVICE_URL | http(s)://<host>:<port>/nextgenemf | Host and port where EMF Studio service is running and |
| IS_JAVA_ENGINE | Y | Configuration for Java engine |
| MMG_UI_URL | http(s)://<mmg remote host>:<port>/<context>/home | Host and port where MMG UI is running |
| MMG_SERVICE_URL | http://ofss-mum-5711.<domain>:7553/mmg260 | Host and port where Remote MMG is running |
| EST_SERVICE_URL | http://ofss-mum-5711.<domain>:7092/estservice | EST |
| MMG_SERVICE_URL_<port> | http://<host>.<domain>:<port>/<mmg context> | Host and port where Remote MMG is running |
| EST_SERVICE_URL_<port> | http://<host>.<domain>:<port>/estservice | EST |


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7

# Aggregation Studio

This chapter describes how to create and manage Aggregation Definitions, configure field treatments and aggregation dimensions, run aggregation, and view the results in STSA.

## 7.1 Introduction

Aggregation Studio enables you to define how source records are grouped and how field values are calculated in an aggregated portfolio. You can use aggregation to reduce the number of records processed for analysis while retaining the dimensions, measures, and identifier relationships configured in the definition.

An **Aggregation Definition** is associated with one **Analysis Configuration** and its version. The application identifies the tables required by the Analysis Configuration and creates a **Field Treatment Plan**. You review the role and treatment of each field, configure aggregation dimensions, and validate the definition before running aggregation or submitting it for review and approval.

An **Aggregation Run** applies the definition to one input date. You can select **Sandbox** or **Production** as the source. The aggregated output is written to the corresponding tables in the configured Sandbox. Each run retains its definition snapshot, status, dates, and operational results.

The number of output records depends on the grouping dimensions, field treatments, source values, and identifier relationships. Some configurations retain the original number of records. Review the achieved compression and the suitability of the output for the intended analysis.

**Table 7-1 Aggregation Definition Steps**

| Step | Description |
|---|---|
| Definition Details | Specify the name and description and select an Analysis Configuration and version. |
| Field Treatment Plan | Review and finalize the roles, treatments, and treatment settings for each table. |
| Aggregation Dimensions | Select the hierarchy and exact hierarchy nodes for the grouping dimensions, where required. |
| Review & Validate | Review the complete definition and resolve validation alerts before proceeding. |

## 7.2 Prerequisites

Before creating and running an Aggregation Definition, ensure that:

- You have access to the required workspace and the permissions to perform the applicable create, modify, view, and workflow actions.
- The required Analysis Configuration and version are available. For more information, see the **Creating Analysis Configuration** section.


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- The source tables and their required metadata are available, and the corresponding target tables exist in the configured Sandbox.
- Source data is available for the selected input date. For information about loading Sandbox data, see the **Adding data in sandbox** section.
- The required dimension mappings and fallback members are available when fields are used as grouping dimensions. Configure hierarchies when specific nodes must remain separate in the output. For more information, see the **Adding Dimensions** and **Configuring Data Catalog** sections.
- The required primary keys, unique keys, and relationships are defined for fields that depend on identifier generation or deterministic source ordering.

> **Note**
>
> Ensure that the source data for the selected input date remains unchanged while aggregation is running.

# 7.3 Accessing Aggregation Studio

To access Aggregation Studio, perform the following steps:

1. Login to STSA.

   The **Workspace Summary** page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. In the Navigator, click **Aggregation Studio**.

   The Aggregation Studio summary page is displayed. The page lists the Aggregation Definitions available to you.
4. Search for the required definition or use the available filters to narrow the list.
5. Use the actions for a definition to view or edit it, perform the available workflow actions, or open **Aggregation Runs and Results**.

The actions available depend on your permissions and the state of the definition.

# 7.4 Creating an Aggregation Definition

To create an Aggregation Definition, click **Create New** on the Aggregation Studio summary page and complete the following steps.

## 7.4.1 Providing Definition Details

1. In **Definition Details**, provide the following details.


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**Table 7-2 Definition Details**

| Field | Description |
|---|---|
| Aggregation Definition Name | Enter a name that identifies the purpose of the definition. |
| Description | Enter a description of the aggregation to be performed. |
| Analysis Configuration | Select the required configuration and version from the list. This selection identifies the tables required for aggregation. |

2. In **Select Analysis Configuration**, search by name or version and select the required configuration.
3. Review the **Analysis Configuration Details**, including the linked objects, to verify that you have selected the required configuration.
4. Click **Select**, and then click **Next**.

   The definition is saved and the **Field Treatment Plan** is displayed.

> **Note**
>
> Changing the Analysis Configuration resets the Field Treatment Plan and Aggregation Dimensions. Review the reset message before continuing with the change.

## 7.4.2 Configuring the Field Treatment Plan

The Field Treatment Plan lists the tables resolved from the selected Analysis Configuration. Each field has a role that describes its purpose and a treatment that determines its value in the aggregated output. The application provides initial field decisions based on the available metadata.

To configure the Field Treatment Plan:

1. Review the table list. Use the search and **Status** filter to locate **Pending** tables.
2. Click **Configure** against a table.

   The table configuration drawer is displayed.
3. Review the **Field**, **Type**, **Role**, **Treatment**, and **Action** columns. Use the search and filters to locate the required fields.
4. Select the appropriate **Role** and **Treatment**. The available choices depend on the field datatype and structural requirements. Refer to Table 7-3 and the **Configuring Treatment Settings** section.
5. Where additional settings are required, open the field configuration, provide the settings, and click **Apply**.
6. Resolve all fields requiring configuration and any validation errors.
7. Click **Save & Finalize** to save and finalize the table configuration.
8. Repeat the procedure for all tables and click **Next** to continue to **Aggregation Dimensions**.


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> **Note**
>
> Applying treatment settings updates the table configuration being edited. Save the table to persist the changes. If you reopen a finalized table for editing, the table returns to **Pending** and must be finalized again.

**Table 7-3 Field Roles and Treatments**

| Role | Available Treatments | Description |
|---|---|---|
| Identifier | Generate ID; Generate Consistent Entity ID | Generates an identifier within a table or maintains a generated identifier across related tables. |
| Grouping Dimension | Engine managed | Defines values used to form aggregation groups. Configure the associated dimension in Aggregation Dimensions. |
| Boolean | Preserve Distribution; Representative Value; Suppress | Processes flag values according to the selected treatment. |
| Date Time | Preserve Distribution; Representative Value; Suppress | Processes dates and timestamps other than the execution date. |
| Numeric Measure | Sum; Average; Weighted Average; Preserve Distribution; Representative Value; Suppress | Aggregates numeric values or applies the selected representative or distribution treatment. |
| Derived | Derive; Suppress | Calculates a numeric value from treated input fields or suppresses the field. |
| Text | Preserve Distribution; Representative Value; Synthetic Text; Suppress | Processes character values. Large character fields support only the compatible subset of treatments. |
| Binary | Suppress | Handles binary fields using the suppression behavior permitted by the target field. |

Grouping dimensions and the output execution date are managed by the application. You do not select a treatment for these fields. All physical target fields remain present in the output.

## 7.4.3 Configuring Treatment Settings

Select treatments according to the use of each field in the intended analysis. The following sections describe the available treatments and the settings required to use them.

### 7.4.3.1 Generate ID

Use **Generate ID** for an identifier that is required within one table. The application generates output identifiers that meet the field's datatype and capacity requirements.


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For an identifier that must be reused by another table, use **Generate Consistent Entity ID** and configure or review the applicable relationship.

## 7.4.3.2 Generate Consistent Entity ID

Use **Generate Consistent Entity ID** to maintain the same generated identifier between related fields. The field that generates the identifier is the **ID Generator**. The field that uses that identifier is the **Reusing Field**. Both fields use the **Identifier** role.

For example, if an account references a customer, the customer identifier generated in the customer table must also be used in the corresponding account records.

For an eligible, enabled, and validated physical relationship between tables in the definition, the application configures the identifier treatment automatically. The related fields display an **Auto GCID** badge and the treatment is locked. If more than one eligible physical relationship is available for a reusing field, select the required relationship before saving.

To configure a manual relationship:

1. In the Field Treatment Plan, click **Configure** against the table containing the reusing field.
2. Select **Identifier** as the field role and **Generate Consistent Entity ID** as the treatment.

   For a field with eligible ID Generator candidates, the treatment configuration drawer opens with **Reuse a consistent ID from another field** selected.
3. Select the **ID generator table**.
4. Select the **ID generator field**.
5. Click **Apply** and save the table configuration.
6. Review and finalize any affected tables that have returned to **Pending**.
7. Review the relationship in **Consistent ID Bindings** in **Review & Validate**.

An ID Generator must be supported by an enabled and validated primary or unique key. A manual relationship supports one business-key field on each side; the execution date is handled automatically. One ID Generator can serve multiple reusing fields, but each reusing field can select only one generator.

If you select this treatment directly on an eligible primary or unique key field, the application identifies it as an **ID Generator** without opening the relationship selection drawer.

> **Note**
>
> **Apply** is unavailable until a valid generator table and field are selected. Cancelling an automatically opened configuration restores the field's previous decision. Other treatments, such as **Sum** or **Representative Value**, do not copy values between related tables.

## 7.4.3.3 Preserve Distribution

Use **Preserve Distribution** when the observed values and their relative frequencies must remain represented in the output. Fields using this treatment are considered together, so observed combinations of values are retained within each aggregation group.

For example, if both status and customer type use Preserve Distribution, the application retains the observed status and customer-type combinations. It selects an output size for which the difference between each source and output combination frequency is no more than one percentage point.


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A group can produce multiple output records. A large number of distinct combinations may limit the reduction in records or result in no reduction. Review **Observed joint tuples** and **Maximum distribution drift** in the table results.

### 7.4.3.4 Representative Value

Use **Representative Value** when one selected value is sufficient for the field. Configure one of the following options:

- **Minimum value** - Uses the minimum value from the source records assigned to the output record.
- **Maximum value** - Uses the maximum value from the source records assigned to the output record.
- **Constant value** - Uses a fixed value that you specify.

For a constant, select **Existing Sandbox value** to choose an available value or **Manual value** to enter a value. Click **Apply**, and then save the table configuration.

The constant must satisfy the target field's datatype, length, precision, and scale. Null cannot be used as the representative constant. Existing Sandbox values are obtained from the current Sandbox table and are not restricted to the input date of a later Aggregation Run.

### 7.4.3.5 Sum and Average

Use **Sum** for additive measures such as balances or amounts. Values from the source records assigned to an output record are added together. The sum of the output values is conserved across the generated records.

Use **Average** when an arithmetic average is appropriate. The application calculates the average of the source values assigned to each output record. For values requiring different weights, use **Weighted Average**.

### 7.4.3.6 Weighted Average

Use **Weighted Average** when the contribution of each value depends on a numeric weight, such as calculating an exposure-weighted rate.

1. Select **Weighted Average** for a field with the **Numeric Measure** role.
2. Open the treatment configuration and enter the name of the numeric field from the same table in **Weight column**.
3. Click **Apply** and save the table configuration.

The application validates the weight field and configuration before the table can be finalized.

### 7.4.3.7 Derive

Use **Derive** to calculate a numeric output from other treated fields. For example, a derived field can calculate a ratio from aggregated amounts.

1. Select **Derived** as the role and **Derive** as the treatment.
2. Open the treatment configuration and provide the **Expression**.
3. In **Input columns (comma separated)**, enter the required input field names, separated by commas.
4. Click **Apply** and save the table configuration.


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Expressions must use supported arithmetic operations and valid input fields. Derived fields are calculated after their required treated inputs. Circular dependencies are not allowed.

### 7.4.3.8 Synthetic Text

Use **Synthetic Text** to generate deterministic placeholder text. Provide **Text prefix**, **Maximum length**, and **Hash length**, click **Apply**, and save the table configuration. The generated value must fit the target field.

This treatment creates a placeholder value for the field. It does not preserve the source text or its distribution.

### 7.4.3.9 Suppress

Use **Suppress** for an eligible field whose source value is not required for the intended analysis. The field remains present in the output.

- For a nullable field, the application writes null.
- For an eligible non-key field that does not allow null, the application uses a deterministic source value for the aggregation group and repeats that value where the group produces multiple output records.

> **Note**
>
> Suppression does not always remove a source value. Review the field's nullability before selecting this treatment. Identifiers, grouping dimensions, and the execution date cannot be suppressed.

## 7.4.4 Configuring Aggregation Dimensions

Aggregation dimensions determine which selected business values form separate groups. The available dimensions are resolved from fields configured with the **Grouping Dimension** role in the finalized Field Treatment Plan.

To configure an aggregation dimension:

1. Open **Aggregation Dimensions** and locate the required dimension table.
2. Click **Configure**.
3. Select one **Hierarchy** from the hierarchies associated with the dimension.
4. Select the exact hierarchy nodes that must remain separate in the aggregated output. Use the node search and **Load More**, where required, to locate nodes.
5. Click **Save Selection**.
6. Repeat the procedure for other dimensions and click **Next**.

When saving a hierarchy selection, select at least one exact node. To remove an existing selection, use **Clear** for the dimension and confirm the action.

Values matching the selected exact nodes remain explicit. Other source values, including null values, resolve to the dimension's fallback member, displayed as **Others**. The actual fallback value is determined by the dimension metadata.


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> **Note**
>
> If no hierarchy selection is configured for a grouping dimension, all source values for that dimension resolve to its fallback member. A valid dimension mapping and fallback are still required.

For example, when two asset-class nodes are selected, records matching either selected value remain in separate groups for that dimension. Records with other asset-class values are assigned to the fallback group. Other grouping fields, identifier relationships, and Preserve Distribution treatments can create additional output records within those groups.

Hierarchy selection groups the source records; values outside the selected nodes are assigned to the fallback group rather than excluded from the input.

### 7.4.5 Reviewing and Validating the Definition

Use **Review & Validate** to check the complete Aggregation Definition before execution or workflow submission.

1. Review the definition details and the selected Analysis Configuration.
2. Review the Field Treatment Plan summary and confirm that all tables have been finalized.
3. Review the selected dimensions, hierarchies, and nodes.
4. Review **Consistent ID Bindings**, including the ID Generator, Reusing Field, and relationship status.
5. Review the validation alerts. Use **Open Field Treatment Plan** or **Open Aggregation Dimensions** to correct the affected configuration.
6. Return to **Review & Validate** and ensure that no blocking validation issues remain.
7. Click **Submit for Review**, or **Submit for Approval** when that action is available for the current workflow state.

The definition is submitted to the applicable workflow stage. For more information, see the **Workflow for STSA Objects** section.

Changes to field decisions, relationships, or dimension selections require the definition to be reviewed and validated again. Finalizing a table or successfully validating the definition does not approve it.

## 7.5 Running Aggregation

You can run an eligible **Draft** or **Approved** Aggregation Definition from Aggregation Studio. A Draft run captures the current definition snapshot so that you can evaluate its configuration. For use in a Project, select an Approved definition.

To run aggregation:

1. Open the Aggregation Studio summary page and locate the required definition and version.
2. Open **Aggregation Runs and Results** from the definition's actions.
3. Click **Run Aggregation**.
4. Provide the following details.


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**Table 7-4 Aggregation Run Details**

| Field | Description |
|---|---|
| Source location | Select Sandbox or Production. Sandbox is the default. |
| Input FIC_MIS_DATE | Select the business date of the source records to aggregate. |
| Output FIC_MIS_DATE | Assigned automatically when a manual Aggregation Run is accepted. You do not enter this value. |
| Target location | Output is written to the configured Sandbox. |

5. Click **Run Aggregation** to submit the request.

   When the request is accepted, an Aggregation Run ID and pseudo output date are assigned, and the run is displayed with **Running** status.

6. Monitor the run in **Aggregation Run History**. Active runs refresh automatically. Use **Refresh** to reload the history when required.

The application validates the definition and source requirements during execution. An accepted run can therefore fail before any output is generated. Use the run details to identify the cause.

> **Note**
>
> The pseudo output date identifies the generated dataset. It is different from the input business date and is not a forecast or scenario date. Each accepted manual run reserves its output date; a failed run does not make that date available for reuse.

If the request cannot be accepted, review the displayed message. Use **Edit Request** to correct the retained input values where available. If execution capacity is reached, wait for an active run to finish before submitting another request.

# 7.6 Viewing Aggregation Run History and Results

To view aggregation results:

1. Open **Aggregation Runs and Results** for the required definition and version.
2. Review **Latest Aggregation Run** or locate a run in **Aggregation Run History**. Use the search and available filters to locate the required run.
3. Click **View Results** for the run.

   The **Aggregation Results** drawer is displayed.

4. Review the run status, source and output dates, locations, requester, timestamps, and overall metrics.
5. Review **Per-table Aggregation Results**. Open **View Details** for a table to inspect its operational metrics and any error details.


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**Table 7-5 Aggregation Run Status**

| Status | Description |
|---|---|
| Running | The accepted run is being validated or processed. |
| Completed | The run has completed processing its tables. |
| Failed | The run stopped because validation or table processing failed. Review the error and table results. |
| Not Started | A table has not yet been processed. This is a table-level status. |

**Table 7-6 Aggregation Result Metrics**

| Metric | Description |
|---|---|
| Source rows | Number of source records processed for the selected input date. |
| Output rows | Number of generated records written for the output date. |
| Compression factor | Source rows divided by output rows. For example, 1,000 source rows and 100 output rows give a compression factor of 10:1. |
| Reduction percentage | Percentage decrease in records, calculated as (1 - output rows / source rows) x 100. The same example gives a reduction of 90%. |
| Observed joint tuples | Number of observed value combinations used by Preserve Distribution for the table. |
| Maximum distribution drift | Greatest difference between source and output combination frequencies, expressed in percentage points. |

Overall compression and reduction are calculated from the total source and output row counts across tables. They are not averages of the individual table ratios. When both source and output row counts are zero, the ratios are displayed as **N/A**.

> **Note**
>
> A run with no source records can complete with zero output records. Check the row counts to confirm that the expected population was processed.

The results show operational execution metrics. Generated business records are stored in the Sandbox; the Aggregation Results drawer does not provide a generated-row preview. Completion and compression metrics do not establish that downstream analytical measures, such as RWA or ECL, are unchanged.

## 7.6.1 Reviewing a Failed Run

1. Locate the **Failed** run in **Aggregation Run History** and open **View Results**.
2. Review the run error and each table's status.
3. Identify whether the failure occurred during definition validation or table processing. Correct configuration issues in an editable definition; refer source-data or metadata issues to the responsible administrator.
4. Review completed table results before arranging any cleanup or further execution.


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When a table fails, its output is rolled back and processing stops. Tables completed earlier can retain their output, while later tables remain **Not Started**. A Failed run must not be treated as a complete aggregated portfolio.

If a run remains **Running** after a service interruption, contact the administrator to reconcile its status and output. Closing the browser or leaving the page does not cancel a run.

# 7.7 Using an Aggregation Definition in a Project

An Approved Aggregation Definition can be selected for a Project associated with the corresponding Analysis Configuration. The Project starts aggregation as part of its execution flow. For information about creating and executing a Project, see the **Creating a Project** section.

To select an Aggregation Definition:

1. Open the required Project and its execution setup.
2. In **Aggregation Run**, select **Yes** for **Do you want to use an Aggregation Run?**
3. Click **Select Aggregation Definition**.
4. Select an Approved definition for the Project's Analysis Configuration and review its details.
5. Confirm the selection and complete the remaining Project run parameters.
6. Execute the Project using the existing Project execution procedure.

The Project determines the aggregation source from its data configuration and supplies the input and output dates. Unlike a manual run started from Aggregation Studio, this route uses the Project's requested output date. Aggregation must complete successfully before this stage of the Project flow reports success.

The run is recorded against the selected definition and version. Refresh **Aggregation Run History** in Aggregation Studio to view its status and table results.

If the Project reports a timeout or an uncertain start, inspect Aggregation Run History before starting the Project again. A timeout does not cancel an accepted Aggregation Run.


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# 8
# Workflow for STSA Objects

A workflow is a defined sequence of stages or steps that an STSA object goes through from its creation to completion. Each stage in the workflow represents a specific point in the life cycle of the object, and each object progresses through these stages, and incrementally by changing its status as it moves along the workflow.

The following is the list of status for each object in STSA:

- Draft - Once you create an object, it is automatically assigned to the Draft stage. At this stage, you can continue to work on it.
- Sending for Comments - Before the object undergoes formal review, you can send it to the relevant stakeholders or team members for comments and feedback. This stage allows for collaborative input to improve the object's quality before formal review.
- Submit for Review - After you have created the object and completed the initial drafting phase, you can move it to the Under Review stage. Here, they undergo assessment and evaluation by relevant stakeholders for accuracy, quality, compliance, or any other criteria.
- Reject - If during the review process an object is found to be unsatisfactory or requires revisions, it may be rejected. This means that the object needs further refinement or correction before it can progress. Once an object is rejected it is moved back to Draft state and you have to initiate the review cycle again.
- Sending for Approval - After review is complete, submit the object to the authorized approver. Submission places the object in the approval workflow. The object becomes Approved only after the approver completes the approval action. Verify its resulting status before using it where approved objects are required.


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# 8.1 Sending Objects for Worlflow Process

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. Click the object, and then click **View** option from the object tile.
4. To send an object for comments for other users or stakeholders, click More Actions and click **Submit for Comments**.

   The **Send for comments** page is displayed.
5. Select the users from whom you require the comments and click **Send**.
6. (Optional) If there are many users listed, use the search bar to filter the users and then select the required user.

# 8.2 Providing Comments for Objects

1. Login to OFSSTSA using the user credentials with posting comments privileges.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. In the **ToDo** tab, all the requests for comments and approvals are listed.

   > **Note**
   >
   > - The **ToDo** tab now also displays entries for paused projects, listed alongside other actionable items.
   > - Use the **More Actions** option next to a paused project to resume execution or review its status.
   > - The **ToDo** page allows users to take action on paused projects. After the action is taken, the project canvas opens for execution. After the user resumes and closes the project, the system automatically navigates back to the **ToDo** page.
4. To provide your comments, search for the object with **Pending for Comments**, and click More Actions and then click **Comment**.

   The **Comments** page is displayed.
5. Provide your comments in the **Add Comments Here** text box and click **Add**.

   > **Note**
   >
   > You can add any number of comments for a single object till it is moved to the next stage (Review Stage).

# 8.3 Submitting Objects for Review

1. Login to STSA.

   The **Workspace Summary** page is displayed.


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2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click the object, and then click **View** option from the object tile.

   The object's summary page is displayed.
4. To send an object for review, in **Actions** column, click **View**, **Edit**, or **Copy** and then review the definition of the object and click **Submit for Review**.

   OR

   After creating the object, click **Submit for Review**.

   After a successful submission, a **Successfully Submitted** popup is displayed.

   After this, the state of the object is changed from **Draft** state to **Under Review**.
5. To return to the main page, click **Ok**.

# 8.4 Reviewing or Rejecting Objects Sent for Review

1. Login to OFSSTSA using the user credentials with review privileges.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. Click the **ToDo** tab.

   All the objects that require an action item from your end are listed.
4. Search for the object sent for review.

   The status of the object is listed as **Under Review**.
5. To review the object, click More Actions and click **Review**.

   The object page is listed with all the comments received so far for the object.
6. Review the comments and if required add your comments and click **Add**.

   > **Note**
   >
   > You can add multiple comments for a single object at this stage.
7. To review the object, click **Mark Reviewed**.

   The status of the object is moved from **Under Review** to **Reviewed** state in the object summary page.
8. To reject the object, click More Actions and click **Reject**.

   After the object is rejected, the object is moved back to **Draft** status.

# 8.5 Sending Objects for Approval

1. Login to STSA.

   The **Workspace Summary** page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. To send the object for approval, click the object, and then click **View** option from the object tile.

   The object's summary page is displayed.


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4. Open the reviewed object in view mode and then click **Submit for Approval**.

   After the object is sent for approval, a successful message is displayed.
   The status of the object is moved from **Reviewed** to **Pending for Authorization** state in the object summary page.

5. To return to the main page, click **Ok**.

> **Note**
>
> Only the users who have review privileges for that type of object can see the object for approval in their **ToDo** tab.

## 8.6 Approving or Rejecting Objects Sent for Approval

1. Login to OFSSTSA using the user credentials with approval privileges.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. Click the **ToDo** tab.

   All the objects that require an action item from your end are listed. The objects sent for approval are in **Under Approval** status.

4. To approve the object, click More Actions and click **Approve**.

   The object page is listed with all the comments received so far for the object.

5. Review the comments and if required add your comments and click **Approve**.

> **Note**
>
> You can enter your comments only once during this stage.

The status of the object is moved from **Under Approval** to **Approved** state on the object summary page.

> **Note**
>
> After the object is approved if you want to further update the definition of the object, then the version number of the object is reved up incrementally and the status of the new version of the object is updated as **Draft**.

6. To reject the object, click More Actions and click **Reject**.

   If required you can provide your comments.

   After the object is rejected, the object is moved back to **Draft** status and then follow the complete workflow for approval.


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# 8.7 Workflows for Models

## 8.7.1 Sending Models for Model Acceptance

To send the models for model acceptance:

1. Login to STSA.

   The **Workspace Summary** page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. Click **Building Blocks** and then click **Models**.

   The **Models Summary** page is displayed.
4. Select the model you want to send for acceptance and click Actions and then **Edit**.

   The Model Definition pipeline page is displayed.
5. To send the model for a review, click the **Deployment Overview** tab and provide the following information:
   a. Provide a reviewer and level 1 approver for the model.
   b. Provide the comments for this review cycle.
   c. Click **Request** and then select **Model Acceptance**.

      The model is sent for approval.

## 8.7.2 Reviewing Models

1. Login to OFSSTSA using the user credentials with review privileges.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Building Blocks** and then click **Models**.

   The **Models Summary** page is displayed.
4. Select the model you want to review and click Actions and then **Edit**.

> **Note**
>
> If you have the approval privileges, then the status for all the models sent for approval is displayed as **Pending for Approval**.

5. Review the model, and then click the **Deployment Overview** tab.
6. To approve the model, provide the comments for review and click **Approve**.


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## 8.7.3 Making Models as Champion (Global or Local)

1. Login to STSA.

   The **Workspace Summary** page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.

   The **Models Summary** page is displayed.
4. Select the model you want to send for approval and click Actions and then **Edit**.

   Select the model you want to send for approval and click Actions and then **Edit**.
5. To send the model for approval, click the **Deployment Overview** tab and provide the following information:
   a. Provide a reviewer and level 1 approver for the model.
   b. Provide the comments for this review cycle.
   c. Click **Request** and then click **Make Champion - Global** or **Make Champion - Local**.

      The model is sent to the approver.

## 8.7.4 Retiring a Champion Model

1. Login to OFSSTSA using the user credentials with approval privileges.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. Click **Building Blocks** and then click **Models**.

   The **Models Summary** page is displayed.
4. Select the model you want to retire and click Actions and then **Edit**.
5. Review the model, and then click the **Deployment Overview** tab.
6. Click **Request**, provide the reasons for model retirement and then click **Retire Champion**.


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# 9
# Managing STSA Resources

This chapter explains the process of managing the Stress Testing and Scenario Analytics (STSA) resources.

## 9.1 Checking Log Files

Check the STSA log file present in the following location for detailed debugging:

```
export LOG_HOME=<EST Installation Directory>/logs
```

> **Note**
>
> During installation, you must export this log path in the configuration file (configforest.sh). For more information, see the Oracle Financial Services Stress Testing and Scenario Analytics Installation Guide.

and

```
<EST Installation Directory>/
OFS_EST/est-service/bin/nohup.ou
```

Check the MMG log file present in the following location for detailed debugging related to models:

```
$LOG_HOME/services
```


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# 9.2 Viewing Audit Trail Reports

Use the Audit Trail Report page to review security and application activity in the selected workspace.

**Note:** Audit Trail Reports are currently available only for the Project module.

To view audit trail reports:

1. Log in to STSA.
   The Workspace Summary page is displayed.
2. On the Sandbox tab, launch the required workspace.
3. Click the user context menu in the upper-right corner of the page, and then click **Audit Log Report** .
   The Audit Trail Report page is displayed.
4. Select one of the following tabs:
   - Security Logs - to view security-related activities.
   - Application Logs - to view application activities.
5. Use the date-range selector to specify the period for which you want to view audit entries.
6. Use the Search field or available filters, such as Module , Action Source , User , Action , and Source URL , to locate specific entries.
7. Review the All , Success , and Failure counts, or select a status to focus on the relevant entries.
8. To download the displayed audit information, click Download and select the required option.
9. Click **Refresh** to reload the report with the latest audit entries.

# 9.3 Managing Metrics

This section details the procedures for managing the metric components.

## 9.3.1 Viewing Metrics

To view the metrics, perform the following steps:

1. Login to STSA.

   The **Workspace Summary** page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Building Blocks** and then click **Metrics**.

   The Metrics Summary page is displayed with details about the metric such as metrics name, version, metric source, logical and physical reference, and status information.

   When there are multiple versions of a metric, the latest version of the metric is listed at the top of the hierarchy and expand the metric to view the previous versions.
4. To search a metric with a keyword, select from the options displayed under the search bar or type the word.
5. To sort the metrics listed on the page as per the available preferences, click the **Sort By** drop-down menu.


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You can sort the list based on the following options:

- Selected - sorts the list of objects that are selected.
- Recently Created - sorts the list of objects that are created recently and places them at the beginning.
- Recently Modified - sorts the list of objects that are modified or updated recently.
- Reset - sorts the list of objects as per the default view (alphabetically).

6. To view details about a single metric, click the metric or click **Actions** and then click **View**.

   To view details about the previous version of a metric, expand the metric, select the required version, click Actions and then click **View**.

   The metric's details is displayed with the name, selected process or model, and selected logical and physical references.
   The **Audit Logs** section displays the user who created the metric and the user who modified the definition at the latest.

   To view any comments associated to the metric, click the **Comments** tab.

   To view any tags associated to the metric, click the **Tags** tab.


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The Tags column is now available and displays the tags associated with each metric.

The **Disabled** checkbox column has been removed from the indirect summary screen. Only selected records are displayed in **View** mode.

The Name column is now left-aligned in **View** mode.

7. To return to the summary screen, click the **Metrics Summary** or click **Cancel**.

## 9.3.2 Editing Metrics

You can edit an object based on the following criteria:

- If you edit an approved object, then a new version of the object is created and the changes are reflected on the new version.
- You cannot edit an object if it is in any other state other than draft state.

> **Note**
>
> However, editing an object that is approved creates a new version of the object.

To edit a metric:

1. Login to STSA.

   The **Workspace Summary** page is displayed.

2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Building Blocks** and then click **Metrics**.

   The metrics summary page is displayed with the metric details.

4. To edit or modify a metric, click Actions and then click **Edit** against the metric.

   The metric's details is displayed with the name, selected process or model, and selected logical and physical references.
   You can edit the name of an object only for the first version and if it is in draft state.

   The **Audit Logs** section displays the user who created the metrics and the user who modified the metrics at the latest.

   To edit any comments associated to the metric, click the **Comments** tab.

   To edit any tags associated to the metric, click the **Tags** tab.

5. To save the changes, click **Update**.
6. To submit the metric for review and approval process, click **Submit for Review**.

   For more information, see the Workflow for STSA Objects.

## 9.3.3 Deleting Metrics

To delete a metric:

- Ensure that the object is not referenced anywhere.
- Ensure that the object is in draft state since you cannot delete an object if it is in any other state.
  For example, an object version is three and it is in draft state, then you can delete the version three of the object and not the object itself.


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1. Login to STSA.

   The **Workspace Summary** page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Building Blocks** and then click **Metrics**.

   The Metrics Summary page is displayed.
4. Select the metric or multiple metrics you want to delete and click **Delete**.
5. Click **Yes** in the confirmation page.

   A status message is displayed. Click **OK**.

# 9.4 Managing Variables

This section details the procedures for managing the variable components.

## 9.4.1 Viewing Variables

To view a variable:

1. Login to STSA.

   The **Workspace Summary** page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Building Blocks** and then click **View** in the **Variables** section.

   The variables summary page is displayed.
4. To view the details of a particular variable, click the variable or select the check-box against the variable and click more options and then click **View**.

   When there are multiple versions of a variable, the latest version of the variable is listed at the top of the hierarchy and expand the variable to view the previous versions.
5. To search a variable with a keyword, select from the options displayed under the search bar or type the word.
6. To sort the metrics listed on the page as per the available preferences, click the **Sort By** drop-down menu.

   You can sort the list based on the following options:

   - Selected - sorts the list of objects that are selected.
   - Recently Created - sorts the list of objects that are created recently and places them at the beginning.
   - Recently Modified - sorts the list of objects that are modified or updated recently.
   - Reset - sorts the list of objects as per the default view (alphabetically).
7. To view details about a variable, click the variable or click more options and then click **View**.

   All the details of the variables are displayed such as the name, description, variable group, variable type, sub-type, dimensions if they are included and the logical references.

   The **Audit Logs** section displays the user who created the variable definition and the last user who modified the variable definition.

   To view any comments associated to the variable definition, click the **Comments** tab.


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To view any tags associated to the variable definition, click the **Tags** tab.

The Tags column is now available and displays the tags associated with each model.

The **Disabled** checkbox column has been removed from the indirect summary screen. Only selected records are displayed in **View** mode.

The **Name** column is in View mode.

8. To return to the summary page, click **Variable Summary** or click the **Cancel** button.

## 9.4.2 Editing Variables

> **Note**
>
> After creating a variable, you cannot change the type and subtype of the variable.

You can edit an object based on the following criteria:

- If you edit an approved object, then a new version of the object is created and the changes are reflected on the new version.
- You cannot edit an object if it is in any other state other than draft state.

> **Note**
>
> However, editing an object that is approved creates a new version of the object.

To edit a variable:

1. Login to STSA.

   The **Workspace Summary** page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Building Blocks** and then click **View** in the **Variables** section.

   The variables summary page is displayed.
4. To modify the variable, click more options and then click **Edit** against the variable.

   The variable definition screen is displayed.
5. You can modify or change the description, variable group, logical reference, dimensions and hierarchies if applicable.

   You can edit the name of an object only for the first version and if it is in draft state.
6. To save the modifications, click **Update**.
7. To submit the variable for review and approval process, click **Submit for Review**.

   For more information, see the Workflow for STSA Objects.
8. To return to the summary screen, click the **Variable Summary** or click **Cancel**.

## 9.4.3 Deleting Variables

To delete a variable:

- Ensure that the object is not referenced anywhere.


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- Ensure that the object is in draft state since you cannot delete an object if it is in any other state.
  For example, an object version is three and it is in draft state, then you can delete the version three of the object and not the object itself.

1. Login to STSA.

   The **Workspace Summary** page is displayed.

2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Building Blocks** and then click **View** in the **Variables** section.

   The variables summary page is displayed.

4. Search and select the variable you want to delete.
5. Click **Delete**.
6. Click **Yes** in the confirmation screen.

   A status message is displayed. Click **OK**.

# 9.5 Managing Portfolios

This section details the procedures for managing the portfolio components.

## 9.5.1 Viewing Portfolios

To view a portfolio:

1. Login to STSA.

   The **Workspace Summary** page is displayed.

2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Building Blocks** and click **View** in the **Portfolio** section.

   The portfolio summary page is displayed.
   All the details of the portfolio are displayed such as portfolio name, version, and dimensions.

   If there are multiple versions of a portfolio, the latest version of the portfolio is listed at the top of the hierarchy.

4. To view the details of a particular portfolio, click the portfolio or select the check-box against the portfolio and click more options and then click **View**.

   All the details of the portfolio are displayed such as portfolio name, description, dimensions and selected hierarchical members.

   The **Audit Logs** section displays the user who created the portfolio definition and the last user who modified the portfolio definition.

   To view any comments associated to the portfolio definition, click the **Comments** tab.

   To view any tags associated to the portfolio definition, click the **Tags** tab.

   The Tags column is now available and displays the tags associated with each portfolio.

   When a bank-wide portfolio is selected in View mode, the following message is displayed: **“Bank-wide portfolio is enabled. Individual portfolios are not shown."** This replaces the earlier message **“No Data Available.”**


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5. To search a portfolio with a keyword, select from the options displayed under the search bar or type the word.
6. To sort the portfolio listed on the page as per the available preferences, click the **Sort By** drop-down menu.

   You can sort the list based on the following options:

   - Selected - sorts the list of objects that are selected.
   - Recently Created - sorts the list of objects that are created recently and places them at the beginning.
   - Recently Modified - sorts the list of objects that are modified or updated recently.
   - Reset - sorts the list of objects as per the default view (alphabetically).
7. To return to the summary page, click **Portfolio Summary** or the **Cancel** button.

## 9.5.2 Editing Portfolios

You can edit an object based on the following criteria:

- If you edit an approved object, then a new version of the object is created and the changes are reflected on the new version.
- You cannot edit an object if it is in any other state other than draft state.

> **Note**
>
> However, editing an object that is approved creates a new version of the object.

> **Note**
>
> You cannot change the name of a portfolio after it is created.

To edit a portfolio:

1. Login to STSA.

   The **Workspace Summary** page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Building Blocks** and click **View** in the **Portfolio** section.

   The Portfolio summary page is displayed.
4. To modify a portfolio, click Actions and then click **Edit** against the portfolio.

   The portfolio definition screen is displayed.
5. You can update the description, add or remove dimensions and the hierarchies.

   You can edit the name of an object only for the first version and if it is in **Draft** state.

   To add any comments associated to the portfolio, click the **Comments** tab.

   To add any tags associated to the portfolio, click the **Tags** tab.

   Review the changes and click **Save**.


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This action automatically creates an incremental version of the portfolio and the changes made to the existing portfolio is saved in the incremented version.

6. To return to the summary page, click **Portfolio Summary** or the **Cancel** button.

## 9.5.3 Deleting Portfolios

> **Note**
>
> Since portfolio is auto-approved, you cannot delete a portfolio.


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# 9.6 Managing Models

This section details the procedures for managing the model components.

## 9.6.1 Viewing Models

To view a model:

1. Login to STSA.

   The **Workspace Summary** page is displayed.

2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.

3. Click **Building Blocks** and then click **Models**.

   The models summary page is displayed with details about the model such as model name, version, scope, purpose, champion status, and the status of the model.
   When there are multiple versions of a model, the latest version of the model is listed at the top of the hierarchy and expand the model to view the previous versions.

4. To search a model with a keyword, select from the options displayed under the search bar or type the word.

5. To sort the model listed on the page as per the available preferences, click the **Sort By** drop-down menu.

   You can sort the list based on the following options:

   - Selected - sorts the list of objects that are selected.
   - Recently Created - sorts the list of objects that are created recently and places them at the beginning.
   - Recently Modified - sorts the list of objects that are modified or updated recently.
   - Reset - sorts the list of objects as per the default view (alphabetically).

6. To view details about a single model, click the model or click Actions and then click **View**.

   To view details about the previous version of a model, expand the model, select the required version, click Actions and then click **View**.

   The model pipeline is displayed. Click other tabs to view more details about the model.

   For more information, see the Oracle Financial Services Model Management and Governance User Guide.

   The **Audit Logs** section displays the user who created the model and the user who modified the definition at the latest.

   To view any comments associated to the model, click the **Comments** tab.

   To view any tags associated to the model, click the **Tags** tab.

   The **Tags** column is now available and displays the tags associated with each model.

   The **Disabled** checkbox column has been removed from the indirect summary screen. Only selected records are displayed in **View** mode.


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The **Name** column is in View mode.

7. To return to the summary screen, click the **Model Summary** or click **Cancel**.

## 9.6.2 Editing Models

> **Note**
>
> You cannot edit a approved or published model.

To edit a model:

1. Login to STSA.

   The **Workspace Summary** page is displayed.

2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Building Blocks** and then click **Models**.

   The **Models Summary** page is displayed.

4. Select the model you want to edit and click Actions and then **Edit**.

   The models summary page is displayed.

5. To modify a model, click Actions and then click **Edit** against the model.

   The model definition screen is displayed.

6. You can edit the model name, description or tags, and add or delete the components in the model from the model design pipeline screen and save the changes. For more information about modification on the model design pipeline screen, see the Oracle Financial Services Model Management and Governance User Guide.

   You can edit the name of an object only for the first version and if it is in draft state.

   To modify the model name, click the edit icon against the name and save the changes.

   To add any comments associated to the model, click the **Comments** tab.

   To add any tags associated to the model, click the **Tags** tab.

   Review the changes and click **Save**.

7. To return to the summary page, click **Model Summary** or the **Cancel** button.

## 9.6.3 Viewing Model Metrics

To view a model metrics

1. Login to STSA.

   The **Workspace Summary** page is displayed.

2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Building Blocks** and then click **Models**.

   The models summary page is displayed with details about the model such as model name, version, scope, purpose, champion status, and the status of the model.
   When there are multiple versions of a model, the latest version of the model is listed at the top of the hierarchy and expand the model to view the previous versions.


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4. To search a model with a keyword, select from the options displayed under the search bar or type the word.
5. To sort the model listed on the page as per the available preferences, click the **Sort By** drop-down menu.

   You can sort the list based on the following options:

   - Selected - sorts the list of objects that are selected.
   - Recently Created - sorts the list of objects that are created recently and places them at the beginning.
   - Recently Modified - sorts the list of objects that are modified or updated recently.
   - Reset - sorts the list of objects as per the default view (alphabetically).
6. To view details about a single model, click the model or click **Actions** and then click **View Metrics**.
7. In the **Selected Metrics** page that opens, review the output metric mappings.

   > **Note**
   >
   > This page displays the logical references and corresponding physical table and column mappings configured in the Output Metric Mapping stage during onboarding.
8. To return to the summary screen, click the **Model Summary** or click **OK**.

## 9.6.4 Viewing Model Variables

To view model variables:

(Optional) <Describe the context.>

1. Login to STSA.

   The **Workspace Summary** page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Building Blocks** and then click **Models**.

   The models summary page is displayed with details about the model such as model name, version, scope, purpose, champion status, and the status of the model.
   When there are multiple versions of a model, the latest version of the model is listed at the top of the hierarchy and expand the model to view the previous versions.
4. To search a model with a keyword, select from the options displayed under the search bar or type the word.


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5. To sort the model listed on the page as per the available preferences, click the **Sort By** drop-down menu.

   You can sort the list based on the following options:

   - Selected - sorts the list of objects that are selected.
   - Recently Created - sorts the list of objects that are created recently and places them at the beginning.
   - Recently Modified - sorts the list of objects that are modified or updated recently.
   - Reset - sorts the list of objects as per the default view (alphabetically).

6. To view details about a single model, click the model or click **Actions** and then click **View Variables**.
7. In the **Selected Variables** page that opens, review the input logical references and asset mappings configured in the Input Variable Mapping stage.

   > **Note**
   >
   > This is a read-only view of the input configurations defined during onboarding.

8. To return to the summary screen, click the **Model Summary** or click **OK**.

# 9.7 Managing Process

This section details the procedures for managing the process components.

## 9.7.1 Viewing Processes

A composite pipeline consists of many processes. All the composite pipelines created in STSA are displayed here.
To view the processes in the new composite pipeline:

1. Login to STSA.

   The **Workspace Summary** page is displayed.

2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Building Blocks** and click **View** in the **Process** section.

   The process summary page is displayed with details about the process such as name, package, category, last used by, and status information.

4. To search a process with a keyword, select from the options displayed under the search bar or type the word.
5. To sort the process listed on the page as per the available preferences, click the **Sort By** drop-down menu.

   You can sort the list based on the following options:

   - Selected - sorts the list of objects that are selected.
   - Recently Created - sorts the list of objects that are created recently and places them at the beginning.
   - Recently Modified - sorts the list of objects that are modified or updated recently.
   - Reset - sorts the list of objects as per the default view (alphabetically).


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6. To view details about a process, click the process or click Actions and then click **View**.

   The process pipeline or the canvas is displayed.

7. To return to the summary screen, click **Cancel**.

## 9.7.2 Viewing Process Metrics

To view a process metrics

1. Login to STSA.

   The **Workspace Summary** page is displayed.

2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.

3. Click **Building Blocks** and then click **Models**.

   The models summary page is displayed with details about the model such as model name, version, scope, purpose, champion status, and the status of the model.
   When there are multiple versions of a model, the latest version of the model is listed at the top of the hierarchy and expand the model to view the previous versions.

4. To search a model with a keyword, select from the options displayed under the search bar or type the word.

5. To sort the model listed on the page as per the available preferences, click the **Sort By** drop-down menu.

   You can sort the list based on the following options:

   - Selected - sorts the list of objects that are selected.
   - Recently Created - sorts the list of objects that are created recently and places them at the beginning.
   - Recently Modified - sorts the list of objects that are modified or updated recently.
   - Reset - sorts the list of objects as per the default view (alphabetically).

6. To view details about a single process, click **Actions** and then click **View Metrics**.

7. In the **Selected Metrics** page that opens, review the output metric mappings.

   > **Note**
   >
   > The system displays the output metric mappings configured in the Output Metric Mapping stage during onboarding.
   > This is a read-only view of the configured output logical references and their corresponding physical table and column mappings.

8. To return to the summary screen, click the **Process Summary** or click **OK**.

## 9.7.3 Viewing Process Variables

To view process variables:

1. Login to STSA.

   The **Workspace Summary** page is displayed.

2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.

3. Click **Building Blocks** and then click **Process**.


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4. To view details about a single process, click **Actions** and then click **View Variables**.
5. In the **Selected Variables** page that opens, review the input logical references and asset mappings configured in the Input Variable Mapping stage.

> **Note**
>
> This is a read-only view of the input configurations defined during onboarding.

6. To return to the summary screen, click the **Process Summary** or click **OK**.

## 9.7.4 Editing Additionally Added Processes and Models in Composite Pipeline

You can edit (add or remove) only the newly added processes and models from the composite pipeline. You cannot edit the process or models that are added automatically through the selected variables and models in the previous steps of analysis configuration creation wizard. Also, you cannot modify anything in the runs, subruns, and scenarios that are part of the composite pipeline.

1. Login to STSA.

   The **Workspace Summary** page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Analysis Configuration**.

   The **Analysis Configuration summary** page is displayed.
4. To open the specific analysis configuration, click the analysis configuration or click **More Actions** on the required configuration and click **View**.

   The **Review & Validate** screen is displayed.
5. Click **Process** on the right-hand side.

   The **Process** page and the selected composite pipeline is displayed.
6. Click actions against the pipeline and click **Edit**.

   The **Process Pipeline** page is displayed.
7. To add new processes, click the **Add New Processes** tab.

   Based on your previous selection, all the applicable processes are listed.
8. Select the required processes and click **Add**.

   A pop-up message is displayed for auto-sequencing option.

   - If you want to continue with auto-sequencing, click **Yes**.
     If you select the auto-sequencing option, a confirmation message is displayed. Click **OK** and proceed to the **Process Pipeline** page.
   - If you want to continue with manual sequence, click **No**.
     For more information on sequencing the runs, see the Sequencing Runs.
9. To save the changes, click **OK** and then click **Save and Close**.


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### 9.7.5 Deleting Additionally Added Processes and Models in Composite Pipeline

You cannot delete a composite pipeline or the runs, subruns, and scenarios that are part of the composite pipeline. However, you can delete only the newly added processes or models in process section of analysis configuration:

1. Login to STSA.

   The **Workspace Summary** page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Analysis Configuration**.

   The **Analysis Configuration summary** page is displayed.
4. To open the specific analysis configuration, click the analysis configuration or click **More Actions** on the required configuration and click **View**.

   The **Review & Validate** screen is displayed.
5. Click **Process** on the right-hand side.

   The **Process** page and the selected composite pipeline is displayed.
6. Click actions against the pipeline and click **Edit**.

   The **Process Pipeline** page is displayed.
7. To delete the additionally added process or models, click the delete button against the process or model.
8. To save the changes, click **Save and Close**.
9. To save the configuration and work on it later, click **Save** or **Save and Close**.
10. Review the selections made and click **Submit for Review**.

    For more information, see the Workflow for STSA Objects.

## 9.8 Managing Pipeline Mapping

This section details the procedures for managing the process to map pipelines to metrics and portfolio.

### 9.8.1 Mapping Metrics

To map pipelines to metrics:

1. Login to STSA.

   The **Workspace Summary** page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Building Blocks** and click **View** in the **Pipeline Mapping** section.

   The Pipeline summary page will display the pipelines, metrics, variables, and portfolio.
4. Select the pipeline, click **Actions** and then select **Map Metrics**.

   The **Select Metrics** page is displayed with the name, version, metric source, logical reference, physical reference, and status information.


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5. Select the metrics you want to map.
6. Click **Save** to save your changes.
7. Click **Cancel** to return to the summary screen.

## 9.8.2 Unmapping a Metric from a Pipeline

To unmap a metric from a pipeline:

1. Login to STSA.

   The **Workspace Summary** page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Building Blocks** and click **View** in the **Pipeline Mapping** section.

   The Pipeline summary page will display the pipelines, metrics, variables, and portfolio.
4. Select the pipeline, click **Actions** and then select **Map Metrics**.

   The **Select Metrics** page is displayed with the name, version, metric source, logical reference, physical reference, and status information.
5. Uncheck the metric(s) you want to unmap.
6. If the pipeline is no longer associated with any metrics, a confirmation message is displayed and do either of the following:

   **“Metric will no longer have any pipeline associated to it. Do you want to proceed?**

   - Click **Yes** to confirm and unmap the metric.
   - Click **No** to cancel the action and retain the mapping.
7. Click **Save** to save your changes.
8. Click **Cancel** to return to the summary screen.

## 9.8.3 Mapping Portfolio

To map pipelines to portfolio:

1. Login to STSA.

   The **Workspace Summary** page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Building Blocks** and click **View** in the **Pipeline Mapping** section.

   The Pipeline summary page will display the pipelines, metrics, variables and portfolio.
4. Select the pipeline, click **Actions** and then select **Map Portfolio**.

   The **Select Portfolio** page is displayed with the name, version, and dimension information.
5. Select the porfolio you want to map.
6. Click **Save** to save your changes.
7. Click **Cancel** to return to the summary screen.

## 9.8.4 Auto-Mapping Variables

Auto-mapping of variables to a pipeline is triggered when the Pipeline Mapping UI loads.To access it:


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1. Login to STSA.

   The **Workspace Summary** page is displayed.

2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.

3. Click **Building Blocks** and click **View** in the **Pipeline Mapping** section.

   The Pipeline summary page will display the pipelines, metrics, variables, and portfolio.

   The mapping is derived from the glossary term mappings of variables and pipelines defined in OpenMetadata. For more information, see the Uploading Glossary Term/Tag to Pipeline Mapping and Creating Variables sections.

# 9.9 Managing Scenarios

This section details the procedures for managing the scenario components.

## 9.9.1 Viewing Scenario

To view a scenario:

1. Login to STSA.

   The **Workspace Summary** page is displayed.

2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.

3. Click **Scenario**.

   The **Scenario summary** page is displayed with details about the scenario such as scenario name, version, source, time frame, frequency, theme, status, start date, and first forecast date. If there are multiple versions of an object, the latest version of the object is listed at the top of the hierarchy.

4. To search a scenario with a keyword, select from the options displayed under the search bar or type the word.

5. To sort the scenario listed on the page as per the available preferences, click the **Sort By** drop-down menu.

   You can sort the list based on the following options:

   - Selected - sorts the list of objects that are selected.
   - Recently Created - sorts the list of objects that are created recently and places them at the beginning.
   - Recently Modified - sorts the list of objects that are modified or updated recently.
   - Reset - sorts the list of objects as per the default view (alphabetically).

6. To view details about a scenario, click the scenario or click actions against the scenario and then click **View**.

   To view an older version of the object, expand the object and select the required version.

   The scenario's details is displayed with details such as name, description, frequency details, dimensions, variables, and shock values.


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The **Audit Logs** section displays the user who created the scenario and the last user who modified the scenario.

To view any comments associated to the scenario, click the **Comments** tab.

To view any tags associated to the scenario, click the **Tags** tab.

The Tags column displays the tags associated with the scenario.

7. To save the wizard, click **Save**.
8. To save and close the wizard, click **Save and Close**.
9. To return to the summary screen, click the **Scenario Summary** or click **Cancel**.

## 9.9.2 Editing a Scenario

You can edit an object only in the draft state. Editing an approved object creates a new version with the changes.

When you open an existing scenario in edit mode, STSA checks whether any associated objects—such as variables, metrics, or portfolios—have newer versions.

If updates are available, the system displays a notification with the latest version and a summary of changes.

This helps ensure the scenario remains aligned with the most recent object definitions.


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To edit a scenario, perform the following steps:

1. Login to STSA.

   The **Workspace Summary** page is displayed.

2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.

3. Click **Scenario**.

   The **Scenario summary** page is displayed with details about the scenario such as scenario name, version, source, time frame, frequency, theme, status, start date, and first forecast date. If there are multiple versions of an object, the latest version of the object is listed at the top of the hierarchy.

4. To edit a scenario, click actions against the scenario and then click **Edit**.

   The scenario definition page is displayed.

5. Modify the details and click **Save** and then click **Submit for Review**.

   You can edit the name of an object only for the first version and if it is in draft state.

   For more information, see the Sending Objects for Worlflow Process section.

6. To save and close the wizard, click **Save and Close**.


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> **Note**
>
> - Changing frequency or timeframe combinations can require a full pathway reset. Review the confirmation before proceeding. Cancel retains the previous settings; after accepting, review the grids and validate the scenario again.
> - Supported date-only updates can preserve matching inputs while refreshing computed values. See Updating Time Horizon Details While Preserving Variable Pathways for the applicable preservation and reset rules.

### 9.9.3 Deleting Scenario

To delete a scenario:

- Ensure that the object is not referenced anywhere.
- Ensure that the object is in draft state since you cannot delete an object if it is in any other state.
  For example, an object version is three and it is in draft state, then you can delete the version three of the object and not the object itself.

1. Login to STSA.

   The **Workspace Summary** page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Scenario**.

   The **Scenario Summary** page is displayed with details about the scenario.
   If there are multiple versions of an object, the latest version of the object is listed at the top of the hierarchy.
4. Select the scenario or scenarios and click **Delete**.
5. Click **Yes** in the confirmation screen.

   Status of the delete action is displayed in the delete summary pop-up window.
6. Click **OK**.

## 9.10 Managing Analysis Configuration

### 9.10.1 Viewing Analysis Configuration

To view the analysis configuration:

1. Login to STSA.

   The **Workspace Summary** page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Analysis Configuration**.

   The analysis configuration summary page is displayed with details about the configuration such as the configuration name, version, analysis purpose, jurisdiction, regulation, regulator, run type and status.


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When there are multiple versions of an analysis configuration, the latest version of the configuration is listed at the top of the hierarchy and expand the configuration to view the previous versions.

4. To search a configuration with a keyword, select from the options displayed under the search bar or type the word.
5. To sort the configuration listed on the page as per the available preferences, click the **Sort By** drop-down menu.

   You can sort the list based on the following options:

   - Selected - sorts the list of objects that are selected.
   - Recently Created - sorts the list of objects that are created recently and places them at the beginning.
   - Recently Modified - sorts the list of objects that are modified or updated recently.
   - Reset - sorts the list of objects as per the default view (alphabetically).
6. To view details about a configuration, click the configuration or click Actions and then click **View**.

   To view details about the previous version of a configuration, expand the configuration, select the required version, click Actions and then click **View**.

   The configuration's **Review & Validate** section of the analysis configuration wizard is displayed. The **Audit Logs** section displays the user who created the configuration and the user who modified the definition at the latest.
   To view any comments associated to the configuration, click the **Comments** tab.

   To view any tags associated to the configuration, click the **Tags** tab.

   The **Tags** column is now available and displays the tags associated with the analysis configuration.
7. To return to the summary screen, click **Close**.

## 9.10.2 Editing Analysis Configuration

You can edit an object based on the following criteria:

- If you edit an approved object, then a new version of the object is created and the changes are reflected on the new version.
- You cannot edit an object if it is in any other state other than draft state.

> **Note**
>
> However, editing an object that is approved creates a new version of the object.

> **Note**
>
> STSA displays a notification alert when you open an existing analysis configuration in edit mode, if any associated objects—such as portfolios, metrics, or variables—have newer versions available.
>
> The alert includes a summary of changes in the updated version, helping ensure that the configuration stays aligned with the latest definitions.


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To edit an analysis configuration:

1. Login to STSA.

   The **Workspace Summary** page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Analysis Configuration**.

   The analysis configuration summary page is displayed.
4. To modify a configuration, click Actions and then click **Edit** against the configuration.

   The **Basic Details** section of the analysis configuration wizard is displayed.
   You can edit the name of an object only for the first version and if it is in draft state.
5. Update the required components and click **Continue** and then click **Submit for Review**.

   For more information, see the Workflow for STSA Objects.

   To save the configuration and work on it later, click **Save** or **Save and Close**.
6.

## 9.10.3 Deleting Analysis Configuration

To delete an analysis configuration:

- Ensure that the object is not referenced anywhere.
- Ensure that the object is in draft state since you cannot delete an object if it is in any other state.
  For example, an object version is three and it is in draft state, then you can delete the version three of the object and not the object itself.

1. Login to STSA.

   The **Workspace Summary** page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Analysis Configuration**.

   The analysis configuration summary page is displayed.
4. Search and select the analysis configuration you want to delete.
5. Click **Delete**.
6. Click **Yes** in the confirmation screen.

   A status message is displayed. Click **OK**.

# 9.11 Managing Project

This section details the procedures for managing the project components.

## 9.11.1 Viewing Project

To view a project:

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.


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3. Click **Project**.

   The project summary page is displayed.

4. To view details about a project, click **Actions** and then click **View**.

   The project summary page is displayed with details like completion percentage, version of the project, status of the project, components of the selected analysis configuration and scenario, run parameters and execution status of the project.
   For a quick view of the status of the project at each stage is displayed in the right side of the **Status** tab.

> **Note**
>
> - The execution id mentioned in the **Execution and Results** tab is required to filter reports in the analytics section.
> - The Tags column is now available and displays the tags associated with the project.

## 9.11.2 Editing Project

You can edit an object based on the following criteria:
You can edit an object based on the following criteria:

- If you edit an approved object, then a new version of the object is created and the changes are reflected on the new version.
- You cannot edit an object if it is in any other state other than draft state.

> **Note**
>
> However, editing an object that is approved creates a new version of the object.

To edit a project:

Ensure that the project is not approved.

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. Click **Project**.

   The project summary page is displayed.

4. To edit details about a project, click Actions and then click **Edit**.

   The project summary page is displayed with details like completion percentage, version of the project, status of the project, components of the selected analysis configuration and scenario, run parameters and execution status of the project.

5. Click **Actions** and then click **Edit Project Details**.

   The project details page is displayed.

6. Update the values and click **Save**.

   You can edit the name of an object only for the first version and if it is in draft state.

7. To change the selected analysis configuration and then click **Scenario** tab.


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a. Click the **Analysis Configuration** tab and click **Remove Configuration**.

b. Add another new or existing configuration by clicking the **Select** option.

8. To change or add scenarios select the **Scenario** tab.

a. To remove the selected scenario, click the **Scenario** tab and click **Remove Configuration**.

b. To add another new or existing scenario, click the **Select** option from **Create New Scenario** or **Add Existing Scenario**.

Repeat this step to add more scenarios.

c. To remove an existing scenario, click the **Delete** icon and confirm your choice in the pop-up window.

9. Create the pipeline, add run parameters and then run the project.

### 9.11.3 Deleting Project

To delete a project, perform the following:

1. Login to STSA.
2. In the **Workspace Summary**, **Sandbox** tab, select the required workspace.
3. Click **Project**.

   The project summary page is displayed.
4. To delete one or more projects, select the check box against the projects and then click **Delete**.
5. Click **Yes** in the pop-up window.

   The project is deleted successfully.

## 9.12 Managing Result Dimensions

### 9.12.1 Editing Result Dimensions

To edit result dimensions:

1. Open the project in **View** mode.
2. In **Project Activity** under **Result Setup** click **Edit Result Dimension**.
3. In the **Choose the dimensions** screen, select the dimension names to update from the drop-down list.
4. Click **Next**.
5. In the **Map dimensions to results** table for the selected metrics screen, select the updated value from the drop-down list in the **Foreignkey Reference** field.
6. Click **Save** to update the Result Dimensions.

   In the **Result Setup** tab, all the added result dimensions are listed.

### 9.12.2 Viewing Result Dimensions

To view the result dimensions:


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1. Open the project in **View** mode.
2. In **Project Activity** under **Result Setup** click **View Result Dimension**.
3. In the **Choose the dimensions** screen, you can view the dimension names that are seelcted.
4. Click **Map dimensions to results table for the selected metrics screen** to view the table name and **Foreignkey Reference** details
5. In the **Map dimensions to results** table for the selected metrics screen, select the updated value from the drop-down list in the **Foreignkey Reference** field.
6. Click **Cancel** to go back to the **Result Setup** screen


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# 9.13 Managing Aggregation Studio

This section details the procedures for managing the aggregation studio component.

## 9.13.1 Viewing Aggregation Studio

To view an Aggregation Studio definition:

1. Log in to STSA.

   The **Workspace Summary** page is displayed.
2. Click **Building Blocks**, and then click **Aggregation Studio**.

   The **Aggregation Studio Summary** page is displayed.
3. Use the search, filter, or status options to find the required definition.
4. Select the required definition and click **View**.

> **Note**
>
> A failed or completed Aggregation Studio definition should be reviewed before it is republished or reused.

## 9.13.2 Editing Aggregation Studio

To edit an Aggregation Studio definition:

1. Log in to STSA.

   The **Workspace Summary** page is displayed.
2. Click **Building Blocks**, and then click **Aggregation Studio**.

   The **Aggregation Studio Summary** page is displayed.
3. Use the search, filter, or status options to find the required definition.
4. Select the required definition and click **Edit**.
5. Update the required details, baseline-plan settings, or segments and grouping, and then save the definition.
6. To continue work on an incomplete definition, select a definition in **Draft** status and click **Continue Setup**.

> **Note**
>
> The actions available for an Aggregation Studio definition depend on its current status and your assigned permissions.


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## 9.13.3 Deleting Aggregation Studio

To delete an Aggregation Studio definition:

1. Log in to STSA.

   The **Workspace Summary** page is displayed.
2. Click **Building Blocks**, and then click **Aggregation Studio**.

   The **Aggregation Studio Summary** page is displayed.
3. Use the search, filter, or status options to find the required **Draft** definition.
4. Select the required Draft definition and click **Delete**.

> **Note**
>
> Only Aggregation Studio definitions in **Draft** status can be deleted.


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# 9.14 Managing Sandbox

This section details the procedures for managing the sandbox.

## 9.14.1 Viewing Sandbox

1. Login to STSA.

   The **Workspace Summary** page is displayed.

2. Click more options in the workspace you want to view and select **View**. The view workspace page is displayed.

   The creation date and data store type is listed along with basic, schema, execution, data and metadata sourcing details are displayed in different tabs. Click each tab for more information.

## 9.14.2 Editing Sandbox

N

> **Note**
>
> While updating a workspace, if any of the DMM operations such as Procedures, Functions, Packages, and so on fails, DMM operations alone will be rolled back and workspace will not be rolled back. You can verify the details in MMG_SANDBOX_DETAILS, MMG_SANDBOX_MASTER, MMG_SANDBOX_SCHEMA tables.

1. Login to STSA.

   The **Workspace Summary** page is displayed.

2. Click more options in the workspace you want to edit and select **Edit**.

   The workspace wizard is displayed.

3. Update the selections and click **Next**.

4. To save the changes made, click **Update**.

   The sandbox is updated successfully.


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# 9.14.3 Deleting Sandbox

> **Note**
>
> When you delete a Workspace, all the underlying objects such as Dataset, Scheduler service metadata and so on from the associated tables are deleted.

Ensure that you de-link the Sandbox workspaces from Production Workspace before deleting the Production Workspace.

1. Login to STSA.

   The **Workspace Summary** page is displayed.

2. Select the workspace you want to delete and click **Delete**.
3. Click **Yes** in the confirmation screen.

   The workspace is deleted successfully.


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# Managing OpenMetadata

This chapter details some of the consolidated views in OpenMetadata.

## 10.1 Viewing Databases added in OpenMetadata

To view all the databases added in OpenMetadata, perform the following:

1. Login to OpenMetadata.
2. Click **Settings** and in the **Services** section, click **Databases**.

   The Databases page is displayed.

## 10.2 Viewing Pipelines

To view all the pipelines added in OpenMetadata, perform the following:

1. Login to OpenMetadata.
2. Click **Settings** and in the **Services** section, click **Pipelines**.
   The Pipelines page is displayed.

## 10.3 Viewing ML Models

To view all the MMG models used in OpenMetadata, perform the following:

1. Login to OpenMetadata.
2. Click **Settings** and in the **Services** section, click **ML Models**.

   The ML Models page is displayed.


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# 11
# Reports and Analysis

Reports are a structured presentation that summarizes the findings from the stress runs. It provides a clear and comprehensive view of the system's performance under stress and presents this data in a visual format. Using this data you can identify potential risks, their impact on the organization and take informed decisions.

## 11.1 Viewing Reports

To view the stress reports:

1. Login to STSA.

   The **Workspace Summary** page is displayed.
2. In the **Workspace Summary**, **Sandbox** tab, launch the required workspace.
3. Click **Project**.

   The project summary page is displayed.
4. Open the project in view mode, by clicking actions and then click **View**.
5. Click the **Execution And Results** tab, click actions and then click **View Results**.

   The analytics login page is displayed.
6. Provide your credentials and login to the BI application.

   The analytics home page is displayed.
7. Click more options and then click **Catalog**.

   The **Catalog** page is displayed.
8. Click **Shared Folders** tab.

   All the STSA reports are listed.
9. Right-click on the report you want to view and open the report.

   Each report in STSA has the following filters. To view granular reports, select or apply the following filters:

   - Project Name - filters the reports based on projects.
   - Run Date - filters the reports based on date when the project was run if a project has multiple results.
   - Project Execution ID - filters the reports based on a project id since each run of the same project is associated with a unique id.
   - MIS Date - filters the reports based on the Management Information System (MIS) date selected for a single or multiple projects.
   - Scenario Name - filters the reports based on a selected scenario or scenarios when multiple scenarios are selected for running a project.


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> **Note**
>
> The dimensions are also listed as filters so that you can view reports at dimension level.

- Measure - filters the reports based on measures you have defined in the result table to view the granular data in a stress run.

> **Note**
>
> By default, the first available measure listed in the filters is applied on all the reports.

10. To apply a filter, click on a filter and select one or more parameters.
11. To remove a filter, click a filter and click on the selected parameter. The filter is removed.

    OR
    Click on filter icon and select **Remove All Filters**.
12. To drill-down on the composition of a value in the trend or variance report, right-click on a report, and select **Composition Report for Dimension Set 1** or **Composition Report for Dimension Set 2**.
13. To view the variance reports for secondary measures, select a secondary measure from the **Secondary Measure** drop-down menu.

# 11.2 List of Reports

### Trend and Composition Reports

**Table 11-1 Details about Trend and Composition Reports**

| Parameters | Description |
|---|---|
| Analysis Name | Trend and Composition Reports |
| Report Level Filters | • Project Name<br>• Run Date<br>• Project Execution ID<br>• MIS Date<br>• Scenario Name<br><br>**Note**<br>The dimensions are also listed as filters so that you can view reports at dimension level.<br><br>• Measure |


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**Table 11-1 (Cont.) Details about Trend and Composition Reports**

| Parameters | Description |
|---|---|
| Analysis Description | These reports analyze the changes and patterns over time, as well as the composition of certain variables or elements within a dataset. They look at long-term changes and structural composition. For example, in business, a trend report might analyze sales growth over several years, while a composition report might break down sales by product categories or regions. It involves longitudinal studies, time-series analysis, and demographic segmentation to highlight how certain trends develop and what elements constitute a larger picture. |
| Reports Covered | This analysis is presented through a combination of the following reports:<br>• **Trend of Actuals report** - This analysis presents the actual numbers of how a selected measure varies across incremental MIS dates.<br>• **Trend of Variance % report** - This analysis presents the change in percentage of how a selected measure varies across incremental MIS dates. |
| Composition Reports | • **Composition of Primary Measure** - these reports analyze the changes and patterns over time, as well as the composition of certain variables or elements within a dataset. They look at long-term changes and structural composition. It represents the composition of the trend report at a dimension level.<br>• **Concentration Analysis of Primary Measure/ Secondary Measure**- this analysis represents the composition of the trend report between the primary (option selected in the measure filter) and secondary measures. |

### Variance Between Scenarios

**Table 11-2 Details about Variance Between Scenarios**

| Parameters | Description |
|---|---|
| Analysis Name | Variance Between Scenarios |
| Report Level Filters | • Project Name<br>• Run Date<br>• Project Execution ID<br>• MIS Date<br>• Scenario 1<br>• Scenario 2<br><br>**Note**<br>The dimensions are also listed as filters so that you can view reports at dimension level.<br><br>• Measure |


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**Table 11-2 (Cont.) Details about Variance Between Scenarios**

| Parameters | Description |
|---|---|
| Analysis Description | This type of report is used to compare two different scenarios to understand how varying conditions or decisions affect outcomes. It shows the difference between two scenarios in value and in percentage. Also, you can view the variance reports for the secondary measure using the **Secondary Measure** drop-down menu. |
| Reports Covered | • Primary Measure Change Analysis - these reports show a graphical representation of the scenarios and the variance between these two scenarios. You can view the reports for each dimension of a scenario.<br>• Scenario 1 - these reports show the granular data of a scenario by each dimension. You can view granular data up to six dimensions.<br>• Concerning Variance - these reports show the data for each dimension against the secondary measure. |

### Variance Between Two Dates for a Given Scenario

**Table 11-3 Details about Variance Between Two Dates for a Given Scenario**

| Parameters | Description |
|---|---|
| Analysis Name | Variance Between Two Dates for a Given Scenario |
| Report Level Filters | • Project Name<br>• Run Date<br>• Project Execution ID<br>• Measure<br>• MIS Date<br>• Comparison MIS Date<br>• Scenario Name<br>**Note:** The dimensions are also listed as filters so that you can view reports at dimension level. |
| Analysis Description | This type of report is used to analyze the changes that occur within a specific scenario over two distinct points in time. This report shows the actual and percentage difference between two dates in the same scenario across six dimensions. Also, you can view the variance reports for the secondary measure using the **Secondary Measure** drop-down menu. |
| Reports Covered | • Primary Measure Change Analysis - this report shows a graphical representation of the difference between the dates in the same scenario and the variance between these two dates in the same scenario.<br>• MIS Date 1 EOP Balance - this report shows the values of each dimension against a defined measure.<br>• Variance - this report shows the value of each dimension against a defined measure.<br>• Variance % - this report shows the percentage value of each dimension against a defined measure.<br>• MIS Date 2 EOP Balance - this report shows the values of each dimension against a defined measure.<br>• Concerning Variance - these reports show the data for each dimension against the secondary measure. |


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### Variance from Base Reference Date

**Table 11-4 Details about Variance from Base Reference Date**

| Parameters | Description |
|---|---|
| Analysis Name | Variance from Base Reference Date |
| Report Level Filters | • Project Name<br>• Run Date<br>• Project Execution ID<br>• Base Date<br>• MIS Date<br>• Scenario Name<br>• Measure<br>• Comparison MIS Date<br>• Scenario Name<br>**Note:** The dimensions are also listed as filters so that you can view reports at dimension level. |
| Analysis Description | This type of report is used to measure how much a variable has deviated from a specific starting point or baseline. This report shows the actual and percentage difference between the base date and MIS date. The **Primary Measure Change Analysis** report shows a graphical representation of the difference between the base date and MIS date and the variance between these two dates. Also, you can view the reports for each dimension of a scenario. You can view the variance reports for the secondary measure using the **Secondary Measure** drop-down menu. |
| Reports Covered | • Primary Measure Change Analysis - this report shows a graphical representation of the difference between the dates in the same scenario and the variance between these two dates in the same scenario.<br>• Base EOP Balance<br>• Variance<br>• Variance - this report shows the value of each dimension against a defined measure.<br>• Variance % - this report shows the percentage value of each dimension against a defined measure.<br>• MIS Date - these reports show the values between MIS date dimension against a measure.<br>• Concerning Variance - these reports show the data for each dimension against the secondary measure. |


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12

# Template Builder Framework

This chapter describes the Template Builder Framework, a configuration-driven UI generation mechanism that enables rapid creation of dynamic, reusable, and dependency-aware input templates through database mappings without requiring manual UI development.

## 12.1 Introduction

The Template Builder is a dynamic UI generation framework designed to accelerate the deployment of input screens without manual coding. Primarily used for regulatory calculators (such as RWA and other financial metrics), it allows developers and business users to define complex, form-based interfaces through database configurations.

By aligning with the latest RAPID components, the framework ensures that generated UIs are fast, responsive, and compliant. This "config-over-code" approach empowers users to build custom forms that interact directly with financial models, significantly reducing development cycles and enabling rapid responses to evolving regulatory requirements.

The following table summarizes the core capabilities of the Template Builder Framework and the benefits it provides in enabling configuration-driven UI generation and model integration.

**Table 12-1 Core Capabilities of the Template Builder Framework**

| Capability | Description |
|---|---|
| Config-over-Code | UI generated through DB configuration |
| Rapid Deployment | No manual UI coding required |
| Reusable Architecture | Combinations and groups are reusable |
| Regulatory Agility | Quick adaptation to evolving regulatory rules |
| Model Integration | Direct interaction with financial models |

### 12.1.1 Framework Architecture Overview

The Template Builder framework is composed of the following logical entities:

**Table 12-2 Template Builder framework**

| Entity | Description | Reusability |
|---|---|---|
| Component | UI control (Input, Dropdown, Table, and so on.) | Reusable |
| Combination | One component mapped with its properties | Reusable across groups |
| Group | Logical section containing combinations | Reusable across templates |
| Template | Collection of groups rendered as UI | Contains multiple groups |
| Dependency Mapping | Controls execution/visibility logic | Template-level |


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## 12.1.2 Supported UI Components in the Template Builder Framework

The following table lists the UI components supported by the Template Builder Framework and describes their functional purpose within dynamically generated templates.

**Table 12-3 Supported UI Components in the Template Builder Framework**

| Component Name | Description |
|---|---|
| Gbu Input Text | Captures the text input |
| Gbu Input Number | Captures numeric input |
| Gbu Radio Button | Displays two selectable options |
| Gbu Input Date | Captures date input |
| Gbu Single Select | Select one option |
| Gbu Multi Select | Select multiple options |
| Gbu Table | Displays predefined tabular data |
| Cartesian Table | Dynamic table supporting SQL/API/hierarchy-driven columns |

## 12.1.3 Component Properties

The following table describes the configurable properties available in the Template Builder Framework, the components to which they apply, and their functional behavior within dynamically generated templates.

> **Note**
>
> The following component and properties are available in the `AF_TB_COMPONENT_CATALOG` and `AF_TB_PROPERTY_CATALOG` table.

**Table 12-4 Component Properties**

| Property | Applicable Components | Description |
|---|---|---|
| SQL Query | Radio Button, Single Select, Multi Select | SQL must return JSON objects with label and value. |
| SQL Query with Placeholder | Radio Button, Single Select, Multi Select, Cartesian Table | SQL contains a placeholder referencing another component's JSON key. Executes after parent value is available. |
| API Data with Placeholder | Radio Button, Single Select, Multi Select, Cartesian Table | API returns JSON with label and value. Placeholder is replaced with parent component value before execution. |
| Min Number | Input Number | Defines minimum allowed numeric value. |
| Max Number | Input Number | Defines maximum allowed numeric value. |


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**Table 12-4 (Cont.) Component Properties**

| Property | Applicable Components | Description |
|---|---|---|
| JSON Key | All Components | Unique identifier used for data storage, placeholder substitution, and dependency mapping. Final output is stored as JSON using these keys. |
| Styling CSS | All Components | Supports external or custom CSS styling. |
| Table Column Headers | Gbu Table | Defines column headers. |
| Required Flag | All Components | When set to **Y**, the field becomes mandatory. Template cannot be saved unless populated. |
| Options for Selection | Radio Button, Single Select, Multi Select | Static JSON list of label and value. Used when options are not fetched dynamically. |
| Cartesian Custom Column Name | Cartesian Table | Display name for dynamically created column. |
| Cartesian Custom Column Type | Cartesian Table | Defines data type such as string or number. |

# 12.1.4 Combinations

## 12.1.4.1 Overview

A Combination represents a single component mapped with its associated properties. It defines how the component behaves and how its data is stored in the final JSON output.

Each combination:

- Contains one component.
- Can have multiple mapped properties
- Is unique.

The following are the governing rules for defining combinations within the Template Builder Framework to ensure consistency, reusability, and proper configuration.

- Each combination represents a single component along with its associated mapped properties.
- Combinations are reusable.
- The same combination can be mapped to multiple groups.

# 12.1.5 Groups

## 12.1.5.1 Purpose

Groups logically organize related combinations under a common section heading in the UI. When multiple combinations represent related inputs, they can be grouped together for better usability and readability.


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### 12.1.5.2 Structure

The following describes the structural characteristics and reusability principles of groups within the Template Builder Framework.

- A group contains multiple combinations.
- Groups define logical sections in the UI.
- Groups are reusable
- The same group can be mapped to multiple templates.

The following table illustrates the reusability relationships between core entities in the Template Builder Framework.

**Table 12-5 Entity Reusability Matrix**

| Entity | Reusability Rule |
|---|---|
| Combination | Can be mapped to multiple groups |
| Group | Can be mapped to multiple templates |
| Template | Can contain multiple groups |

## 12.1.6 Dependent Components

### 12.1.6.1 Overview

Templates can contain dependent combinations where one combination's visibility or availability depends on another combination's value.

Dependencies are defined at the combination level and are fully data-driven.

### 12.1.6.2 Dependency Configuration

Dependencies are configured using the AF_TB_COMBINATION_DEP_MAPPING table.

Each dependency includes:

- Template Name
- Parent Combination
- Child Combination
- Condition

The following table outlines the supported dependency conditions in the Template Builder Framework and describes how each condition controls the activation behavior of child combinations.

**Table 12-6 Supported Dependency Conditions**

| Condition Type | Behavior |
|---|---|
| Not Null or Has Value | The child combination becomes active when the parent combination contains any value. |


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**Table 12-6 (Cont.) Supported Dependency Conditions**

| Condition Type | Behavior |
|---|---|
| Specific Value Match | The child combination becomes active only when the parent combination equals a specified value. |

The following rules define how dependency relationships are structured and enforced within a template in the Template Builder Framework.

- Dependencies apply within the same template.
- One parent can control multiple children.
- A child can depend on multiple parents, if supported.
- All dependency logic is configured through database mapping.

# 12.2 Creating a Template

The following section outlines the high-level process for creating and registering a template within the Template Builder Framework, from defining combinations to completing system-level registration.

## 12.2.1 Template Creation Process

This section provides a high-level overview of the template creation process:

To create a template:

1. Create combinations by mapping a component with required properties in AF_TB_COMBINATION_MAPPING_DETAIL.
2. 2. Map combinations to groups using AF_TB_COMBINATION_GROUP_MAPPING.
3. Create the template entry in AF_TB_TEMPLATE_MASTER.
4. For every template created within STSA, corresponding roles and functions must be created before proceeding with template creation.

   Each template code follows the prefix TEMP_ (for example, TEMP_TEST). Function codes must also begin with the template code. The standard function codes are:
5. Register the template in the COM tables (AAICL_OBJ_TYPE_B and AAICL_OBJ_TYPE_TL).

   The Object Type value must correspond to the template code defined during template creation. Specify a high sequence number to avoid potential clashes with existing object type entries in the system.
6. Map groups to the template using AF_TB_TEMPLATE_GROUP_MAPPING.
7. Configure combination dependencies in AF_TB_COMBINATION_DEP_MAPPING, if required.

> **Note**
>
> This configuration-driven process ensures that once database entries are completed, the UI is automatically rendered.


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## 12.2.2 Creating a Template – Scenario Weightage Template

This section provides a conceptual overview of configuring the Scenario Weightage template using the Template Builder framework.

The configuration includes:

- One Cartesian Table
- Two Single-Select Dropdowns
- Dependency sequencing between components

For information about DML scripts for this example, see Appendix A – Scenario Weightage Template: Complete DML Configuration Example.

1. Create the required combinations. To do so, map each component with its corresponding properties in the `AF_TB_COMBINATION_MAPPING_DETAIL` table.

   In this example, define the following combinations:

   - `CARTESIAN_TABLE`
   - `VERSION_DROPDOWN`
   - `SQL_PROJECT_DROPDOWN`

   > **Note**
   >
   > For each combination, ensure that you specify the following details in the mapping table: Component Type, Combination Code, Property Code, and Property Value.

2. Map the defined combinations to logical groups. To do so, configure the mappings in the `AF_TB_COMBINATION_GROUP_MAPPING` table.

   In this example, create and use the following groups:

   - `GROUP_DROPDOWN`
   - `GROUP_CARTESIAN_TABLE`

   > **Note**
   >
   > Ensure that the relevant combinations are associated with each group and that the display order within the group is defined appropriately.

3. Create the template entry. To do so, insert the template metadata into the `AF_TB_TEMPLATE_MASTER` table.

   For this example, use the following details:

   - Template Name: `Scenario Weightage`
   - Template Code: `TEMP_SCEN`


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> **Note**
>
> Ensure that all required metadata fields are populated as per your environment configuration.

4. Each template code follows the prefix TEMP_ (for example, TEMP_SCEN). Function codes must also begin with the template code. The standard function codes are:

**Table 12-7 Standard Function Codes**

| Function Code | Purpose |
|---|---|
| *TEMP_SCEN_VIEW* | View access |
| *TEMP_SCEN_SUMM* | Summary access |
| *TEMP_SCEN_MOD* | Modify access |
| *TEMP_SCEN_DEL* | Delete access |
| *TEMP_SCEN_COPY* | Copy access |
| *TEMP_SCEN_ADD* | Add access |

User roles must be defined as follows:

- *TEMPLATE_READ* — Read-only access
- *TEMPLATE_WRITE* — Read and write access

Follow the existing procedure for creating roles and functions while adhering to this naming convention.

The following tables must be populated when configuring roles and functions for a template:

**Table 12-8 Tables to be Populated**

| Table | Purpose |
|---|---|
| *AAICL_SMS_USERGROUP_B* | User group base table |
| *AAICL_SMS_USERGROUP_TL* | User group translation table |
| *AAICL_SMS_USER_UGRP_MAP* | User to user group mapping |
| *AAICL_SMS_UGRP_ROLE_MAP* | User group to role mapping |
| *AAICL_SMS_ROLE_B* | Role base table |
| *AAICL_SMS_ROLE_TL* | Role translation table |
| *AAICL_SMS_FUNCTION_B* | Function base table |
| *AAICL_SMS_FUNCTION_TL* | Function translation table |
| *AAICL_SMS_ROLE_FUNCTION_MAP* | Role to function mapping |

Templates can be created for multiple use cases, with each template acting as a separate object in STSA. Whenever a template is created, it is mandatory to define:

- The user group that will use it
- The level of access assigned to that user group


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> **Note**
>
> STSA currently does not support adding User Groups through the UI, as there is a one-way mapping between STSA and OFSAA for user groups. However, functions can be created and mapped to an existing user group. To achieve this, insert the required entries using the provided SQL scripts.

5. Register the template in the COM object type tables. To do so, insert the corresponding entries into the `AAICL_OBJ_TYPE_B` and `AAICL_OBJ_TYPE_TL` tables.

> **Note**
>
> Ensure that the `Object Type Code` matches the template code (`TEMP_SCEN`) and that a sufficiently high sequence number (if applicable in your environment) is assigned to avoid conflicts with existing object type entries.

6. Map the group templates to the template. To do so, configure the mappings in the `AF_TB_TEMPLATE_GROUP_MAPPING` table.

> **Note**
>
> This defines the layout and rendering order.

7. Configure the combination dependencies. To do so, define the dependency mappings in the `AF_TB_COMBINATION_DEP_MAPPING` table.

> **Note**
>
> Dependencies define the execution sequence within the template in the following order:
>
> - Project Dropdown
> - Version Dropdown
> - Cartesian Table

# 12.3 Template Usage in STSA

Templates in STSA support two primary usage models, enabling both dynamic model execution and sandbox-based scenario processing.

## 12.3.1 Templates as Lookup Data for Model Execution

Templates serve as dynamic reference data sources that models use during execution. Instead of embedding static or hardcoded values, models retrieve required inputs directly from configured templates.

During execution, models:

- Read sandbox data
- Perform calculations


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- Store results in sandbox tables

By externalizing reference values into templates, model logic remains flexible, reusable, and configuration-driven.

**Example:**

- Rating is sourced from a maintained hierarchy
- Risk Weight is defined as a custom Cartesian column within the template

Rather than hardcoding these values, the model dynamically queries the template at runtime. Templates can also store scalar parameters, execution flags, and other configurable inputs required for processing.

The template name acts as a logical placeholder within the model. Multiple templates may share the same structural design but contain different data values. At runtime, users select the appropriate template, allowing the same model to execute with different configurations without any code changes.

## 12.3.2 Templates as a Base for Sandbox Table Creation

Templates can be physicalized into sandbox tables to enable scenario-based and time-based execution.

When a template is saved, users are prompted to confirm whether the template should be physicalized. If confirmed, the system performs the following actions:

- Creates the required sandbox tables
- Registers the tables in the Data Catalog with a Template tag
- Applies glossary mappings

> **Note**
>
> - The Micro or Macro variables must be created on the physicalized table and associated with the scenario.
> - You can physicalize the tables with custom column.

Each Cartesian table defined in the template generates a corresponding sandbox table.

An additional `fic_mis_date` column is automatically added to support time-based execution.

> **Note**
>
> Base reference data is stored using `fic_mis_date = 01/01/1990`.

During execution, scenario-specific data is written to the sandbox table for each applicable fic_mis_date, enabling structured scenario and temporal analysis.

## 12.3.3 Sandbox Table Naming Convention

Sandbox tables generated from templates follow a standardized naming convention to ensure consistency and traceability.


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The naming format is:

```
STSA_<TemplateCode>_<TemplateTableKey>
```

**Example:**

```
STSA_TEMP_LOAN_1767957194770_RWDATA
```

This structured naming approach ensures clear identification of the template source and associated table key, enabling flexible, configuration-driven execution while maintaining alignment with stress testing and scenario analysis requirements.


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13

# Public APIs

This chapter describes the public APIs available for project execution and workspace ingestion. Use these APIs to submit requests from an integration or an API client.

## 13.1 Introduction

The public APIs allow you to start, resume, or abort project execution, retrieve execution details, and trigger a workspace ingestion pipeline. Each API entry explains its purpose, endpoint, request parameters, sample request, and expected response.

A request combines an HTTP method, an endpoint URL, common headers, and any parameters required for the operation. Replace values shown in angle brackets, such as `<project_code>`, with values from your environment.

## 13.2 Prerequisites and Common Request Settings

Before using these APIs, obtain the STSA service base URL, a valid bearer token, and the user, service, tenant, and workspace identifiers for your environment. Ensure that your user has the permission required for the operation.

**Base Path**

All APIs in this chapter are exposed under the following base path:

```
/generic
```

Prefix each endpoint path with the STSA service base URL provided for your deployment. For example, `<base_url>/generic/execute-project/executeBatch`.

**Table 13-1 Required Permissions**

| API group | Required permission |
|---|---|
| Project execution APIs (Sections 13.3 to 13.7) | `EST_PROJECT_EXEC` |
| Workspace ingestion pipeline API (Section 13.8) | `FUN_INGESTION_WRITE` |


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# Common Headers

Include the following headers in requests to all six APIs. Replace the placeholder values with the values for your user and environment.

**Table 13-2 Common Request Headers**

| Header | Value | Description |
|---|---|---|
| `Content-Type` | `application/json` | Request content format. |
| `Accept` | `application/json` | Requested response format. |
| `Authorization` | `Bearer <token>` | Bearer token used to authenticate the request. |
| `ofs_remote_user` | `<user>` | User making the request. |
| `ofs_service_id` | `<service_id>` | Service identifier for the request. |
| `ofs_tenant_id` | `<tenant_id>` | Tenant identifier for the request. |
| `ofs_workspace_id` | `<workspace_id>` | Workspace identifier for the request. |
| `locale` | `en-US` | Locale used for the request. |

### Header Sample

```
Content-Type: application/json
Accept: application/json
Authorization: Bearer <token>
ofs_remote_user: <user>
ofs_service_id: <service_id>
ofs_tenant_id: <tenant_id>
ofs_workspace_id: <workspace_id>
locale: en-US
```

Use the endpoint and request sample in the relevant API section together with these common headers. Preserve the capitalization of parameter names, such as `processInstanceID` and `projExecID`.


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# 13.3 Execute Batch

Use this API to start batch execution for a project. Identify the project by its code and the version you want to execute.

### End Point Details

**Method:** POST

**URL:** `<base_url>/generic/execute-project/executeBatch`

**Content-Type:** `application/json`

**Required permission:** `EST_PROJECT_EXEC`

Include all common headers listed in Section 13.2.

### Request JSON Parameters

**Table 13-3 Execute Batch Request Parameters**

| Name | Description |
|---|---|
| `code` | Code of the project to execute. |
| `version` | Version of the project to execute. |

### Request JSON Sample

```
{
  "code": "<project_code>",
  "version": "<project_version>"
}
```

### Response

The API triggers project batch execution and returns the scheduler/batch execution response. A trigger response alone does not confirm that the batch has finished.


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# 13.4 Resume Execution

Use this API to resume an execution using its process instance, project execution, and project object identifiers.

### End Point Details

**Method:** POST

**URL:** `<base_url>/generic/execute-project/resume`

**Content-Type:** `application/json`

**Required permission:** `EST_PROJECT_EXEC`

Include all common headers listed in Section 13.2.

### Request JSON Parameters

**Table 13-4 Resume Execution Request Parameters**

| Name | Description |
|---|---|
| `executionStatus` | Use `RESUMED` as shown in the request sample. |
| `processInstanceID` | Identifier of the process instance to resume. |
| `projectExecutionId` | Identifier of the project execution to resume. |
| `projectObjectId` | Object identifier of the project associated with the execution. |

### Request JSON Sample

```
{
  "executionStatus": "RESUMED",
  "processInstanceID": "<process_instance_id>",
  "projectExecutionId": "<project_execution_id>",
  "projectObjectId": "<project_object_id>"
}
```

### Response

On success, the API returns the following text:

```
SUCCESS
```


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# 13.5 Resume Project Execution

Use this API to resume a project execution using the project object ID, project execution ID, batch name, and process ID.

### End Point Details

**Method:** POST

**URL:** `<base_url>/generic/execute-project/project-execution-resume`

**Content-Type:** `application/json`

**Required permission:** `EST_PROJECT_EXEC`

Include all common headers listed in Section 13.2.

### Request JSON Parameters

**Table 13-5 Resume Project Execution Request Parameters**

| Name | Description |
|---|---|
| `projID` | Object identifier of the project associated with the execution. |
| `projExecID` | Identifier of the project execution to resume. |
| `batchName` | Name of the batch associated with the execution. |
| `processId` | Identifier of the process associated with the execution. |

### Request JSON Sample

```
{
  "projID": "<project_object_id>",
  "projExecID": "<project_execution_id>",
  "batchName": "<batch_name>",
  "processId": "<process_id>"
}
```

### Response

The API resumes the project execution and returns the service response as a string.

### Using the Correct Resume Request

This request uses `batchName` and `processId`. The Resume Execution API in Section 13.4 uses `processInstanceID` and `executionStatus`. Keep the parameter names for the selected endpoint.


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# 13.6 Abort Execution

Use this API to request that an execution be stopped. Supply the project, execution, and batch identifiers, together with the status value for the abort request.

### End Point Details

**Method:** POST

**URL:** `<base_url>/generic/execute-project/abort`

**Content-Type:** `application/json`

**Required permission:** `EST_PROJECT_EXEC`

Include all common headers listed in Section 13.2.

### Request JSON Parameters

**Table 13-6 Abort Execution Request Parameters**

| Name | Description |
|---|---|
| `projectObjectId` | Object identifier of the project associated with the execution. |
| `projectExecutionId` | Identifier of the project execution to abort. |
| `executionStatus` | Status value to send with the abort request. |
| `batchId` | Identifier of the batch associated with the execution. |

### Request JSON Sample

```
{
  "projectObjectId": "<project_object_id>",
  "projectExecutionId": "<project_execution_id>",
  "executionStatus": "<status>",
  "batchId": "<batch_id>"
}
```

### Response

On success, the API returns the following text:

```
SUCCESS
```


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# 13.7 Fetch Execution Details

Use this API to retrieve execution details for a specified status. You can also filter the request by project ID, project execution ID, or both.

### End Point Details

**Method:** GET

**URL:** `<base_url>/generic/execute-project/execution/details`

**Content-Type:** `application/json`

**Required permission:** `EST_PROJECT_EXEC`

Include all common headers listed in Section 13.2.

### Query Parameters

**Table 13-7 Execution Details Query Parameters**

| Name | Required | Description |
|---|---|---|
| `execStatus` | Yes | Execution status to retrieve. The sample uses PAUSED. |
| `projectId` | No | Project ID used to filter the execution details. |
| `projectExecutionId` | No | Project execution ID used to filter the execution details. |

Append query parameters to the URL. Start with `?execStatus=<status>` and add either optional filter using `&projectId=<project_id>` or `&projectExecutionId=<project_execution_id>`.

### Request Sample

The following request retrieves execution details for PAUSED status:

```
GET /generic/execute-project/execution/details?execStatus=PAUSED
```

Send the filters in the URL; no JSON request body is used for this GET request.

### Response

The API returns execution details that match the requested status and any project or project execution filters supplied.


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# 13.8 Run Workspace Ingestion Pipeline

Use this API to trigger the ingestion pipeline for a workspace. The `ofs_workspace_id` request header identifies the workspace for this operation.

### End Point Details

**Method:** POST

**URL:** `<base_url>/generic/data-catalog/v1/ingestionpipeline/run`

**Content-Type:** `application/json`

**Required permission:** `FUN_INGESTION_WRITE`

Include all common headers listed in Section 13.2.

### Request Parameters

This API uses the `ofs_workspace_id` common header to select the workspace whose ingestion pipeline will run. No request body is required.

### Request Sample

```
POST /generic/data-catalog/v1/ingestionpipeline/run
```

Send the common headers from Section 13.2, including `ofs_workspace_id: <workspace_id>`, and leave the request body empty.

### Response

The API triggers the workspace ingestion pipeline and returns the Data Catalog trigger response. A trigger response alone does not confirm that ingestion has finished.


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# 14
# MMG Overview and Access

MMG provides workspaces, data preparation, model development, governance, execution and monitoring. This chapter contains the MMG product overview, access paths, user groups and full workspace lifecycle. For STSA model onboarding, see Section 5.2.4.

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Source: MMG 26.2.0 User Guide. Procedures, screenshots and examples are incorporated into this STSA 8.1.2.8.0 draft; release-specific statements retain their source status.


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# 14.1 Getting Started

This section gives an introduction to OFS Model Management and Governance and the requirements to use the application.

## About this Guide

This guide has information about configuring and publishing workspaces using the OFS Model Management and Governance (MMG) application. The further sections in this guide provide information for the creation and deployment of models into production. Use it for information about workspace and model management or help with the processes in the application.

## About Oracle Financial Services Model Management and Governance

Financial Institutions require models that work on traditional statistical techniques, modern machine-learning methods, computational and simulation models. Oracle Financial Services Model Management and Governance leverage the Data Studio environment to develop, deploy, and manage models at the enterprise level.

The OFS Model Management and Governance application enables institutions to implement their IT policies while providing flexibility and freedom that Data Scientists and Statistical Modelers desire. OFS MMG's design facilitates financial institutions to manage external regulatory and internal governance policies by building testing models in a workspace environment. A workspace is provisioned and authorized for use (usually by an administrator) before making it available to modelers. Administrative users grant analysts and modelers access to workspaces along with a subset of production data to build models. Validated and approved models can then be promoted from workspaces to the enterprise model repository. Models in the repository can then be woven into analytical application flows crafted by mixing data management tasks, model execution, and deterministic business logic.

## Workflow

The workflow involves the creation of workspaces and the creation of Models mapped to the Workspaces. Models are then configured as training models that you can use to perform model visualizations and test for the outcomes. You can then publish a model into production and make it available to users after you have determined that the models and the parameters used to construct the models meet the requirements of your business logic.


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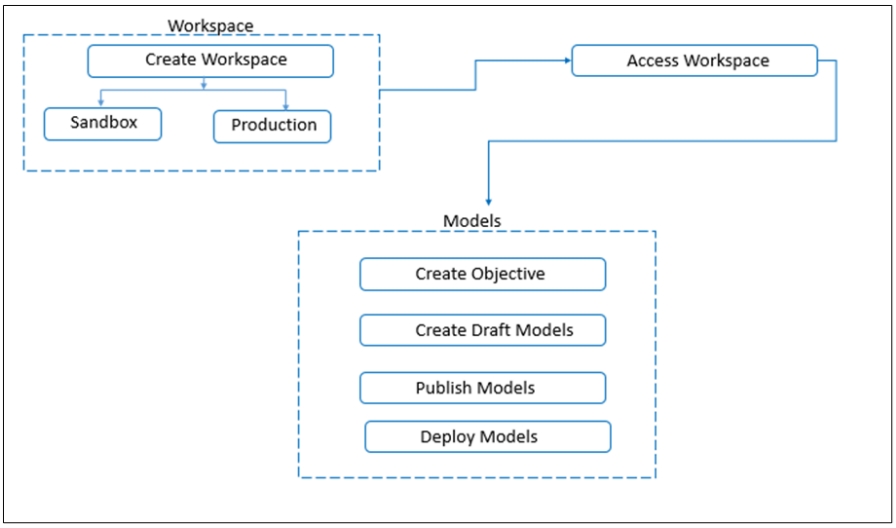
**Figure 14-1 Oracle Financial Services Model Management and Governance Workflow**




# Components

The following are the components of Oracle Financial Services Model Management and Governance application:

- Workspaces
- Datasets
- Model Pipelines
- Model Actions
- Graphs
- Scheduler Service
- Audit Trail
- Data Studio Options
- Object Migration
- Model Libraries
- Model Techniques
- Model Catalog
- Data Management

## Workspaces

Workspace Management is where the workspace Administrators define datasets and make them available to modelers in Oracle Financial Services Model Management and Governance. It is an environment where the data is prepared for modelers to use in their modeling creation activity.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Workspaces are provisioned with the data required for modeling by the Administrators, who configure workspaces with subsets of production data. The data in the workspace is made available to modelers using datasets, who then build models. In effect, the data is ready for the modelers, and they do not have to undergo the arduous task of accessing and querying the database. See the Using Workspaces section for information on how to use Workspace Management in the application.

## Datasets

Datasets allow for the creation of a dataframe, a data structure that captures the logic that organizes data into a 2-dimensional table of rows and columns. Datasets allow for the reuse of these dataframes across models, as well as the features derived from the data source(s).

The Dataset allows you to manage the entire operation related to data set. You can perform the following two things using the Dataset window:

- Define a metadata on how you want to create a dataset.
- In addition, a mechanism where you can take a snapshot of real time data and store it. So, it can be used later in the pipeline.

## Model Pipelines

Modeling refers to the process of designing a prototype based on a structured data model, for statistical analysis and to simulate real events and processes. Models in a workspace can be created or modified by a user with access to the workspace. Model versions are preserved in the workspace along with execution and output histories. Once a model has been validated in the workspace and considered fit for use, modelers can request to push the model into the production environment.

> **Note**
>
> When you save a model pipeline in the **Pipeline Builder**, you can enter comments in the **Add** comments text box that appears in the **Save Pipeline** dialog box. Saved comments are available for review in the **Audit** tab (Audit panel) of the **Pipeline Builder**.

> **Note**
>
> The Add new pipeline field is added to set limits on memory usage by notebook session. When a user executes a pipeline, the memory limit will be applied. Ideally, the user should not consume the entire memory available. However, if they exceed the maximum memory limit, they will get a memory error.

## Model Actions

The Model Actions window allows you to view the list of models for which the Workflow action has been taken which requires review or approve across the workspace.


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## Graphs

Unlike traditional relational database management systems, the Graph Pipeline feature allows you to view the data relationships in a graphical format.

This feature uses the latest technology to harness the power of Graph Analytics to give Financial Institutions the ability to monitor the data financial institutions effectively. The data is organized as nodes, relationships, and properties (property data is stored on the nodes or relationships). The results of analytics algorithms are stored as transient properties of nodes and edges in the Graph.

## Scheduler Service

The Scheduler Service is a service in the Infrastructure system that automates behind-the-scenes work that is necessary to sustain various enterprise applications and functionalities. This automation helps the applications to control unattended background jobs program execution.

The Scheduler Service contains a graphical user interface and a single point of control for the definition and monitoring of background executions.

**Scheduler Configuration/Admin UI**

## Audit Trail

The Audit Trail window provides the complete details of model. This shows the information such as, when Model was created, who created the Model, workflow of Model, for example, when this Model became champion or deployed, and so on.

## Data Studio Options

The application's Notebook Server has the following configurable options:

- Interpreters
- Tasks
- Permissions
- Credentials
- Templates

To access the Data Studio Options page:

1. Click **Launch Workspace** to launch the workspace to display the **Dashboard** window with the application configuration and model creation menu.
2. Hover your mouse over the Data Studio Options widget . The following options are available:
    - Interpreters
    - Tasks
    - Permissions
    - Credentials
    - Templates


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> **Note**
>
> DS 23.4.10 has introduced 'Select-Multiple' forms in Data Studio. The same should now be handled in MMG (parameters sets, dashboard, execute pipeline drawer, simulations, and so on).

# Object Migration

Object Migration is the process of migrating or moving objects between environments.

You may want to migrate objects for several reasons such as managing global deployments on multiple environments or creating multiple environments so that you can separate the development, testing, and production processes.

**Object Migration Rest Endpoints to support Migration of Object available in MMG**

**Table 14-1 Object Migration Rest Endpoints to support Migration of Object available in MMG**

| Sr No | Object Migration API | Technical Standards to Follow | Method | Endpoint | Sample Request | Sample Response |
|---|---|---|---|---|---|---|
| 1 | Save Export Definition | Headers: ofs_workspace_id ofs_remote_user locale (default set as en-US) | POST | /v1/public/migrate/export/outline | { "migrationCode":"testexp42", "exportObjects": [ {"objectCode":"TEST_population", "objectType":"BATCH" } ]} | output success-> { "response": { "message": "Migration outline definition saved successfully." } } output failed -> { "migrationCode": "testexp42", "errorMessage": "objectCode/Type missing", "statusCode": "INVALID_INPUT", "status": "FAILED" } |


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**Table 14-1 (Cont.) Object Migration Rest Endpoints to support Migration of Object available in MMG**

| Sr No | Object Migration API | Technical Standards to Follow | Method | Endpoint | Sample Request | Sample Response |
|---|---|---|---|---|---|---|
| 2 | Invoke Export | Headers: ofs_workspace_id ofs_remote_user locale (default set as en-US) | POST | /v1/public/migrate/export/{code} | | `{ "response": { "message": "Object Migration Triggered Successfully" } }` |
| 3 | Save Import Definition | Headers: ofs_workspace_id ofs_remote_user locale (default set as en-US) | POST | /v1/public/migrate/import/outline | `{ "migrationCode":"imp1_exp41", "fileName":"TEST_TESTEXP41_06082024_680336", "code":"imp1_exp41" }` | `{ "response": { "message": "Migration outline definition saved successfully." } }` |
| 4 | Invoke Import | Headers: ofs_workspace_id ofs_remote_user locale (default set as en-US) | POST | /v1/public/migrate/import/{code} | | `{ "response": { "message": "Object Migration Triggered Successfully" } }` |

All APIs should be invoked through Gateway port, if enabled, and UI port, if not enabled. Auth should be the bearer token, which is same as OFS_AAI.

**Use Bearer Token Authentication**

We can execute these APIs: `https://[<mmg_ui_gateway_url/ui_url>/<contextname>/rest-api/v1/token|https://ofss-mum-1035.snbomprshared1.gbucdsint02bom.oraclevcn.com:6773/mmg8127/rest-api/v1/token]`

**Basic Auth:** `ofsauser/secret` (configured as properties in the `app.property` file)

**Response:**

`{"token_type":"Bearer","expires_in":3600,"token":"eyJ0eXAiOiJKV1QiLCJhbGciOiJSUzI1NiJ9.eyJqdGkiOiJhZTZkNTUyMC0zYTQwLTRhMjctYTg1OC0yNzFmY2FjN2YzMWQiLCJpc3MiOiJPRlNBQSIsInN1YiI6Im9mc2F1c2VyIiwic3ViamVjdFR5cGUiOiJjbGllbnRJRCIsImlhdCI6MTc0MTA4MjQ4MCwiZXhwIjoxNzQxMDg2MDgwfQ.XqbtbZYqKnY1RQv4EW371iZHxrpNWBuNMX8ef161AhwKozc3qfYgLG3fXYfwrQhT9VdSUfoGu1-stdTYWIs2O3RtWBniuYyjkR5ghXCYwVkzypxmLALx6v8H3bl1g248GrNPZHTy1tgKfhYbDM-nCl5f__ztZh8I0IApA6xImRHFisd5MRv0dVvNn3vsdJd7onLgEQWnCEBGgT6HQ2QfuAECeulv5V4gtOlc`


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```
Aib8BWoKJM-NCVPiov5uaDPYOklyMljdvA6z5Cmr6-
gOMWIjyX16GLtBSDgBAvsEopLznwnmiQLSEPwAnp8Y3KJZwQQVlS2zY033XDv9B8eufXkeOA"}

# save export definition eg:-[https://<mmg_ui_gateway_url/ui_url>/<contextname>|
https://host/]/v1/public/migrate/export/outline input json:

{ "migrationCode":"testexp42", "exportObjects":[ \
{"objectCode":"TEST_population", "objectType":"BATCH" } ]} headers:-
ofs_workspace_id (default set as TEST) ofs_remote_user (default set as aaaiuser)
locale (default set as en-US) output success-> { "response": \{ "message":
"Migration outline definition saved successfully." } } output failed -> \
{ "migrationCode": "testexp42", "errorMessage": "objectCode/Type missing",
"statusCode": "INVALID_INPUT", "status": "FAILED" }
```

**Invoke Export**

For example:`[https://<mmg_ui_gateway_url/ui_url>/<contextname>|https://host/]/v1/public/migrate/export/\{migrationCode} output-> { "response": \{ "message": "Object Migration Triggered Successfully" } } headers:- ofs_workspace_id (default set as TEST) ofs_remote_user (default set as aaaiuser) locale (default set as en-US)`

**Save Import Definition**

For example:`[https://<mmg_ui_gateway_url/ui_url>/<contextname>|https://host/]/v1/public/migrate/import/outline input Json:- \{ "migrationCode":"imp1_exp41", "fileName":"TEST_TESTEXP41_06082024_680336", "code":"imp1_exp41" } headers:- ofs_workspace_id (default set as TEST) ofs_remote_user (default set as aaaiuser) locale (default set as en-US) output success-> { "response": \\{ "message": "Migration outline definiton saved successfully." }`

```
}
```

**Invoke Import**

For example:`[https://<mmg_ui_gateway_url/ui_url>/<contextname>|https://host/]<context>/v1/public/migrate/import/\{migrationCode} headers:- ofs_workspace_id (default set as TEST) ofs_remote_user (default set as aaaiuser) locale (default set as en-US) output success->output-> { "response": \\ { "message": "Object Migration Triggered Successfully" }`

```
}
```

**Object Migration REST APIs (MMG)**

Object Migration enables moving MMG objects between environments (for example, DEV to UAT to PROD) to support controlled deployments and environment separation.

**Base URL and Connectivity**

All Object Migration APIs must be invoked by using the MMG base URL:

If the gateway is enabled, then use the gateway host and port.

If the gateway is not enabled, then use the MMG UI host and port.

Base URL format: `https://<MMG_SERVICE_HOST>:<MMG_GATEWAY_OR_UI_PORT>/<WEB_CONTEXT>/`

For example:`https://<host>:<port>/mmg8133/`


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**Authentication (Bearer Token same as OFS_AAI)**

All migration APIs require Bearer token authentication, using the same token mechanism as OFS_AAI.

**Get Bearer Token**

**Endpoint:**`POST /rest-api/v1/token`

**Authentication:**Use the basic auth (client/user credentials configured in your deployment)

**Example (curl):**

```
curl -k -u "<CLIENT_ID>:<CLIENT_SECRET>" -X POST
"https://<MMG_SERVICE_HOST>:<MMG_GATEWAY_OR_UI_PORT>/<WEB_CONTEXT>/rest-api/v1/token"
```

**Sample Response:**

```
{
"token_type": "Bearer",
"expires_in": 3600,
"token": "<JWT_TOKEN_VALUE>"
}
```

**Use the Token**

For all Object Migration APIs, include:

**Authorization:** Bearer `<JWT_TOKEN_VALUE>`

**Required Headers (All Object Migration APIs)**

Include the following headers on every request:

**ofs_workspace_id:** `<WORKSPACE_ID>`

**ofs_remote_user:** `<REMOTE_USER>`

**locale:** `en-US (default)`

Also include standard headers as applicable:

**Content-Type:** `application/json`

**Authorization:** Bearer `<JWT_TOKEN_VALUE>`

Object Migration Endpoints

**Save Export Definition**

Creates an export outline definition (objects to export).

**Method/Endpoint:**`POST /v1/public/migrate/export/outline`

**Request Body (example):**

```
{
"migrationCode": "testexp42",
```


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```
"exportObjects": [
{
"objectCode": "TEST_population",
"objectType": "BATCH"
}
]
}
```

**Success Response (example):**

```
{
"response": {
"message": "Migration outline definition saved successfully."
}
}
```

**Failure Response (example):**

```
{
"migrationCode": "testexp42",
"errorMessage": "objectCode/Type missing",
"statusCode": "INVALID_INPUT",
"status": "FAILED"
}
```

**Example (curl):**

```
curl -k -X POST
"https://<MMG_SERVICE_HOST>:
<MMG_GATEWAY_OR_UI_PORT>/<WEB_CONTEXT>/v1/public/migrate/export/outline"
-H "Authorization: Bearer <JWT_TOKEN_VALUE>"
-H "Content-Type: application/json"
-H "ofs_workspace_id: <WORKSPACE_ID>"
-H "ofs_remote_user: <REMOTE_USER>"
-H "locale: en-US"
-d '
{ "migrationCode": "testexp42", "exportObjects": [ { "objectCode":
"TEST_population", "objectType": "BATCH" }
]
}'
```


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**Invoke Export**

Triggers export execution for a previously saved export definition.

**Method/Endpoint:**

```
POST /v1/public/migrate/export/
```

```
Where:
```

```
= migrationCode used in Save Export Definition
```

```
Success Response (example):
```

```
{
"response": {
"message": "Object Migration Triggered Successfully"
}
}
```

**Example (curl):**

```
curl -k -X POST
"https://<MMG_SERVICE_HOST>:
<MMG_GATEWAY_OR_UI_PORT>/<WEB_CONTEXT>/v1/public/migrate/export/testexp42"
-H "Authorization: Bearer <JWT_TOKEN_VALUE>"
-H "ofs_workspace_id: <WORKSPACE_ID>"
-H "ofs_remote_user: <REMOTE_USER>"
-H "locale: en-US"
```

**Save Import Definition**

Creates an import outline definition (dump file to import and import code).

**Method/Endpoint:**`POST /v1/public/migrate/import/outline`

**Request Body (example):**

```
{
"migrationCode": "imp1_exp41",
"fileName": "TEST_TESTEXP41_06082024_680336",
"code": "imp1_exp41"
}
```

**Success Response (example):**

```
{
"response": {
"message": "Migration outline definition saved successfully."
```


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```
}
}
```

**Example (curl):**

```
curl -k -X POST
"https://<MMG_SERVICE_HOST>:
<MMG_GATEWAY_OR_UI_PORT>/<WEB_CONTEXT>/v1/public/migrate/import/outline"
-H "Authorization: Bearer <JWT_TOKEN_VALUE>"
-H "Content-Type: application/json"
-H "ofs_workspace_id: <WORKSPACE_ID>"
-H "ofs_remote_user: <REMOTE_USER>"
-H "locale: en-US"
-d '{
"migrationCode": "imp1_exp41",
"fileName": "TEST_TESTEXP41_06082024_680336",
"code": "imp1_exp41"
}'
```

**Invoke Import**

Triggers import execution for a previously saved import definition.

**Method/Endpoint:**`POST /v1/public/migrate/import/`

```
Where:
= migrationCode used in Save Import Definition
```

**Success Response (example):**

```
{
"response": {
"message": "Object Migration Triggered Successfully"
}
}
```

**Example (curl):**

```
curl -k -X POST
"https://<MMG_SERVICE_HOST>:
<MMG_GATEWAY_OR_UI_PORT>/<WEB_CONTEXT>/v1/public/migrate/import/imp1_exp41"
-H "Authorization: Bearer <JWT_TOKEN_VALUE>"
-H "ofs_workspace_id: <WORKSPACE_ID>"
```


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```
-H "ofs_remote_user: <REMOTE_USER>"

-H "locale: en-US"
```

> **Note**
>
> Use the gateway port when the gateway is enabled; else use the UI port. Authorization must be the Bearer token (OFS_AAI token mechanism). Ensure that `ofs_workspace_id` and `ofs_remote_user` are correctly populated per your deployment conventions.

## Model Libraries

The Model Library information is used to bind a particular technique and its details to one unique Model Library. The Starting point for the Model builder is to register a model library with MMG application after it is properly set up in the python environment to be used.

## Model Techniques

Model Technique is the algorithm/technique used to create python model using the library/ package which was created in the Model Library Screen. It is the actual information captured in the MMG application that helps in training the model (Upload and Build).

## Model Catalog

The Model Catalog page allows you to add and manage the Model Technique, Model Library, and Model Objectives. You can either import the models from external sources or create, train and label it as champion model.

## Data Management

The Data Management module allows users to efficiently manage data stores within a workspace. It provides key features for importing both data models and data from Source Schemas. With features like Data Modelling and Data Population, users can replicate database structures, create data ingestion jobs, and schedule or manually run those jobs to bring in new data. This module simplifies schema integration, supports data migration, and ensures consistent data flow across environments.

# Managing User Groups

Users must be mapped to User Groups that are mapped to access OFS MMG. The following subsections provide information about the user groups and roles required in addition to the information about configuring the user groups.

## User Groups

The following table gives details about the User Groups in the Oracle Financial Services Model Management and Governance application.


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**Table 14-2 User Groups**

| User Group Name | User Group Description |
|---|---|
| IDNTYADMN | Identity Administrator group |
| IDNTYAUTH | Identity Authorizer group |
| MDLREV | The Modeling Reviewer Group.<br>Users mapped to this group have access to the menu items in the OFS MMG application that are related to model review activities. |
| MDLAPPR | The Modeling Approver Group.<br>Users mapped to this group have the rights to approve models created by the users. |
| MDLBATCHUSR | The Modeling Batch User. Scheduler can use this Group for executing batches. |
| WKSPADMIN | The Workspace Administrator Group.<br>Users mapped to this group have access to create and populate workspaces. For vieweing the MMG landing page this group is required. |
| MDLUSR | The Modeling User Group.<br>Users mapped to this group have access to all the menu items in the OFS MMG application that is related to model creation. |
| DSUSRGRP | Data Studio User Group<br>This User Group provide access to modify Interpreter configurations. |
| DSREDACTGRP | Roles for applying redaction in graph. This group will be applicable to only those users for whom graph redaction is required. |
| OBJMIGADMIN | Users mapped to this group have access to Object Migration links and UI to perform import or export of objects. |
| GRPADMIN | The Graph Administrator Group.<br>Users mapped to this group have access to all the menu items in the OFS MMG Application related to graph and Pipeline/Refresh graphs related health services. |
| GRPUSR | The Graph User Group.<br>Users mapped to this group have access to all the menu items in the OFS MMG Application related to graph and Pipeline/Refresh graphs related health services. |


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**Table 14-2 (Cont.) User Groups**

| User Group Name | User Group Description |
|---|---|
| MMGDATAMODELADMIN | The MMG Data Model Admin Group<br>This group contains individual roles that allows the user to perform data model tasks such as view, edit, etc.<br><br>**Note**<br>This group has replaced the DMADMIN group. |
| MMGDATAPOPLNADMIN | The MMG Data Population Admin Group<br>This group contains individual roles that allows the user to perform data population tasks such as view, add, edit, delete, execute etc.<br><br>**Note**<br>This group has replaced the DMADMIN group. |
| MMGHLTHCHKADMIN | The MMG health check user group.<br>Users must be mapped to this group for the Health icon to be enabled on the homepage. |
| SCHEDULERADMIN | This group contains all the roles and functions related to the Scheduler feature.<br>The SCHEDULERADMINACCESS role contains has all the functions that are related to LINKSCHDLR.<br>The new function LINKSCHDLRCNF, enables you to open the scheduler configuration. |

If you create a custom user group (other than the seeded OFS MMG groups) and want users in that group to access the OFS MMG Studio operations, then you must add the group in the following configuration files:

`mmgstudio/conf/application.yml`

`mmgstudio/conf/ofsaa-permissions.init.yml`

These updates ensure that the custom group is recognized by OFS MMG Studio and is mapped to the required Studio permissions.

**Note**

Enter group names in UPPERCASE, because AAI/OFSAA groups are stored and validated in uppercase.


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> **Note**
>
> At the first-time login, User Group mappings are initialized from AAI/IDCS for the newly provisioned users. These will be reflected in MMG Admin Console in next MMG login.
> If User Group mappings are deleted in AAI/IDCS, it would not delete in MMG Admin Console. Admin needs to delete this in MMG Identity screens too.
>
> Only the group with MDLSUMM role will be displayed in the Workspace provisioning steps.
>
> MDLSUMM function is mapped to the MDLACCESS role.

> **Note**
>
> **Behavior of USER_USERGROUP Map when User directly creates in MMG**
>
> - If new mappings are created in MMG Identity (and not in AAI/IDCS), those will not get deleted (synced with AAI/IDCS) on next login. The Usergroups which are present in MMG Schema and not in AAI/IDCS will not get deleted unless manually removed from MMG.
> - If mappings are deleted in MMG Identity (and not in AAI/IDCS), mappings will re-appear on next login.

# Role Mapping

Map the user groups in the application to the roles in the following table to enable access to the OFS MMG application.

**Table 14-3 User Group to Role Mapping**

| Group Name | Role Name |
|---|---|
| DSREDACTGRP | DSREDACT |
| IDNTYADMN | Batch Advance Role |
| IDNTYADMN | Batch Write Role |
| IDNTYADMN | Admin Link Role |
| IDNTYADMN | User Advanced Role |
| IDNTYADMN | Group Advanced Role |
| IDNTYADMN | Role Advanced Role |
| IDNTYADMN | Function Advanced Role |
| IDNTYAUTH | Group Authorize Role |
| IDNTYAUTH | User Authorize Role |
| IDNTYAUTH | Group Read Role |
| IDNTYAUTH | Admin Link Role |
| IDNTYAUTH | Function Read Role |
| IDNTYAUTH | Role Read Role |
| IDNTYAUTH | Role Authorize Role |
| MDLAPPR | DSINTER |
| MDLAPPR | Model Authorize |


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**Table 14-3 (Cont.) User Group to Role Mapping**

| Group Name | Role Name |
|---|---|
| MDLAPPR | Model Deployment |
| MDLAPPR | Workspace Read |
| MDLAPPR | Model Read |
| MDLAPPR | Model Access |
| MDLAPPR | Workspace Access |
| MDLAPPR | DSAPPROVER |
| MDLAPPR | MDLRPT (Model Report View) |
| MDLBATCHUSR | DSBATCH |
| MDLREV | Workspace Read |
| MDLREV | Model Review |
| MDLREV | Model Access |
| MDLREV | Workspace Access |
| MDLREV | DSUSER |
| MDLREV | Model Read |
| MDLREV | MDLRPT (Model Report View) |
| MDLUSR | Model Advanced |
| MDLUSR | Model Write |
| MDLUSR | Model Read |
| MDLUSR | Batch Advance Role |
| MDLUSR | Model Execute |
| MDLUSR | DSUSER |
| MDLUSR | Model Access |
| MDLUSR | Workspace Access |
| MDLUSR | Workspace Read |
| MDLUSR | Datasource Access |
| MDLUSR | Datasource Write |
| MDLUSR | Datasource Read |
| MDLUSR | MDLRPT (Model Report View) |
| WKSPADMIN | Workspace Access |
| WKSPADMIN | DSADMIN |
| WKSPADMIN | Identity MGMT advanced |
| WKSPADMIN | Workspace Authorize |
| WKSPADMIN | Workspace Read |
| WKSPADMIN | Workspace Write |
| DSUSRGRP | DSADMIN |
| GRAPHUSER | Graph Administrator |
| GRAPHUSER | Graph Read Role |
| GRAPHUSER | Graph Read Role |
| GRAPHUSER | Graph Execute Role |
| GRAPHADMINISTRATOR | Graph Administrator Role |
| MMGDATAMODELADMIN | MMG_DATAMODELREAD |
| MMGDATAMODELADMIN | MMG_DATAMODELWRITE |
| MMGDATAMODELADMIN | MMG_DATAMODELACCESS |
| MMGDATAMODELADMIN | MMG_DATAMODELADV |


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**Table 14-3 (Cont.) User Group to Role Mapping**

| Group Name | Role Name |
|---|---|
| MMGDATAPOPLNADMIN | MMG_DATAPOPLNREAD |
| MMGDATAPOPLNADMIN | MMG_DATAPOPLNWRITE |
| MMGDATAPOPLNADMIN | MMG_DATAPOPLNEXECUTE |
| MMGDATAPOPLNADMIN | MMG_DATAPOPLNACCESS |
| MMGDATAPOPLNADMIN | MMG_DATAPOPLNADV |
| MMGHLTHCHKADMIN | MMGHLTHCHKREAD |
| OBJMIGADMIN | OMEXADVND |
| OBJMIGADMIN | OMEXPHTM |
| OBJMIGADMIN | OMEXREAD |
| OBJMIGADMIN | OMEXWRITE |
| OBJMIGADMIN | OMIMADVND |
| OBJMIGADMIN | OMIMPHTM |
| OBJMIGADMIN | OMIMREAD |
| OBJMIGADMIN | OMIMWRITE |
| SCHEDULERADMIN | BATCH_ADV |
| SCHEDULERADMIN | SCHEDULERADMINACCESS |
| SCHEDULERADMIN | BATCH_ADMIN_ROLE |

# Function-Role Matrix for Conda CRUD Operations

The following table provides details about the Functions and Roles required to perform CRUD operations for Conda in the Oracle Financial Services Model Management and Governance application.

For more information, see the Conda Environments section.

**Table 14-4 User Groups**

| Function | Role | Groups Mapped | Access |
|---|---|---|---|
| CONDAENVSUMM | CONDAENVACCESS | • MDLUSR<br>• MDLREV<br>• MDLAPPR | Summary view |
| CONDAENVVIEW | CONDAENVREAD | • MDLUSR<br>• MDLREV<br>• MDLAPPR | Read |
| CONDAENVEXP | CONDAENVREAD | • MDLUSR<br>• MDLREV<br>• MDLAPPR | Export yml file |
| CONDAENVEXP | CONDAENVWRITE | • MDLREV<br>• MDLAPPR | Export yml file |
| CONDAENVDEL | CONDAENVWRITE | • MDLREV<br>• MDLAPPR | Delete a registered Conda environment |
| CONDAENVEDIT | CONDAENVWRITE | • MDLREV<br>• MDLAPPR | Edit a Conda environment |
| CONDAENVADD | CONDAENVWRITE | • MDLREV<br>• MDLAPPR | Add a Conda environment |


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# Sign in

After the application is installed and configured, you can access the Oracle Financial Services Model Management and Governance application.

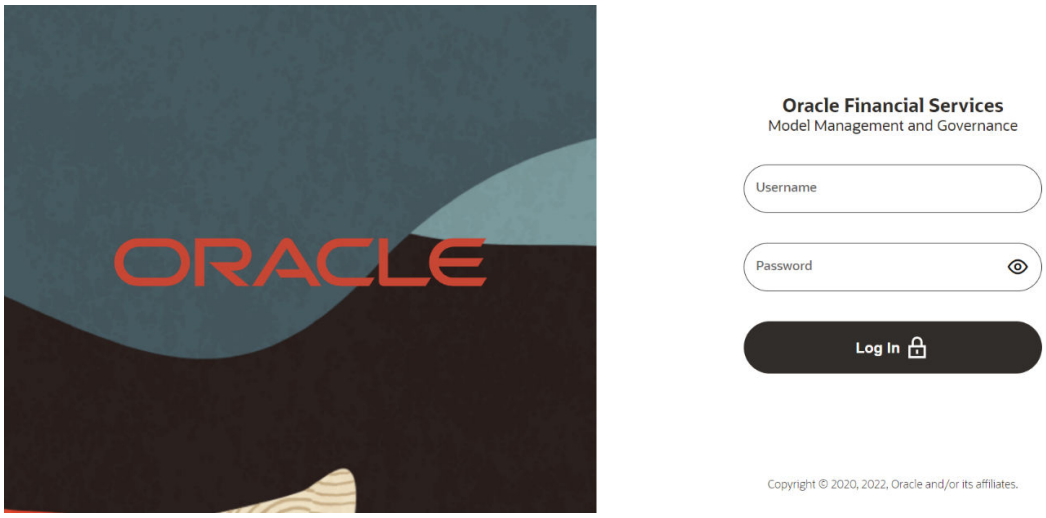
To access the application:

1. Enter the application URL in your browser.

   The **Login** page is displayed.

> **Note**
>
> The below screen is an example of AAI type login. The log in page is different for saml type based on the configuration.

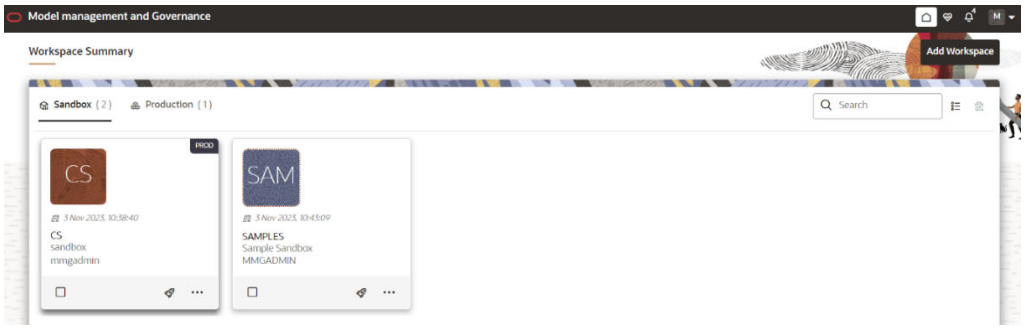
**Figure 14-2 OFS Model Management and Governance Application Login Page**




2. Enter your **Username**and **Password**.
3. Click **Log in**.

   The **Home Page**is displayed.

**Figure 14-3 Home Page**





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# 14.2 Execute Production Workspace Models from AAI

To execute the Production Workspace Models from AAI, follow these steps:

- To execute the Production Workspace Models from AAI, log in to My Oracle Support, and search for **33603448** patch under the **Patches & Updates** tab, download and apply it on the OFSAAI sever.
- Ensure the AAI Infodom and the Workspace names are same before you execute the Production Workspace Models.
- The Logged In user should also be same as the Workspace Create user.

1. In the AAI Configuration Schema, update the value for `MMG_SERVICE_URL` in the `nextgenemf_config` table with the values in the installation.

   Example: `MMG_SERVICE_URL :<FQDN/IP>:<mmg_be_port>/<mmg_context_name>`

   > **Note**
   >
   > If the Target Application is using secured connection, import the Target Server Certificate to the AAI Application Java Truststore and restart the services.

2. Restart the AAI services.

   A new component STUDIOMODEL will be available in ICC, RRF, and PMF modules for selecting the Production Workspace Models of the application.

   For more details, refer to the Component: STUDIO section of AAI User Guide.


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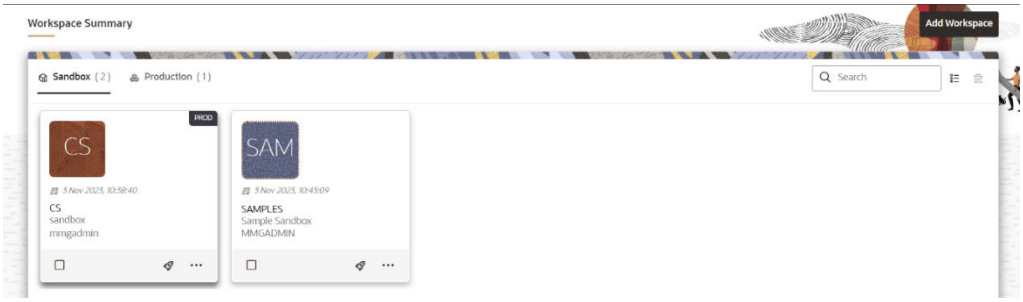
# 14.3 User Interface

Access all features from the home page. Familiarize yourself with the menus, icons, and their location to quickly complete your tasks.

**Figure 14-4 Workspace Summary page**




The following table provides descriptions for the fields and icons on the Workspace Summary page.

**Table 14-5 Fields and Icons of the Workspace Summary page**

| Field or Icon | Description |
|---|---|
| Search | The field to search for Workspace.<br>Enter specific terms in the field for which you want to search, and press Enter on the keyboard to display the results.<br>You can search a Workspace using Workspace Code, Owner, Creation Date, or Workspace Type fields.<br>The search list shows the Workspace details with Workspace Code, Owner, Creation Date and time, and Type. |
| Card and Grid View | Click the Card View or Grid View on the top-right corner of this pane to view the workspace as a block or a table, respectively. |
| Delete | Click Delete to delete the Workspaces. |
| Workspace Code | The code of the Workspace.<br>NOTE: Use up to 20 characters consisting of alphanumeric and space characters only. Do not use "ALL" as a workspace code. |
| Description | The description for the Workspace. |
| Owner | The owner of the Workspace. |
| Creation Date | The date and time on which the Workspace was created. |
| Data Source Type | Shows the type of the Data Source. |


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**Table 14-5 (Cont.) Fields and Icons of the Workspace Summary page**

| Field or Icon | Description |
|---|---|
| Add Workspace | Click Add Workspace to create a new Workspace. See the Create a Workspace section for more information. |
| Launch Workspace | Click Launch next to corresponding workspace to display the Workspace Dashboard with application configuration and model creation menu. See the Launch a Workspace section for more information. |
| View Workspace | Click Action next to corresponding Workspace and select View to view the workspace with dataset data. See the View a Workspace section for more information. |
| Populate Workspace | Click Action next to corresponding Workspace and select Populate to populate the workspace with dataset data. See the Populate a Workspace section for more information. |
| Edit Workspace | Click Action next to corresponding Workspace and select Edit to edit the Workspace. |
| Delete Workspace | Click Action next to corresponding Workspace and select Delete to delete the Workspace. See the Delete a Workspace section for more information. |
| Download Workspace | Click Action next to corresponding Workspace and select Download to download the Workspace. See the Download a Workspace section for more information. The file is downloaded in .cfg format. |

# Home Page Components

The Home page contains the following sections:

- Navigation Menu
- Home
- Data Source Summary
- API Configurations
- Conda Environments
- Kafka Topics
- Health
- Notification
- Profile

## Home

Click **Home** to navigate to **Workspace Summary** page from any other window in the application. You can add and manage Workspaces from this page.


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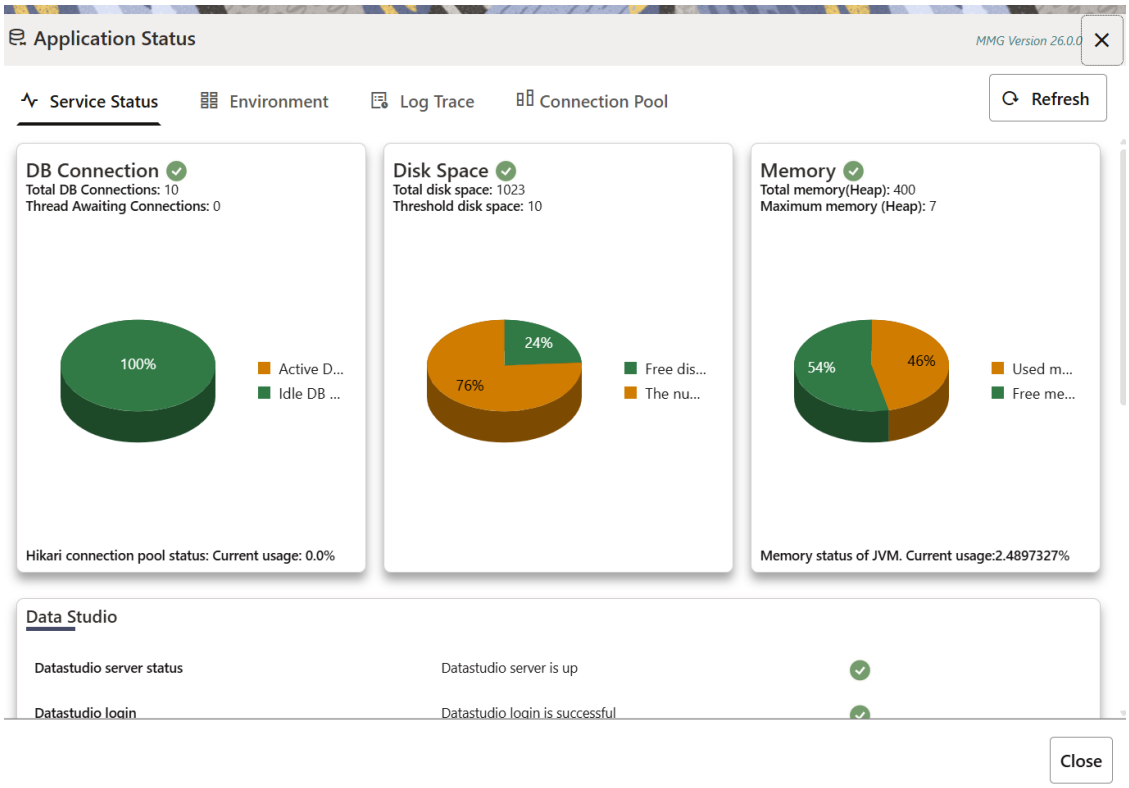
# Health

This feature is only accessable if the users are mapped to the health check user group (**MMGHLTHCHKADMIN**). This user group contains the **MMGHLTHCHKREAD** role and **MMGHLTHCHKVIEW** function. If users are not mapped to this group, then the Health icon will not be visible on the homepage.

Click **Health** icon to view the application status and version details. The Health page consists of four tabs:

**Figure 14-5 Application Status Window**




- **Service Status**:The Database connection, Disk space, Memory allocation details are displayed in graphical chart format. Hover on the chart to view more details. In addition, the status information of the services that are running such as Data Studio, Data Pipeline, and Graph Services are displayed. Click on the + icon to view individual services status.

  > **Note**
  >
  > The Data Pipeline Service Health status is displayed as "Not healthy" when the response is other than "UP" status. You must be mapped to the Graph role 'GRPSUM' as the Data Pipeline Health check is present in Graph services.

- **Environment**: The System and Application properties details are displayed.
- **Log Trace**: The individual logs are displayed that will help you during analysis and debugging of the issue. You can set the last lines of the log based on your requirements. For example, if you wish to see only 10 last lines of the log, enter 10 in the Show last lines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text box. By default, the files are displayed in alphabetical order and **mmg-service.log** is displayed. Click on the required log file to view specific details.

> **Note**
>
> Access logs are available in the following location for UI and Services.
> $LOG_HOME/services/access/mmg-ui-access.log
>
> $LOG_HOME/services/access/mmg-service-access.log

- **Connection Pool**: The information of connections used for the data source are displayed. Select the data source from the drop-down list to view the connections and the maximum capacity. This will help you in monitoring the connections of the specific data source. Clicking on the **Refresh** icon will refresh the application status details.

> **Note**
>
> Logs can be downloaded from Health UI screen, under log trace tab. User can download the zip files of individual logs, and Bulk download is also supported. The user needs to have LOGADMN role to access the download option.

# Notification

Click **Notification** icon to display the notifications from the application. In the current release, only data population related notifications are displayed. You can delete the notifications by clicking on the **Delete** when no longer needed.

To add or modify the notification details, perform the following:

1. In the header of the Home page, click on the **Notifications** icon.

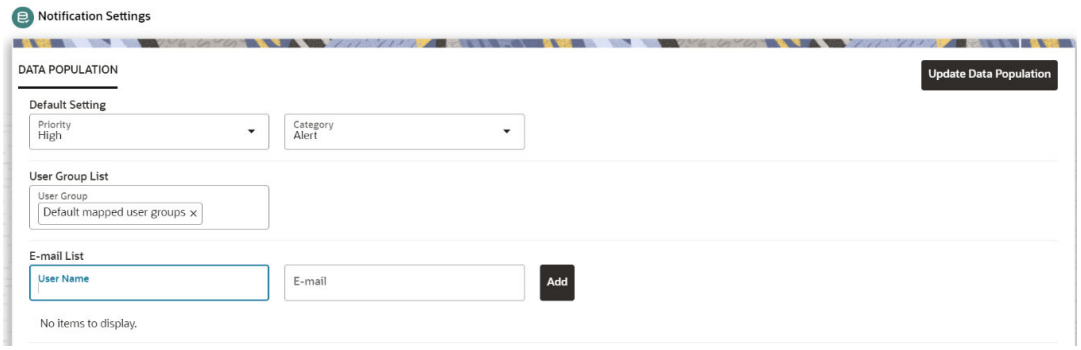
   The Notifications are displayed.

2. In the Notifications screen, click **Notification Settings** icon.

   The Notifications Settings page is displayed.

3. Select the required options from the **Notification Settings** page and click **Update Data Population**. If you select the User group, they will be notified via User Interface with the alerts under Notification icon and if you want to get the notifications in email, add the user name and email ID so that whenever a data population is triggered, an email notification is shared to the user.

**Figure 14-6 Notification Settings**





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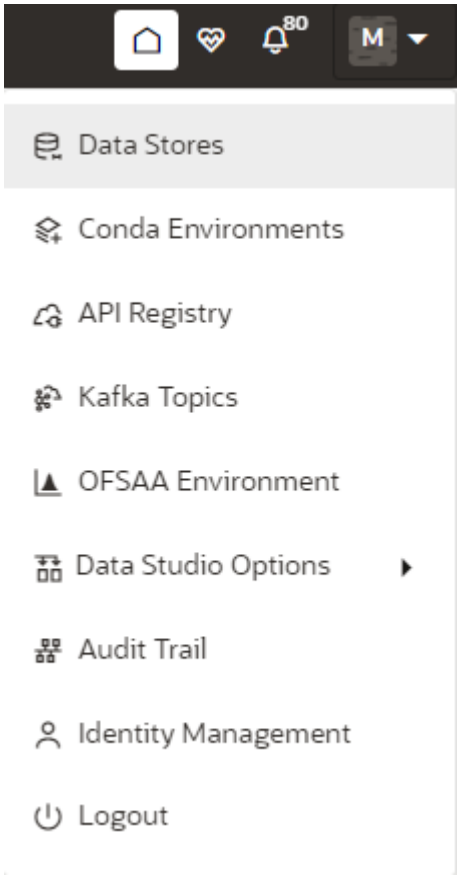
The notification alerts details are updated.

> **Note**
>
> An email notification is sent to the default email id added in AAICL_SMS_USER_PROFILE present in the Config Schema.

# Profile

The Header displays icons, buttons, and text for generic information and access to the OFSAA application's features. The following user-interface elements are displayed.

**Figure 14-7 User Interface Elements**




- **User Name**: Displays the first letter of the logged-in user name. Hover over to view the complete name of the user. Click this to select from the following options in the drop-down list:
  - **Data Stores**: Click to navigate to Data Store Summary page. You can add and manage data stores from this page.
  - **Conda Environments**: Click to navigate to Environment Summary page. You can configure and manage conda environments from this page.
  - **API Registry:** Click to navigate to API Summary page. You can configure and manage APIs from this page.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- **Kafka Topics**: Click to navigate to Kafka Topics page. You can configure and manage kafka topics and clusters from this page.
- **OFSAA Environment**: Click to navigate to OFSAA Environment page. You can register and OFSAA environments (Simulation and Production) from this page.
- **Data Studio Options**: Contains an underlying Notebook Server which has the following configurable options:
  * Interpreters
  * Tasks
  * Permissions
  * Credentials
  * Templates

  Clicking on the option will navigate you to the specific page. For more details, see Data Studio Options section.
- **Admin**: Navigates to IDCS page.
- **Logout**: Select this to log out of the application.

# Mega Menu Components

To view the Mega Menu components, launch a Workspace. The Dashobaord page is displayed with menu options such as Modeling, Orchestration, More, and other sections of the Application.

## Modeling

The Modeling component contains the following features:

- **Datasets**: Explore data, engineer features and monitor data drifts.
- **Model Libraries**: Manage python libraries for model creation and usage.
- **Model Techniques**: Manage techniques and algorithms from registered model libraries.
- **Model Catalog**: Centralized hub for all your machine learning models.
- **Pipelines**: Design, deploy and govern end-to-end machine learning pipelines for seamless model development.
- **Graphs**: Analyze complex relationships within your data through interactive graph representations.

For more details, see Modeling section.

## Orchestration

The Orchestration component contains the following features:

- **Scheduler Dashboard**: Get an overview of scheduled tasks and processes.
- **Define Batch**: Manage and configure batch definitions.
- **Define Tasks**: Create tasks, configure parameters and set execution dependencies within a batch process.
- **Schedule Batch**: Set execution schedules for your batch processes.


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- **Monitor Batch**: Track and monitor batch process executions.

For more details, see Orchestration section.

## More

The More component contains the following features:

- **Export Objects**: Utilize Object Migration feature to efficiently export and save objects.
- **Import Objects**: Import previously exported objects into the system.
- **Model Actions**: Review and approve model deployments in bulk.
- **Audit Trail**: Monitor all system activities and changes.
- **Data Pipelines**: Create and manage data pipelines for efficient data flow and processing.

For more details, see More section.

# Using the Application

The Application displays windows and pages that are interconnected to the OFS AAI. Primarily, you will create Workspace. Within these Workspaces, you will create models, compare them for the best fit, and promote one to production.

Use the information in the following topics to create the workspaces and models:

- Workspaces
- Pipelines

The prerequisites for Workspace are as follows:

- To create a workspace, your user profile must be mapped to the Workspace Administrator role.
- To use a workspace to create models, your user profile must be mapped to the Model User role (such as a modeler).


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# 14.4 Access MMG from AAI

You can now access the MMG Application and its features from AAI.

**Prerequisite**

- To access the MMG application from AAI, log in to My Oracle Support, and search for **36336349** patch under the **Patches & Updates** tab, download and apply it.
- A valid MMG setup should be up and running.

> **Note**
>
> Embedding the OFS MMG UI from the OFS AAI page is supported only when both OFS AAI and OFS MMG use the same protocol (either both HTTP or both HTTPS). Mixed protocol usage may cause authentication/session failures due to browser security restrictions.

To access the MMG application, perform the following steps:

1. In the AAI Configuration Schema, update the value for `MMG_UI_URL`, and `MMG_SERVICE_URL`in the `nextgenemf_config`table with the values in the MMG installation.

   Example:

   - `MMG_UI_URL:http(s)://<FQDN/IP>:<mmg_ui_port>/<mmg_context_name>/home`
   - `MMG_SERVICE_URL :<FQDN/IP>:<mmg_be_port>/<mmg_context_name>`

   > **Note**
   >
   > If the target MMG is using secured connection, import the target server certificate to the AAI application Java Truststore and restart the services.

2. You must map the **MMGACCR** role to the required user. In addition, **MMGACCGRP** group is preseeded with the above role.
3. You must map the `OFS_MMG_HOME` Menu ID to the desired Parent ID in the `AAI_MENU_TREE` table in the AAI Configuration Schema.
4. Restart the AAI services.

   After successful login to the AAI application, a menu named **Model Management and Governance** is displayed. Based on your menu tree configuration, the left pane is displayed as shown below:


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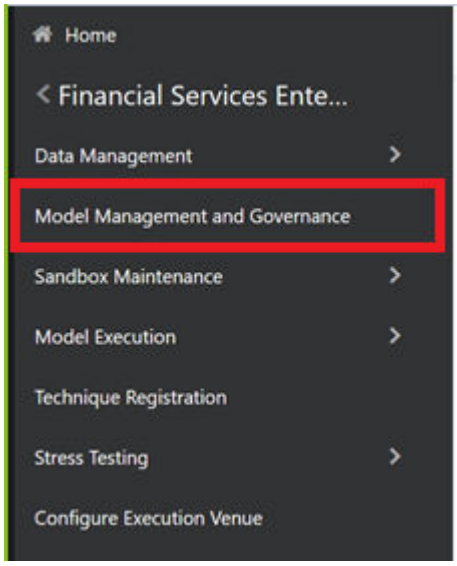
**Figure 14-8 Model Management and Governance menu**




5. When you click on Model Management and Governance, the MMG Login page is displayed, enter the credentials to access the MMG application.

> **Note**
>
> MMG Login - Mandatory User Mapping is required to the SAML Application: Before the recent SAML fix from aai, the SAML users created did not have any direct mapping to the SAML Application. All the users that were mapped to the user groups were able to access the respective mapped MMG Applications. However, now after the AAI Authorization and SAML Authentication fix, the user is expected to be mapped to the application.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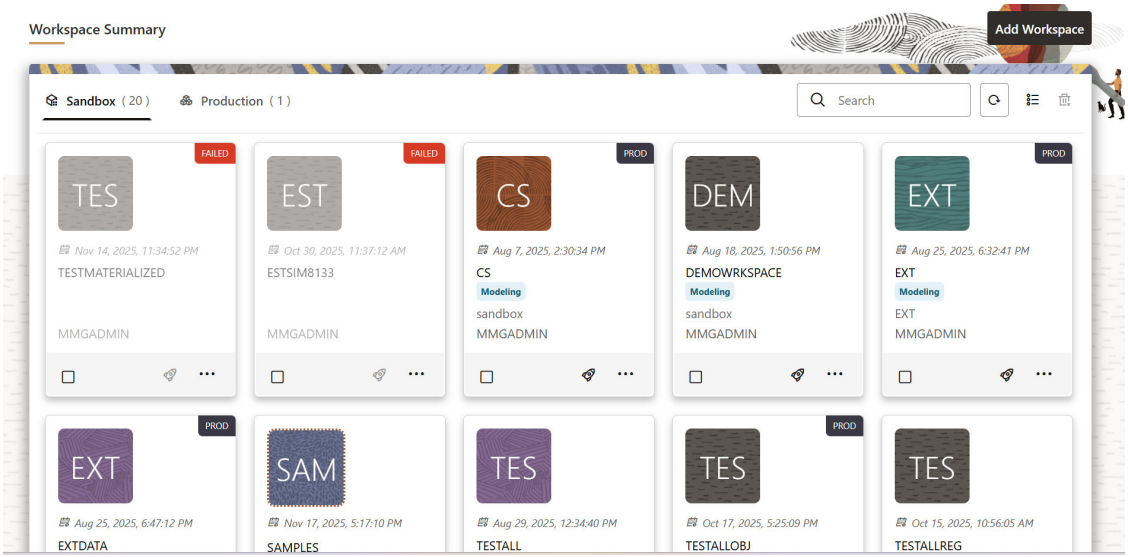
# 14.5 Workspaces

Use this page to create and manage workspaces. By default, a sample workspace is created so that that you can provision and use it to understand the workspace workflow.

Workspaces can be in the production environment (deployed), or they can exist in a separate instance on their own (on a local system for testing) with a copy of the data that comes from the desired data source (production or external data source).

You can view the following details on the **Workspace Summary** page:

**Figure 14-9 Workspace Summary Page**




- **Add Workspace icon:** Click this link to create a workspace.
- **Sandbox tab:** This tab is open by default and also displays the number of sandbox workspaces.
- **Production tab:** Click this tab to work in the production workspace. This tab also displays the number of production workspaces.
- **Search field:** This enables you to search for a specified workspace.
- **Refresh icon:** Click this icon to refresh the summary page with the latest data.
- **Grid View** or **Card View**: Click this icon to toggle between the grid view or the card view.
- **Delete icon:** Select a workspace to enable this icon and delete it.
- **Workspace tiles:** Click any of the available workspace tiles to view it's details on the dashboard.


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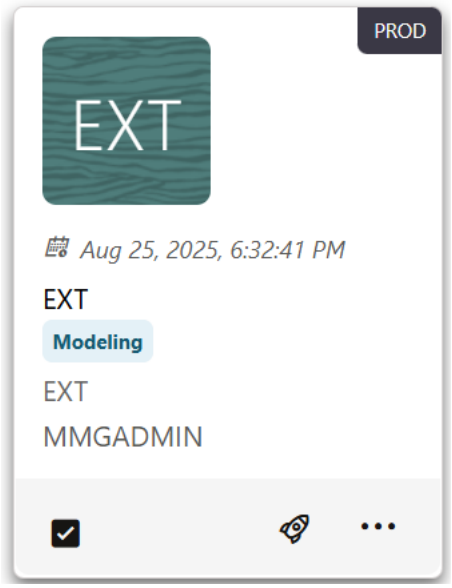
**Figure 14-10 An Example of a Workspace Tile**




The following list provides information on the workspace tile:

- If a worspace is in production, it will contain the *PROD* status.
- Workspaces with the *Failed* status cannot be selected.
- **Launch icon:** Click this icon within a non *Failed* status workspace to view it's details on the dashboard.
- **Action icon:** Click this icon to open the Action menu. The available options are:
  - Populate
  - Details
  - Delete
  - Download

- **Page Navigation:** If there are workspaces that span across pages, click the respective page links or the **Next** icon or the **Last** icon to navigate to a specific page.
- **File Manager:** The File Manager is an ftpshare home path. It enables users to upload a new file, create a new folder, search for a file, preview the file, delete, mark a folder as a favourite and download them.

> **Note**
>
> For **File Manager** to be visible on the **Workspace Summary** page, the *File Admin User* must contain the following roles mapped to it
>
> - File Read
> - File Delete
> - File Write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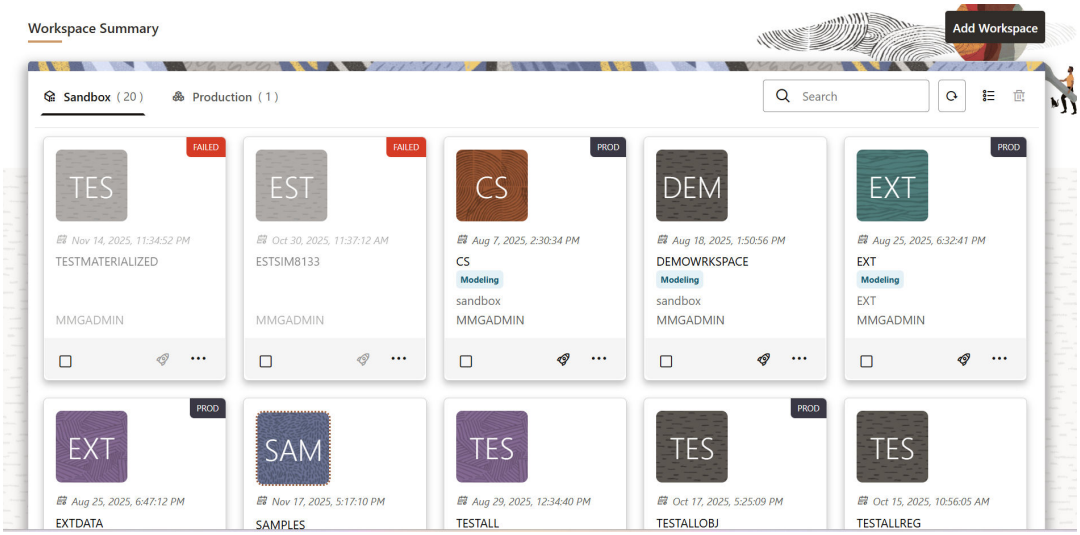
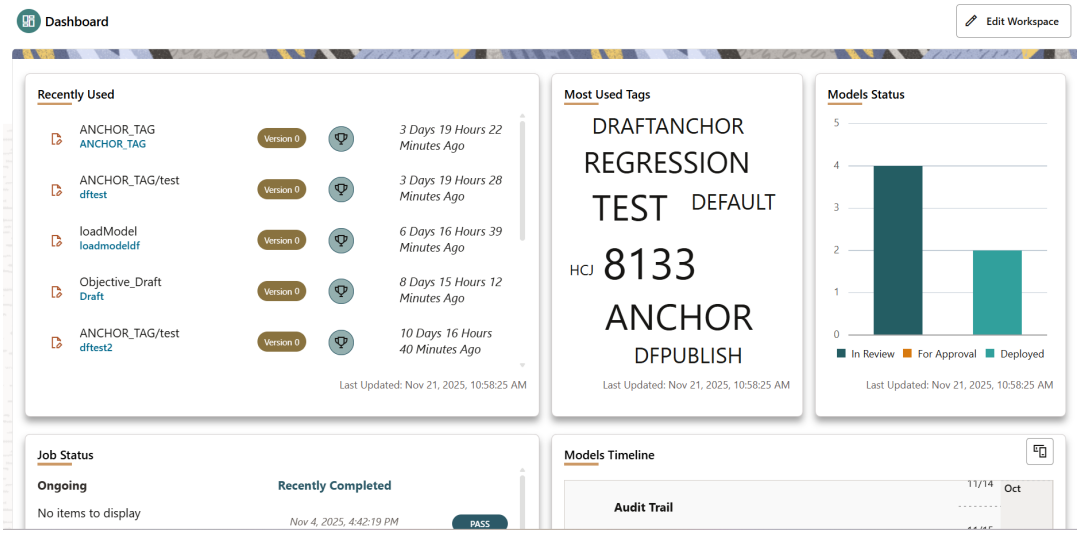
The workspace **Dashboard** allows you to view the models of the launched workspace. To access the **Dashboard** window, perform the following steps:

1. Navigate to **Workspace Summary** page.
   The page displays workspace records in a tile format.




2. Click the **Launch** icon that is within the desired workspace tile view the **Dashboard** page.




The **Dashboard** page displays the following features of a launched workspace:

- **Edit Workspace:** Click this icon to edit a workspace.
- **Recently Used:** This tile displays the most recently used models. When any model from this list is clicked, it navigates the user to the Model Pipelines page.
- **Most Used Tags:** This displays the tags that have been used the most in the models. Hover over each tag to view the number of models it has been used in.
- **Models Status:** This tile displays the status of the models in a bar graph format. The statuses are; *In Review*, *For Approval*, and *Deployed*. .
- **Job Status:** This displays the list of ongoing and recently completed jobs. It also displays the status of the recently completed jobs.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- **Models Time line:** This displays the timeline of the models. Hover over the timeline tile to view the **Zoom In** or **Zoom Out** icons and use them. You can also click the **Orientation** icon to change the orientation of the time line display.

# Create a Workspace

The Workspace creation requires entry of the source of dataset, validation, and deployment. Besides, the application may require users of different function groups to create and approve a Workspace. In other words, a user associated with the modeler function group creates a Workspace and the approval and deployment are done by a user associated with the Modeling Administrator function group.
UGDOMMAP function should be mapped to the user performing sandbox creation operation. Otherwise, the create operation will fail.

Two new objects are added during data sourcing in workspace creation:

- Materialized View
- Triggers

Create workspace process can be time-consuming, typically may take between 2 to 3 hours. However, if certain scenarios are not carefully considered, the creation may encounter failures, leading to unwanted delays. To prevent such setbacks and ensure a seamless creation, it is crucial to address these potential issues beforehand.

The possible issue and solution are as follows:

- **Adding Views, Materialized Views, or Triggers without selecting their respective parent tables**
  - **Issue**: If a user adds views, materialized views, or triggers without confirming the selection of their corresponding parent tables, it can lead to the workspace creation failure.
  - **Solution**: It is essential to verify that all dependent objects, such as Views, Materialized views, and Triggers, have their corresponding parent tables included in the selection before initiating the creation process.

To create a Workspace, follow these steps:

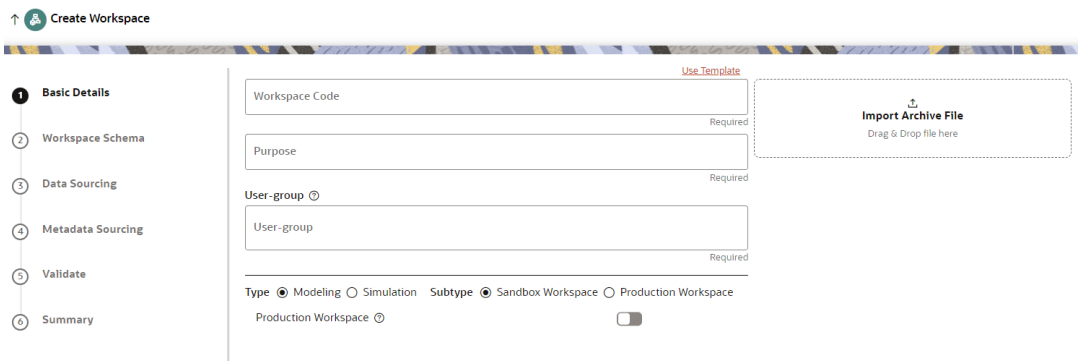
1. Navigate to **Workspace Summary**page.

   The page displays workspace records in a table.

2. Click **Add Workspace**.

   The **Create Workspace** page is displayed.

**Figure 14-11 Create Workspace**





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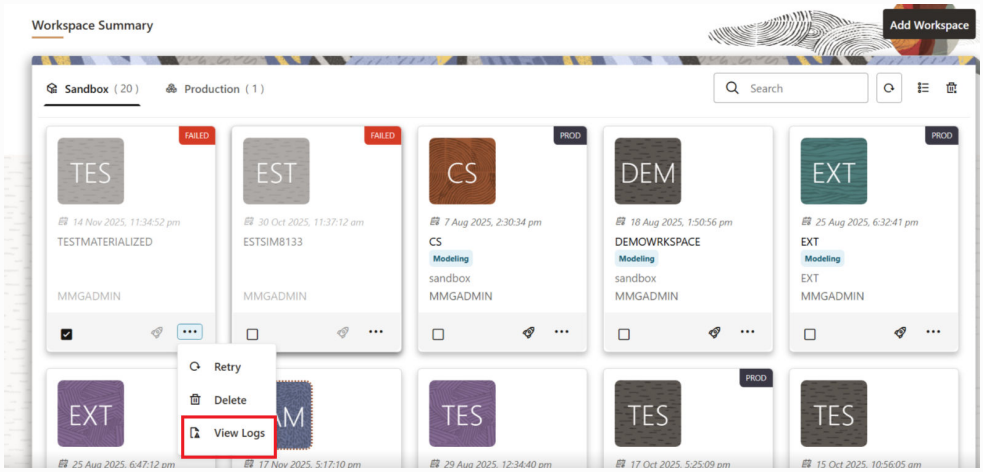
The window displays a progress indicator at the left that indicates the active window where you are entering details. Click **Previous** to go back a step and click **Next** to go to the next step.

The following steps show the various phases from workspace creation to deployment:

a. Basic Details
b. Workspace Schema
c. Data Sourcing
d. Metadata Sourcing
e. Validate
f. Summary

> **Note**
>
> During the Workspace creation, simulation segment code parameter is added. Simulation segment code can be provided as anything. It should be 10Char Name and it can be same as the workspace name.

> **Note**
>
> The **View Logs** option has been added for failed workspaces to view error log details.




# Configure Basic Details

Enter basic configuration details in this window.


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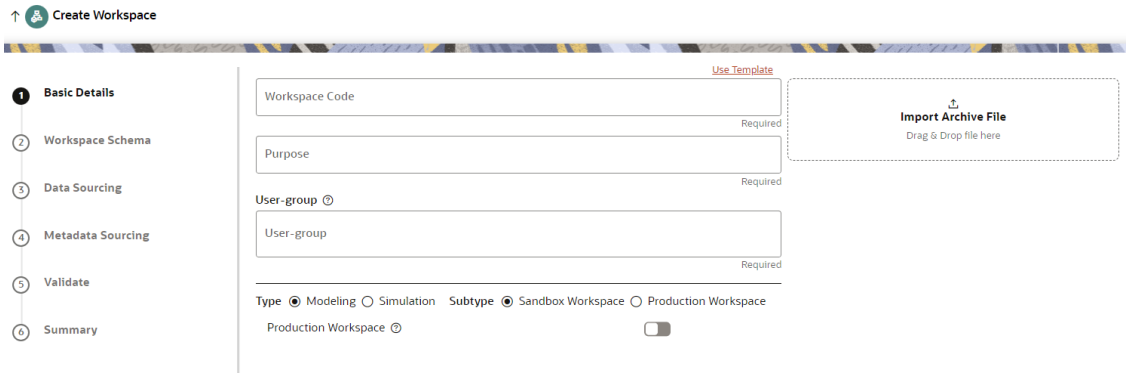
**Figure 14-12 Basic Details**




To configure the basic details for the workspace, follow these steps:

1. Enter the required details in the **Basic Details** pane as shown in the following table:

**Table 14-6 Details for Basic Details pane**

| Field | Description |
|---|---|
| Use Template | Click on this field to create a workspace from a template.<br>The zip files stored on the path: <Installation path> /scratch/ofsaadb/ftpshare/mmg/seeded/workspace-templates will be displayed in the **Library** drop-down.<br>On selecting the template, any pre-filled values will be overridden with the template provided values. |
| Workspace Code | Enter the code of the workspace.<br>**Note**<br>Use up to 20 characters consisting of alphanumeric and space characters only. Do not use "ALL" as a workspace code. |
| Purpose | Enter the purpose of the creation of the Workspace. |
| User-group | Click on this field to display a list of User-group values. Select the required value.<br>For Example: Modeling Approver, Modeling Reviewer, and Modeling User. |
| Type | Select the type of Workspace as Modeling or Simulation.<br>NOTE: If Simulation is selected, fields to add the simulation data are displayed. The simulation option is displayed only when the user is mapped to **SIMULATIONACCESS** role.<br>Select the subtype of Workspace as Sandbox or Production. |
| Production Workspace | NOTE: This option is not displayed when the **Type** field is selected as Production.<br>Move the toggle switch to the right to enable this option.<br>Enabling it attaches the production schema, which selects the Workspace being created for automatic model promotion. Based on the selection of the Source Workspace, the model is promoted to the environment. |


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**Table 14-6 (Cont.) Details for Basic Details pane**

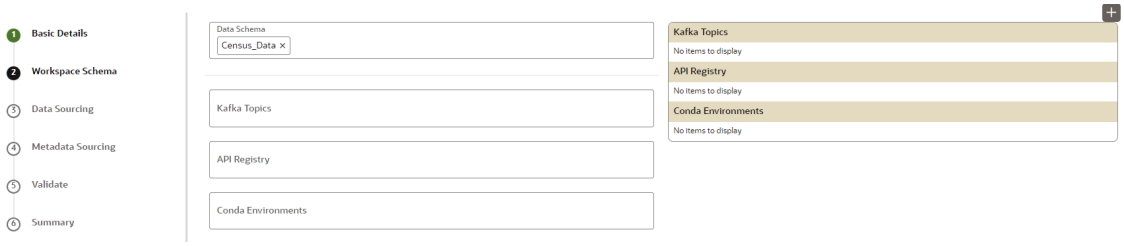
| Field | Description |
|---|---|
| Import archive file | Enter the archived file to import for basic details. If you use this feature, the other fields described in the preceding rows are auto populated.<br>Click on the box to open the file selector dialog and select the required configuration file or drag the file from its directory and drop it in the box. |

2. Click **Next** to go to the next step.

# Configure Workspace Schema

Enter schema operation and enter connection details in this window.

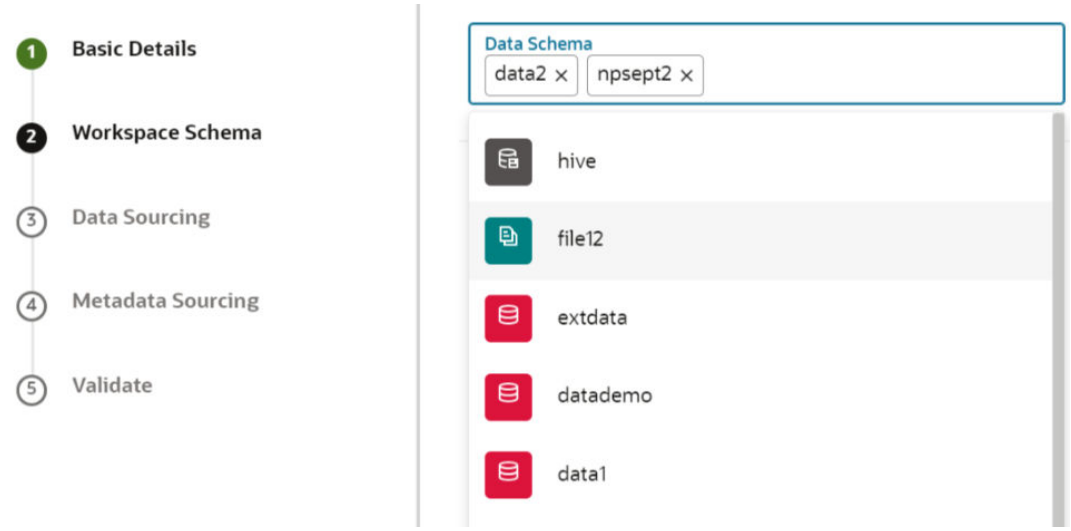
**Figure 14-13 Workspace Schema**




To configure the Workspace Schema:

1. Select the required schemas from the **Data Schema** drop-down list. This is the actual data used for model building. You can use multiple Data Schemas for one Meta Source. You can select an existing Schema or add a new Schema by clicking on + icon. The data source options such as Oracle, Hive, and File are displayed.

**Figure 14-14 Data Schema**





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> **Note**
>
> For details on adding a new data store, see Data Store section.

2. Select the required options from the **Kafka Topics** list. The selected Kafka topics are listed in the right side menu with the order of selection. For more details, see Kafka Topics.
3. Select the required options from the **API Registry** list. The selected API Registry are listed in the right side menu with the order of selection. For more details, see API Registry.
4. Select the required options from the **Conda Environments** list. For more details, see Conda Environments.
5. Click **Next** to go to the next step.

   OR

   Click **Skip** to skip the step.

# Configure Data Sourcing

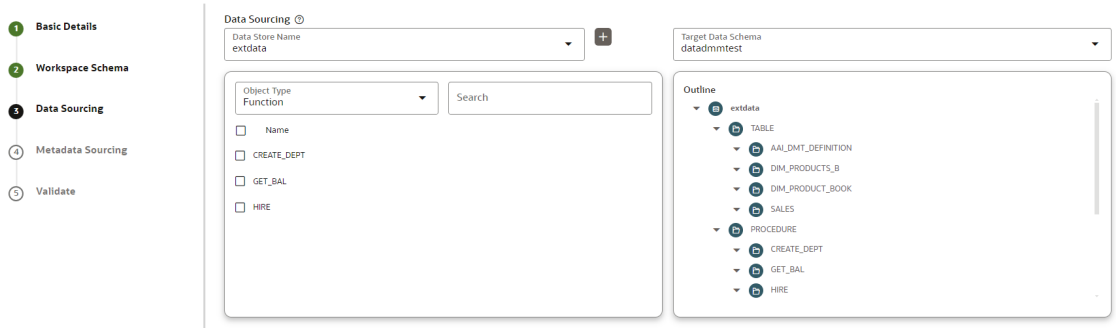
The schema type selected in the previous step requires the definition of database objects to be used for model creation. The data sourcing step of the workspace provisioning allows you to select tables from Oracle, Hive, or File based data sources through which data has to pulled into the Oracle based Workspace Data Schemas. However, unlike the data sourcing from RDBMS data sources, the tables will not get physicalized in the target schema, hence it is expected that the tables with compatible structures are already present in the target RDBMS Schema. You can also select DMM operations such as procedures, functions, sequences, and package while configuring the data sourcing. Once a workspace has been provisioned by using DMM, it is stored in ftpshare path - `ftpshare/dmm/DATE`.

In the case that the selected tables are not present in the target schema, those tables are included in the failed objects count in the workspace provisioning summary.

This window shows the different icons for Oracle, File, and Hive data sources.

Enter the details in this window.

**Figure 14-15 Data Sourcing - External Data Source**




To configure Data Sourcing, perform the following steps:

1. You can select Data Source from Data Source Name drop-down list or create a new Data Source. To create a new Data Source, see the Configure Workspace Schema section.
2. Select the Target Data Schema. You can select multiple Data Sources for a Target Data Schema.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3. For example, if there are D1, D2 and D3 Data Sources, then you can select the tables from all these Data Sources, tables from two Data Sources, tables from one Data Source, or as required. Here, multiple combination of tables are possible with Data Source and Target Data Source.
4. If two Data Sources are having same tables (from different Data Sources), then the columns from the first selected table will be used. For example:
5. If table A has columns C1, C2, C3 and Table B has columns C1, C2, and C4,then the data from the first table will be used.
6. During the data population, only columns C1 and C2 will be used and those will be marked in Green color.
7. Select the type of objects to be displayed in the pane that follows the drop-down list. The Object Type drop-down list will be enabled after selecting the Data Source from Data Source Name drop-down list. The following are the options in the drop-down list:
    - Table
    - View
    - Synonym
    - Function
    - Procedure
    - Package
    - Sequence
    - Materialized View
    - Trigger
    - Type
8. Click **Next** to go to the next step. or Click **Skip** to skip the step.

# Configure Metadata Sourcing

The database objects selected in the previous step can be added with metadata for selected objects. Metadata Sourcing is a stage during Workspace provisioning to allow seeding of metadata like scheduler batches at the time of workspace provisioning.

Also, by default there will be seeded metadata. However, if you wish to seed the metadata, navigate to <installed path>/ftpshare/mmg/seeded/batches and drag and drop the metadata in SQL format.

> **Note**
>
> This step is optional.


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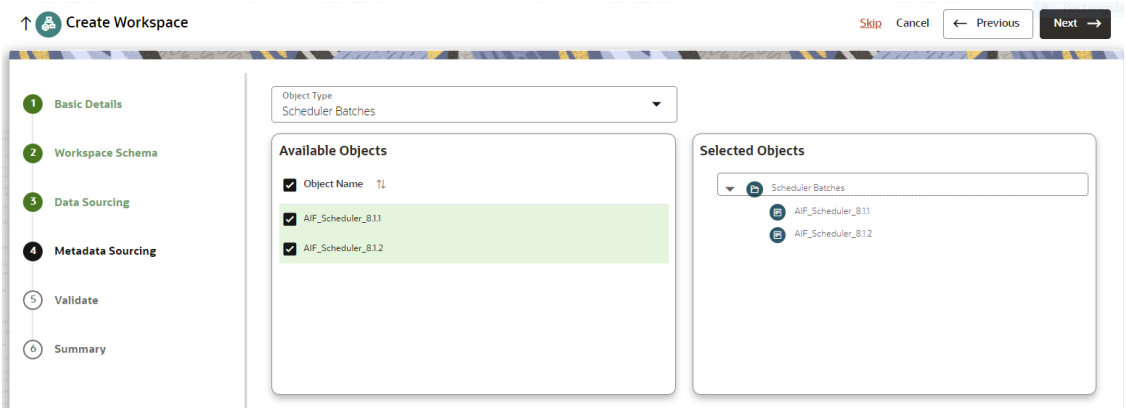
**Figure 14-16 Metadata Sourcing**




To configure Metadata Sourcing, follow these steps:

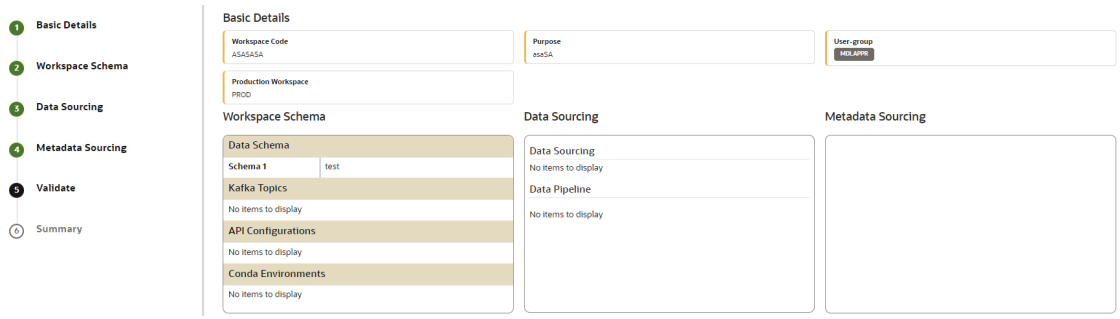
1. Select the required schema from the **Object Type (Optional)** drop-down list.

   The **Available Objects** are displayed in **Selected Objects** pane.
2. Click **Next** to go to the next step. or Click **Skip** to skip the step.

# Validate Workspace

The **Validate** pane displays a preview of the configuration values entered in the previous panes.

**Figure 14-17 Validate Workspace**




To validate the workspace and deploy it, perform the following steps:

1. Review the details in the **Validate** pane. You can edit the workspace by clicking **Edit**.
2. Click the **Finish** drop-down list. The available options are:
   - **Physicalize Workspace**: When you click this option, it creates the actual workspace.
   - **Download Configurable Archive**: When you clickthis option, it exports the metadata information of the workspace in a `.zip` format. This can be used later by using the **Import** option.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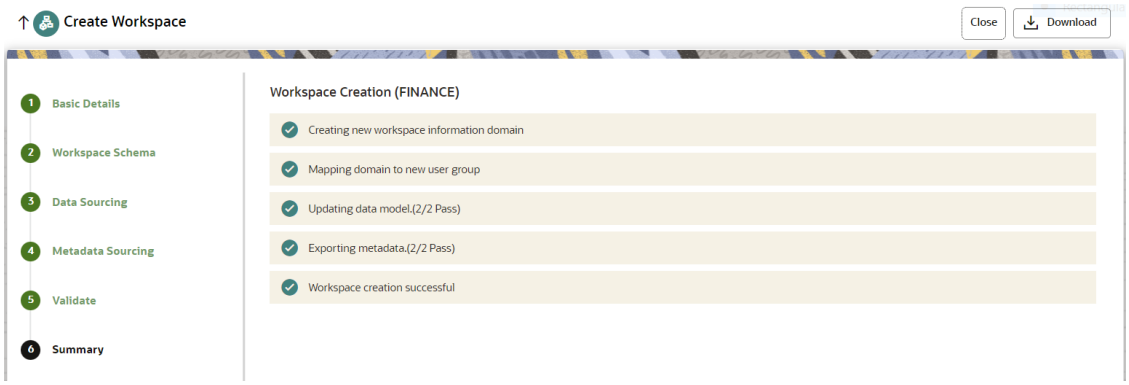
## Display Summary

The **Summary** pane displays the status of the workspace creation.

**Figure 14-18 Workspace Creation Summary**




- Click **Download** to download the configurable archive (workspace created).

> **Note**
>
> During the workspace creation process, if any of the DMM operations such as procedures, functions, packages, and so on *fails* then the workspace creation will be rolled back. You can verify the details in the **MMG_SANDBOX_DETAILS**, **MMG_SANDBOX_MASTER**, and **MMG_SANDBOX_SCHEMA** tables.

# Populate a Workspace

The workspace is populated with data from the datasets in external sources.

To populate the workspace, perform the following steps:

1. Navigate to the **Workspace Summary** page.

   The page displays workspace records in a table.


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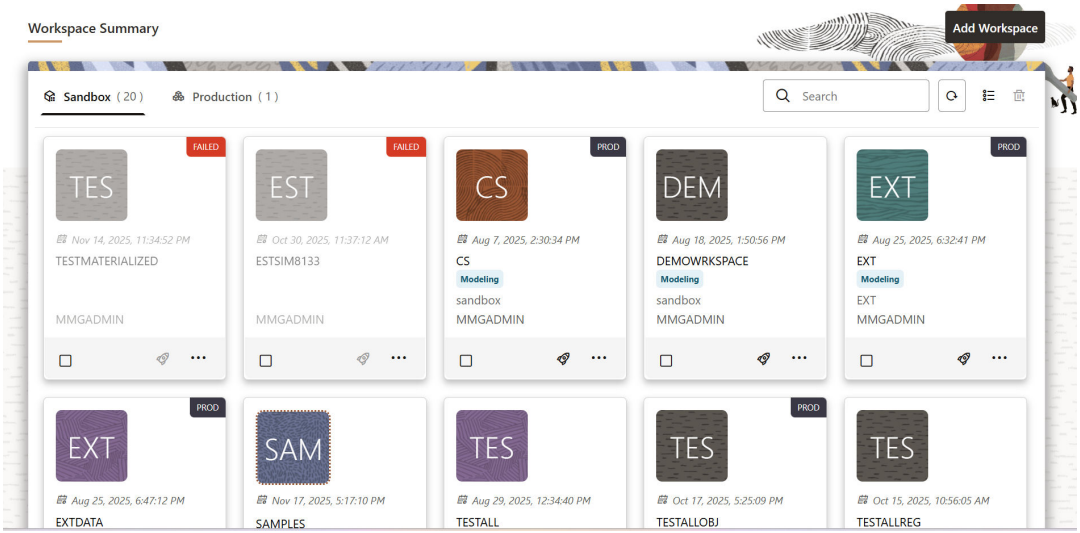
**Figure 14-19 Workspace Summary Page**




2. Click the **Action** icon within the desired workspace tile and then select **Populate** to populate the workspace with data from a dataset in the **Populate Workspace** window.


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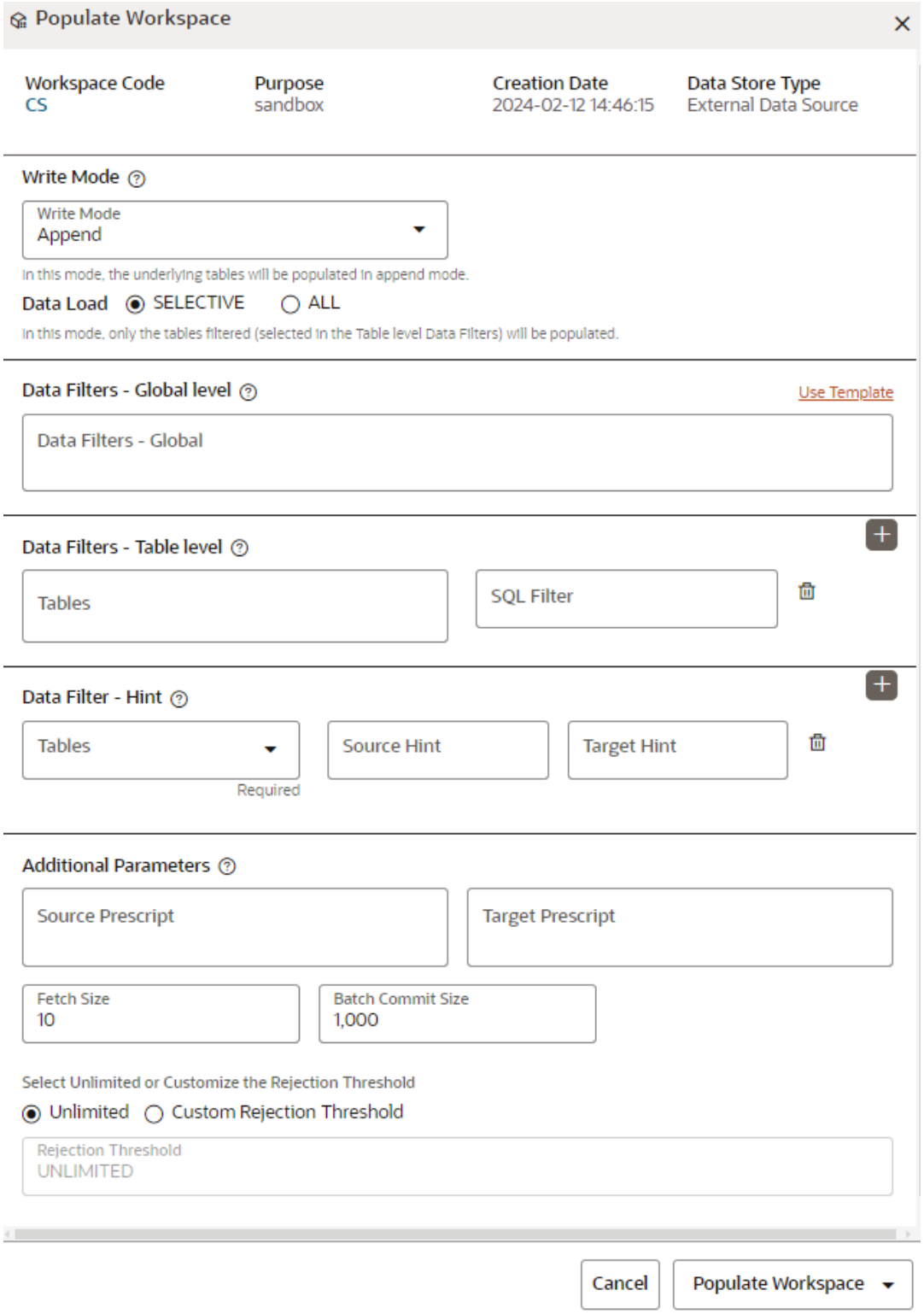
**Figure 14-20 Populate Workspace window**




The following table provides descriptions for the fields in the Populate Workspace window.


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**Table 14-7 Details for the Populate Sandbox Window**

| Field | Description |
|---|---|
| Workspace Code | Displays the code of the workspace. |
| Purpose | Contains the description of the workspace. |
| Creation Date | The date and time on which the workspace was created. |
| Data Source Type | The source of the data. The value can be the *OFSAA Data Schema* or an *External Data Source*. |
| Write Mode | You can either overwrite the existing data (truncate and insert) or append to the existing data.<br>• **Overwrite:** In this mode, the underlying tables are truncated (overwritten on existing data) followed by an insert operation.<br>• **Append:** In this mode, the underlying tables will be populated (added to the existing data) in the append mode. |
| Data Load | You can select a few tables or add all the tables from the source. The available options are:<br>• **SELECTIVE**: In this mode, only the filtered tables (selected in the Table level Data Filters) are populated.<br>• **ALL**: In this mode, all the underlying tables mapped to the workspace are populated along with the specified filters for specific tables. |
| Data Filter- Global Level | Enter the data filter that needs to be applied on all the tables selected for data sourcing. For example: If **MISDATE** is equal to **Today**, then it is applied to all tables (wherever it is available) for selected Data Sources during population. If this field is not found (**MISDATE**) in the tables, it is not updated.<br>Or<br>Click **Use Template** to open the **Template** pop-up window. Select a template from the **Template** drop-down list.<br>On selecting the template, any pre-filled values will be overridden with the template provided values. |
| Data Filter- Table level | You can provide the data filters individually for the tables. Select the table and enter the SQL filter. Additionally, click the **Add** icon to add more rows or click the **Delete** icon to delete a row.<br>**Note**:<br>You can provide multiple table names for the same SQL filter.<br>For example, there are two tables called *Student* and *Employee* in the target data source, and the following filters are applied:<br>**MISDATE** as **Today** for *Student* and *Employee* tables<br>**ID** as **1** for the *Student* table<br>Then, the *Student* table will be populated with the **MISDATE** and **ID** filters. The *Employee* table will be populated with only the **MISDATE** filter.<br>**Note**: Global filters are not applicable for those tables on which filters have been applied individually.<br>If the same table name is provided in more than one row, then the filter condition is generated as a conjunction of all the provided filters. |


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**Table 14-7 (Cont.) Details for the Populate Sandbox Window**

| Field | Description |
|---|---|
| Data Filter - Hint | You can provide database hints at table-level and SQL prescripts at the schema level for data load performance improvement during the workspace population. Additionally, click the **Add** icon to add more rows or click the **Delete** icon to delete a row.<br>Select the table and enter source and target hint filters. You can add multiple filters by clicking the **Add** icon.<br>**Note**:<br>You can also pass runtime values in the workspace population for the user-defined parameters in the **Data Filter – Global/Table** field.<br>**Example: Table Filter /Global Filter**<br>`[{"id":1,"filter":"CUSTOMER_ID =$CUSTID and INCOME =$income and CUSTOMER_NAME =$customerName","tables": ["CUSTOMERS"]}]`<br>**Additional Parameters:**<br>`{"fetch_size" :10, "batch_commit_size" :1000, "rejection_threshold" :"UNLIMITED", "write_mode" :"APPEND", "dynamic_parameters": [\ {"key":"$CUSTID","value":"125"} , {"key":"$income$","value":"30000"}, {"key":"$customerName","value":"Cust125"}]}`<br>The Runtime parameters can be passed on as a part of the additional parameters json .Key = "dynamic_parameters" .It will replace all the $ values in Table filter /Global Filters. |
| Source Prescript | Enter the source prescript of JDBC properties for data upload. |
| Target Prescript | Enter the target prescript of JDBC properties for data upload. |
| Fetch Size | Enter the Fetch size of JDBC properties for data upload |
| Batch Commit Size | Enter the Batch Commit size of JDBC properties for data upload |
| Write Mode | You can either overwrite the existing data (truncate and insert) or to append to the existing data. You can choose to either overwrite the data or append to the existing data. |
| Rejection Threshold | The following two options are available:<br>• **Unlimited** - All the errors will be ignored during the data population.<br>• **Custom Rejection Threshold** - Enter the maximum of number of inserts that may fail any of the selected tables. You can provide the maximum number of inserts that can fail while loading data to a given table from all the sources. In the case of threshold breach, all the inserts into the particular target schema will be rolled back. However, it will continue populating the next target schema. |

3. Click **Populate Workspace** drop-down list to select between the two options; **Create Batch** or **Create and Execute Batch**.

   You can create the batch by using **Create Batch**, or create and execute by using the **Create and Execute Batch** option. When you select either one of these options, a workspace population task gets added to the batch.

   - **Create Batch:** When you select this option, it allows you to prepare the batch and then execute or schedule the batch at a later time through the **Scheduler Service** window. The workspace population task execution can be tracked in the **Monitor Batch** window in the **Scheduler Service**.


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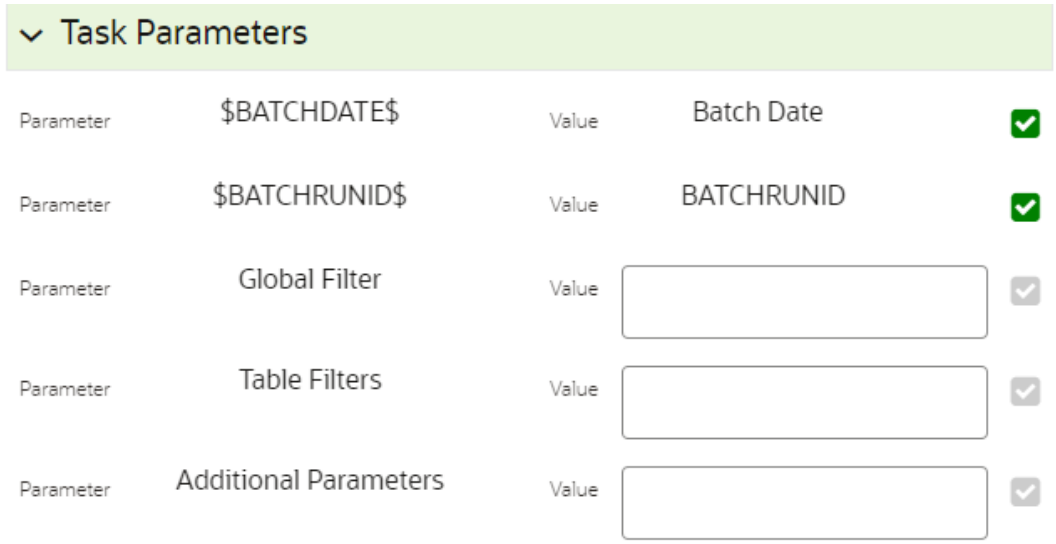
- **Create and Execute Batch:** When you select this option, it allows you to create the batch and triggers the batch as well.
- For a workspace population task, you have to mandatory check the logs to check if the target table is getting populated. Workspace population logs can be found under: `<MMG_HOME>/OFS_MMG/logs/execution/<MISDATE>/<WORKSPACENAME>/workspace-population/`

**Figure 14-21 Task Parameters**




4. Enter the following parameters for workspace population.

   This step is optional.

   - **Additional Parameters:** Enter the Additional Parameters in following format: `{"fetch_size" :10, "batch_commit_size" :1000, "rejection_threshold" :"UNLIMITED", "write_mode" :"OVERWRITE"}`
   - **Global Filter:** The provided input will be applied as a data filter on all the tables that are selected for data sourcing.
   - **Table Filter:** You can provide data filters individually on the tables here. You must provide multiple table names for the same SQL filter. Global Filters will not be applicable for those tables on which filters have been applied individually. In case the same table name is provided in more than one rows here, the filter condition will be generated as a conjunction of all the provided filters.
     Enter the Table filters in following format:

     ```
     [{"id":1,"filter":"<filter condition>","tables":["TABLE1",
     "TABLE2"]}, {"id":2,"filter":"<filter condition>","tables":["TABLE2"]}]
     ```

> **Note**
>
> You can run a workspace population for a given workspace any number of times. New tables may be added to the definition. Any new table added to the definition, that is not present in the target schema will be physicalized on update of the workspace. You can also add new sources if required.
> Any table that is deselected from the data sourcing definition will **NOT** be dropped.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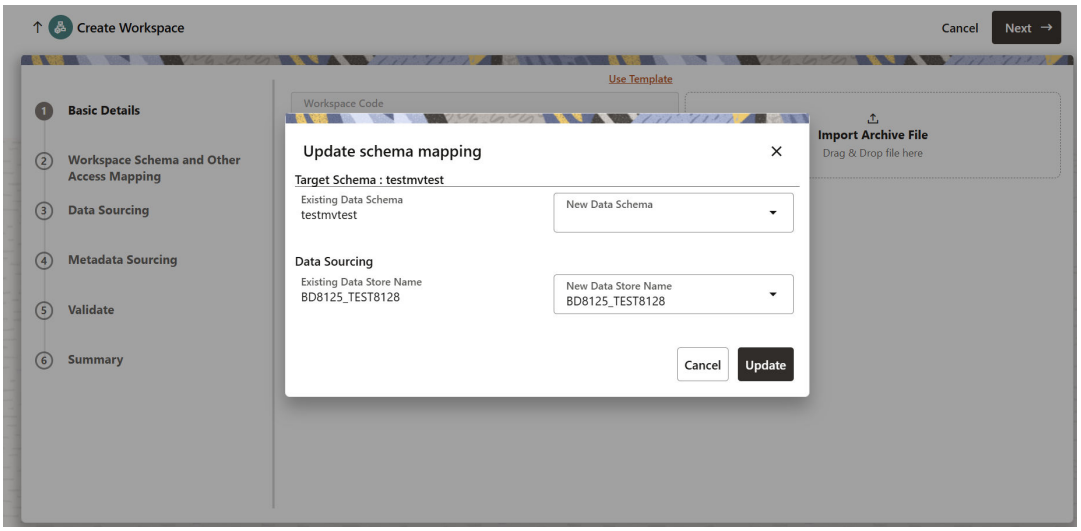
# Retry a Failed Workspace

Perform the following steps to retry a workspace that has failed.

> **Note**
>
> This option is only available for failed workspaces.

1. Click the **Action** icon adjacent to the workspace with a *Failed* status.
2. Click **Retry**.
   The **Create** workspace window opens with the **Update schema mapping** window.

**Figure 14-22 Update schema mapping Window**




3. Select a new data schema and new data store name from the **New Data Schema** and **New Data Store Name** drop-down lists respectively.
4. Click **Update**.
5. Additionally, after updating the data schema and data store, on the Create Workspace page, you can modify all the details in the respective workflow except for the workspace code.

# Delete a Workspace

> **Note**
>
> When you delete a Workspace, all the underlying objects such as Dataset, Scheduler service metadata and so on from the associated tables are deleted.

To delete a Workspace, follow these steps:

1. Navigate to **Workspace Management** to display the **Workspace Summary** page. The page displays workspace records in a table.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2. Click Action next to corresponding Workspace and select **Delete** to delete the workspace.

**Figure 14-23 Delete Workspace window**



The following table provides descriptions for the fields in the Delete Workspace window.

**Table 14-8 Details on the Delete Sandbox window**

| Field | Description |
|---|---|
| Workspace Code | The code of the workspace. |
| Purpose | The description for the workspace. |
| Created Date | The date on which the workspace was created. |

3. Click **Delete**.
4. Click **OK** on the confirmation dialog box to confirm or click **Cancel** to cancel.

> **Note**
>
> Ensure that you de-link the Sandbox workspaces from Production Workspace before deleting the Production Workspace.

# Download a Workspace

Downloading a workspace allows you to export the workspace metadata definition (without underlying objects such as Models, Pipeline, Graphs, and so on) in a zip format. Further, the same can be used to re-create the workspace.

To download a workspace, follow these steps:

1. Navigate to **Workspace Management**to display the **Workspace Summary**page. The page displays Workspace records in a table.
2. Click Action next to corresponding workspace and select **Download**to download the workspace.

   OR

   Navigate to the Summary screen during the creation of a Workspace and click Finish and select **Download Configuration Archive**option.

> **Note**
>
> The file is downloaded in .cfg format.

# Managing Data Sources

This feature allows you to manage the Data Schemas registered with the application. The Data Source Summary window shows the list of Data schemas registered with the application.


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These Data schemas can be used either for workspace or for sourcing data. Click **Data Source Summary** to navigate to Data Source Summary window.

This window also allows you to manage these registered external sources.

The Data Source Summary is divided into two sections: Used Data Source and Unused Data Source.

To view the Data Source details., Click **Action** next to corresponding Workspace and select **View**

- **Used Data Source**: This shows the list of Data Sources registered with any workspace. Here, you can only view the Data Source details. The count of Used Data Sources also displayed at the top of Data Source Summary page.
- **Unused Data Source**: This shows the list of Data Sources those are not registered with any workspace. Here, you can only view, edit, or delete the Data Source details. The count of Unused Data Sources also displayed at the top of Data Source Summary page.

To add a Data Source from Workspace Summary window, follow these steps:

1. Navigate to **Workspace Summary** window.
2. Click **Data Source Summary** to navigate to **Data Source Summary** window and click **Add Datasource**
   The Add Data Source window is displayed.

To add a Data Source from Data Source Summary window, follow these steps:

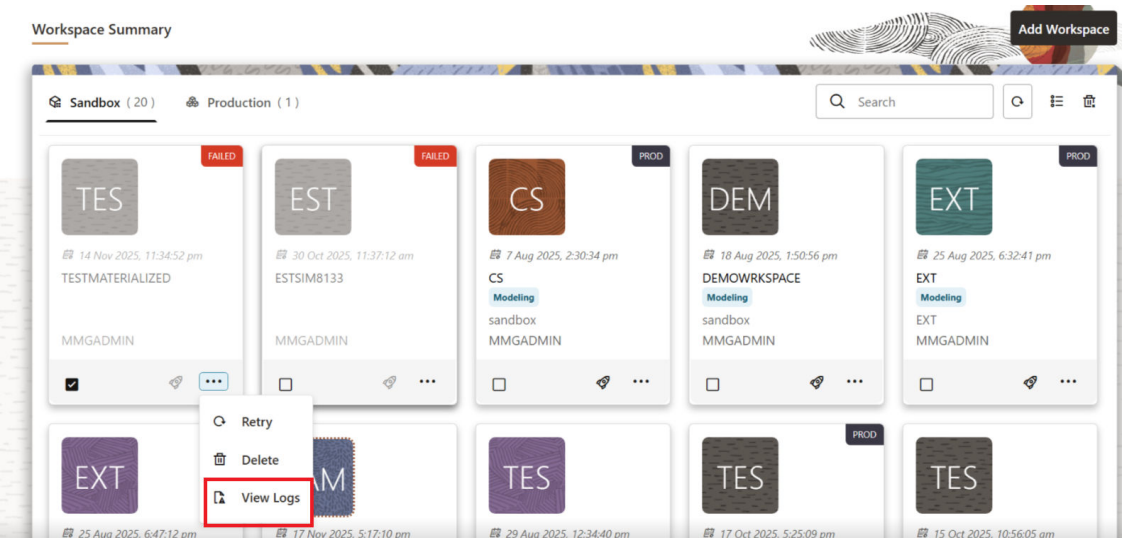
1. Navigate to **Data Source Summary** window.
2. Click **Add Datasource** .

For more information, see the Configure Data Sourcing section.

# Details Screen

The **Details** screen enables you to edit and view a workspace.

Log in to the application. From the **Workspace Summary** screen.




Click the **Action** icon and then click **Details**, to navigate to the **Details** screen.


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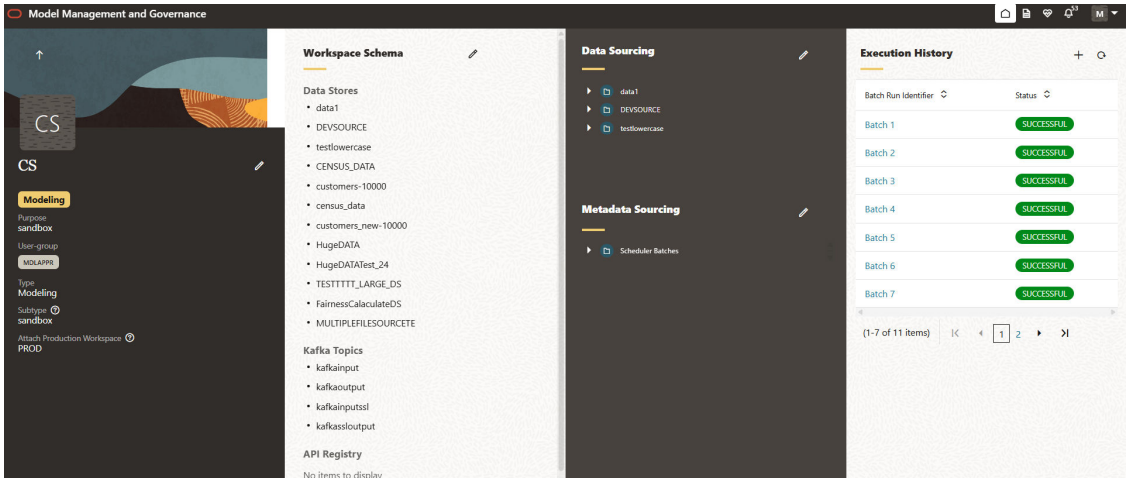
**Figure 14-24 Details screen**




This screen is divided into four columns: The first three columns, basic details, **Workspace Schema**, and **Data Sourcing**, provides information about the workspace and fourth column, **Data Population Jobs**, focuses on the execution history of the workspace population.

The information present in first three columns is the one that users configure when creating or editing a workspace.

The workspace data or information is given by the user when they create or edit a workspace.

The first columnis the basic details screen. It contains the workspace name, purpose, user-group, type, subtype, and the attach production workspace details. You can edit the details in this section if you have edit rights.

**Workspace Schema**

The Workspace Schema is divided into four sections:

- Data Stores
- Kafka Topics
- API Registry
- Conda Environment


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**Figure 14-25 Workspace Schema**




Click the**Edit** icon adjacent to **Workspace Schema** to edit the same.

The view changes to edit mode. Modify the details and then click **Save** to save the information.


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**Figure 14-26 Workspace Schema**




Click the **Create Data Store** icon adjacent to the Data Schema screen to create or add a **Datastore**.


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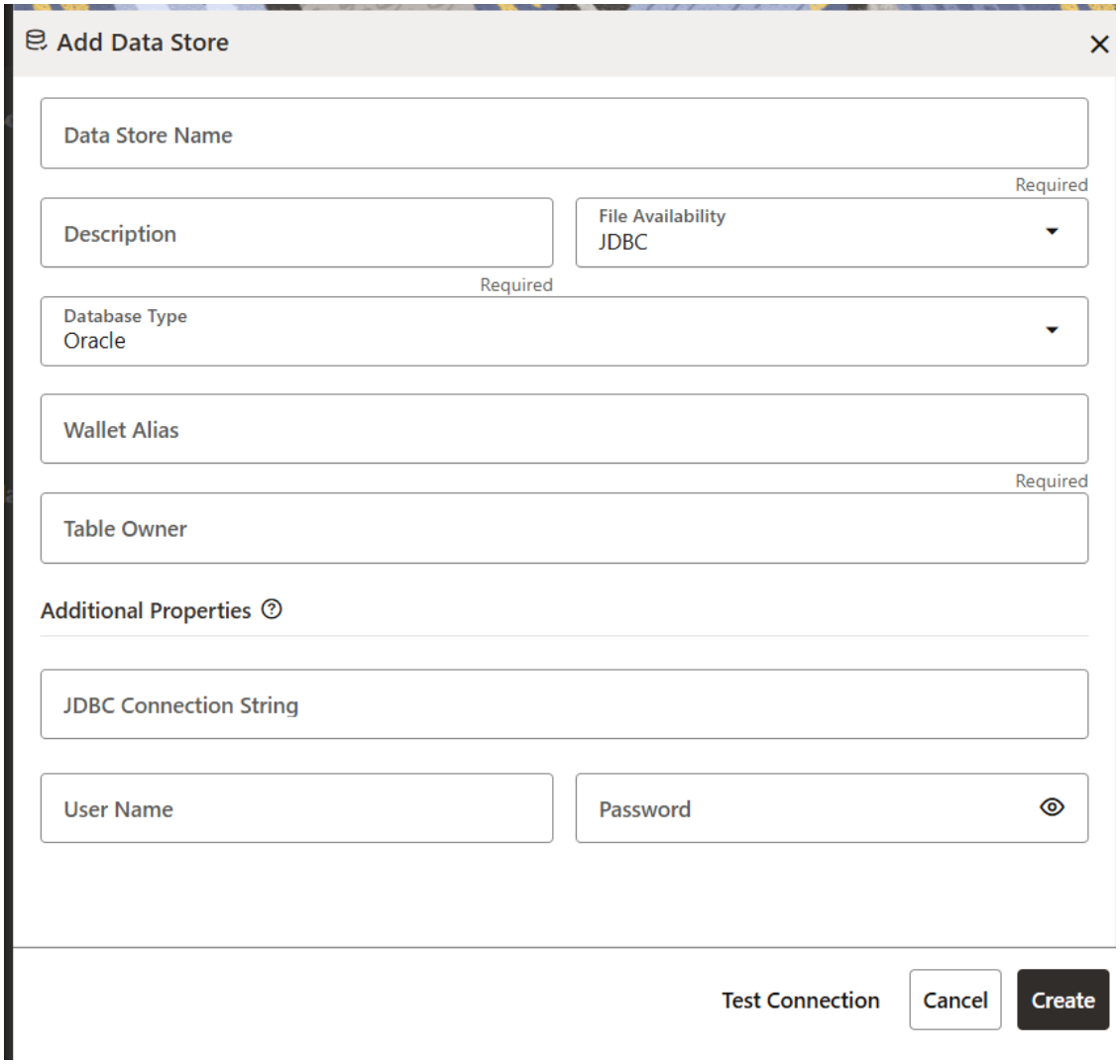
**Figure 14-27 Add a Datastore**




### Data Sourcing

Data Sourcing is divided into two sections:

- Data Sourcing
- Metadata Sourcing

Click the **Add** icon adjacent to **Data Sourcing** to edit it.


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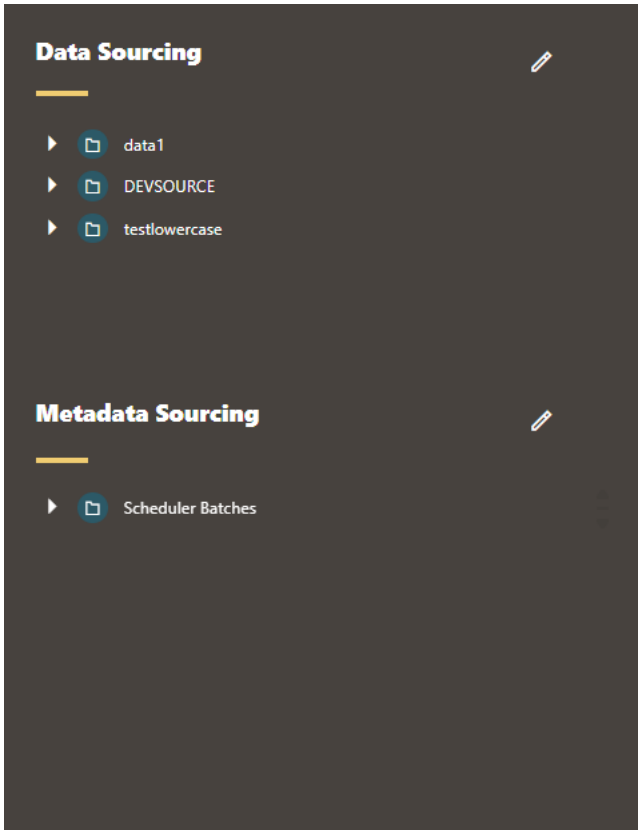
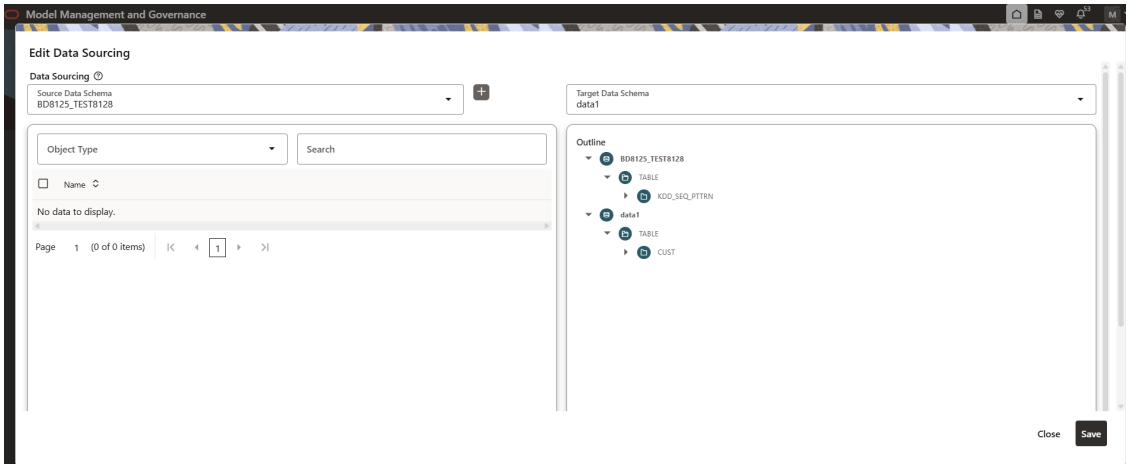
**Figure 14-28 Data Sourcing**




The Edit Data Sourcing pop-up window appears.

**Figure 14-29 Edit Data Sourcing**




Modify the desired details and then click **Save**.

Click the **Add** icon adjacent to **Metadata Sourcing** to edit it.

The Edit Metadata Sourcing pop-up window appears.


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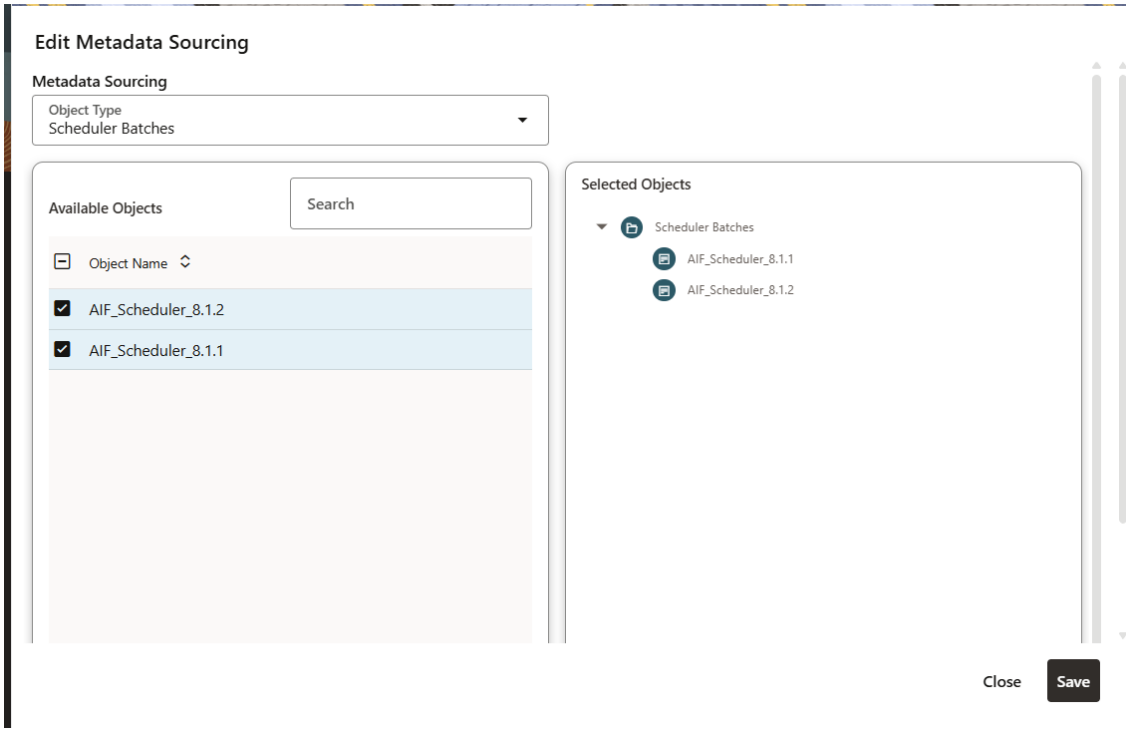
**Figure 14-30 Edit Metadata Sourcing page**



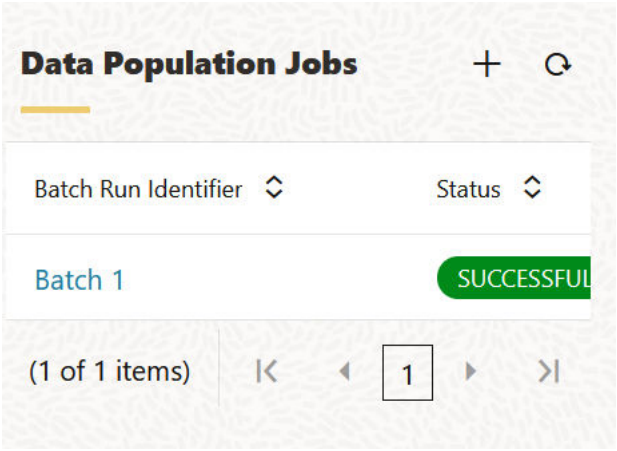

In this window, you can add new objects or edit the existing ones.

Modify the desired details and then click **Save**.

**Data Population Jobs**

In the Data Population Jobs section, the you can view the output of the population under **Batch Run Identifier** and **Status** columns for the workspaces.

**Figure 14-31 Data Population Job**




To view details about a listed batch, click the batch link to open the **Task Details** window.


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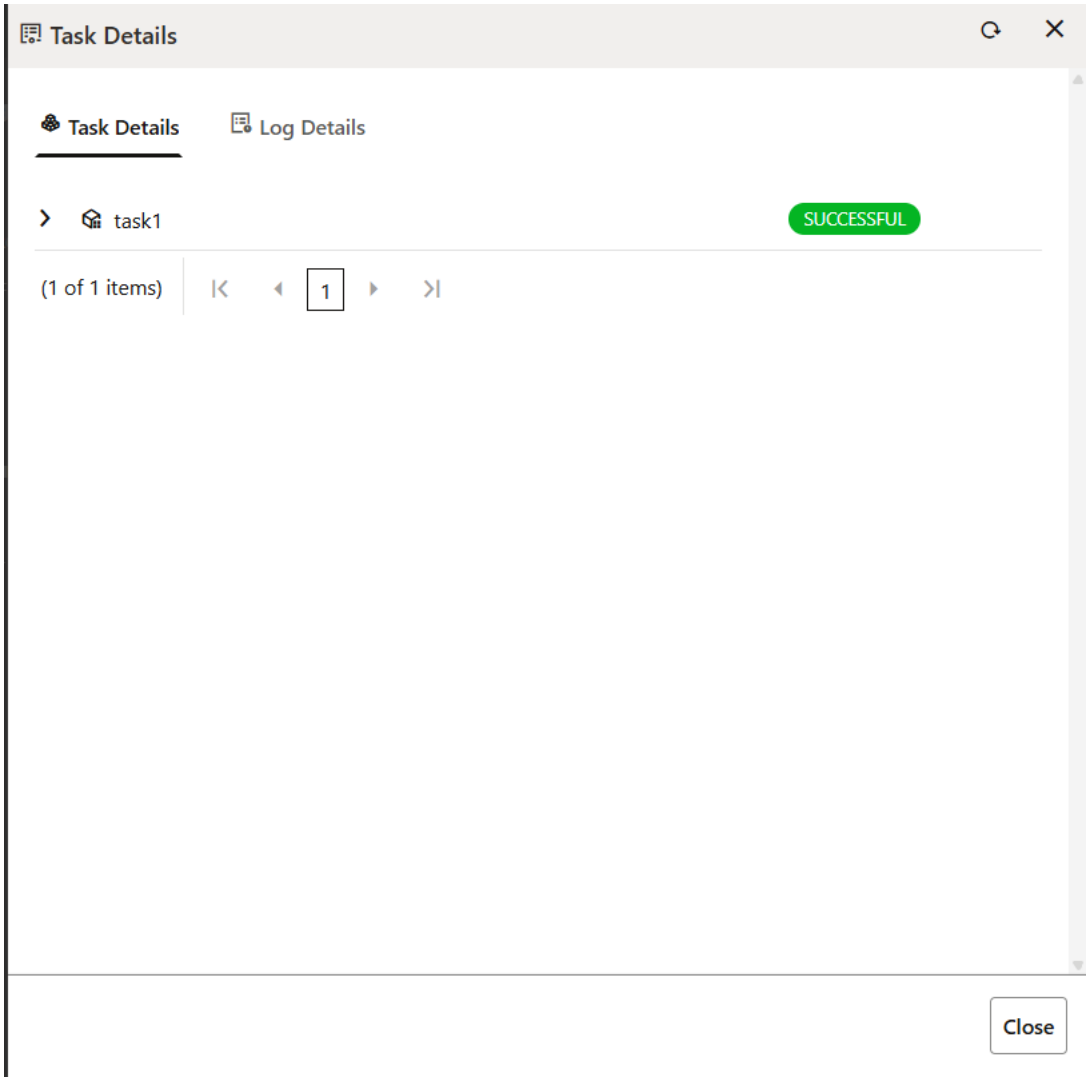
**Figure 14-32 Task details**




Click **Close** to close the window.

Click the **Populate** icon to create a new data population job.


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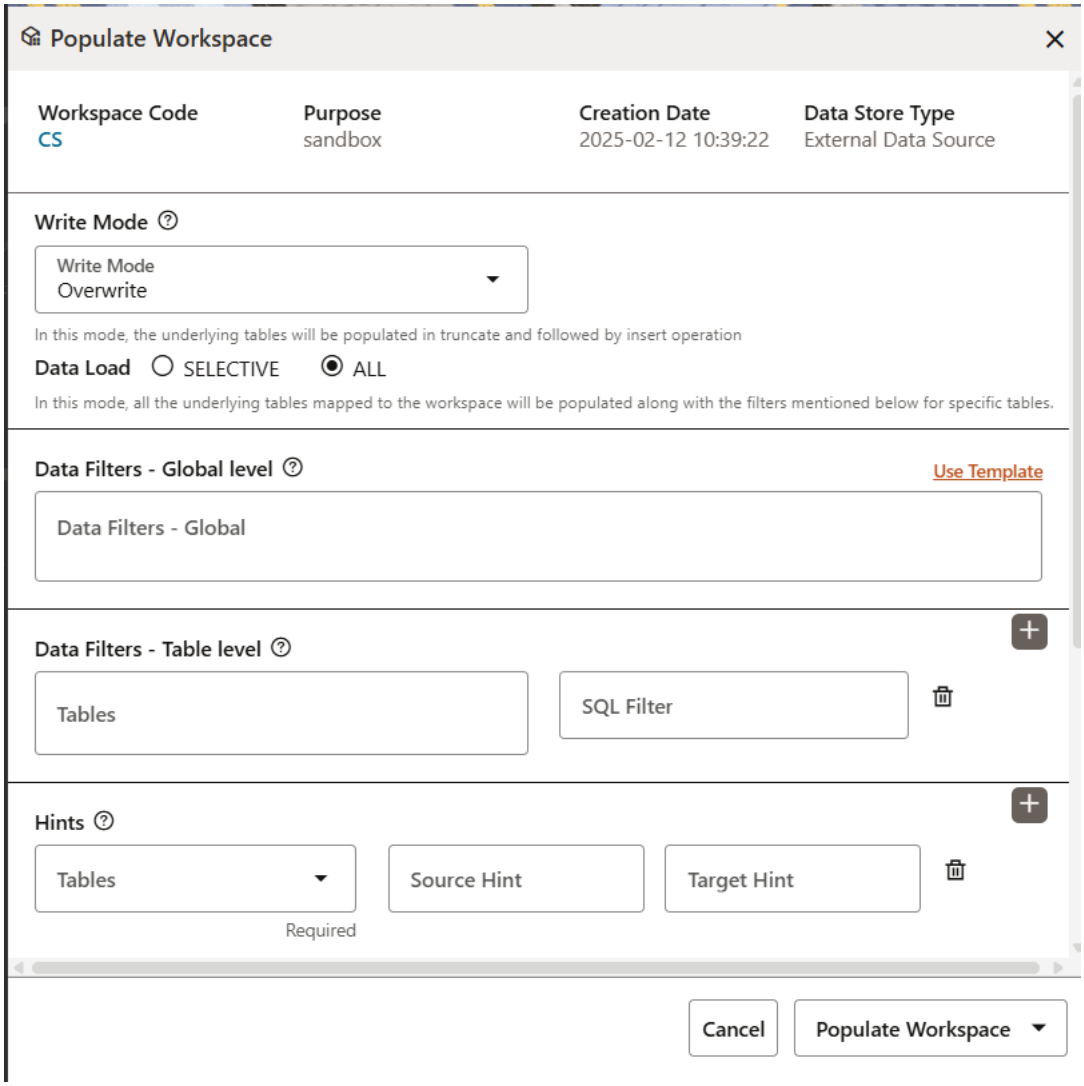
**Figure 14-33 Populate Workspace page**




Hover over the *?* icon over each field to view more information about it. Populate the fields in this window:

- **Write Mode** - Select either *Overwrite* or *Append*.
- **Data Load** - Select either *SELECTIVE* or *ALL*.
- **Data Filters - Global level** - Enter values or click the **Use Template** link to select a template from the Template the drop-down list.
- **Data Filters - Table level** - Select a table from the **Table** drop-down list. Add an SQL filter in the **SQL Filter** field. Additionally, click the **Delete** icon to delete the data.
- **Hints** - Select a table from the **Table** drop-down list. Add a value for the **Source Hint** and **Target Hint** fields. Additionally, click the **Delete** icon to delete the data.
- **Additional Parameters** - Enter values in the **Source Prescript** and **Target Prescript** fields. You can also modify the values in the **Fetch Size** and **Batch Commit Size** fields.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- **Additional Parameters** - Select either **Unlimited** or **Custom Rejection Threshold**. If **Custom Rejection Threshold** is selected, then the Rejection Threshold fields is enabled for editing.

Click the **Populate Workspace** drop-down list and click either **Create Batch** or **Create and Execute Batch**.

Click **Save**.

> **Note**
>
> The **View Workspace** screen and the Edit Workspace screen has been merged into one screen and is known as the Details screen.

# Edit a Workspace

The Edit Workspace process can be time-consuming, typically may take between 2 to 3 hours. However, if certain scenarios are not carefully considered, the update may encounter failures, leading to unwanted delays. To prevent such setbacks and ensure a seamless update, it is crucial to address these potential issues beforehand.

The possible issue and solution are as follows:

- **Adding Views, Materialized Views, or Triggers without selecting their respective parent tables**
  - **Issue**: If a user adds views, materialized views, or triggers without confirming the selection of their corresponding parent tables, it can lead to the failure of the edit workspace update.
  - **Solution**: It is essential to verify that all dependent objects, such as Views, Materialized views, and Triggers, have their corresponding parent tables included in the selection before initiating the update process.
- **Manually adding additional tables in the Target Workspace Schema instead of using Workspace functionality**
  - **Issue**: If a user manually creates a table (for example, ABC) in both the Source and Target Schemas, independent of the workspace functionality, and then tries to map it to an existing workspace, the edit process may fail. This would lead to an inconsistency between the Target Schema and Source Schema Database objects.
  - **Solution**: To resolve this issue you need to sync up the inconsistency between the Workspace Source and Target Database objects, for which you can execute the following API with the respective headers and payload.
    - **HTTP Method**: POST
    - **URL**: http(s)://<MMG_BE_HOSTNAME>:<MMG_BE_PORT>/<MMG_CONTEXT_NAME>/dmm-service/v1/modelupload/dbcatalog
    - **Header Parameter**:
      - **ofs_workspace_id**: MMG Workspace Code.
      - **ofs_remote_user**: Login User of the application.
      - **locale**: Locale in languageCode-countryCode format. The values should be en-US.
      - **ofs_service_id**: Target Workspace Data Store Name.


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* **ofs_connection_type**: Connection type and the value shoule be OFSAA-DATA.

* **Payload**:

  * **Case 1:** This will retrieve all table definitions, and since the list is empty, it will fetch all tables, making the process time-consuming.

```
{
            "tableNames":[]
    }
```

  * **Case 2:** This will retrieve only the tables specified in the request body. If you want to include specific tables, ensure they are listed.

```
{
            "tableNames":["A","B"]
    }
```

– **Response**: The response will serve as an acknowledgment that the request has been received, and it will be asynchronous due to the time-consuming nature of the process.

  * **Success**:

```
{
            "status": "received",
            "errorMessage": null,
            "additionalInfo": null
    }
```

  * **Error**:

```
{
            "status": "error",
            "errorMessage": <Error Message>,
            "additionalInfo": null
    }
```

  Once the execution is successful, utilize the workspace edit functionality to update the workspace by selecting the externally created table. This update is expected to proceed without issues.

To edit a workspace, follow these steps:

1. Navigate to **Workspace Management** to display the **Workspace Summary**page. The page displays Workspace records in a table.
2. Click Action next to corresponding workspace and select **Edit** to edit the workspace.


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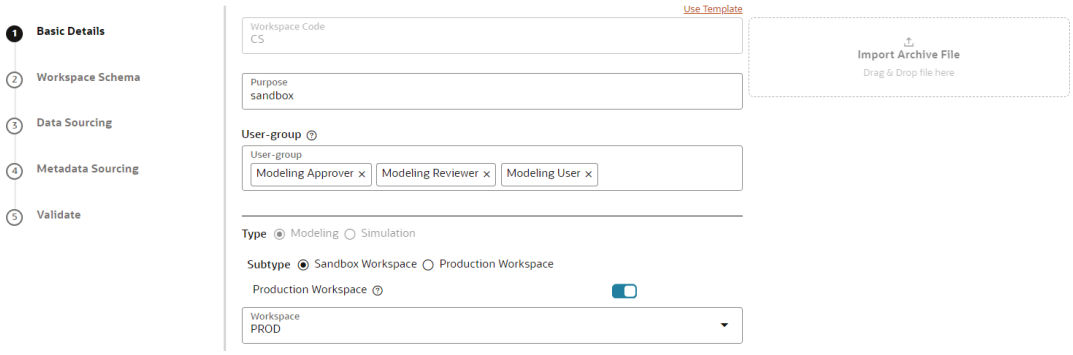
**Figure 14-34 Edit Workspace window**




> **Note**
>
> You can modify the Workspace Type from Sandbox to Production or vice versa.

For more details on the Basic Details fields, see Configure Basic Details section.

> **Note**
>
> While updating a workspace, if any of the DMM operations such as Procedures, Functions, Packages, and so on fails, DMM operations alone will be rolled back and workspace will not be rolled back. You can verify the details in MMG_SANDBOX_DETAILS, MMG_SANDBOX_MASTER, MMG_SANDBOX_SCHEMA tables.

3. Click **Save**.

> **Note**
>
> The **Details** option has been added, replacing Edit Workspace in Action list of workspace. In the Details screen, the Edit Workspace is available.
> The background concept has been added while adding/editing workspace. Once a user clicks on update option, the confirmation message will pop up and the user will be redirected to Sandbox Summary screen where the workspace will display as loading, indicating add/edit process is going on. Meanwhile, the user can proceed with other tasks and operations, instead of waiting for the workspace to be created or edited.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> **Note**
>
> The users should not perform manual modifications on the Target and Source Schema objects.
> Currently, there are scenarios where in manual changes are performed directly on the Target Schema and this leads to failure when user performs Workspace Edit operation. Therefore, the user should ensure not to perform any manual modification to underlying database objects in Source and Target Schema.

> **Note**
>
> The Edit workspace icon with details has been added post launching the workspace.

# MMG Schema Sync Utility

The MMG Schema Sync Utility, `sync_source_target_schema_utility.sh`, enables administrators and advanced users to synchronize database schema meta data between a work space's source and target environments.

The utility refreshes MMG and DMM metadata for source and target schema tables. Use this utility when tables are created or modified outside MMG to synchronize the metadata before using the tables in MMG workspace operations.

This tool is essential when modifications, such as new table creation, are performed manually outside OFS MMG, by using tools like SQL Developer, which may cause inconsistencies between the source and target schema definitions and OFS MMG's meta data catalog. By keeping the DMM meta data in sync ensures that subsequent workspace edits and data sourcing operations proceed without errors.

The following is an example of how this works; you had initially sourced **Table1** and **Table2** into your workspace through OFS MMG. Later, you or another team member manually creates a new **Table3** directly in both the source and target schema outside the OFS MMG user interface. If you try to edit your workspace in OFS MMG to bring in **Table3**, the operation will fail because OFS MMG's meta data (managed by DMM) does not recognize that **Table3** already exists in the target. DMM will attempt to recreate it that will in turn cause a conflict.

The MMG Schema Sync Utility solves this by refreshing DMM's meta data, allowing OFS MMG to recognize all the tables that currently present in the target schema, including those that are added manually.

The MMG Schema Sync Utility works in the following way:

1. The utility invokes a backend DMM API.
2. If the run contains no table filter, it scans and re-registers all the tables in the target schema into DMM's catalog.
3. If the run contains a list of tables, it updates only the specified tables.
4. Once the synchronization is performed, these tables are visible and selectable within OFS MMG as if they had originally been sourced there.


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# Use the MMG Schema Sync Utility

Before you use the MMG Schema Sync Utility, the following prerequisites must be met:

- You must have shell access to the OFS MMG server.
- You require the following information:
  - **Workspace name**: The workspace that contains the source and target schemas. Example: `WS123`
  - **Login user name**: The MMG user who runs the utility. Example: `mmgadmin`
  - **Locale**: The locale for utility execution. Example: `en_US`
  - **V_SERVICE_ID**: The V_SERVICE_ID value from the `tenant_connection_info` table for the DATA connection type of the target schema. This is the wallet alias that corresponds to the target schema and can be found in the `tenant_connection_info` table.
  - Optional, a space-separated list of tables in the required format for synchronizing specific tables.

### Synchronize Tables with the MMG Schema Sync Utility

Use the following commands to synchronize the database schema meta data between a work space's source and target environments in any of the following scenarios:

- After manually creating or altering tables in the target schema outside OFS MMG.
- Whenever you observe errors related to missing or duplicate objects while editing the workspace or data sourcing in OFS MMG.
- As part of a scheduled reconciliation or maintenance process in environments with frequent manual DBA operations.

1. To synchronize specific tables, run the following code:
   ```
   ./sync_source_target_schema_utility.sh WORKSPACE_NAME LOGIN_USER LOCALE
   V_SERVICE_ID -t \"TABLE1 TABLE2"
   ```

   > **Note**
   >
   > Specify the V_SERVICE_ID value from the `tenant_connection_info` table. Do not specify the target schema name or datastore name.

   Or

   To synchronize all tables, run the following code:

   ```
   ./sync_source_target_schema_utility.sh MYWORKSPACE mmgadmin en_US
   MY_SERVICE_ID
   ```

   Valid examples:

   - Sync all tables: `./sync_source_target_schema_utility.sh UTILWR1 mmgadmin en_US utl_als`
   - Sync one table: `./sync_source_target_schema_utility.sh UTILWR1 mmgadmin en_US utl_als -t "DIM_CUSTOMER"`


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- Sync multiple tables: `./sync_source_target_schema_utility.sh UTILWR1 mmgadmin en_US utl_als -t "STG_SALES_ORDER_C2 STG_SALES_ORDER_C3 STG_SALES_ORDER_C4"`

The following `-t` formats are invalid:

- `-t "\"TABLE1\""`
- `-t ""`
- `-t "`
- `TABLE1"`

Malformed values specified for the -t option are rejected during input validation, and the utility displays an appropriate validation message before processing the synchronization request.

Although the current implementation may accept a single unquoted table name after the -t option, Oracle recommends specifying table names in double quotation marks for consistency.

2. After you accept the request, the utility returns a *status: received* message, to indicate that the synchronization request has been accepted. This status indicates only that the request has been received and does not confirm successful completion of the synchronization. Review the backend logs to verify that the synchronization completed successfully.

   After successful synchronization, the synchronized tables become available for MMG workspace operations.

3. Check the log file that can be found in `mmg-service.logs` for further details such as ensuring that the synchronization has completed and to diagnose errors.

4. After running the utility, you will be able to add the newly synchronized tables in OFS MMG through the UI as part of data sourcing or workspace editing.

> **Note**
>
> Validation of the `-t` option is performed before the synchronization request is submitted. Errors such as an invalid table list format are reported immediately. Environment-specific or business validation failures, such as an invalid workspace name or V_SERVICE_ID, are detected during backend processing and require backend log inspection.

### Limitations and Best Practices

- The utility does not validate your parameters, workspace, service ID, etc.. Incorrect entries will not cause visible errors in the command line, but it will result in sync failure, hence it is recommended to view the log file in `mmg-service.logs`.
- For best results, double-check all the inputs and consult your system administrator for the correct `V_SERVICE_ID`.
- Large schema or multiple tables may take time to synchronize.

### Troubleshooting

- If your synchronization status displays the *status: received* message but your changes don't appear in OFS MMG, you must check the log file in `mmg-service.logs` for details.
- Verify that the provided `V_SERVICE_ID` matches your intended target schema connection.


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- When in doubt, consult the technical team or system administrator for reviewing the log file or further troubleshooting actions.


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# 15
# MMG Administration

Manage MMG files, data stores, runtime environments, registered APIs, streaming connections, OFSAA environments, administrative audit and identity. Data Studio options and interpreter setup are covered in Chapter 16.

## Chapter contents

15.1 File Manager 15-2

15.2 Administration 15-4

Source: MMG 26.2.0 User Guide. Procedures, screenshots and examples are incorporated into this STSA 8.1.2.8.0 draft; release-specific statements retain their source status.


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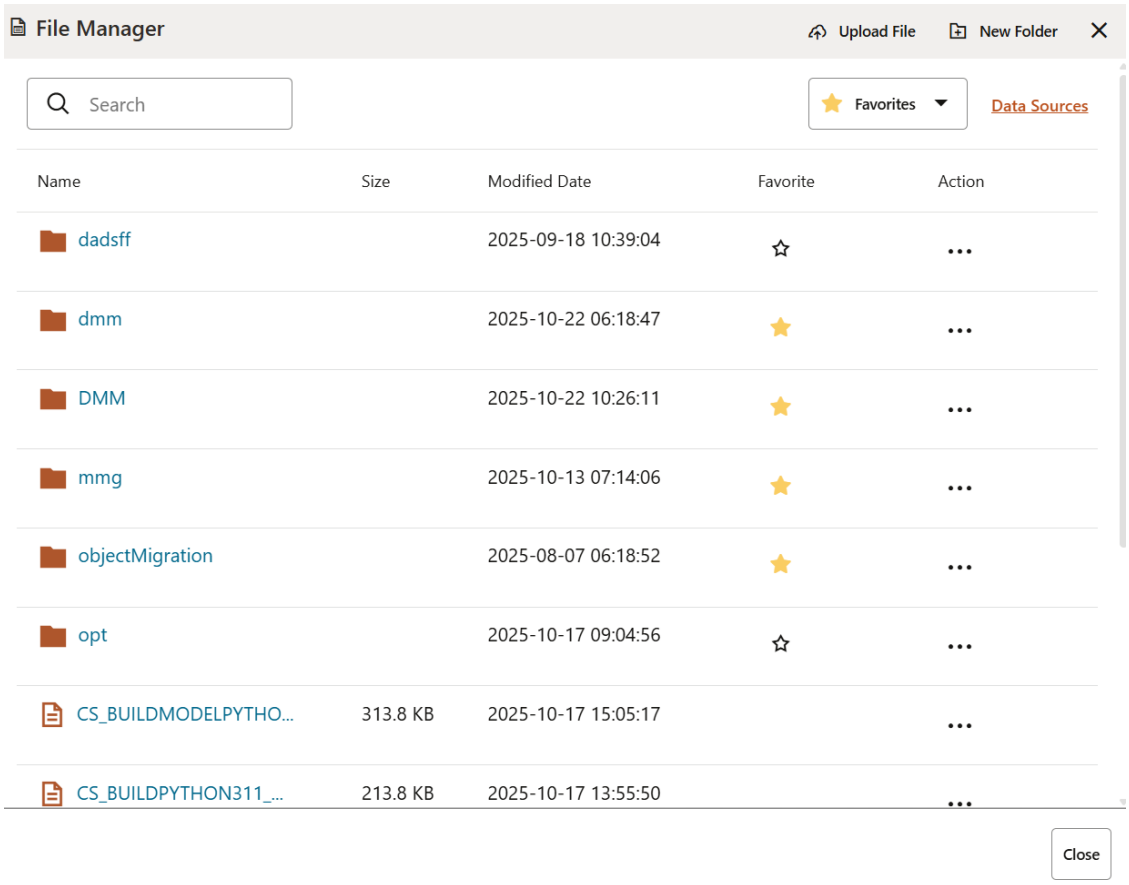
# 15.1 File Manager

File Manager is a new feature that is added in the **Workspace Summary** screen.

> **Note**
>
> File manager will always open the last opened directory from anywhere within the application.

**Figure 15-1 File Manager**




You must map the *File Admin User* to view it on the headers of the **Home** screen. The *File Admin User* has the following roles mapped to it:

- File Read
- File Delete
- File Write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The file manager stores the files and folders and replicates the data of the ftpshare folder from the deployed location. Users can use those stored files directly during the pipeline notebook and any other location where the file manager option is added. It has the feature to upload a new file, create a new folder, preview the file, and delete and download options. The user can view only those workspace folders to which he is mapped.

The favourites feature appears as a drop-down list on the **File Manager** page. It enables you to add a folder to the **Favourites** drop-down list by clicking the **Add to Favourites** icon adjacent to a folder. Click the **Add to Favourites** to remove a folder from the **Favourites** drop-down list. You can view all the folders that have been marked as a favourite by clicking the **Favourites** drop-down list. When a favourite is selected from the drop-down list, the application fetches the list of favorite folders and shows reason for it being a favourite as a tool tip.

> ⓘ **Note**
>
> - If a folder that was added into the Favourites drop-down list was deleted, then it will appear as disabled and the hover over text will inform you that the directory does not exist.
> - If the permissions or roles are revoked for a user in accessing a specified folder, then the user will not have access to that folder as it will be disabled for this user. The hover over text in this case will inform the user that the file is not accessable.

Additionally, workspace-level access controls are also applicable to files/folder. To access files/folders in python see the Access Module for File/Folder Operations section in Notebook.


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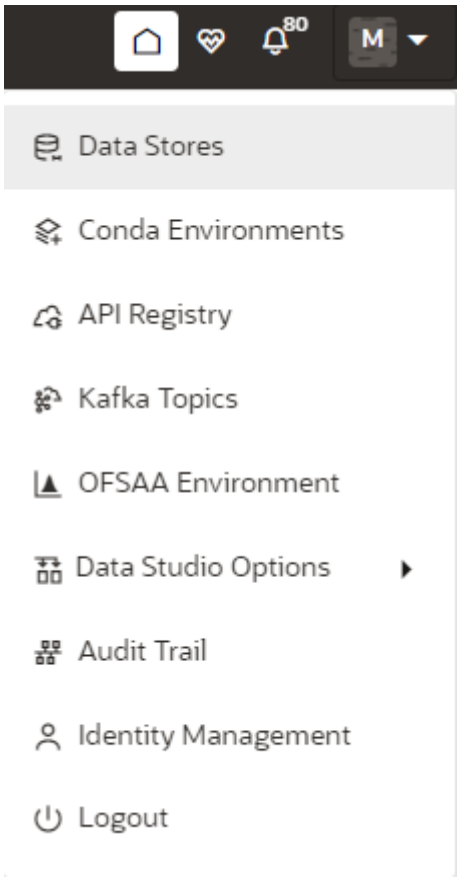
# 15.2 Administration

The Header displays icons, buttons, and text for generic information and access to the OFSAA application's features. The following user-interface elements are displayed.

**Figure 15-2 Administration menu**




- **User Name**: Displays the first letter of the logged-in user name. Hover over to view the complete name of the user. Click on this icon to select from the following options in the drop-down list:
- **Data Stores**: Click to navigate to Data Store Summary page. You can add and manage data stores from this page.
- **Conda Environments**: Click to navigate to Environment Summary page. You can configure and manage conda environments from this page.
- **API Registry**: Click to navigate to API Summary page. You can configure and manage APIs from this page.
- **Kafka Topics**: Click to navigate to Kafka Topics page. You can configure and manage kafka topics and clusters from this page.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- **OFSAA Environment**: Click to navigate to OFSAA Environment page. You can register OFSAA environments (Simulation and Production) from this page.
- **Data Studio Options**: Contains an underlying Notebook Server which has the following configurable options:
  - Interpreters
  - Tasks
  - Permissions
  - Credentials
  - Templates

  Clicking on the option will navigate you to the specific page. For more details, see Data Studio Options section.
- **Admin**: Navigates to IDCS page.
- **Audit Trail**: Click to navigate to Audit Trail page The details such as start and stop of UI and Service, add or delete of datasource, API Registry, Kafka topics, Conda Environments and so on are displayed. You can view the sequence of actions performed in table view or timeline view (graphical representation) by clicking on Audit Table View, and Audit Timeline View options respectively. You can search the model by entering the name in the search box.
- **Identity Management**: Click to navigate to IDCS page. You can manage users, groups, roles, and functions from this page.
- **Logout**: Click to log out of the application.

# Data Stores

This feature allows you to manage the Data Schemas registered with the application. The Data Store Summary drawer displays the list of data schemas registered with the application. These data schemas can be used either for workspace or for sourcing data. Click **Data Stores** to view the **Data Source Summary** drawer. This window can be accessed and opened from any UI

This drawer also allows you to manage these registered external sources.


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**Figure 15-3 The Data Store Summary Drawer**

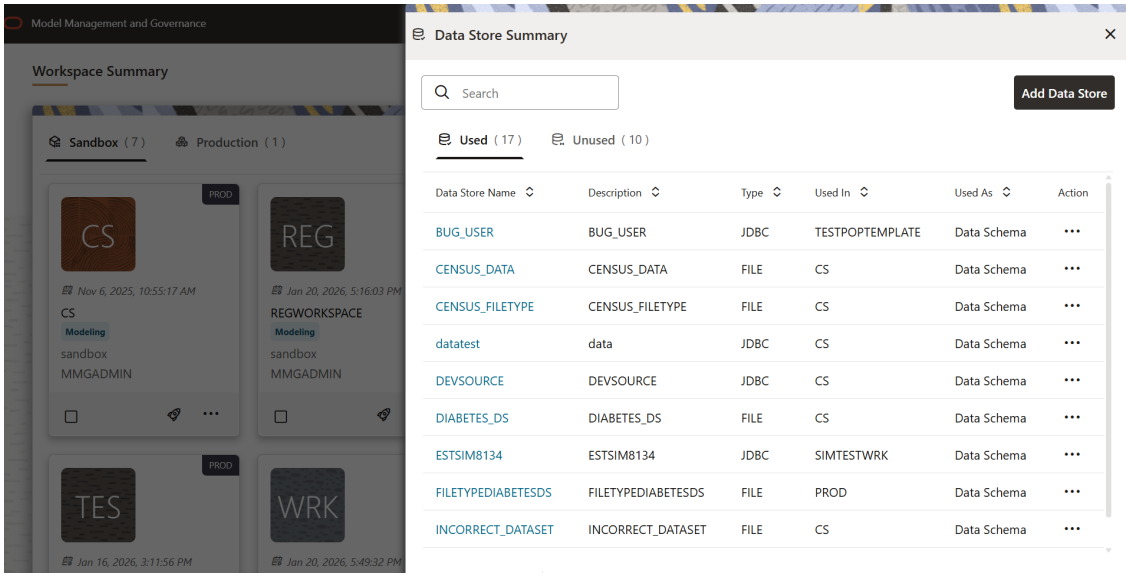
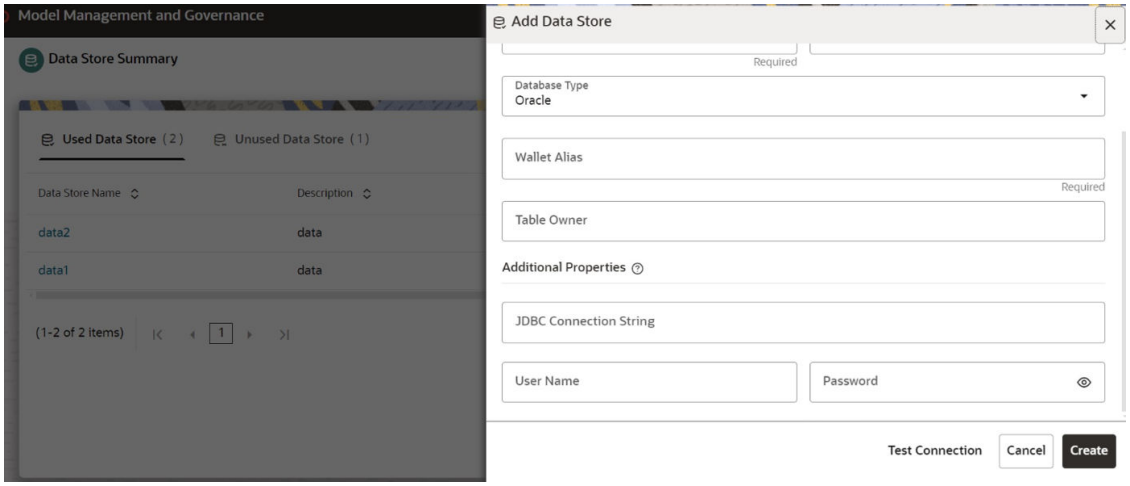



**Figure 15-4 Add Data Store**




The Data Store Summary consists of two sections: Used Data Source and Unused Data Source.

- **Used Data Source:**
- This shows the list of Data Sources registered with any workspace. Here, you can only view the Data Source details. The count of Used Data Sources also displayed at the top of Data Source Summary page.
- **Unused Data Source:**
- This shows the list of Data Sources those are not registered with any workspace. Here, you can only view, edit, or delete the Data Source details. The count of Unused Data Sources also displayed at the top of Data Source Summary page.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> **Note**
>
> Data Store name should not be allowed to be created with spaces at the start and end of Data Store name and with multiple spaces in between.

# Adding a Data Store

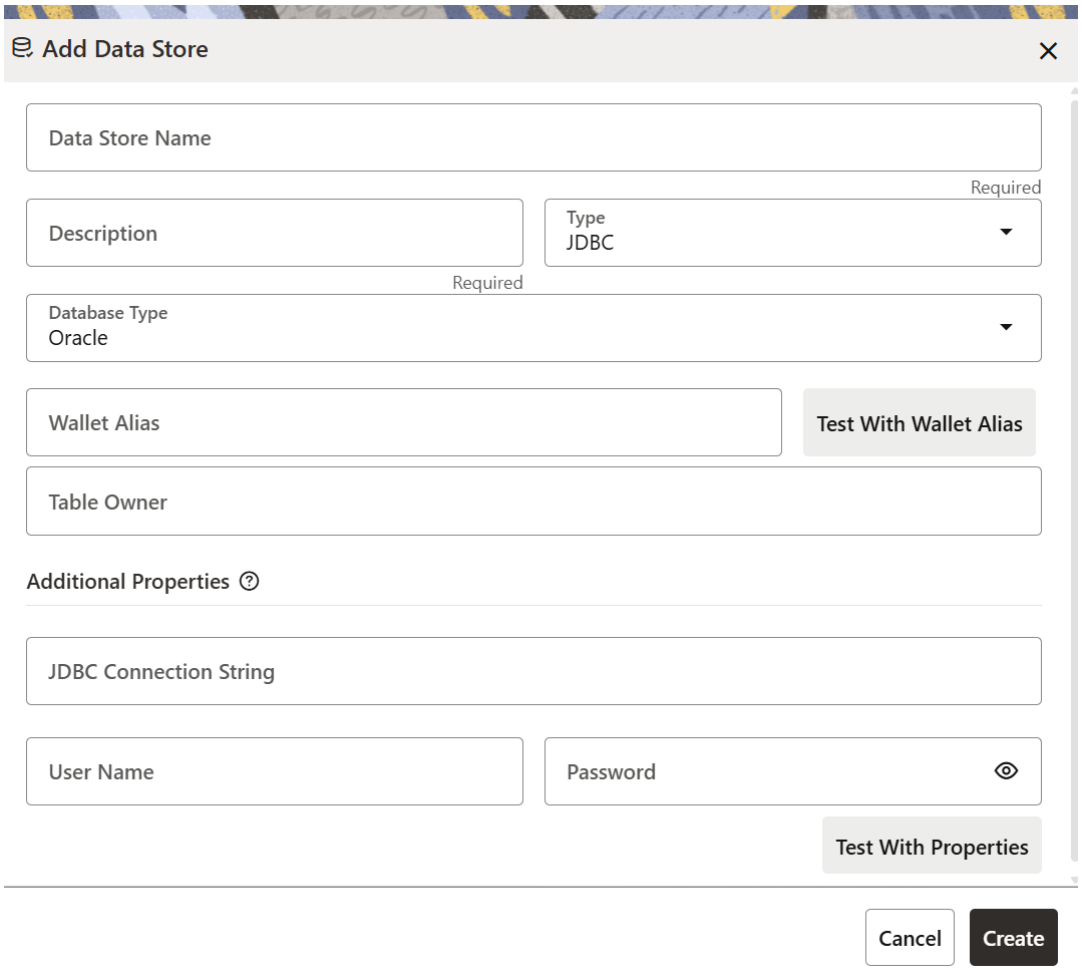
To add a Data store, follow these steps:

1. Navigate to **Workspace Summary** window.
2. Click **Profile** icon and select **Data Stores**.

   The **Data Store Summary** page is displayed.
3. Click **Add Store**.

   The **Add Data Store** window is displayed.

**Figure 15-5 Add Data Store Window**




4. Enter the required details as shown in the following table.


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**Table 15-1 Add Data Source**

| Field | Description |
|---|---|
| Data Store Name | Enter the connection URL to the database for the data schema. |
| Description | Enter the description of database connection. |


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**Table 15-1 (Cont.) Add Data Source**

| Field | Description |
|---|---|
| Type | Enter the type of the database connection. The supported types are JDBC and File.<br>• **JDBC** : If selected, the Database type options Oracle and Hive are displayed.<br>• **File**: If selected, the following options are displayed.<br>**Global**: Select this option if you want to fetch the global level datasource details. You need to place the file with the datasource details in JSON format in the following location: <installed path>/ftpshare/mmg/Data Sources/datasources/##Data Source Name##/datafiles/##MISDATE##/*<br>**Workspace-limited**: Select this option if you want to fetch the workspace level datasource details. You need to place the file with the datasource details in JSON format in the following location:<br><installed path>/ftpshare/mmg/##Workspace##/datasources/##Data Source Name##/datafiles/##MISDATE##/*<br>**Upload Data File**: Click to upload data file in text or csv format. Any pre-filled values will be overridden with the selected data file. Once the file is uploaded, you can derive the schema which will auto populate the values based on the file.<br>**File Type** : Select the Type as text or csv format.<br>**Escape Delimiter**: An escape delimiter is simply a sequence that is recognized and ignored during parsing. Its purpose is to allow the use of escape sequences to embed byte sequences in data that would otherwise be seen as delimiter occurrences. This option differentiates multiple records in one single column from second column. Escape delimiter (eg. '), added in from of multiple records will treat it as multiple records for one single column. For example, if there is a normal delimiter “+” at a given level, and you define an escape delimiter “\+” as shown in the following figure, then aaa+b\+c+ddd will parse as three fields: aaa, b\+c, and ddd. If the escape delimiter were not defined, the sequence would then parse as four fields: aaa, b\, c, and ddd.<br>**Record Delimiter**: There is a separation of the records using a delimiter character like a comma, semicolon, hyphen, and so on for the rows. Enter the delimiter in the Record Delimiter field. This is a mandatory field and limited to two characters.<br>**Field Delimiter**: There is a separation of the records using a delimiter character for the columns. Enter the delimiter in the Field Delimiter field. This is a mandatory field.<br>**Derive Schema**: It is an optional feature that populates the data grid by analyzing schema details from any data file stored in the above |


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**Table 15-1 (Cont.) Add Data Source**

| Field | Description |
|---|---|
| | specified directory. This is applicable when you upload data file in previous steps.<br>You can either add the file details using data template or manually.<br>Click Data File Template icon to select the Data Source entities and click Save.<br>**OR**<br>Click Add icon to add the details such as Physical Name, Logical Name, Data Type, and Field Order manually and click Save.<br>Click Reorder Grid option to reorder the field orders. |


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**Table 15-1 (Cont.) Add Data Source**

| Field | Description |
|---|---|
| Database Type | If the Type field is selected as JDBC, the following options are displayed.<br>Select the Database Type as Oracle or Hive.<br>NOTE: Selected tables during Hive sourcing should be preexisting in the RDBMS data schema before the workspace population.<br>If you select Database Type as Oracle (see Figure 10), then following additional fields are displayed to enter details:<br>• Wallet Alias : Enter the Wallet Alias. This value should be same as configured using Oracle Wallet. For more information, see the Oracle Financial Services Model Management and Governance Installation Guide<br>• Table Owner: Enter the Oracle Database schema name.<br>If you select Database Type as Hive (see Figure 11), then following additional fields are displayed to enter details:<br>User Name: User Name / Principal is used for Kerberos authentication.<br>Example: mmg/hostname@ORACLE.COM.<br>Table Owner: Enter the Hive schema.<br>JDBC Connection String: Enter the JDBC Connection String.<br>Example: jdbc:hive2://hostname:10000/default;principal=hive/hive-service-hostname@ORACLE.COM.<br>JDBC Driver: Supports org.apache.hive.jdbc.HiveDriver and com.cloudera.hive.jdbc4.HS2Driver.<br>Keytab File Name: Enter the Name of the keytab file present in conf directory.<br>Example: mmg.keytab<br>Realm File Name: Enter the Name of the configuration file present in conf directory.<br>Example: krb5.conf<br>NOTE:<br>• Schema population for Hive as target is not supported.<br>• This is applicable only for Sandbox Workspace.<br>For more information on setting the environment, see the Oracle Financial Services Model Management and Governance Installation Guide. |

5. Click **Create**.

   The Data Store is created.


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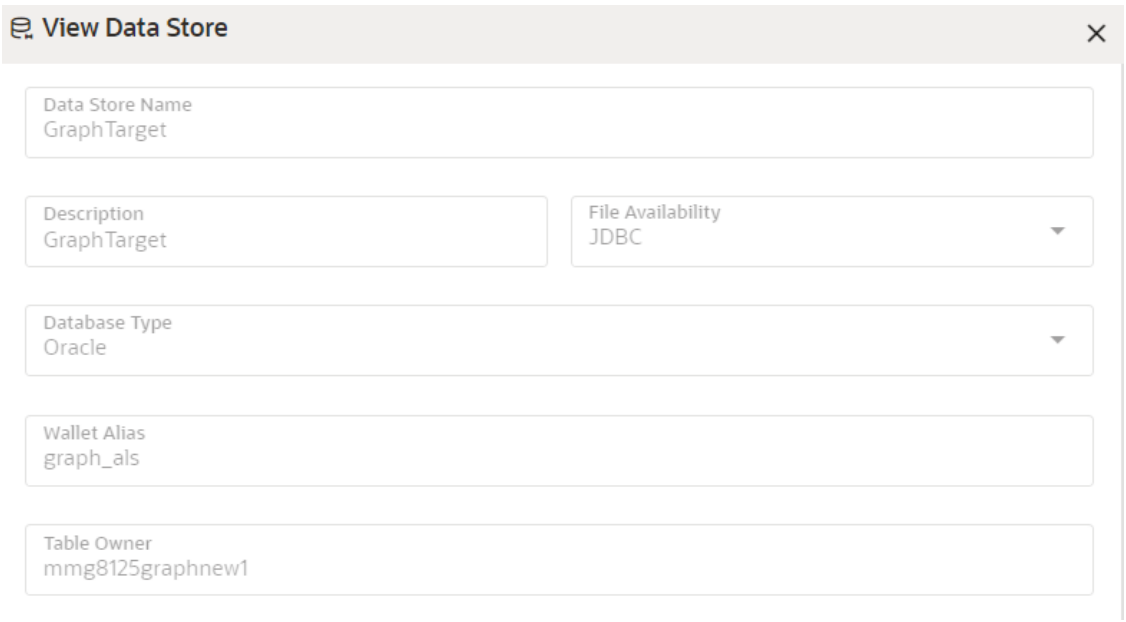
> **Note**
>
> Click **Test Connection** to check the connection. A success message is displayed.

> **Note**
>
> Data Store needs to be created with additional properties giving JDBC connection string, username and password.
> The user should not provide '//' for the JDBC connection string. For example: jdbc:oracle:thin:@//sevicehost:port/servicename
>
> The correct JDBC connection string which the user should provide is: jdbc:oracle:thin:@sevicehost:port/servicename
>
> The reason because AAI does not accept the string with //, thereby leading to workspace creation failure.

## Viewing the Data Store Details

To view the Data Store details, click the **Action** icon next to corresponding Workspace and select **View**.

**Figure 15-6 View Data Store**




# Conda Environments

Conda as a package manager helps you to find and install packages. With the capability of environment manager, you can set up a totally separate environment to run different versions of Python. In addition, you can continue to run your usual version of Python in your normal environment. You can configure the channels required for the Conda environment creation in the .condarc file.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> **Note**
>
> The supported version of Conda is 3.9.x.

You must add the miniconda/bin directory in the following path variable as shown below:

**PATH=/scratch/ofsaadb/miniconda3/bin:$PATH**

For proxy support, you need to manually configure the .condarc file present in the root directory.

**Limitation**: Conda support currently does not include linking externally created environments to the application.

To configure:

Add the below in the .condarc file.

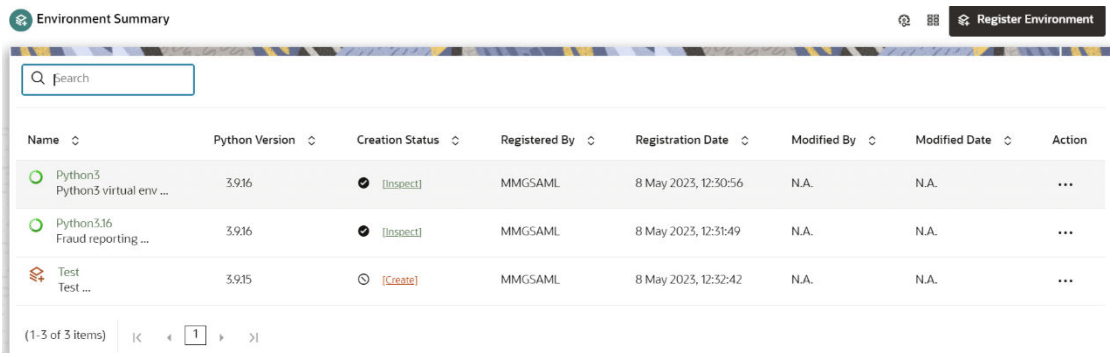
proxy_servers:

- `http: http://www-proxy.idc.oracle.com:80`
- `https: http://www-proxy.idc.oracle.com:80`

> **Note**
>
> - Conda package search is restricted only to the package name and does not include versions.
> - Python version displayed in the Register Conda UI.

Click **Conda Environments** to navigate to **Environment Summary** page from any other window in the application. You can register and manage Conda environments from this page.

**Figure 15-7 Environment Summary page**




The following table provides descriptions for the fields and icons on the **Environment Summary**page.


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**Table 15-2 Fields and icons on the Sandbox Summary page**

| Field or Icon | Description |
|---|---|
| Search | The field to search for a Conda environment. Enter specific terms in the field for which you want to search, and press Enter on the keyboard to display the results.<br>**NOTE**: Conda package search is restricted only to the package name and does not include versions. |
| Name | The name of the Conda environment. |
| Python Version | The python library version of the Conda environment. |
| Creation Status | The status of the Conda environment. The folloing are the available status that appear in this column:<br>• **Inspect**: The environment is registered and created. You can perform functions such as Edit/View/Inspect/Clone/Export/Remove for the Inspect status environments. Click this link to view the environment details. For more information, see the Inspect a Conda Environment. Note that you cannot view the log information from this option. If you select the **View Logs** button from the **Action** icon, the **Environment Logs** window appears, informing you that the logs are not available for successfully created environments.<br>• **Create**: The environment is registered but not created. You can perform functions such as Create/Edit/View/Deregister for the Create status environments<br>• **Import**: The selected YAML file for the Conda environment has been uploaded and is ready to import. Click the **Import** link to create this Conda environment in the system.<br>• **Failed:** This status appears for failed operations. Click this link to open the **What's Next?** window. The available options in this window are:<br>– **Retry:** Click this button to open the **Create Environment** window. Click the **Create** button to retry the import or create operation by using the same parameters.<br>– **View Logs:** Click this button to open the **Environment Logs** window and view the log information. This window displays the complete, detailed logs for the failed operation, enabling you to troubleshoot or share information with the support team. |
| Registered By | The User Id of the User who registered the Conda environment. |
| Registration Date | The date on which the Conda environment has been registered. |
| Modified By | The ID of the Last Modified by user who has modified the Conda environment. |
| Modified Date | The date on which the Conda environment was modified. |


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**Table 15-2 (Cont.) Fields and icons on the Sandbox Summary page**

| Field or Icon | Description |
|---|---|
| Register Environment | Click to register a new Conda environment. |
| Conda Settings | Click to add or modify the Conda components settings. |
| Conda Properties | Click to view the Conda properties. |
| Action | Click the three dots to perform Create/ Import/Edit/ View/Inspect/Clone/Export/Remove/Deregister functions on selected Conda environment. The functions might vary based on the selected Conda environment. |

# Register a Conda Environment

To register a Conda environment:

1. Click **Conda Environments**to navigate to the **Environment Summary** page from any window in the application.

   This page displays the Conda environments.

2. In the **Environment Summary** screen, click **Register Environment**.

   The **Register Environment** page is displayed.


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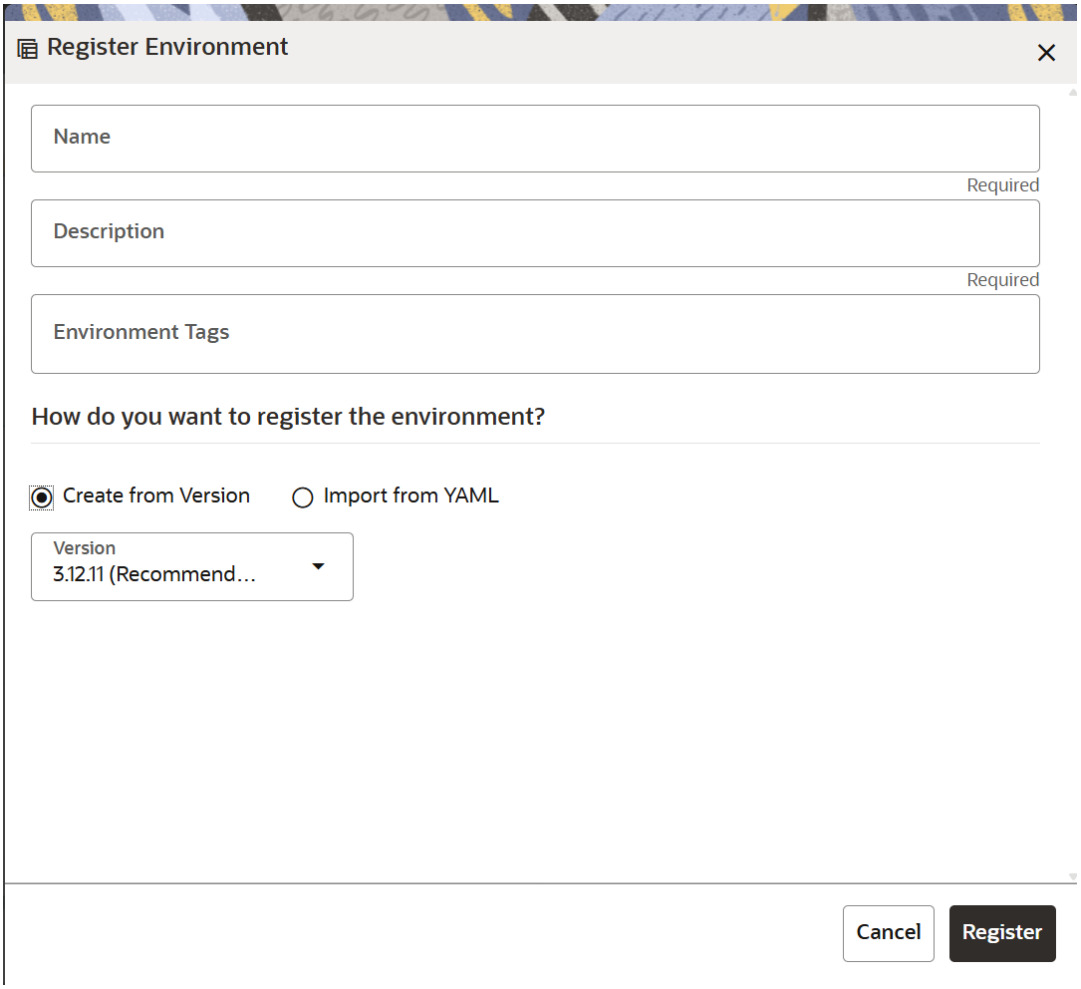
**Figure 15-8 Register Environment Window**




3. Enter the **Name** for the environment. This field is mandatory.
4. Enter the **Description** for the environment. This field is mandatory.
5. Enter a tag in the **Environment Tags** field. You can add multiple tags.

> **Note**
>
> The **Location** of the Conda environment is displayed. This field is greyed out and cannot be modified.

6. From the **How do you want to register the environment?** section, select either of the following options:
   - **Create from Version:** This option is selected by default. Select a Python version number from the **Version** drop-down list.
     If this option is selected and the **Register** button is clicked, then the creation operation is performed asynchronously in the background. This enables you to interact with other UI features in the application as the screen is not locked. Real-time status updates, operation histories, and context-specific actions are now provided. An operation status or progress area is available, where each in-progress action is listed with states such as *Queued*, *In Progress*, *Completed*, or *Failed*. Once this operation is completed, the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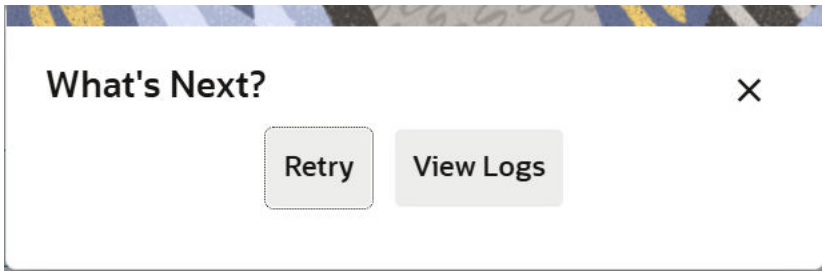
status is updated on the **Environment Summary** page. The following are the status that are displayed in the **Creation Status** column adjacent to an environment:

– **Inspect:** Click this link to view the environment details. For more information, see the Inspect a Conda Environment. Note that you cannot view the log information from this option. If you select the **View Logs** button from the **Action** icon, the **Environment Logs** window appears, informing you that the logs are not available for successfully created environments.

– **Failed:** This status appears for failed operations. Click this link to open the **What's Next?** window.

**Figure 15-9 What's Next? Window**




The available options in this window are:

* **Retry:** Click this button to open the **Create Environment** window. Click the **Create** button to retry the operation.

* **View Logs:** Click this button to open the **Environment Logs** window and view the log information.

* **Deregister:**Click this button to deregister the Conda environment and remove it from the **Environment Summary** page.

Multiple environment creation tasks can be started in parallel and each task is tracked individually in the status or progress panel. This enables you to receive further details about the operation.

> **Note**
>
> The following are the known issues and limitations of this feature:
>
> * The log information is only available for failures. For successful operations, the Inspect option allows you to view the summary details.
>
> * When multiple creation operations run in parallel, there may be a delay or omission in the live status updates for a few entries until the UI is manually refreshed. This is a known issue.


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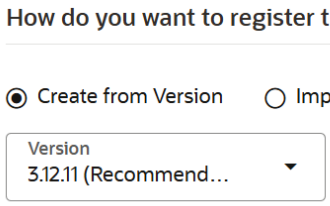
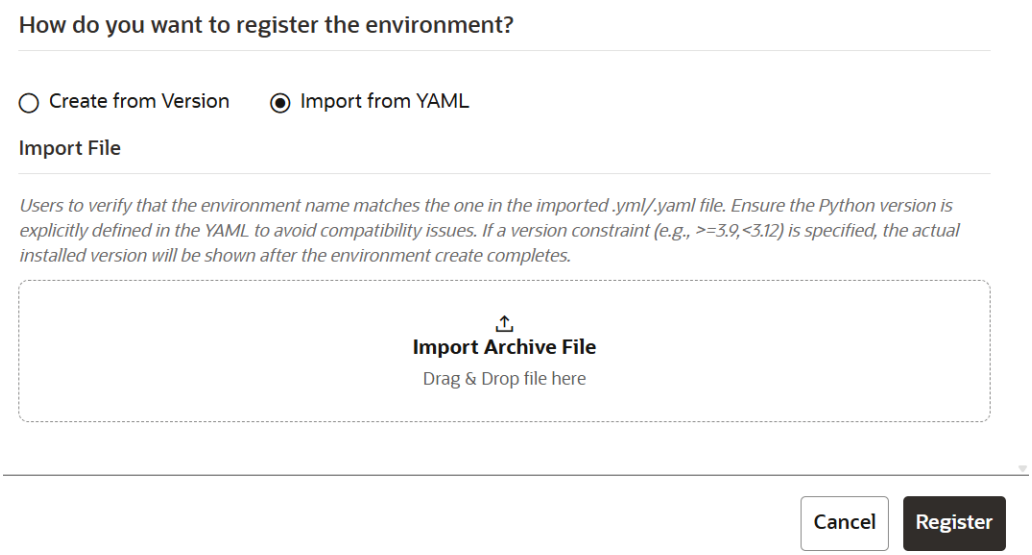
**Figure 15-10 Create from Version Option**




- **Import from YAML:** Select this option if you want to import the metadata from a YAML file. Click **Import Archive File** or drag and drop the desired `.yml/.yaml` file from your local system into the Import Archive File section. You must ensure that the Python version is included in the `.yml/.yaml` file.

**Figure 15-11 Import form YAML Option**




After attaching the `.yml/.yaml` file in the registration dialog, the `.yml/.yaml` file content is displayed in a read-only, scrollable preview area labeled as **File Details** along with the file name and size. This preview allows you to fully inspect the uploaded environment specification before submission. If the attached file is removed or replaced, the preview disappears or updates automatically to reflect the new file. You cannot modify the content of the file in this preview area. Any desired modifications must be done in the file and then the modified file must be reattached.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> **Note**
>
> The following limitations are present in this version of the application for this feature:
>
> – Currently, this feature is only available during the registration process. This preview feature will be available in the **View** or **Edit** windows in future releases.
>
> – In the **Edit** screen, the preview of the attached `.yml/.yaml` file is currently not displayed. Also note that if updates are made in any of the fields in the **Edit** window, then the changes can be saved without reuploading a new `.yml/.yaml` file. The file preview and validation are known issues that will be fixed in future releases.

You must review the `.yml/.yaml` file details in the **File Details** section to confirm that the required metadata, such as environment name and Python version, are present before registering the environment. Post-registering, the file content will not be displayed in the **Edit** window. Hence, ensure that you keep your local copies of the uploaded files for audit.

OFS MMG now processes Conda environment imports asynchronously in the background. When you begin an import operation, the **Environment Summary** page automatically displays the current status of the import. This allows you to continue using the application while your Conda environment is being imported.

The **Import** status on the **Environment Summary** keeps you informed so that you do not have to wait or keep the page open.

Until the environment is imported, the actions that you can perform in the **Action** icon on the **Environment Summary** page, such as **Edit**, **View**, and **Deregister** will be temporarily disabled.

> **Note**
>
> If you do not see the **Creation Status** on the **Environment Summary** page update automatically, you can refresh this page to view the latest status.

7. Click **Register**.

   The Conda environment is registered and displayed in the **Environment Summary** page.

   After the environment registration is complete, you must create the Conda environment. For more details, see the Create a Conda Environment section.

# Create a Conda Environment

To create a Conda environment:

1. Click **Conda Environments** to navigate to **Environment Summary** page from any other window in the application.

   This page displays the Conda environments in a table.

2. Click the **Create** link in the **Creation Status** column of a desired environment to create the Conda environment, or, you can also click the **Action** icon adjacent to a desired environment and then click **Create**. Note that this option is only available if the status in the **Creation Status** column is *Create*.


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> **Note**
>
> The **Create** option is not displayed for the Conda environment with the creation status **Inspect**.

A confirmation dialog is displayed.

3. Click **Create**.

   The Conda environment is created.

   These environments can be selected while creating a Workspace. For more details, see the Workspace Schema section.

   In addition, these environments can be selected during the Model pipeline execution.

## Edit a Conda Environment

To edit a Conda environment:

1. Click **Conda Environments** to navigate to **Environment Summary** page from any other window in the application.

   This page displays the Conda environments in a table.

2. Click **Action** next to corresponding environment and select **Edit** to edit the details.

   The **Edit Environment** page is displayed.

   For more details on the Edit environment fields, see Register a Conda Environment section.

> **Note**
>
> The **Name** of the Conda environment is greyed out and cannot be modified.


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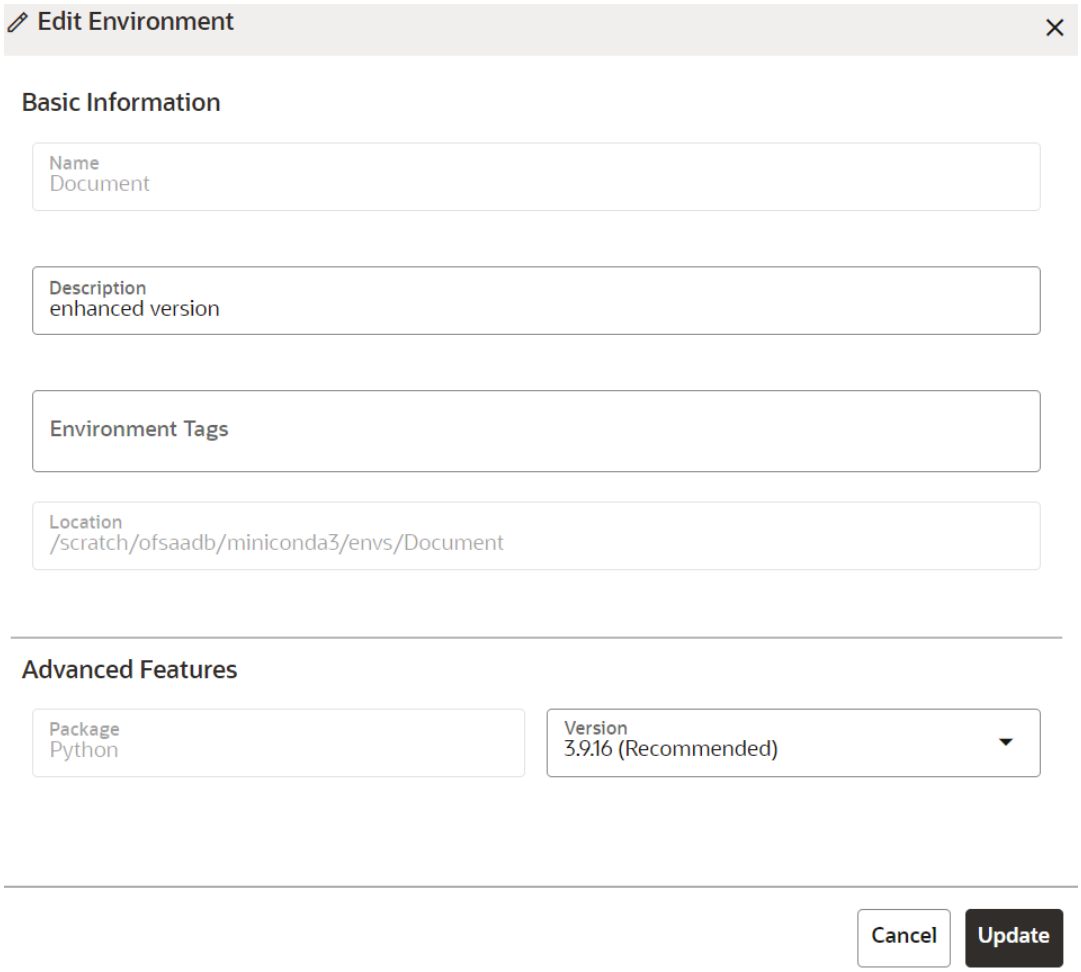
**Figure 15-12 Edit Environment page**




3. Click **Update**.

   The details of the Conda environment is updated.

# Deregister a Conda Environment

To Deregister a Conda environment:

1. Click **Conda Environments**to navigate to **Environment Summary** page from any other window in the application.

   This page displays the Conda environments in a table.

2. Click **Action**next to corresponding environment and select **Deregister** to deregister the Conda environment.

   > **Note**
   >
   > The **Deregister** option is not displayed for the Conda environment with the creation status **Inspect**. A confirmation dialog is displayed.

3. Click **Deregister**.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The registered Conda environment is deregistered and removed from the Environment Summary page.

## Inspect a Conda Environment

To inspect a Conda environment:

1. Click **Conda Environments** to navigate to **Environment Summary** page from any other window in the application.

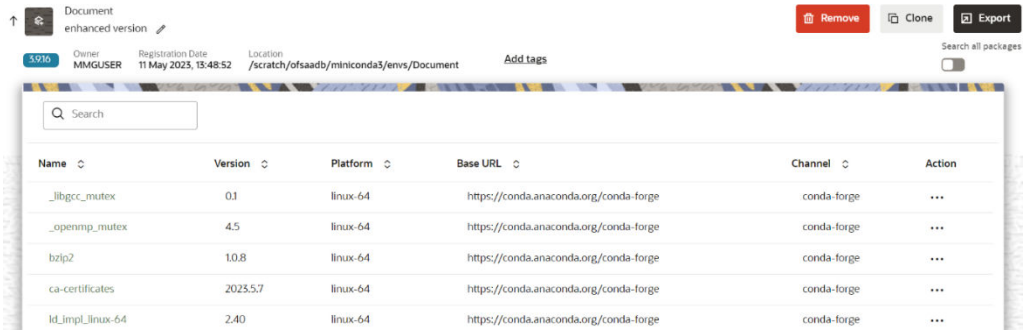
   This page displays the Conda environments in a table.

2. Click **Action**next to corresponding environment and select **Inspect** to edit the details.

> **Note**
>
> The **Inspect** option is not displayed for the Conda environment whose creation status is **Create**.

The Conda environment details are displayed.

**Figure 15-13 Conda environment details**




You can perform the following in the above page:

- Remove Environment
- Clone Environment
- Export Environment
- Edit a Conda Environment Description
- Add or Remove the Environment Tags
- Search All Packages
- View Package Properties
- Update Package
- Remove Package

## Remove Environment

To remove a Conda environment: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1. In the Conda details page, click **Remove**.

   A confirmation message is displayed.

2. Click **Remove**.

   The Conda environment is deregistered and removed from the **Environment Summary** page.

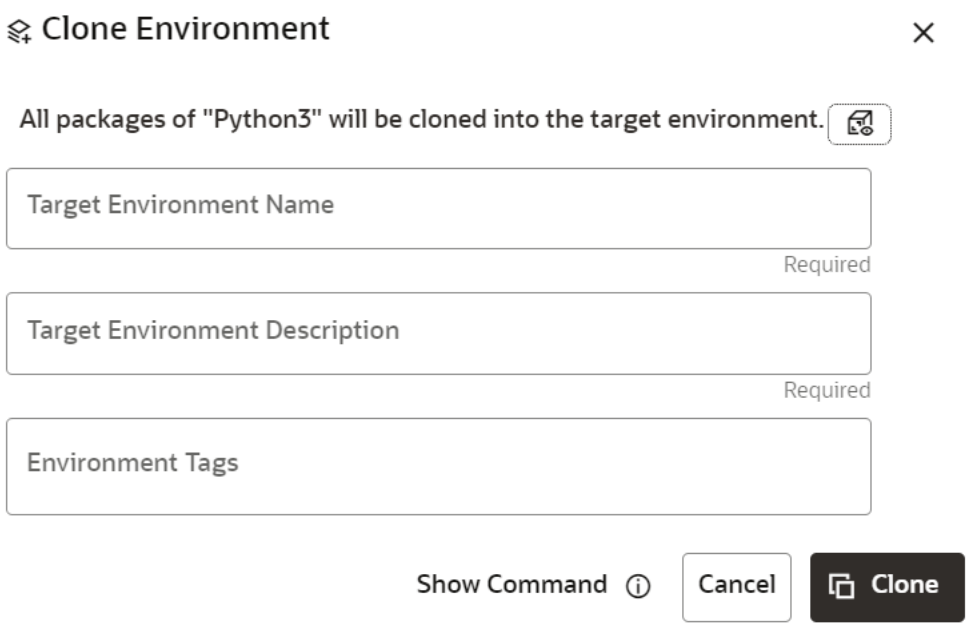
## Clone Environment

To clone a Conda environment:

1. In the Conda details page, click **Clone**.

   The **Clone Environment** page is displayed.

   **Figure 15-14 Clone Environment**




> **Note**
>
> You can preview the packages of the current Conda environment by clicking the **Preview** icon.

2. Enter the **Target Environment Name**to which the current environment needs to be cloned.
3. Enter the **Target Environment Description**.
4. Enter a tag in the **Environment Tags**field. You can add multiple tags.
5. Click **Clone**.

   The Conda environment is cloned to the targeted environment.

## Export Environment

To export a Conda environment: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- In the Conda details page, click **Export**.

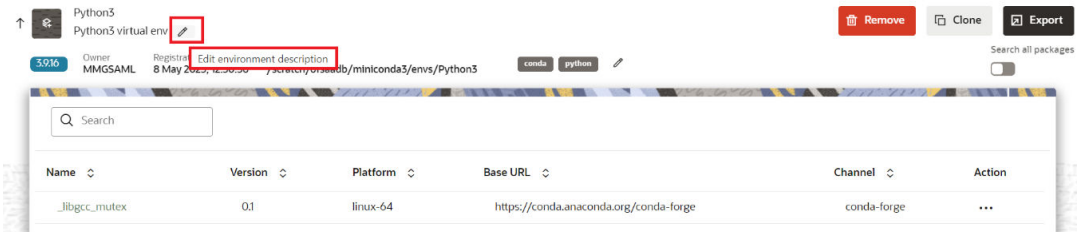
  The Conda environment is exported in **yml** format.

## Edit a Conda Environment Description

To edit a Conda environment description:

1. In the Conda details page, click **Edit** icon.

**Figure 15-15 Conda details page**




2. Modify the description and click **Save**.

> **Note**
>
> The **Name** of the Conda environment cannot be modified.

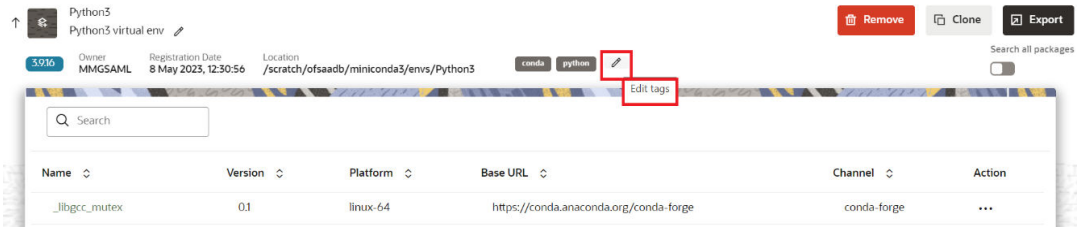
The details of the Conda environment is updated.

## Add or Remove Environment Tags

To add or remove Environment Tags:

1. In the Conda details page, click **Edit**.

**Figure 15-16 Conda details page**




2. Add or remove the environment tags, and click **Save**.

   The environment tag details of the Conda environment are updated.

## Search All Packages

To search all the packages:

1. In the Conda details page, enable the **Search all packages** option.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2. If you want to search the packages in cache, enable the Look up in cache option.

   This option is set to true by default for faster processing. The searched package is looked up in the cache and the result published, if found. If not, a new search in the conda-forge channel is performed. You can toggle this option if you expect more recent versions to be available.

3. Enter the package name in the search bar and press **Enter**.

   All the packages meeting your search criteria are displayed.

   Click the **Action** icon to view and install packages.

## View Package Properties

To view package properties of the Conda environment, on the Conda Details page, click **Action** and select **View**.

The details of the package are displayed.

**Figure 15-17 Package Properties**




## Update Package

To update the package of the Conda environment:

1. In the Conda details page, click **Action** and select **Update**.

   A confirmation message is displayed.

2. Click **Update**.

   The selected package is updated.

## Remove Package

To remove a package from the Conda environment:


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1. In the Conda details page, click **Action** and click **Remove**.

   A confirmation message is displayed.

2. Click **Remove**.

   The selected package is removed.

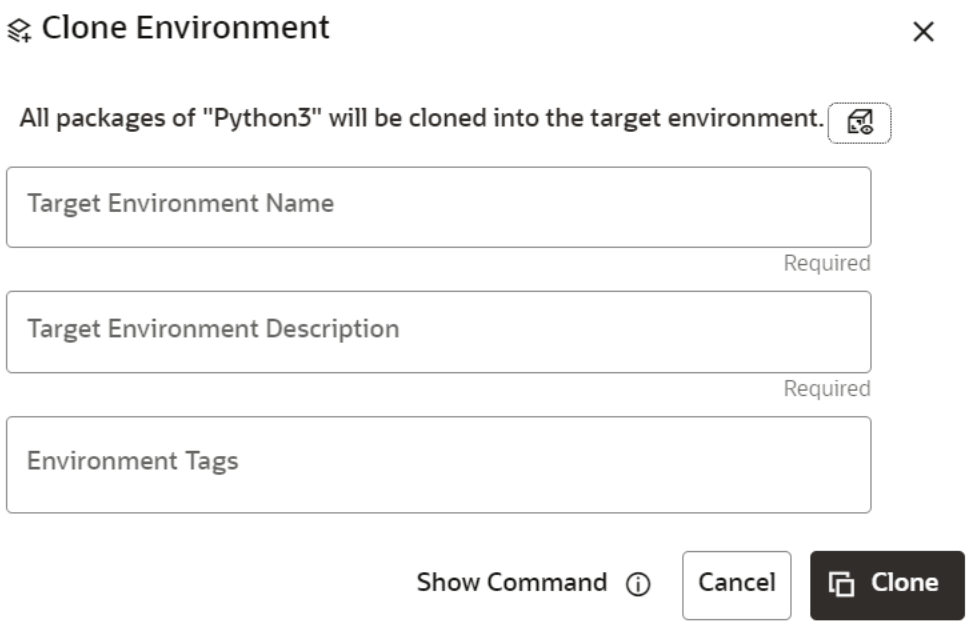
## Clone Environment

To clone a Conda environment:

1. In the Conda details page, click **Clone**.

   The **Clone Environment** page is displayed.

**Figure 15-18 Clone Environment page**




> **Note**
>
> You can preview the packages of the current Conda environment by clicking the Preview icon.

2. Enter the **Target Environment Name** to which the current environment needs to be cloned.
3. Enter the **Target Environment** Description.
4. Enter a tag in the **Environment Tags** field. You can add multiple tags.
5. Click **Clone**.

   The Conda environment is cloned to the targeted environment.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# Export Environment

To export a Conda environment:

1. Click the **Conda Environments** icon to navigate to the **Environment Summary** page from any other window in the application.

   This page displays the Conda environments in a tabular format.

2. Click **Action** and select **Export**.

   The Conda environment is exported in **yml** format.

# Modify Conda Settings

To modify the Conda Settings:

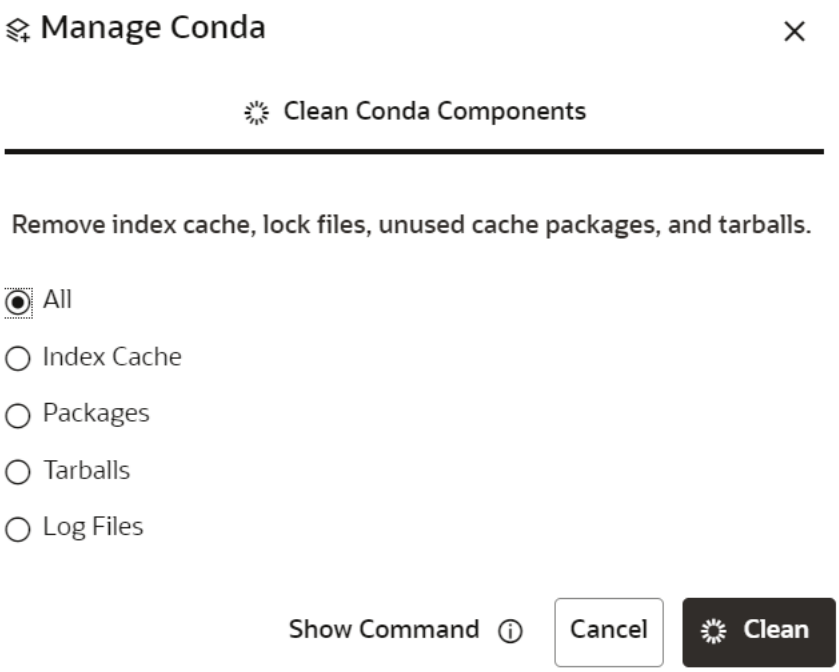
1. Click the **Conda Environments** icon to navigate to the **Environment Summary** page from any other window in the application.

   This page displays the Conda environments in a tabular format.

2. Click the **Conda Settings** icon.

   The **Manage Conda** screen is displayed.

**Figure 15-19 Manage Conda screen**




3. Select the required option and click **Clean**.
   - **All**: Removes index cache, lock files, unused cache packages, and tarballs.
   - **Index Cache**: Removes index cache.
   - **Packages**: Removes unused packages from writable package caches. WARNING: This does not check for packages installed using symlinks back to the package cache.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- **Tarballs**: Removes cached package tarballs.
- **Log Files**: Removes log files.

This will clean up the Conda components based on the selection.

# View Conda Properties

To view Conda Properties:

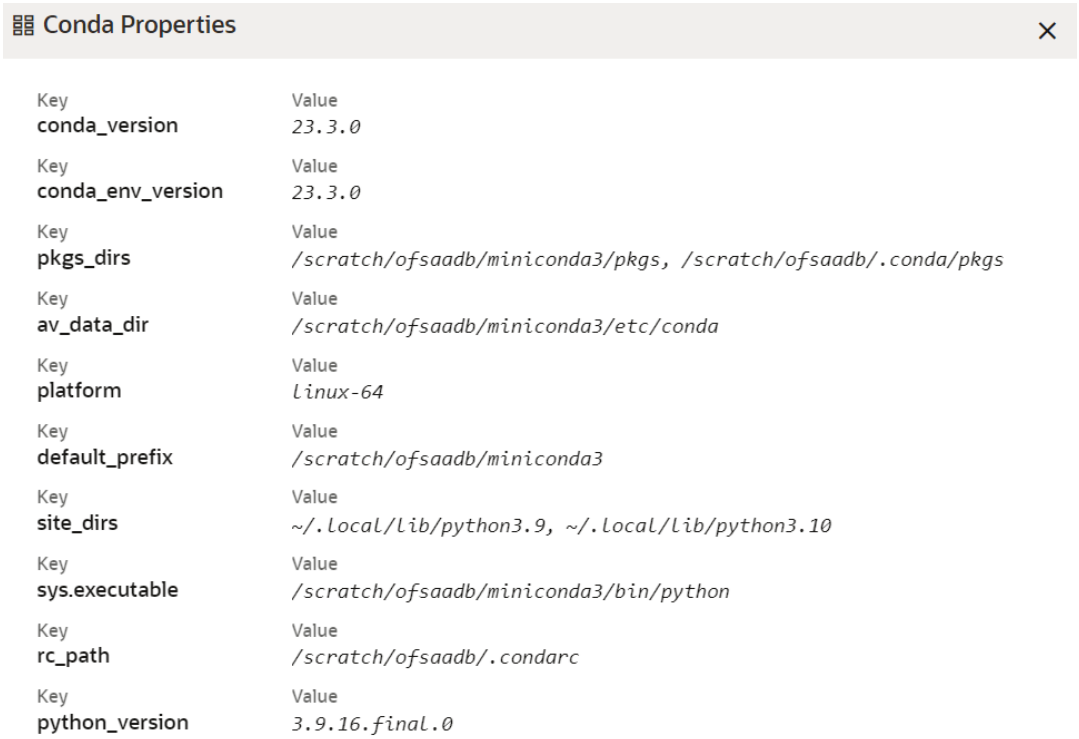
1. Click the **Conda Environments** icon to navigate to the **Environment Summary** page from any other window in the application.

   This page displays the Conda Environments in a tabular format.

2. Click the **Conda Properties** icon.

   The Conda properties are displayed in a key-value format.

**Figure 15-20 Conda Properties**




# Using the .condarc Conda Configuration File

### Overview

The Conda configuration file, `.condarc`, is an optional runtime configuration file that allows advanced users to configure various aspects of Conda, such as which channels it searches for; packages, proxy settings, and environment directories.

> **Note**
>
> A `.condarc` file can also be used in an administrator-controlled installation to override the users' configuration. See Administering a multi-user Conda Installation.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The `.condarc` file can change many parameters, including:

- Where Conda looks for packages.
- If and how Conda uses a proxy server.
- Where Conda lists known environments.
- Whether to update the Bash prompt with the currently activated environment name.
- Whether user-built packages should be uploaded to Anaconda.org.
- What default packages or features to include in new environments.

**Creating and Editing**

The `.condarc` file is not included by default, but it is automatically created in your home directory the first time you run the `conda config` command. To create or modify a `.condarc` file, open a terminal and enter the `conda config` command. The `.condarc` configuration file follows a simple YAML syntax.

**Example:**

```
conda config --add channels conda-forge
```

Alternatively, you can open a text editor such as Notepad on Windows, or TextEdit on MacOS, or VS Code. Name the new file `.condarc` and save it to your user home directory or root directory. To edit the `.condarc` file, open it from your home or root directory and edit it in the same way you would with any other text file. If the `.condarc` file is in the root environment, it will override any in the Home Directory.

You can find information about your `.condarc` file by typing Conda info in your terminal. This will give you information about your `.condarc` file, including where it is located.

You can also download a sample .condarc file to edit in your editor and save to your user Home Directory or Root Directory.

**Example:**

To set the `auto_update_conda` option to `False` run:

```
conda config --set auto_update_conda False
```

For a complete list of Conda Config commands, see the command reference. The same list is available at the terminal by running `conda config --help`. You can also see the Conda Channel Configuration for more information.

Conda supports a wide range of configuration options. This section gives a non-exhaustive list of the most frequently used options and their usage. For a complete list of all available options for your version of conda, use the `conda config --describe` command.

**Searching for .condarc**

Conda looks in the following locations for a `.condarc file`:

- `XDG_CONFIG_HOME` is the path to where the user-specific configuration files should be stored or defined by following the XDG Base Directory Specification (XDGBDS).
- Default to `$HOME/.config` must be used. `CONDA_ROOT` is the path for your base conda installation.
- `CONDA_PREFIX` is the path to the current active environment.


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- `CONDARC` must be a path to a file named `.condarc`, `condarc`, or end with a YAML suffix (`.yml` or `.yaml`).

> **Note**
>
> Any `condarc` files that exist in any of these special search path directories need to end in a valid `yaml` extension (`.yml` or `.yaml`).

### Channels

You can create or configure the `.condarc` file (the global configuration file for Conda) by using the following example:

```
channels:

- conda-forge

- defaults

channel_alias: https://oracle.repo

default_channels:

- https://oracle.repo

ssl_verify: False

proxy_servers:

http: http://www-proxy.us.oracle.com:80

https: http://www-proxy.us.oracle.com:80
```

### Channel Locations

When you list the channel locations in the `.condarc` file, it overrides the Conda defaults that in turn cause Conda to only search the listed channels in a given order.

To automatically include all default channels, use `defaults`. Non-URL channels are interpreted as an Anaconda.org user or as per the organization names. Perform the steps documented in the Set a channel alias (channel_alias) to modify the `channel_alias`. The default is `defaults`.

### Example

```
channels:

- <anaconda_dot_org_username>

- http://some.custom/channel

- file:///some/local/directory

- defaults
```

Add a `.condarc` file in the root directory of the environment (or when you are using `conda config`, use the `--env` option) to select channels for a single environment. For example, you have installed Miniconda with Python 3 in your home directory and the environment is named `newenvironment`, the path may be:

```
~/miniconda3/envs/newenvironment/.condarc
```


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### Default channels (default_channels)

The defaults channel points to several channels in the repo.anaconda.com repository, but a new list of default channels are set if the `default_channels` is defined. This is especially useful for airgapped and enterprise installations:

Setting both the channel_alias and `default_channels` by an administrator, ensures that all users only pull packages from an on-premises repository, for example:

```
default_channels:

- http://some.custom/channel

- file:///some/local/directory
```

### Conflict Merging Strategy

When conflicts between configurations arise, the following strategies are employed:

- Lists-merge
- Dictionaries-merge
- Primitive-clobber

### Precedence

The precedence by which the Conda configuration is built is shown in this. Each new arrow takes precedence over the ones before it. For example, `config` files (by parse order) will be superseded by any of the other configuration options. Configuration environment variables (formatted as `CONDA_<CONFIG NAME>`) will always take precedence over the other 3.

### Obtaining Information from the .condarc file

You can use the following commands to get the effective settings for conda. The effective settings are those that have merged settings from all the sources mentioned above.

To get all keys and their values:

```
conda config --get
```

To get the value of a specific key, such as channels:

```
conda config --get channels
```

To show all the configuration file sources and their contents:

```
conda config --show-sources
```

### Saving Settings to your .condarc file

The `.condarc` file can also be modified via conda commands. The following are several examples of how to do this.

To add a new value, such as http://conda.anaconda.org/mutirri, to a specific key, such as channels:

```
conda config --add channels http://conda.anaconda.org/mutirri
```


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To remove an existing value, such as http://conda.anaconda.org/mutirri from a specific key, such as channels:

```
conda config --remove channels http://conda.anaconda.org/mutirri
```

To remove a key, such as channels, and all of its values:

```
conda config --remove-key channels
```

To configure channels and their priority for a single environment, make a `.condarc` file in the root directory of that environment.

**Sample .condarc file**

Because the `.condarc` file is just a YAML file, it means that it can be edited directly. Below is an example `.condarc` file:

# API Registry

The API Registry feature enables you to register APIs above the workspace level. Configured APIs can be mapped to multiple workspaces and the mapped APIs will be available for use in model pipelines. The **API Registry** drawer can be accessed by clicking the drop-down arrow that is adjacent to the user name on the upper-right corner of the screen, and then clicking **API Registry** from the drop-down list. This drawer can be accessed from any page of the application UI.

Currently, **No Auth**, **Token Based** and **Basic Auth** authentications are supported. Additionally, body parameters can only be provided with text data. All values that needs to be replaced during run time can be given in the format '<<placeholder variable name>>'.

Configured API can be viewed, edited (API code is not editable) and deleted. APIs that are not mapped to any workspace can only be deleted.

**Integrating API with Model Pipelines**

Mapped APIs will be available for use in model pipelines for the workspace. By selecting a specified API from the dropdown, you can link a node with an API. Additionally, you can provide an output variable name which will be assigned with the response from the API when that node is executed.

> **Note**
>
> API Registry is available only for %python interpreters. Output variable will be a python variable accessible only for paragraphs with %python interpreters.

In pipeline execute screen, values can be entered for all the placeholder variables during run time.

> **Note**
>
> Since variables are fetched during run time, it will be available in notebook or execute screen only after the first execution. This is the default behavior of all programmatic dynamic forms in Datastudio.


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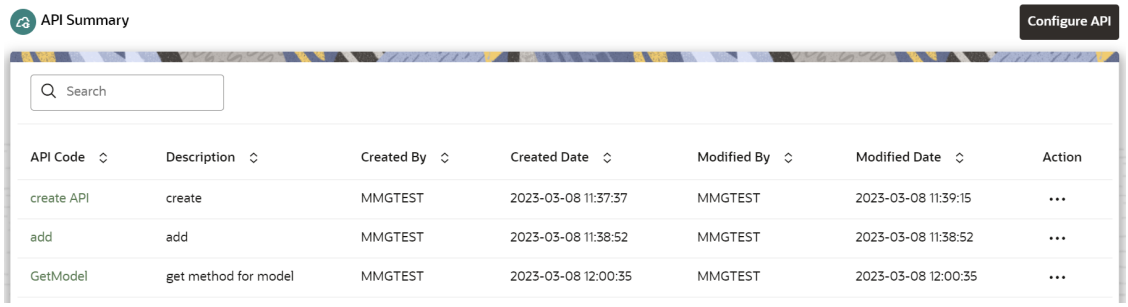
On executing the node/pipeline, result of the API executed can be accessed from the variable given under 'Output_variable_name'.

When the pipeline is imported to another workspace, it will seamlessly use the API that is mapped with the target workspace in the same order as that of the API mapped in source workspace.

Click **API Registry** to navigate to **API Summary** page from any other window in the application. You can configure and manage APIs from this page.

**Figure 15-21 API Summary page**




The following table provides descriptions for the fields and icons on the **API Summary**page.

**Table 15-3 Fields and icons on the Sandbox Summary page**

| Field or Icon | Description |
|---|---|
| Search | The field to search for an API.<br>Enter specific terms in the field for which you want to search, and press Enter on the keyboard to display the results. |
| API Code | The code of the API. |
| Description | The description for the API. |
| Created By | The User Id of the User who created the API. |
| Created Date | The date on which the API was created. |
| Modified By | The ID of the Last Modified by user who has modified the API. |
| Modified Date | The date on which the API was modified. |
| Configure API | Click Configure API to create a new API. |
| Action | Click the three dots to perform View/Edit/Delete functions on selected API. |

# Configure an API

To configure an API:

1. Click **API Registry**to navigate to **API Summary** page from any other window in the application.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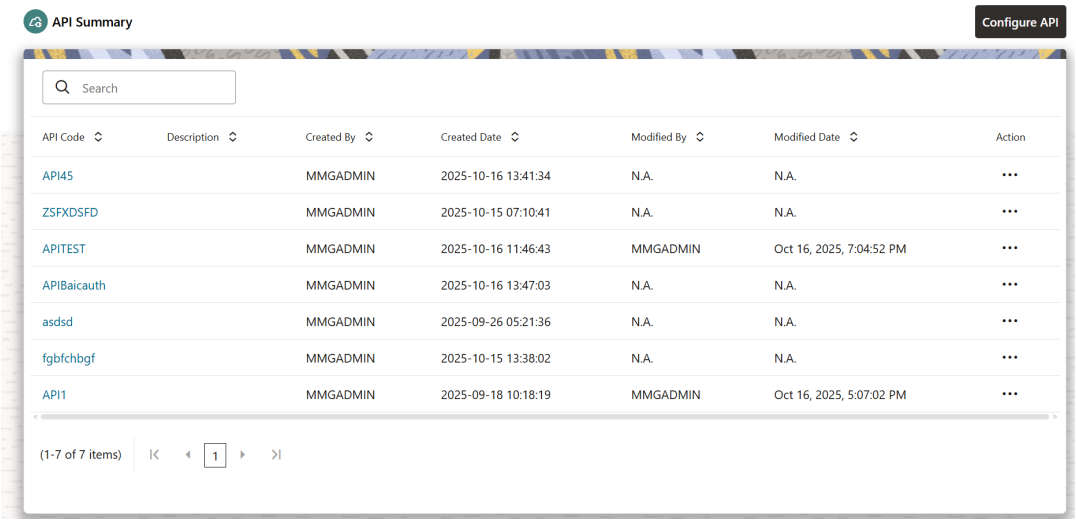
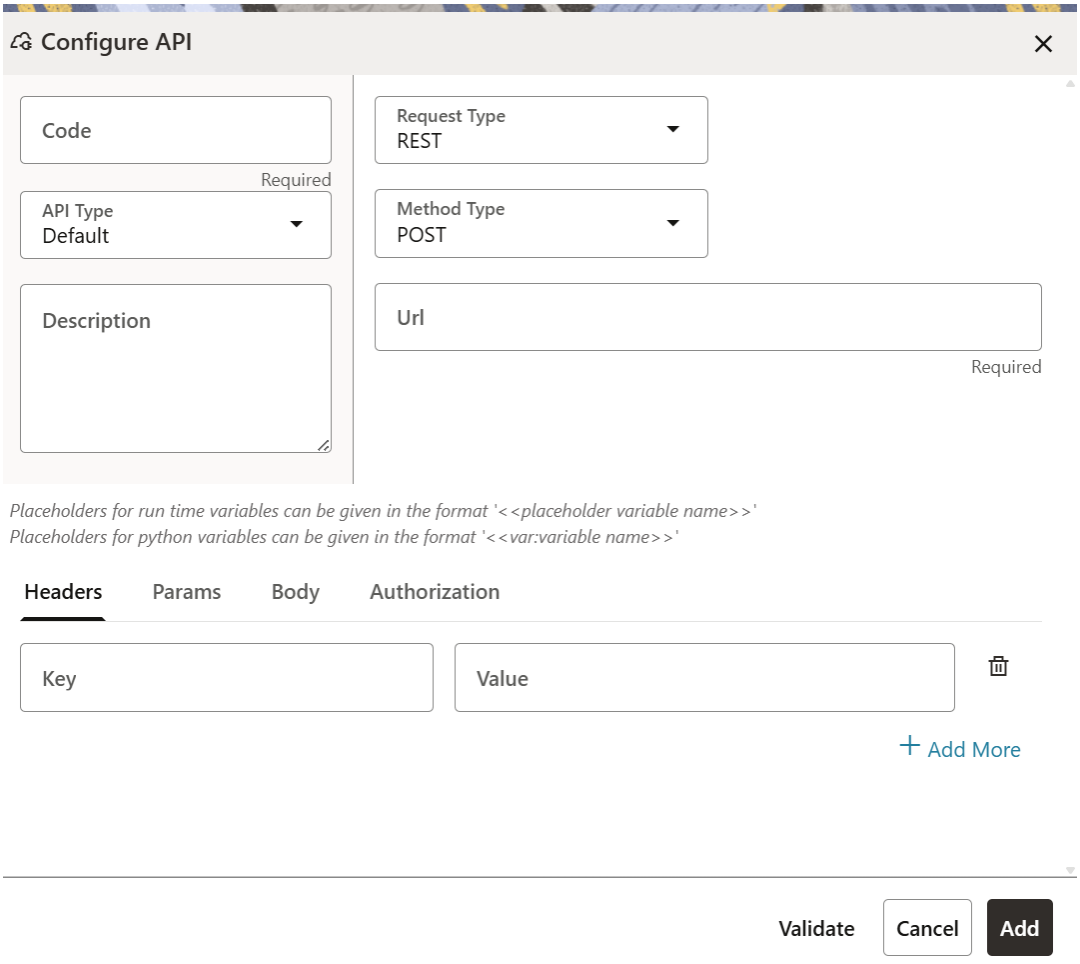



This page displays the API records in a tabular format.

2. Click the **Configure API** button.

   The **Configure API**page is displayed.

**Figure 15-22 Configure API Window**





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3. Enter the **Code**for the API. This field is mandatory.
4. Enter the **Description**for the API.
5. In the **Request Type**drop-down list, select the required option. Currently, REST type is supported.
6. In the **Method Type** drop-down list, select the required option. The supported types are GET, POST, PUT, and DELETE.
7. Enter the **URL** for the API. This field is mandatory.
8. You can provide the details such as Headers, Params, Body, and Authorization under the respective fields.

   In the **Authorization** tab, the **Auth Type** drop-down list contains the following options:

   - No Auth
   - Token Based
   - Basic Auth - This option enables you to add a basic authenthication, username and password.
9. Click **Validate** to open the **Validate API** window and tovalidate the API details.




You are prompted to add the values for all the placeholder variables. After entering the values for placeholders, click the **Validate** button to view the API responses.


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10. Click **Add**.

    The API is added and displayed in the API Summary page. These API's can be selected while creating a Workspace. For more details, see the Workspace Schema section.

# View an API Registry

To view an API Registry:

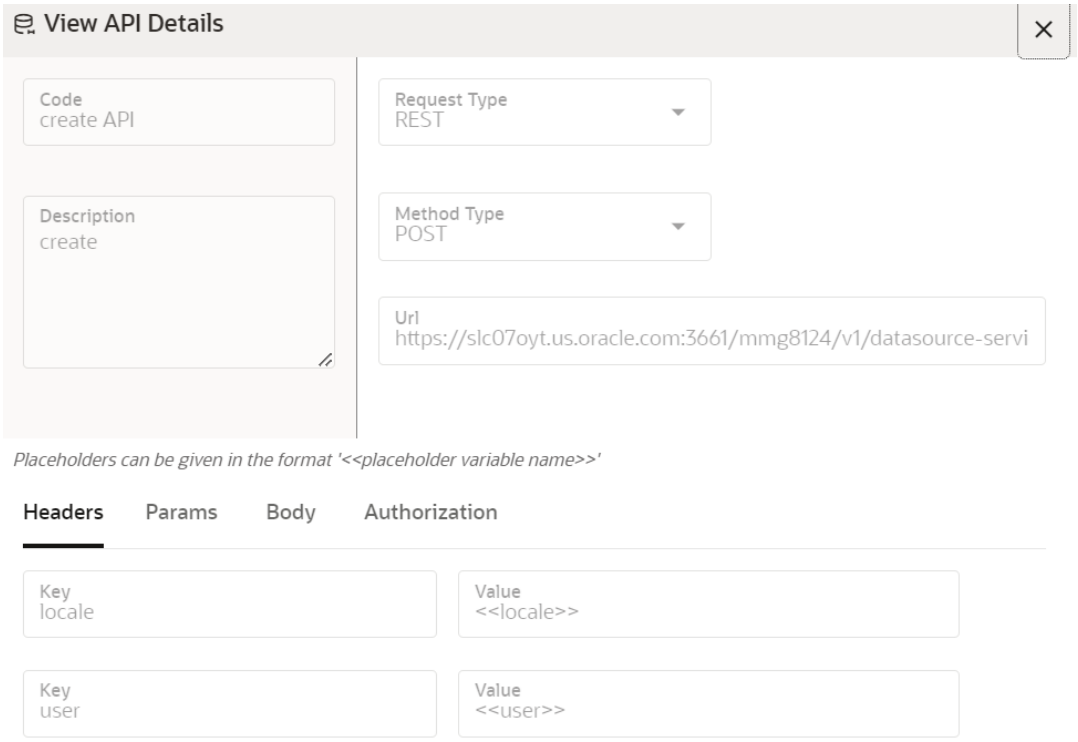
1. Click **API Registry**to navigate to **API Summary** page from any other window in the application.

   This page displays the API records in a tabular format.

2. Click **Action**and select **View** to view the API.

   The details of the API is displayed.

**Figure 15-23 View API Details**




3. Navigate to the Headers, Params, Body, and Authorization to view the respective details.

# Edit an API Registry

To edit an API configuration:

1. Click **API Registry** to navigate to **API Summary page** from any other window in the application.

   This page displays the API records in a table.

2. Click Action next to corresponding API and select **Edit** to edit the API.

   The **Edit API Details**page is displayed.


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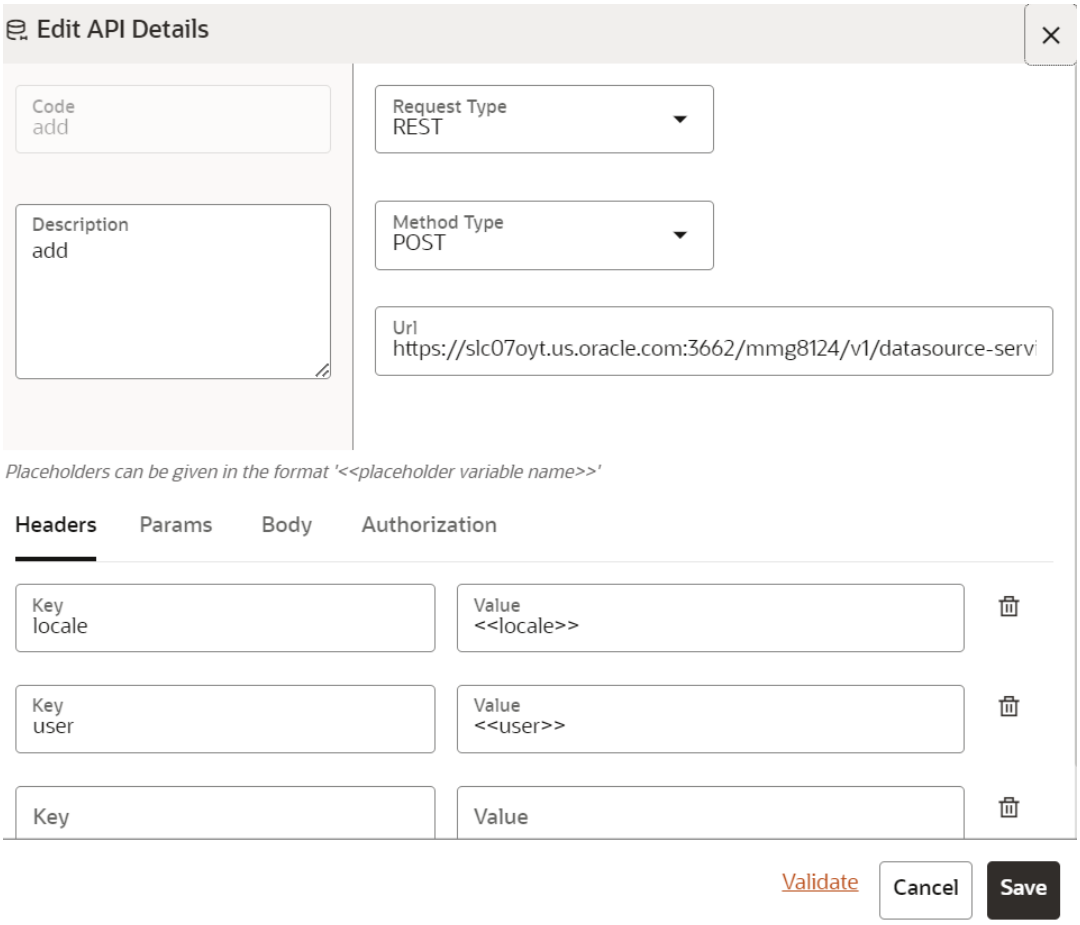
**Figure 15-24 Edit API Details page**




For more details on the Edit API Details fields, see Configure an API section.

3. Click **Save**.

# Delete an API Registry

To delete an API Registry:

1. Click **API Registry**to navigate to **API Summary** page from any other window in the application.

   This page displays the API records in a tabular format.

2. Click Action and select **Delete**.


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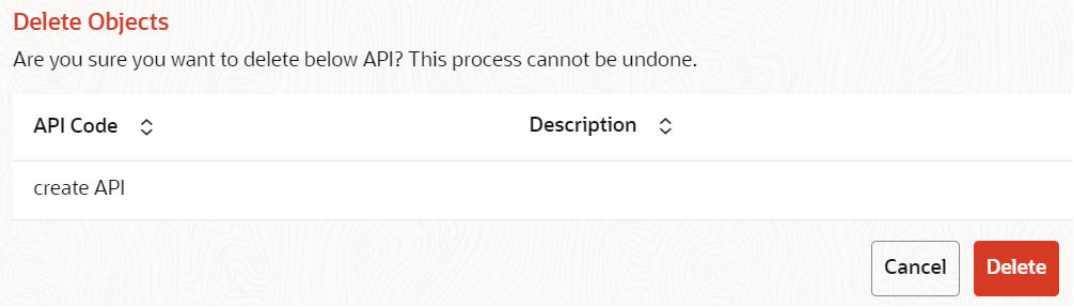
**Figure 15-25 Delete Objects screen**




3. Click **Delete**.

   The API Registry is deleted.

# Kafka Topics

Kafka is a distributed data source which is used to create real-time data pipelines and allows you to decouple data streams and systems.

Click **Kafka Topics** icon to navigate to **Kafka Topics** page from any other window in the application. You can configure and manage Kafka topics and clusters from this page.

**Figure 15-26 API Summary page**



The following table provides descriptions for the fields and icons on the **Kafka Topics**page.

**Table 15-4 Fields and icons on the Sandbox Summary page**

| Field or Icon | Description |
|---|---|
| Search | The field to search for a Kafka topics and clusters.<br>Enter specific terms in the field for which you want to search, and press Enter on the keyboard to display the results. |
| Topic Name | The topic name of the Kafka. |
| Cluster Name | The cluster name of the Kafka. |
| Description | The description of the Kafka. |
| Created Date | The date on which the API was created. |
| Kafka Clusters | Click Kafka Clusters to view/create/delete Kafka Clusters. |
| Register API | Click Register API to create a new Kafka topic. |
| Action | Click the three dots to perform View/Edit/Delete functions on selected Kafka topic. |

## Create a Kafka Cluster

To create a Kafka Cluster:

1. Click **Kafka Topics** to navigate to **Kafka Topics** page from any other window in the application.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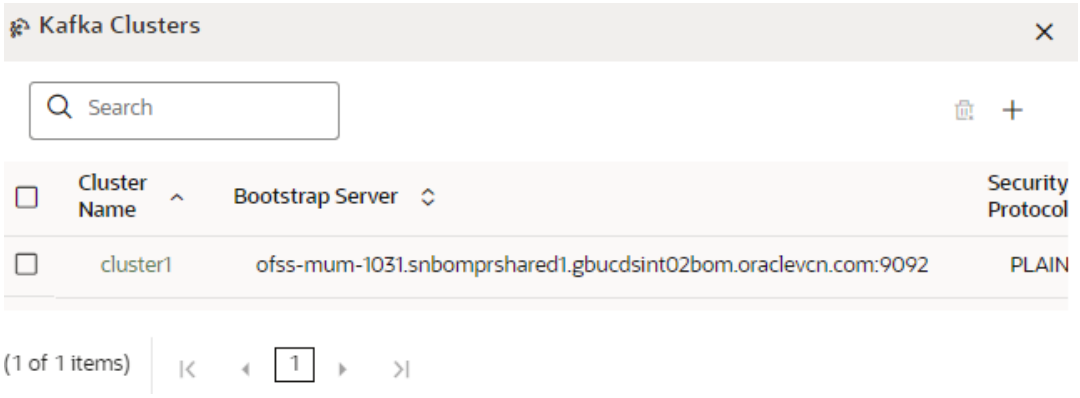
This page displays the Kafka Topics in a tabular format.

2. Click **Kafka Clusters**option.

   The **Kafka Clusters**page is displayed.

**Figure 15-27 Kafka Clusters page**

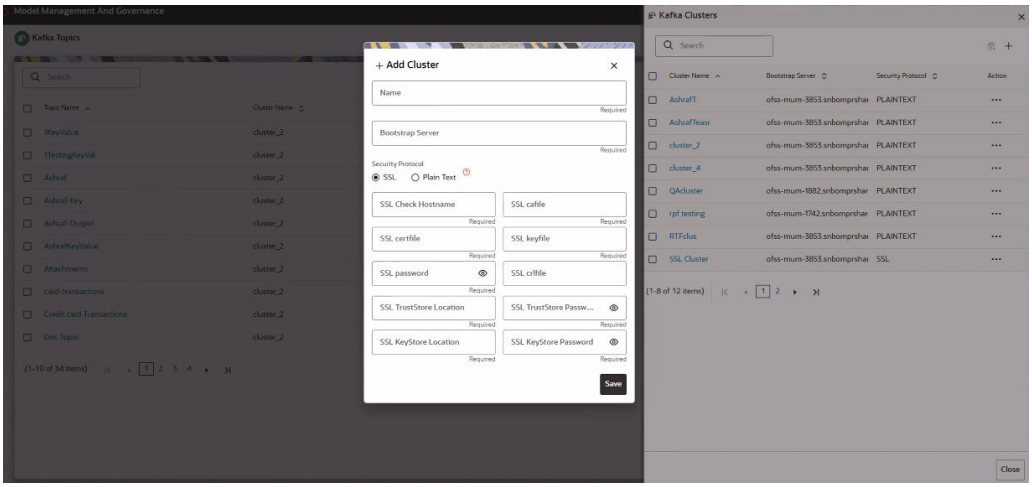



3. Click **Add** .

   The Add Cluster window is displayed.

4. Enter the **Cluster Name**. This field is mandatory.
5. Enter the **Bootstrap server** details. This field is mandatory.
6. Select the **Security Protocol** as:
   - **Plain Text**
     OR
   - **SSL**

**Figure 15-28 SSL Type Cluster**




Populate the mandatory fields. For detailed reference click the **Help** icon.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> **Note**
>
> In the current release:
>
> - The Kafka feature is not supported in Solaris OS.
> - Kafka is not supported with Python version 3.12 onwards. This is because pyflink cannot be downloaded from this version.

7. Click **Save**.

   The Kafka cluster is created, and this will be displayed while registering the Kafka Topic.

## Delete a Kafka Cluster

To delete a Kafka Cluster:

1. Click **Kafka Topics** to navigate to **Kafka Topics** page from any other window in the application.

   This page displays the Kafka Topics in a tabular format.

2. Click **Kafka Clusters**option.

   The **Kafka Clusters**page is displayed.

3. Select the Kafka Cluster which you want to delete and click **Delete**.

   A confirmation message is displayed.

4. Click **Delete**.

   The Kafka Cluster is deleted.

## Register a Kafka Topic

To register a Kafka topic perform the following steps:

1. Click **Kafka Topics** to navigate to **Kafka Topics** page from any other window in the application.


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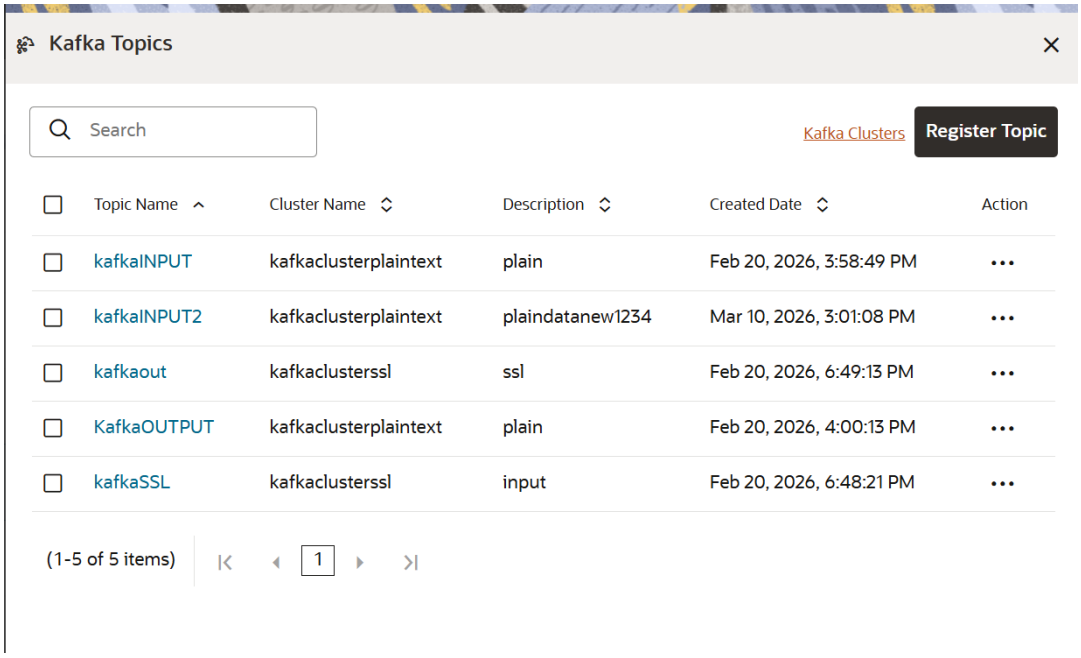
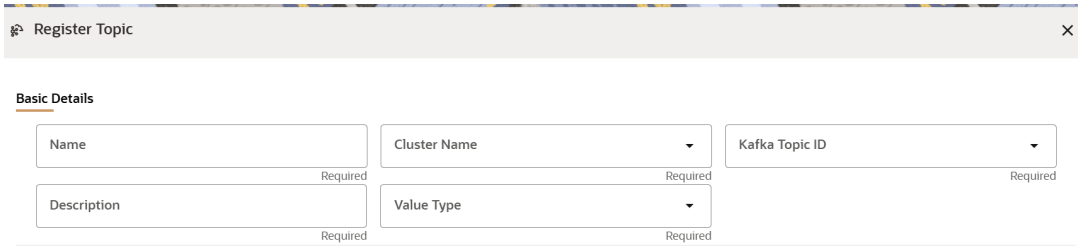



2. Click **Register Topic** .

   The **Register Topic** window appears.

**Figure 15-29 Register Topic Window**




3. Populate the form:

   - **Name:** Enter a name in this field for the Kafka topic. This is a mandatory field.
   - **Cluster Name:** Select the name of the cluster from the drop-down list. When the name of the cluster is selected, the Kafka Topic IDs related to the selected cluster are populated in the **Kafka Topic ID** field. This is a mandatory field.
   - **Kafka Topic ID:** Select a topic ID from the drop-down list. This is a mandatory field.
   - **Description:** Enter a description for the Kafka topic.
   - **Value Type:** Select a value from the drop-down list.
   - **Python Runtime:**This option enables you to select a Conda environment for a Kafka topicthat can then be used in the Pipelines feature.
   - **Record Schema:** enter the order, name, and the data type for the Kafka topic.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> **Note**
>
> Currently, **PyFlink, Python,** and **Java Schema** types are supported. For more details, click the icon next to Record Schema field.

4. Click **Register**.

   The Kafka topic is added and displayed in the Kafka Topics page. These topics can be selected while creating a Workspace.

## View a Kafka Topic

To view a Kafka Topic:

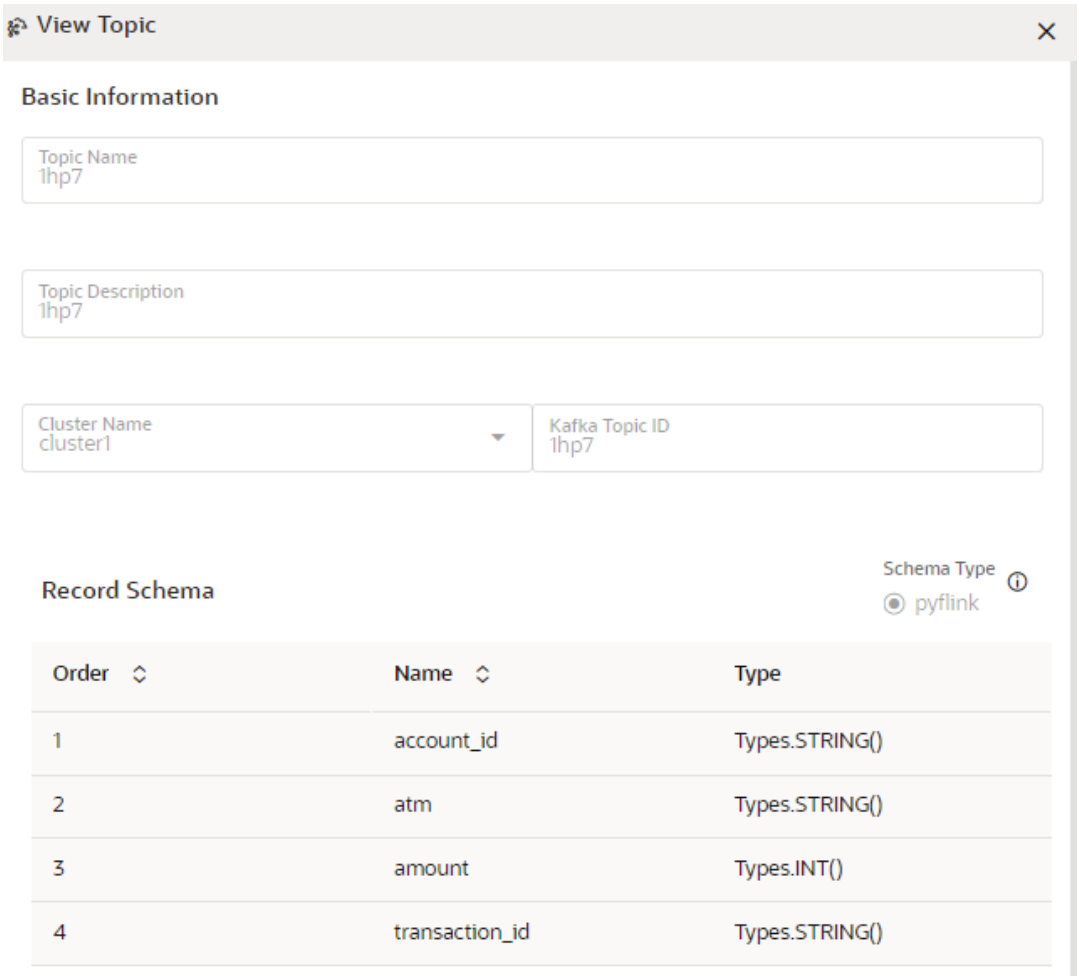
1. Click **Kafka Topics** to navigate to **Kafka Topics** page from any other window in the application.

   This page displays the Kafka Topics in a tabular format.

2. Click **Action**and select **View**.

   The details of the Kafka Topic is displayed.

**Figure 15-30 Kafka Topics page**





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# Edit a Kafka Topic

To edit a Kafka Topic:

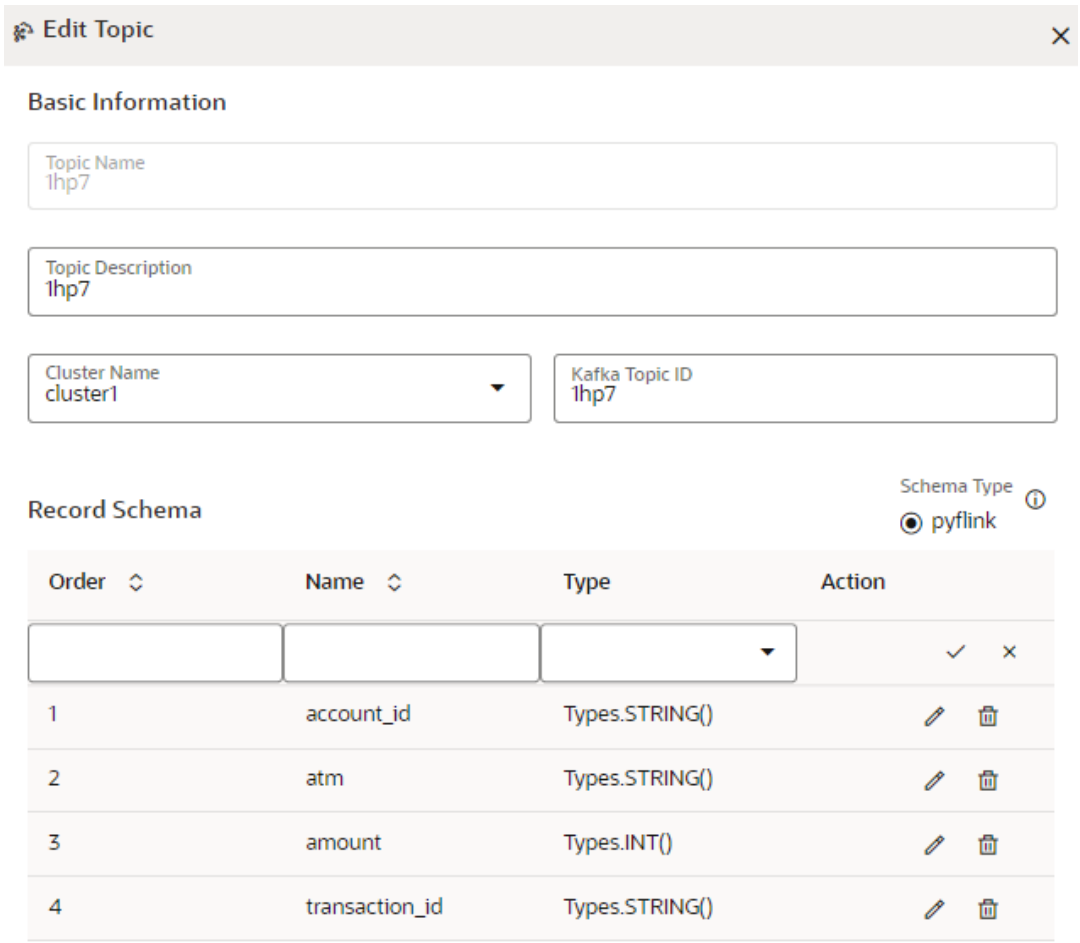
1. Click **Kafka Topics**to navigate to **Kafka Topics**page from any other window in the application.

   This page displays the Kafka Topics in a tabular format.

2. Click **Action** next to corresponding Kafka Topic and select **Edit**.

   The **Edit Topic** page is displayed.

   **Figure 15-31 Edit Topic page**




   For more details on the Kafka Topic fields, see Register a Kafka Topic section.

3. Click **Update**.

# Delete a Kafka Topic

To delete a Kafka Topic:

1. Click **Kafka Topics** icon to navigate to **Kafka Topics** page from any other window in the application.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This page displays the Kafka Topics in a tabular format.

2. Click **Action** and select **Delete**.

   A confirmation message is displayed.

> **Note**
>
> You cannot delete a Kafka Topic mapped to a workspace.

Click **Delete**. The Kafka Topic is deleted.

# OFSAA Environment

You can register OFSAA environment (Simulation and Production) from this page.

> **Note**
>
> The user must be mapped to ENVACCESS role to view the OFSAA Environment option.

To register a OFSAA environment:

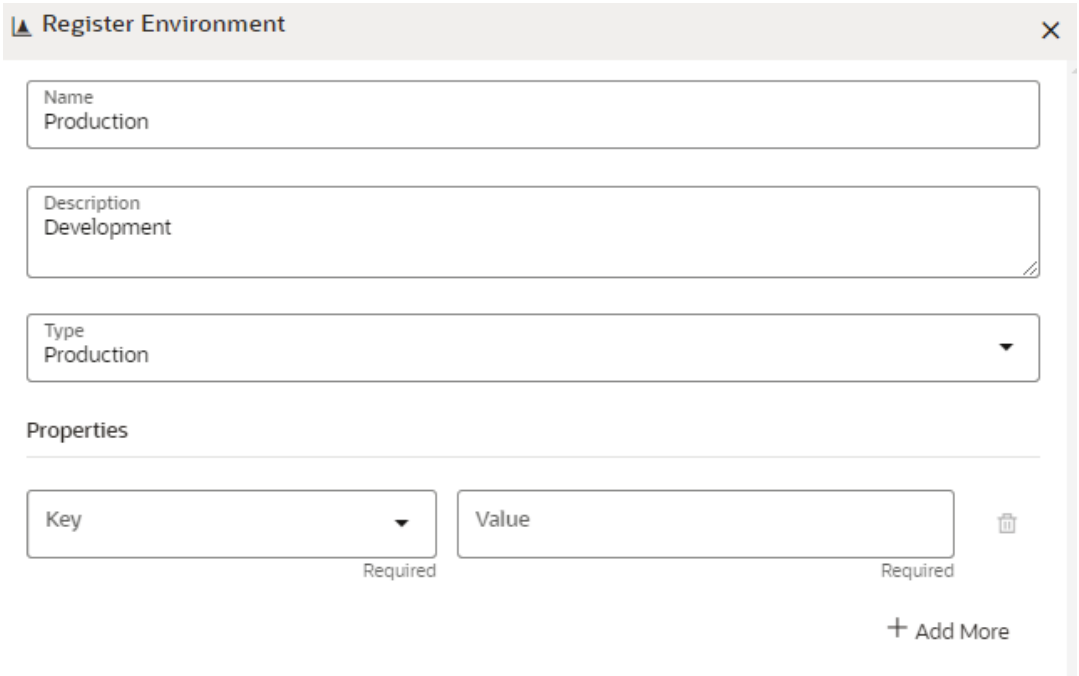
1. Navigate to the OFSAA environment page.

   This page displays the OFSAA environments in a tabular format.

2. Click **Register Environment**.

   The Register Environment page is displayed.

**Figure 15-32 Register a OFSAA Environment**





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3. Enter the environment **Name**. This field is mandatory.
4. Enter the **Description** for the environment. This field is mandatory.
5. In the **Type** field, select the environment as either Production or Simulation.
6. In the **Key** field, select the required option from the drop-down and enter value for the selected property. You can add more properties by clicking **Add More** icon.
7. Click **Create**.

   The OFSAA Environment is added and displayed in the OFSAA Environment page.

   You can view, edit, and delete OFSAA environments by clicking Actions icon.


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# Audit Trail

The Audit Trail window provides information such as the start and stop of UI and services, add or delete of the datasource, API Registry, kafka topics, conda environments, and so on.

It supports file manager operations such as uploading files, creating folders, deleting files and folders, and previewing files. It also supports workspace related activities such as creating, editing and deleting workspaces.


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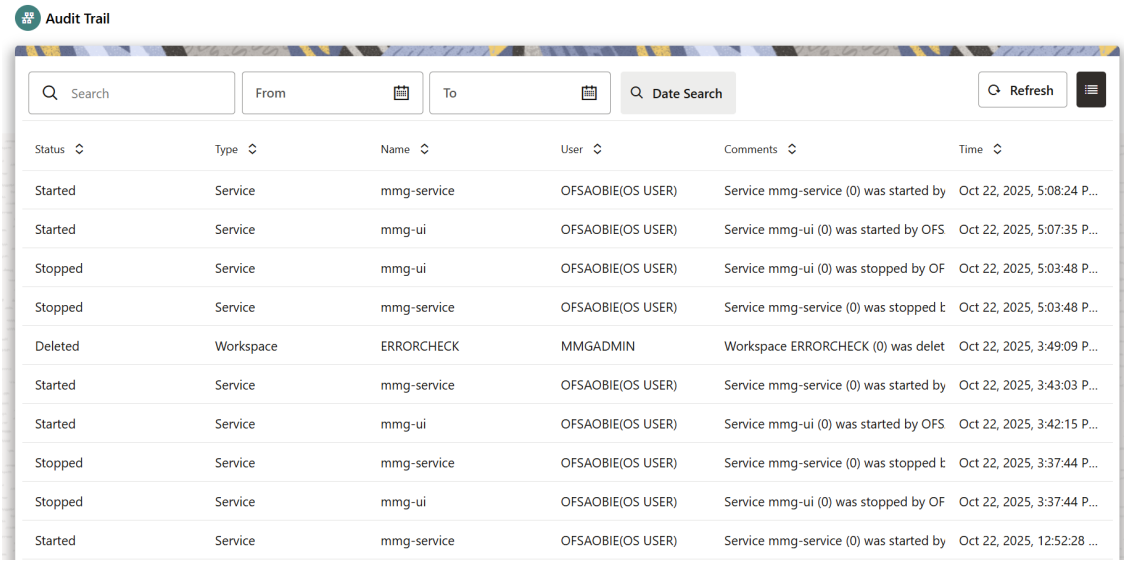
**Figure 15-33 The Audit Trail Page**




Select the **Audit Timeline View** icon, adjacent to the **Refresh** icon, to view the listed sequence of actions that have been performed. Additionally, the Audit Table view (graphical representation) can also be viewed from the main **Audit Trail** page. Models can be searched by

- **Name:** Enter the name of the model. The list is automatically filtered when a value is typed in this field.
- **From:** Click the **Select Date.** icon in the **From** field to select a date.
- **To:** Click the **Select Date**icon in the **To** field to select a date. After selecting this date, click the **Date Search** icon to filter the models as per the selected dates.

# Identity Management

Click **Identity Management** to navigate to the **Identity Management** page.


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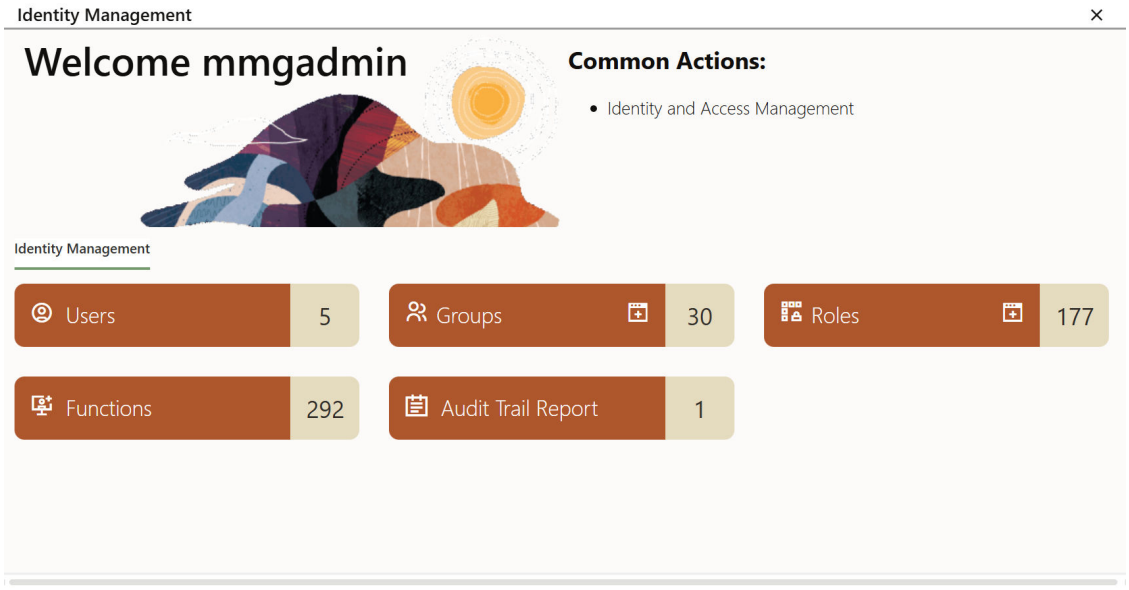
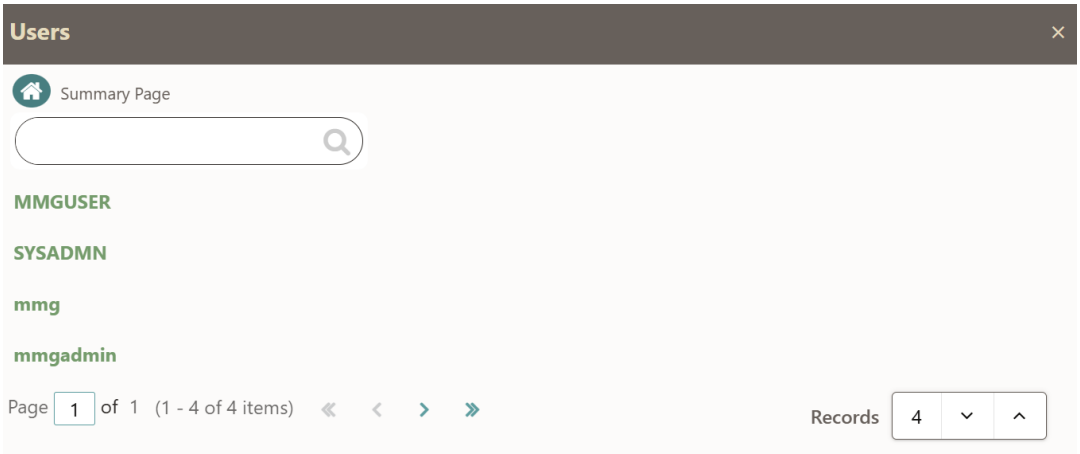
**Figure 15-34 The Identity Management Page**




You can manage users, groups, roles, functions, and also view the audit trail report from this page.

- **Users:** The users who are mapped to the application are listed on this page.

**Figure 15-35 Identity Management Users**




- **Groups:** The application admin users contain groups. This page displays the groups that are assigned to a user.


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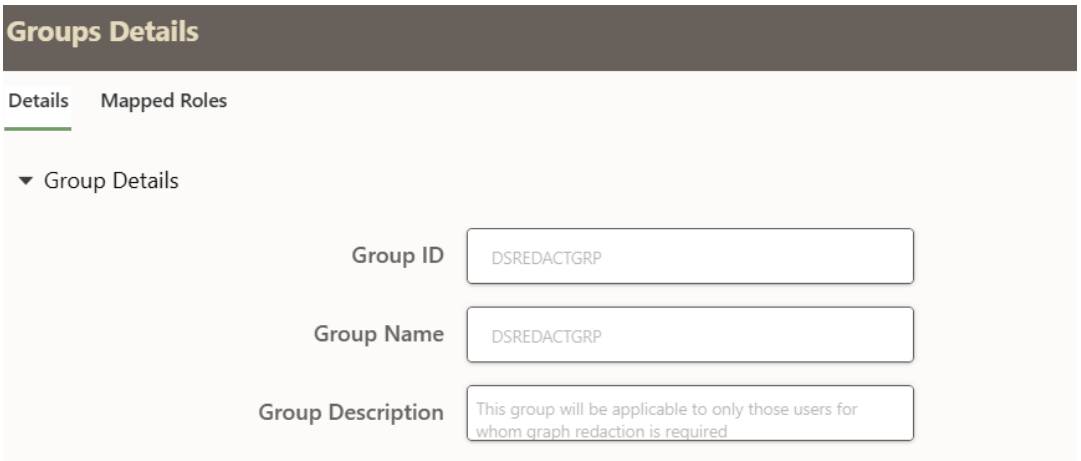
**Figure 15-36 Identity Management Groups**




Select a group to view or add details about it on the **Group Details** page. The **Details** tab is open by default.

**Figure 15-37 Group Details - Details**




Additionally, click the **Mapped Roles** tab to view details about roles that are mapped to specific groups.


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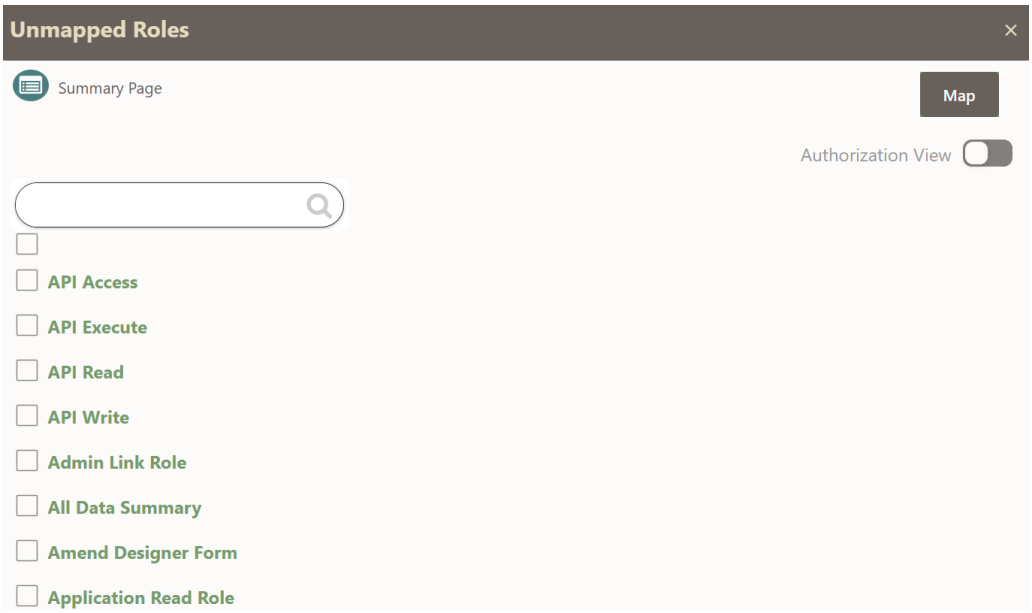
**Figure 15-38 Group Details - Mapped Roles**




All the groups have specific roles mapped to it.

– **New Mapping:** Click **New Mapping** to map a role to a group via the **Unmapped Roles** page. On this page, select the desired roles and click **Map**. You can also search for a specific role by entering the name of the role in the **Search** field and then clicking the search icon.

**Figure 15-39 Unmapped Roles**




– **Unmap:**Select the Role(s) that you want to unmap and then click **Unmap**.

> **Note**
>
> If a user has logged in and then mapped the role and group with a specific user credential, then, they can unmap only other groups, and not the user group they have logged in with.

– **Authorization**: When you need to map a new role, you request for a new role or user group mapping. Select the **Authorization View** toggle. The **Authorize** and **Reject**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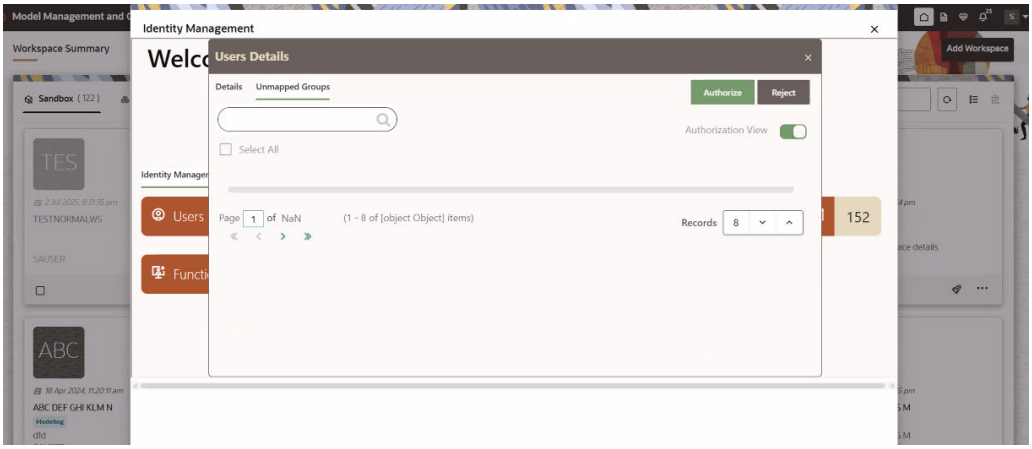
button appear. To authorize or approve the role or group, select **Authorize**. To reject the request, click **Reject**.

**Figure 15-40 Authorization View screen**




- **Roles:** The application admin users contain roles. This page displays the roles that are assigned to a user.

**Figure 15-41 Roles**




Select a to view or add details about it on the **Roles Details** page. The **Details** tab is open by default.


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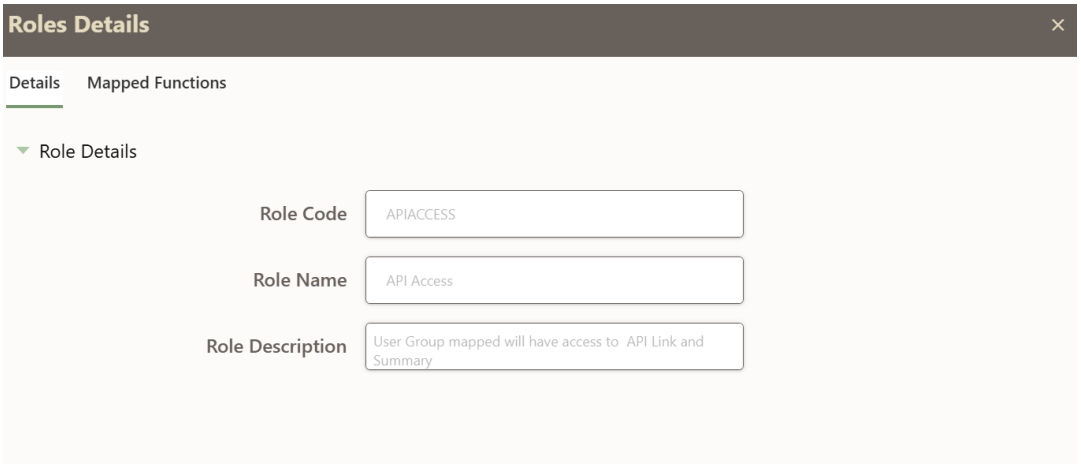
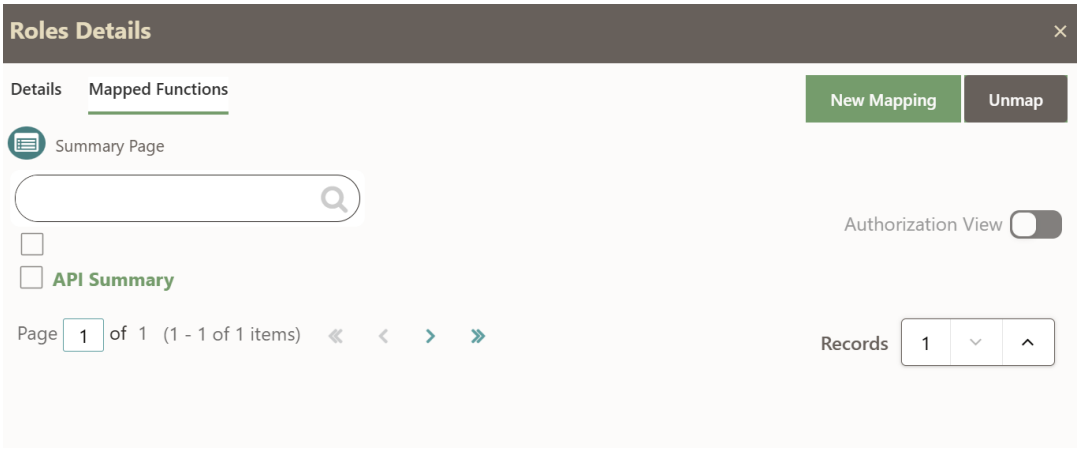
**Figure 15-42 Role Details**




Additionally, click the **Mapped Functions** tab to view details about roles that are mapped to specific functions.

**Figure 15-43 Mapped Functions**




All the roles have specific functions mapped to it.

– **New Mapping:** Click **New Mapping** to map a role to a function via the **Unmapped Functions** page. On this page, select the desired functions and click **Map**. You can also search for a specific function by entering the name of the function in the **Search** field and then clicking the search icon.


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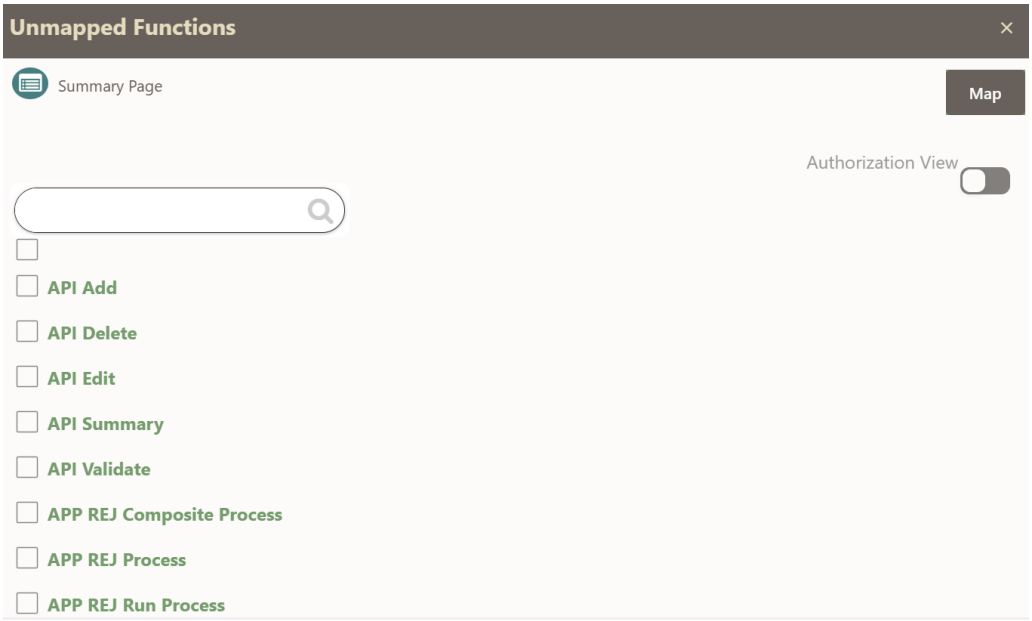
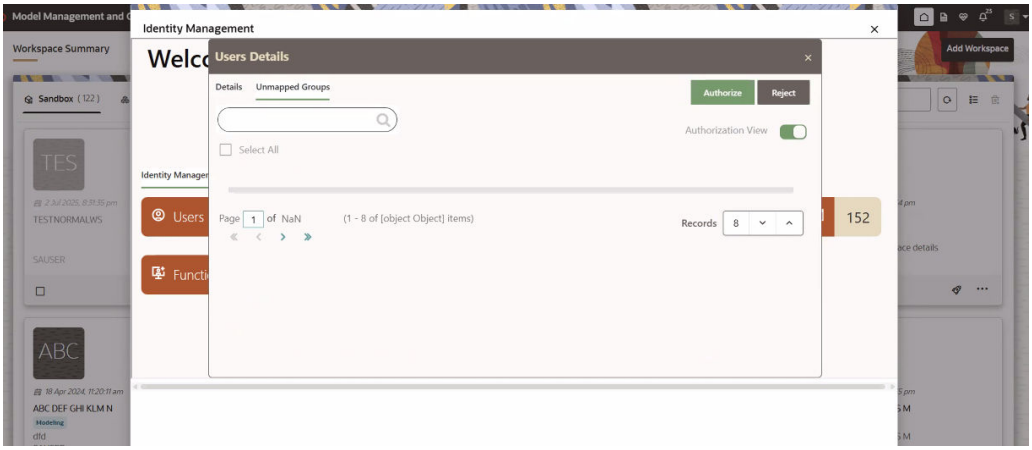
**Figure 15-44 Unmapped Functions**




- **Unmap:**Select the function(s) that you want to unmap and then click **Unmap**.
- **Authorization**: Select the **Authorization View** toggle. The **Authorize** and **Reject** button appear. To authorize or approve the role or function, select **Authorize**. To reject the request, click **Reject**.

**Figure 15-45 Authorization View**




- **Functions:** View the list of functions on this page. Click a specific function to view or add details about it. You can also search for a specific function by entering the name of the function in the **Search** field and then clicking the search icon.


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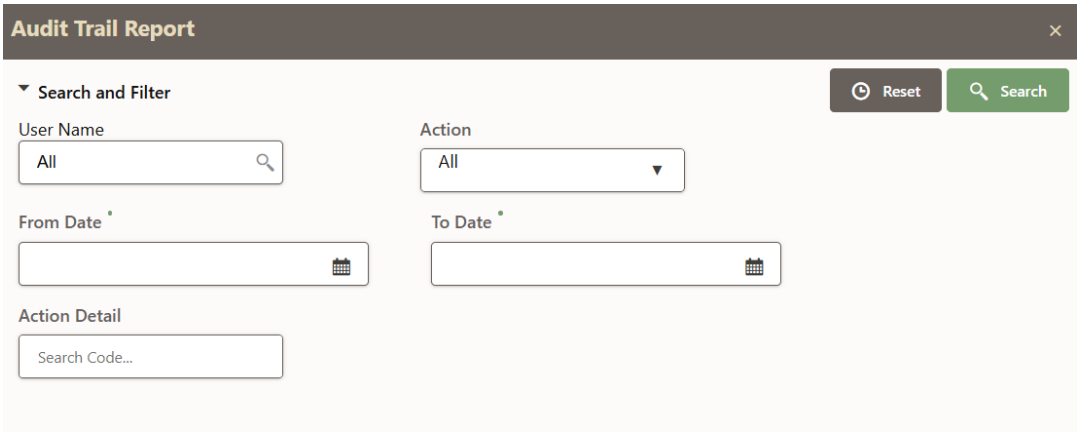
**Figure 15-46 Functions**




- **Audit Trail**: The audit trail report reflects the activities the user performs during a particular period.

**Figure 15-47 Audit Trail Report**




  - **User Name:**Click the arrow to select a user name from the drop-down list.
  - **Action:** Click the arrow to select an action from the drop-down list
  - **From Date:** Click the **Select Date**. icon to select a from date.
  - **To Date:**Click the **Select Date**. icon to select a to date.
  - **Action Detail:** Enter a value in this field.
  - **Reset:** Click this button to reset the data in the audit trail report.
  - **Search:** Click the search button to track a particular activity.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# 16
# Data Studio and Interpreter Connectivity

Configure notebook services, tasks, permissions, credentials, templates, interpreter runtimes and database or graph connectivity. Retain the documented runtime restrictions when configuring the bundled MMG release.

## Chapter contents

16.1 Data Studio Options 16-2

16.2 Interpreter Configuration and Connectivity 16-5

Source: MMG 26.2.0 User Guide. Procedures, screenshots and examples are incorporated into this STSA 8.1.2.8.0 draft; release-specific statements retain their source status.


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# 16.1 Data Studio Options

The application's Notebook Server has the following configurable options:

- Interpreters
- Tasks
- Permissions
- Credentials
- Templates

To access the Data Studio Options page:

1. Click **Launch Workspace** to launch the workspace to display the **Dashboard** window with the application configuration and model creation menu.
2. Hover your mouse over the Data Studio Options widget . The following options are available:
   - Interpreters
   - Tasks
   - Permissions
   - Credentials
   - Templates

> **Note**
>
> DS 23.4.10 has introduced 'Select-Multiple' forms in Data Studio. The same should now be handled in MMG (parameters sets, dashboard, execute pipeline drawer, simulations, and so on).

## Configure Interpreters

An Interpreter is a program that directly executes instructions written in a programming or scripting language without requiring them previously to be compiled into a machine language program. Interpreters are plug-ins that enable users to use a specific language to process data in the backend. Examples of Interpreters are jdbc-interpreter, spark-interpreters, python-interpreters, etc. Interpreters allow you to define customized drivers, URLs, passwords, connections, SQL results to display, etc.


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In OFS Compliance Studio, Interpreters are used in Notebooks to execute code in different languages. Each Interpreter has a set of properties that are adjusted and applied across all notebooks. For example, using the python-interpreter makes it possible to change between versions, whereas the jdbc-interpreter offers to customize the URL, schema, or credentials. You can either use a default interpreter variant or create a new variant for an interpreter. You can create more than one variant for an interpreter. The benefit of creating multiple variants for an Interpreter is to connect different versions of interpreters (Python ver:3, Python ver:2, etc.). This helps to connect a different set of users and database schema. For example, Compliance Studio schema, BD schema, etc. Compliance Studio provides secure and safe credential management such as Oracle Wallet (jdbc wallet), Password (jdbc password), or KeyStores to link to interpreter variants to access secured data.

The application has ready-to-use interpreters and you can configure them based on the use case. Additional variants of interpreters are created as multiple users might require different settings to access the database securely. The jdbc Interpreters use the credentials to enable secure data access.

> **Note**
>
> Pyspark, spark, and ore are a few other available interpreters.
> For more information on the Spark interpreter, see the OFS MMG Installation Guide.

Interpreters are configured when you want to modify URL, data location, drivers, enable or disable connections, etc.

To configure ready-to-use interpreters:

1. Click the Interpreter that you want to view from the list displayed on the LHS. The default configured interpreter variant is displayed.
2. Modify the values in the fields as per requirement. For example, to modify a parameter's limit, connect to a different schema, PGX server, and so on.
3. Click **Update**. The modified values are updated in the Interpreter.

# Manage Tasks

Tasks are created when notebooks or paragraphs are executed by the Notebook users. It is important to know the status of the execution, whether the tasks are created, rejected, canceled, etc. The Tasks page allows you to view the status of the task and associated notebooks, paragraphs, interpreters, etc. By default, all the tasks are listed on the Task page. You can view the specific task using filters such as task status, date of creation, and notebook name.

# Manage Tasks

You can view the logged-in users and view, add, or modify ready-to-use permissions granted to the users, roles, or groups. You can create groups, roles, and permission templates (actions).

> **Note**
>
> You can only view users and their details.


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See the *User Access and Permissioning Management* section in the OFS Compliance Studio Administration and Configuration Guide.

## Manage Credentials

Compliance Studio provides secure and safe credential management. Examples of credentials are passwords, Oracle Wallets, or KeyStores. This section links credentials (a wallet and a password) to the jdbc interpreter variant to enable secure data access. This linking enables the jdbc interpreter to securely connect to the specified Oracle Database. You can also create new credentials based on your requirement to connect to the new interpreter variants.

For more information on Credentials, see the Link Credentials section in the OFS Compliance Studio Administration and Configuration Guide.

> **Note**
>
> You can link credentials only to the jdbc interpreter. The Credentials section is enabled if an Interpreter variant can accept credentials.

## Configure Templates

To create, import, and set the default FCCM template in the Template Dashboard:

1. Click CS Launch Workspace to display the CS Production Workspace window.
2. Click Templates from Design Studio Options.

   Compliance Studio offers different formats to view the result after a paragraph's execution. Templates enable you to define parameters to customize the result formats. You can customize the visualization of the result by defining parameters in a template and then applying that template to a notebook.

   > **Note**
   >
   > - Compliance Studio comes with a default template, but users can customize this at the template level but can also override any global template settings in each notebook paragraph.
   > - It is recommended to use the template that is available from out-of-the-box Compliance Studio.

   For more information, see the *Interpreter Configuration and Connectivity* section in the OFS Compliance Studio Administration and Configuration Guide.


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# 16.2 Interpreter Configuration and Connectivity

An interpreter is a program that directly executes instructions written in a programming or scripting language without requiring them previously to be compiled into a machine language program. Interpreters are plug-ins that enable users to use a specific language to process data in the backend. Examples of Interpreters are jdbc-interpreter, spark-interpreters, python-interpreters, etc. Interpreters allow you to define customized drivers, URLs, passwords, connections, SQL results to display, etc.

In OFS MMG, Interpreters are used in Notebooks to execute code in different languages. Each Interpreter has a set of adjusted and applied properties across all notebooks. For example, using the python-interpreter makes it possible to change between versions, whereas the jdbc-interpreter offers to customize the URL, schema, or credentials. In OFS MMG, you can either use a default interpreter variant or create a new variant for an interpreter. You can create more than one variant for an interpreter. The benefit of creating multiple variants for an Interpreter is to connect different versions of interpreters (Python version: 3, Python version: 2, etc.). This helps to connect a different set of users and database schema. For example, OFS MMG schema, BD schema, etc. OFS MMG provides secure and safe credential management such as Oracle Wallet (jdbc wallet), Password (jdbc password), or KeyStores to link to interpreter variants to access secured data.

> **Note**
>
> By default, the interpreter configuration is refreshed from the filesystem `interpreter.json` the next time you restart the application. If you update `interpreter.json` on the filesystem, the changes take effect after the restart. Changes made only in the UI are not overwritten when you restart (overwrite is driven only by the filesystem JSON).

The following image illustrates the examples of interpreters used in OFS MMG and database connections.


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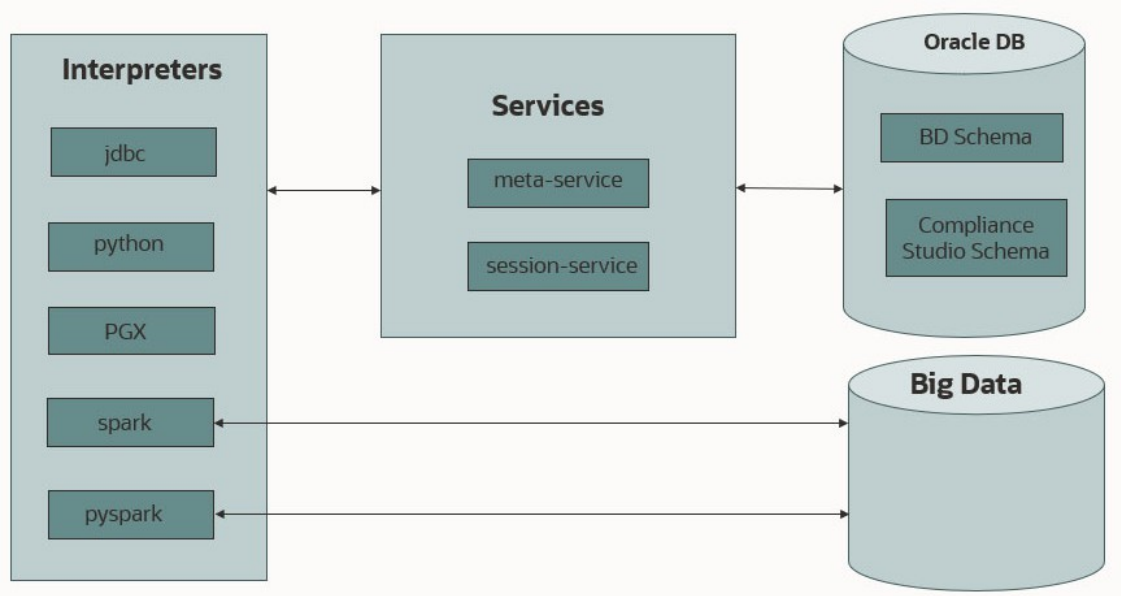
**Figure 16-1 Examples of Interpreters**




> **Note**
>
> From OFS MMG Release 26.0.0 onwards, the shell interpreter capability (python.shell) and related configurations are fully removed from the system. Executing shell commands via the Python shell is no longer supported. There is no option to enable this functionality in this release or future releases.

# Configure Interpreters

Interpreters are configured when you want to modify URL, data location, drivers, enable or disable connections, etc.

To configure ready-to-use interpreters, follow these steps:

1. On the **Workspace Summary** page, select Launch workspace to display the **CS Production workspace** window.
2. Click the **User Profile** drop-down list and select **Data Studio Options** widget. The following options are available:
   - Interpreters
   - Tasks
   - Permissions
   - Credentials
   - Templates
3. Click **Interpreters** that you want to view from the list displayed on the LHS. The default configured interpreter variant is displayed on the RHS.


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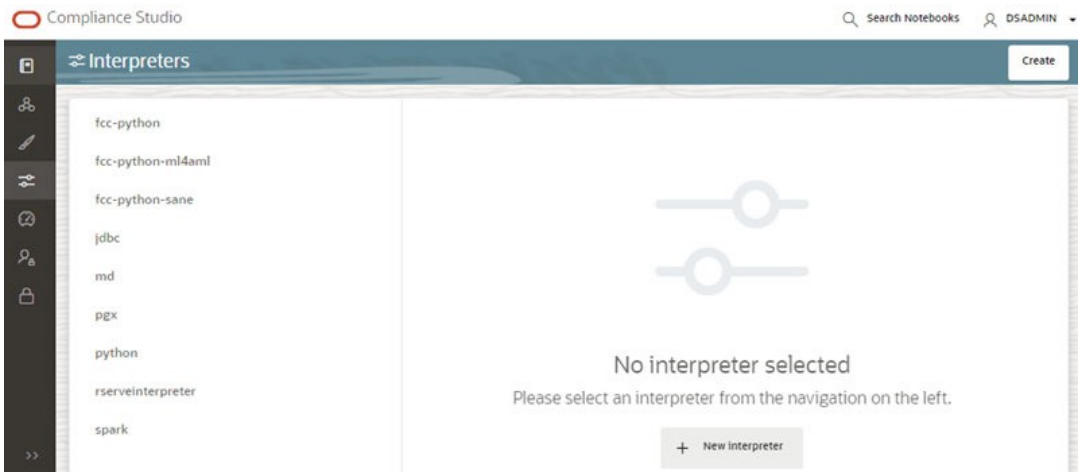
**Figure 16-2 Interpreters' screen**

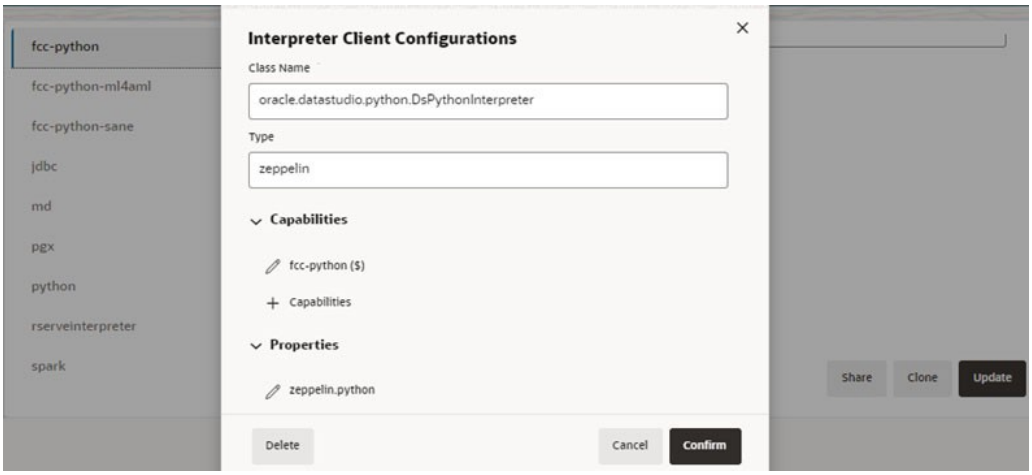



4. Modify the values in the fields as per requirement. For example, to modify a parameter's limit, connect to a different schema, PGX server, etc.

   You can modify the values in the following UI options:

   - Wizard

**Figure 16-3 Wizard UI options**




An interpreter can group multiple interpreter clients that all run in one JVM process and can be stopped together.

For example, the spark interpreter group contains the spark and pyspark interpreter client.


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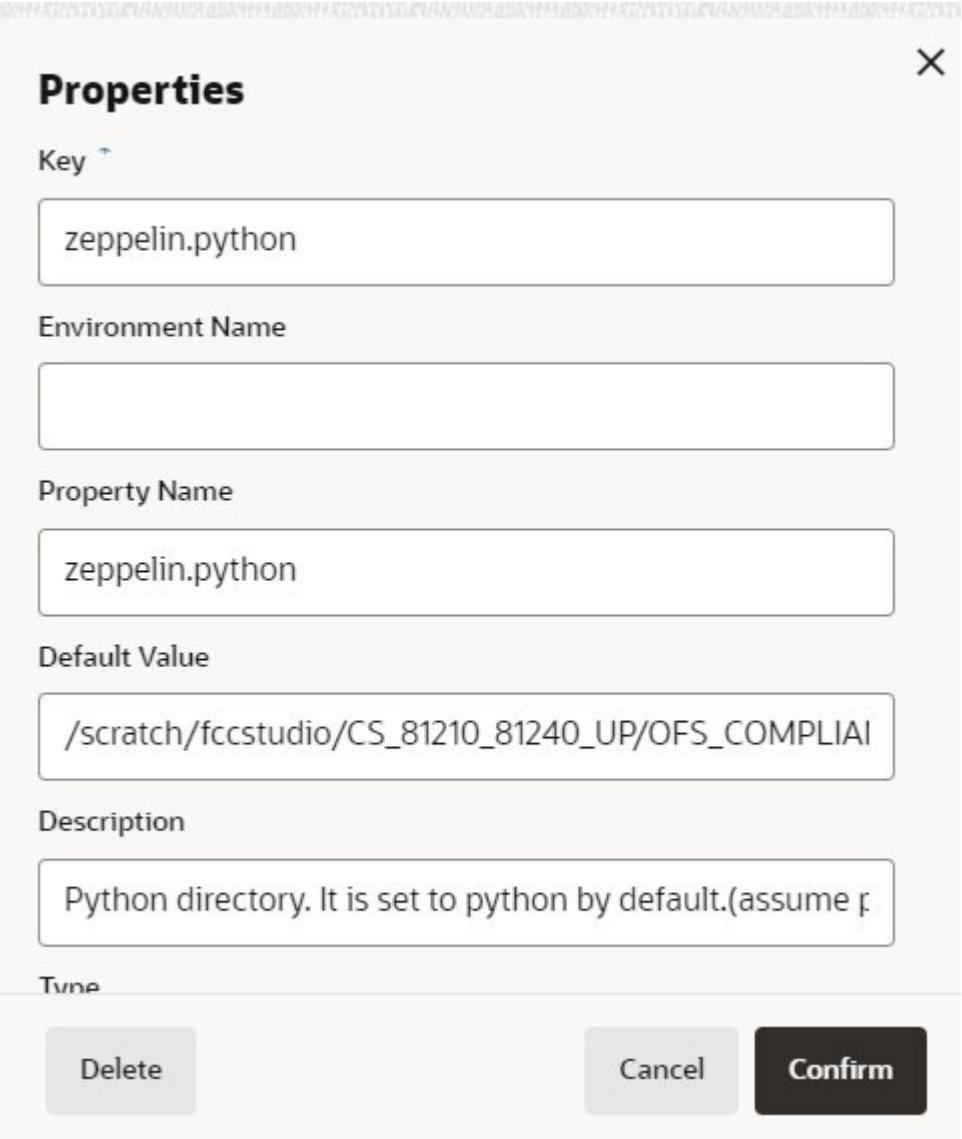
**Figure 16-4 Properties screen**




### Group Configuration

*Initial Code*

For example, when using a Spark interpreter group with spark and pyspark interpreter clients. If you define the initialization code for the spark interpreter group, the initialization code will run when the runtime environment is created, i.e., the first time a user runs a paragraph of either spark or pyspark in a notebook with OFS MMG running in NOTEBOOK session mode.

*Initial Code Capability*

The initial code capability defines what interpreter client to use to run the group initial code. For example, in the spark interpreter group, you would select the spark capability as the initial code capability to create a spark context for the group JVM process.

*Credential Configurations*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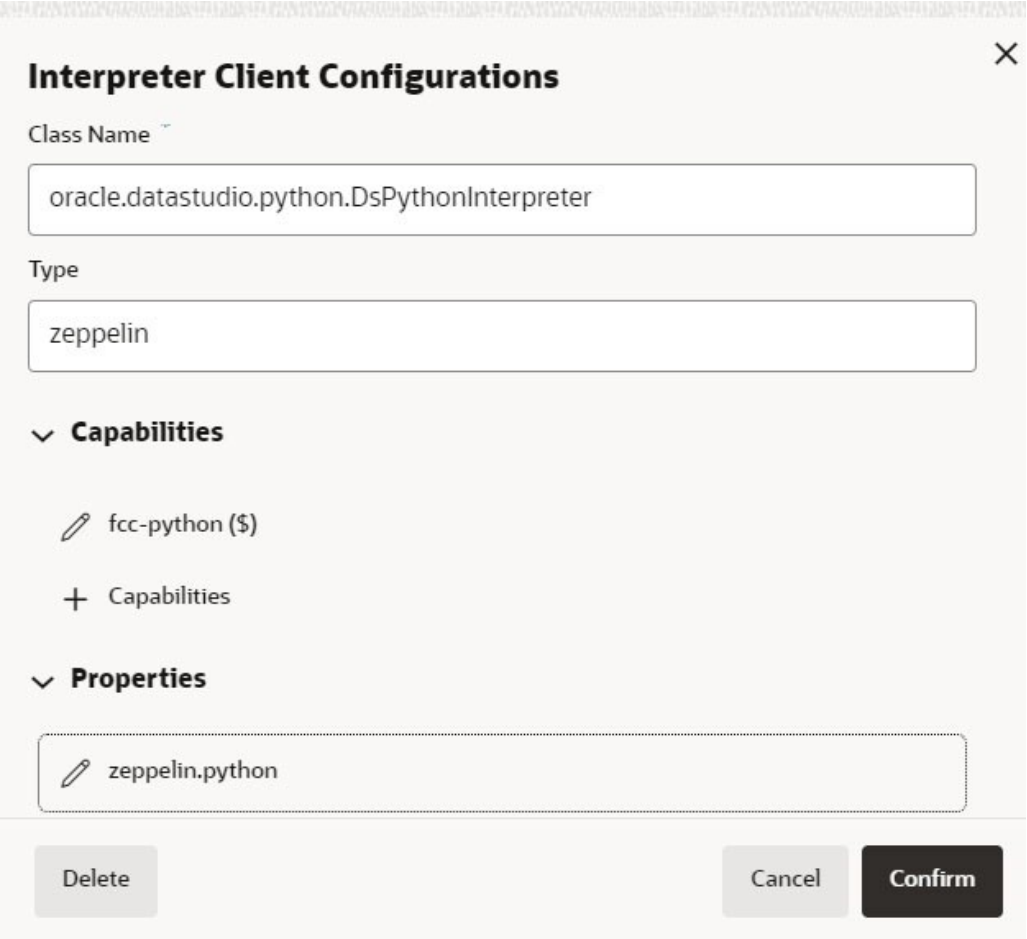
For linking any credentials to the interpreter, you have to define what credential types should be used and what credential mode to use. For example, the jdbc interpreter supports a credential type of type Password for the credential qualifier **jdbc_password** and a credential type of type Oracle Wallet for the credential qualifier **jdbc_wallet**. After defining the credential configuration, a new section for selecting the respective credential values will appear.

**Interpreter Client Configuration**

Interpreter properties can be configured for each interpreter client.

**Figure 16-5 Interpreter Client Configuration**




**Lifecycle Configuration**

*Host Mode*

In the Host lifecycle mode, the following properties can be configured:

- **Host**: The hostname on which the interpreter is listening. For example, localhost if the **interpreter** runs on the same machine as the server.
- **Port**: The port on which the interpreter is listening.

*Credentials*

A credential section appears if you have defined a credential configuration as part of the group settings. For each credential qualifier, an already defined credential can be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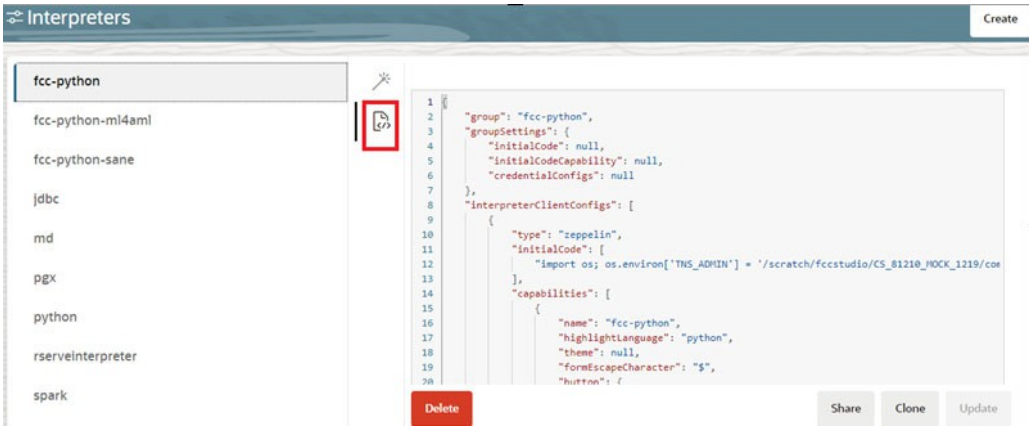
selected. If the credential mode Per User is used, each individual user has to select their own credential.

- JSON:
  You can modify the values in the properties of the interpreter in the JSON file, as shown in the following figure.

**Figure 16-6 JSON file properties**




5. Click Update. The modified values are updated in the Interpreter.
6. The user can also perform Share, Clone, and Delete operations on this screen.

The following table lists the Ready-to-use interpreter in OFS MMG.

**Table 16-1 Ready-to-use interpreter**

| Interpreters | Description |
|---|---|
| python Interpreter | The python interpreter is used to write Python code in a notebook to analyze data from different sources, machine learning, artificial intelligence, etc.<br>The python interpreter uses a python conda environment. OFS MMG comes with predefined conda environments as follows:<br>• default_<CS version><br>• ml4aml_<CS version><br>• sane_<CS version><br>Before executing any python notebooks, you need to attach the conda environment using drop-down list. |


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**Table 16-1 (Cont.) Ready-to-use interpreter**

| Interpreters | Description |
|---|---|
| jdbc Interpreter | The jdbc interpreter is a ready-to-use interpreter used to connect to Studio schema. This Interpreter is used to connect and write SQL queries on any schema without any restriction. In the jdbc Interpreter, you can configure schema details, link Wallet Credentials to the jdbc Interpreter, etc.<br>**Note**:<br>This feature is not recommended approach because it can only be used to connect to a single schema, and all users will have access to that, rather than access being managed per user. In future releases this interpreter will not be enabled by default but instructions will be given to enable if required.<br>**Limitation**<br>• Data source configuration is not dynamic; instead, it is static from the Interpreter Configuration screen.<br>• There is no restriction or secure access of data provided with this interpreter. |
| jdbc Interpreter | **Recommendation**<br>Users are recommended to use a python interpreter to get dynamic data source configuration; even data access permission features can also be used with this interpreter. |
| md Interpreter | The md interpreter is used to configure the markdown parser type. This Interpreter displays text based on Markdown, which is a lightweight markup language.<br>The connection does not apply to this Interpreter. |
| pgql Interpreter (part of PGX interpreter) | The pgql interpreter is a ready-to-use interpreter used to connect the configured PGX server. This Interpreter is used to perform queries on the graph in OFS MMG. PGQL is a graph query language built on top of SQL, bringing graph pattern matching capabilities to existing SQL users and new users interested in graph technology but who do not have an SQL background. |
| pgx-python (part of PGX interpreter) | The pgx-python interpreter is a ready-to-use interpreter used to connect to the configured PGX server. It is a **python** based interpreter with a PGX python client embedded in it to query on graph present in the PGX server. By default, this Interpreter points to ml4aml Python Virtual environment. |
| pgx-algorithm Interpreter (part of PGX interpreter) | The pgx-algorithm interpreter is a ready-to-use interpreter that connects to the configured PGX server. This Interpreter is used to write an algorithm on the graph and is also used in the PGX interpreter. |


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**Table 16-1 (Cont.) Ready-to-use interpreter**

| Interpreters | Description |
|---|---|
| pgx-java Interpreter (part of PGX interpreter) | The pgx-java interpreter is a ready-to-use interpreter that connects to the configured PGX server. It is **Java11** based interpreter with a PGX client embedded in it to query on graph present in the PGX server. |
| spark Interpreter | The spark interpreter connects to the big data environment by default. Users must write for connection either in the Initialization section or in the notebook's paragraph.<br>This Interpreter is used to perform analytics on data present in the big data clusters in the Scala language. This requires additional configuration, which must be performed as a prerequisite or as post-installation with the manual change of interpreter settings.<br>In the spark interpreter, you can configure the cluster manager to connect, print the Read Eval Print Loop (REPL) output, the total number of cores to use, etc. |
| pyspark Interpreter | The pyspark interpreter connects to the big data environment by default. Users must write code for connection either in the Initialization section or in the notebook's paragraph.<br>This Interpreter is used to write the pyspark language to query and perform analytics on data present in big data. This requires additional configuration, which must be performed as a prerequisite or as post-installation with the manual change of interpreter settings.<br>In the pyspark Interpreter, you can configure the Python binary executable to use for PySpark in both driver and workers, set true to use IPython, else set to false, etc. |

# python Interpreter

In OFS MMG, the python interpreter uses a python conda environment. OFS MMG comes with predefined conda environment as follows:

- **default_<CS Version>**
- **ml4aml_<CS Version>**
- **sane_<CS Version>**

%python interpreter points to a different conda environment. The following table lists the predefined conda environment.

**Table 16-2 Predefined Conda Environment**

| Conda Environment | Description |
|---|---|
| default_<CS version> | Default python interpreter. |
| ml4aml_<CS version> | Python interpreter for ML4AML use cases. |


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**Table 16-2 (Cont.) Predefined Conda Environment**

| Conda Environment | Description |
|---|---|
| sane_<CS version> | Python interpreter for scoring Name and Address Matching. |

> **Note**
>
> Users can also configure the python libraries. For more information about python libraries, see the Python Libraries for Predefined Conda Environment section.

## Configure a Python Interpreter

To configure an python interpreter, follow these steps:

1. On the Interpreter page LHS menu, select python. The python interpreter pane is displayed.
2. On the Interpreter Settings page, expand **Interpreter Client Configurations** and click the Edit icon for **<Class Name> (zeppelin)**. The Interpreter Client Configurations Window is displayed.
3. Enter the following information in the python interpreter variant pane as described in the following table.

**Table 16-3 Python Interpreter Settings**

| Field | Description |
|---|---|
| zeppelin.python | Enter the Python installed path. The value points to the default Python version set for the Interpreter. |
| zeppelin.python.useIPython | Set to **True** to use IPython, else set to **False**. |
| zeppelin.python.maxResult | Enter the maximum number of results that must be displayed. By, default the value is **1000**.<br>**Note**: To update the default value for this property, see the Setting the Maximum Number of Results in the Python Interpreter section. |
| zeppelin.interpreter.output.limit | Output message from interpreter exceeding the limit will be truncated. Set the default value and the value ranges from 102400 to 10240000 bytes.<br>**Note**: Increasing the Default Value from 102400 bytes to a higher value may slow down output rendering in the python paragraph.<br>If the zeppelin.interpreter.output.limit property is unavailable, create and set a default value. For more information, see the Create Zeppelin Interpreter Output Limit in the Python Interpreter section. |

## Change Version in the Python Interpreter

In the python Interpreter, the Linux console uses the default python version in. /user/fccstudio/python_user/bin/python as value. If you want to modify the python version, either you can


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create an interpreter variant or modify the existing python version in the same interpreter variant.

> **Note**
>
> The **python2** is the default version used in the Linux console and is no longer supported. Hence, you can use any version of **python3** or any conda environment with a specific python version or a specific version of python packages.

To use a different version of Python, follow these steps:

1. Navigate to the **python** Interpreter Settings page.
2. Expand **Interpreter Client Configurations** and click the Edit icon for <Class Name> (zeppelin). The Interpreter Client Configurations Window is displayed.
3. Click `zeppelin.properties`. The Properties window is displayed.
4. Change the default Python version in the `Default Value` parameter to the new version. `<MMG_INSTALLATION_PATH>/deployed/python-packages/ defaultVirtualEnv/bin/ <Python Version>.`

   By default, it is python3.

   For example, `<MMG_INSTALLATION_PATH>/deployed/pythonpackages/ defaultVirtualEnv/bin/python3`.
5. Create a new interpreter variant and configure the version in the Default Value parameter. For information on creating a new interpreter variant, see Create an Interpreter Variant section. For example, to use Python 3.6.13, create a new python interpreter variant and enter the value as python 3.6.13.

## Create Zeppelin Interpreter Output Limit in the Python Interpreter

> **Note**
>
> This section is applicable only when zeppelin.interpreter.output.limit is unavailable in the Python Interpreter.

You can create the Zeppelin Interpreter Output Limit in the Python interpreter either in OFS MMG UI or in OFS MMG Server.

**OFS MMG UI**

To create the Zeppelin Interpreter Output Limit in Python Interpreter via OFS MMG UI, follow these steps:

1. Log in to OFS MMG UI.
2. Click **User Profile**, select **Data Studio Options** and then click **Interpreters**. The **Interpreters** page is displayed.


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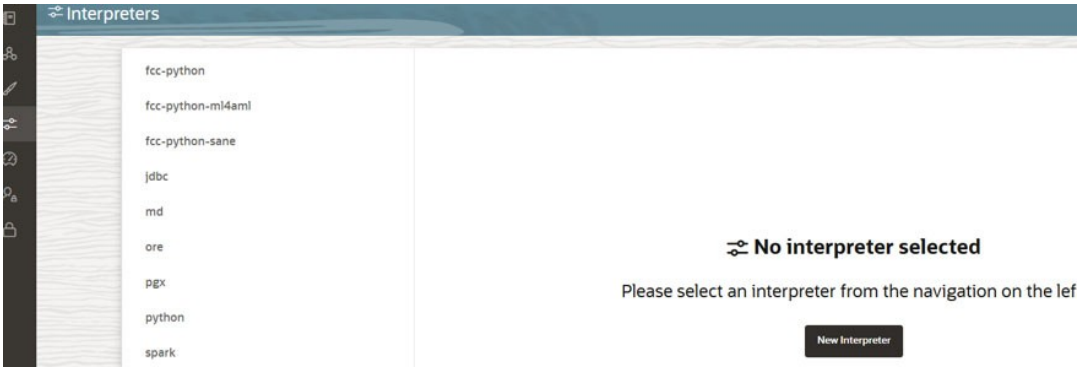
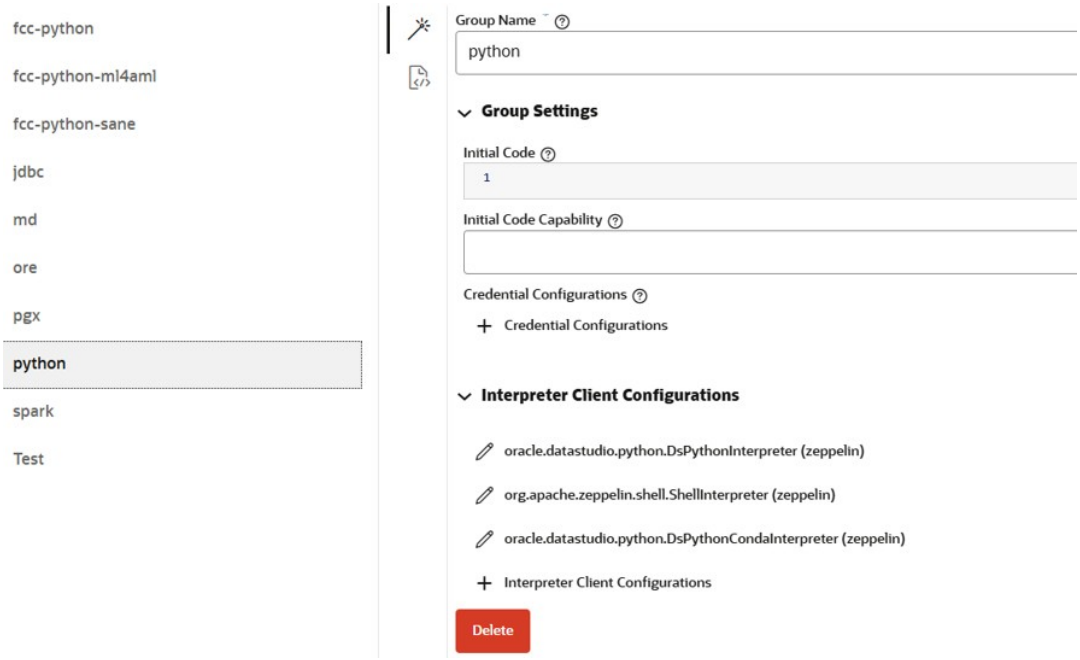
**Figure 16-7 Interpreters**




3. On the Left-Hand Side, click **python** interpreter. By default, **Wizard** pane is displayed.

**Figure 16-8 Python Interpreter**




4. On the Right-Hand Side, navigate to **Interpreter Client Configurations**.


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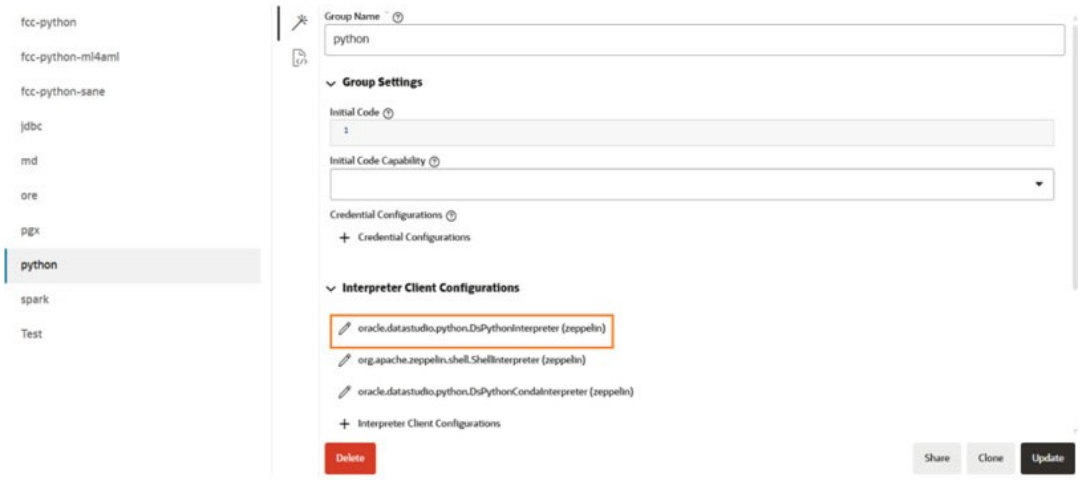
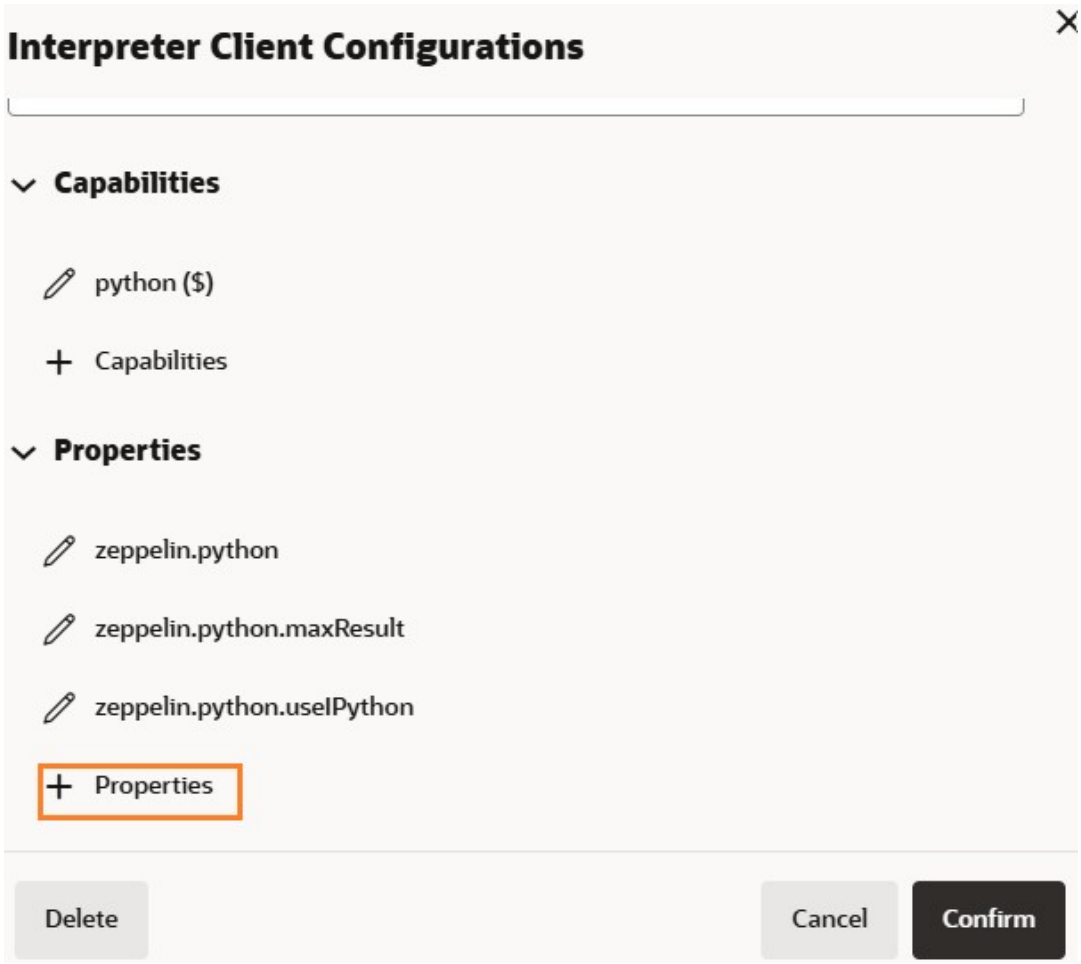
**Figure 16-9 Interpreter Client Configurations**




5. Click **oracle.datastudio.python.DsPythonInterpreter (zeppelin)**. The **Interpreter Client Configurations** pane is displayed.

**Figure 16-10 Zeppelin Properties**




6. Navigate to Properties and click **+ Properties**. The **Properties** pane is displayed.


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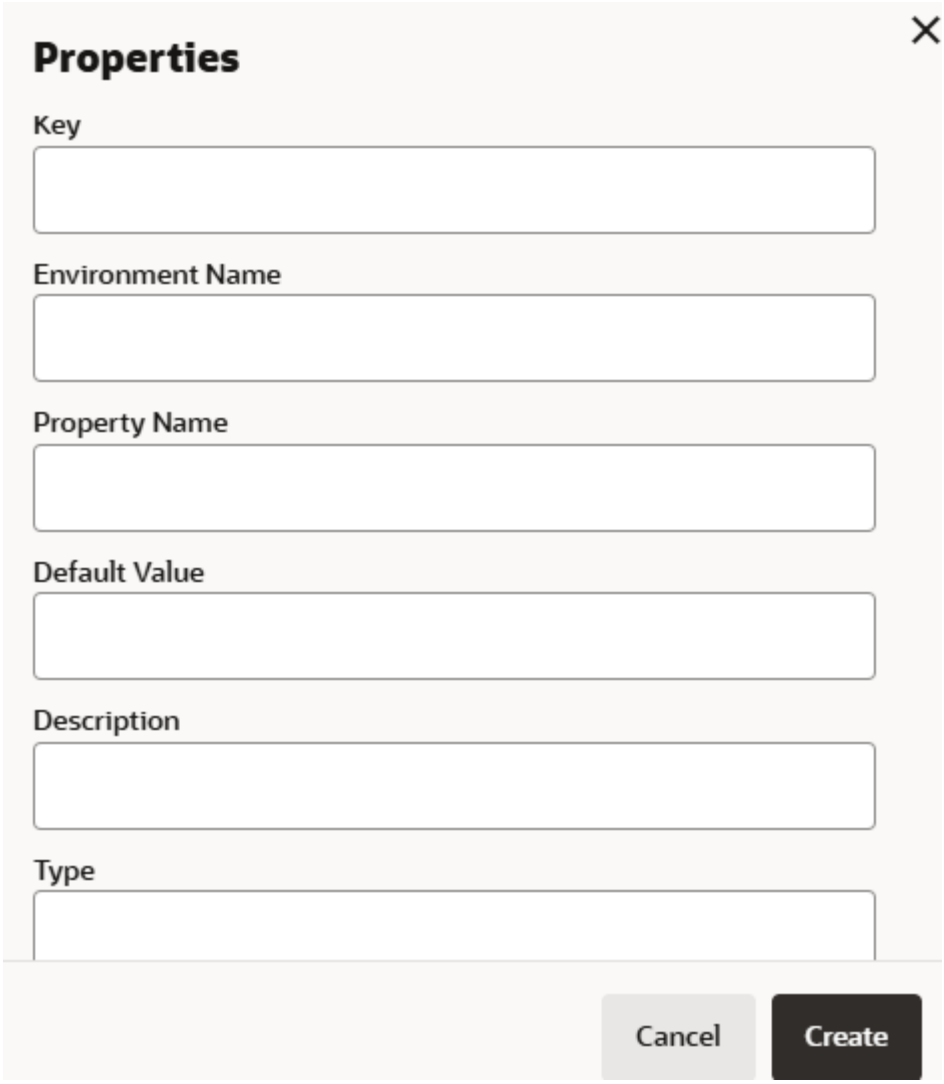
**Figure 16-11 Properties of Zeppelin Interpreter Output Limit**




7. Enter the **Key** and **Property Name** as **zeppelin.interpreter.output.limit**.

> **Note**
>
> The **Environment Name**, **Description**, and **Type** fields are optional, and you can provide the details if required.

8. Update the preferred value in the **Default Value**. The value ranges from **102400** to **10240000** bytes.

> **Note**
>
> Increasing the Default Value from 102400 bytes to a higher value may slow down output rendering in the python paragraph.

9. Click **Create**. The zeppelin.interpreter.output.limit property will be created and displayed in the Interpreter Client Configurations section.


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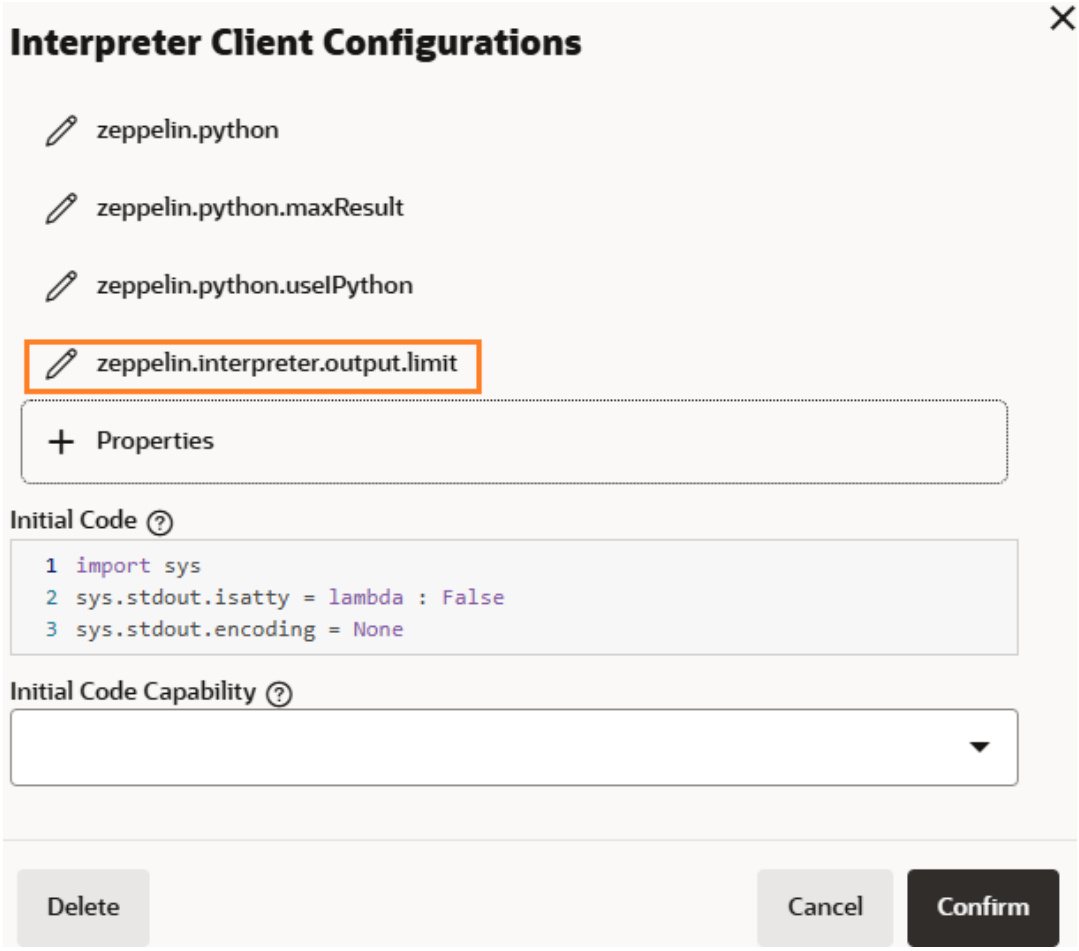
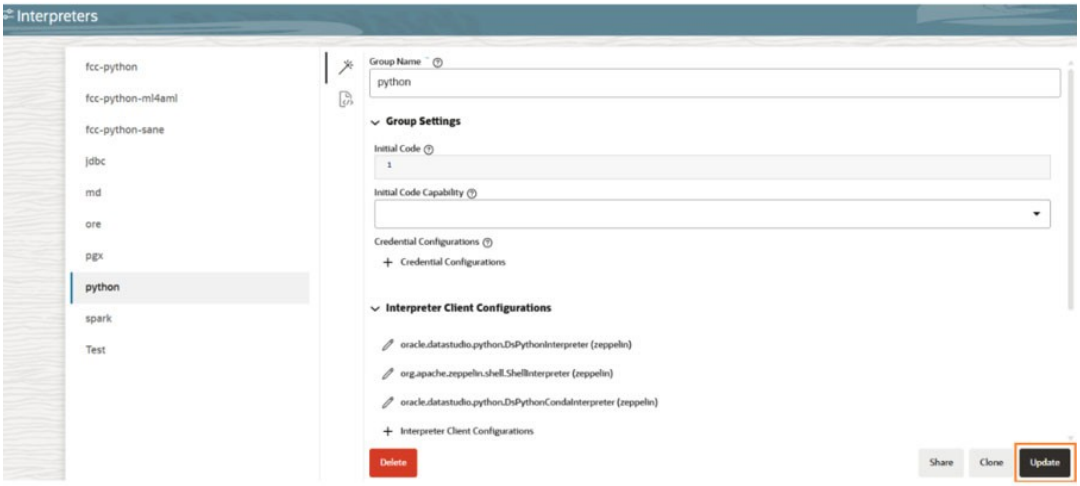
**Figure 16-12 Zeppelin Interpreter Output Limit**




10. Click **Confirm** to confirm the changes. The **Python Interpreter** page is displayed.

**Figure 16-13 Update Python Interpreter**




11. On the Right-Hand Side, click **Update** to save the modifications. A confirmation message will indicate that the Python interpreter has been updated.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12. Restart OFS MMG. The new zeppelin.interpreter.output.limit will be created in the python interpreter.

**OFS MMG Server**
To create the Zeppelin Interpreter Output Limit in the Python interpreter in OFS MMG Server, follow these steps:

1. Navigate to the `<MMG_INSTALLATION_PATH>/deployed/mmg-home/mmgstudio/ server/builtin/interpreters` directory.
2. Open the **python.json** file and navigate to className": "oracle.datastudio.python.DsPythonInterpreter.
3. Add the following lines at the end of the zeppelin properties.

```
"zeppelin.interpreter.output.limit ": {
                        "envName": "",
                        "propertyName": "",
                        "defaultValue": "",
                        "description": "",
                        "type": ""
}
```

You can refer the following example when default value is 102400 bytes.

```
"zeppelin.interpreter.output.limit ": {
                        "envName": "null",
                        "propertyName":
"zeppelin.interpreter.output.limit",
                        "defaultValue": "102400",
                        "description": "Output message from interpreter
exceeding the limit will be truncated",
                        "type": "number"
}
```

4. Save and close the **python.json** file.
5. Restart OFS MMG. The new zeppelin.interpreter.output.limit will be created in the python interpreter.

## Setting the Maximum Number of Results in the Python Interpreter

> **Note**
>
> This section is applicable only when modifying the default value of the **zeppelin.python.maxResult** property.

To set the maximum number of results in the Python Interpreter, follow these steps:

1. Log in to OFS MMG UI.
2. Click **User Profile**, select **Data Studio Options** and then click **Interpreters**. The **Interpreters** page is displayed.


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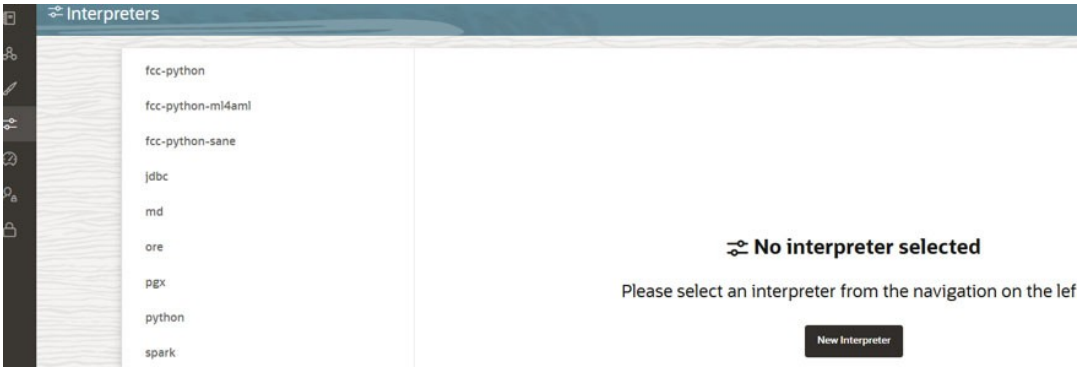
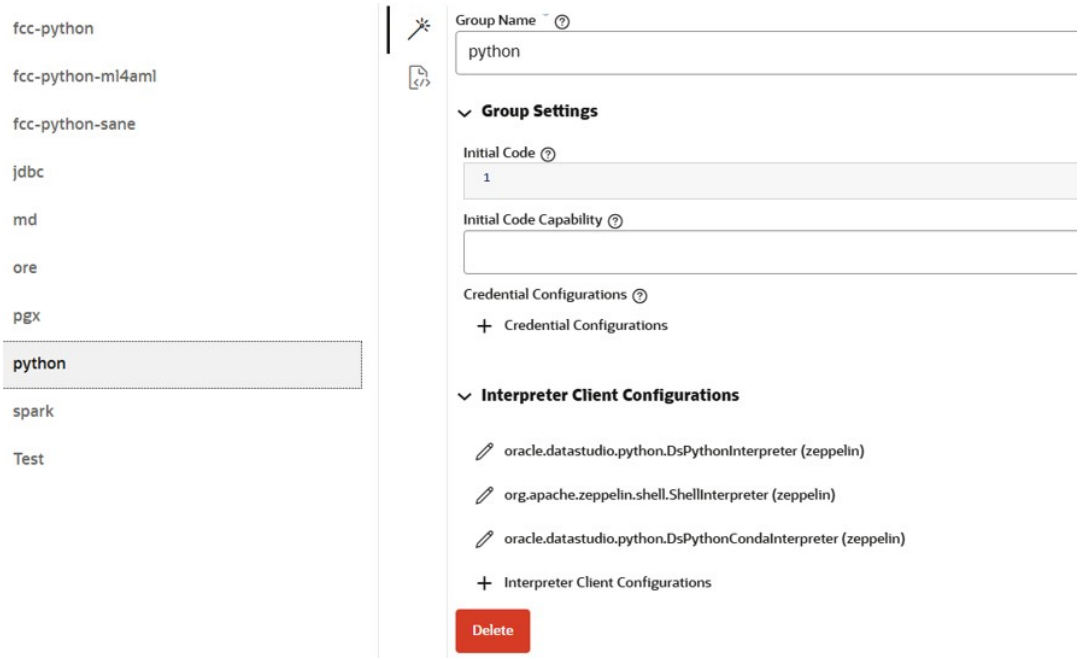
**Figure 16-14 Interpreters**




3. On the Left-Hand Side, click **python** interpreter. By default, **Wizard** pane is displayed.

**Figure 16-15 Python Interpreter**




4. On the Right-Hand Side, navigate to **Interpreter Client Configurations**.


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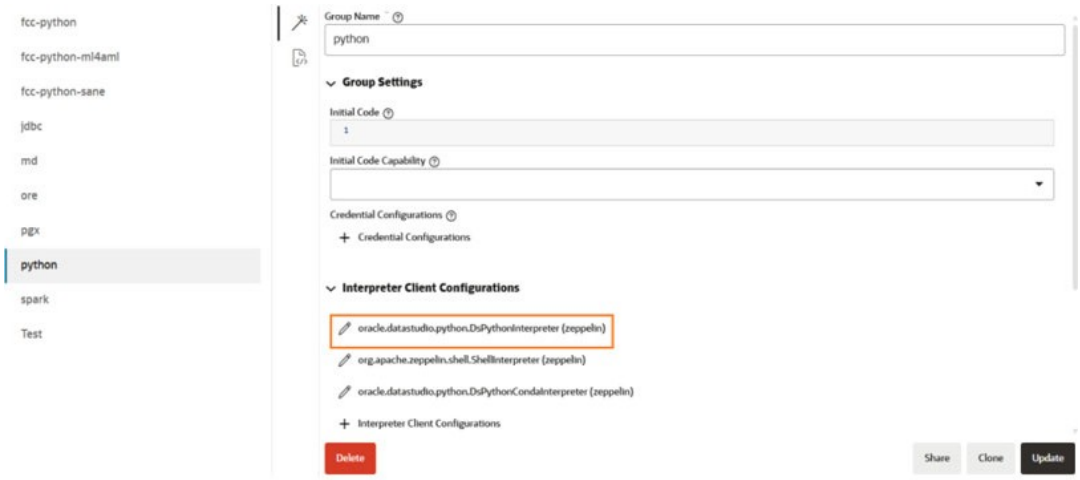
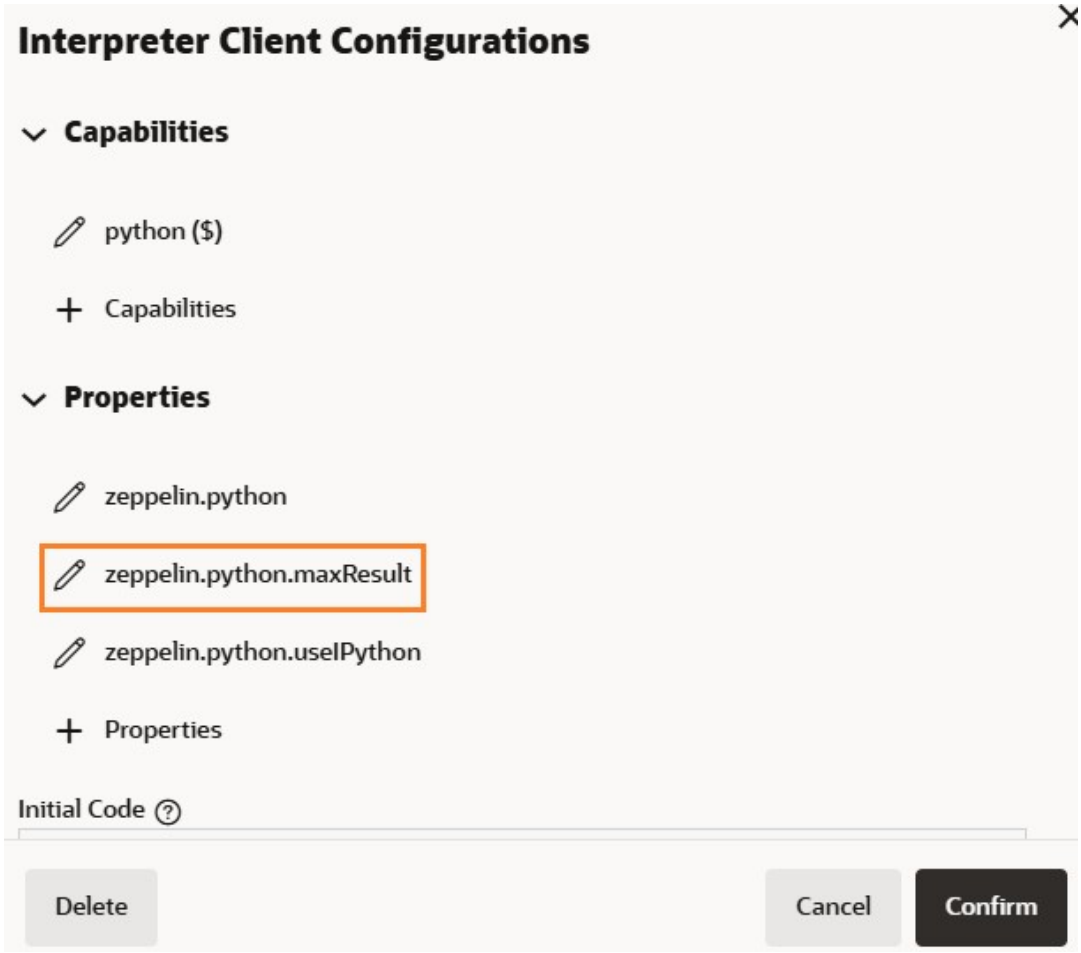
**Figure 16-16 Interpreter Client Configurations**




5. Click **oracle.datastudio.python.DsPythonInterpreter (zeppelin)**. The **Interpreter Client Configurations** pane is displayed.

**Figure 16-17 Zeppelin Python maxResult**




6. Click **zeppelin.python.maxResult**. The **Properties** pane is displayed.


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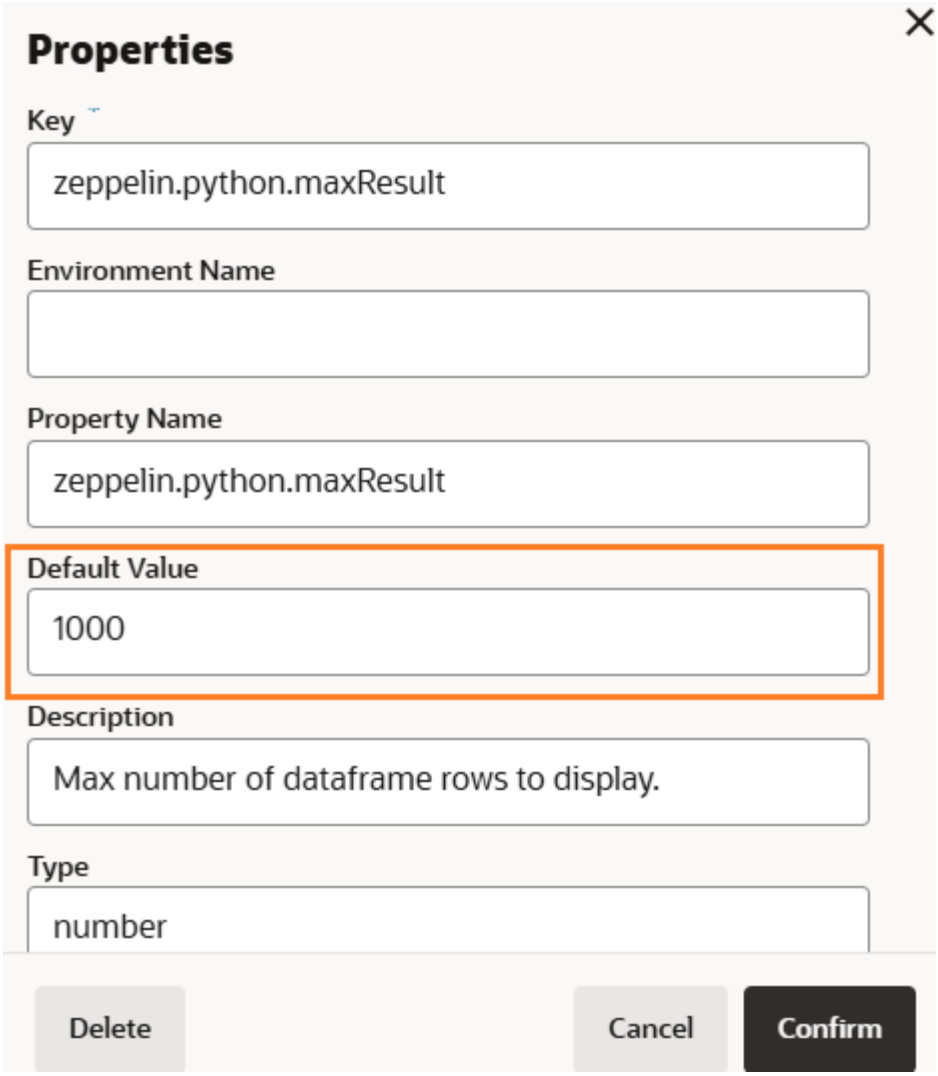
**Figure 16-18 Properties of zeppelin.python.maxResult**




7. Update the **Default Value** based on your preference. By, default the value is **1000**.
8. Click **Confirm** to confirm the changes. The **Interpreter Client Configurations** page is displayed.
9. Again, click **Confirm** to confirm the changes. The **Python Interpreter** page is displayed.
10. On the Right-Hand Side, click **Update** to save the modifications. A confirmation message will indicate that the Python interpreter has been updated.
11. Restart Compliance Studio. The default value for the maximum number of results will be updated in the Python Interpreter.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# jdbc Interpreter

> **Note**
>
> This feature is not recommended approach because it can only be used to connect to a single schema, and all users will have access to that, rather than access being managed per user. In future releases this interpreter will not be enabled by default but instructions will be given to enable if required.
> **Limitation**
>
> - Data source configuration is not dynamic; instead, it is static from the Interpreter Configuration screen.
> - There is no restriction or secure access of data provided with this interpreter.
>
> **Recommendation**
>
> Users are recommended to use a python interpreter to get dynamic data source configuration; even data access permission features can also be used with this interpreter.

The jdbc Interpreter is a ready-to-use interpreter used to connect Studio schema without OFSAA. This Interpreter is used to connect and write SQL queries on any schema without any restriction. The jdbc interpreter has no security attributes. It can be used to access any schema. In the jdbc interpreter, you can configure schema details, link Wallet Credentials to the jdbc Interpreter, etc.

**Prerequisites**

1. Navigate to `<MMG_INSTALLATION_PATH>/deployed/mmg-home/mmgstudio/ conf` directory.
2. Open the `application.yml` file and update **overwrite-builtin** property as **false**.
3. Save the changes and close the `application.yml` file.
4. Restart OFS MMG.


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# Configure a jdbc Interpreter

> **Note**
>
> This feature is not recommended approach because it can only be used to connect to a single schema, and all users will have access to that, rather than access being managed per user. In future releases this interpreter will not be enabled by default but instructions will be given to enable if required.
> **Limitation**
>
> - Data source configuration is not dynamic; instead, it is static from the Interpreter Configuration screen.
> - There is no restriction or secure access of data provided with this interpreter.
>
> **Recommendation**
>
> Users are recommended to use a python interpreter to get dynamic data source configuration; even data access permission features can also be used with this interpreter.

To configure a jdbc interpreter, follow these steps:

1. Navigate to `<MMG_INSTALLATION_PATH>/deployed/mmg-home/mmgstudio/ bin` directory.
2. Open `startup.sh` file, navigate to line 29 and update jdbc value as **7011**.

   For example: . ./"$DIR"/datastudio --port 7008 --markdown 7009 --spark 7014 --python 7012 - -**jdbc 7011** --shell -1 --pgx 7022 --external
3. Navigate to `<MMG_INSTALLATION_PATH>/deployed/mmg-home/mmgstudio/ bin` directory.
4. Open the `config.sh` file and update DATASTUDIO_JDBC_INTERPRETER_PORT as **7011**.
5. Navigate to `<MMG_INSTALLATION_PATH>/deployed/mmg-home/bin` directory.
6. Open the `config.sh` file and update DATASTUDIO_JDBC_INTERPRETER_PORT as **7011**.
7. Navigate to `<MMG_INSTALLATION_PATH>/deployed/mmg-home/mmgstudio/ server/builtin/interpreters/jdbc.json` directory.
8. Navigate to line 154 and update port value as **7011**.
9. Restart OFS MMG.
10. On the Interpreter page LHS menu, select jdbc. The jdbc interpreter pane is displayed.


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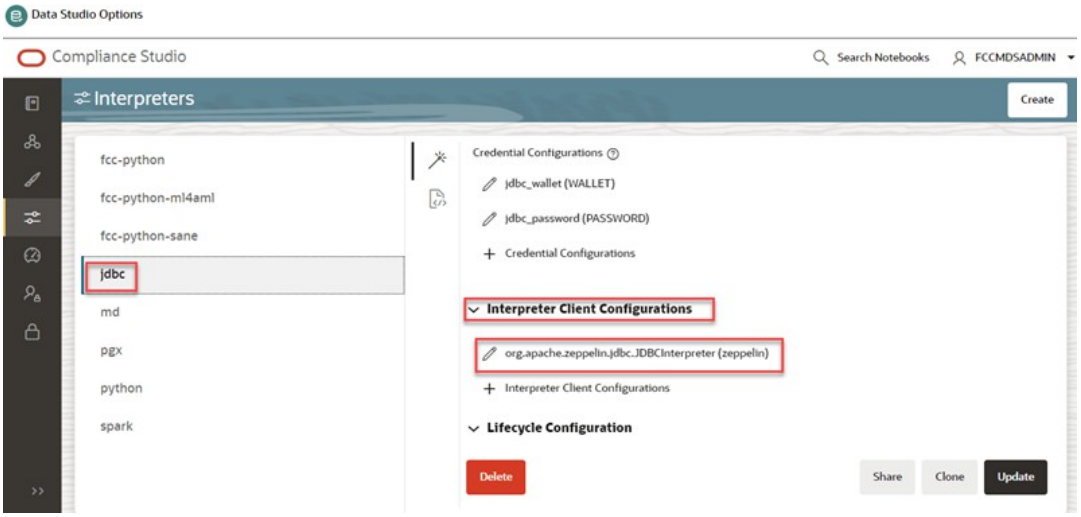
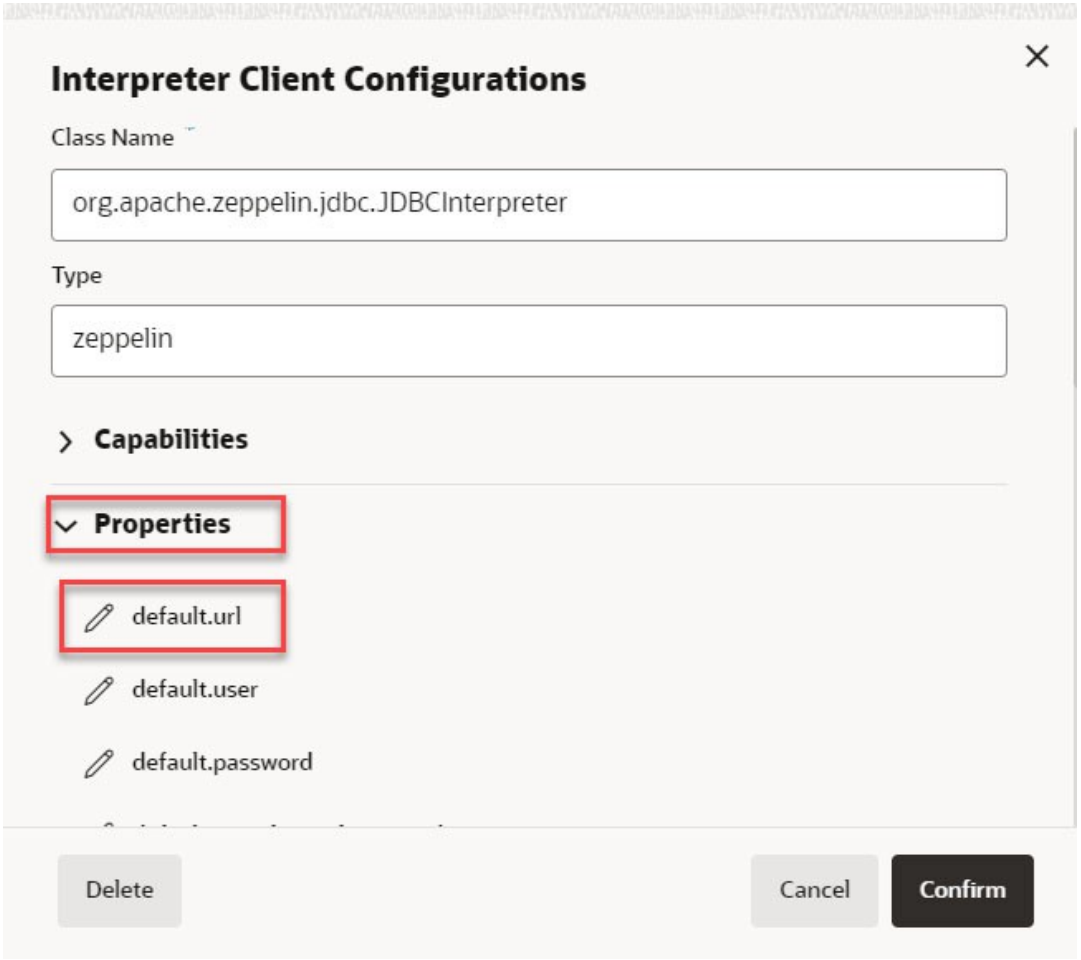
**Figure 16-19 jdbc Interpreter**




11. On Interpreter Settings page, expand **Interpreter Client Configurations** and click the Edit icon on the **<Class Name> (zeppelin)**. The Interpreter Client Configurations Window is displayed.

**Figure 16-20 Interpreter Client Configurations**





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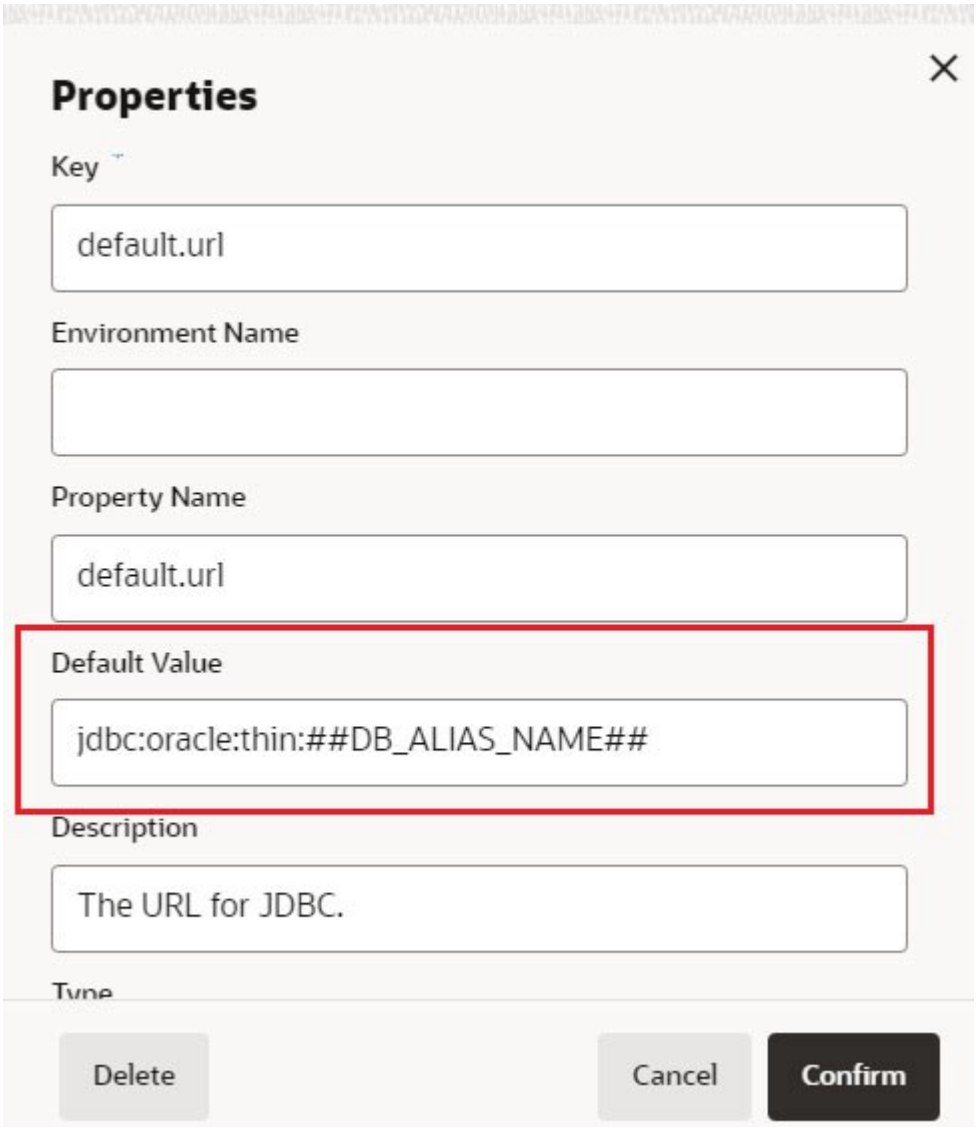
12. Click **default.url** under the Properties. The Properties page is displayed.

**Figure 16-21 Properties**




13. Enter the alias name in the **Default Value** field.

    The alias name is available in the `<MMG_STUDIO_INSTALLATION_PATH>/wallet/tnsnames.ora` directory.

    For example, jdbc:oracle:thin:##DB_ALIAS_NAME##

14. Click **Confirm**. The Interpreter Client Configurations page is displayed.


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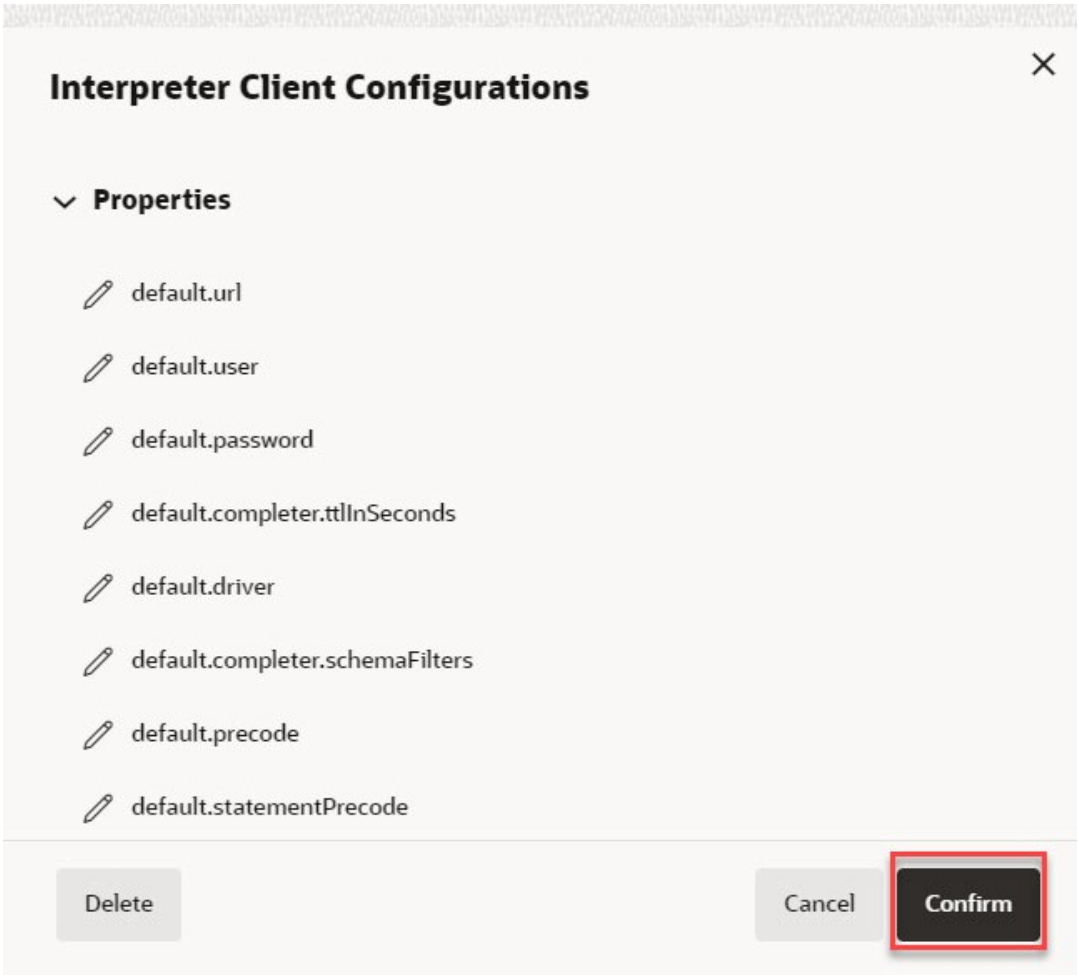
**Figure 16-22 Interpreter Client Configurations**




15. Click default.user property and it should be null in the **Default Value** field.
16. Click default.password property and it should be null in the **Default Value** field.

> **Note**
>
> Retain the default settings for the remaining properties in the Interpreter Client Configurations.

17. Click **Update**. The modified values are updated in the Interpreter.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## Link Wallet Credentials to jdbc Interpreter

> **Note**
>
> This feature is not recommended approach because it can only be used to connect to a single schema, and all users will have access to that, rather than access being managed per user. In future releases this interpreter will not be enabled by default but instructions will be given to enable if required.
> **Limitation**
>
> - Data source configuration is not dynamic; instead, it is static from the Interpreter Configuration screen.
> - There is no restriction or secure access of data provided with this interpreter.
>
> **Recommendation**
>
> Users are recommended to use a python interpreter to get dynamic data source configuration; even data access permission features can also be used with this interpreter.

OFS MMG provides secure and safe credential management. Examples of credentials are passwords, Oracle Wallets, or KeyStores. To link credentials (a wallet and a password) to the jdbc interpreter variant to enable secure data access. This linking enables the jdbc interpreter to securely connect to the specified Oracle database. For more information on linking Wallet Credentials to jdbc Interpreter, see the Link Credentials section.

> **Note**
>
> The Credentials section is enabled if an interpreter variant can accept credentials.

You can also create new credentials and link to jdbc Interpreter. For more information, see Create a Credential section.

# md Interpreter

This Interpreter displays text based on Markdown, which is a lightweight markup language. In the md interpreter, you can configure the markdown parser type. Markdown (md) is a plain text formatting syntax designed so that it can be converted to HTML. Use this section to configure the markdown parser type.

To configure the md interpreter variant, follow these steps:

1. On the md Interpreter page LHS menu, select md. The md interpreter pane is displayed.
2. On the Interpreter Settings page, expand **Interpreter Client Configurations** and click the Edit icon for **<Class Name> (zeppelin**). The Interpreter Client Configurations Window is displayed.
3. Enter the markdown parser type and click **Update**. To confirm the modified configuration.


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# PGX Interpreter

The PGX has the following interpreters:

- **pgql**: The pgql interpreter is a ready-to-use interpreter used to connect the configured PGX server. This Interpreter is used to perform queries on the graph in OFS MMG. PGQL is a graph query language built on top of SQL, bringing graph pattern matching capabilities to existing SQL users and new users interested in graph technology but who do not have an SQL background.
- **pgx-algorithm**: The pgx-algorithm is a ready-to-use interpreter used to connect to the configured PGX server. This Interpreter is used to write an algorithm on the graph and is also used in the PGX interpreter.
- **pgx-java**: The pgx-java interpreter is a ready-to-use interpreter used to connect to the configured PGX server. It is **Java11** based interpreter with a PGX client embedded in it to query on graph present in the PGX server.
- **pgx-python**: The pgx-python interpreter is a ready-to-use interpreter used to connect to the configured PGX server. It is a **python** based interpreter with a PGX python client embedded in it to query on graph present in the PGX server. By default, this Interpreter points to ml4aml Python Virtual environment.
- **java**: The java interpreter is a ready-to-use interpreter based on **Java11**, where users can write the java code.

To configure the pgql interpreter variant, follow these steps:

1. On the Interpreter page LHS menu, select pgql. The pgql interpreter pane is displayed.
2. On the Interpreter Settings page, expand **Interpreter Client Configurations** and click the Edit icon for **<Class Name> (zeppelin)**. The Interpreter Client Configurations Window is displayed.
3. Enter the following information in the pgql interpreter variant pane as tabulated in the following table.

**Table 16-4 PGX interpreter**

| Field | Description |
|---|---|
| graphviz.formatter.class | Enter the class which implements the formatting of the visualization output.<br>For example,`oracle.datastudio.graphviz.formatter.DataStudi oFormatter` |
| graphviz.driver.class | Enter the class which implements the PGQL driver.<br>For example:`oracle.pgx.graphviz.driver.PgxDriver` |
| base_url | Enter the base URL of the PGX.<br>For example, `http://<HOSTNAME>:7007` |
| zeppelin.interpreter.outpu t.limit | Enter the output message limit. Any message that exceeds the limit is truncated.<br>For example, 102 or 400. |


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**Table 16-4 (Cont.) PGX interpreter**

| Field | Description |
|---|---|
| num_cached_resultsets | Maximum number of results sets kept open on the PGX server per interpreter session. Only checked when the interpreter is used, and therefore it should only be used with expiring interpreter sessions.<br>For example: 5 |
| resultset_expiration_time _secs | Number of seconds after which unused results sets are closed on the PGX server. Only checked when interpreter session is used and should only be used with expiring interpreter sessions.<br>For example: 3600 |
| zeppelin.python.useIPyth on | Set to 'True' to use IPython, else set to 'False'. |
| zeppelin.python | Enter the Python installed path. The value points to the default Python version set for the Interpreter.<br>**Note**:<br>To use a different Python version, see Change Version in the Python Interpreter section. |

# Spark Interpreter

This section explains about Spark Interpreter configurations.

## Spark Interpreter in Local Mode

To start spark interpreter in the local mode, follow these steps:

1. Download `spark-3.0.3-bin-hadoop2.7.tgz` from the website.
2. Unzip the spark hadoop cluster's zip file in the below mentioned locations:
   - `<MMG_INSTALLATION_PATH>/deployed/mmg-home/mmg-studio/ interpreter-server/spark-interpreter-<version>/extralibs`
   - `<MMG_INSTALLATION_PATH>/mmg-home/mmg-studio/interpreter- server/spark-interpreter-<version>/extralibs`
3. Navigate to `<MMG_INSTALLATION_PATH>/deployed/mmg-home/mmgstudio/ bin` directory.
4. Open the `startup.sh` file and add following line before the line containing "counter=1";`nohup "$DIR"/../interpreter-server/spark-interpreter-<version>/bin/spark-interpreter &>> <path_to_save_the_logs>/<log_file_name>.log &`


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**Figure 16-23 Snapshot of startup.sh file**




5. Save and close the file.
6. Open the `shutdown.sh` file and add following line before the line containing “SL=”.

```
I7014=`ps -eaf | grep java | grep RemoteInterpreterServer | grep 7014 |
awk '{print $2}'`
if [[ "" != "$I7014" ]];
then kill -9 $I7014;
fi
```

**Figure 16-24 Snapshot of shutdown.sh file**




> **Note**
>
> In the above step, the port number for the spark interpreter is assumed to be 7014, the default port that comes with the installer. If a different port is used, then change the configuration accordingly.

7. Save and close the file.
8. Navigate to `<MMG_INSTALLATION_PATH>/deployed/mmg-home/mmgstudio/ bin` directory.
9. Open the `startup.sh` file, navigate to line 29 and update spark value as **7014**.

   For example: . ./"$DIR"/datastudio --port 7008 --markdown 7009 --**spark 7014** --python 7012 --jdbc 7011 --shell -1 --pgx 7022 --external
10. Navigate to `<MMG_INSTALLATION_PATH>/deployed/mmg-home/mmgstudio/ bin` directory.
11. Open the `config.sh` file and update the following parameters:
    - MMG_SPARK_ENABLED=true


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- SPARK_HOME=<MMG_INSTALLATION_PATH>/deployed/mmg-home/ mmg-studio/ interpreter-server/spark-interpreter-<version>/extralibs/ spark-<version>-bin-hadoop<version>
- HADOOP_HOME=##HADOOP_HOME##

> **Note**
>
> Retain the placeholder as it is.

- SPARK_MASTER=local
- SPARK_DEPLOY_MODE=

> **Note**
>
> Retain the SPARK_DEPLOY_MODE as **blank**.

- DATASTUDIO_SPARK_INTERPRETER_PORT=7014

12. Navigate to <MMG_INSTALLATION_PATH>/deployed/mmg-home/bin directory.
13. Open the config.sh file and update the following parameters:
    - MMG_SPARK_ENABLED=true

> **Note**
>
> By default, it is set to false. You can configure the following parameters only when **MMG_SPARK_ENABLED** is set to **true**.

    - SPARK_HOME=<MMG_INSTALLATION_PATH>/deployed/mmg-home/ mmg-studio/ interpreter-server/spark-interpreter-<version>/extralibs/ spark-<version>-bin-hadoop<version>
    - HADOOP_HOME= ##HADOOP_HOME##

> **Note**
>
> Retain the placeholder as it is.

    - SPARK_MASTER= local
    - SPARK_DEPLOY_MODE=

> **Note**
>
> Retain the SPARK_DEPLOY_MODE as blank.

    - DATASTUDIO_SPARK_INTERPRETER_PORT=7014
14. Navigate to <MMG_INSTALLATION_PATH>/deployed/mmg-home/mmgstudio/ server/ builtin/interpreters/spark.json directory.
15. Navigate to line 169 and update port value as **7014**.


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16. Update **default value** as **local** for spark.master and **blank** for spark.submit.deployMode.

    For example:

```
"spark.master": {
                            "envName": "MASTER",
                            "propertyName": "spark.master",
                            "defaultValue": "local",
                            "description": "Spark master uri. ex) spark://
masterhost:7077",
                            "type": "string"
},
                            "spark.submit.deployMode": {
                                "envName": null,
                                "propertyName":"spark.submit.deployMode",
"defaultValue": "",
                            "description": "The deploy mode of Spark driver
program, either 'client' or 'cluster'",
                            "type": "string"
                 },
```

17. Navigate to `<CMMG_INSTALLATION_PATH>/bin` directory.
18. Restart OFS MMG using the following command.

    ```
    ./MMG.sh –restart
    ```

19. Verify if the spark-interpreter has started using the following command:

    ```
    netstat –nltp | grep 7014
    ```

## Enable Additional Spark Interpreter

Interpreter variant does not apply to spark interpreters. Hence, you must enable an additional set of interpreters.

To enable an additional spark interpreter, see Enable Additional Spark Interpreter section in the Appendix.

# Pyspark Interpreter

OFS MMG uses PySpark 2.4.0. Before you begin the configurations, check the prerequisites depending on your operation mode.

## Prerequisites

The PySpark interpreter has the same prerequisites as that as the Spark Interpreter. For more information, see Spark Interpreter. Also, all Spark components must be configured to use the same Python version.

## Configuration

The PySpark interpreter can be configured through the Spark interpreter, with the only exception being the Python version used. By default, the Python version is set to 3 that can be changed either in the interpreter JSON files before the startup or from the Interpreters page of the OFS MMG application UI during runtime by changing the following properties:


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To change the value of the `spark.pyspark.python` property before installing the OFS MMG, follow these steps:

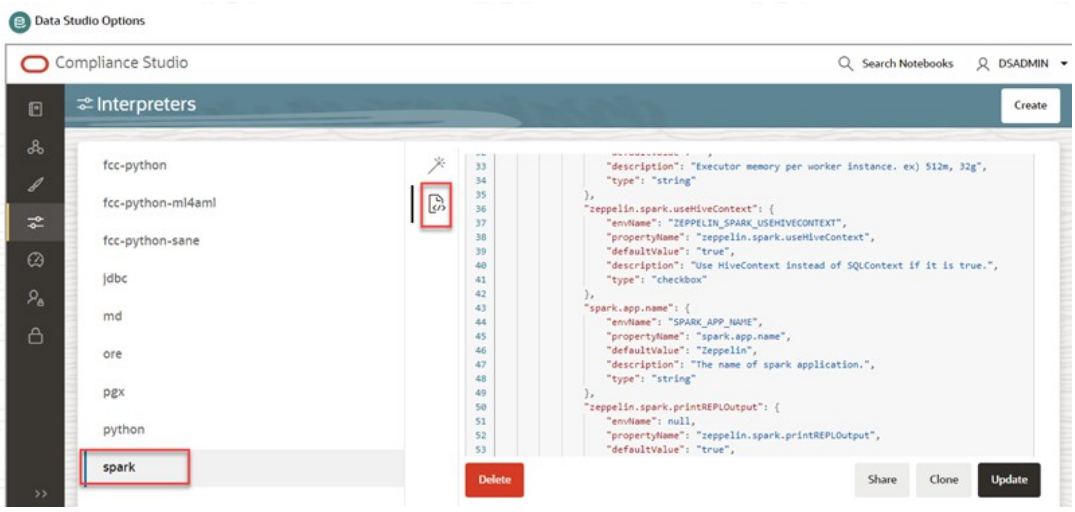
1. Navigate to `<MMG_INSTALLATION_PATH>/deployed/mmg-home/mmgstudio/ server/builtin/interpreters/spark.json` directory.
2. Update the value in `spark.pyspark.python` property of the spark.json file.

To change the value of the `spark.pyspark.python` property after installing the OFS MMG, follow these steps:

1. Login to the MMG application.
2. Launch the **CS Production** Workspace.
3. Click the **User Profile** drop-down list and select **Data Studio Options**.
4. Click Interpreters.

   By default, the Interpreters page lists all the available interpreters on the LHS.

**Figure 16-25 Spark Interpreter**




5. Click **spark** interpreter on the LHS and then click **Plain Configuration** on the RHS.
6. Update the value in the spark.pyspark.python property and click **Update**.

   In the **Spark Interpreter Settings** page of the OFS MMG application UI (or `spark.json` file), change the value of the `spark.pyspark.python` property to the Python executable path that is to be used by the Spark executors.

   In the **PySpark Interpreter Settings** page of the OFS MMG application UI (or `pyspark.json` file), change the value of the `zeppelin.pyspark.python` property to the Python executable path that is to be used by the Spark driver.

## Use Python Virtual Environments with PySpark

To ensure that the two Python versions match, in case your components run on different machines, you must use the Python virtual environments with PySpark.

### Create a Virtual Environment with Conda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> **Note**
>
> You can also use **virtualenv** to create your virtual environment instead of **conda**.

To create a virtual environment with Conda, follow these steps:

1. Ensure that you have conda and conda-Pack installed.

   > **Note**
   >
   > To check if conda is installed, then execute the following command: "`conda --version`"

2. Create your virtual environment using the following command:

   ```
   conda create -y -n <environment-name> python=<python-version>
   <additional-packages>
   ```

   > **Note**
   >
   > The <environment-name> can be chosen freely and subsequently has to be substituted in further commands.

3. Activate your virtual environment using the following command:

   ```
   conda activate <environment-name>
   ```

4. Execute the following to obtain the path to your virtual environment:

   ```
   which python
   ```

   The obtained result is referred to as `<environment-abs-path>`.

5. Compress your virtual environment using the following command:

   ```
   conda pack -n <environment-name> -o <environment-abs-path>/
   <environmentname>.
   tar.gz
   ```

### Update Interpreter Properties

The interpreter properties can either be configured in the interpreter JSON files or from the Interpreters page of the OFS MMG application UI after starting the OFS MMG application.

- In the Spark Interpreter Settings page of the OFS MMG application UI (or `spark.json`), change the following:
  - Change the value of the `spark.yarn.dist.archives` property to `<environment-abspath>/< environment-name>.tar.gz#<environment-name>`
  - Change the value of the `spark.pyspark.python property to ./<environmentname>/bin/python`


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- In the **PySpark Interpreter Settings** page of the OFS MMG application UI (or `pyspark.json`), change the value of the `zeppelin.pyspark.python` parameter to `<environment-abs-path>/bin/python.`

## Configure Pyspark Interpreter

Users must write for connection either in the Initialization section or in the notebook's paragraph. This interpreter is used to write the pyspark language to query and perform analytics on data present in big data. This requires additional configuration, which must be performed as a prerequisite or as postinstallation with the manual change of interpreter settings.
In the pyspark interpreter, you can configure the Python binary executable for PySpark in both driver and workers, set 'True' to use IPython, else set it to 'False'.

To configure the pyspark interpreter variant, follow these steps:

1. On the Interpreter page LHS menu, select pyspark. The pyspark interpreter pane is displayed.
2. On the Interpreter Settings page, expand **Interpreter Client Configurations** and click the Edit icon for **<Class Name> (zeppelin)**. The Interpreter Client Configurations Window is displayed.
3. Enter the following information in the pyspark interpreter variant pane as tabulated in the following table

**Table 16-5 pyspark interpreter**

| Field | Description |
|---|---|
| zeppelin.pyspark.python | Enter the Python binary executable for PySpark in both drivers and workers. The default value is python.<br>For example, `python` |
| zeppelin.pyspark.useIPython | Set to 'True' to use IPython, else set to 'False'. |
| zeppelin.interpreter.output.limit | Output message from interpreter exceeding the limit will be truncated |

## Enable Additional PySpark Interpreter

Interpreter variant does not apply to pyspark interpreters. Hence, you must enable an additional set of interpreters.

To enable an additional pyspark interpreter, see Enable Additional Spark or PySpark interpreter section in the Appendix.

# R Interpreter

The R interpreter allows execution of R code within OFS MMG interactive notebooks and pipelines, supporting exploratory analytics, reproducible research, and statistical computing, while integrating seamlessly with big data tools to provide an interactive environment for advanced analytics.

You can configure the R Interpreter support either with **ORD-3.6.1** or **R 4.1.2**.

### ORD-3.6.1 Installation

To install ORD-3.6.1, follow the steps:


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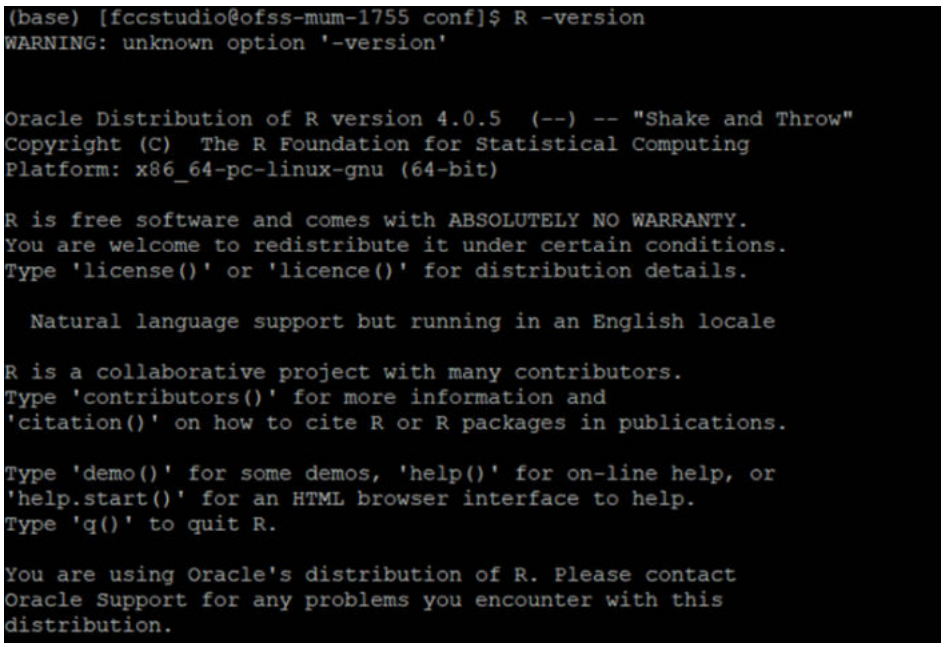
1. Check Linux version. For example, `cat /etc/os-release`
   You can install R interpreter based on the following Linux version.
   a. To install Oracle R Distribution on Linux 7, see Using Yum.
   b. To install Oracle R Distribution on Linux 8, see Using Yum or Dnf.
2. In the terminal, check installation using **R -version**.

**Figure 16-26 R Interpreter**




3. To install other packages, execute the following.
   a. `R-e "install.packages('Rserve', repos='https://www.rforge.net/')"`
   b. `R-e "install.packages(c('knitr', 'ggplot2', 'backports'),repos='https://mirror.las.iastate.edu/CRAN/')"`

### R 4.1.2 Installation

> **Note**
> This setup might update some of the older root level files and using Non-Oracle Yum Repository for getting R rpm files.

To install R 4.1.2, follow these steps:

1. In the terminal, execute the following.
   a. `curl- O https://dl.fedoraproject.org/pub/epel/epel-release-latest-7.noarch.rpm`
   b. `yum install epel-release-latest-7.noarch.rpm`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c. `curl- O https://cdn.rstudio.com/r/centos-7/pkgs/R-${R_VERSION}-1-1.x86_64.rpm`

d. `sudo yum install R-${R_VERSION}-1-1.x86_64.rpm`

e. `sudo ln -s /opt/R/${R_VERSION}/bin/R /usr/bin/R`

2. Check installation using **R -version**.
3. To install other packages, execute the following.

a. `R-e "install.packages('Rserve',repos='https://www.rforge.net/')"`

b.
```
R-e "install.packages(c('knitr', 'ggplot2', 'backports'),repos='https://
mirror.las.iastate.edu/CRAN/')"
```

## Configuration

This section describes about how to configure R interpreter.

To configure R interpreter, follow these steps:

1. Navigate to the `<MMG_INSTALLATION_PATH>/deployed/mmg-home/mmg-studio/conf` directory.
2. To configure Rserve, execute the following.

```
nano /scratch/software/R/Rserve.conf (sample file)
>
auth required
plaintext disabled
pwdfile /scratch/software/R/creds/Rserve.pwd
remote enable
switch.qap.tls enable
tls.port 6311
qap disable
interactive no
rsa.key /scratch/software/R/creds/server.key
tls.key /scratch/software/R/creds/server.key
tls.cert /scratch/software/R/creds/server.crt
```

3. Create a password file (Rserve.pwd) using the following.

```
>
oml $5baa61e4c9b93f3f0682250b6cf8331b7ee68fd8
```

The file contains one line per user, where the first part is the username, and the second part is the password. The password can either be plain text or a MD5/SHA1 hash. In this example the password `password` is hashed with SHA1.If you use hashed passwords, the password string needs to start with a `$` sign.


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4. To generate the SSL key, execute the following.

```
openssl genrsa -out server.key 2048
openssl req -new -key server.key -out server.csr # password 1234
openssl x509 -req -days 365 -in server.csr -signkey server.key -out
server.crt
```

5. To generate a keystore file, execute the following.

```
keytool -import -alias <keystore-alias> -file <path-to-server.crt>/
server.crt -keystore <output-path-to-keystore/rinterpreterkeystore -
storepass <keystore-secret> -noprompt
```

For example,

```
keytool -import -alias <rserve -file> <MMG_INSTALLATION_PATH>/deployed/mmg-
home/mmg-studio/conf/Rserver.crt -keystore <MMG_INSTALLATION_PATH>/
deployed/mmg-home/mmg-studio/conf/rinterpreterkeystore -storepass changeit
-noprompt
```

After execution, the following files are generated in the `<MMG_INSTALLATION_PATH>/deployed/mmg-home/mmg-studio/conf` directory.

- rinterpreterkeystore
- Rserve.conf
- Rserve.pwd
- Rserver.crt
- Rserver.csr
- Rserver.key

6. Open the `Rserve.conf` file and update the following:

**Table 16-6 Rserve.conf File**

| Parameter | Value |
|---|---|
| rsa.key | `<MMG_INSTALLATION_PATH>/deployed/mmg-home/mmg-studio/conf/Rserver.key` |
| tls.key | `<MMG_INSTALLATION_PATH>/deployed/mmg-home/mmg-studio/conf/Rserver.key` |
| tls.cert | `<MMG_INSTALLATION_PATH>/deployed/mmg-home/mmg-studio/conf/Rserver.crt` |
| maxbufsize | 1000000004 in bytes |

7. Navigate to the `<MMG_INSTALLATION_PATH>/bin` directory.
8. Open `config.sh` file and update the following parameters:
   a. **R_ENABLED**=true
   b. **RS_CONF_PATH**=`<MMG_INSTALLATION_PATH>/mmg-home/mmg-studio/conf/Rserver.conf`
   c. **RS_KEYSTORE**=`<MMG_INSTALLATION_PATH>/mmg-home/mmg-studio/conf/rinterpreterkeystore`


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d. **RS_KS_SECRET**=changeit

9. Run OFS MMG. To run, execute the following command.

```
./MMG.sh --update
```

10. Restart OFS MMG. The R interpreter will be visible in the UI and you can execute the R paragraph.
11. Navigate to the `<MMG_INSTALLATION_PATH>/deployed/mmg-home/bin` directory.
12. Open `config.sh` file and validate the following parameters:
    a. **R_ENABLED**=true
    b. **RS_CONF_PATH**=`<MMG_INSTALLATION_PATH>/deployed/mmg-home/mmg-studio/conf/Rserver.conf`
    c. **RS_KEYSTORE**=`<MMG_INSTALLATION_PATH>/deployed/mmg-home/mmg-studio/conf/rinterpreterkeystore`
    d. **RS_KS_SECRET**=changeit
13. Navigate to the `<MMG_INSTALLATION_PATH>/mmg-home/bin` directory.
14. Open `config.sh` file and validate the following parameters:
    a. **R_ENABLED**=true
    b. **RS_CONF_PATH**=`<MMG_INSTALLATION_PATH>/mmg-home/mmg-studio/conf/Rserver.conf`
    c. **RS_KEYSTORE**=`<MMG_INSTALLATION_PATH>/mmg-home/mmg-studio/conf/rinterpreterkeystore`
    d. **RS_KS_SECRET**=changeit

If users get an SSL error while executing the R interpreter, follow these steps:

1. Log in to the Linux server as root and change to the `/etc/yum.repos.d` directory.
2. Download Rserve_1.8-10.tar.gz.
3. Install openssl-devel - yum install openssl-devel
4. To install, execute the following.

```
R CMD INSTALL --configure-args="--with-ssl-headers=/usr/include --with-ssl-libraries=/usr/lib64" Rserve_1.8-10.tar.gz
```

   The following steps can be executed from R session to check that rserve configuration is working before starting the services.

5. Open the **Putty** and enter **R -version**.
6. Execute the following command.
    a. `library(Rserve)`
    b. `Rserve(args="--RS-conf <MMG_INSTALLATION_PATH>/deployed/mmg-home/mmg-studio/conf/Rserve.conf --no-save")`
7. After verifying, stop Rserve and ensure the port is free.
8. Navigate to the `<MMG_INSTALLATION_PATH>/bin` directory.


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9. Restart OFS MMG.
10. Navigate to the interpreter notebook and run the R paragraph to validate the output.

# Create a Credential

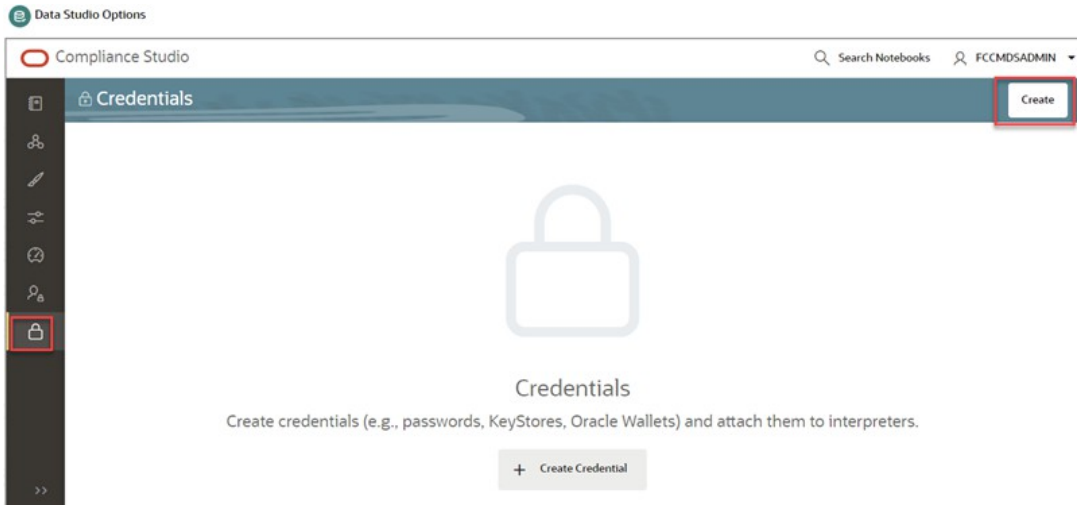
New credentials are created when database details are changed or updated. For example, change in Transparent Network Substrate (TNS) due to hostname change or compulsory periodic update of schema passwords.

Oracle Wallet provides a simple and easy method to manage database credentials across multiple domains. It allows you to update database credentials by updating the Wallet instead of having to change individual data store definitions.

To create a new password credential for the wallet, follow these steps:

1. On the Compliance Studio workspace LHS Menu, click **Credentials**. The Credentials page is displayed.

**Figure 16-27 Credentials Page**




2. Click **Create**. The **New Credential** dialog box is displayed.


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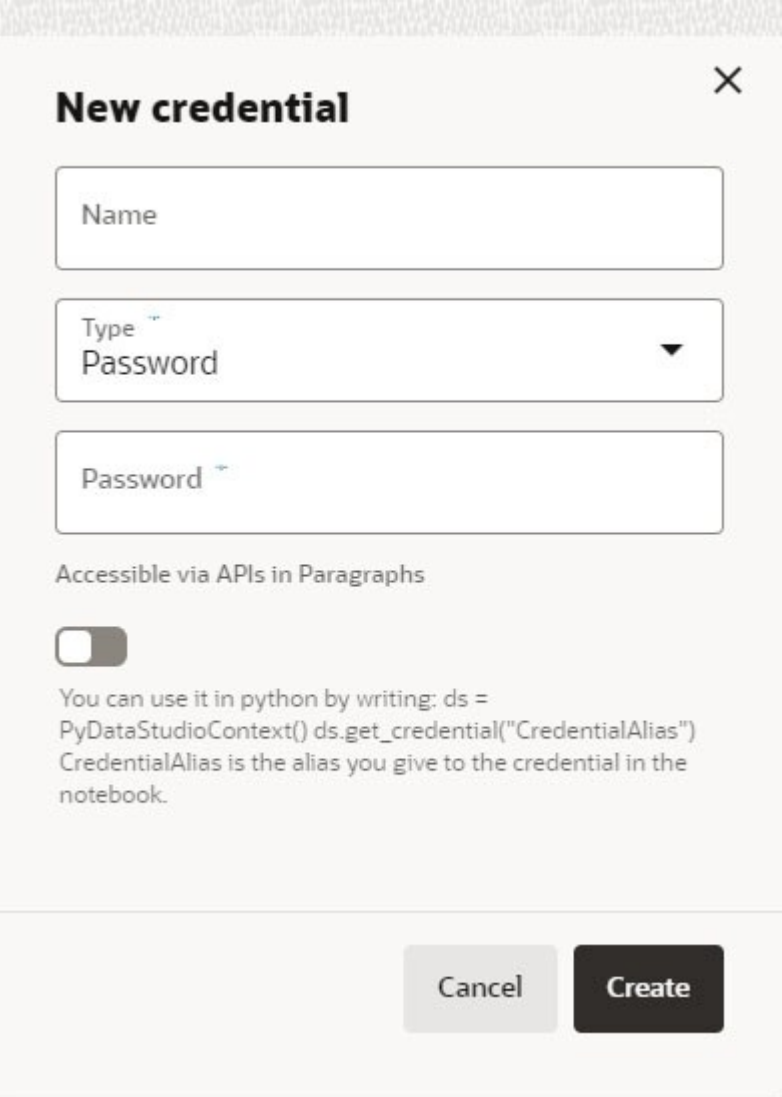
**Figure 16-28 New Credential for Password**




3. Enter the following information in the New credential dialog as tabulated in the following table.

**Table 16-7 Create Credential dialog**

| Field | Description |
|---|---|
| Name | Enter the name for the password credential. |
| Type | From the drop-down list, select the Password type. |
| Password | Enter the wallet password for the password credential. |
| Accessible via APIs in Paragraphs | Move this toggle switch to right to enable this option. |

4. Click **Create**. The password is created for the wallet and displayed on the Credentials page.

To create a wallet credential, follow these steps: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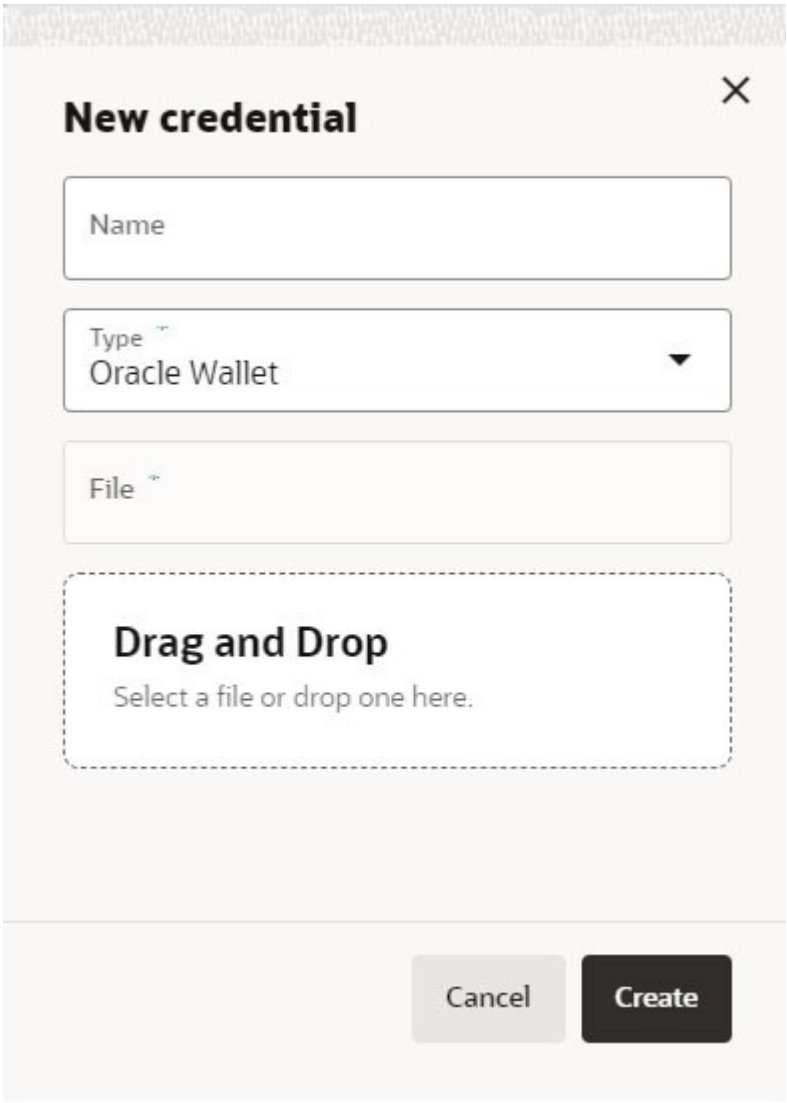
1. Click **Create**. The **New Credential** dialog box is displayed.

**Figure 16-29 New Credential for Wallet**




2. Enter the following information in the New credential dialog as tabulated in the following table.

**Table 16-8 Create Credential dialog box**

| Field | Description |
|---|---|
| Name | Enter the name for the wallet credential. |
| Type | From the drop-down list, select the Oracle Wallet type. |


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**Table 16-8 (Cont.) Create Credential dialog box**

| Field | Description |
|---|---|
| File | Upload the wallet zip file that includes the following files:<br>• `tnsnames.ora`<br>• `ewallet.p12`<br>• `cwallet.sso`<br>These files are available in the `<COMPLIANCE_STUDIO_INSTALLATION_PATH>/wallet` directory.<br>**Note**:<br>• The wallet file must be in .zip format.<br>• The maximum file size allowed for the credential file is 128Kb. |

3. Click **Create**. The wallet credential is created and displayed on the Credentials page.

# Link Credentials

Compliance Studio provides secure and safe credential management. Examples for credentials are passwords, Oracle Wallets, or KeyStores. To link credentials (a wallet and a password) to the jdbc interpreter variant to enable secure data access. This linking enables the jdbc interpreter to securely connect to the specified Oracle Database. You can also create new credentials to connect to the new interpreter variants based on your requirement. For more information, see Create a Credential section.

> **Note**
>
> You can link credentials only for jdbc interpreters. The Credential section is enabled if an Interpreter variant can accept credentials.

To link ready-to-use credentials to the required interpreters, follow these steps:

1. On the Interpreters page, select the required interpreters. For example, jdbc.
2. Navigate to the Credentials section.


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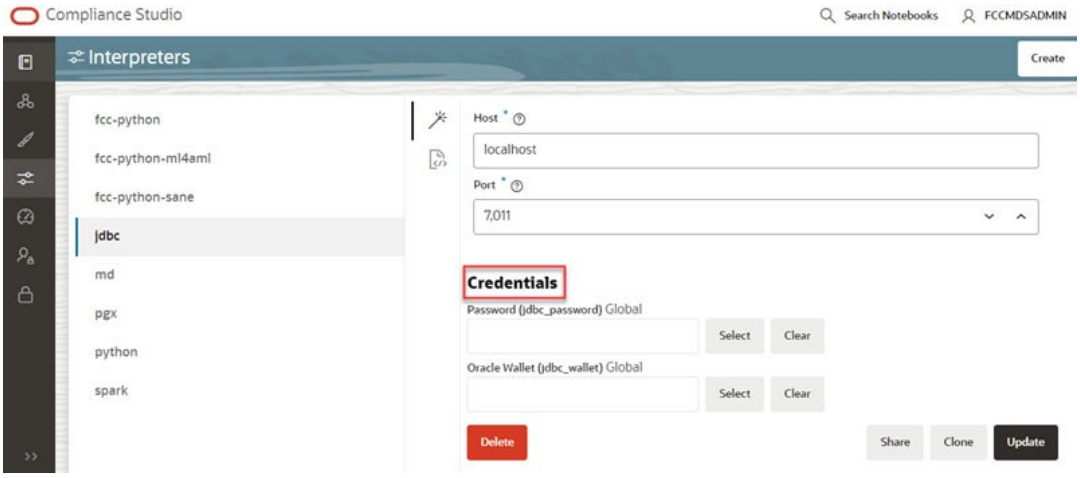
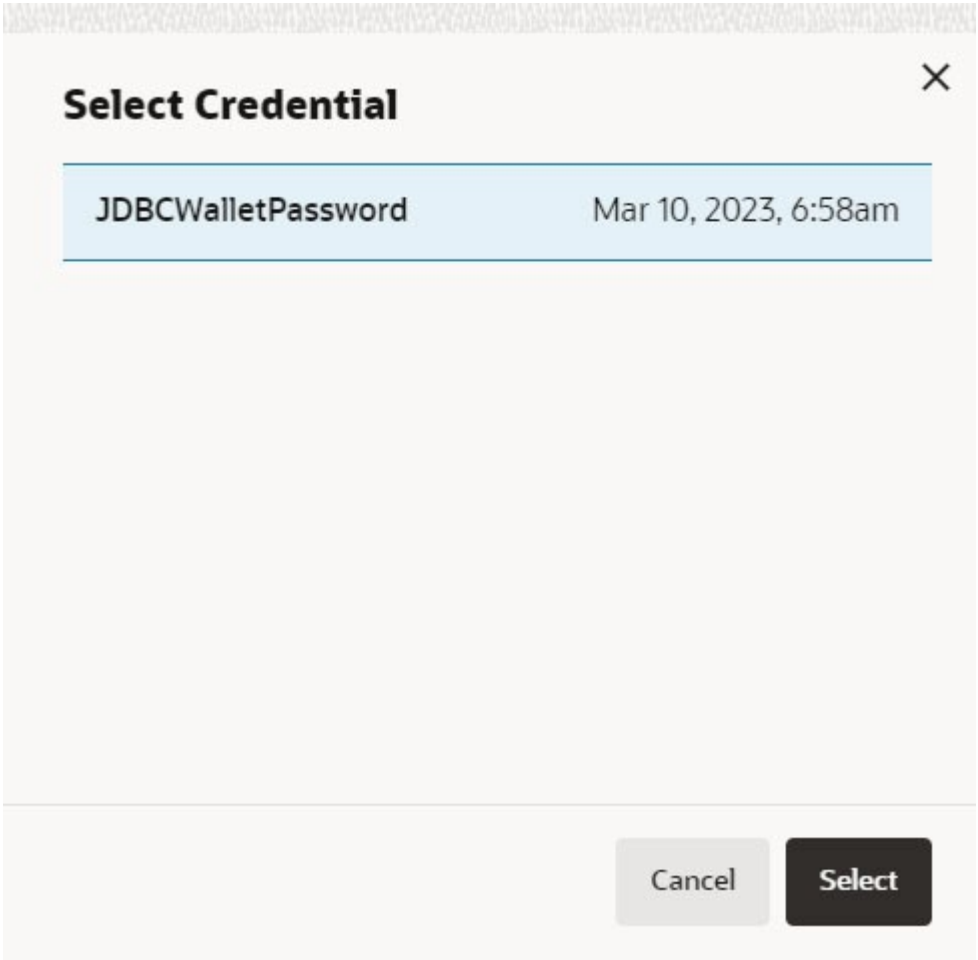
**Figure 16-30 Credentials**




3. Click **Select** to select the Password (jdbc password) that you want to link to the Interpreter variant. The Select Credential dialog is displayed.

**Figure 16-31 Select Credential**




4. Select the required Password (jdbc_password) and click **Select**.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5. Click **Select** on the Credentials section to select the Oracle Wallet (jdbc_wallet) that you want to link to the Interpreter variant. The Select Credential dialog is displayed.
6. Select the required Oracle Wallet (jdbc_wallet) and click **Select**.
7. Click **Update** on the Credentials section to save the changes.

   The required password and Oracle Wallet are linked to the jdbc Interpreter.
8. Restart Compliance Studio.

# Create an Interpreter Group

In Compliance Studio, you can either use a default interpreter group or create a new group for an interpreter. You can create more than one group for an interpreter. Multiple groups for an interpreter are created to connect different versions of interpreters (Python version: 3, Python version: 2) and connect a different set of users and database schema. For example, Compliance Studio schema, BD schema, etc.

To create a new interpreter group, follow these steps:

1. On the Interpreters page, click the required interpreters from the LHS list. For example, jdbc interpreter.
2. The default interpreter group is displayed on the RHS.
3. On the default interpreter, click **Clone** button to create a new group. The Create Interpreter Group dialog box is displayed.
4. Enter the Name for the new interpreter group. Click **Create**. A new group is created with a name, **<Interpreter Type>.<Group Name>.**
5. Provide the new schema details, such as the default.url, default.user, and default.password.

# Clone an Interpreter

You can either use a default interpreter group or create a new group for an interpreter. You can create more than one group for an interpreter.

Multiple groups for an interpreter are created to connect different versions of interpreters (Python version: 3, Python version: 2) and connect a different set of users and database schema. For example, Compliance Studio schema, BD schema, etc.

1. Log in to the Compliance Studio application.
2. Launch the **CS Production** Workspace.
3. Click the **User Profile** drop-down list and select **Data Studio Options**.
4. Click **Interpreters**.

   By default, the Interpreters page lists all the available interpreters.
5. Click **jdbc** interpreter on the LHS. The default configured interpreter variant is displayed on the RHS:


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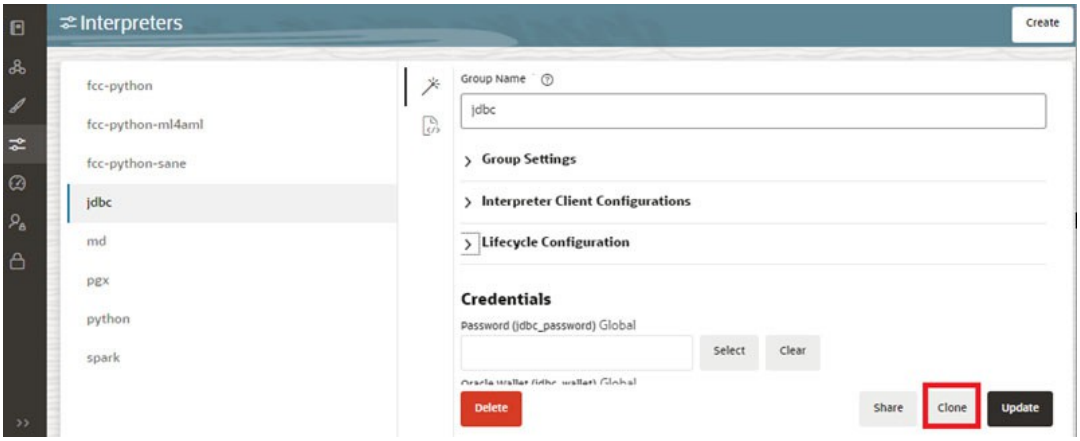
**Figure 16-32 jdbc interpreter screens**




6. Click **Clone** on the RHS. The pop-up window displayed for the group name.
7. Enter the group name in the **Group Name** text box and click **Create**. The new group is created and displayed on LHS.
8. Enter **Name** for the new interpreter group.
9. Click **Create**. A new group is created with a name, **<Interpreter Type>.<Group Name>**.
10. Provide the new schema details, such as the default.url, default.user, and default.password.

    You can modify the values in the interpreter properties in the JSON file or Wizard view.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# 17
# Data Management and Datasets

Manage physical schema objects and data population, then create and transform datasets. The procedures also cover profiling, model monitoring, data drift, fairness, lineage, audit and dataset caching. These operations are distinct from STSA Data Catalog metadata ingestion.

## Chapter contents

17.1 Data Management 17-2

17.2 Datasets 17-19

Source: MMG 26.2.0 User Guide. Procedures, screenshots and examples are incorporated into this STSA 8.1.2.8.0 draft; release-specific statements retain their source status.


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# 17.1 Data Management

The Data Management module allows you to efficiently manage data stores within a workspace. It provides key features for importing both data models and data from the source schemas. With features like data modelling and data population, users can replicate database structures, create data ingestion jobs, and schedule or manually run those jobs to bring in new data. This module simplifies schema integration, supports data migration, and ensures consistent data flow across environments.

Data Management also has a feature where you can view the structure of the database object.

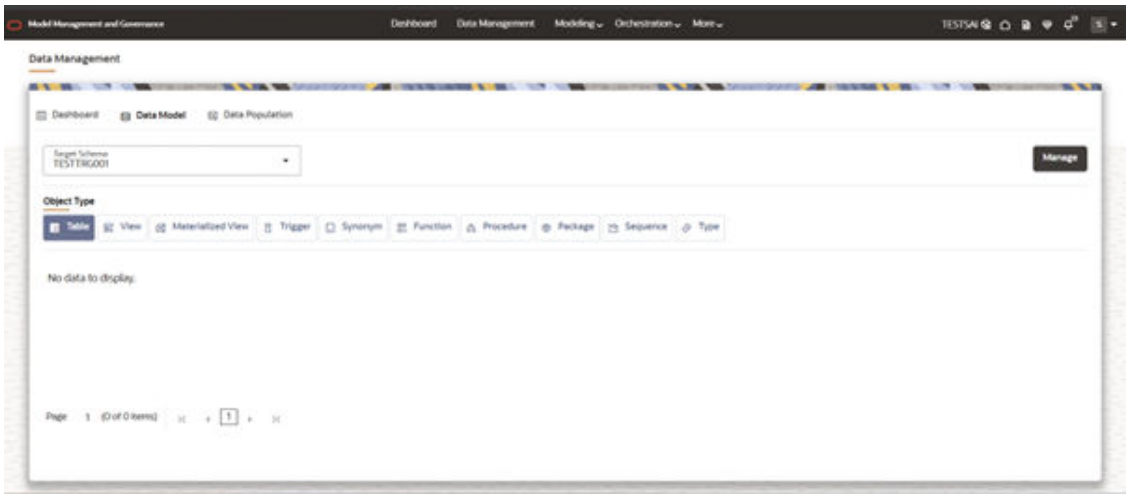
The previous data management group **DMADMIN** has been removed and now individual groups; **MMGDATAPOPLNADMIN** for data population and **MMGDATAMODELADMIN** for the data model has been added. Each of these groups has individual roles and functions for edit, view, link, delete etc.

> **Note**
>
> Currently, Hive Data Stores does not support Data Management.

# Data Modeling

Data Modeling refers to the process of replicating database objects from a source schema to a target schema. During this process, the structural definitions and metadata of the database objects are transferred to the target environment. This replication ensures that the logical design and structural components of the database are accurately maintained across schemas, supporting development activities for modelers. Database Objects are tables, views, functions, triggers, synonyms, Materialized views, procedures, packages, Sequences, and types.

**Figure 17-1 Data Modeling tab**





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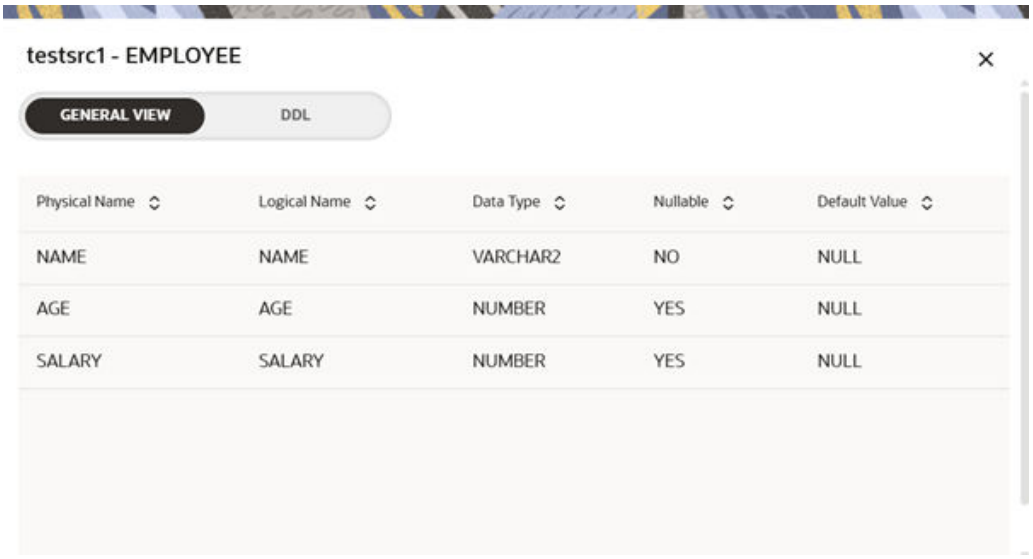
- **Database Objects List menu**
  - The interface displays a list of database object types. Users can select any object type to view the corresponding objects available within the schema.
- **Target Schemas Dropdown**
  - The user can select the target schema from a dropdown menu. Based on the selected target schema, the system will display the corresponding list of database objects—filtered by the selected object type—in the left panel.
- **Database Objects List**
  - A table displays the list of database objects based on the selected object type and schema. This table includes the source schema name, object name, and a **View** option.
    * The **View** option allows users to view the DDL (Data Definition Language) of the selected database object, along with a **Generic View** (applicable only for tables and views).

> **Note**
>
> The **Generic View** presents a simplified tabular representation containing details such as column name, data type, nullability, and default value.

  - **Figure 17-2 Data Definition Language View**





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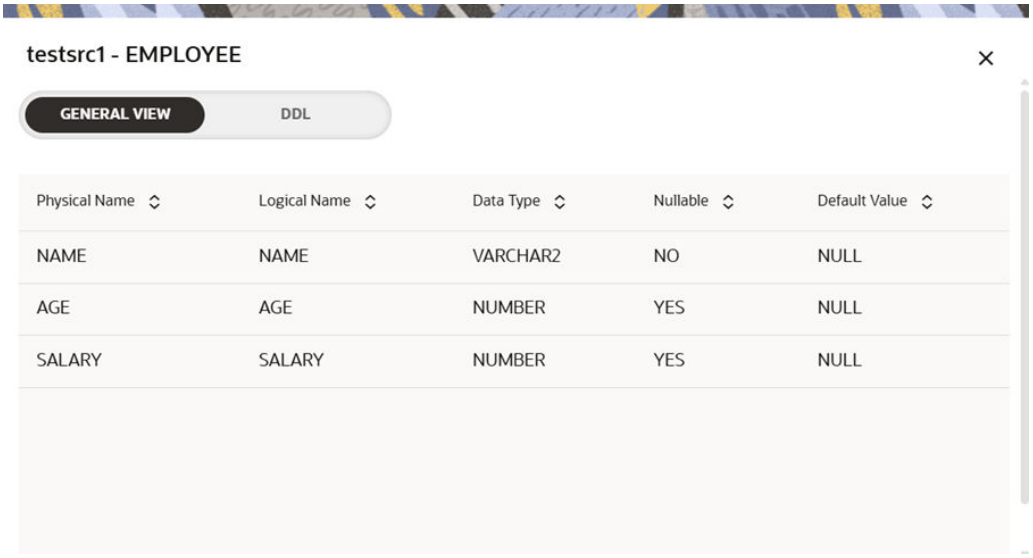
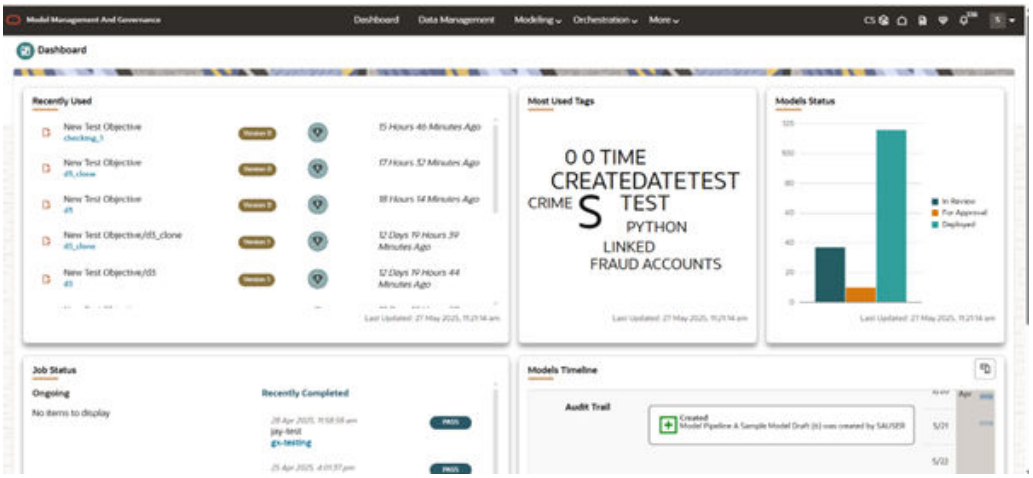
– **Figure 17-3 Generic View**




- **Tree View and Add Item buttons**
  - **Tree View:**
    1. Clicking this option opens a new tab within the Data Management UI, titled [TargetSchemaName] - Modeling.
    2. This view provides a hierarchical structure to assist users in creating and organizing new data models.
  - **Add Item:**
    1. This button opens a pop-up window that facilitates data modeling for the selected database object type (as chosen from the left panel).
- **Steps/Process of Data Modeling**
  1. Launch any workspace where you wanted to do **Data Modeling** and go to **Data Management** tab from main menu.

**Figure 17-4 Data Management tab from main menu**




2. Click **Data Model** sub-tab.


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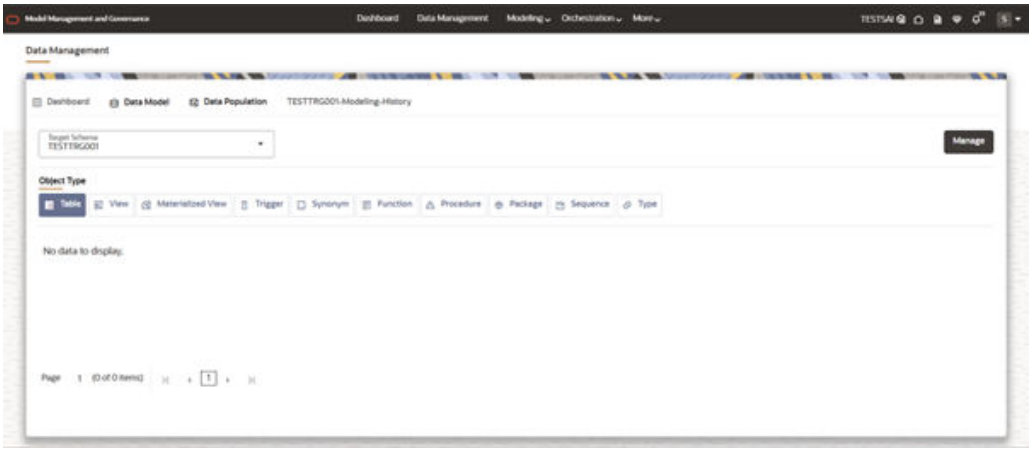
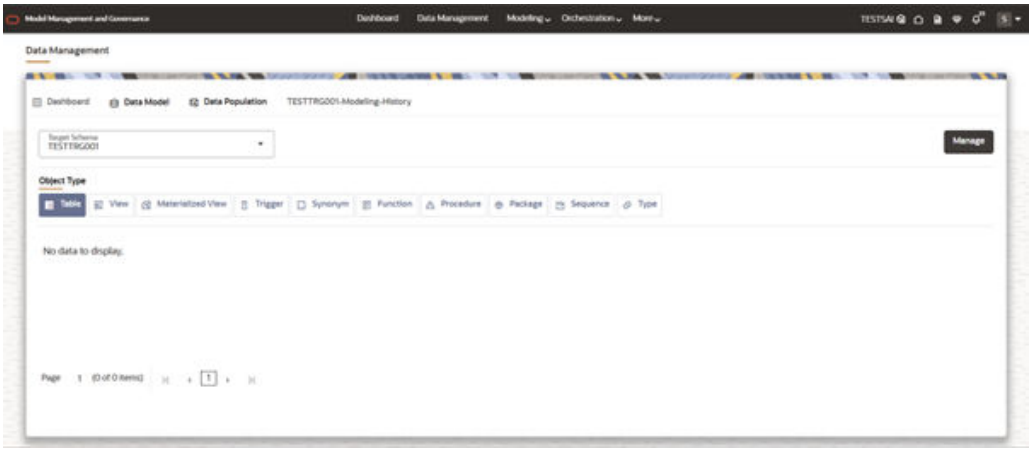
**Figure 17-5 Data Model sub-tab**




3. This tab contains the **Table Schema** drop-down list, **Object Types** and the list of schemas.
4. Click **Manage** to open a new tab within the MMG- Data Management UI.

**Figure 17-6 Manage button tab**




5. When a new tab opens, it includes the following components:
   - **Source Schema Drop down:**
     a. Allows the user to select the desired source schema for Data Modeling. Users can switch between multiple Source Schemas and select the required database objects from each—all in a single Modeling session.
   - **Left panel:**
     a. Contains an object type drop down and a search bar for filtering.
     b. Displays a table listing the available database objects based on the selected type and schema.
   - **Right panel:**
     a. If the user is initiating Data Modeling for the first time, this panel will be empty.
     b. As the user selects database objects from the Left panel, they will be added to and displayed in the Right panel for further configuration.


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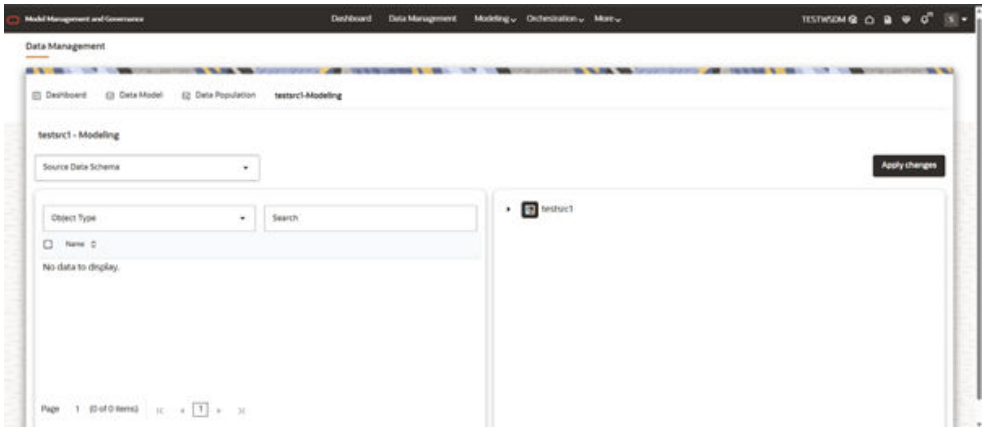
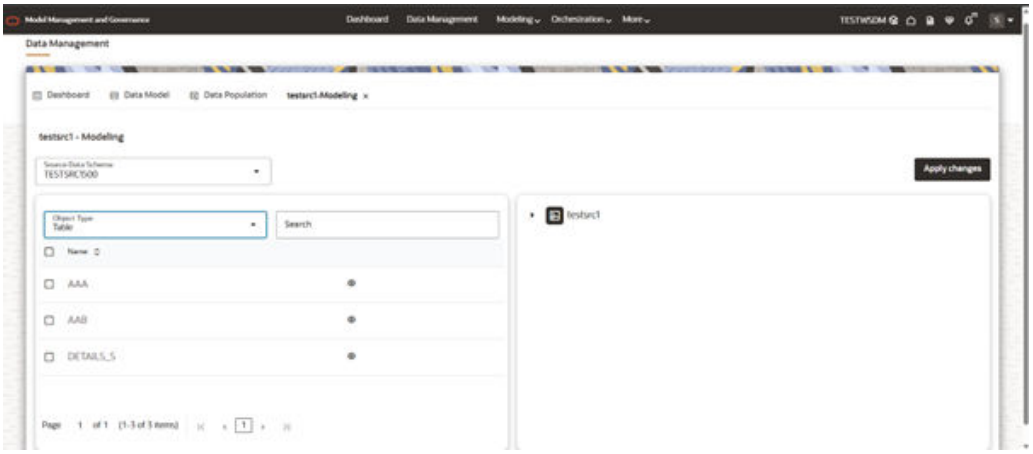
**Figure 17-7 Left panel and Right panel**




6. Now the user can choose source schema from where user wants to bring in the database objects.
7. After selecting the Source Schema, the user can choose the desired database object type from the left panel. The table in the left panel will then display all available database objects that match the selected type and schema.

> **Note**
>
> Each database object listed in the table includes an eye icon. Clicking this icon opens a pop-up that provides both the **DDL View** and the **Generic View** of the selected object.

**Figure 17-8 DDL and Generic View of the selected object**




8. User can choose the required and the selected ones automatically comes into the right panel in following structure.
   a. **Source Schema-Name1**: DB object type 1, DB Object 1 2, DB Object 2.
   b. **Source Schema-Name2**: DB object type 1, DB Object 1 2, DB Object 2.


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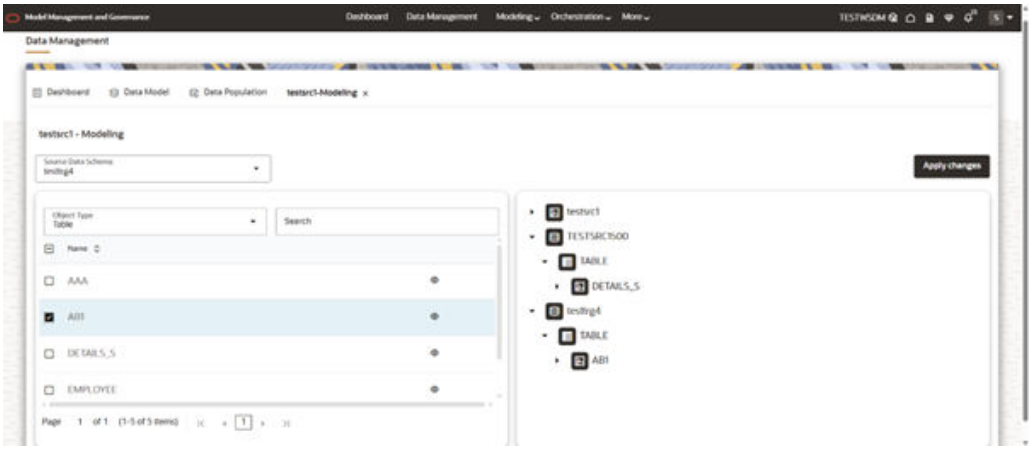
**Figure 17-9 Source Schema Name**




9. Once all the required database objects are selected, the user can click the **Apply Changes** button to initiate the Data Modeling process. On triggering, a confirmation pop-up will be displayed, indicating that the Data Modeling process has started. This tab will automatically close after a few seconds.

**Figure 17-10 Apply Changes button**

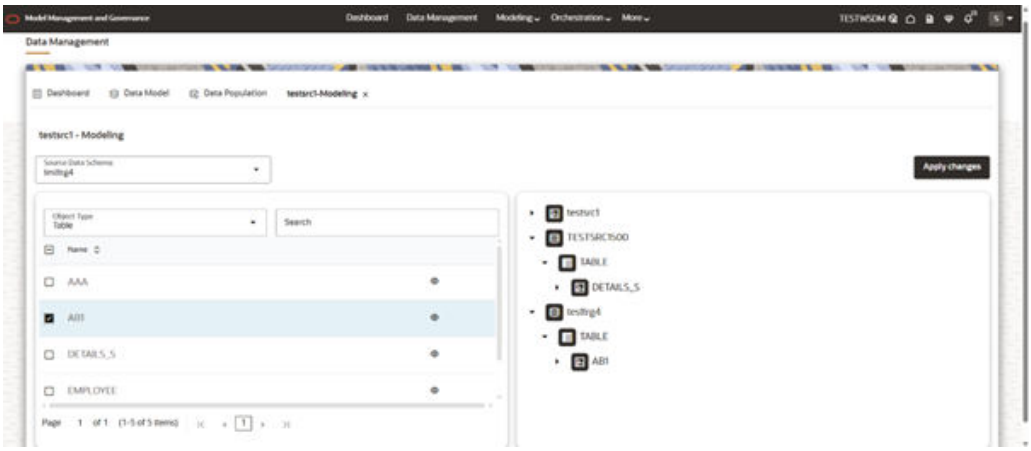
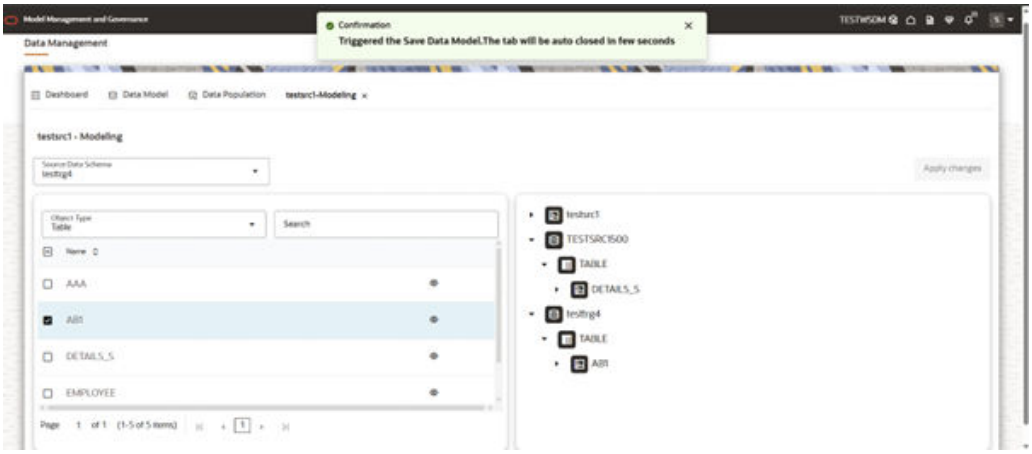



**Figure 17-11 Confirmation message**





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> **Note**
>
> The user can choose database objects from multiple Source Schemas at a time. The user can also choose multiple database object types at a single time.

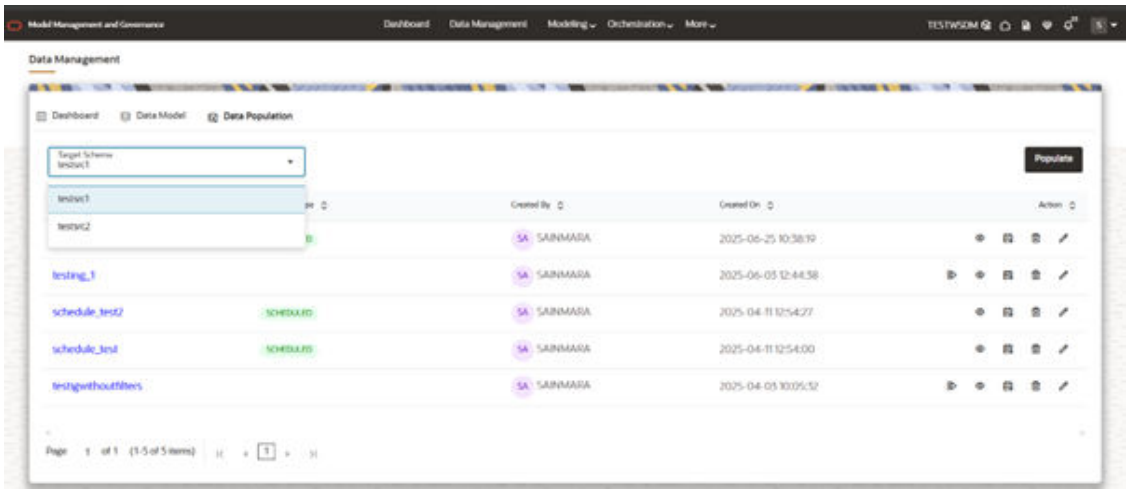
> **Note**
>
> For a selected Target Schema, if any previous Data Modeling is in progress, the user is not allowed to do another Data Modeling.

# Data Population

Data Population is about getting the data of tables from Source Schemas to Target Schema by applying the filters at table level and global level. Data is very important aspect of Modeling and we need data to be up to date, so keeping this point we have came up with scheduling idea for Data Population which periodically refreshes the data in the tables.

**Data Population tab**

**Figure 17-12 Target Schema selection and populate button**




**Target Schemas dropdown**

- It will show list of Target Schemas mapped to current workspace.
- We can select any Target Schema, by default 1st one is selected (The one which is selected firstly in workspace creation step 2).
- By choosing one schema, it will show the list of data populations that are created as a table.

**Populate button**

- This button helps to create a new Data Population.
- By clicking on this, user will be taken through few steps for creating a Data Population.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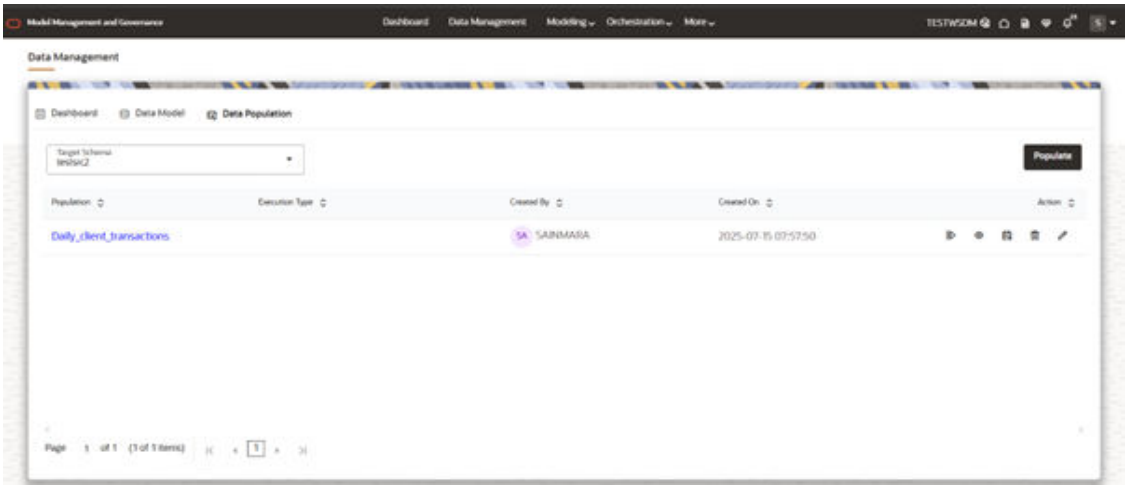
### Data Population List

- This will show the list of populations that created for the selected Target Schema (From dropdown).

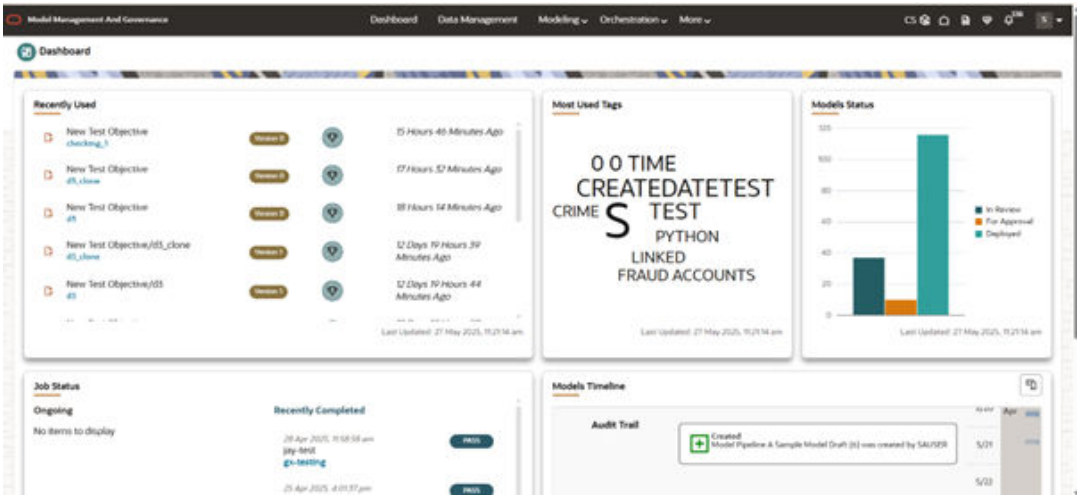
**Figure 17-13 Data Population List**




### Steps of Data Population

1. Launch any workspace where you wanted to do Data Population and go to Data Management tab from main menu.

**Figure 17-14 Data Population Dashboard**




2. Click on Data Population sub-tab.


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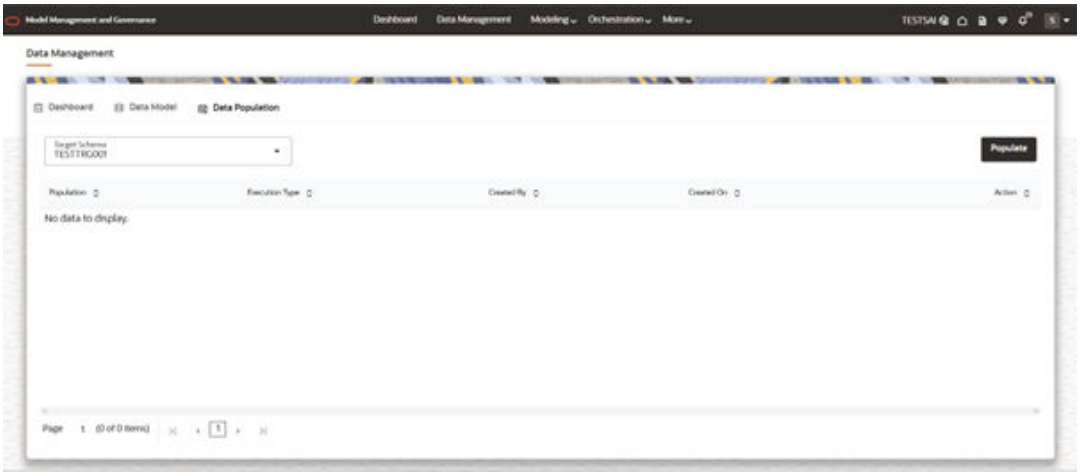
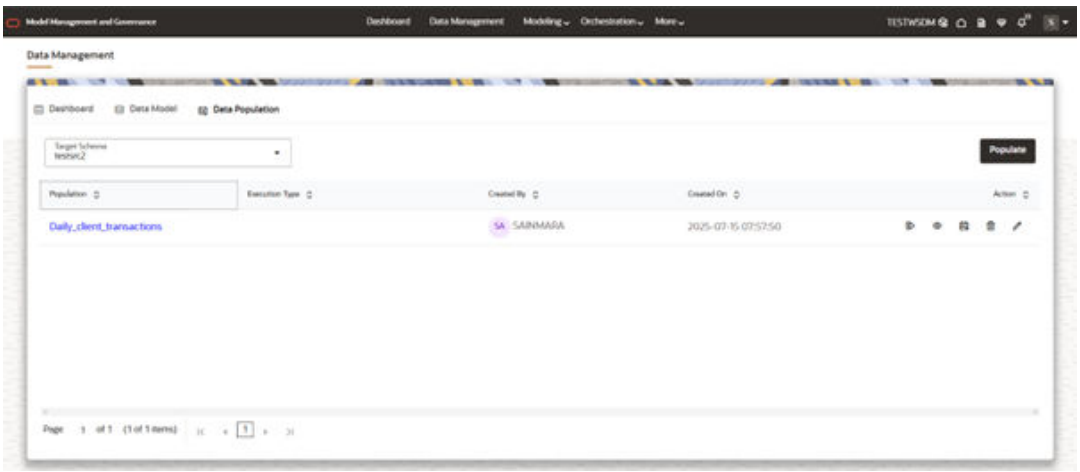
**Figure 17-15 Data Population Sub-tab**




3. Now the user can see the list of Data Population which are created. When we launch for first time, it will be empty.
4. Click on Populate button, which will take you through the step-by-step process to create a new Data Population.

**Figure 17-16 New Data Population**




5. Now a drawer will open on the right side where it consists of the following stages:
   - Basic Information
   - Table Selection
   - Fetch Configuration
   - Schedule
6. **Basic Information**
   - Here user need to provide the basic information about Data Population Name and can choose the Target Schema for which user wants to create Data Population.
     **For example**: Data Population Name –> Daily_client_transactions, Target Schema –> Testtrg3


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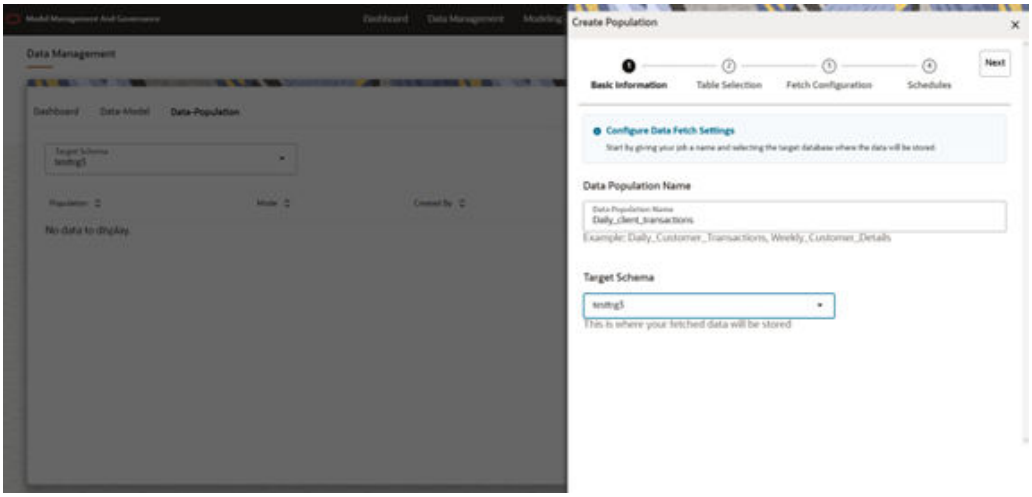
**Figure 17-17 Basic Information**

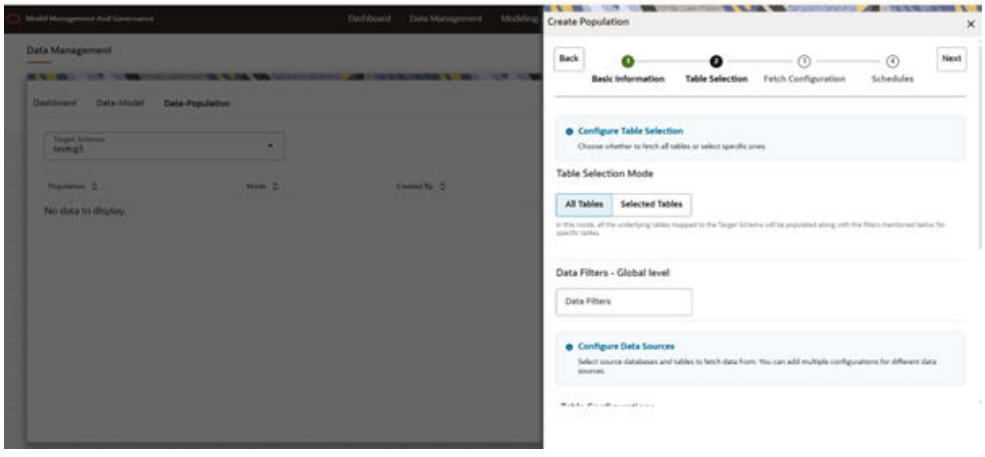



7. **Table Selection**

   - This step includes tables selection mode and table filters to be seeded.
   - **Table Selection**
     - Table selection mode is about to refresh All tables data or Selected tables data.
     - We have two modes in this: All tables and Selected tables, where All tables fetches data for all the tables from Source Schema to Target Schema, by applying the filters. Selected tables are the ones that have been selected as part of Table Filter Configuration, for fetching data.

> **Note**
>
> All tables mean the tables that are created by using MMG in Target Schema.

**Figure 17-18 Table selection and global filter**




   - **Table Filters**
     - Table filters are applied to the tables when fetching the data from Source table. We have Global Filters and Table level Filters: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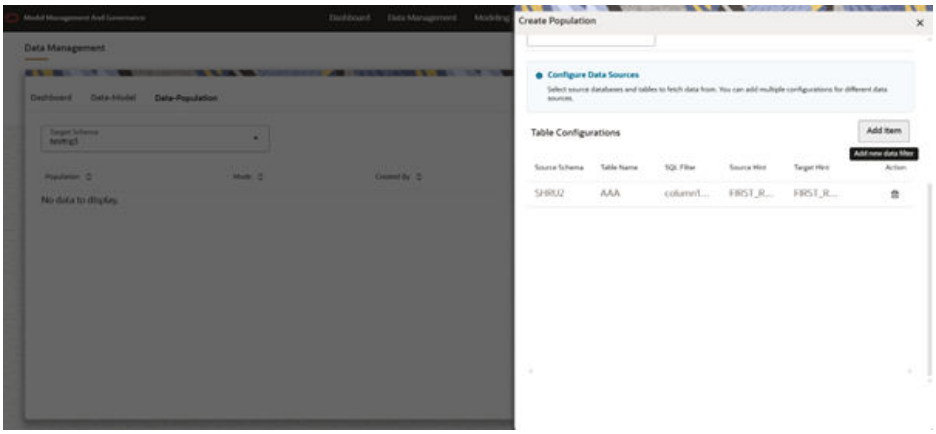
- **Global Filter**: This filter will be applied to all the tables that are part of data population. If the individual table have any table level filters then this is not applied to the specific table.
- **Table Level Filters**: This filter can be applied to individual table level. Click on Add item. This will add an empty row in the table where we need to fill the details of Source schema, table name, SQL Filter, Source Hint, Target hint.
  a. **Source Schema**: This is dropdown where it lists the Source Schemas, which are already mapped to this Target Schema.
  b. **Tables**: This is dropdown, where we select a table from list of tables, this list of tables is the tables list that are selected when doing data modeling or workspace creation step.
  c. We can select more than one table.
  d. **SQL Filter**: This is the filter that will be applied to the tables that are selected and used while fetching the data.
  e. **Source Hint**: You can provide database Hints at table-level, Source hint is applied in the source schema while fetching the Data from Source.
  f. **Target Hint**: You can provide database hints at table-level, Target hint is applied in the Target Schema while doing the inserting Data to Target.

**Figure 17-19 Table Level Filters**




8. **Fetch Configurations**
   - This has mainly three configurations:


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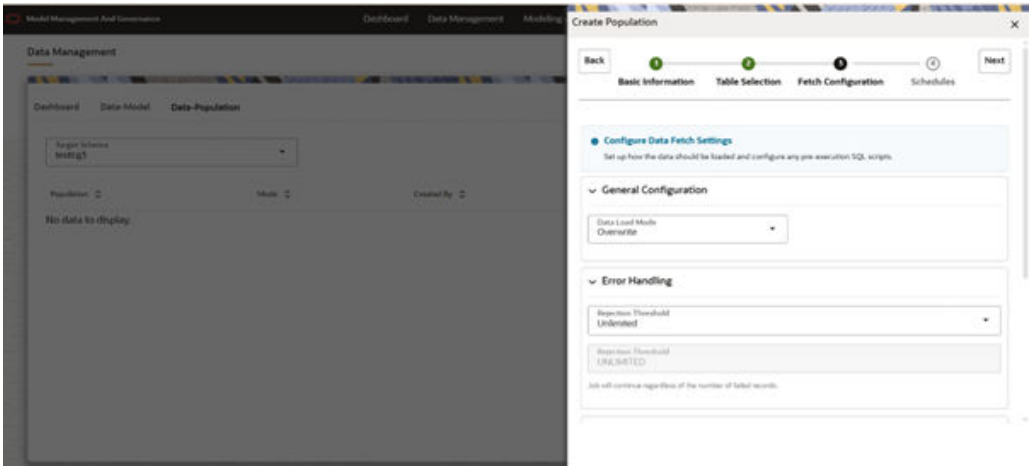
**Figure 17-20 General Configuraitons and Error Handling**




a. **General Configurations**

   – It has data load mode dropdown, where we have two options: Overwrite and Append.

   – Overwrite mode: In this mode, the underlying tables are truncated (overwritten on existing data) followed by an insert operation.

   – Append mode: In this mode, the underlying tables will be populated (added to the existing data) in the append mode.

b. **Error Handling**

   – It has Rejection Threshold configuration, whereby default it is set to Unlimited. So Here, all the errors will be ignored during the data population.

   – We can also set a custom rejection threshold, for this we need to change the dropdown value to Custom Rejection Threshold, which in turns enables the input box for giving custom value. You can provide the maximum number of inserts that can fail while loading data to a given table. In case of threshold breach, all the inserts into the table will be rolled back. However, it will continue populating to the next table.

c. **Performance Configuration**

   – This consists of Fetch Size, Batch Commit Size, Source prescript, Target prescript.

   – **Fetch Size**: Enter the Fetch size of JDBC properties for data upload. By default it is set to 10. Therefore, every time it fetches 10 records from the available records.

   – **Batch Commit Size**: Enter the Batch Commit size of JDBC properties for data upload. By default it is set to 1000.

   – **Source Prescript**: Enter the source prescript of JDBC properties for data upload.

   – **Target Prescript**: Enter the target prescript of JDBC properties for data upload.


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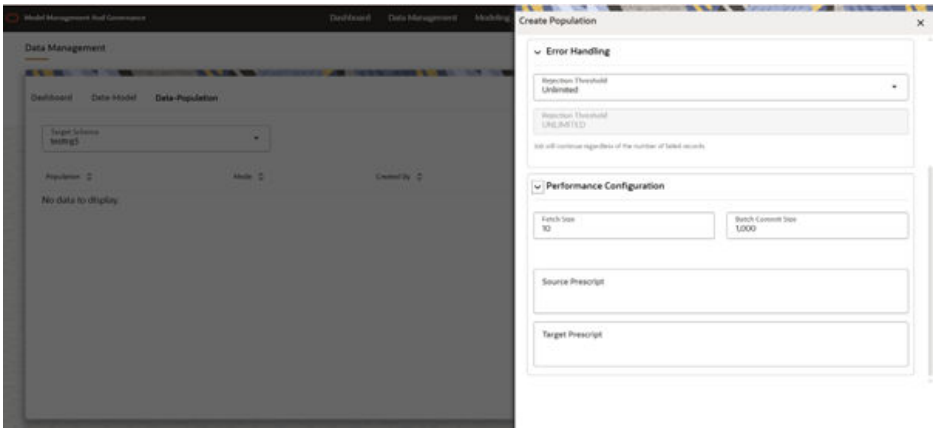
**Figure 17-21 Performance Configuration**



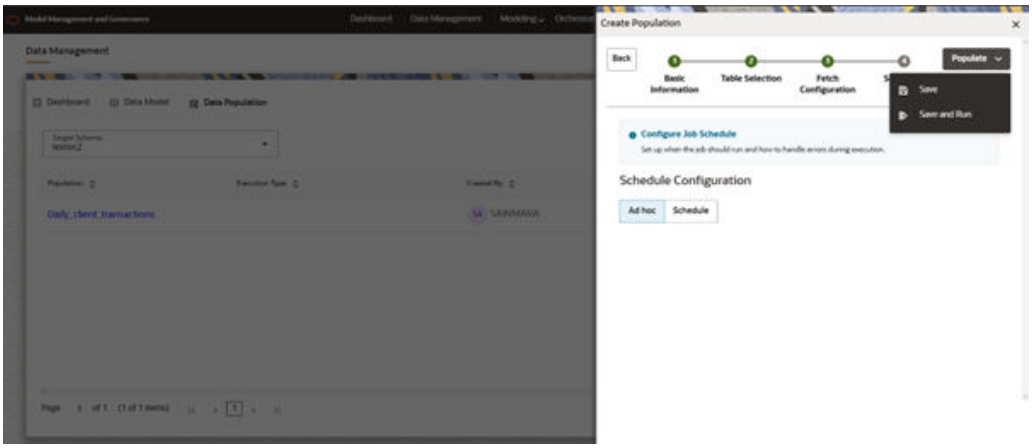

9. **Schedules**

   a. We have two options Ad hoc and Schedule, when Ad hoc is selected Populate button at the right acts as drop down and gives two options **SAVE** and **SAVEANDRUN**.

   b. **Save Mode**: In this mode, after filling all the details we will save this configuration. This population can be run manually from the data population lists screen.

   c. **Save And Run Mode**: In this mode, after filling all the details we will save this configuration and run the population once. This population can be run manually from the data population lists screen.

**Figure 17-22 Save and Run option**




   d. If the selected mode is SCHEDULE, then we need to choose whether we need to bring data Daily/Weekly/Monthly/CRON.

      i. Based on mode we need to fill in few details.

      ii. **DAILY**: We need to configure Start Date, End Date and Time when schedule should run daily.

      iii. **WEEKLY**: We need to configure Start Date, End Date, Time and Days of week when schedule should run.

      iv. **MONTHLY**: We need to configure Start Date, End Date, Time and Months of year and day of the month when schedule should run.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v. **ONCE**: We need to configure Start Date and time when schedule should run.

vi. **CRON**: We need to give a CRON Expression.

e. Once after giving the information then we need to click on populate.

**Figure 17-23 Schedule Type options**

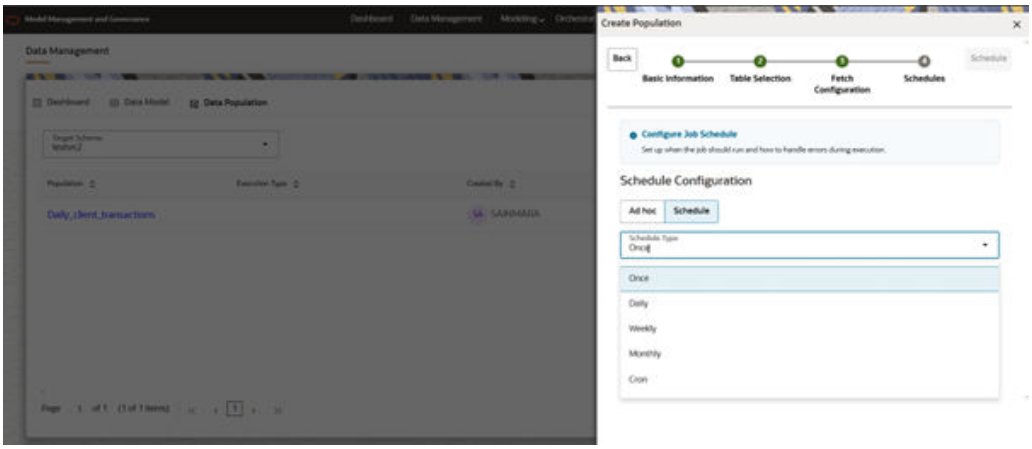


**Figure 17-24 Schedule Daily options**

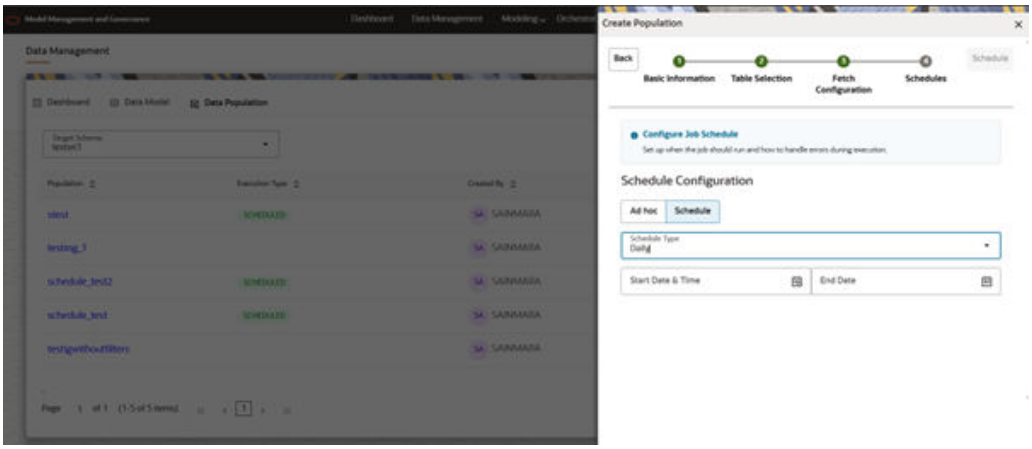



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**Figure 17-25 Schedule Weekly options**

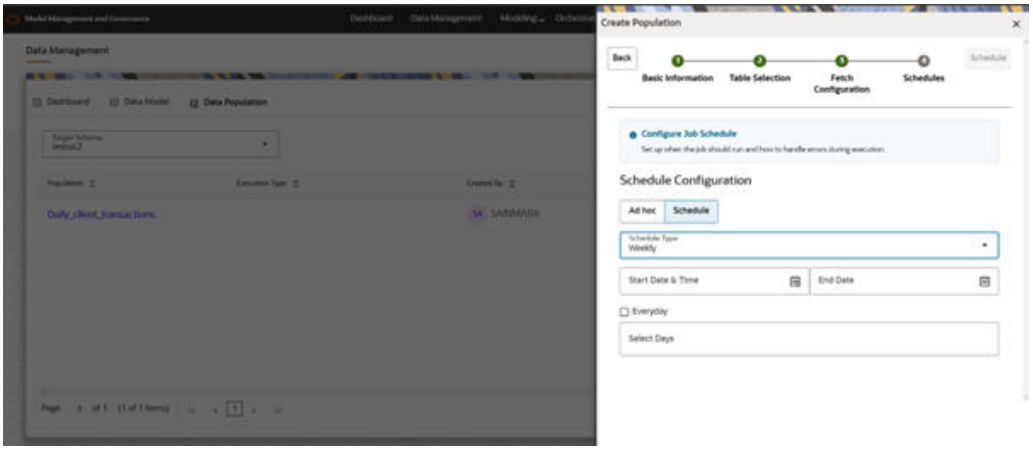


**Figure 17-26 Schedule Monthly options**

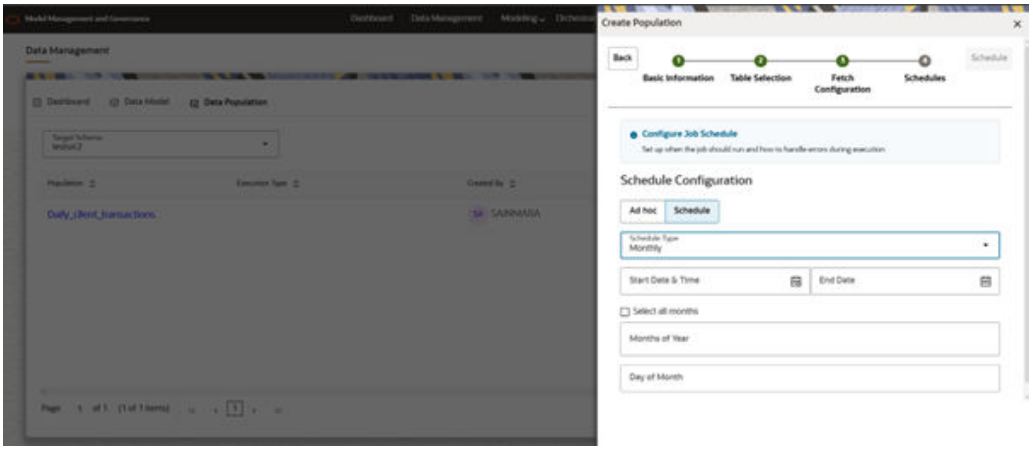


**Figure 17-27 Schedule Cron Expression**

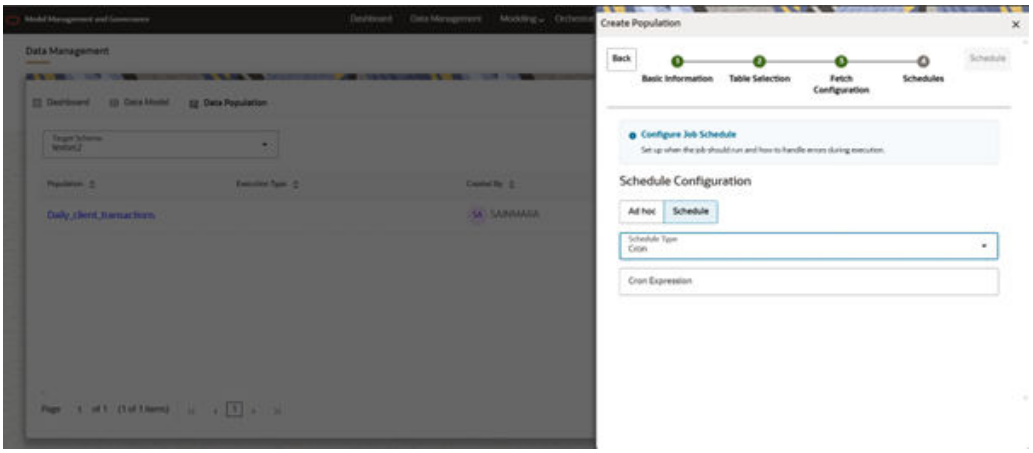



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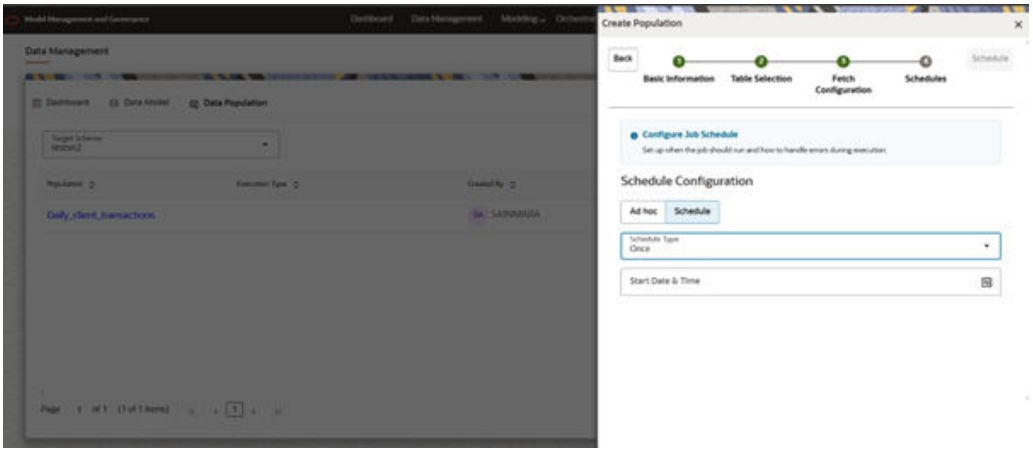
**Figure 17-28 Schedule Once options**




### Data Populations List Action buttons

There are Actions associated to every Data Population based on mode (**SCHEDULE**, **SAVE** OR **SAVEANDRUN**).

### Common Actions

1. **DELETE**: When user click on this, it deletes the Data Population.
2. **EDIT**: This option will open a drawer and enables users to edit the data population information which consists of Table level filters, Global filters, Table selection mode, General configuration, Error Handling, Performance Configuration.
3. **VIEW**: When the user clicks on this, it opens a new tab and show the information related to the population.

### SAVE or SAVEANDRUN Mode Actions

1. **RUN**: We can Run the data population which is already configured. When we click on this the data population is triggered.
2. **SCHEDULE**: We can schedule a data population which is created in this mode. We convert the manually triggered data population to Scheduled one.

### SCHEDULE Mode Actions

1. **RESCHEDULE**: This option enables the user to re-schedule already existing scheduled data population.


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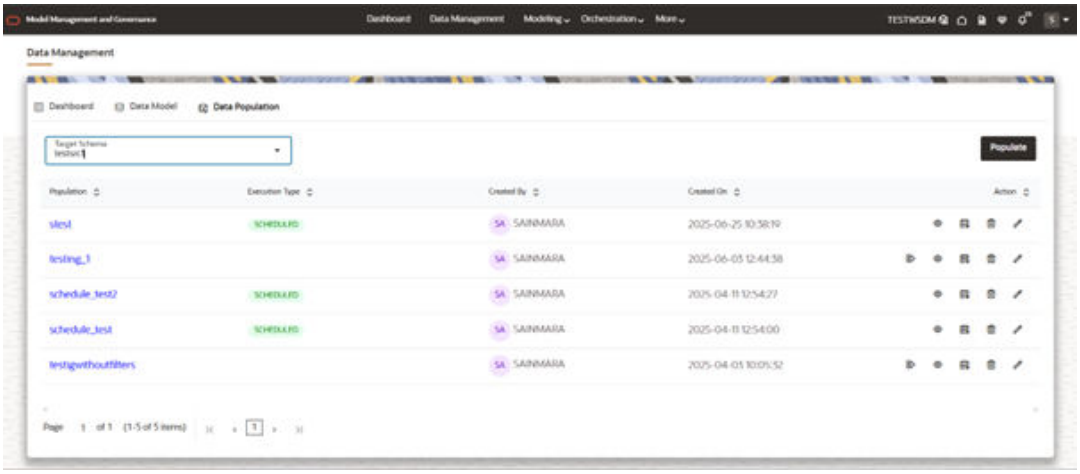
**Figure 17-29 Data Population List Actions**





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# 17.2 Datasets

Modeling covers the following:

- **Datasets**: Explore data, engineer features, and monitor data drifts.
- **Model Libraries**: Manage python libraries to create and use models.
- **Model Techniques**: Manage techniques and algorithms from registered model libraries.
- **Model Catalog**: A centralized hub for all your machine learning models.
- **Pipelines**: Design, deploy and govern end-to-end machine learning pipelines for seamless model development.
- **Graphs**: Analyze complex relationships within your data through interactive graph representations.

# Dataset

You can define a metadata about how you want to create a dataset and also take a snapshot of real time data and store it, which you can later use in the pipeline.

This is similar to T2Ts, where you can select data from Data Source, such as file, table or another dataset and so on. The data can be imported from one column of one table, and another column from another table, or any file. After extracting the data from tables or files, provide the name to Target Dataset.

The Dataset is a trail-based UI that allows you to configure the Dataset details.

## Access the Dataset Summary

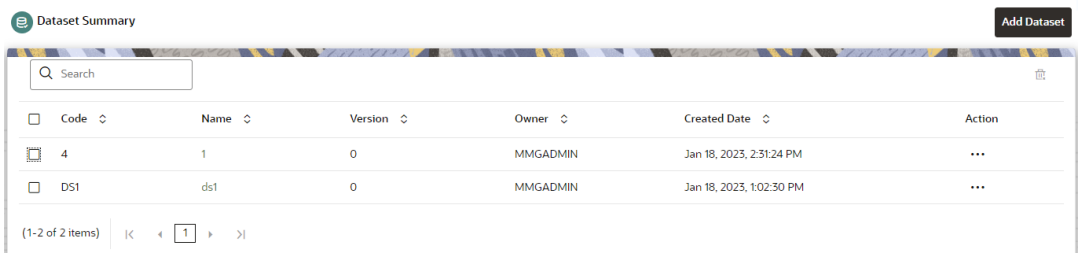
The Dataset Summary page gives access to the various Dataset functions such as create, view, and delete.

To access the Dataset Summary page, follow these steps:

1. Click **Launch Workspace**next to corresponding Workspace to Launch Workspace to display the **Dashboard** window with application configuration and model creation menu.
2. In the LHS menu, click **Dataset** to display the **Dataset Summary** window.

   This window displays the dataset records in a table.

**Figure 17-30 Dataset Summary page**





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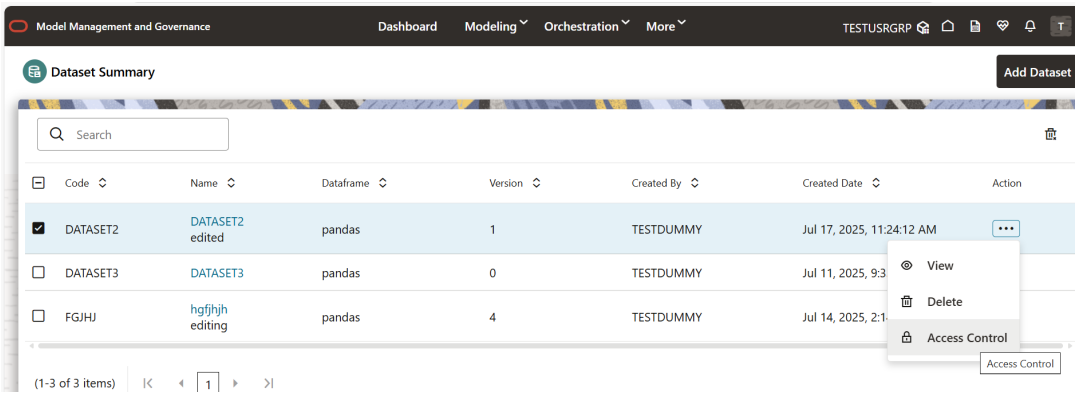
The following table provides the descriptions for the fields and icons on the Dataset Summary page.

**Table 17-1 Fields and icons on the Dataset Summary page**

| Field or Icon | Description |
|---|---|
| Search | The field to search for Dataset.<br>Enter specific terms in the field for which you want to search, and press Enter on the keyboard to display the results. |
| Code | The code of the dataset. |
| Name | The name of the dataset. |
| Description | The description for the Workspace |
| Version | Version of dataset |
| Created Date | The date on which the Dataset was created. |
| Owner | The owner of the dataset. |
| Add Dataset | Click Add Dataset to create a new Dataset. |
| Delete | Click Delete to delete multiple Datasets. |
| Action | Click the three dots to perform View/Delete/ Access Control functions on selected dataset. |

**Figure 17-31 Access Control Menu option under Action**




Access Control Pop has two Access Level Radio button: Restricted Mode and Public Mode.


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**Figure 17-32 Restricted Mode**

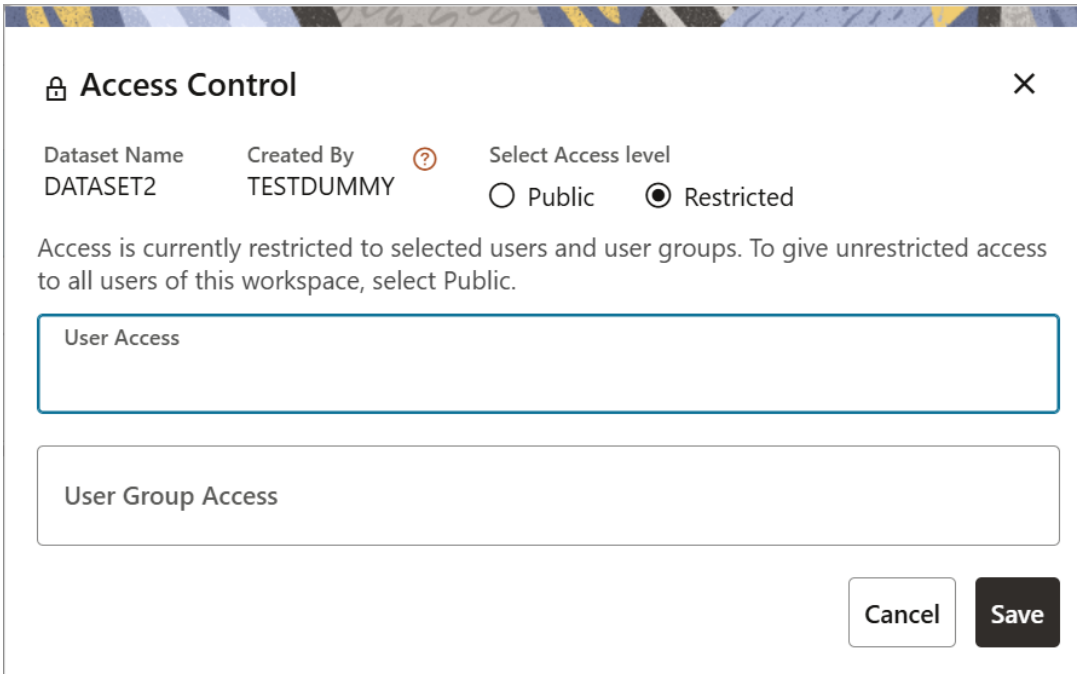
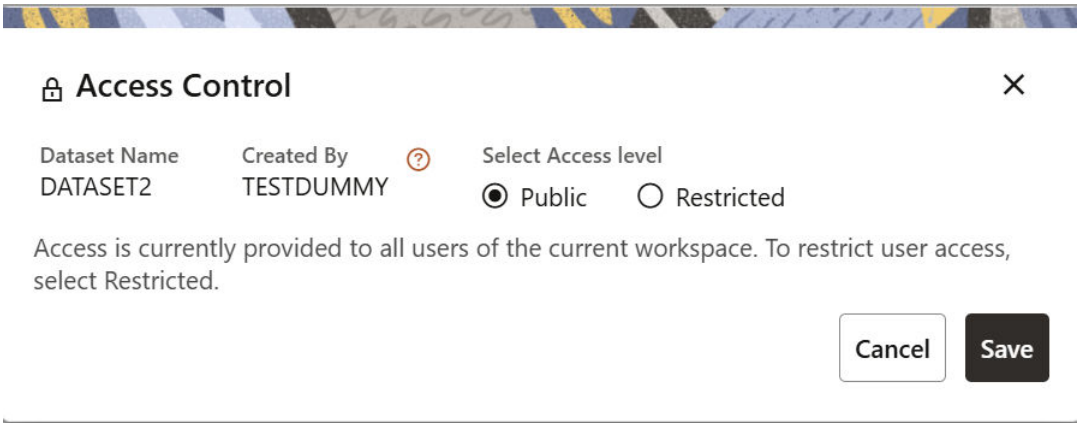



**Figure 17-33 Public Mode**




The Access Control pop-up have the below details:

- Dataset Name
- Created By
- Info
- Select Access level with two radio button options: Public and Restricted
- User Access and User Group Access should list all the users present in the Identity Management
- Cancel button
- Save button


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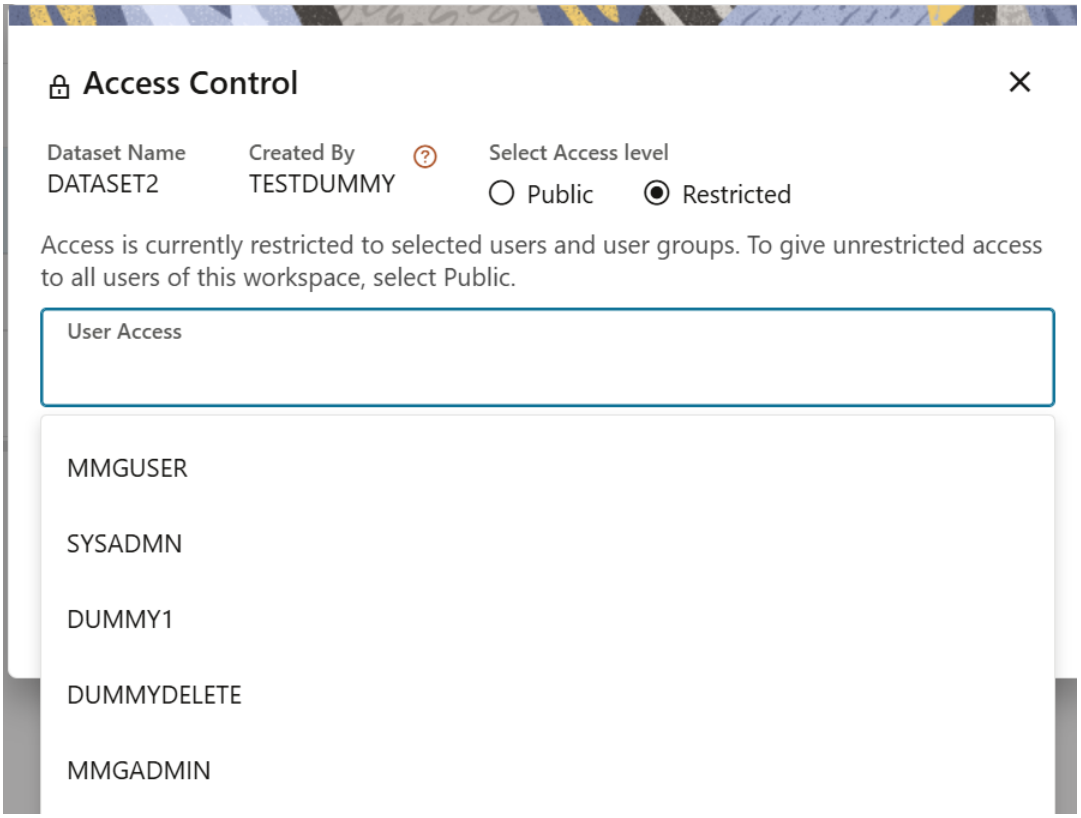
**Figure 17-34 Access Control User Dropdown**




The Access Control User Groups dropdown fetches all the User Groups present in the Identity Management.


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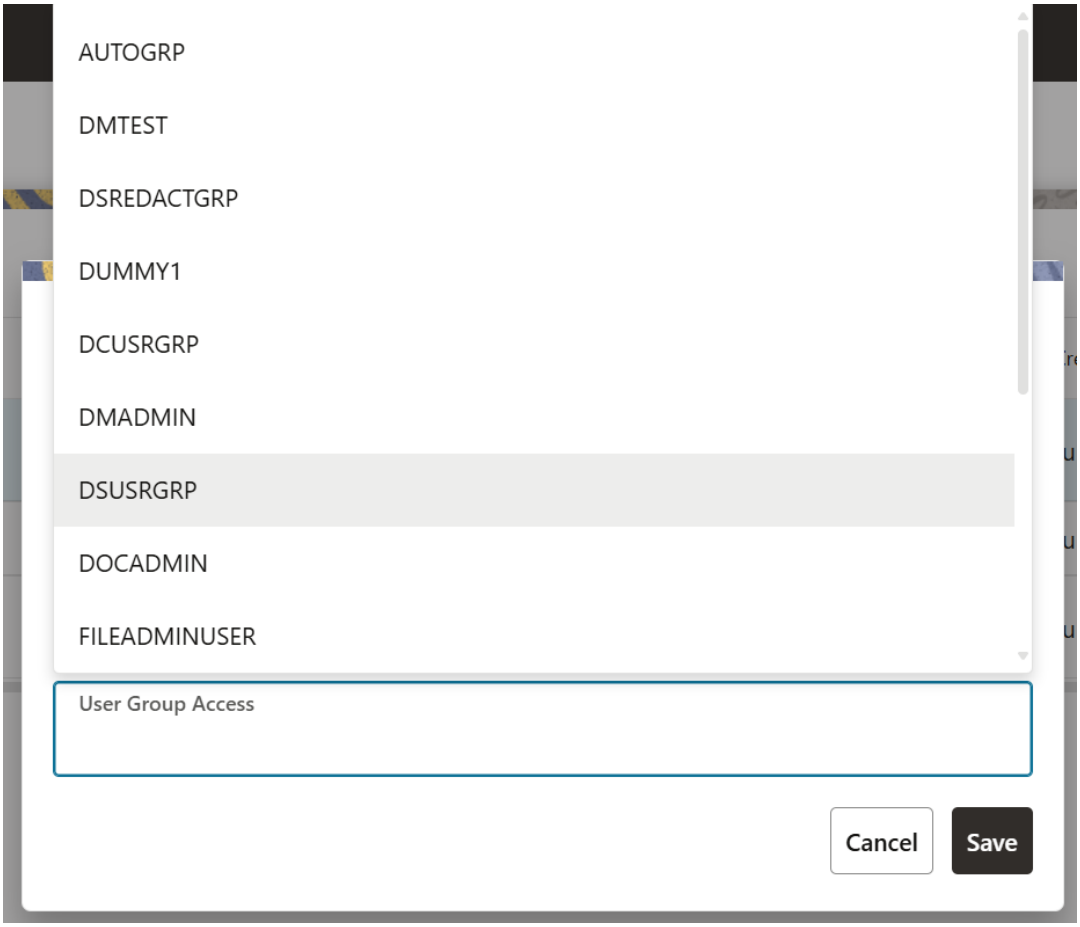
**Figure 17-35 Access Control User Groups dropdown**




# Create a Dataset

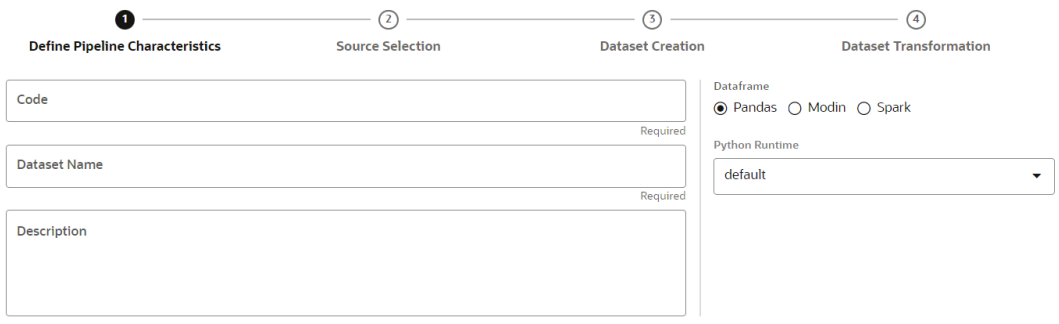
The Dataset creation requires entry of the source of dataset and validation. These datasets are required for schema creation.

## Creating a Dataset

To create a Dataset:

- On the Dataset Summary page, click **Add Dataset**.

**Figure 17-36 Dataset Creation window**





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Provide the following information to create a Dataset:

- Define Pipeline Characteristics
- Source Selection
- Dataset Creation
- Dataset Transformation

## Define Pipeline Characteristics

Enter basic configuration details in this window.

To configure the basic details for the dataset:

1. Enter the required details in the **Define Pipeline Characteristics** window as shown in the following table.

**Table 17-2 Details for Basic Details pane**

| Field | Description |
|---|---|
| Code | Enter the identification code of the dataset.<br>This field is limited to 30 alphanumeric characters. |
| Dataset Name | Enter the name of dataset.<br>This field is limited to 30 alphanumeric characters. Space not exceeding 30 characters. You cannot keep this field blank. |
| Description | Enter the purpose of the creation of the dataset.<br>This field is limited to 150 alphanumeric characters. Space not exceeding 150 characters. |

2. Select the data library from the options: **Pandas**, **Modin**, or **Spark** and select **Python Runtime** from the drop-down and click **Close**.
   - **Pandas**: An open-source data manipulation library for Python. It provides data structures such as Series (1-dimensional) and DataFrame (2-dimensional) that allow for easy manipulation and analysis of data. It also provides tools for reading and writing data to various file formats, including CSV, Excel, and SQL databases. **Pandas** is the default selection.
   - **Modin**: An open-source library that allows for faster operations on DataFrames using distributed computing which can lead to significant speed improvements, particularly for large datasets or computationally expensive operations.
   - **Spark** : Pyspark option for scaling dataset.
     If Spark library is selected, the Python Runtime drop-down option is not displayed.
3. Click **Next** to go to the next step.

## Source Selection

This section allows you to define the source of data. Here, you can choose the data structures from an existing datasources. Click on the icon next to Data Source field to view the tables/ data source information associated with the data source.

To configure the Source details for the dataset, follow these steps:

1. Select the required **Data Store** from the drop-down.

   OR


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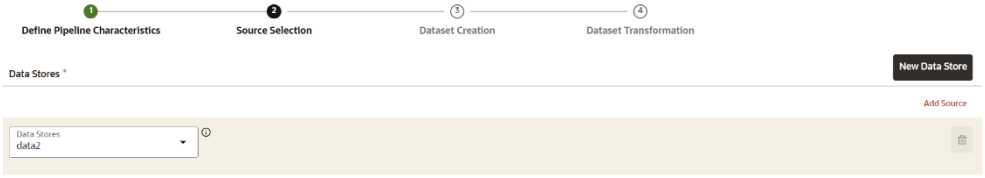
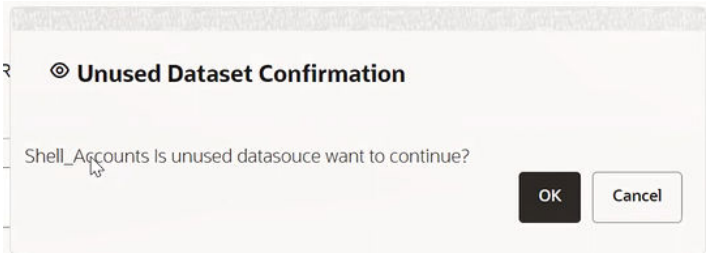
Click **New Data Store** to create a data source.

**Figure 17-37 Source Selection Details screen**




> **Note**
>
> The MISDATE feature is displayed only when the Data Source field is selected as a **File Type**.
> If enabled, you need to add the Physical and Feature name for the Data Source.

**Table 17-3 Details for Basic Details pane**

| Field | Description |
|---|---|
| Data Stores | The Data Stores drop-down list shows all the data sources and the data dorms those are tagged with the corresponding workspace. In addition, this lists all the available unused data source, which can be used. You can search the data sources by clicking on **Data Store information** icon. A confirmation message is displayed to tag an unused datasource with workspace.<br><br>**Figure 17-38 Unused Dataset Confirmation message**<br><br><br><br><br>Here, either use the unused or create a new datasource using **New Datasource**. When you create a new datasource, it becomes as unused.<br>You can add more Data Sources using **Add More** link.<br>Use **Delete**to delete added Data Source. |

2. Click **Next** to go to the next step or click **Previous** to go back to previous step.

## Create a Dataset

This window allows you to select entity part (for example, column of table) of the datasource. The data source selected in the previous step requires the definition of database objects to be used.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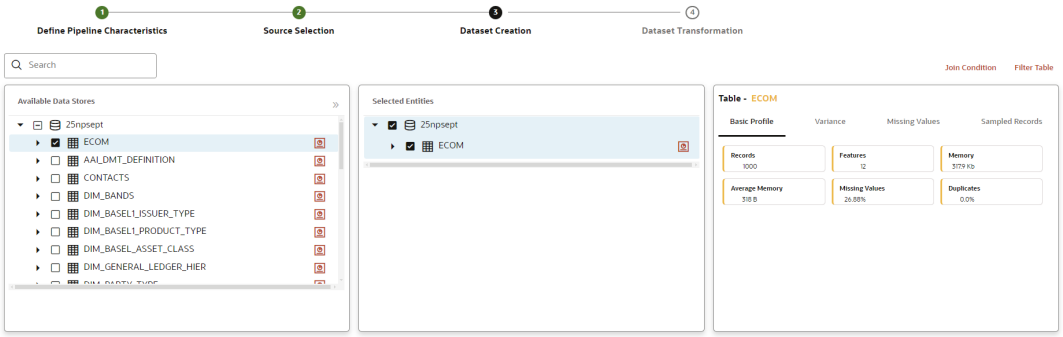
To configure the Dataset Creation:

1. Select the required data source from the **Available Data Sources** pane and click >> to move the selected data to **Selected Entities**pane. The **Available Data Sources** section shows the high-level data sources. You can select data from multiple data source entities. The selected Data Sources are displayed in **Selected Entities** pane. You can use to select or use to de-select the data in the **Selected Entities** pane. Additionally, clicking on **View Profile** icon displays the profile details in the **Basic Profile** tab.

**Figure 17-39 Dataset creation page**




2. For more information on Joins, see Joining Tables section.

   For more information on Filtering, see Filtering Tables section.

3. Click **Next** to go to the next step or click **Previous** to go back to previous step.

## Joining Tables

Use Join Condition to combine the data source details. Each data sources have multiple tables and multiple columns, so you can join them using Join Condition window. Joins can be applied only when user has selected more than one table.

**Figure 17-40 Join tables**




You can join Tables either using drop-down or using the Joinscript option.

### Using Drop-down

Select the Column name of Table from the drop-down list. You can use multiple join conditions by using icon.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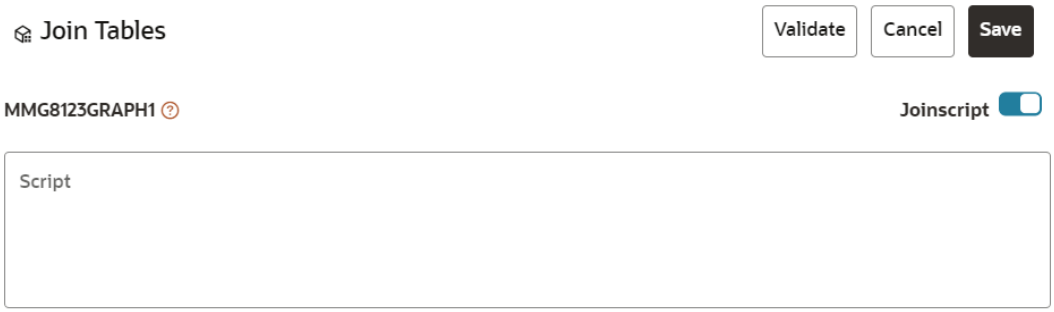
> **Note**
>
> In the current release, only INNER JOIN is present.

### Using Script

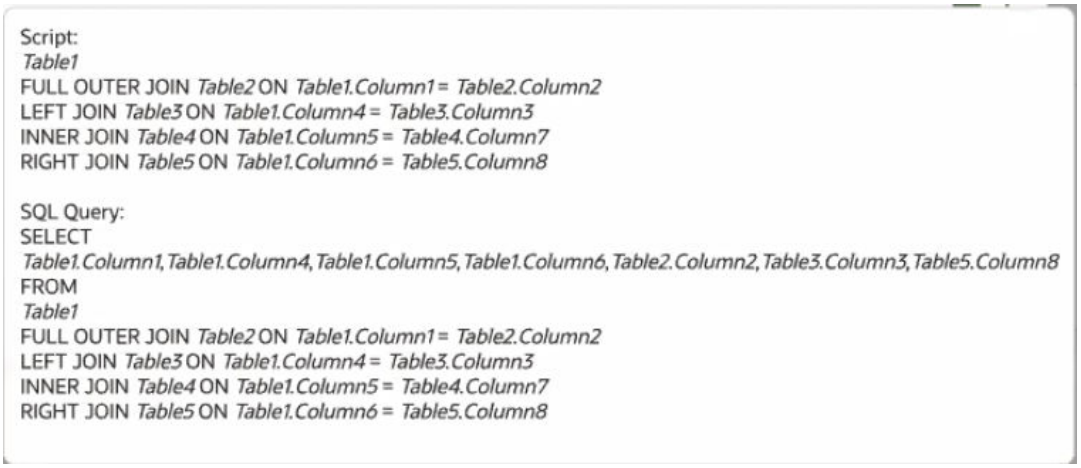
1. To use script, enable **Join Script** option.
   The Join Tables window is displayed to add scripts.

**Figure 17-41 Join Tables window**




You must provide the script in below format:

**Figure 17-42 Script**




2. Click Validate to check the Join conditions.
3. Click Save.

## Filtering Tables

You can also use the filters in dataframe creation from entity.

1. Click **Filter Table** to navigate to Filter tables window.


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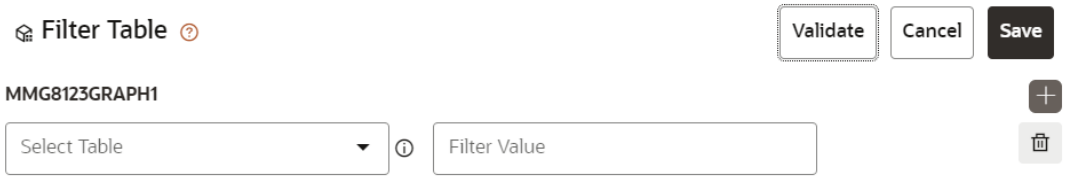
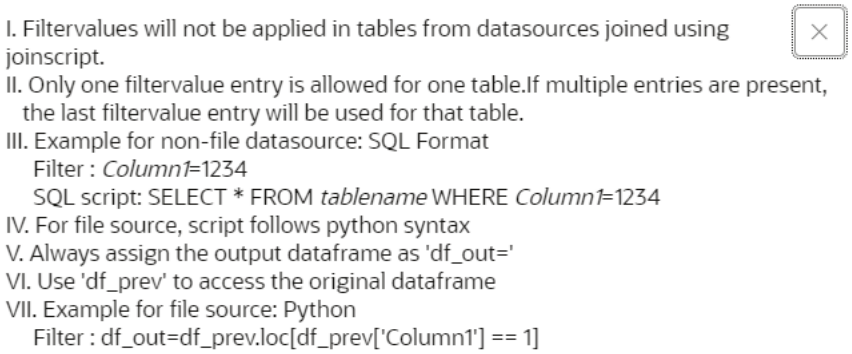
**Figure 17-43 Filter Table**




There are certain rules to be followed when adding filters.

**Figure 17-44 Rules to be followed when adding filters**

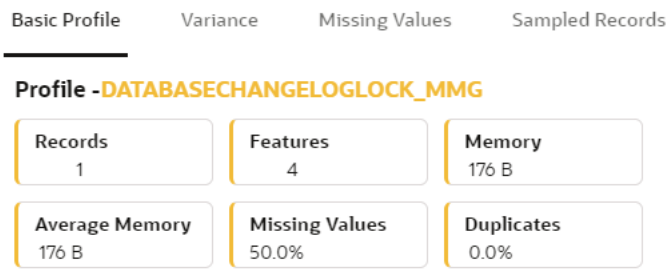



2. Multiple filters can be added by using **Add**.
3. Click **Validate** to check the Filter conditions.
4. Click **Save**.

## Viewing Profile

The Profile section from RHS shows the report based on Selected Objects (complete dataset) section. For example, Missing Values report shows the details of missing data in selected table in Selected Objects section.

**Figure 17-45 Selected Objects section**





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## Dataset Transformation

This window allows you to transform the data source information. This complete grid displays the Table like structure, which helps you to make the data better using many methods, such as by remove all the missing values, performing scaling and so on.

This window shows the following columns:

- **Physical Name**: Shows the Physical Name of column.
- **Feature Name**: Shows the Feature Name of column along with its data type. You can edit the Feature Name.
- **Observations**: The Observations field shows the value of column. For example, if any column is missing any value, you can easily identify missing value columns. Use Transformation button to fix these values.
- **Create Feature**: To create a new feature/column by doing operations on the existing features.
- **Calculate Fairness**: You can calculate the fairness metrics of the dataset by choosing the required metric, target variable, and protected features. For more details, see Fairness section. Click Help icon for more details on how the fairness is calculated.
- **View Report**: To view the complete report of the sampled data.
- **Re-Validate**: To re validate all the transformations.
  You can also revalidate an individual transformation by clicking the More Action and select the Re-Validate option
- **Add Transformation**: To add new transformations

The profile button helps you to view profile the final data frame that you have selected. For more information, see the Viewing Profile section.

Here, you can perform the following actions:

- Re-ordering of transformations
- Insertion of transformation

## Create New Feature

The Create New Feature window allows you to create a new feature. This is used to add a new column to dataset. This is useful, if you want to add a new column based on derived T2Ts (from data source).

To create a New Feature, follow these steps:

1. Click Create Feature on Dataset Transformation of Dataset UI.


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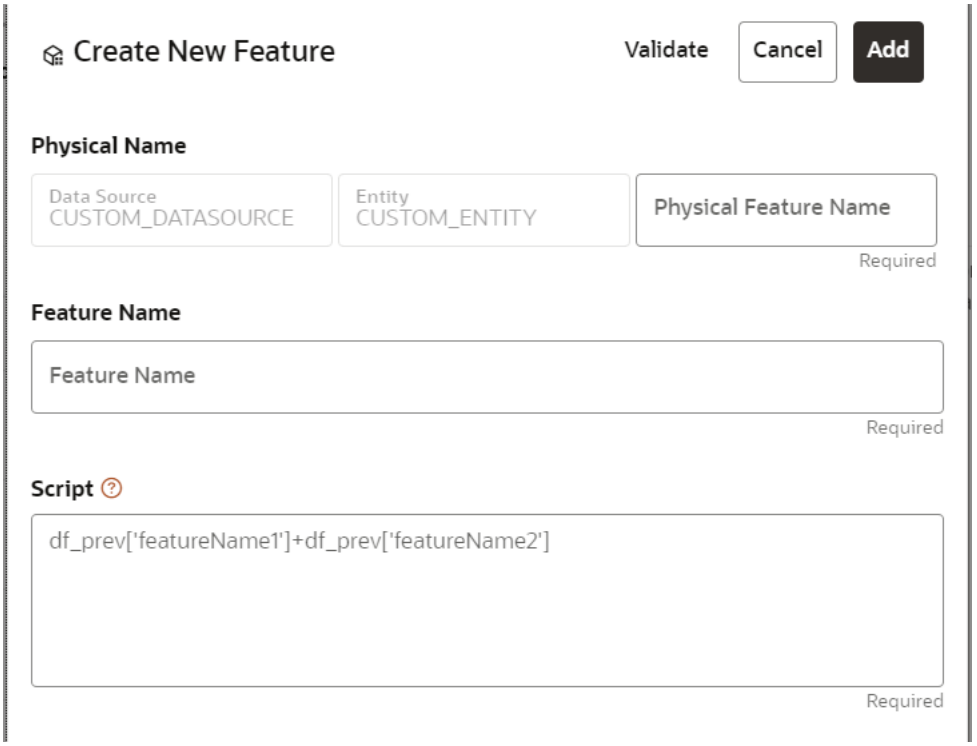
**Figure 17-46 Create Feature on Dataset Transformation of Dataset UI**




2. Enter the following details:
   - **Physical Feature**: Name of Physical feature
   - **Feature Name**: Logical Name of feature
   - **Script**: Update the script
3. Click **Add** after validating the feature.

   The new feature will be added at end of LHS section.
4. You can also edit or delete a newly added feature.

## Add Data Transformation

To add the data transformation, follow these steps:

1. Click **Add**.

   The Transform window is displayed.
2. Select the Transformation Type.

   Following types are available:
   - **Dataframe Transform**: This is used to transform entire dataframe. For example, if you want to remove all missing values from all the columns of entire sampled data.
   - **Feature Transform**: This is used to transform a particular column of dataframe.


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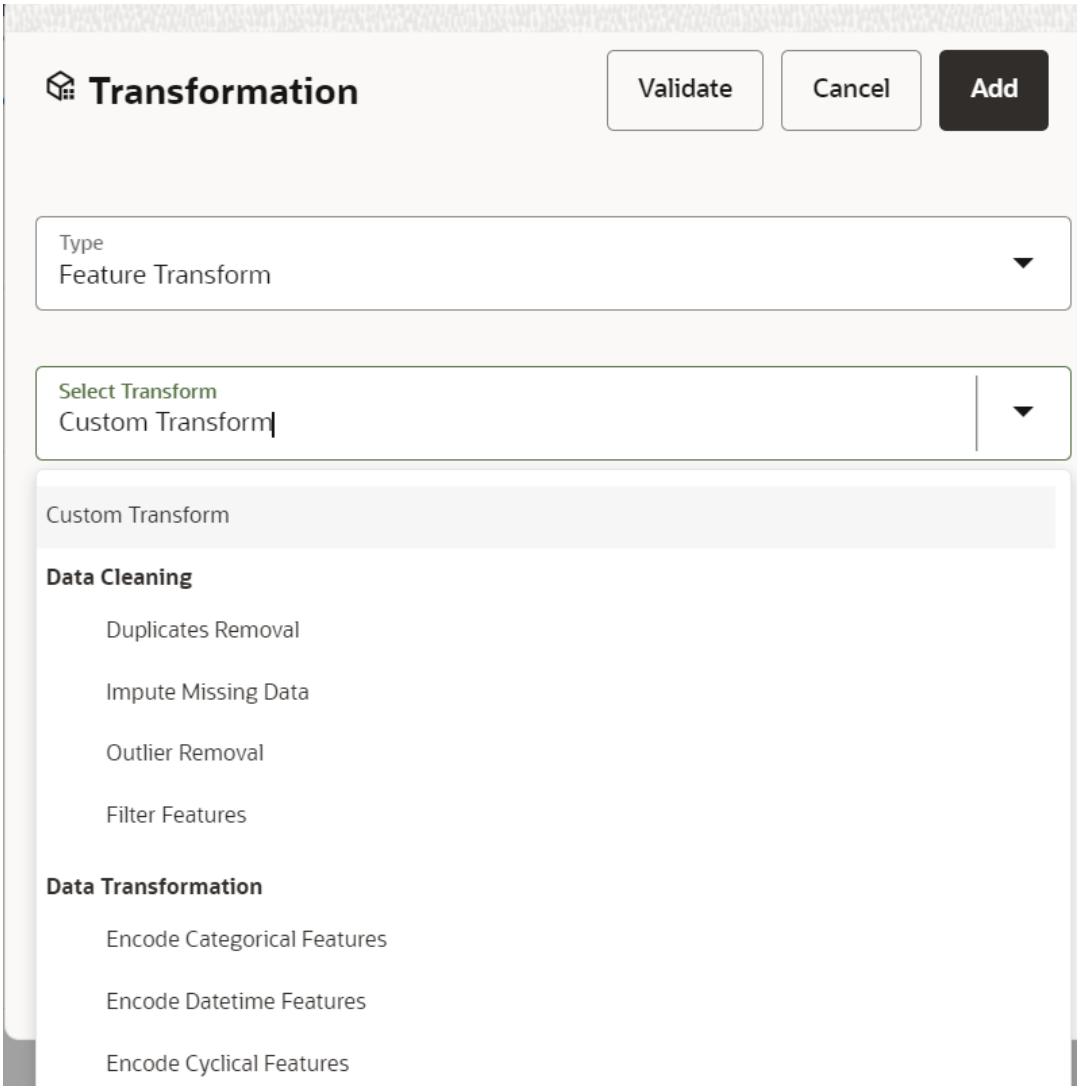
**Figure 17-47 Transformation screen**




3. Select **Transform**: Here you either enter values using Method and Argument fields, or script.
4. Click **Validate** to validate the details.
5. Click **Add** to add the new transformation.

   The New Transform is created and displayed at RHS section.
6. Click **Finish** to navigate to Dataset Summary window.

   This saves the metadata of dataset.

   Example:

   If there is “missing value” for one of the columns, then perform following steps to add the transform.

   a. Click Add on Dataset Transformation window.
   b. Select Type as Feature Transform.
   c. Select Transform as Impute Missing Value.
   d. Select the Physical Name from Physical Name drop-down list.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e. Select the Method and enter parameter in Argument field. The Method is updated on selected Column type. For example, if the selected column type is numerical, then following methods will be available: Simple, Constant, KNN, and Mice
OR

Enter the script
Below are the Sample Custom Scripts:

- Directly pass input data frame to output: df_out=df_prev
- Drop first row of data frame: df_out=df_prev.drop(0,axis=0) if not df_prev.empty else df_prev
- Drop column from data frame: df_out = df_prev.drop('colname',axis=1)

## Sample Custom Scripts

Below are few sample scripts which the users can refer to create transformations.

**Table 17-4 Sample Custom Scripts**

| Function | Script | Comments |
|---|---|---|
| Directly pass input data frame to output | df_out=df_prev | |
| Drop first row of data frame | df_out=df_prev.drop(0,axis=0) if not df_prev.empty else df_prev | |
| Drop column from data frame | df_out= df_prev.drop('colname',axis=1) | FEATURE TRANSFORMATION |

## Transformations

These are the various transformations which can be done from the UI.

**Table 17-5 Transformations**

| No. | Transformation | Function |
|---|---|---|
| 1. | Add New Feature | A new feature can be added to the dataset which could be derived from the existing features using Script.<br>Physical Feature Name and Feature Name are the names of the new feature.<br>Script can be used to create a pandas Series for the new feature |
| 2. | Encode Categorical Features | This function performs One Hot Encoding on a categorical feature and replaces it with multiple numerical features in the dataset. |
| 3. | Encode Datetime Features | This function encodes a datetime feature and replaces it with multiple numerical features having the following information derived from the datetime feature - year, month, week, day, hour, minute, dayofweek. |


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**Table 17-5 (Cont.) Transformations**

| No. | Transformation | Function |
|---|---|---|
| 4. | Encode Cyclical Features | This function encodes a cyclical feature having hour, minute data, and so on and returns two features carrying the sine and cosine transformation of the cyclical data.<br>'fmax ' denotes the maximum possible value of the cyclical feature data. |
| 5. | Impute Missing Data | This function imputes missing data within a feature.<br>For numerical features, there are 4 methods for imputing missing data.<br>simple - imputes with mean, median, most_frequent values based on chosen arg value using the SimpleImputer in sklearn.<br>const - fills the missing values with the value given in the arg<br>knn - imputes using the KNNImputer in sklearn with k value given in arg<br>mice - imputes using the IterativeImputer in sklearn<br>For non-numerical data, missing values can be imputed using the 'const' method by replacing all missing values with the value given in arg |
| 6. | Feature Scaling | This function is used to scale multiple selected numerical features using the StandardScaler in sklearn |
| 7. | Dimensionality Reduction | This function performs PCA on selected numerical features to reduce the dimensionality using sklearn.decomposition.PCA module.<br>The number of output features can be specified using dim field.<br>The names of the output features' names can be specified in the fields 'Physical Feature Name' and 'Feature Name' |
| 8. | Outlier removal | This function is used to remove outliers present in a feature based on the specified zscore value.<br>Non-numerical features are label encoded before removing the outliers. |
| 9. | Duplicates Removal - Data Frame | This function removes all duplicate rows in the dataframe. |
| 10. | Duplicates Removal - Feature | This function removes all duplicate rows within a specified subset of features and consequently removes those rows from the data frame |


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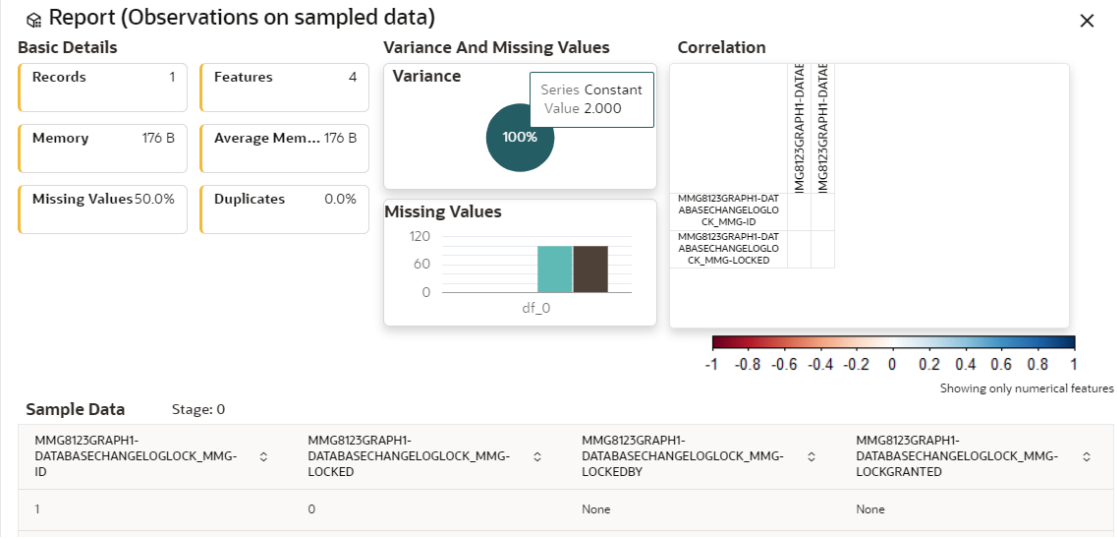
**Table 17-5 (Cont.) Transformations**

| No. | Transformation | Function |
|---|---|---|
| 11. | Filter Features | This function is used to filter the data frame based on conditions specified on features<br>Operations allowed : >,>=,=,!=,<,<=,isin<br>When the chosen operation is 'isin', the input to 'Filter Value' is a list of values that should be present in the output data frame |

## View Reports

This report shows the Observation on Sampled data, profiles, Variance, Correlation Matrix (correlation between columns), Sample Data. This report is based on sampled data.

**Figure 17-48 Sampled Data Report**




## Re-ordering of Transformations

You can re-order the transformations using the drag-drop. During the transformation re-order, you can compare the profile of transformations. The transformation order gets adjusted accordingly.

# View a Dataset

To view a Dataset, follow these steps:

1. Navigate to Dataset Summary page.
2. Click **Action** next to corresponding Dataset and select **View**.

   The Profile Summary screen is displayed.


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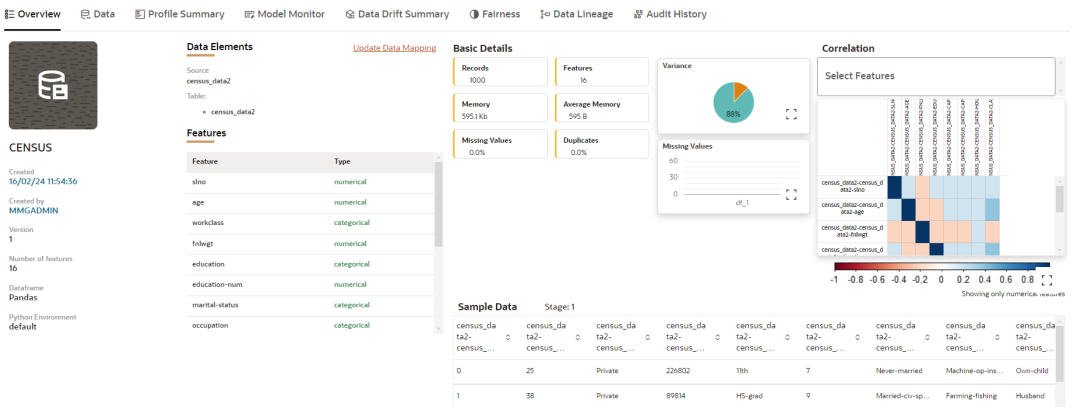
**Figure 17-49 Dataset Details screen**




## Overview

The details such as Data Elements, Features, Basic Details, Correlation, and Sample Data are displayed in graphical format.

To view the Overview of a Dataset, follow these steps:

1. Navigate to **Dataset Summary** page.
2. Click the **Next** to corresponding Dataset and select **View**.

   OR

   Click on the Dataset **Name** column which you want to view.

   The Overview page is displayed.

   You can update the data mapping details by clicking on Edit icon in Data Elements group.


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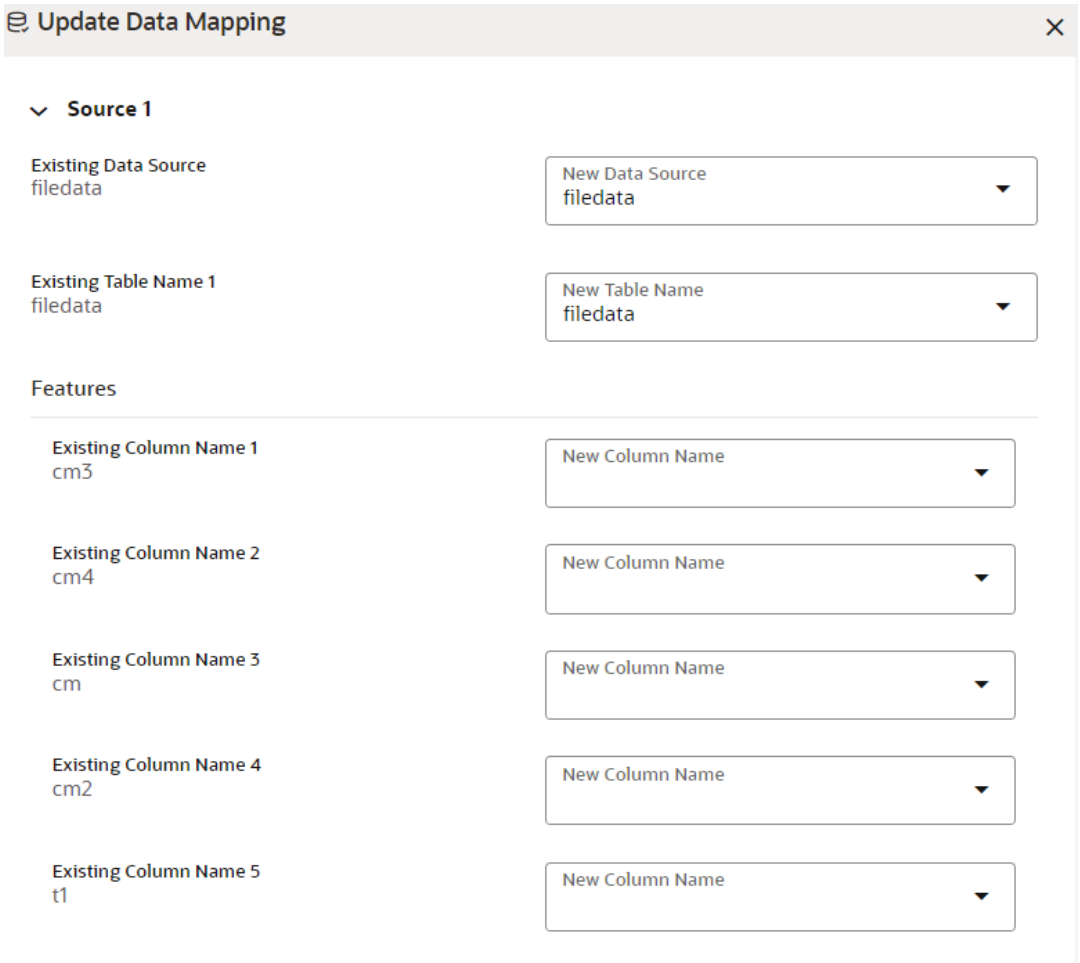
**Figure 17-50 Update Data Mapping**




## Data

To view the data of a Dataset, follow these steps:

1. Navigate to the **Dataset Summary** page.
2. Click **Next** to the corresponding Dataset and select **View**.

   The Overview page is displayed.
3. Navigate to **Data** tab.

## Profile Summary

To view the Profile Summary, perform the following steps:

1. In the Profile Summary screen, click next to corresponding data profile and select View Summary.
   This window displays the following details in graphical format:
   - Profile Setting
   - Correlation
   - Profile visualization along with the metrics


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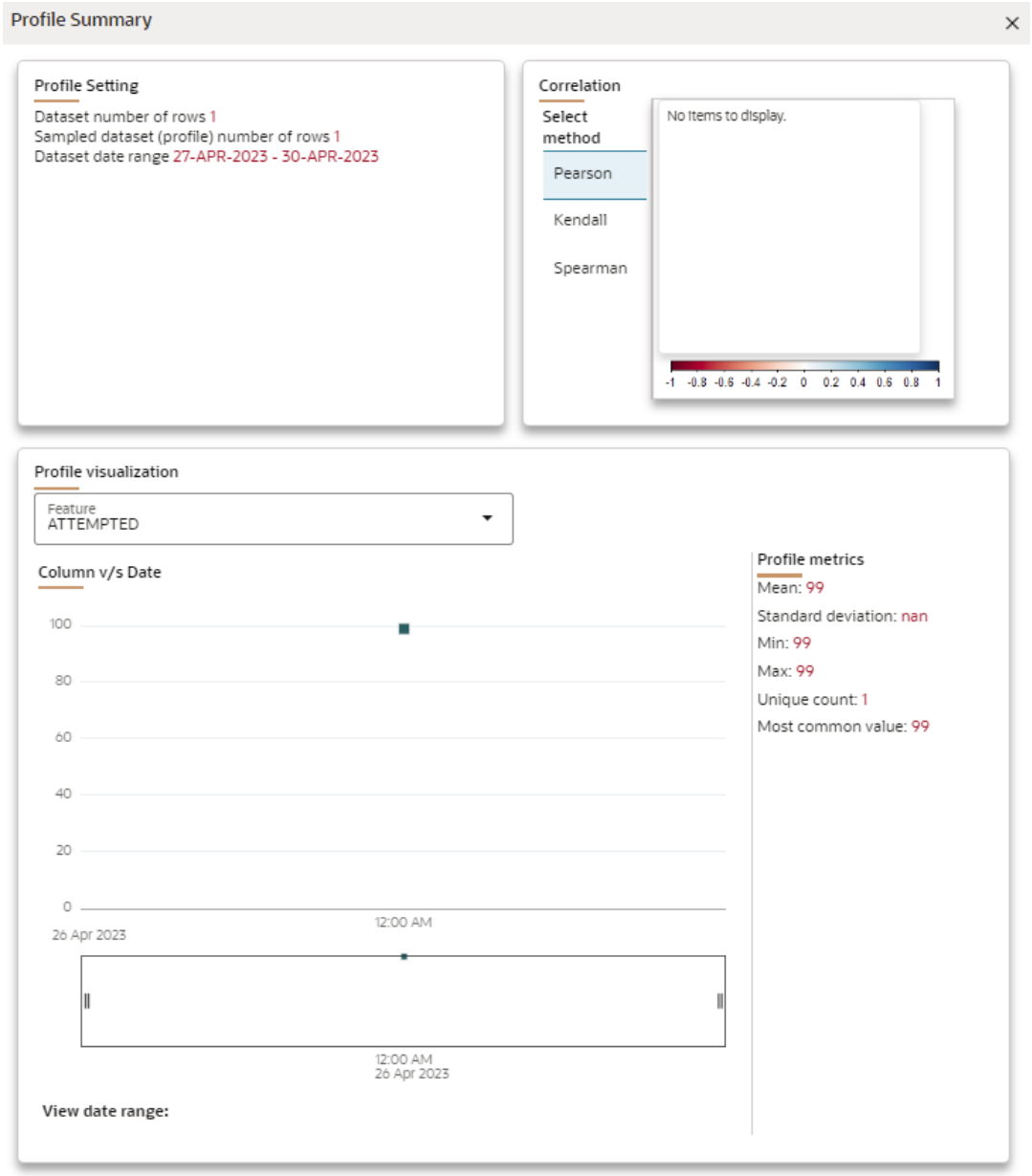
**Figure 17-51 Profile Summary**




## Start Profiling

Prerequisite: You must create a Dataset with a datasource having columns with **DATA_TYPE** as **DATE**.

To start a Profile:

1. Navigate to Dataset Summary page.
2. Click **Action** next to corresponding Dataset and select **View**.

   This window displays the Dataset profiles in a table.


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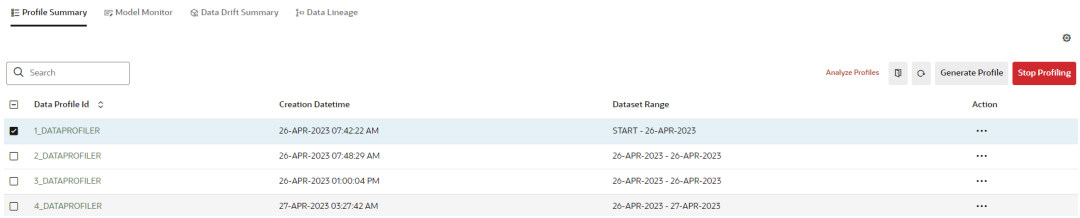
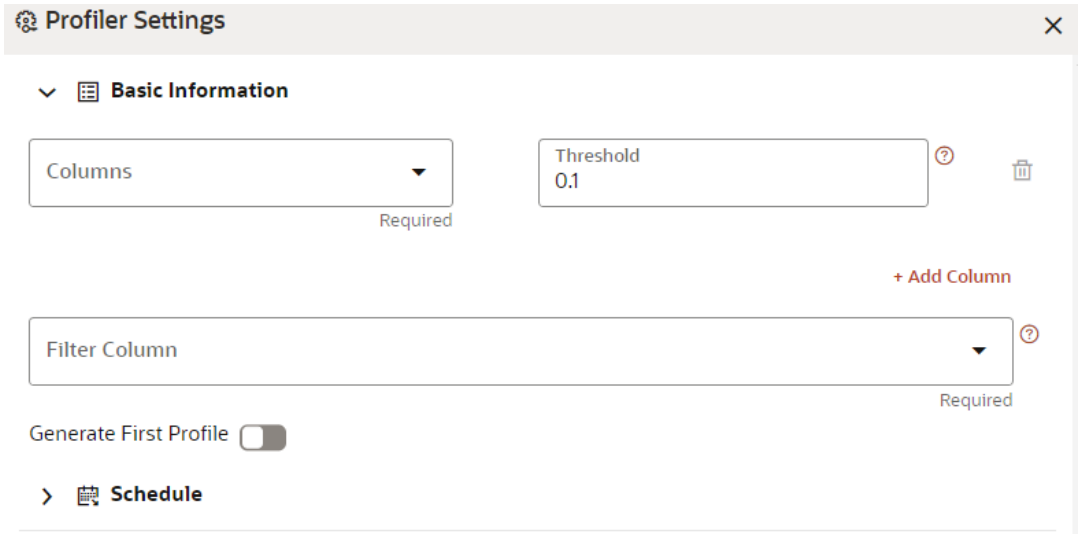
**Figure 17-52 Dataset Profiles**




3. Click **Start Profiling** or click **Settings** .

   The Profiler Settings page is displayed.

**Figure 17-53 Profiler Settings page**




4. Under Basic Information section, enter the following details:
   a. Select the required columns from the drop-down. All the numeric options are displayed under the Columns drop down. You can select multiple columns by clicking on + icon.
   b. Enter the threshold for the columns. Threshold defines the Drift detection threshold for each column and only numerical columns can be selected for profiling.
   c. Select the required filter column from the drop-down. Filter column contains date column of the dataset to filter.
   d. Enable **Generate First Profile** option if you want to generate a profile.
5. Under Schedule section, enter the following details:
   a. Enter a Schedule Name.
   b. Select the Schedule Type as required:
      - **Daily**: Select to run the schedule everyday.
      - **Weekly**: Select to run the schedule once in a week or the selected days in a week.
      - **Monthly**: Select to run the schedule once in a month or the selected days in a month.
   c. Click **Save**.

   The Data Profiling has been started and Stop Profiling option is displayed in the Profile Summary screen.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For more details on disabling dataset profile, see Stop Profiling section.

6. Click **Generate Profile**.

   The Data Profile is created.

   **Schedule Daily**

   To schedule the profiler to run daily, perform the following steps:

   a. In the **Profiler Settings** screen, select the Schedule Type as **Daily**.
   b. Select the start date on which you want to run the profiler.
   c. Select the end date on which you want to stop your schedule.
   d. Enter the time at which you want to run the profiler.
   e. Click **Save**.

   **Schedule Weekly**

   To schedule the profiler to run weekly, perform the following steps:

   a. In the **Profiler Settings** screen, select the Schedule Type as **Weekly**.
   b. Select the start date on which you want to run the profiler.
   c. Select the end date on which you want to stop your schedule.
   d. Enter the time at which you want to run the profiler.
   e. Select the day on which you want to run the profiler. You can select multiple days to run the profiler.
   f. Click **Save**.

   **Schedule Monthly**

   To schedule the profiler to run monthly, perform the following steps:

   a. In the **Profiler Settings** screen, select the Schedule Type as **Daily**.
   b. Select the start date on which you want to run the profiler.
   c. Select the end date on which you want to stop your schedule.
   d. Enter the time at which you want to run the profiler.
   e. Select the month on which you want to run the profiler. You can select multiple months to run the profiler.
   f. Select the date on which you want to run the profile of the selected month to run.
   g. Click **Save**.

## Analyze Profiles

To analyze multiple data profiles, perform the following steps:

1. In the Profiler Summary screen, select the data profiles that you want to analyze profiles. You can select multiple data profiles.
2. Click **Analyze Profiles**.

   A window is displayed with multiple metrics of the selected profiles. Click on each metric to view the data in graphical format.


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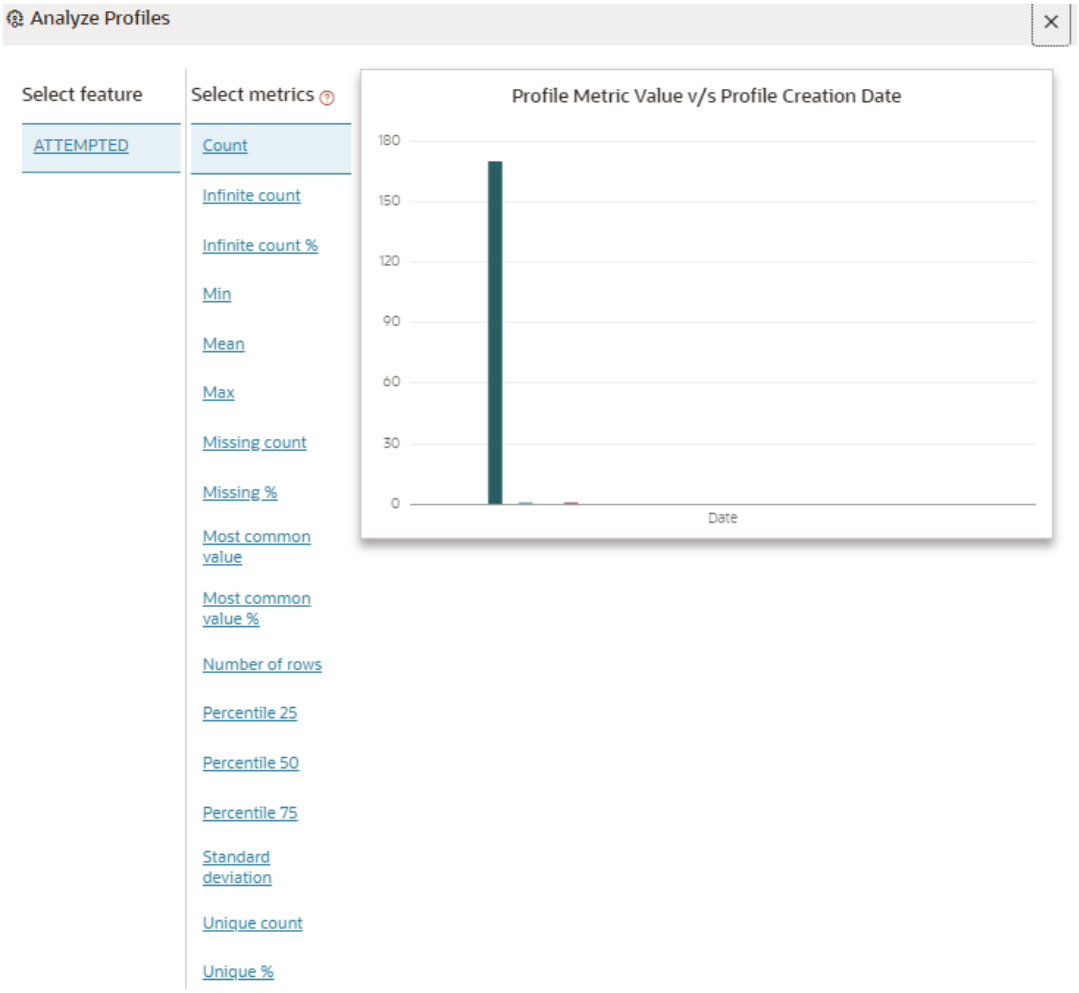
**Figure 17-54 Analyze Profiles screen**




## Compare Profiles

To compare the data between two data profiles, perform the following steps:

1. In the Profiler Summary screen, select two data profiles that you want to compare.
2. Click **Compare Profiles**.

   The Profile Comparison is displayed.
3. In the Dataset Feature drop-down, select the feature that you want to compare.

   The properties of both the profiles is compared and displayed in a tabular format.


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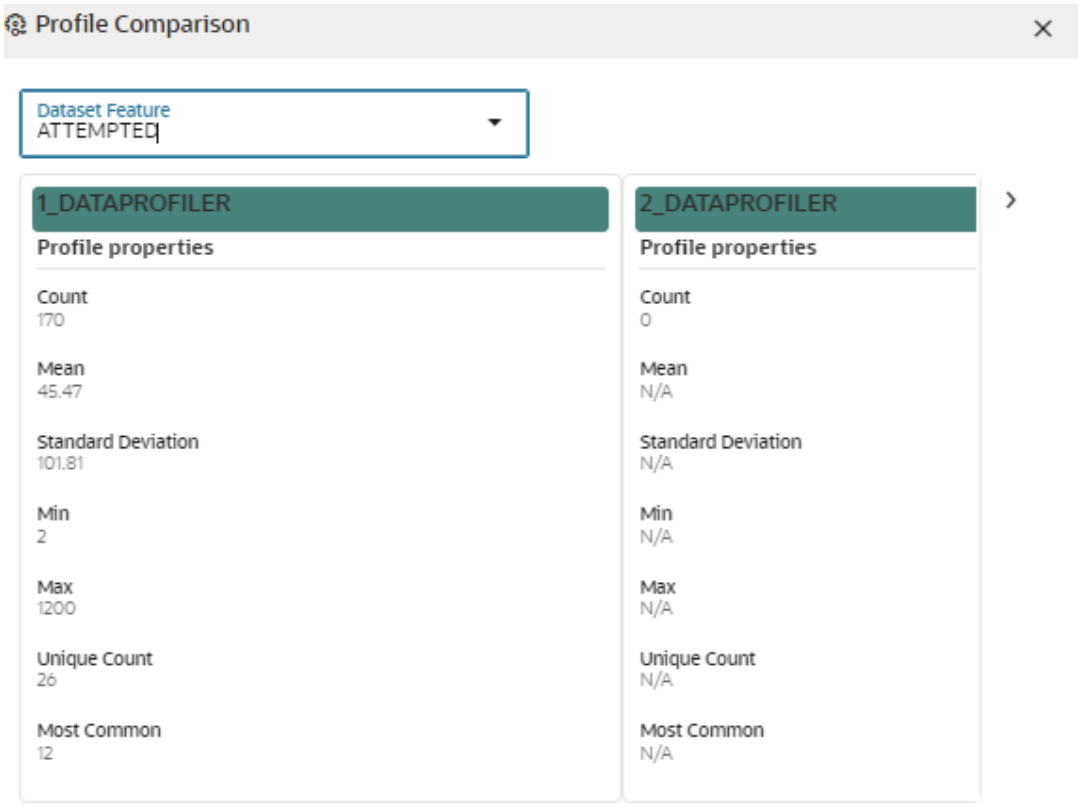
**Figure 17-55 Profile Comparison screen**




### Stop Profiling

To stop the profiling, perform the following steps:

1. In the Profiler Summary screen, select the data profiles that you want to stop profiling. You can select multiple data profiles.
2. Click **Stop Profiling**.

   A confirmation pop-up window is displayed.
3. Click **Yes**to disable the dataset profile.

   The dataset profiling has been disabled and Start Profiling option is displayed. For more information on profile, see Create a Profile section.

## Model Monitor

Model Monitoring refers to the process of closely tracking the performance of models in production and helps you to frequently monitor the distribution of the model and provides alerts in case of any exceptions.

In addition, it enables you to identify and eliminate bad quality predictions and poor technical performance of the models.

The model's robustness depends not only on the training of the feature-engineered data but also on how well the model is monitored after deployment. Typically a model's performance degrades over time, and it essential to detect the cause of the decrease in performance of the model. The main cause of the decline in performance can be drift in the independent or/and dependent features which may violate the model’s assumption and distribution about the data. When models are built, the model builder will create a snapshot of the dataset used for training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the model and save it in a file which is later used for calculating drift with the current snapshot of the dataset.

To start the model monitoring, perform the following steps:

1. In the LHS menu, click **Dataset**to display the **Dataset Summary** window.

   This window displays the dataset records in a table.

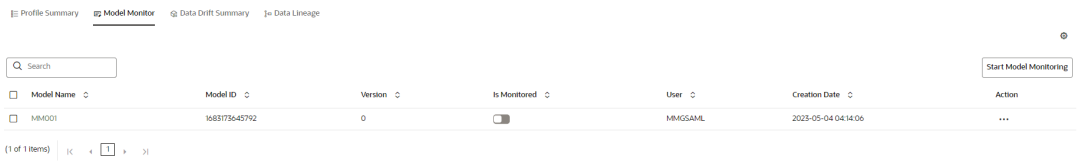
2. Click **Action**next to corresponding Dataset and select **View**.

   The Profile Summary screen is displayed.

3. Navigate to **Mode Monitor**page.

   All the models associated with the selected dataset will be displayed.

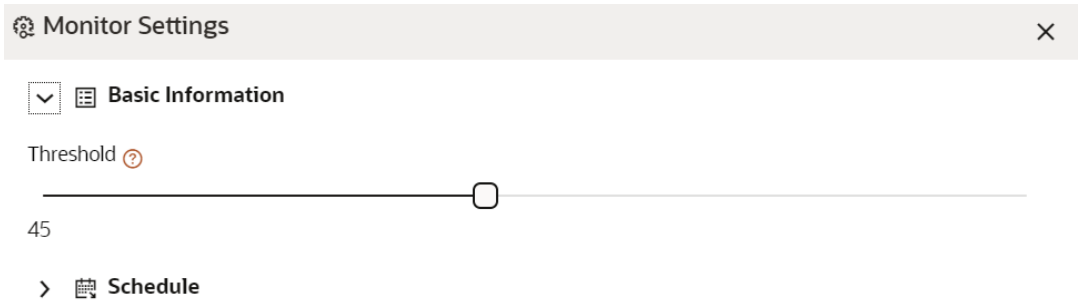
**Figure 17-56 Mode Monitor page**




4. Click **Start Model Monitoring**or **Monitor Settings** icon.

   The Monitor Settings page is displayed.

**Figure 17-57 Monitor Settings page**




5. Drag the slider and set the threshold settings. Threshold is the value in percentage, beyond which it is labelled as drifted.
6. Select the Schedule Type as required:
   - Daily: Select to run the schedule everyday.
   - Weekly: Select to run the schedule once in a week or the selected days in a week.
   - Monthly: Select to run the schedule once in a month or the selected days in a month.

   The monitoring for the model is started and Is Monitored option is enabled by default and you can disable it if you do not want to monitor.

## Stop the Model Monitoring

To stop the model monitoring, perform the following steps:

1. Navigate to **Model Monitor** page.

   All the models associated with the selected dataset will be displayed.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2. Click **Stop Model Monitoring**.

   A confirmation pop-up window is displayed.

3. Click **Yes**.

   The Model Monitoring is stopped.

## Viewing the Model Summary

To view the Model Summary, perform the following steps:

1. Navigate to **Model Monitor** page.

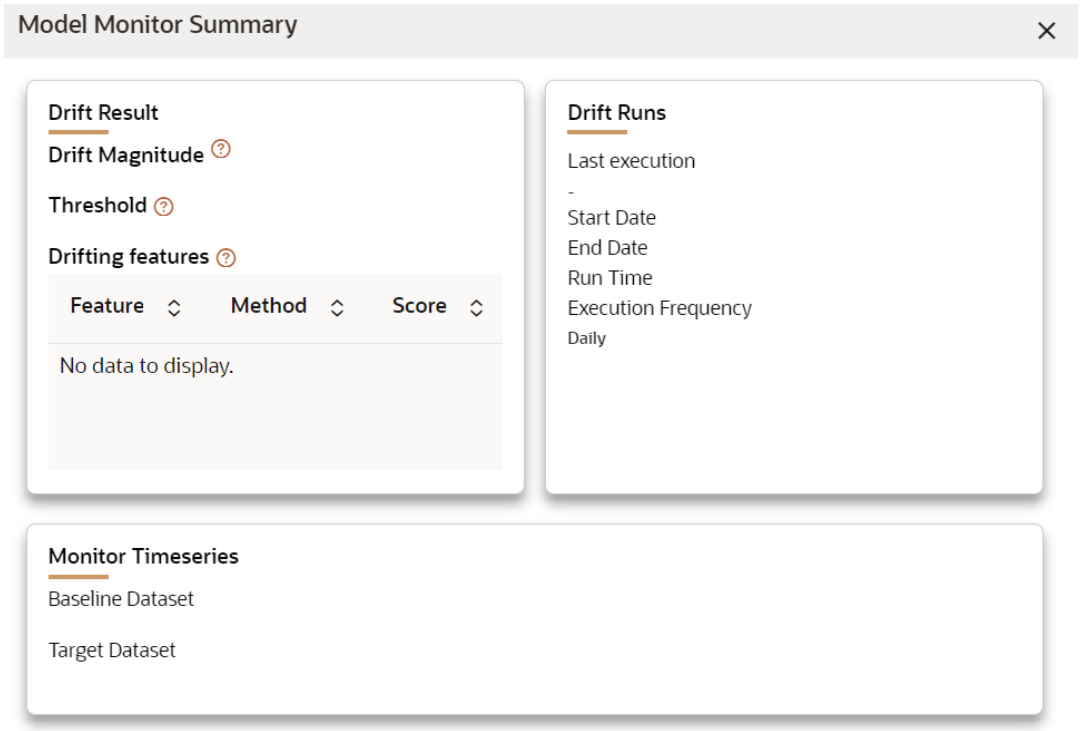
   All the models associated with the selected dataset will be displayed.

2. Click **Action** next to corresponding model and select **View Summary**.

   This window displays the following details in graphical format.

   - Drift Result
   - Drift Runs
   - Monitor Timeseries

**Figure 17-58 Model Monitor Summary**




## Viewing the Model Latest Report

To view the Model Latest Report, perform the following steps:

1. Navigate to **Model Monitor** page.

   All the models associated with the selected dataset will be displayed.

2. Click **Action** next to corresponding model and select **View Latest Report** .

   The execution details of the model are displayed.


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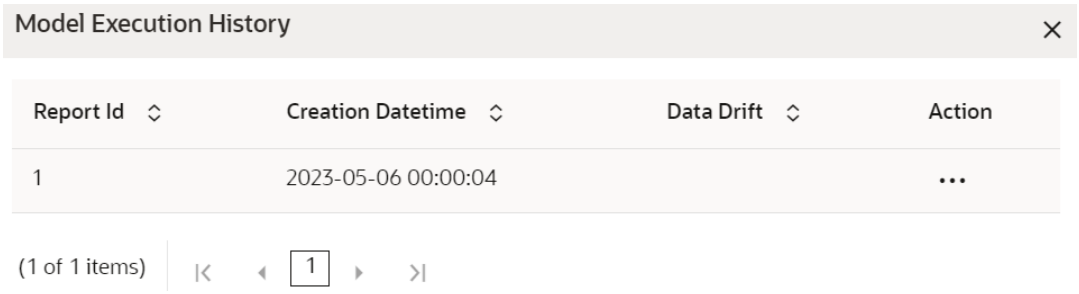
**Figure 17-59 Model Execution History**




To view the report of each execution, click **Action** next to corresponding report and select **View Report**.

## Viewing the Model Execution History

To view the Model Execution History, perform the following steps:

1. Navigate to **Model Monitor**page.

   All the models associated with the selected dataset will be displayed.

2. Click **Action**next to corresponding model and select **View Execution History**.

   This window displays the details such as Baseline Distribution, Target Distribution, Drift Method, Drift Score, and Data Drift of the models.

# Data Drift Summary

A Data Drift Summary report summarizes the changes in a dataset over time. It typically includes information for any changes in the data distribution of the selected features over the selected baseline and target date ranges.

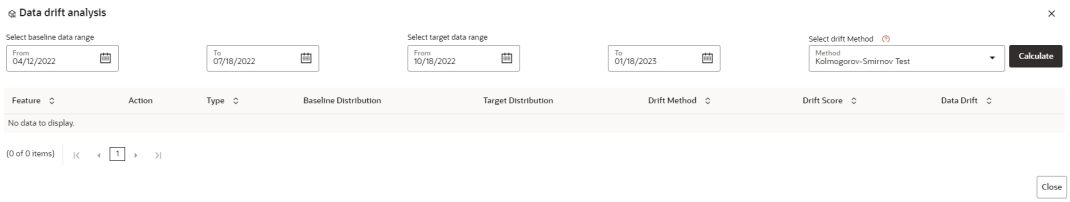
The report is used to help identify potential issues with data quality which helps the users to take necessary actions further.

To calculate the data drift, perform the following steps:

1. In the Data Drift Summary screen, click Calculate Drift.

   The Data Drift Analysis window is displayed.

**Figure 17-60 Data Drift Summary screen**




2. Select the data range (From and To) dates for the baseline.
3. Select the data range (From and To) dates for the target.
4. Select the drift method from the drop-down.

   The available drift methods are: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- Kolmogorov–Smirnov (K-S) test
  - Only for numerical features
  - Output: p_value, drift detected when p_value < threshold.
- Kullback-Leibler divergence
  - For numerical and categorical features
  - Output: divergence, drift detected when divergence >= threshold.
- Wasserstein distance (normed)
- Only for numerical features
- Output: distance, drift detected when distance >= threshold.
- Population Stability Index (PSI)
  - For numerical and categorical features
  - Output: psi_value, drift detected when psi_value >= threshold.
- Jensen-Shannon distance
  - For numerical and categorical features
  - Output: distance, drift detected when distance >= threshold.

5. Click **Calculate**.

   The drift analysis report is displayed.
6. Click **Save**.

   The reports are displayed under Data Drift Summary screen.

## Disabling the Data Drift Monitoring

To stop the Data Drift monitoring, perform the following steps:

1. Navigate to **Data Drift Summary**page.

   The data drift summary reports are displayed in a table.
2. Click **Stop Data Monitoring**.

   A confirmation pop-up window is displayed.
3. Click **Yes**.

   The Data Drift Monitoring is disabled.

## Start the Data Drift Monitoring

To start the Data Drift monitoring, perform the following steps:

1. Navigate to **Data Drift Summary**page.

   The data drift summary reports are displayed in a table.
2. Click **Start Data Monitoring**or **Data Drift Settings** icon.

   The Data Drift Settings window is displayed.


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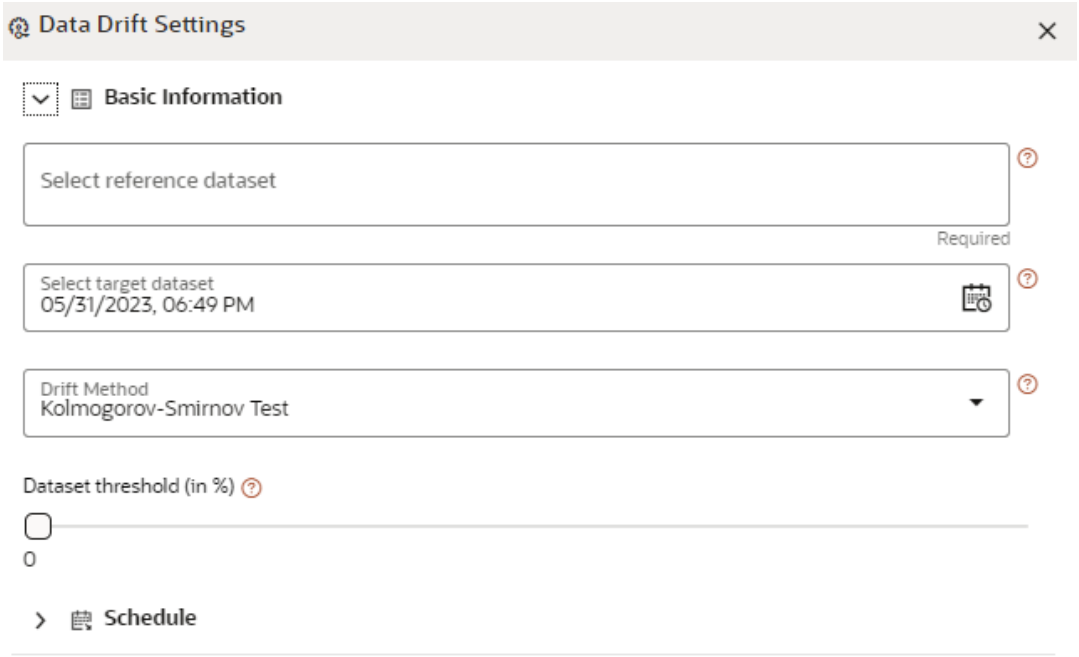
**Figure 17-61 Data Drift Settings**




3. Enter the basic information and schedule details and click **Save**.

   For more details, see Data Drift Summary section.

   The Data Drift Monitoring is started.

## Viewing the Data Drift Summary Report

To view the Data Drift Summary Report, perform the following steps:

1. Navigate to **Data Drift Summary** page.

   The data drift summary reports are displayed in a table.

2. Click **Action** next to corresponding drift report Id and select **View**.

   The drift report is displayed in a graphical format.


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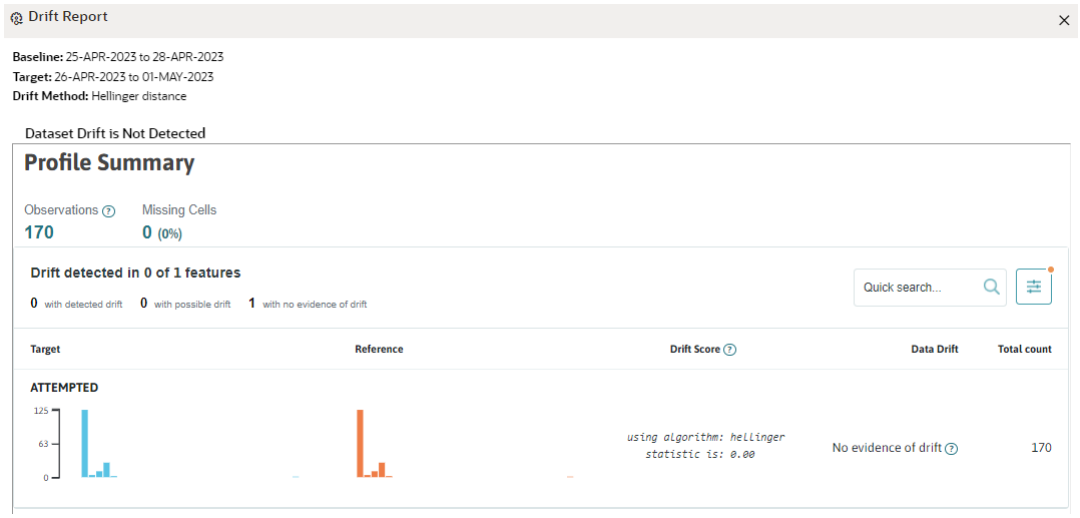
**Figure 17-62 Drift Report**




## Deleting the Data Drift Summary Report

To delete the Data Drift Summary Report, perform the following steps:

1. Navigate to **Data Drift Summary**page.

   The data drift summary reports are displayed in a table.

2. Click **Action** next to corresponding drift report Id and select **Delete** .

   OR

   If you wish to delete multiple data drift reports, select reports and click **Delete**.

   A confirmation pop-up window with report details is displayed.

3. Click **Delete**.

   The Data Drift Report is deleted.

# Fairness

You can calculate the fairness metrics of the dataset by choosing the target variable and protected features. The module provides metrics dedicated to assessing and checking whether the model predictions and/or true labels in data comply with a particular fairness metric. For this example, the statistical parity metric also known as demographic parity, measures how much a protected group's outcome varies when compared to the rest of the population. Thus, such fairness metrics denote differences in error rates for different demographic groups/ protected attributes in data. Therefore, these metrics are to be *minimized*to decrease discrepancies in model predictions with respect to specific groups of people. Traditional classification metrics such as accuracy, on the other hand, are to be maximized.

You can perform the following functions:

- Measure Fairness Metrics of Dataset
- Models Bias Mitigation of Models
- Privacy Estimation of Models

For Example: In model pipeline, a new widget can be added to calculate the fairness metrics of a trained model or an advanced option can be added to model training widget to calculate the fairness metric of the model after training.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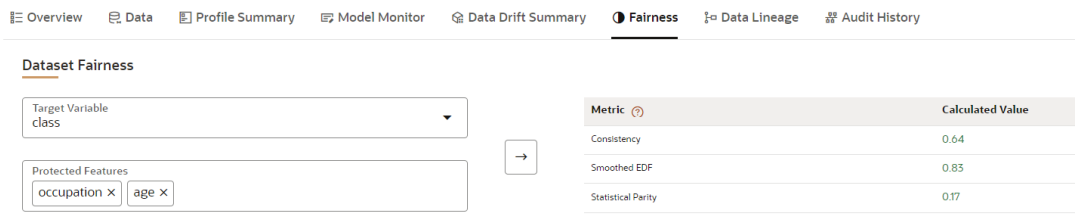
To calculate the dataset fairness, perform the following steps:

1. In the Fairness screen, select the Target Variable from the drop-down.
2. In the Protected features, select the required features to understand the fairness of the dataset.

**Figure 17-63 Fairness screen**




The metric and calculated values are displayed. Click Help icon for more details on how the fairness is calculated.

> **Note**
>
> The fairness calculation in the dataset is only supported for python versions lesser than 3.12.
> For python version 3.12, you will get the error *Error in calculating fairness metrics of dataset. No module named "guardian_ai".* This is due to it's dependency on the older version of scikit-learn and numpy that are not supported on python version 3.12.

## Data Lineage

Data Lineage provides a summary view or visualization of Data Sources and its associated dataset and features in a graphical format. Also displays the complete data flow from start to finish.

To view the data lineage, perform the following steps:

1. In the LHS menu, click **Dataset** to display the **Dataset Summary** window.

   This window displays the dataset records in a table.
2. Click **Action** next to corresponding Dataset and select **View**.

   The Profile Summary screen is displayed.
3. Navigate to **Data Lineage** page.

   A summary view of Data Sources and its associated dataset and features in a graphical format.


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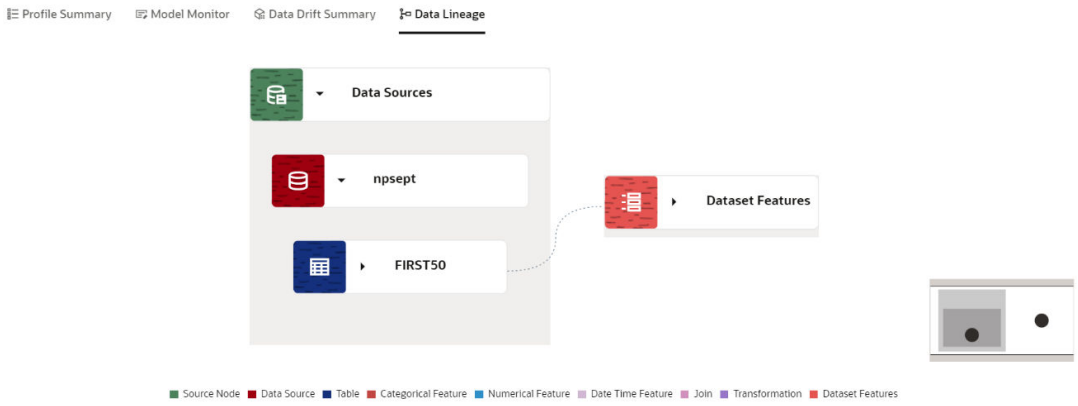
**Figure 17-64 Data Lineage page**




Click the drop-down of the respective features to view granular details and its workflow.

## Audit History

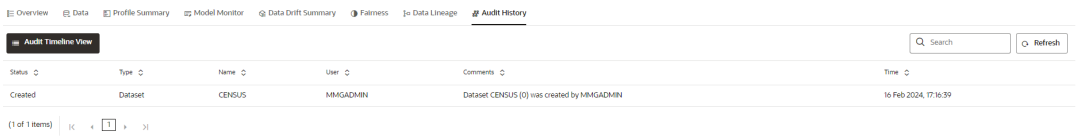
At any time, you can audit the datasets from the Audit History page. The Audit Trail window provides the complete details of datsets. The sequence of actions performed in the dataset lifecycle is listed in the table view and the timeline view (graphical representation).

To audit datasets:

1. Click **Launch Workspace** next to corresponding Workspace to Launch Workspace to display the **Dashboard** window with application configuration and model creation menu.
2. Navigate to **Dataset Summary** page.
3. Click More Options icon next to corresponding Dataset and select View.

   The **Overview** screen is displayed.
4. Navigate to **Audit History** page.

**Figure 17-65 Audit History**




Click for **Audit Timeline View** for Timeline View and **Audit Table View** to switch to the regular view. Click to **Refresh**to refresh the Audit History. You can search the datasets by entering the name in the search box.


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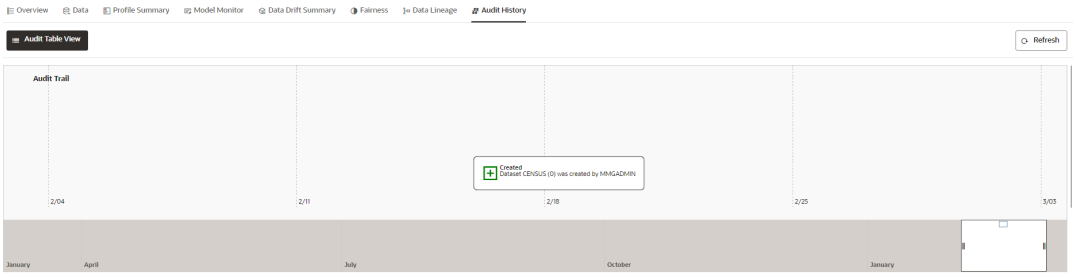
**Figure 17-66 Audit History window Timeline View with Horizontal Time Axis**




## Create a Cache Snapshot

You can create a Cache Snapshot of the Dataset from this page.

To create a cache snapshot, follow these steps:

1. Navigate to Dataset Summary page.
2. Click next to corresponding Dataset and select View.

   The Overview page is displayed.
3. Click on the header and select Create a cache snapshot.
4. Enter the **Snapshot Name** having alphanumeric character, underscore and hyphen not exceeding 30 characters and click Create.

   This screen additionally allows users to cache a snapshot of the current state of data. The cached snapshots can be accessed later in Model Pipelines without any recompilation or re-read from data sources.

   To use the dataset in model pipeline or data pipeline, the actual data is fetched using the Cache option. For example, to take the data from dataset on As of Date, create the data frame and provide the name to cache. Only Cache pulls the data from dataset.

   This helps the things to work faster when you have millions of records, and you want to use intermediate data for use. For example, if you have 1 million records and want to use only 10,000 out of that, then perform the sampling for that 10, 000 entries. This increases the speed of processing, validation of information.

   - Once the metadata is created, the original data can be cached. A snapshot of the actual data in the dataset at the current time can be stored referenced by a tag name.
   - The location for caching is in the datastudio server location `$DS_HOME/work/ftpshare/mmg/workspace_name/dscode/tag`. The dataset will be saved as a parquet file with name dscode_tag.parquet
   - When executing all APIs from notebook, workspace has to be attached.
   - Caching can be performed in two ways:
     - From UI, immediately after saving the metadata.

   Or the users will have to fetch(create) a new snapshot/dataframe of the dataset using the API 'Fetch New Snapshot of dataset' and manually cache using the 'Caching Data Frame' API.

   The following table provides information on the error and the troubleshooting procedure in case of dataset failure.


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**Table 17-6 Information on the error and the troubleshooting procedure**

| Error | Troubleshooting procedure |
|---|---|
| `ModuleNotFoundError: No module named '_bz2'` | Install the package 'libbz2-dev' before building python. |
| `ModuleNotFoundError: No module named '_sqlite3'` | Install the package 'libsqlite3-dev' before building python. |
| `Python-env-health-check fails if pandas version is less than 1.4.1.`<br>**NOTE:** `modin dataframe library is supported only from pandas version 1.4.1 and higher.` | You can switch between the options modin[dask] and pandas for the underlying dataframe library if pandas version 1.4.1 is installed. |
| `“Not a valid file"` errorwhile profiling the Hive Data sources. | Copy the following required files : kbank.keytab , krb5.conf , hive-jdbc-driver.jar into the path : $DS_HOME/conf folder of datastudio |

# Edit a Dataset

To edit a Dataset, follow these steps:

1. Navigate to **Dataset Summary** page.
2. Click on the Dataset Name column which you want to edit.

   The Overview page is displayed.
3. Click **Edit**.

   You can edit the Dataset fields except Code and Dataset Name.

# Delete a Dataset

To delete a Dataset, follow these steps:

1. Navigate to **Dataset Summary**page.
2. Click next to corresponding Dataset and select **Delete**.

   OR

   Click next to corresponding Dataset and select **View**. You can delete a Dataset from this page.

# Python functions for accessing Dataset from Model Pipelines/Notebooks

This section provides information on the Python functions for accessing Dataset from Model Pipelines/Notebooks.

## List tags of Datasets Cached from UI

To get a list of all snapshots/tags of a dataset cached from UI, use the API below:


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**Table 17-7 Listing tags of Datasets Cached from UI**

| API | Notebook Script | Notes/Input |
|---|---|---|
| List Tags of a Dataset | from mmg.datasets import list_tags<br>list_tags(dscode) | dscode = dataset code - string<br>tag = tag with which the dataset was cached - string |

## Delete Cached Dataset

A Cached Dataset can be deleted by using the API below where tag refers to a particular snapshot/timestamp of the dataframe.

**Table 17-8 Delete Cached Dataset**

| API | Notebook Script | Notes/Input |
|---|---|---|
| Delete Dataset | from mmg.datasets import delete_df<br>delete_df(dscode, tag) | dscode = dataset code - string<br>tag = tag with which the dataset was cached - string |

## List all Datasets with Metadata saved from UI

**Table 17-9 List all Datasets with Metadata saved from UI**

| API | Notebook Script | Notes/Input |
|---|---|---|
| List Datasets | from mmg.datasets import list_datasets<br>list_datasets() | |

## Fetch Dataset in Notebook

Dataset whose metadata has been saved from UI can be fetched in two ways:

1. Dataset that has already been cached from UI can be fetched using first API below by providing the dataset code and tag.(DataFrame will not be recalculated. It will be read from cache.)
2. A new data frame for a dataset can be calculated/fetched using data from the present time with the metadata saved for that dataset as given in second API.

**Table 17-10 Fetching Dataset in Notebook**

| API | Notebook Script | Notes/Input |
|---|---|---|
| Fetch Dataset Cached from UI | from mmg.datasets import fetch_ds<br>df = fetch_ds(dscode,tag) | dscode = dataset code - string<br>tag - string |
| Fetch New Snapshot of Dataset | from mmg.datasets import fetch_ds<br>df = fetch_ds(dscode) | dscode = dataset code - string |


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## Cache User's Dataframe from Notebook

A user-made data frame can also be cached using the below API. It will be stored in the datastudio server in location : `$DS_HOME/work/ftpshare/mmg/workspace_name/cached/tag`. The dataset will be saved as a parquet file with name `cached_tag.parquet`.

> **Note**
>
> This dataframe is not related to dataset created from UI. This is independent of dataset metadata.

**Table 17-11 Cache User's Dataframe from Notebook**

| API | Notebook Script | Notes/Input |
|---|---|---|
| Caching Data Frame | from mmg.datasets import cache_df<br>path=cache_df(df, tag)<br>path | df = dataframe to be cached - pandas dataframe<br>tag - string |

## Fetching Data Frame Cached from Notebook

The data frame cached from notebook can be fetched using the below API.

**Table 17-12 Fetching Data Frame Cached from Notebook**

| API | Notebook Script | Notes/Input |
|---|---|---|
| Fetch dataset cached manually | from mmg.datasets import fetch_ds<br>df = fetch_ds("cached",tag) | tag - string |

## List Tags of all Data Frames Cached from Notebook

**Table 17-13 List Tags of all Data Frames Cached from Notebook**

| API | Notebook Script | Notes/Input |
|---|---|---|
| List Tags of Manually Cached Datasets | from mmg.datasets import list_tags<br>list_tags() | |


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# 18
# Model Development and Pipeline Designer

Develop and manage MMG models with libraries, techniques, catalogs, pipelines and notebooks. This chapter includes the full publication, acceptance, production promotion, deployment, model action and audit procedures. After MMG publication and required approval, follow STSA Section 5.2.4 for model onboarding.

## Chapter contents

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18.2 Model Technique 18-7
18.3 Model Catalog 18-9
18.4 Pipelines 18-21
18.5 Model Actions 18-86
18.6 Audit Trail 18-87

Source: MMG 26.2.0 User Guide. Procedures, screenshots and examples are incorporated into this STSA 8.1.2.8.0 draft; release-specific statements retain their source status. The complete model pipeline and notebook API reference is included in Appendix E.


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# 18.1 Model Libraries

The Model Library information is used to bind a particular technique and its details to one unique Model Library. The Starting point for the Model builder is to register a model library with the application after it is properly set up in the python environment to be used.

Currently, the following libraries are supported:

- keras


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- ONNX
- scikit-learn
- xgboost

As an example, the following section provides information on how to set up and register the scikit-learn library.

**Setting up the Python Library in the python environment:**

Open the terminal and install the scikit-learn library using the following command:

```
python3 -m pip install scikit-learn
```

> **Note**
>
> Proxy might be required to install the packages from pip.

Once the installation is complete, check for the package details using the following command:

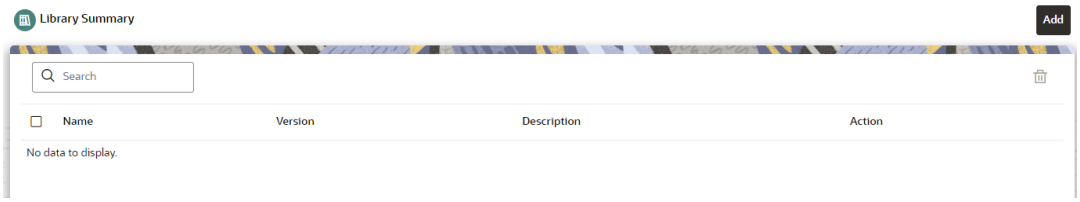
```
pip show scikit-learn
```

Once the installation is complete in Python environment, you need to register the library into the application.

**Registering the Python Library**

1. In the Mega menu, click Modeling > Model Libraries.
   The **Library Summary** page is displayed.

**Figure 18-1 Library Summary page**




2. In the **Library Summary** page, click **Add**.
   The **Add Library** page is displayed.


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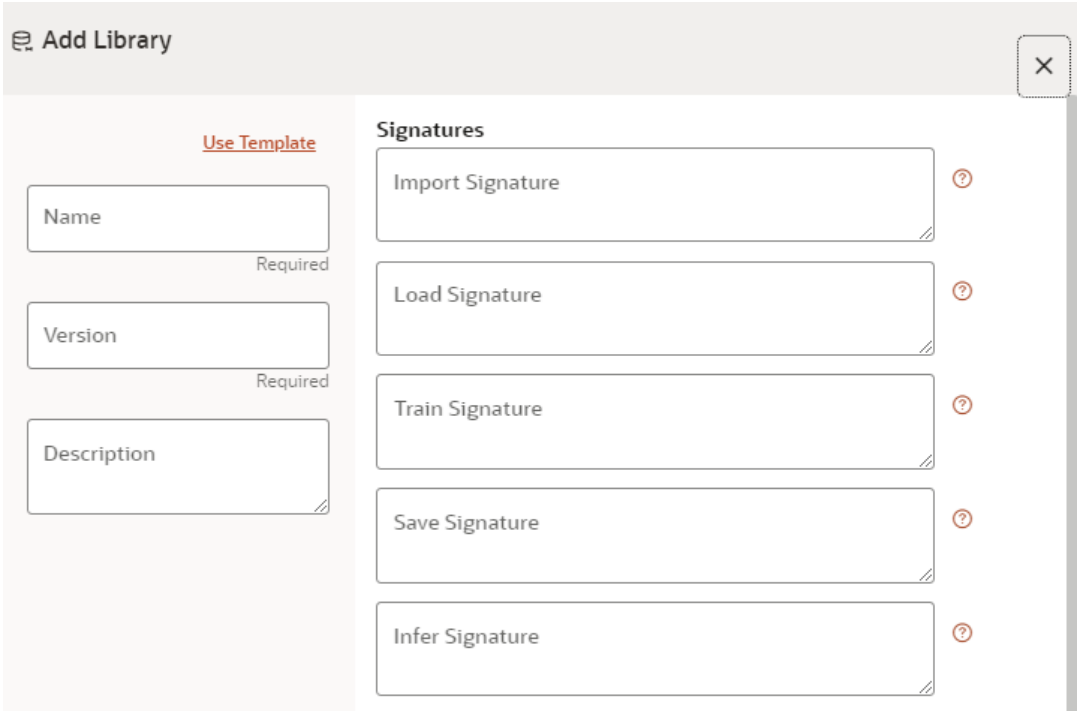
**Figure 18-2 Add Library page**




3. Enter the name of the library.
4. Enter the version and description of the library.
5. Enter the signatures such as Import, Load, Train, Save, and Infer. For more details on the signatures, click the respective help icons.
   Some of the signatures captured in library stage might not be standard across different algorithm/techniques provided by the library.
6. Click **Create**.
   The Model Objective is created and displayed in the Model Objective screen.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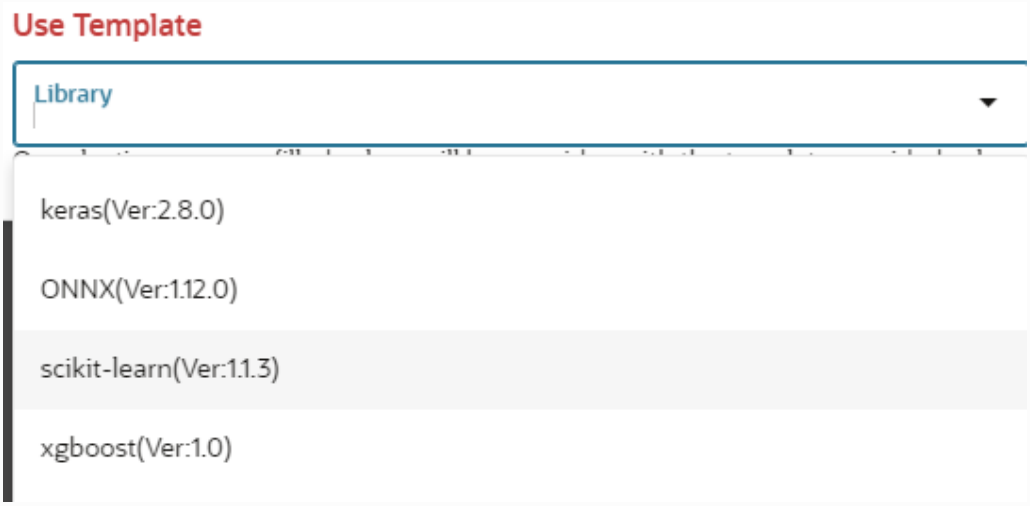
**Note**

The User must check the details provided above from the home page of the library being captured.
For example: `https://scikit-learn.org/stable/`.

**OR**

You can select the **Use Template** option to pre-fill the entries from the seeded list of Libraries. Currently, the following libraries are present in the template.

**Figure 18-3 Use Template**




You can also edit the data based on your requirements.

**Note**

The .whl file for MMG-Python is available in the below location: OFS_MMG/mmg-service/python-lib/mmg-8.1.3.2.0-py3-none-any.whl

This can be installed using the command Python3 -m pip install MMG-8.1.3.2.0-py3-none-any.whl

On successfull installation, the user will get a message: "Successfully installed MMG-8.1.3.2.0".

# Edit a Model Library

To edit a Model Library:

1. Navigate to **Library Summary** page.
2. Click and select Edit.

   The **Edit Library** screen is displayed.


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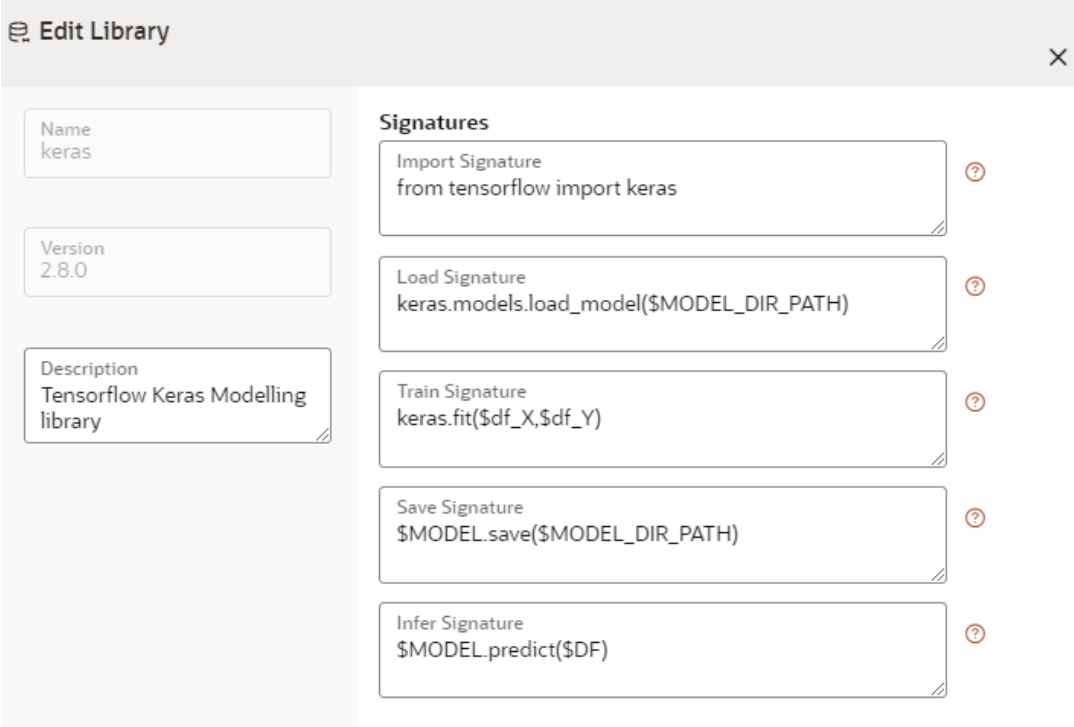
**Figure 18-4 Edit Library screen**




3. Make the necessary changes and click **Update**.

> **Note**
>
> The Model Library name and version are unique and cannot be modified.

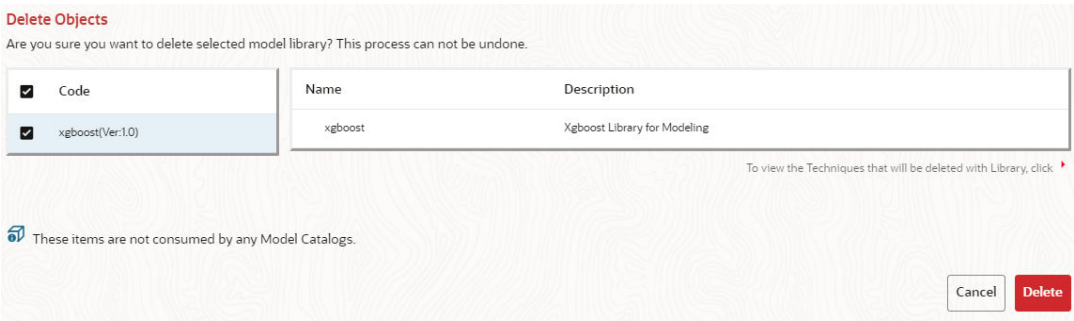
# Delete a Model Library

To delete a Model Library:

1. Navigate to **Library Summary** page.
2. Click and select **Delete**.

   A confirmation message is displayed.

**Figure 18-5 Confirmation Message**





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3. Click **Delete**.

   The selected model library and all the associated model techniques are deleted. The libraries that are deleted cannot be consumed by any model catalog.

   To delete multiple model libraries select all the model libraries that you want to delete and click the icon on the page header.

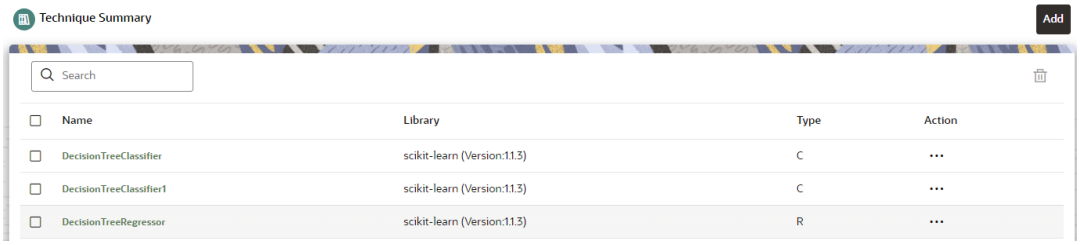
# 18.2 Model Technique

Model Technique is the algorithm/technique used to create python model using the library/ package which was created in the Model Library Screen. It is the actual information captured in the application that helps in training the model (Upload and Build).

1. In the LHS menu, click **Model Catalog > Model Technique**option.

   The **Technique Summary**page is displayed.

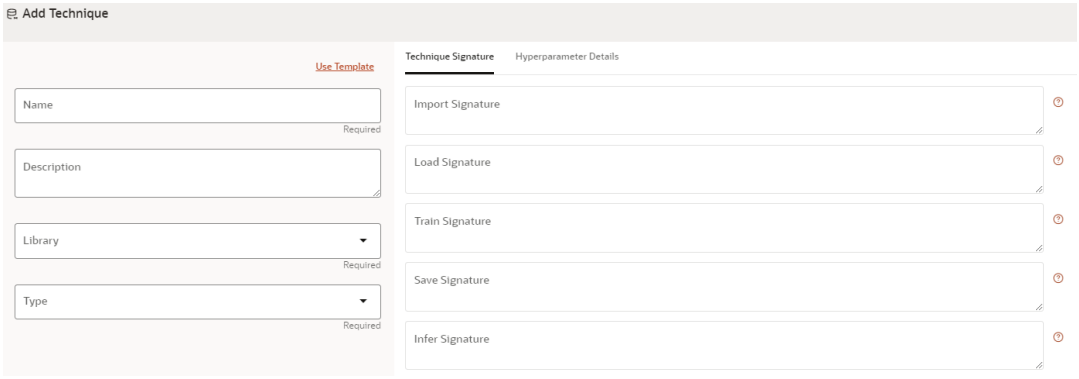
**Figure 18-6 Technique Summary page**




2. In the **Technique Summary** page, click **Add**.

   The **Add Technique** page is displayed.

**Figure 18-7 Add Technique page**




3. Enter the name of the technique.
4. Enter the description of the technique.
5. Select the library from the drop-down. Currently, the application supports the libraries such as keras, ONNX, scikit-learn, and xgboost.
6. Select the type as either as **Classification** or **Regression**.

   Classification: Classification is a process of finding a function which helps in dividing the dataset into classes based on different parameters. The task of the classification algorithm is to find the mapping function to map the input(x) to the discrete output(y).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Regression: Regression is a process of finding the correlations between dependent and independent variables. The task of the Regression algorithm is to find the mapping function to map the input variable(x) to the continuous output variable(y).

7. Enter the signatures such as Import, Load, Train, Save, and Infer. For more details on the signatures, click on the respective help icon.

   Some of the signatures captured in library stage might not be standard across different algorithm/technique provided by the library.

8. Navigate to **Hyperparameter Details** tab and click **Add** to add the parameters.

   You can add the type of parameters such as String, Integer, Float, and Boolean.

9. Click **Create**.

   The Model Technique is created and displayed in the **Technique Summary**screen.

> **Note**
>
> The user needs to check the details provided above from the homepage of the library being captured.
> For example: `https://scikit-learn.org/stable/.`

OR

You can select the Use Template option to pre-fill the entries from the seeded list of Libraries.

You can also edit the data based on your requirements.

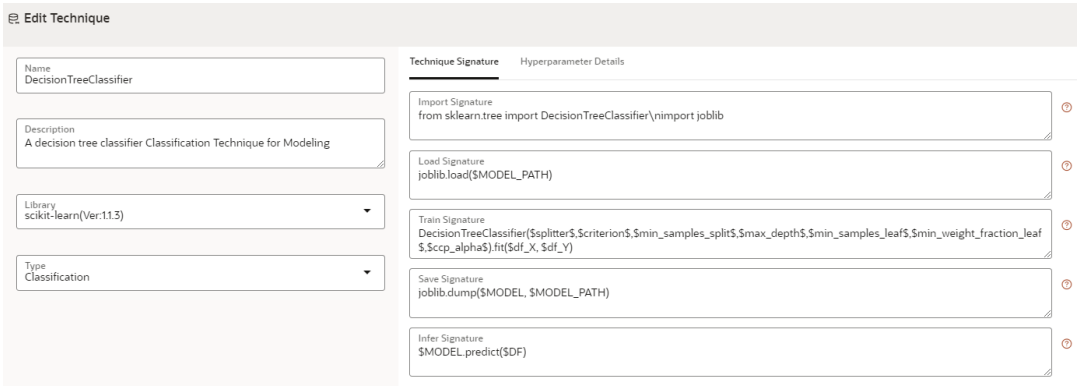
# Edit a Model Technique

To edit a model technique, follow these steps:

1. Navigate to **Technique Summary** page.
2. Click **Action** next to corresponding model technique and select **Edit**.

   The **Edit Technique** screen is displayed.

**Figure 18-8 Edit Technique screen**




3. Make the necessary changes and click **Update**.

   For more details, see Model Technique section.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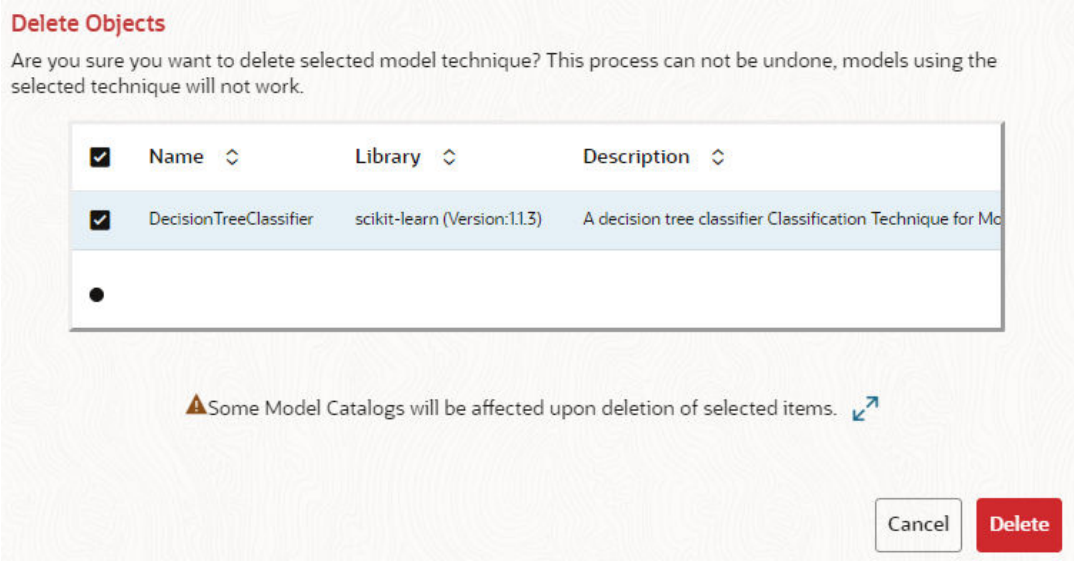
## Delete a Model Technique

To delete a model technique, follow these steps:

1. Navigate to **Technique Summary** page.
2. Click **Action** next to corresponding model technique and select **Delete**.

   A confirmation message is displayed.

**Figure 18-9 Confirmation Message**




3. Click **Delete**.

   The selected model technique and all the model catalogs associated are deleted.

   To delete multiple model techniques, select all the model techniques that you want to delete and click the **Delete**icon on the page header.

# 18.3 Model Catalog

The **Model Catalog** feature allows you to manage your Model Catalogs. You can either import the models from external sources or create, train and label it as champion model.

## Model Objective

Model Objective is the top level metadata where further models are created or trained which can be consumed in the upcoming steps.

> **Note**
>
> Ensure Data Studio is up and running. A validation message is displayed when the Data Studio is down during creation of Model Objectives.

To add a Model Objective: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1. Click **Launch Workspace** next to the corresponding workspace to display the **Dashboard** window with application configuration and model creation menu.
2. In the LHS menu, click **Model Catalog** to display the **Model Objective Summary** window.

   This window displays the model objectives in a table.

   The following table provides descriptions for the fields and icons on the **Model Objective Summary** page.

**Table 18-1 Fields and icons on the Model Objective Summary page**

| Field or Icon | Description |
|---|---|
| Search | The field to search for Model Objectives.<br>Enter specific terms in the field for which you want to search, and press Enter on the keyboard to display the results. |
| Code | The unique identifier of the Model Objective. |
| Name | The name of the Model Objective. |
| Dataset | The dataset which is used to create the Model Objective. |
| Target Variable | Target Variable is the important parameter after the dataset. During the dataset selection, target variable is selected that constitutes of number of columns/features. |
| Type | The type which is selected during model objective creation. The type can be either Classification or Regression. |
| Action | Click the three dots to perform View/Delete functions on the selected model objective.. |

> **Note**
>
> On the **Objective Summary** page, use the **Show Empty Objectives** checkbox to toggle the display of empty objectives. By default, empty objectives are hidden. You can select **Show Empty Objectives** to display them. After you successfully add a new objective, **Show Empty Objectives** is automatically enabled.

## Add a Model Catalog

To add a Model Catalog:

1. In the **Model Catalog Summary** screen, click **Add**.

   The **Add Model Catalog** screen is displayed.


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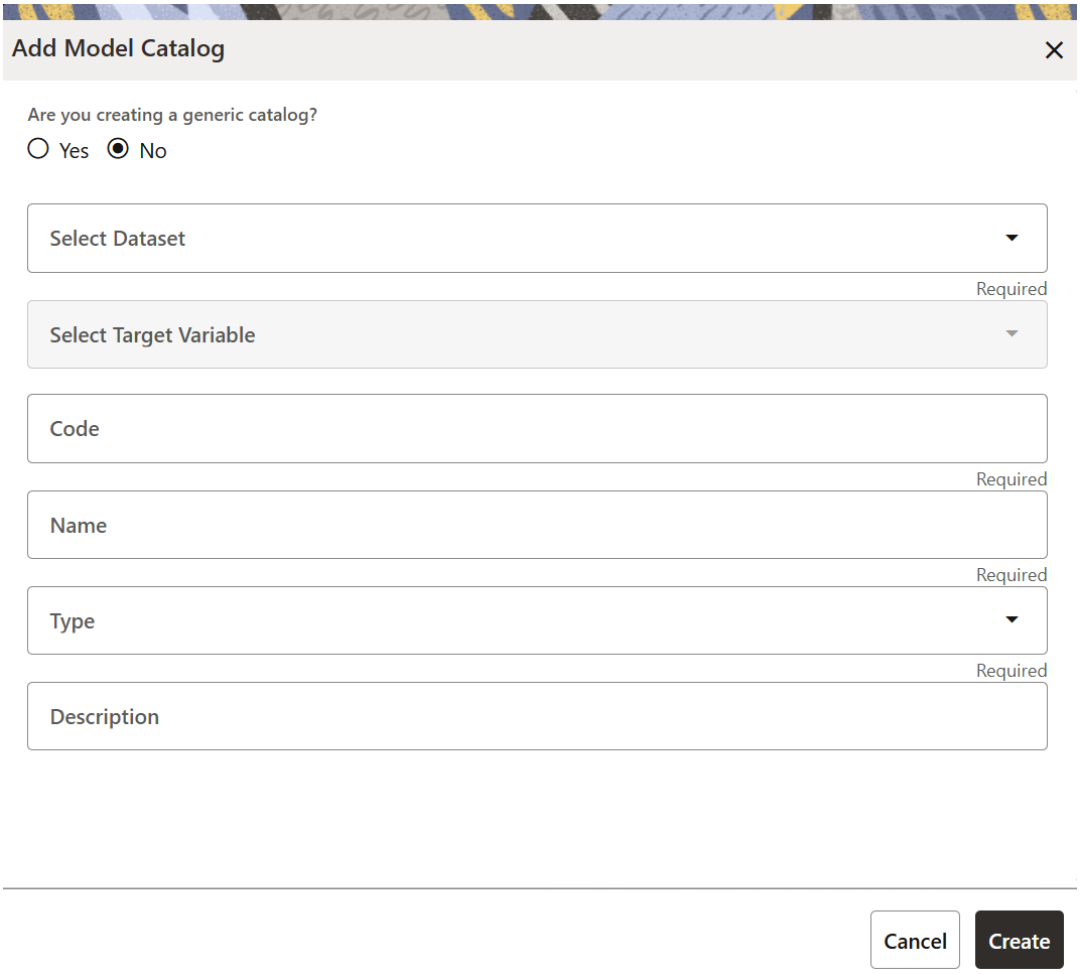
**Figure 18-10 Add Model Catalog**




2. Select either *Yes* or *No* in the **Are you creating a generic catalog?** section. By default, the *No* option is selected on this window. If you select *Yes*, the following options appears:


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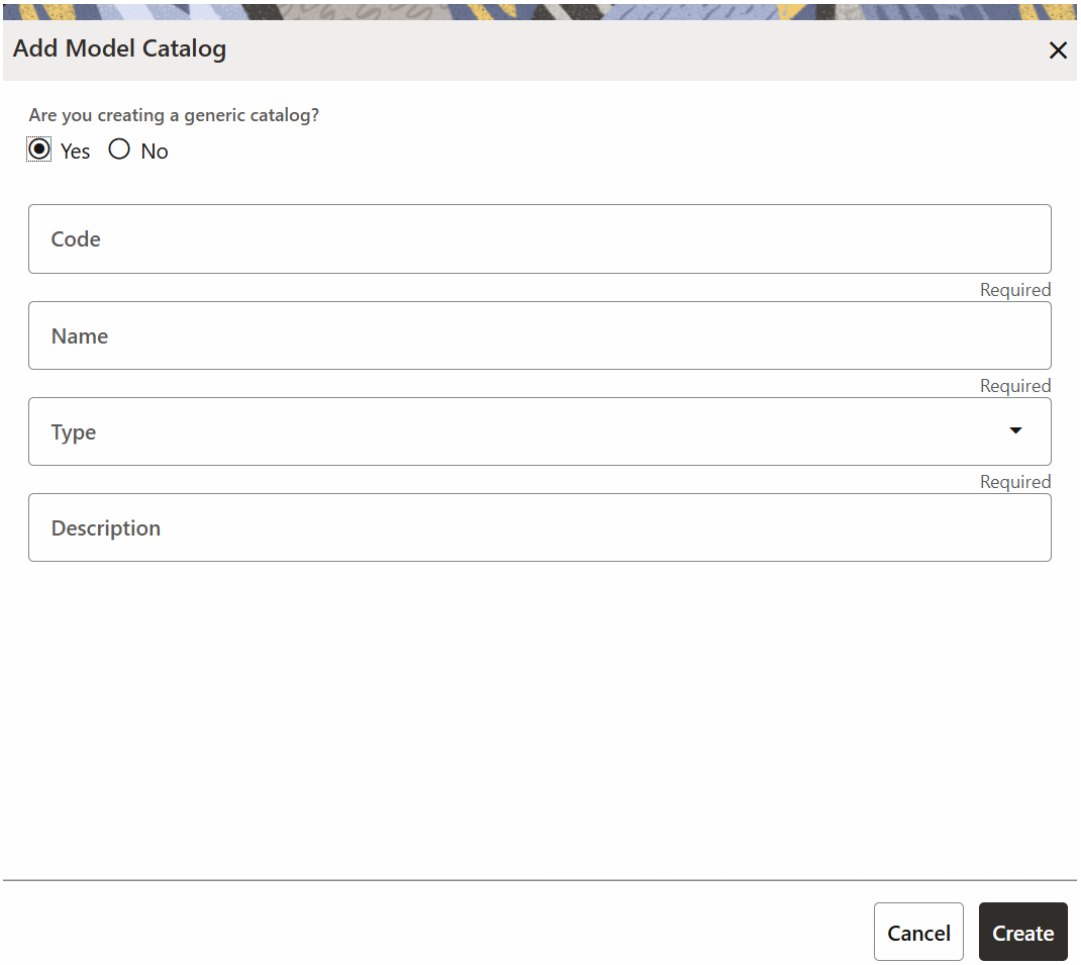
**Figure 18-11 Add Model Catalog Window with the Yes Option Selected**




3. Select the desired dataset from the **Select Dataset** drop-down list. This option is only available if *No* is the selected option in the **Are you creating a generic catalog?** section.

   For more details on datasets, see Dataset section.

4. In the **Select Target Variable** field, select one of the column/feature as the target variable for the models that needs to be trained/uploaded. This option is only available if *No* is the selected option in the **Are you creating a generic catalog?** section.

5. Enter a code for the model catalog in the **Code** field.

   The code should be unique for each model catalog.

6. Enter a name in the **Name** field.

7. Select the type from the **Type** drop-down list. The available options are:

   **Classification:** Classification is the process of finding a function that helps in dividing the dataset into classes based on different parameters. The task of the classification algorithm is to find the mapping function to map the input(*x*) to the discrete output(*y*).

   **Regression:** Regression is the process of finding the correlations between dependent and independent variables. The task of the regression algorithm is to find the mapping function to map the input variable(*x*) to the continuous output variable(*y*).

   **Others:**If the type in this field is not **Classification** or **Regression**, then select this option.

8. Enter the description in the **Description** field.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9. Click **Create**.

   The Model Catalog is created and displayed in the **Model Catalog Summary** screen.

## View a Model Catalog

To view a Model Catalog:

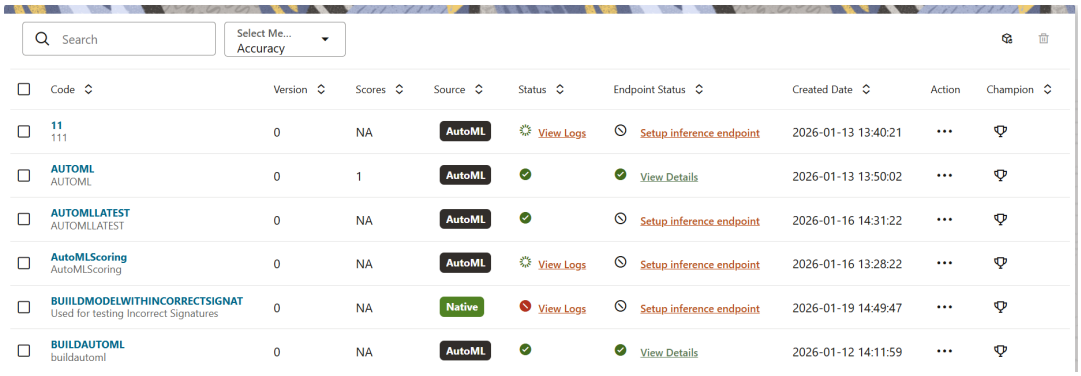
1. Navigate to the **Model Catalog Summary** page.
2. Click **Action** and select **View**.

   OR

   Click the desired model.

   The following page is displayed.

**Figure 18-12 View Model Page**




Click a model to view it's details.


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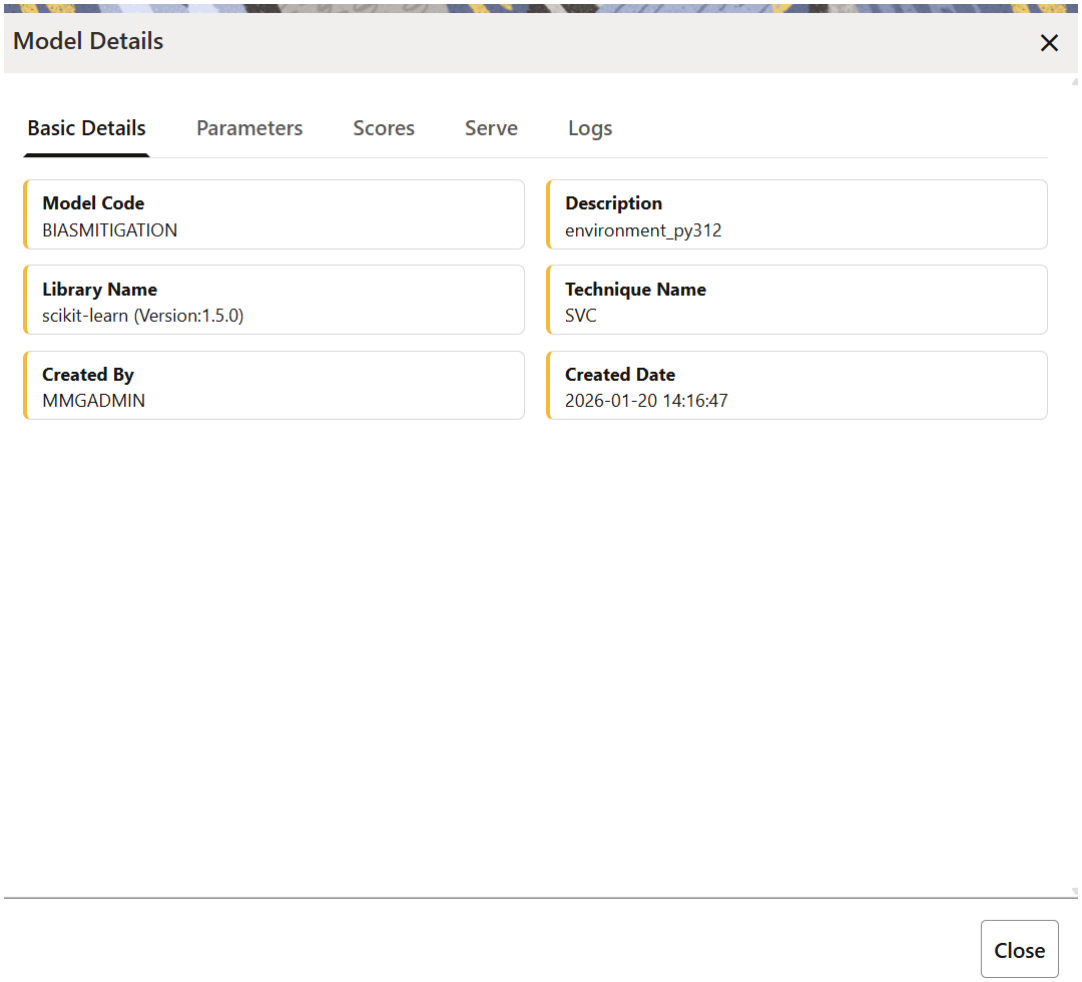
**Figure 18-13 Model Details Drawer**




3. If a model has failed, the **View Log** link appears in the **Status** column of the **Model Catalog Summary** page. When you click this link, the **Model Details** window appears. Navigate to the **Logs** tab to view the reason for the failure and the path to the file that failed.

## Upload a Model

To upload a model:

1. In the **View Model Objective**page, click **Add** and then select **Upload Model**.

   The **Upload Model** page is displayed.


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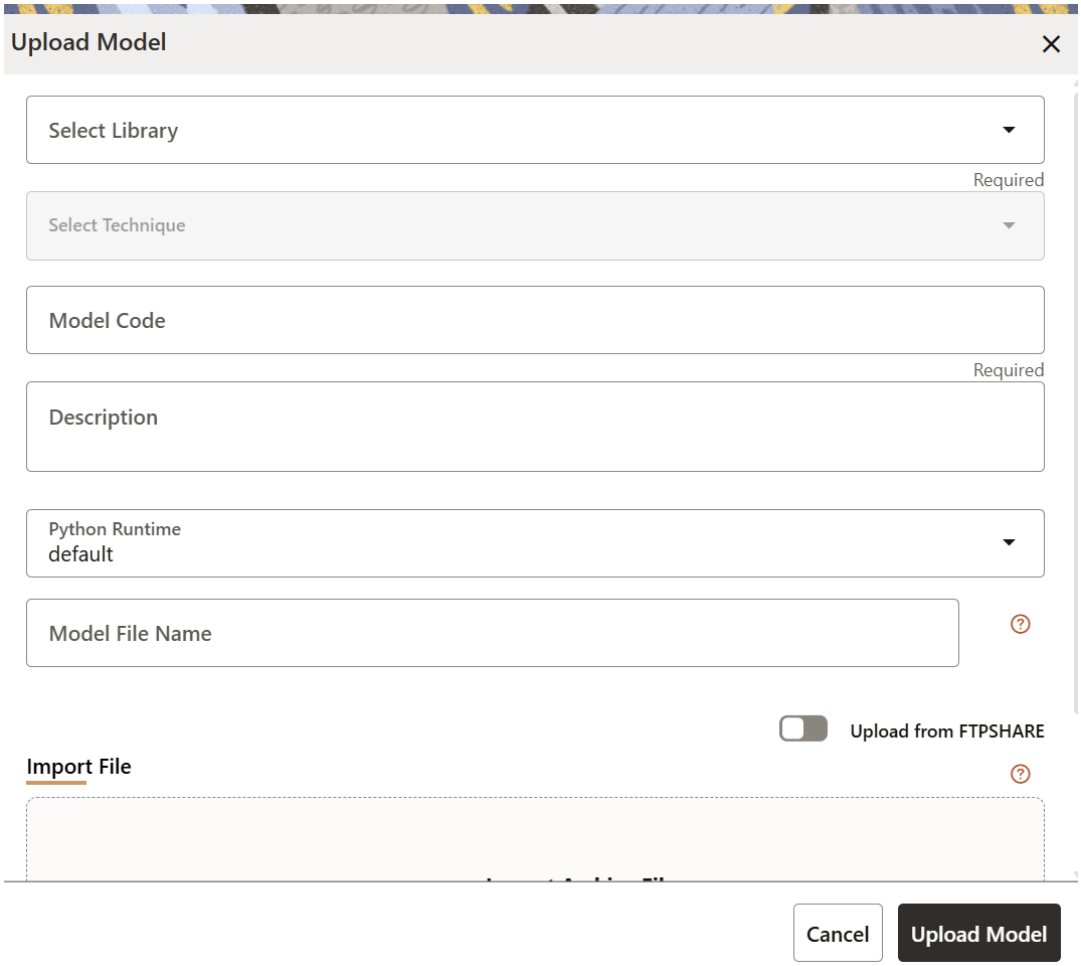
**Figure 18-14 Upload Model Drawer**




2. Select a library from the **Select Library** drop-down list. When a library is selected, the **Select Technique** drop-down list appears

   For more details on the model library, see the Model Libraries section.

3. Select the required technique from the **Select Technique** drop-down list.

   For more details on the model technique, see the Model Technique section.

4. Enter the model code and description for the model catalog in the **Model Code** and **Description** fields.

5. Select a python runtime from the **Python Runtime** drop-down list.

6. Enter the name of model file with the extension in the **Model File Name** field.

7. Import the model by using the **Import Archive File**option. The file format must be in be a zip format.

   OR

   Enable the **Upload from FTPSHARE** option to import the model. The file path that is entered is the zip file path that is present on the server relative to ftpshare path, including the file.
   For example: `<installation path>/temp/models/model.zip`

8. Click **Upload Model**.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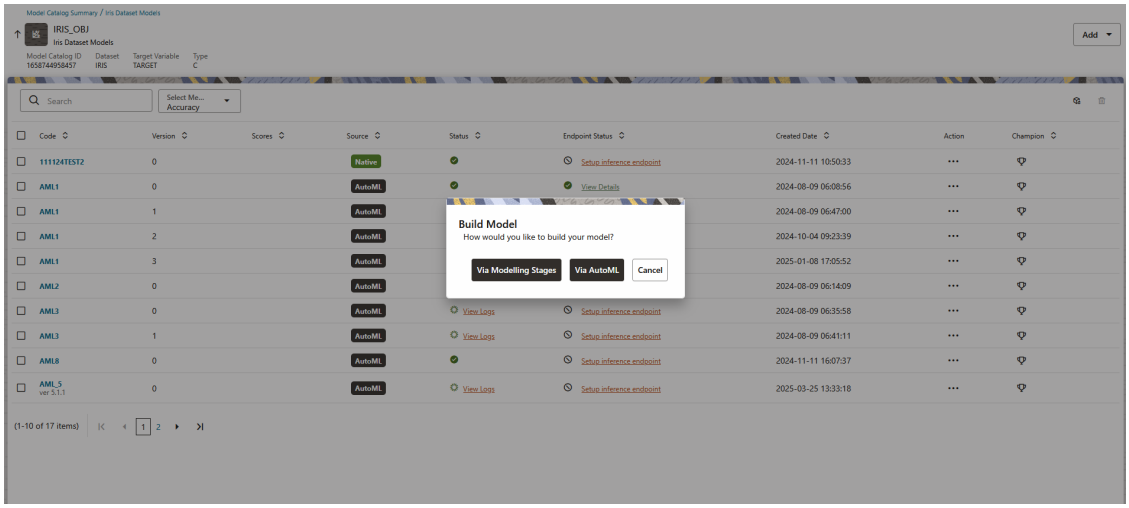
The model is uploaded successfully.

## Build a Model

Building a model consists of the following steps:

- Model Details
- Pre–Processing Stage
- Model Training Stage
- Model Validation Stage
- Model Summary

**Figure 18-15 Model Building screen**




## Build via Modelling Stages

### Model Details

1. In the **View Model Objective** page, click **Add** and select **Build Model**.

   The **Model Details** page is displayed.


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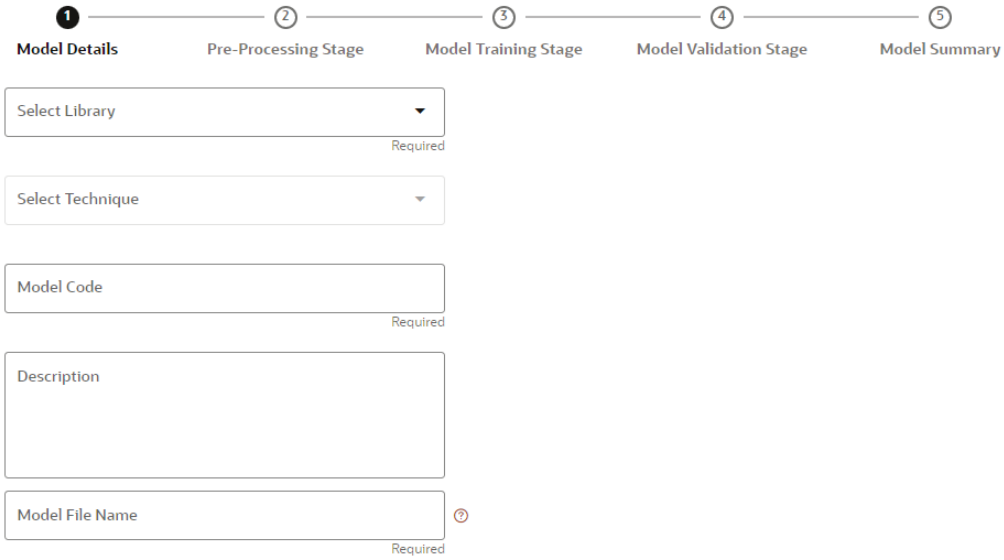
**Figure 18-16 Model Details page**

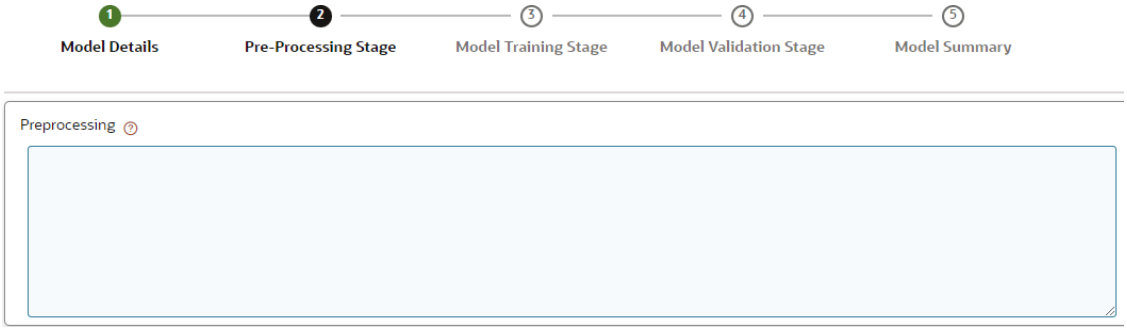



2. Select the library from the drop-down. Currently, the supported libraries are keras, ONNX, scikit-learn, and xgboost. For more details, see the Model Libraries section.
3. Select the required technique from the drop-down. For more details, see the Model Technique section.
4. Enter the model code and description for the model.
5. Enter the name of model file with extension for use during Save and Load.
6. Click **Next** to go to the next step.

Pre–Processing Stage

After adding the details in the Model Details page, the Pre-Processing Stage screen is displayed.

**Figure 18-17 Pre-Processing Stage screen**




1. Enter the data in the Pre-Processing text box as shown in an example is provided here.


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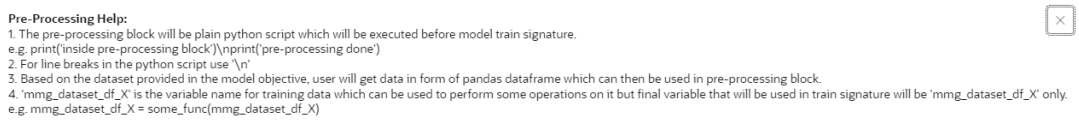
**Figure 18-18 Pre-Processing text box**

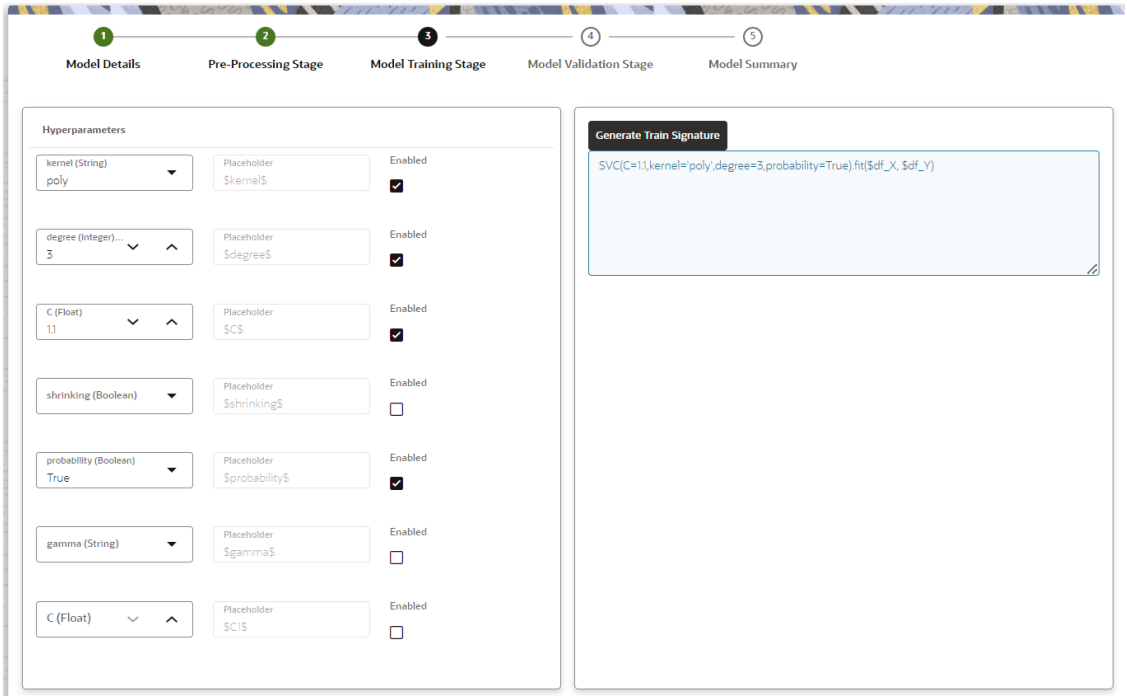



2. Click **Next** to go to the next step.

Model Training Stage

After adding the details in the Pre-Processing Stage page, the Model Training Stage screen is displayed.

**Figure 18-19 Model Training Stage screen**




1. Select the hyperparameters.

   When the parameters is selected, the **Enabled** check box is selected by default.

2. Click **Generate Train Signature**.

   The signature is displayed.

3. Click **Next** to go to the next step.

Model Validation Stage

After adding the details in the Model Training Stage page, the Model Validation Stage screen is displayed.


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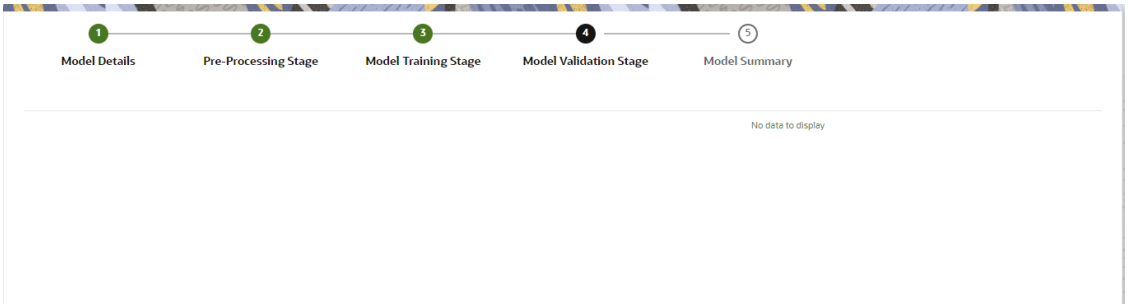
**Figure 18-20 Model Validation Stage screen**




The Validation is work in progress.

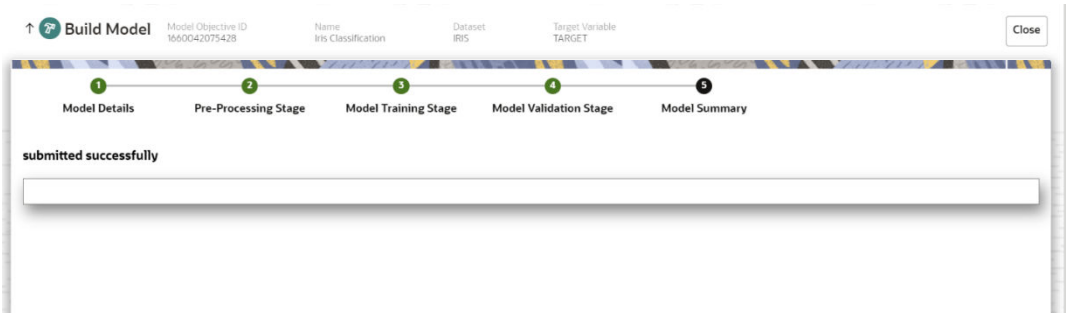
- Click **Finish** to start the training of the model.

Model Summary

Once the validation of the model is completed, the Model Summary screen is displayed. Follow the below steps to publish Models from Model Summary:

1. Navigate to Model Summary.
2. Click on the three dots.
3. Select publish Datastudio option.
4. Check the links.

**Figure 18-21 Model Summary screen**




- Click **Close**.

  The model is created and displayed in the Model Objective screen.

## Build via Modelling Stages

## Build via Modelling Stages

## Build via Modelling Stages

## View the Details of a Model

To view details of a model, perform the following steps: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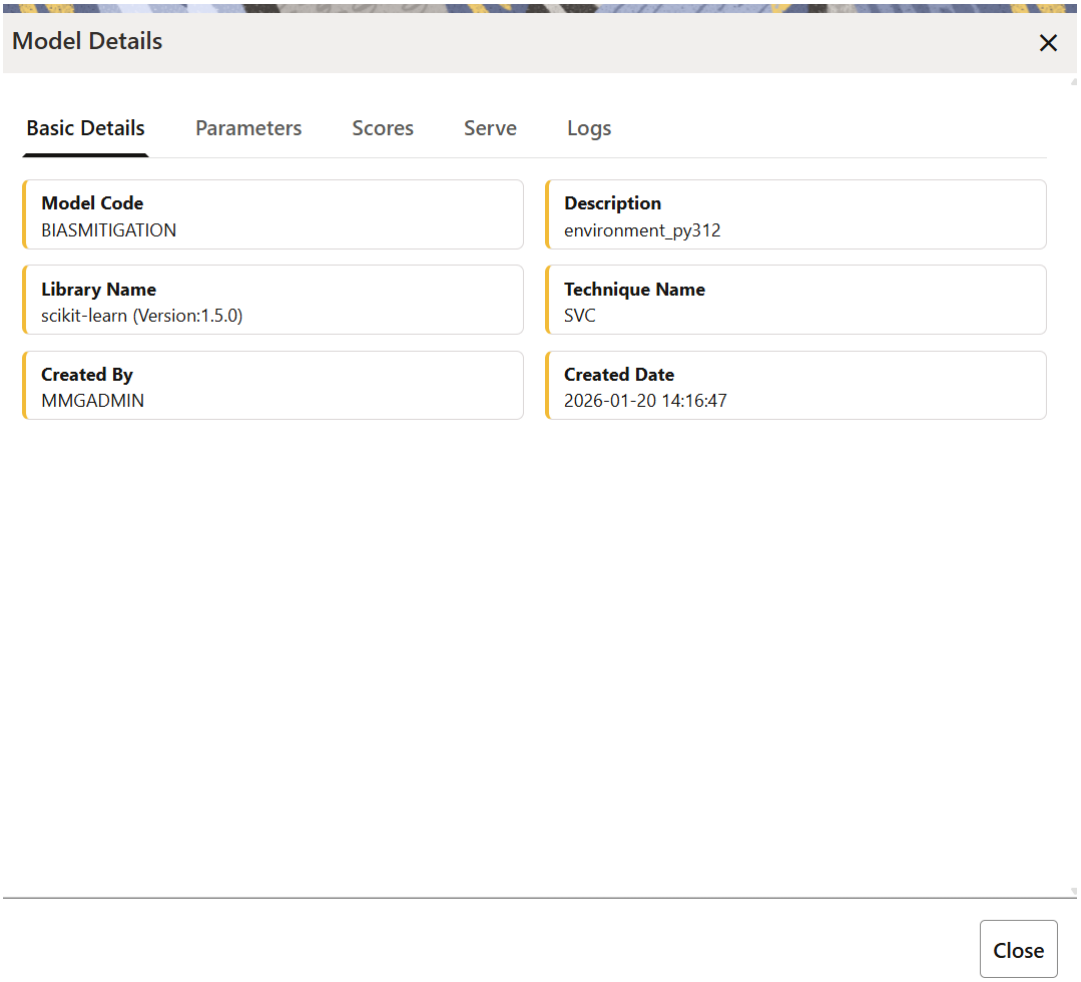
1. In the **View Model Catalog** page, click **Action** next to corresponding model and select **View Details**.

   The model details are displayed.

**Figure 18-22 Model Details Drawer**




2. Click the tabs to view the following details:
   - **Basic Details:** This tab displays the basic details of the model catalog such as the model code, description, library name, technique name, created by, and the created date.
   - **Parameters:** This tab displays the preprocessing details of the model in the **Preprocessing** tab. The **Hyperparameter Details** tab displays the different names, placeholder, type, and values that are used during the training of the selected model.
   - **Scores:**This tab displays information about the latest evaluation score, evaluation history, fairness score.
   - **Serve:**This tab displays the endpoint details of a deployed model.
   - **Logs:**This tab displays the log information of the selected model. In case a model has failed, you can view the reason for the failure.
3. Click the **Score Details** tab to view the Latest score, and Scoring details of the model.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### Delete a Model

To delete a model:

1. In the **View Model Catalog** page, click **Action** next to corresponding model and select **Delete**. A confirmation message appears, asking if you want to delete the selected model.
2. Click yes to delete the selected model.

### Build via Modelling Stages

### Build via Modelling Stages

### Build via Modelling Stages

### Build via Modelling Stages

### Set the Model as Champion

You can set the trained models as champion model.

To set a champion model:

1. In the **View Model Catalog** page, click **Action** next to corresponding model and select **Set Champion**.

   A confirmation message appears, asking if you want to set the selected model as a champion.
2. Click **Update**.

   The model is set as champion for the selected model objective.

### Delete a Model Catalog

To delete a Model Catalog:

1. Navigate to **Model Catalog Summary** page.
2. Select the model that you want to delete and then click the **Delete** icon. A confirmation message appears asking you if you want to delete the model catalog.
3. Confirm the deletion and the selected model catalog is deleted.

## 18.4 Pipelines

Model Pipeline enable you to create and publish models based on the workspaces created from datasources. The published models are then deployed in production to be consumed by other services and applications. Modelers create models by using model templates available as part of ML4AML or by developing them independently in Compliance Studio Notebooks. After building and evaluating, multiple models, the best model or champion model can be selected. The champion model can then be deployed for scoring. In this document the champion model can also be referred to as the scoring model.

### Prerequisites

The prerequisites for model pipeline are as follows:


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- To create a model, your user profile must be mapped to the Modeler Group.
- To create a model, a workspace must be deployed.
- To approve and deploy a model, your user profile must be mapped to the Modeling Administrator Group.

## Access Model Pipelines

The Model Pipeline window allows you to create and publish models.

To access the Model Pipeline window:

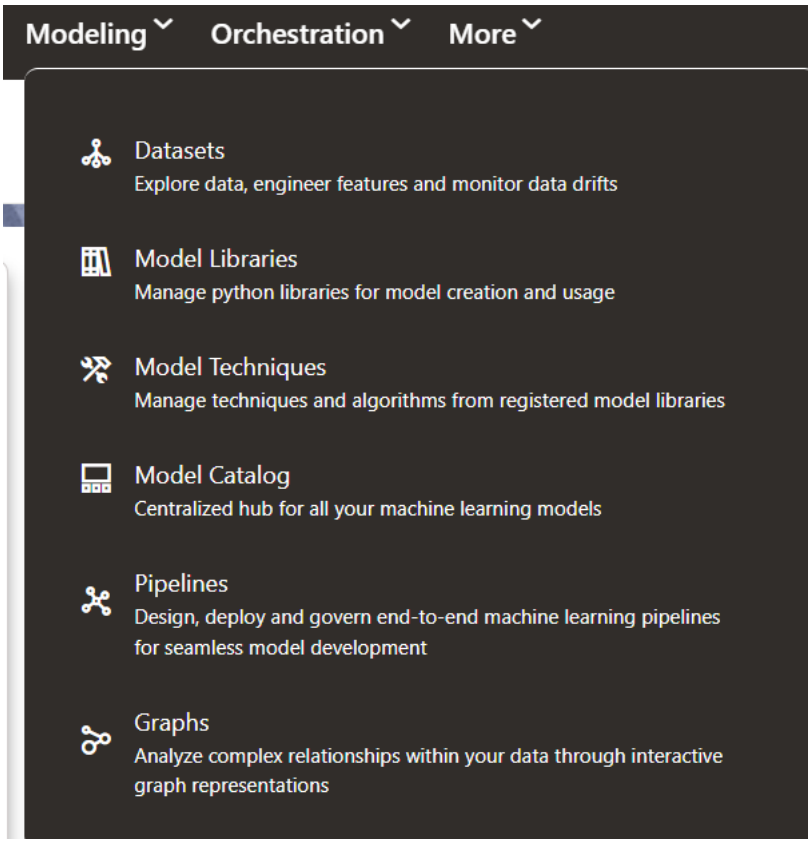
1. Navigate to **Workspace Summary** page.

   The page displays workspace records in a table.

2. Click **Launch** next to corresponding Workspace to Launch Workspace.

   The **Dashboard** window is displayed with application configuration and model creation menu.

3. Click the **Modeling** drop-down list at the top of the page and then click **Pipelines**.




The window displays objectives that contain drafts and models. When you hover over the count that are adjacent to the **ID** column, it displays the count of sub objectives, drafts, models, and champion, if available.


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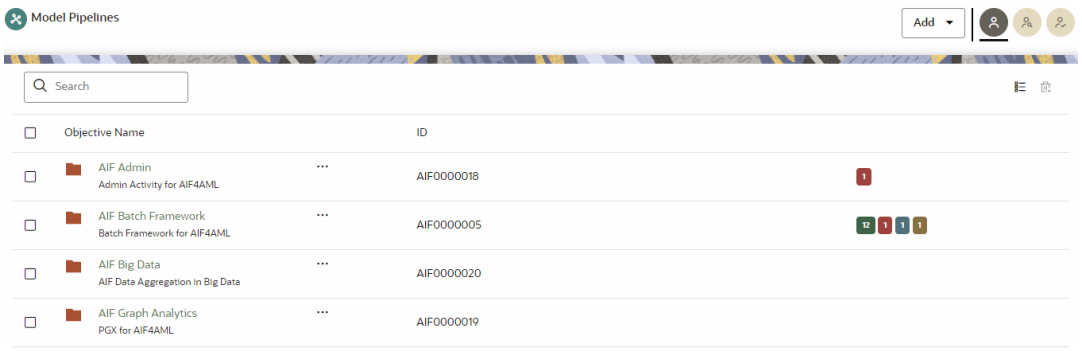
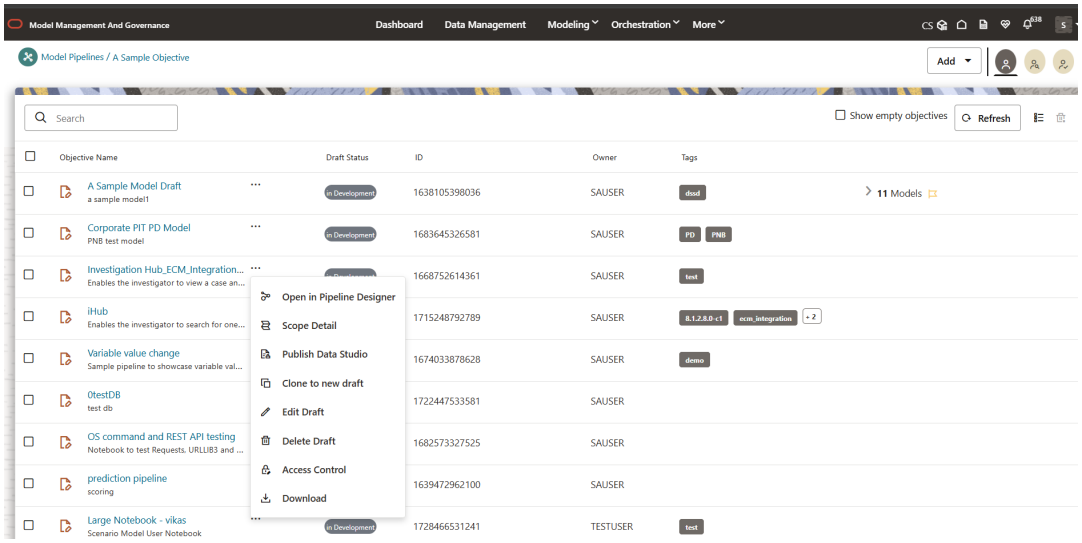
**Figure 18-23 Model Pipelines page**




Click the **More** icon adjacent to an objective to view all the available actions.

**Figure 18-24 Actions for an Objective**




You can click the **Flat List** icon, adjacent to the **Refresh** button, to change the view. Flat list is the default view in the production workspace while hierarchical list is the default in the sandbox.

- **Hierarchical**: This option displays the hierarchical list of objectives. In the **Hierarchical** view, you can view the details of the objectives such as the objective name and ID.
- **Flat List**: This option displays the flat list of all the models (published and drafts) by using the **Flat List**icon. Flat list is not objective-specific. It displays the models across all the objectives. You can search the models by using the **Filter by Version**, **Filter by Status**, **Sort by**, and **All champions**. The **Sort by** onption contains two sorting options; **Default** and **Latest first**.
  - In the flat list view of models, you can see the details of the models such as the name, ID, version, objective ID, objective name, owner, and status.


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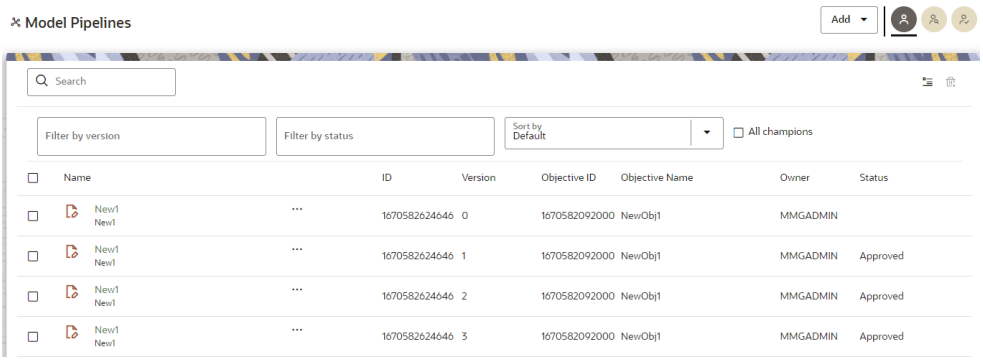
**Figure 18-25 Model Pipelines**




The following table provides descriptions for the fields and icons on the Model Pipeline page.

**Table 18-2 Fields and icons on the Model Pipeline page**

| Field or Icon | Description |
|---|---|
| Model Pipeline Page Header | The header that follows the global header in the application. |
| Breadcrumbs | Indicates the position of the current page in the Model Management hierarchy. Use breadcrumbs locator links to navigate back to higher levels in the hierarchy after you have drilled down through levels of functions.<br>Click to navigate to Model Summary page.<br>Click or to navigate back to Workspace Summary page. |
| Create Objectives and Models | Select Add to display a list with the following options:<br>• Draft<br>• Objective<br>• Seeded Models<br>To create models, select **Draft**. To create objectives, select **Objective**. See the Create Objective (Folders)and Create Draft Models sections for more information.<br>When you are creating a Model by using the extraction widget, you might want to increase the **ZEPPELIN_LIMIT_INTERPETER_OUTPUT** in the Python Interpreter. For information on how to do this, see the question on how to increase the **ZEPPELIN_LIMIT_INTERPETER_OUTPUT** in the Python Interpreter in the Frequently Asked Questions topic of the OFS MMG Installation Guide.<br>However, if you want to know about the cycle of model creation, see the Manage Models section. |
| Requester | Displays that the logged-in user has the requester privileges when the status is green.<br>You can create a model. However, to approve and publish, the model must be reviewed by a user with reviewer privileges and approved by a user with approver privileges. |
| Reviewer | Displays that the logged-in user has the reviewer privileges when the status is green.<br>You can review models. However, to approve and publish, the model must be approved by a user with approver privileges. |
| Approver | Displays that the logged-in user has the approver privileges when the status is green.<br>You can approve models that are created and reviewed. |


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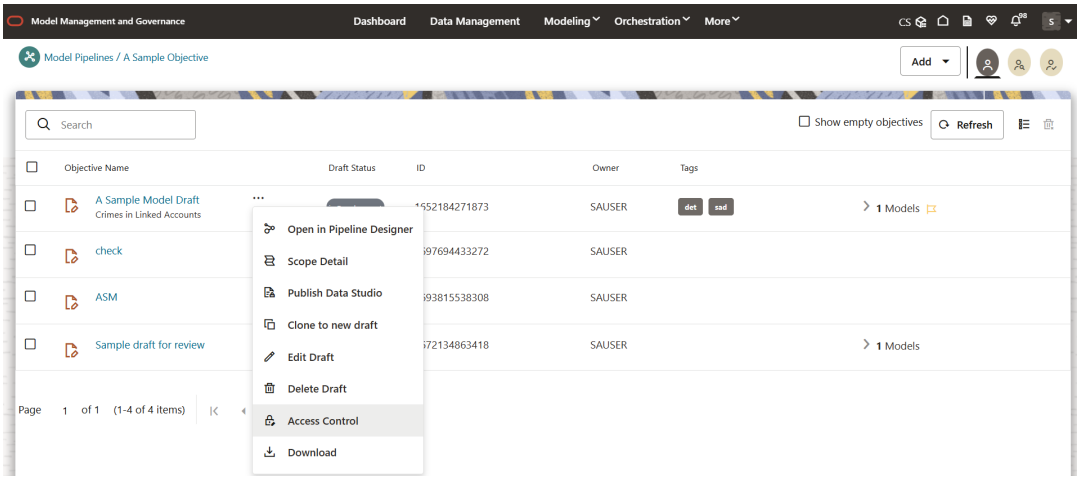
**Table 18-2 (Cont.) Fields and icons on the Model Pipeline page**

| Field or Icon | Description |
|---|---|
| Model Pipeline Page Table | The table displays the objective and model records on the page. |
| Objective Name | Displays the name and description of the objective |
| ID | Displays the ID of the objective. |
| Owner | Displays the owner who created the drafts.<br>This information does not display for an objective. |
| Tags | Displays the tags associated with the models or drafts.<br>This information does not display for an objective. |
| Delete Objective | Select to delete the model from the confirmation dialog box. Click **Delete** to process or click **Cancel** to cancel.<br>This information is not displayed for an objective. |
| Edit Objective | Select this option to edit the models in Data Studio. See the Edit Models section for more information.<br>This information is not displayed for an objective. |

> **Note**
>
> When executing PGX, the user is unable to access the interpreter 'PGX-Java' for the Notebook type 'Jupyter'. The allowed interpreters are: Python and MD. However, when the user changes the notebook type from the **Notebook** interface, the user is able to access the PGX-Java.

**Figure 18-26 Access Control Menu option**




The **Access Control** window has two radio buttons: **Public** and **Restricted**.


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**Figure 18-27 Public Mode**

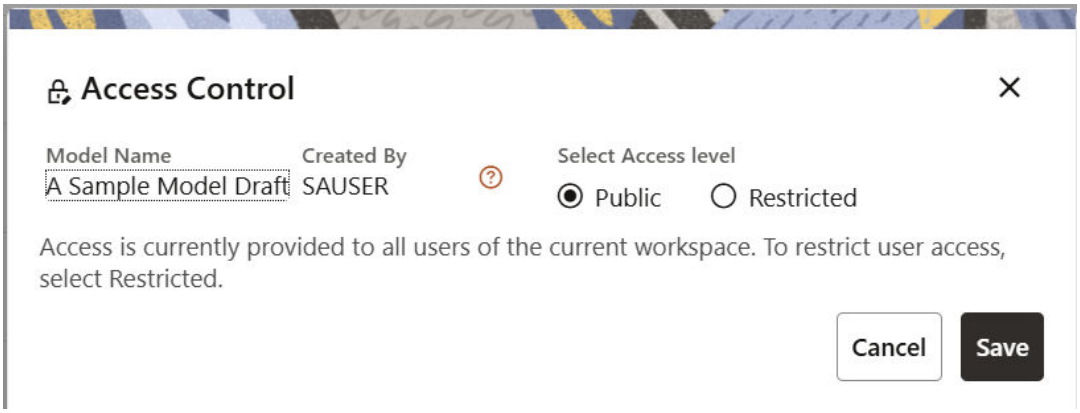
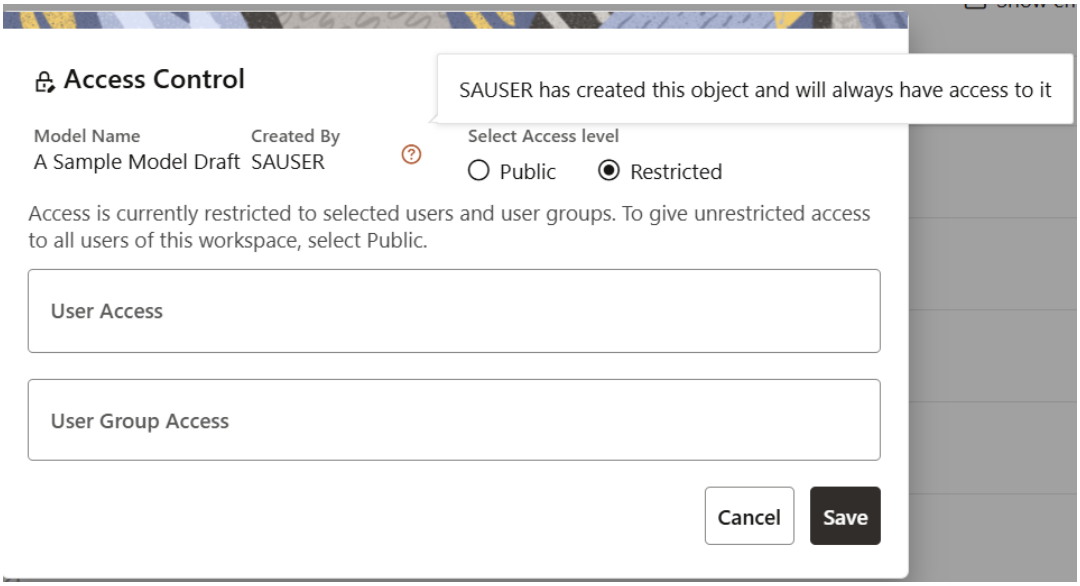



**Figure 18-28 Restricted Mode**




The **Access Control** window contains the following details:

- **Model Name**
- **Created By**
- **Select Access level: Public** and **Restricted**
- **User Access** (**Restricted** only): Select the users with restricted access. This drop-down list fetches all the users present in the Identity Management.


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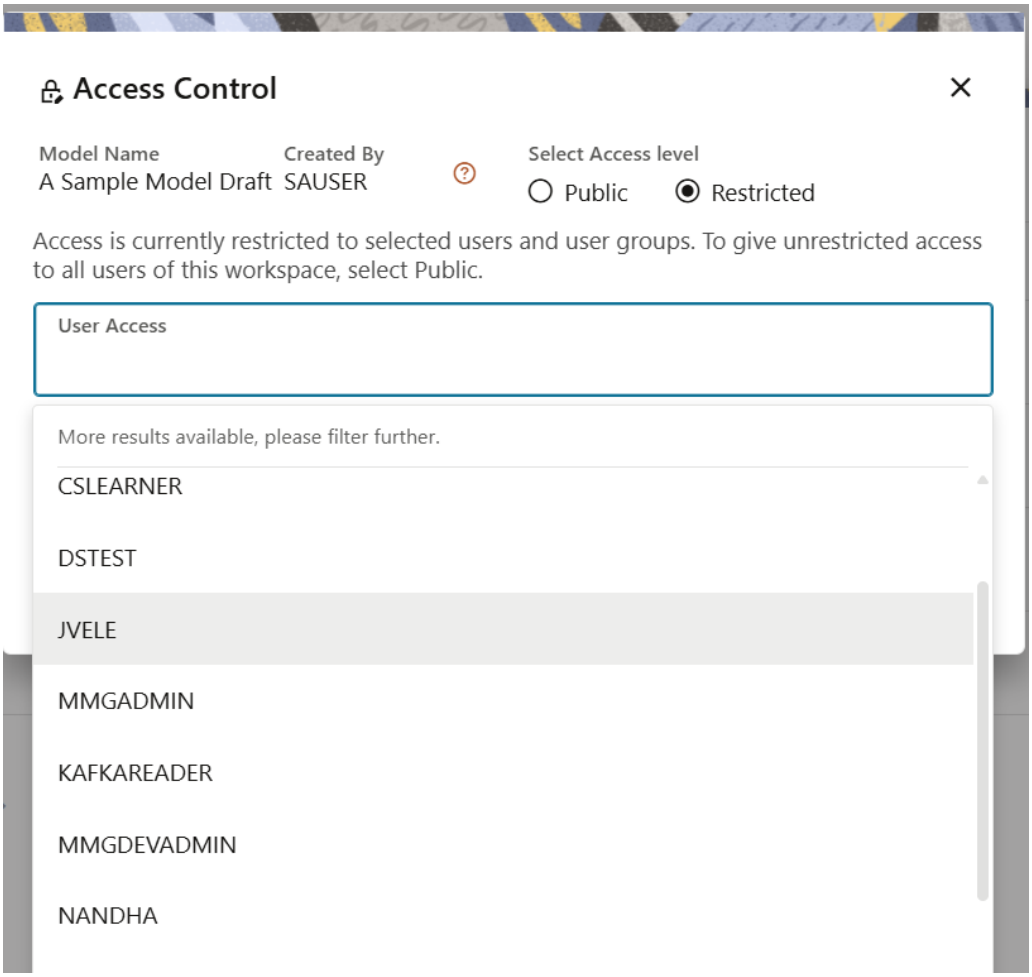
**Figure 18-29 Access Control User Dropdown**




- **User Group Access** (**Restricted** only): Select the user groups with restricted access. This drop-down list fetches all the user groups present in the Identity Management.


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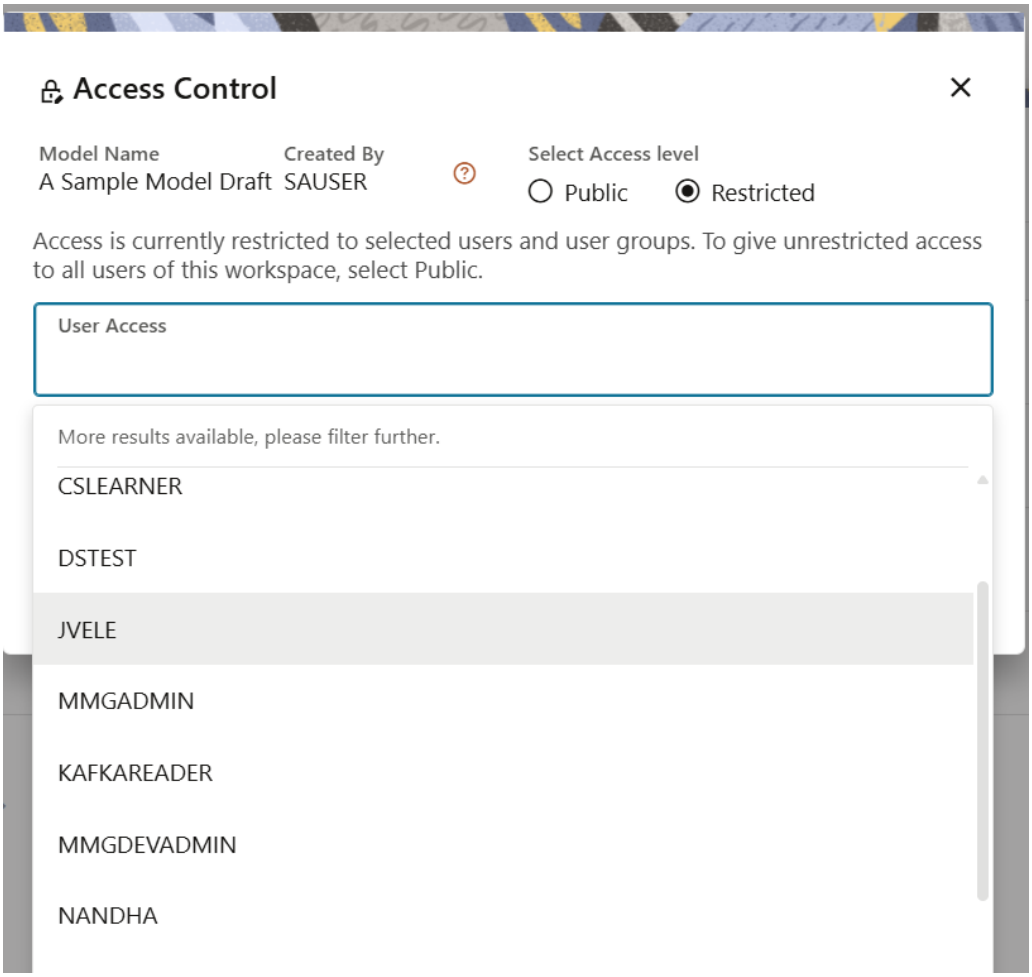
**Figure 18-30 Access Control User Dropdown**




- Cancel
- Save

> **Note**
>
> The new stage selector in theexecution drawer is added for executions from the pipeline canvas with the auto-populated option selected stage in the canvas. Users can now run independent stages from the pipeline canvas and even from the scheduler. The function of the stage remains the same as before as the stages are dynamic in nature. The executed stages are not shown in the execution history, instead the application follows the filtering of nodes to execute or nodes that have been executed at runtime.

# Manage Models

A Model has to go through an approval workflow before it can be deployed to production. The following types of users in the system have privileges that restrict the activities, they can do in the model creation and deployment workflow.


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**Table 18-3 Field or icons for the Model creation and deployment**

| Field or Icon | Description |
|---|---|
| Requester | You can create a model. However, to approve and publish, the model must be reviewed by a user with reviewer privileges and approved by a user with approver privileges.<br>**NOTE**: User Groups must be mapped to the MDLDEPLOY role to access Requester functions. |
| Reviewer | You can review models. However, to approve and publish, the model must be approved by a user with approver privileges.<br>**NOTE**: User Groups must be mapped to the MDLREVIEW role to access Reviewer functions. |
| Approver | You can approve models that are created and reviewed. You can then promote to production and make the model the champion in the production.<br>**NOTE**: User Groups must be mapped to the MDLAUTH role to access Approver functions. |

The following sections in this topic provide details for the cycle of creation of a model, review, approval, and deployment:

- Create Objective (Folders)
- Create Draft Models
- Publish Models (Scoring)
- View Model Details
- Compare Models
- Understand Model Governance
- Request Model Acceptance
- Review Models and Move to Approve or Reject
- Approve Models and Promote to Production
- Deploy Models in Production and Make it a Global Champion

## Create Objective (Folders)

This topic provides information on how to create folders, also known as objectives, within which you can create models. To create an objective, perform the following steps:

1. Click **Launch Workspace** adjacent to the corresponding workspace to launch the **Dashboard** window with the application configuration and model creation menu.
2. Click **Model Pipelines** to display the **Model Pipelines** window.

   The window displays folders that contain models and model records in a table.
3. Click **Add** and select **Objective** from the list.


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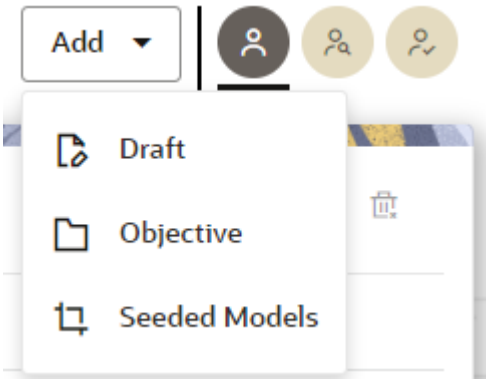
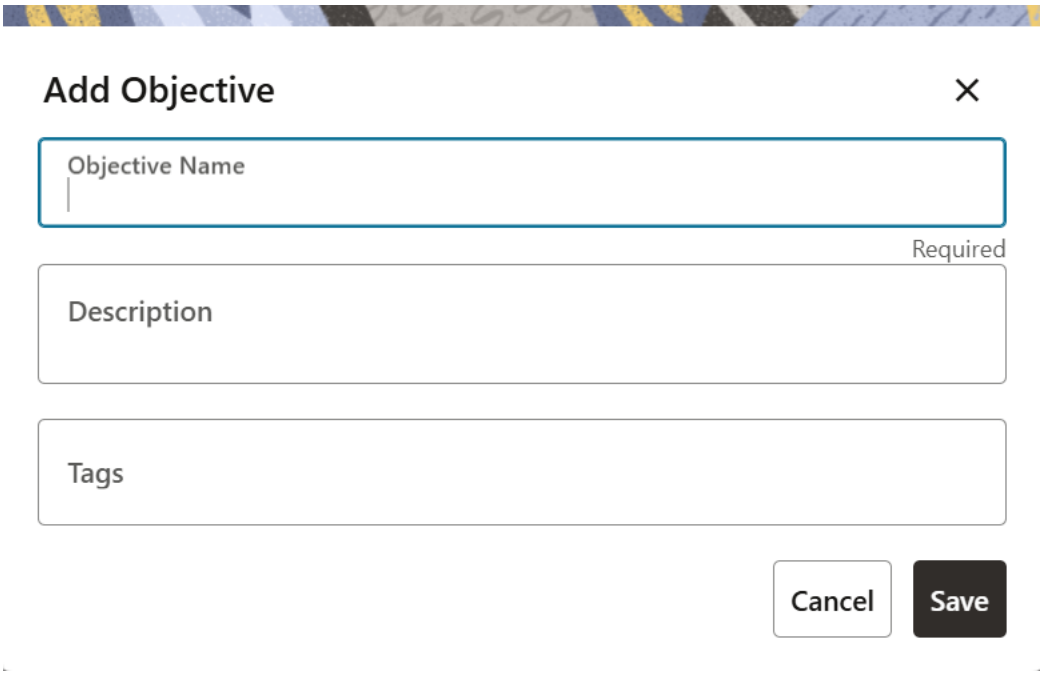
**Figure 18-31 Objective Option**




4. Enter details in the **Name**, **Description**, and **Tags** fields.

**Figure 18-32 The Add Objective Window**




5. Click **Save**.

**Create an Objective by Supplying the Custom Objective ID and Name**

Whenever a new objective is created, the application generates a unique ID that is associated with the objective. An objective can also be created by supplying the custom objective ID and name via an API.

## Create Draft Models

After creating an objective, a model draft or notebook can be created where the model development can begin. Perform the following steps to create a draft model:

1. Click **Launch Workspace** adjacent to the corresponding workspace to launch the **Dashboard** window with the application configuration and model creation menu.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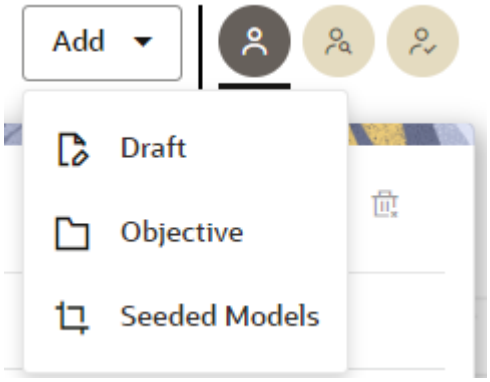
2. Click **Model Pipelines** to display the **Model Pipelines** window.

   This window displays folders that contain models and model records in a table.

3. Click **Add** and then select **Draft** from the list to display the **Add Draft** dialog box.

**Figure 18-33 Draft Option**




4. **Create New Model** is the default setting in the **Model Details** dialog box. Click the toggle button to select **Import Dump**. You can also create a draft under Objective (Folder) also. Click an Objective to open it.

   OR

   Drag the toggle button to select **Import Dump**. Import Dump lets you drag and drop an existing file with model data and modify it. To import a model data dump from another model, see the Import a Workspace Model Data into a New Model section.

   To create a new model:

   a. Enter details for Draft **Name** and **Description**.


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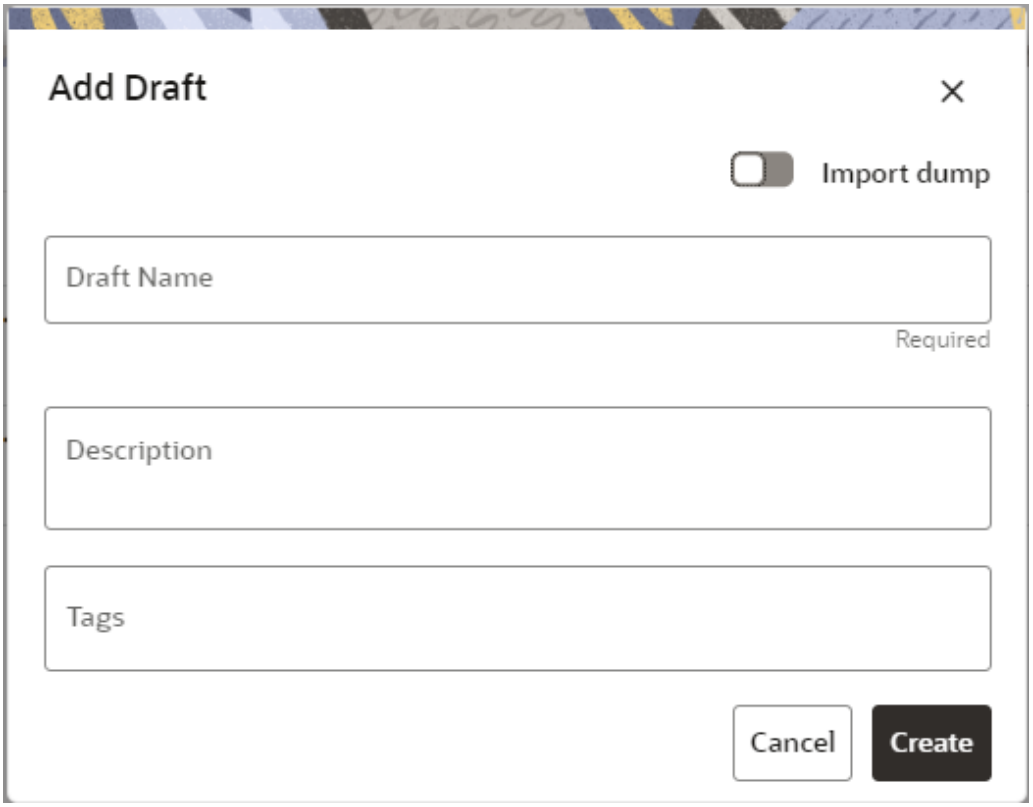
**Figure 18-34 Model Details- Create New Model**




b. Enter a tag in the **Tags** field.

c. Click **Create**.

**Creating Drafts from within an Objective**

a. From the **Model Pipelines** list of objectives, select **Draft** from the **Add** drop-down list.


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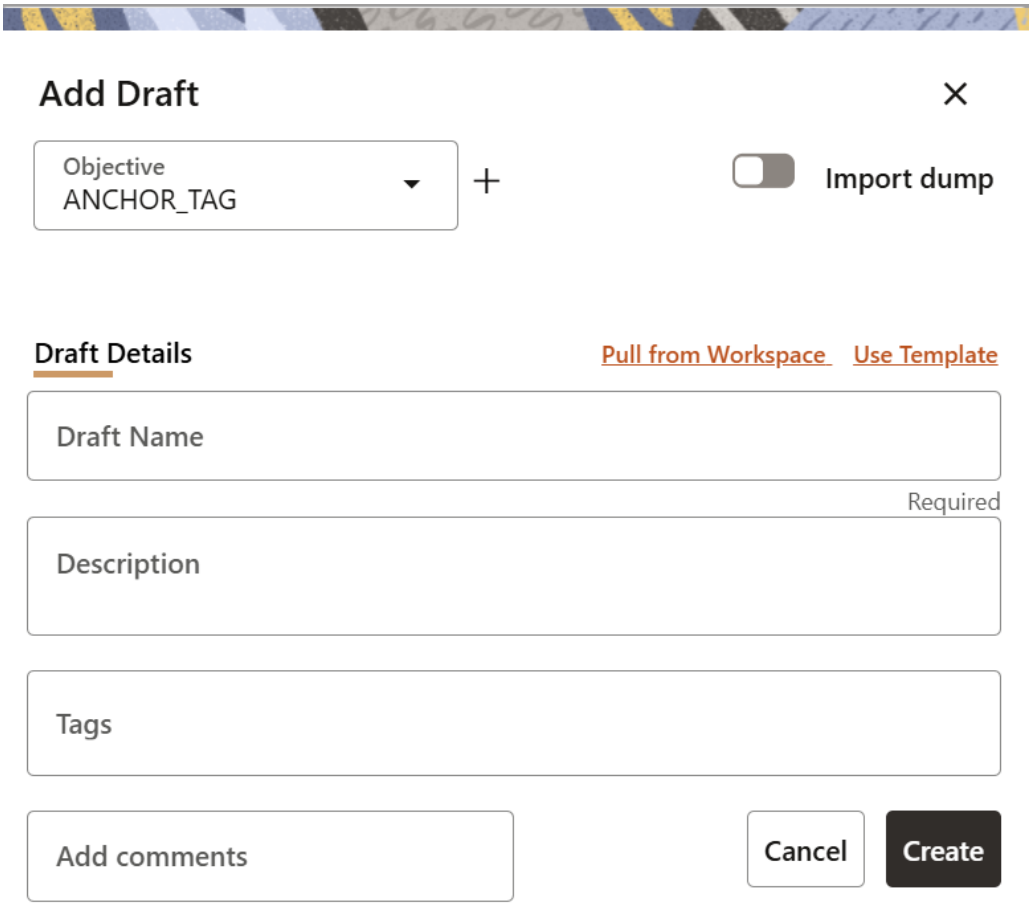
**Figure 18-35 Add Draft from an Objective**




b. Populate the following fields:
   - **Draft Name:** Enter a name for the draft.
   - **Description:** Enter a description for the draft.
   - **Tags:** Add tags for the draft.
   - **Comments:** Add comments for the draft.

c. Additionally, you can use different methods to create drafts:
   - **Create a draft from an objective**
     i. Click the **Add in new Objective** icon, adjacent to the **Objective** drop-down list.


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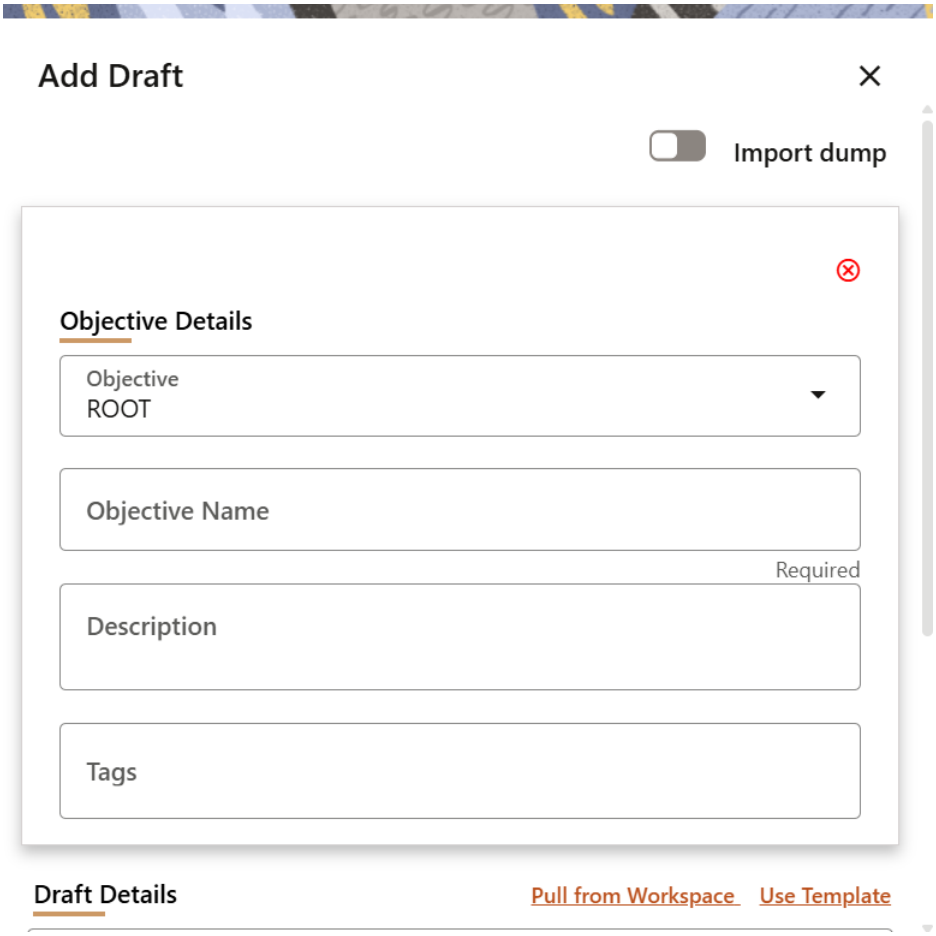
**Figure 18-36 Objective Details**




ii. Perform the following actions to populate the form:
   - **Objective:** Select an objective from the drop-down list.
   - **Objective Name:** Enter a name for the objective.
   - **Description:** Enter a description for the objective.
   - **Tags:** Enter tags for the objective.
   - **Draft Name:** Enter a name for the draft.
   - **Description:** Enter a description for the draft.
   - **Tags:** Add tags for the draft.
   - **Comments:** Add comments for the draft.

iii. You can also select the **Pull from Workspace** or **Use Template** options to add the information via a selected workspace or a template.

iv. Click **Create**.

- **Pull from Workspace**


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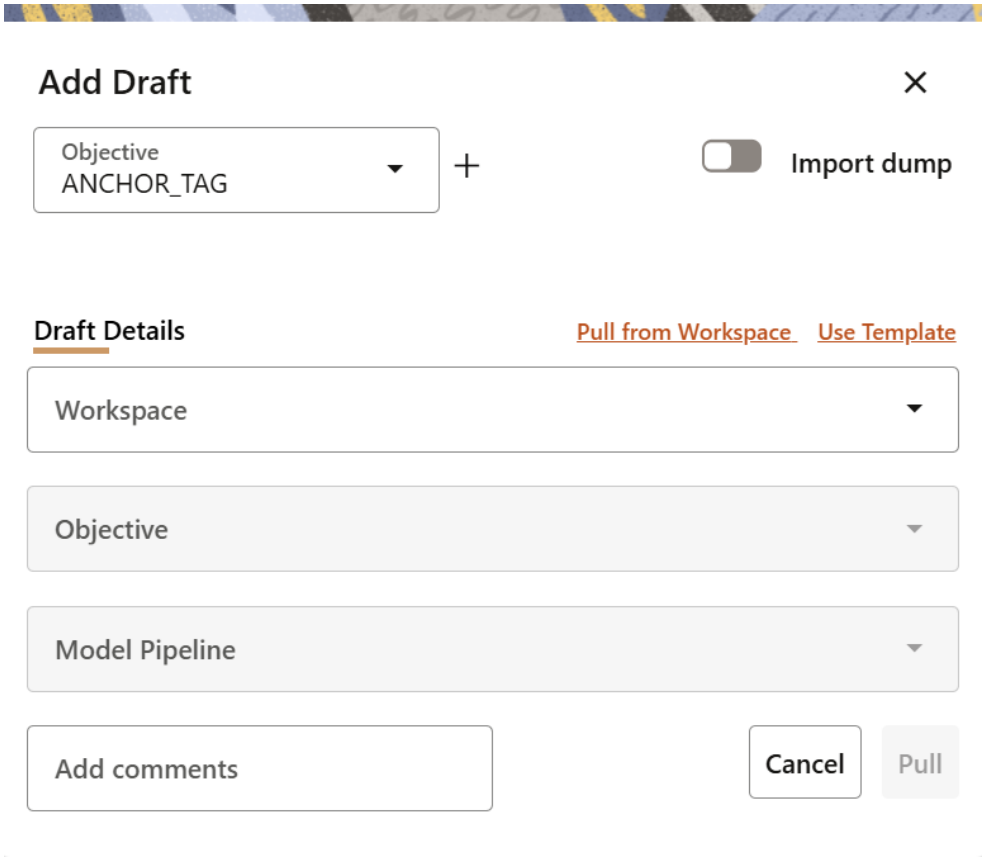
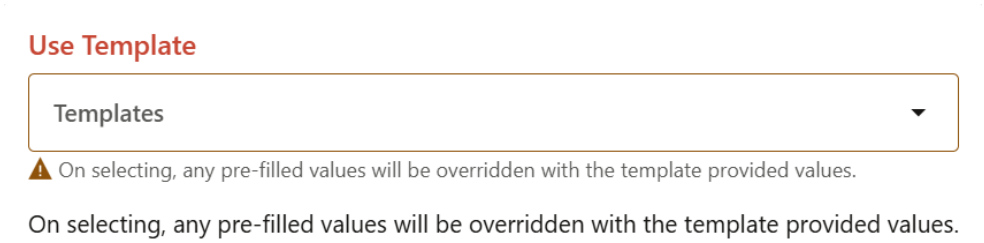
**Figure 18-37 Pull from Workspace**




- **Workspace:** Select a workspace from the drop-down list.
- **Objective:** This option is enabled when a worspace is selected from the **Workspace** drop-down list. Select an objective from the drop-down list.
- **Model Pipeline:** This option is enabled when an objective is selected from the **Objective** drop-down list. Select a model pipeline from the drop-down list.
- **Comments:** Add comments for the draft.
- **Pull:** Click this option to pull all the selected details from the workspace.

- **Use Template**

**Figure 18-38 Use Template**





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Select a template from the **Templates** drop-down list. Note that any pre-filled values will be overridden with the values from the template that has been selected from the **Templates** drop-down list.

## Create Seeded Models

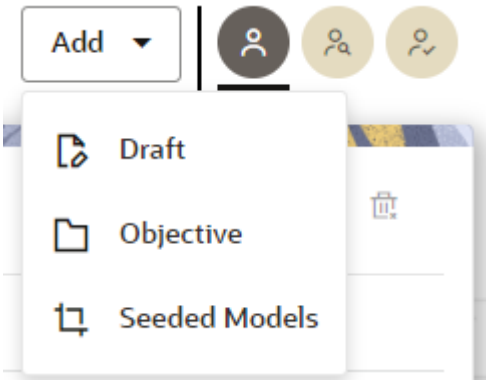
You can seed the models from the external sources which can be imported in the application.

To import the models:

1. Click **Launch Workspace** next to the corresponding Workspace to display the **Dashboard** window with application configuration and model creation menu.
2. Click **Model Pipelines** to display the **Model Pipelines** window.

   The window displays folders that contain models and model records in a table.
3. Click **Add** and select **Seeded Models** from the list to display the **Add Draft** dialog box.

**Figure 18-39 Add Seeded Models**

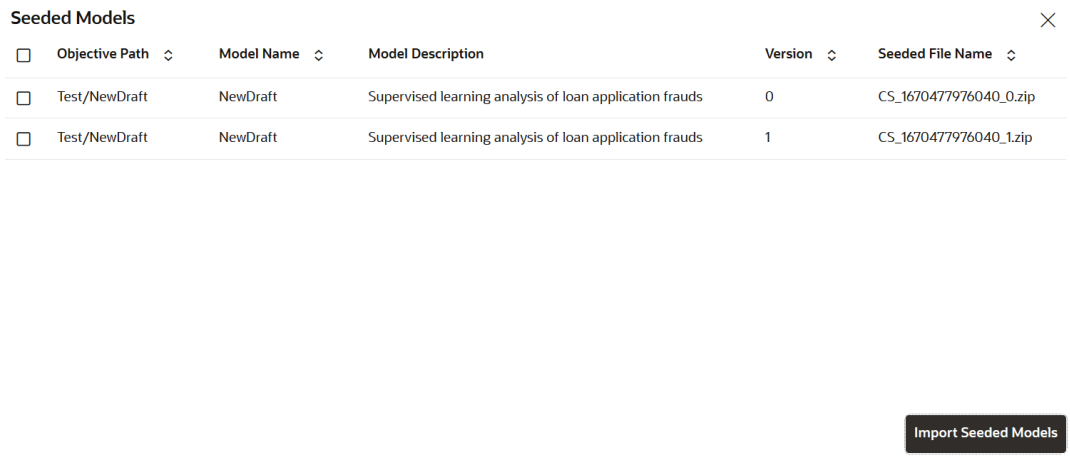



4. You must add the models in the following installed path location:

   `<FTPSHARE>/mmg/seeded/models`

   The added models is displayed in the Seeded Models page.

**Figure 18-40 Seeded Models**





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5. Select the models which you want to import and click **Import Seeded Models**.

   The selected models are imported and displayed in the **Model Pipelines** page.

## Model Report

This option allows you to view the Model report and download the same in PDF format.

To view and download Report, follow these steps:

1. Open a Model in Pipeline Designer.
2. Click **Generate Model Report**.

   The Model Report window is displayed.

> **Note**
>
> The function, Model Report View-All, is mapped by default to the role,MMGMDLRPTREAD, and the groups MDLREV, MDLAPPR, and MDLUSR. If this function is unmapped, then the **Generate Model Report** button will be disabled. You must map this function to enable the **Generate Model Report** option.

3. Select the parameters to generate the report.
4. Click **Preview Report**.

   The report is displayed based on selected parameters.
5. Click **Export as PDF** to save the report as PDF in local system.

## Download a Model

This option allows you to download the Model. To download a model, follow these steps:

1. Open a Model in Pipeline Designer.
2. Click **Download**.

   A zip folder is downloaded. This folder contains .cfg and .dsnb files.

## Delete

This option is used to delete the Model.

## Cloning a Model

You can pick any published model and clone the contents to a new draft in the same objective or clone the content to the current parent draft. The cloned draft can be edited and used further. Audit Trail window also captures the clone information.

To clone the model details, follow these steps:

1. Open a Published Model in Pipeline Designer.
2. Select Clone to new Draft or Reimage parent draft with current.

# Pipeline Designer

Clicking on the model navigates you to the Pipeline Designer page.


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The following sections are available on the Pipeline Designer window:

- Pipeline Canvas
- Dashboard
- Notebook
- Simulations
- Execution History
- Compare

> **Note**
>
> 1. Models in Production workspace have the 'Dashboard' as the default tab.
> 2. Drafts or Models in the Sandbox workspace have the 'Pipeline Canvas' as the default tab.

## Pipeline Canvas

You can perform following functions on Pipeline Canvas:

- Creating a Pipeline
- Creating Script Template
- Viewing a Pipeline
- Using Link Connector Nodes
- Execution of Pipeline
- Publishing a Pipeline

> **Note**
>
> Users are now able to view the sub-stages from the canvas with the help of the new stage dropdown.

### Create Paragraphs using Pipeline Designer

After creating the Models in the Workspace, create Paragraphs using the **Pipeline Designer** window.

Pipeline Designer enables you to design the paragraph using widgets (graphical representation) instead of using python codes. In addition, if you add new paragraphs in Data Studio, the added paragraphs are displayed in the widget format on Pipeline. Similarly, if you create a Notebook using Pipeline Designer, it can be opened for editing in Data Studio using Studio Notebook option.


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> **Note**
>
> When you open the notebooks from the UI, the attach workspace call will be made from mmg service and proper workspace will get attached. If the Studio is opened outside of mmg, then the attach_workspace command has to be used.

This helps the Financial Institutes and Banks in following ways:

- Visualization of the data (for example, based on data tasks)
- View the dependency
- Modify the flow of execution or execution order
- Easy for Auditing purpose

You can execute the flow based on requirement. For example, if you have created one flow and want to execute a flow of training paragraphs out of that and other flow as experimental way, then you can modify using the Training and Experimentation link types. One flow can be break into 2-3 flows for execution purpose.

When a draft is edited using the Pipeline Designer/Data Studio, and published, then a new version of published model is displayed in Model Summary page.

> **Note**
>
> When you add a new paragraph from studio and opened the same in pipeline designer, it gets linked to multiple paragraphs. For example, you have paragraphs P1, P2 and P3 in the same order in a Notebook. It shows in Pipeline Designer canvas as P1 > P3 > P2.
> If you add two new paragraphs P1a and P1b in the Notebook after the P1 and open the canvas, this gets reflected as the following:
>
> 1. P1 -> P1a -> P1b -> P2
> 2. P1 -> P3 -> P2

After opening a Model in the Pipeline Designer, following options are displayed:

- Generate Model Report
- Download
- Delete
- Clone Model

After opening a Draft in the Pipeline Designer, following options are displayed:

- Generate Model Report
- Download
- Delete
- Publish
- Script Template list


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## Create a Pipeline

To create a paragraph using pipeline:

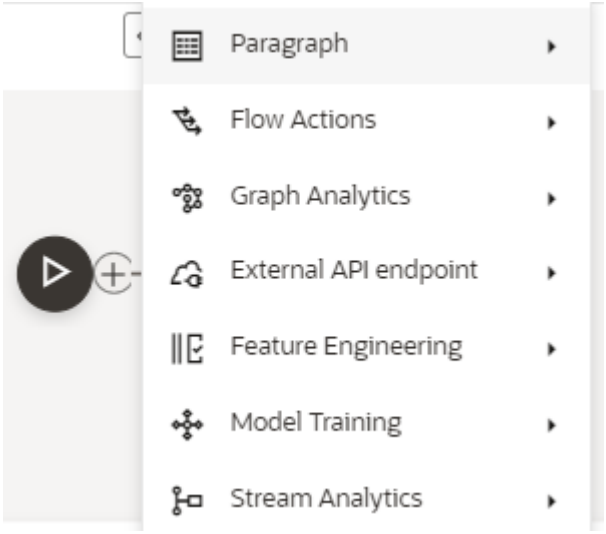
1. Navigate to the **Pipeline Designer** page.

   The **Start** widget is displayed by default in the canvas screen.

2. Hover over the **Start** widget and new nodes can be added by using the **Add** button in the **Pipeline Canvas**.

   When the **Add** button is clicked, a menu opens that contains all the widgets sectioned into different categories. The spectra diagram builder is based on row and column positioning.

**Figure 18-41 Create a Pipeline menu**




> **Note**
>
> Click each menu option to select the required widgets.

You cannot edit or delete the **Start** widget. Whenever a new draft is created, not by importing dump files, the default paragraph that is created is converted into a **Start** widget. The visibility of code or result or the title in the notebook of this node will be invisible.

Whenever the notebook is opened, the script execution, including the workspace attachment will happen in this node.


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**Table 18-4 Widgets**

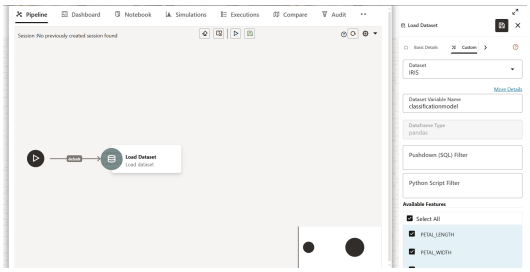
| Widget | Description |
|---|---|
| Load Dataset Widget | **Push Down Filtering (SQL Filters)** and **Python Script Filtering** is available for the **Load Dataset** widget in the pipeline.<br><br>**Figure 18-42 Pushdown (SQL) Filter and Python Script Filter**<br><br><br><br><br>**Examples:**<br>**Pushdown (SQL) Filter:**<br>- column1 > 100 and column2 < 1000<br>**Python Script Filtering:**<br>df_out = df_prev[df_prev['column'] > 100] |
| Start Widget | Publish, download, import, and promoting a model to production can be done via this widget. When you publish a model from the **Model Summary** page, you can select the **Start** widget paragraph from the list of paragraphs and then the start widget will appear in the published model. |


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**Table 18-4 (Cont.) Widgets**

| Widget | Description |
|---|---|
| Exploratory Data Analysis (EDA) Widget | This widget provides a one-click, automated evaluation of any dataset within OFS MMG. It provides a rapid insight into the structure, quality, and characteristics of data, and generates visual summaries, statistics, and distribution plots without requiring any coding or a manual setup.<br>This widget automatically generates the following analyses for a dataset:<br>• **Missing Value & Schema Summary**<br>– Creates a table that lists each feature or column.<br>– Shows the number and percentage of missing values per column.<br>– Displays the inferred data type (e.g., numeric, categorical, text).<br>– This helps users to quickly identify columns with significant missing data or non-standard data types that may need cleaning or attention.<br>• **Numeric Feature Analysis (For Columns Detected as Numeric)**<br>– **Distribution Plots**: Histograms combined with a smooth density (KDE) curve display how data points are spread across ranges of values.<br>– **Box Plots**: Allows quick detection of outliers, medians, and interquartile ranges.<br>– **Purpose**: Enables users to see which values are common, detect skewness or unusual patterns, and spot potential anomalies.<br>• **Correlation Heatmap**<br>– Displays a color-coded matrix showing how strongly pairs of numeric features are correlated.<br>– Helps in detecting strong associations, redundancy (collinearity), or identifying which variables might influence each other.<br>• **Categorical Feature Analysis (For any Column Detected as Categorical or Text:)**<br>– **Frequency Plots**: Bar charts that display how often each category appears within the column.<br>– **Purpose:** Visualizes dominant and rare categories, helping to find class imbalance or need for further grouping. |

3. Click the node to add the basic details.

   The **Basic Details** page is displayed.


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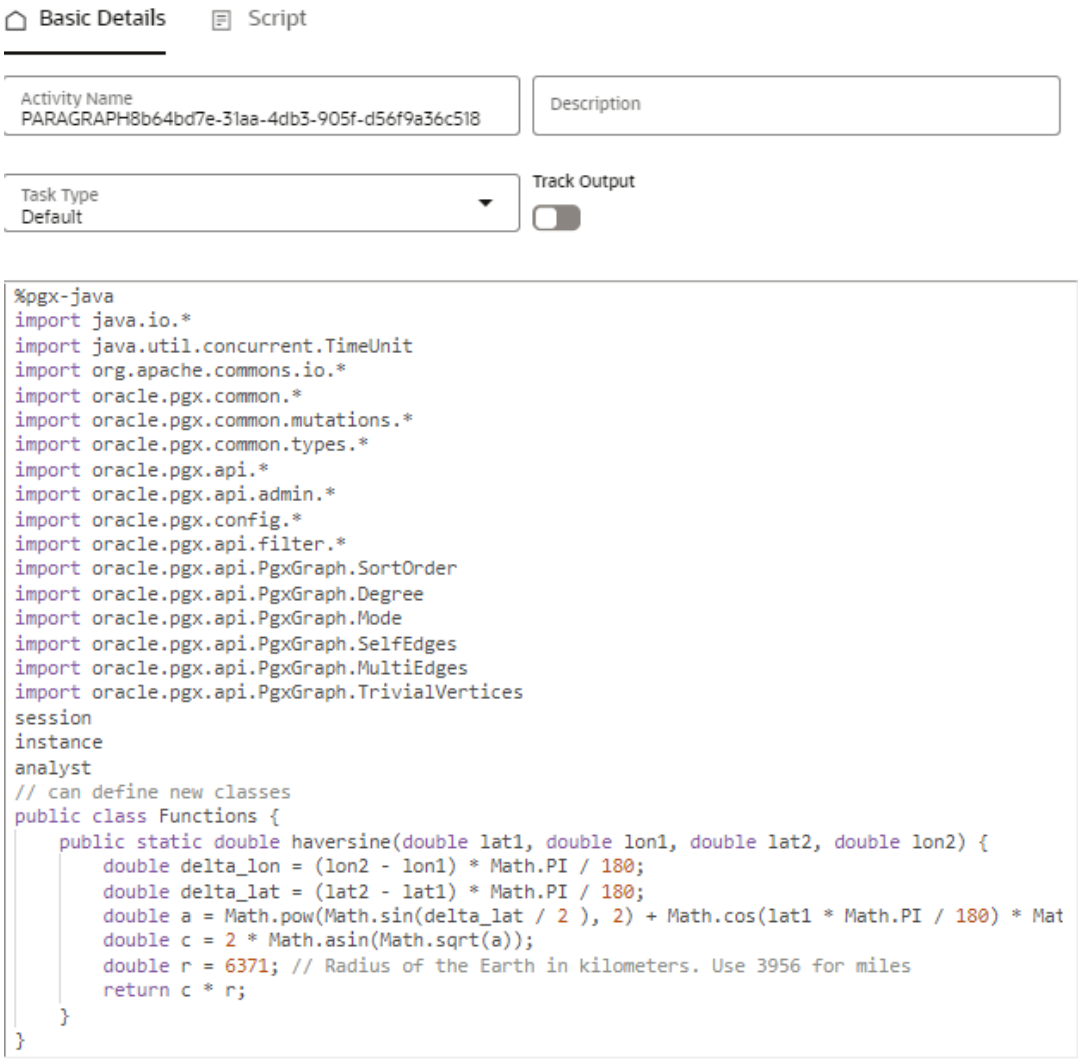
**Figure 18-43 Basic Details for the Paragraph**




4. Provide the following details:

**Table 18-5 Adding Details**

| Field | Description |
|---|---|
| Activity Name | Enter the activity name |
| Description | Enter the description of the activity |
| Task Type | Select the task type. For example, model training, data analysis and so on. You can also search the task type. |
| Track Output | If this option is selected for any paragraph, then during the model comparison the output details are displayed. Keep the **Track Output** as **ON** in case you want to execute the paragraph and view the result from the **Dashboard** tab. |
| Script | Displays the script. You can edit the script in this screen or in the **Script** tab. This script can also be saved as the script template. |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> **Note**
>
> **If** is a conditional node, whose behavior is based on the execution of the user. It has a script that evaluates *True* or *False* and based on the value, it chooses either of them. Additionally, you can also add a new node that comes with a default link. The default path will be executed irrespective of the result.

5. To execute a node, click the **Execute** icon. If no active or a selected session is available, then the **Session Required** dialog box appears, informing you that it cannot be executed with no selected session and you need to select a valid session or create a new one. Either click the **Create New** button to create a new session, or click the **Cancel** button, select a session and then click **Execute**.

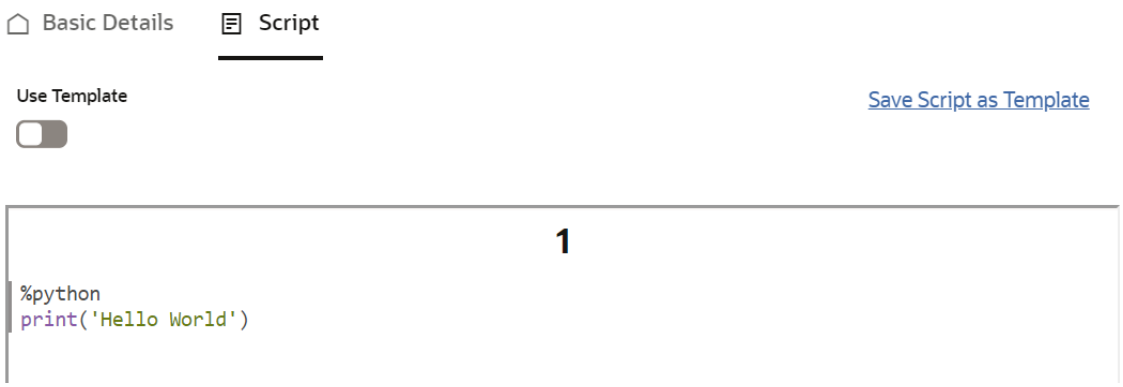
> **Note**
>
> The **Session Required** dialog box will not appear if the session is active or if the session has been selected.

## Build via Modelling Stages

## Create Script Template

Navigate to Script tab to manage scripts. These scripts can be called for paragraph. You can also create the Script template by clicking on the More options icon in the Pipeline Designer.

**Figure 18-44 Script template**




To add a script template:

1. In the **Script** tab, Click **Save Script as Template** link.


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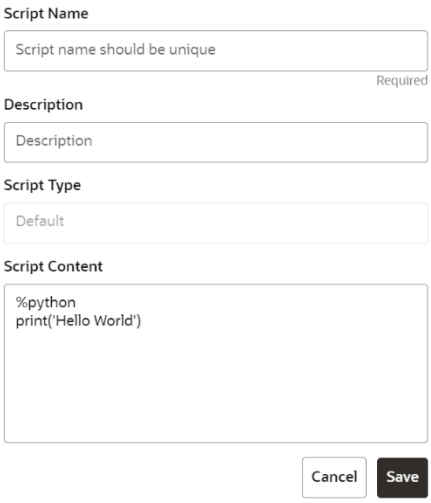
**Figure 18-45 Script tab**




2. Enter the following details:

**Table 18-6 Creating Script Template**

| Field | Description |
|---|---|
| Script Name | Enter the Script Name |
| Description | Enter the description of Script |
| Task Type | Select the task type. For example, Model Training, Data Analysis and so on. You can also search the task type. |
| Script Content | Enter Python script |

3. Click **Save**.

A node is created.

You can perform the following functions on Pipeline Designer window:

- Parameter Sets: Allows you to view, edit, clone, and delete the Parameter Set. Use the Clone option to duplicate the parameter set with different values and name.
- Publish: Allows publishing the pipeline. This option is displayed for the Drafts.
- Deploy: Allows you to deploy the model. This option is displayed for the published models.
- More Actions icon:
  - Generate Model Report: To generate model report
  - Download: Use Download to download the current working version in opened in canvas
  - Script Template list: Allows you to add, edit, view, and delete the script templates.
  - Delete: Allows to delete the current working version. If this is first draft of Model, it will delete all the dependent published version in the Sandbox. If the Model is not first version, then it will delete only the current working version.

  The following options are displayed only for the published models.

  - Clone to new draft: Allows to create a new draft with the same pipeline.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– Overwrite existing draft: Allows to overwrite the existing draft with the current published model.

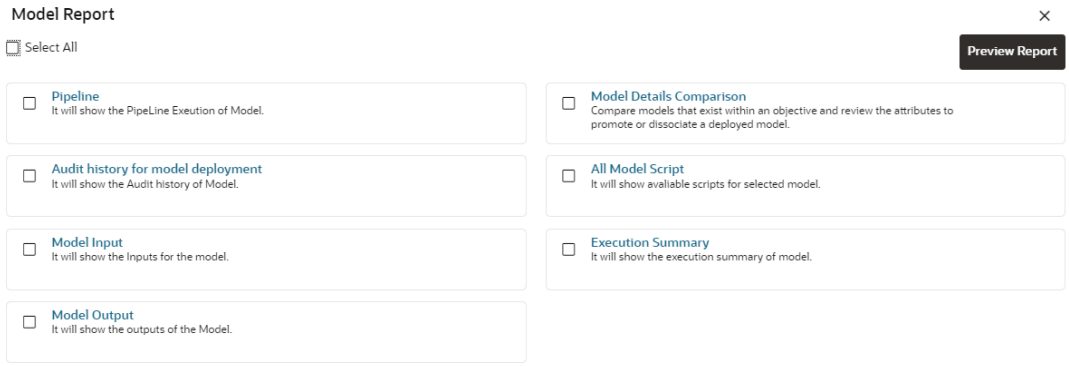
Model Report

This option allows you to view the Model Report and download the same in PDF format.

To view and download report:

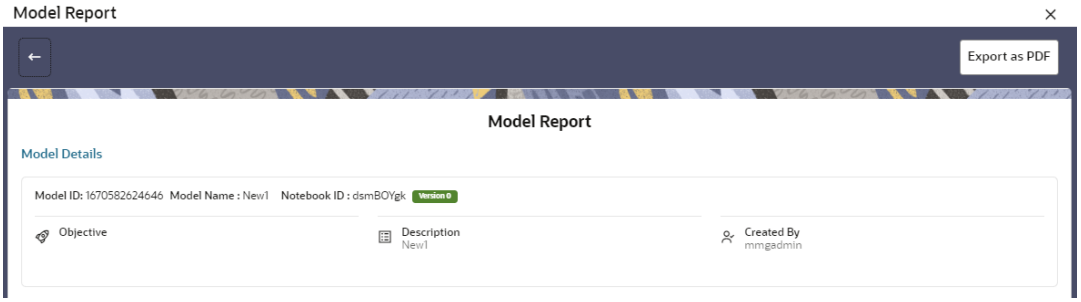
1. Open a Model in Pipeline Designer.
2. Click **Generate Model Report**.
   The Model Report window is displayed.

**Figure 18-46 Model Report window**




3. Select the Parameters to generate the report.
4. Click **Preview Report**.
   The report is displayed based on selected parameters.

**Figure 18-47 Model Report**




5. Click **Export as PDF** to save the report as PDF in local system.

Download a Model

This option allows you to download the Model.

To download a model:

1. Open a Model in Pipeline Designer.
2. Click **Download**.
   A zip folder is downloaded. This folder contains .cfg and .dsnb files.

Delete

This option is used to delete the Model.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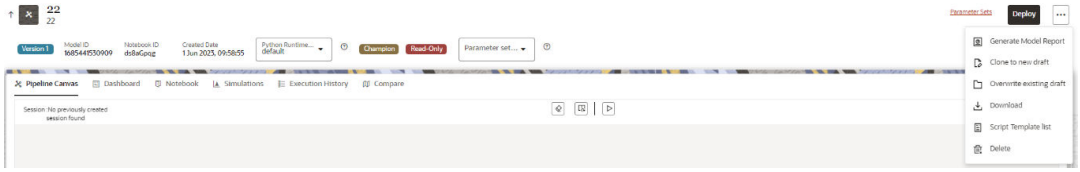
## Cloning a Model

You can pick any published model and clone the contents to a new draft in the same objective or clone the content to the current parent draft. The cloned draft can be edited and used further. The Audit Trail window also captures the cloning information.

To clone the model:

1. Open a Published Model in Pipeline Designer.

**Figure 18-48 Published Model in Pipeline Designer**




2. Click **More Actions** icon and select **Clone to new draft** or **Overwrite existing draft** option.
   You can perform the following functions on Pipeline Canvas window:
   - **Clear Execution Results:** Clears the execution details.
   - **Invalidate session:** Deletes the previous session details.
   - **Execute:** Allows you to execute the pipeline.
   - **Save Now:** Allows saving the pipeline.
   - **Open Notebook in session:** Allows you to open the notebook in canvas. This is displayed after the pipeline is executed.
   - **Execute Notebook in another session:** Allows you to provide different data for the same notebook execution. This option is only displayed when execution is in progress.
   - **Stop Execution:** Allows you to stop the execution which is in progress. This option is only displayed when execution is in progress.
     Whenever user executes a batch, a user session is created. This execution time can be less or more for any execution. Sometime, user doesn't want to wait for execution to complete and navigate away from the Pipeline Canvas page.

     For example, if user does not want to execute all the paragraphs and want to execute only Paragraph 1 and Paragraph 2. Paragraph 1 takes 15 minutes time for execution and Paragraph 2 takes 10 minutes for execution. Paragraph 2 execution also wants to use the execution of Paragraph 1. In this case, user can navigate away from the page. A confirmation message is displayed to close the current session. Here, this session time is configurable.


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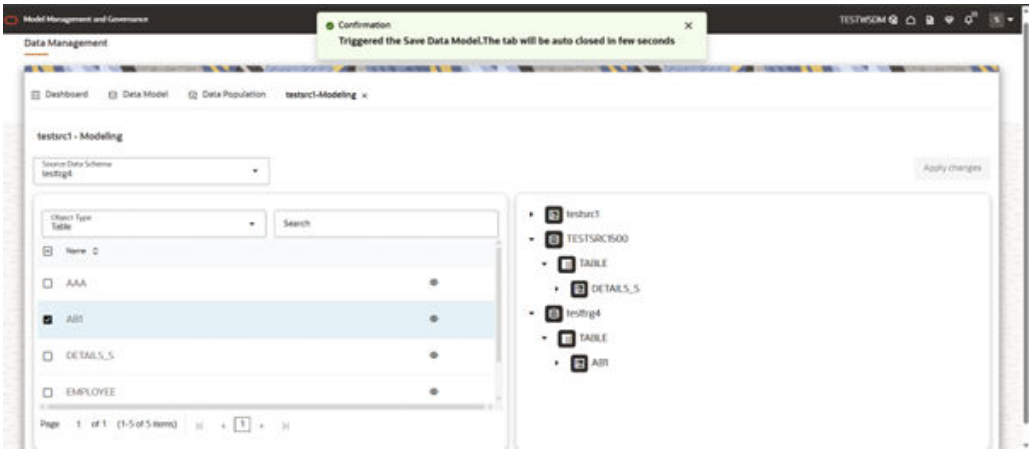
**Figure 18-49 Confirmation message**



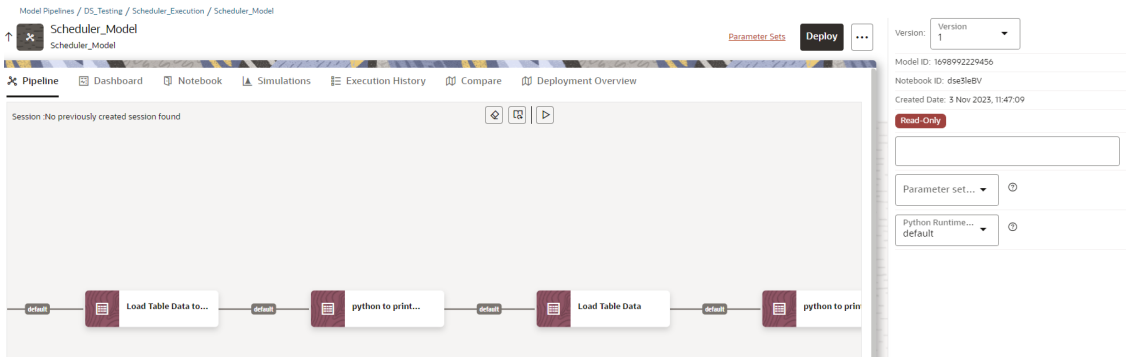

- If user clicks **Yes**, then execution thread will be closed for this given session time.
- If user clicks **No**, then execution thread will be valid for this given kill time and run in the background.

You can configure these values in Application.xml file. For more information, see the *MMG Installation Guide*.

Add a Version, Parameter set, and Python Runtime parameters

The Pipeline canvas window allows you to add a Version, Parameter set, and Python Runtime parameters.

**Figure 18-50 Pipeline canvas window**




- **Version**: Select the version for the pipeline.
- **Parameter Set**: Select the required parameter set. The selected parameter set will be promoted along with the model pipeline at the time of deployment and you can update this dependency based on your requirements.
- **Python Runtime Parameters**: Select the required Python Runtime parameter. The selected Python runtime parameter will be used during all the executions and you can update this dependency based on your requirements.

View a Pipeline

The Pipeline canvas window allows you to view the Pipeline using the following options:

- **Auto-align**: Arrange all the widgets in vertical order. After saving, the reverting option will not work.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- **Revert-align**: Revert all the widgets if they are Auto-aligned.
- **Refresh**: Refresh the pipeline canvas.

Execute a Notebook

The Execute icon on Pipeline Canvas allows us to execute the notebook.
The following link types are available in the Pipeline Designer:

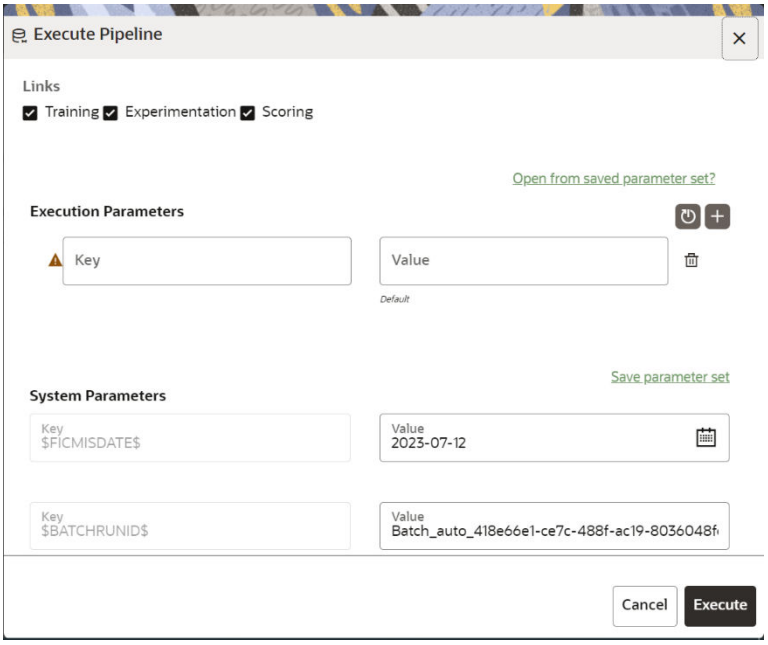
- Default
- Scoring
- Training
- Experimentation

> **Note**
>
> When a model gets published from Model summary page, the Link types configured in Pipeline Designer are set to Default link type.

To execute the notebook:

1. Click **Execute** to view **Execute Pipeline** window.

**Figure 18-51 Execute Pipeline**




2. Execution parameters are the parameters defined in the notebook required for execution. Select the flow, which you want to execute Scoring, Training, and Experimentation. It displays all the keys defined for all the paragraphs in the notebook with a placeholder for providing the values.
3. Enter the execution Key and Value.

   You can also use Runtime parameters for execution. This runtime parameter must be defined in Notebook. If this is defined, you can enter execution value during the process execution.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For more information, see Create Paragraphs in Model Studio Notebooks section.

The System Parameters window also shows the execution ID, execution Date, and execution Batch. These are required for executing all the paragraphs along with other parameters. It also shows from where the parameter comes from as a subscript.

- **Parameter Sets**: These are the set of parameters with a specific value required for an instance of execution. It consists Key and Value. You can save the parameters set that can be used for one execution instance and reuse it for the next execution. It consists of parameters with a specific value to each parameter. Parameters containing no value will not be taken. Each set is identified with a unique code for each objective. While saving the parameter, you have to provide a code for identifying the name and description which is not mandatory.
  You can save Key Value parameter set using the Save Parameter Set option. To Save Parameter Set, enter the Threshold Value and Description in the Parameter Set window.
- **Selecting Parameter Set**: These saved Parameter Set can be selected during the execution. It will replace the values of the parameters from the chosen Parameter Set. To select the Parameter Set, follow these steps:
  - Click “Open from saved Parameter Set". The Threshold Code window is displayed.
  - Select the Parameter Set from the available list. You can select multiple Parameter Set in the same execution instance. In that case, if there are any common keys, value will be replaced with that from the latest Parameter Set selected.

4. You can add new parameters using **Save parameter set** option.

> **Note**
>
> If the parameter is not defined in the notebook, it will not be used for the execution. In case of multi select, if there are common parameters among the chosen scenarios, it will take the value based on the order of selection. that is first chosen scenario parameter will be taken.

5. But if open from saved Parameter Set again (not on single go), then already added will get replaced by the newly added (same as what existed).
6. Execution is performed based on selected link types. It filters out all the not required/ unused parameters. And all the unused parameters for the current execution are displayed with a warning. To view the only required parameters, click **Show only required**link.
7. Click **Reset**to reset the entered data.
8. Click **Delete** to delete the entered Key and Value.

   For example, refer to below figure.


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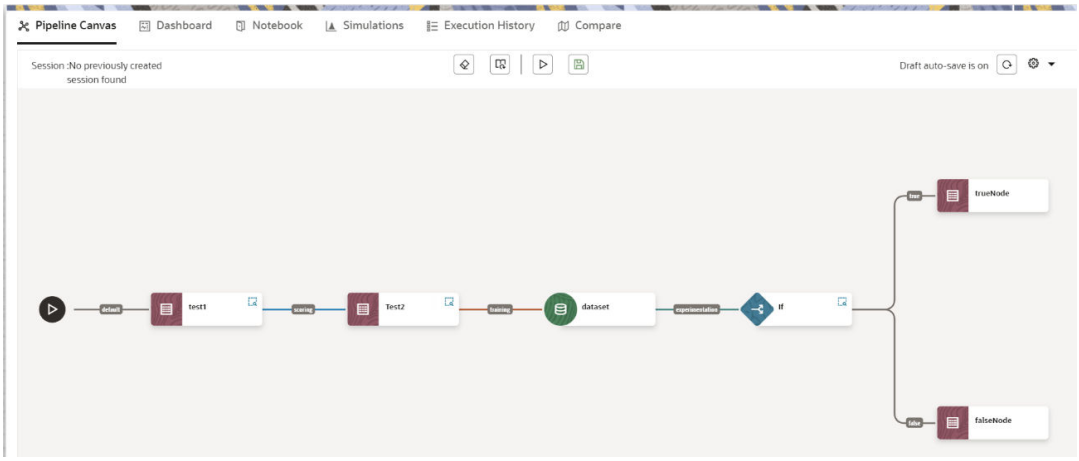
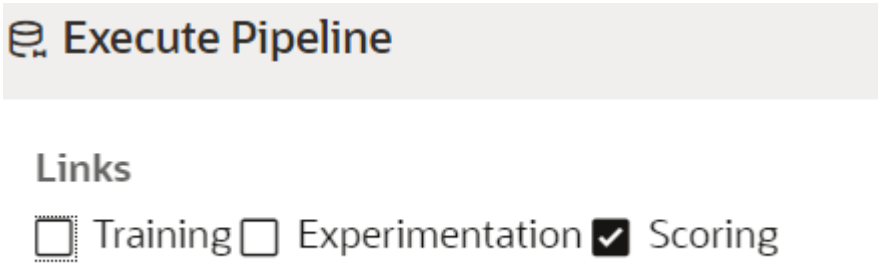
**Figure 18-52 Example of Pipeline Canvas**




- Here, if you want to execute this Notebook for scoring purpose, then the flow will be executed till Test 2. To perform this, Click Execute Notebook and select Links as Scoring.

**Figure 18-53 Execute Pipeline**




- Similarly, if you want to execute this Notebook for training purpose, then the flow will be executed till dataset with default paragraphs. To perform this, Click Execute Notebook and select Links as Training.

Publish a Pipeline

To publish the pipeline:

1. Click **Publish** to view **Publish Pipeline** window.


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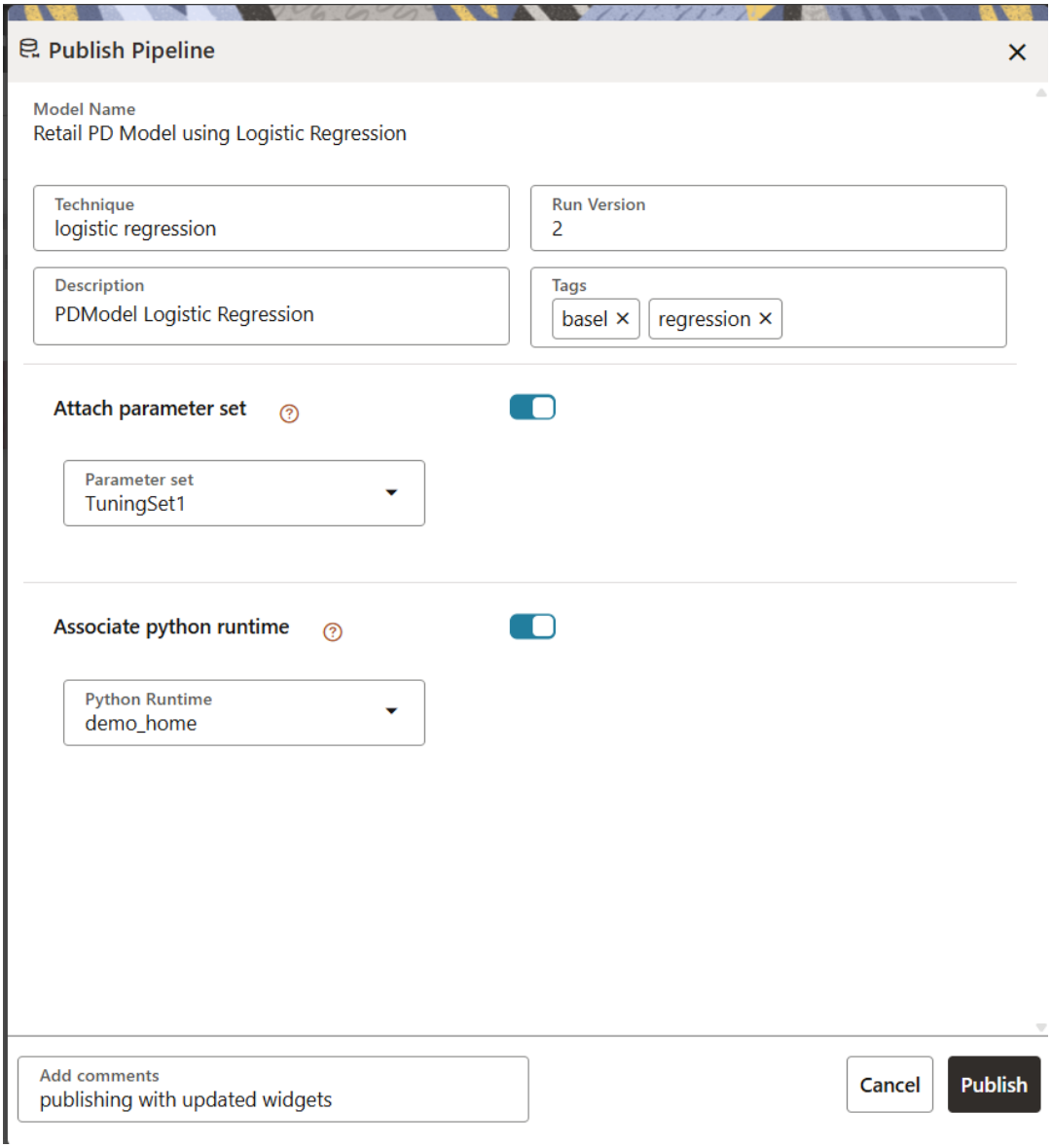
**Figure 18-54 Publish Pipeline**




2. Enter the details as shown in the following table.

**Table 18-7 Field and its description for the Publish pop up window**

| Field or Icon | Description |
|---|---|
| Model Name | The field displays the name of the Model. |
| Model Description | The field displays the description for the Model. Enter or modify the description if required. |
| Technique | Enter the registered technique to use. |
| Run Version | Select a run version. |
| Tags | Enter one or more tags to associate with the Model Pipeline. The tags help to categorize your pipeline. These tags are permanent and cannot be modified after publishing. |


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**Table 18-7 (Cont.) Field and its description for the Publish pop up window**

| Field or Icon | Description |
|---|---|
| Attach Parameter set | If this option is enabled:<br>• Selected parameter set will be associated with the published model.<br>• Best performing parameter set or prime reference of the objective is recommended to be associated with the model.<br>• This set is further used for promoting to production at the time of deployment.<br>• Users can update this dependency from model details screen. |
| Associate python runtime | If this option is enabled:<br>• Selected python run time will be associated with the published model.<br>• This python run time will be further used for promoting the model to production at the time of deployment.<br>• Users can update this dependency from model details screen. |

3. Click **Publish**.

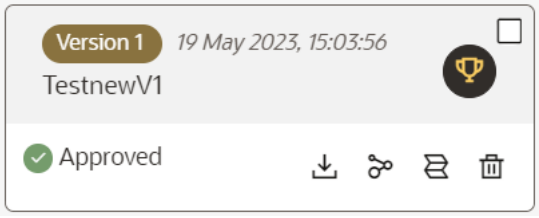
View Model Details

You can view model information for deployed models, models that require approval, and so on.

To view model details:

1. Click **Launch Workspace** next to the corresponding Workspace to display the **Dashboard** window with application configuration and model creation menu.
2. Click **Model Pipelines** to display the **Model Pipelines** window.
   The window displays folders that contain models and model records in a table.
   - The icon indicates that Model 1 is the champion.
3. Hover over the model records to view the various icons.

**Figure 18-55 Mouse over the Model**




The icon actions are listed in the following:

a. Download
b. Open in Pipeline Designer. See the Create Paragraphs using Pipeline Designer section for more details.
c. Scope Detail. See the Scope Detail section for more details.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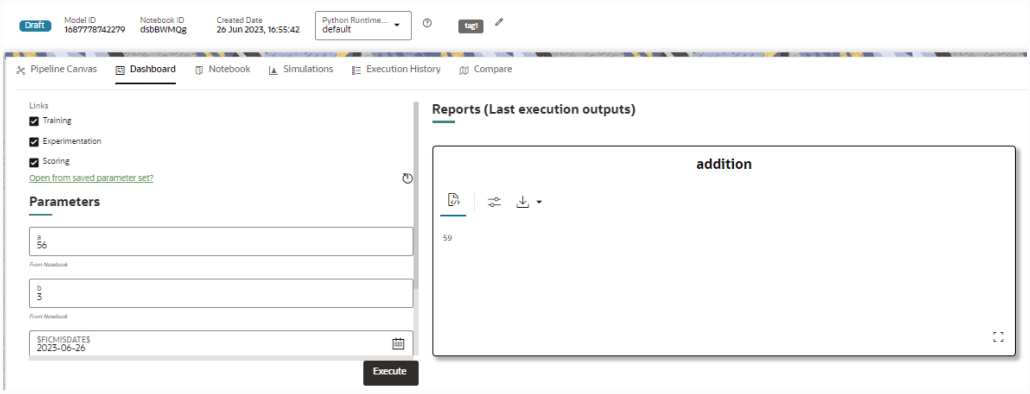
d. Delete Model.

## Dashboard

This section of Pipeline Designer allows you to execute the models and also displays the execution output of a model if the widgets are saved with the Track output option enabled.

> **Note**
>
> For *Promoted* models, the **Dashboard** is the default tab.

**Figure 18-56 Dashboard**




This tab contains two options for execution:

- **Batch:** This provides all the required inputs upfront and executes the pipeline end-to-end in a single run.
- **Interactive:** This executes the pipeline stage-by-stage; the run pauses at each stage to prompt the required inputs for that stage before continuing further.

> **Note**
>
> In an Interactive execution, when two or more paragraphs within the same stage are configured to run in parallel, the input prompt may not list the parameters for all the parallel paragraphs, for example, parameters for *Para2* may not be displayed. As a workaround, avoid parallel executions for paragraphs that require interactive inputs, or move the paragraphs to separate stages so that inputs are collected sequentially.

> **Note**
>
> There is no Cancel button in Settings tab of reports in the Dashboard tab. You can press 'Escape' key to close the Settings.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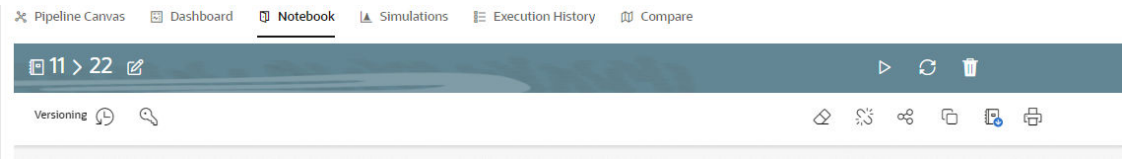
## Notebook

> **Note**
>
> The Username is case sensitive. Ensure you use the correct case for the username when accessing and executing the notebook.

Navigate to **Notebook** page to view the paragraphs. You can run, Restart session, edit, add, export the notebook, and so on.

**Figure 18-57 Notebook page**




> **Note**
>
> The following features on Notebook are not supported in the current release.
>
> - Cloning the Notebook
> - Sharing the Notebook
> - Versioning the Notebook
> - Modifying the Notebook
> - Deleting the Notebook
> - Attaching credentials to the Notebook
> - Entering dependency modes to the Notebook

**Steps to enable two or more users to access the same Notebook with distinct sets of permissions**

To enable two or more users to access the same notebook with distinct sets of permissions, follow these steps:

1. Create a New Role in Data Studio
   Log in to MMG with a user account that has DSUSRGRP (Data Studio User) access:
   - Navigate to Data Studio Options > Permissions and switch to the Roles tab. # Click Create Entity and create a new role (For example, DSREADONLY). Assign the desired permissions, such as:
   - View Code
   - View Notebook
   - View Sessions
   - View Result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- View Paragraph for Read-Only access to Data Studio Notebooks.

2. Create a Corresponding User Group.
   Navigate to your Identity Management page and create a new user group with the same name as the role created in Data Studio. For example, DSREADONLY.
3. Update Application Configuration.
   To validate the new user group, update the `application.yml` file:
   - Navigate to `mmg-studio/conf/application.yml. #`
   - Under studio-server.security, append the newly created role to the validRoles field, separated by commas (For example, validRoles{*}: "MDLUSR,MDLREV,MDLAPPR,MDLBATCHUSR,DSUSRGRP,DSREDACTGRP,MDLVIEW,DSREADONLY").
4. Restart Data Studio.
   Restart Data Studio using the following commands:
   - # ./shutdown.sh
   - # ./startup.sh
5. Map the New User Group to a User.
   Navigate back to the Identity Management screen and map the newly created user group (DSREADONLY) to the user(s) you want to grant these permissions.

   **Markers for track output and link types from Notebook and syncing up with Canvas**

   Markers for track output and link types from notebook and syncing up with canvas Using specific key words like "##track output##", there should be an option to provide these key words from the notebook paragraph and sync up with the pipeline. User will not have to use canvas interface here. This has to be done for output tracking and link types to determine execution paths (training,scoring,experimentation).

   These are only applicable for draft and 'PARAGRAPH type nodes:

   - ##track_output## - For paragraph output tracking
   - ##training## - For training nodes
   - ##scoring## - For scoring nodes ##Experimentation
   - ## - For Experimentation nodes

   If the marker "##track_output##" is added in the Notebook paragraph, the canvas will automatically be synced up with this and corresponding node output will be tracked. If the marker is removed, the output tracking will be set to off.

   On execution, if any of the nodes are associated with a path, the paths added on the links will not be considered for the execution. There is also an option to choose these path types from the node basic details window.

### Access Module for File/Folder Operations

The OFS MMG Access feature provides utility functions where code can be used with OFS MMG workspaces and the file system within the OFS MMG Studio to perfrom file/folder related operations.

It is assumed that the module has already been imported by using one of the following codes:

```
from mmg.access import
```

or

```
import mmg.access as mac
```


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> **Note**
>
> The workspace attachment step must be performed before using any of the following API mentioned in this section. The current working directory will always be the path inside the FTPSHARE of the attached workspace. For example, <FTPSHARE_PATH>/mmg/<WS>
>
> If the source and the destination starts with /, then it is assumed to be an absolute path (as is the case with os and shutil. Hence, to maintain the compatibility, the same is the case with the OFS MMG access feature module APIs

**Table 18-8 List of APIs**

| Name | Description | Usage Example | Note |
|---|---|---|---|
| getcwd | Returns the current working directory path within MMG FTPSHARE for the active workspace. | getcwd() | The getcwd() function returns the path inside the attached workspace that is within FTPSHARE. It does not reflect the actual cwd path that is returned from the os.getcwd() function. Hence, using os.chdir() will not affect the getcwd() function implemented from the OFS MMG access module library. |
| move | Moves a file or directory to another location. | move(src='/source/path', dst='/destination/path') | |
| copy | Copies a file with metadata from one location to another. | copy(src='/source/path', dst='/destination/path') | |
| copyfile | Copies a file without its' metadata. | copyfile(src='/source/file', dst='/destination/file') | |
| copytree | Recursively copies a directory tree to the destination. | copytree(src='/source/dir', dst='/destination/dir', dirs_exist_ok=True) | |
| listdir | Lists all files in the specified directory. | listdir(path='/your/dir') | |
| remove | Removes a single file from the specified path. | remove(path='/file/to/remove') | |
| rename | Renames a file within the current workspace. | rename(src='/old/filename', dst='/new/filename') | |

**Limitation:**


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- **%shell:** This is not enabled by default. Shell execution is generally considered a security risk and is disabled unless explicitly required and approved as per internal security guidelines.
- **%spark:** This is the Data Studio default configuration (spark.json) and enables both `%spark` and `%pyspark`; however, the **Add** button is enabled only for `%pyspark` by default. Enable `%spark` only if it is required by the application or customer and is approved.
- **%jdbc:** This is the Data Studio default configuration and enables the **Add** button for `%mysql` but not for `%jdbc`. Enable `%jdbc` only if it is required by the application or customer and is approved.

### Attach private credentials

Private credentials allow you to securely use sensitive values in your active MMG notebook runtime without exposing or storing secrets in your notebook code.

Perform the following steps to attach private credentials:

1. Open the **Pipeline Notebook** tab.
2. Click **Private Credentials** (key icon).
3. In **Set Private Credentials** dialog, add one or more rows.
4. Select the credential type:
   - **Secured Variable**:
   - **Datastore Connection User**: Use this when multiple private datastore users are attached or when a specific private user must be selected.
5. Specify the key/value or username/password. Or, optionally, you can import the environment details using the **Select .env file** button.

> **Note**
>
> - Use simple credential names containing only letters, numbers, and underscores. Avoid quotes, newlines, and special characters in keys and user names.
> - Imported .env entries are treated as Secured Variable by default. To use the Datasource Connection User type, manually update the type after the import.

6. Click **Set Credentials**.
   **Session Behavior**
   - Private credentials are attached to the active notebook runtime. If a canvas session is active, they're attached to that session; otherwise, they're attached to the default user runtime.
   - If the runtime is restarted, reinitialized, or invalidated, attach the credentials again.
   - Reset clears only the form. It does not remove credentials already attached to the runtime.
   - Setting the same key or datastore user again updates the existing value in the runtime.

## Create Paragraphs in Model Studio Notebooks

When logged in to the OFS MMG application, the operating system and similar libraries can be used to view/edit/delete the files that are outside the FTPSHARE or workspace bounded path.

1. Log in to the application.


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2. Create a notebook.
3. Create script by using the operating system library.
4. Use `os.remove(), os.listdir()` by providing the path that is outside the scope of FTPSHARE.
5. The above operations will be run successfully.

Create Paragraphs

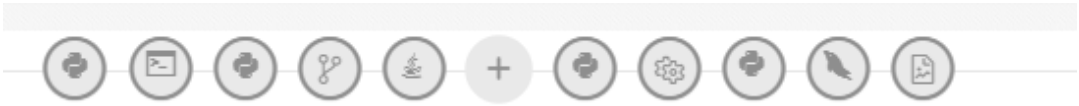
The paragraph should be added after the start widget paragraph. Navigate to Notebook page to create the paragraphs.
The following types of paragraph creation are supported for model creation:

- Python Paragraph
- Shell in Python Paragraph
- Conda Paragraph
- PGQL Paragraph
- PGX - Java Paragraph
- Paragraph
- PGX - Python Paragraph
- PGX – Algorithm Paragraph
- PGX - PySpark Paragraph
- MySQL Paragraph
- Markdown Paragraph

To create Paragraphs in the Model Studio Notebooks:

1. Open the draft in Pipeline Designer and click **Notebook** tab.
2. Hover your mouse above or below a paragraph to display the interpreter toolbar.

**Figure 18-58 Interpreter toolbar**



3. Click an icon in the toolbar to select an interpreter and add a new paragraph that uses that interpreter. When you click some of the icons, the paragraph that's created includes example code that you can run.

> **Note**
>
> You should not delete the start widget paragraph or rewrite the contents of this seeded paragraph.

Add Python Paragraph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- Click **Add Python Paragraph** in Model Studio to add a python paragraph in the Notebook and add the following scripting instructions.

  1. To fetch connection objects:
     `conn = mmg.getConnection(<workspace name>)`

     This creates a cx_oracle based connection object to the datadom of the workspace being passed:

  2. To fetch current Notebook and Model Objective details, use the following predefined parameters:

     - `currentNotebookId` - fetches the current notebook ID
     - `objectiveId` - fetches the current objective ID

     To fetch the runtime parameters supported in Model Studio runtime or to access optional parameters passed from scheduler services:

     - To access predefined batch runtime parameters like `taskid`, `batchrunid`, and `ficmisdate` passed during the model execution from scheduler, use the following variables : $BATCHRUNID$, $TASKID$, $FICMISDATE$.
       **Example:**

       ```
       %python
       print('BATCHRUNID value is : ${$BATCHRUNID$}')
       print('TASKID value is : ${$TASKID$}')
       print('FICMISDATE value is : ${$FICMISDATE$}')
       ```

     - To access any optional parameters passed during the model execution from scheduler, use the below sample script:

       ```
       %python
       print('threshold value is : ${threshold}')
       ```

> **Note**
>
> Threshold is the optional parameter passed during the model execution.

> **Note**
>
> For more details on the predefined functions available in MMG for python scripting, see Appendix E.
> Click the icon to run the script.

> **Note**
>
> The execution result from the Pipeline Canvas screen is not displayed in the notebook tab.


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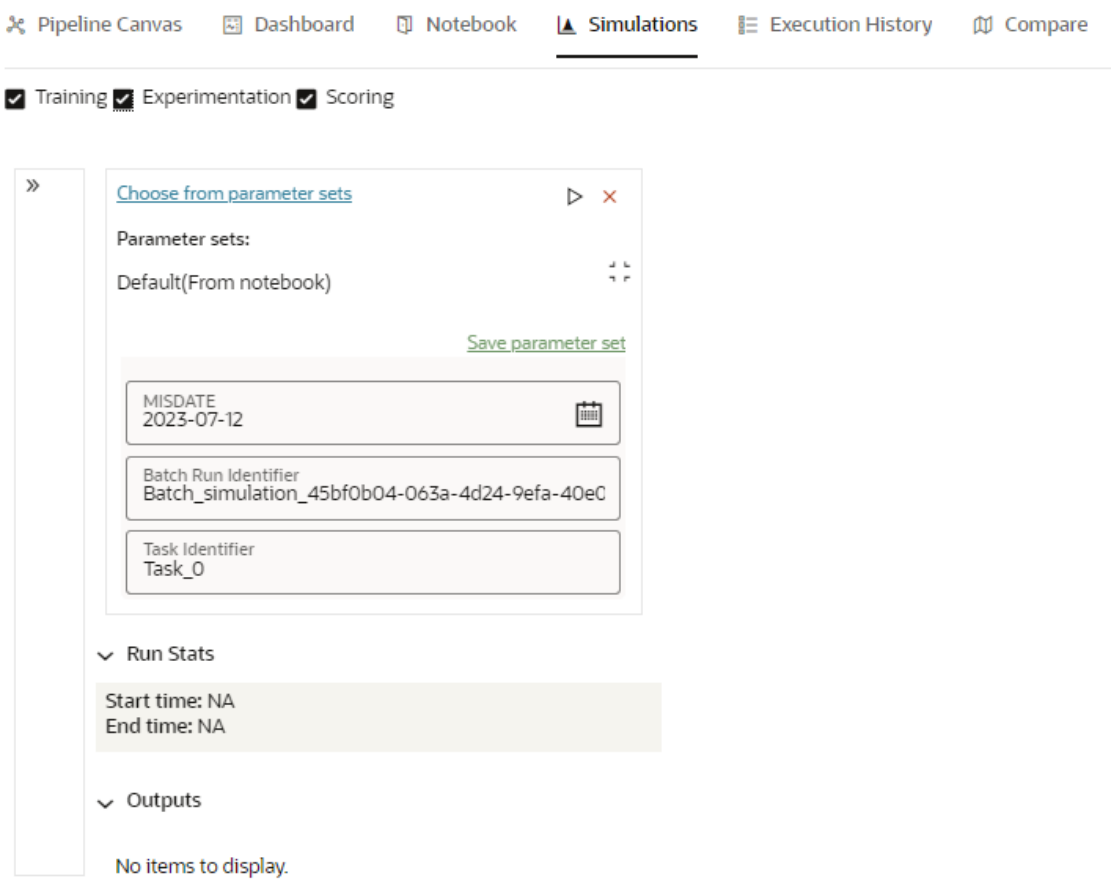
## Simulations

Simulation run is for executing a single notebook in parallel by giving different values for same parameters. The simulation flow allows for iterative execution along that path with input drivers (variables) that are passed through a parameter set.

You can either create a new parameter set or use the existing parameter set and execute it from this tab. In addition, you can select or deselect the link types which you want to execute.

**Figure 18-59 Simulation tab**




If you want to add different values for the same parameter, click Add Run. You can add any number of Run based on your requirements and then click Execute all to execute at one time. The Batch Run Identifier will be same for all runs and the Task id will be incremented for newly created run.


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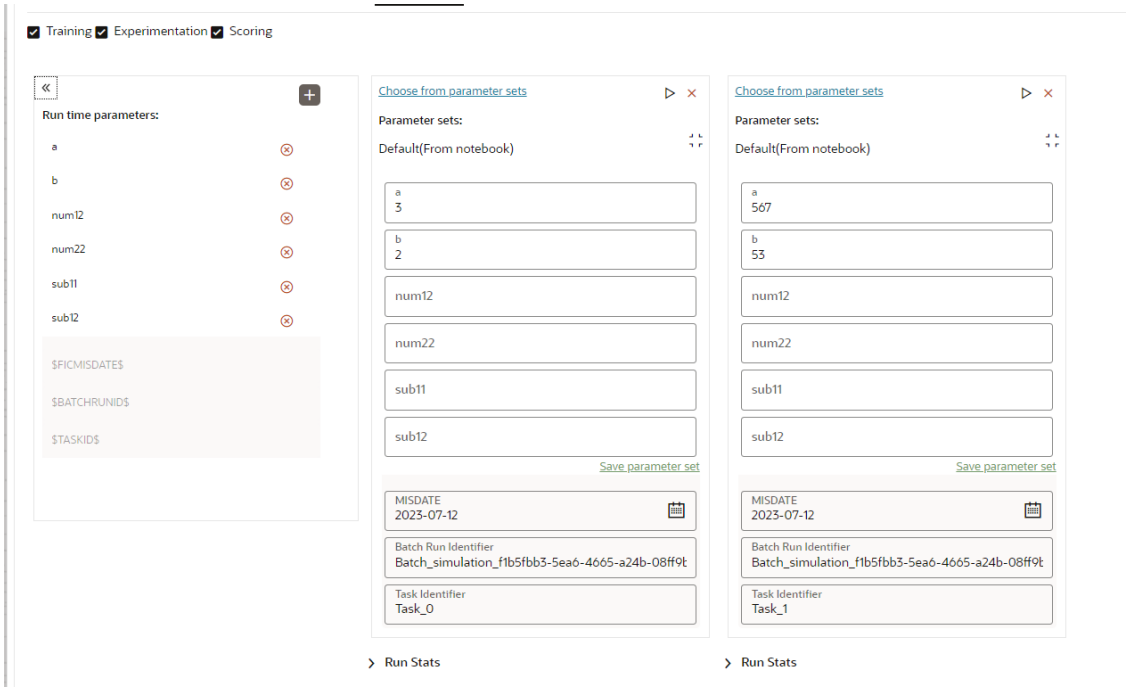
**Figure 18-60 Run Stats**



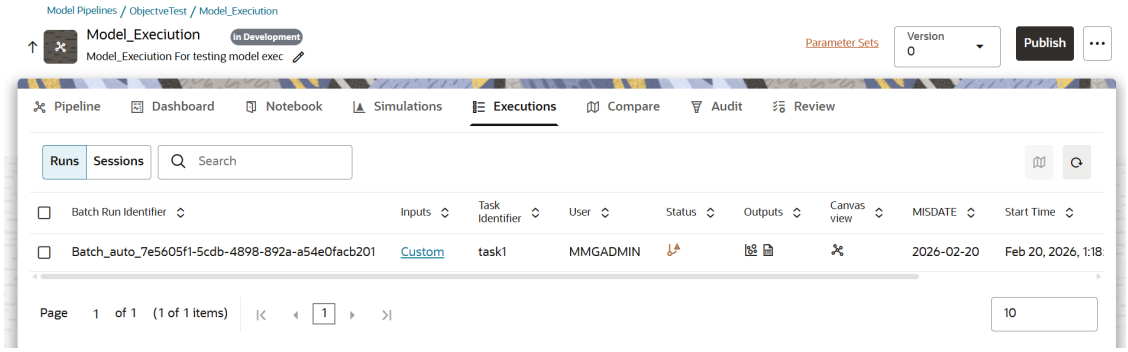

The Run Stats displays the execution start and end date. The Outputs of the tracked nodes will be shown under the inputs of each run panel.

## Executions

This section of the Pipeline Designer displays the history of the executed pipelines.

> **Note**
>
> The **Add File Output** button in the execution history tab opens the file manager at a specific path depending on the Save dataframe widget in the **Pipeline** window. When the Save dataframe widget is not available in the pipeline, it displays that the path does not exist from file manager.

**Figure 18-61 Executions**





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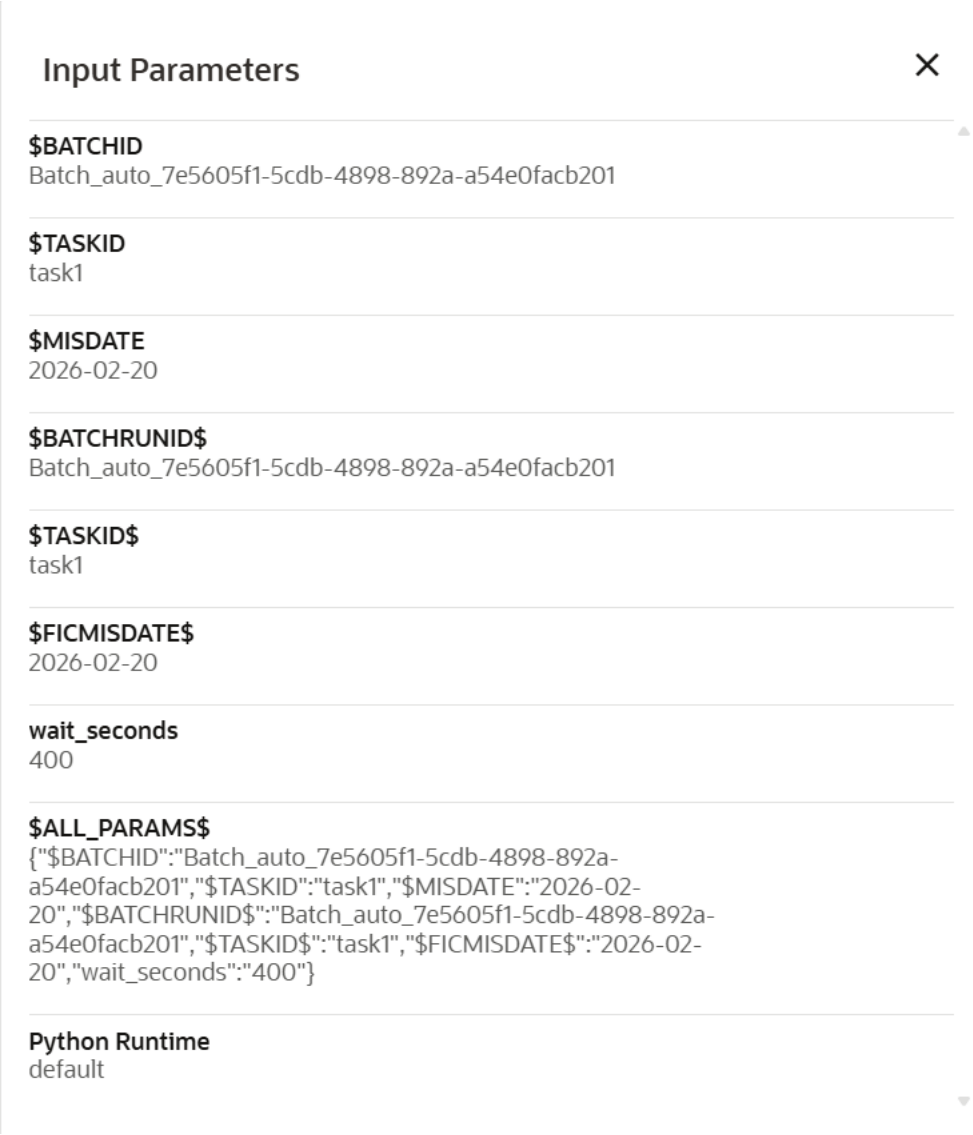
### Runs Tab

You can compare and refresh the executions by clicking the **Compare** and **Refresh** icons.

Click the link in the **Inputs** column adjacent to an execution to open the Input Parameters window. This window displays the input parameters details of the execution.

**Figure 18-62 Input Parameters window**




In the Outputs column, click either of the following icons:

- **Show Outputs:** When you click this icon, the **Output Details** window appears, displaying the *Executed-only* paragraph outputs. By default, this option is enabled, you can disable this option based on your requirements. From the **View Type** drop-down list, you can select either *Paragraph List View* or *Notebook View*. In the **Output Visibility** section, select either **Tracked** or **All**. By default, the **Tracked** option is selected and displays the outputs tracked from the time of the execution.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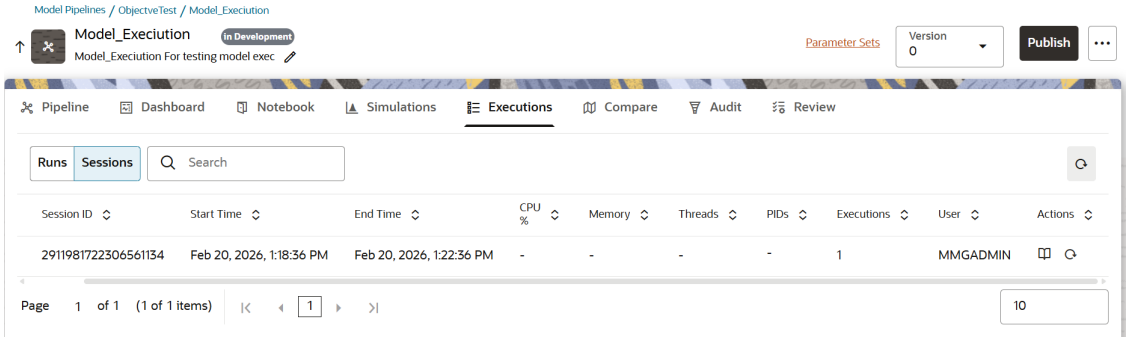
- **Output File:** When you click this option, the File Manager window appears. For more information on the File Manager feature, see the File Manager topic.

Click the **View in canvas** icon in the **Canvas View** column to view the executions via the Pipeline View window.

### Sessions Tab

Click the **Sessions** tab to view the sessions information:

**Figure 18-63 Sessions Tab**




- **Cancel:** Click this icon to cancel a session.
- **Refresh:** Click this icon to refresh the page.
- The form displays the session information via the following columns:
  - Session ID
  - Start Time
  - End Time
  - CPU %
  - Memory
  - Threads
  - PIDs
  - Executions
  - User
  - Actions - This column contains the folling icons:
    - **Open Notebook:** When you click this icon, the **Session Notebook** window appears.
    - **Refresh:** Click this icon to refresh the session.

> **Note**
>
> The data that appears in the CPU%, Memory, and PIDs columns are fetched via the data-studio APIs.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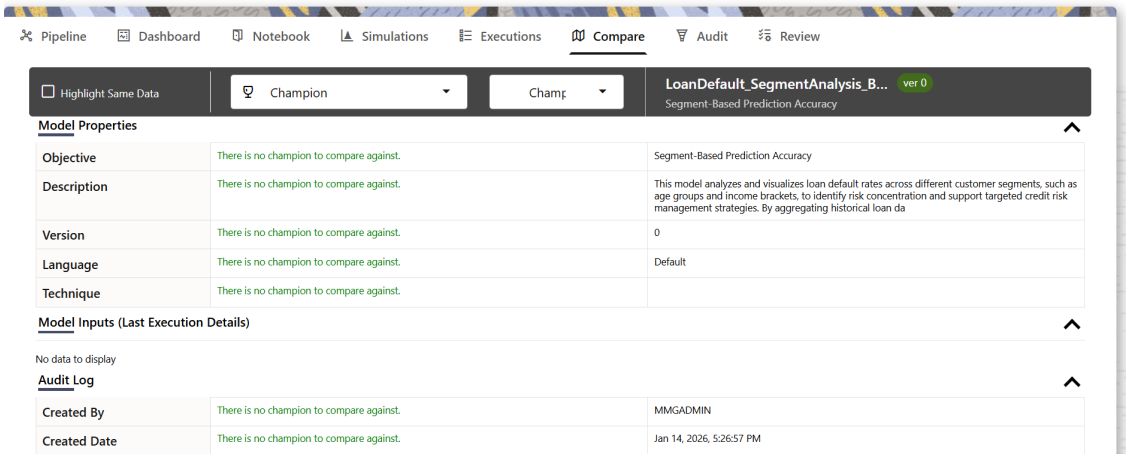
## Compare

The **Compare** tab in the Model Pipeline Designer enables you to evaluate and contrast different model pipelines and their versions within a given objective. This feature is now more flexible as you are no longer limited to comparing only the champion, the best-performing pipeline, but can select any pipeline and version available from the current or descendant objectives.

To compare a selected pipeline against a champion version, navigate to **Pipeline Designer** window and click **Compare** tab.

**Figure 18-64 The Compare Tab**




This tab contains two drop-down lists:

- **Pipeline:** Select the desired available pipelines in the current objective and its descendants. The pipeline selector includes all pipelines from the current objective and its descendants
- **Version:** Select the desired version for the selected pipeline. Additional versions of the same pipeline can be selected but the champion version will not be duplicated in the selection list.

This tab also displays the following comparison details:

- Model Properties
- Model Inputs (Last Execution Details)
- Audit Log
- Model Script
- Model Output (Last execution outputs)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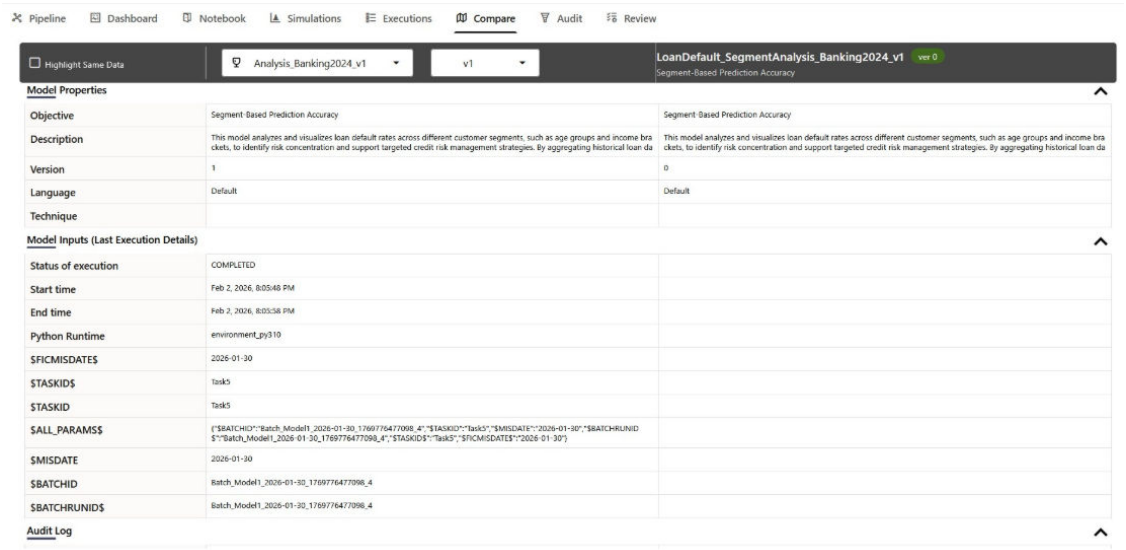
> **Note**
>
> If a model pipeline is newly created and only its initial version, *ver 0* or *Draft 0*, exists, with no champion or other versions, the **Compare** tab remains in an inactive, informational state. The **model/version** dropdowns may appear empty or disabled and *Draft 0* may not be selectable for comparison because there is no alternative version. In the comparison grid, all property rows display the message: *There is no champion to compare against.* To perform a comparison, create another version and/or designate a champion.

The following image illustrates an example of how this feature works when you select a pipeline and a champion version to compare:

**Figure 18-65 Comparing a Selected Pipeline against a Champion Version**




## Review

The **Review** tab provides a workspace for reviewing the content associated with the selected item.

Use this tab to review the following information pertaining to the model pipelines:

- Conceptual Soundness
- Data Quality
- Implementation Testing
- Model Governance Assessment

Comments added on the **Notebook** tab are displayed as timeline entries on the **Review** tab. Each timeline entry includes an information icon. Click the Information icon to view the paragraph title and paragraph index for the selected comment. This information helps you identify the exact section of the document associated with the comment.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# Build via Modelling Stages

# Build via Modelling Stages

# Build via Modelling Stages

# Publish Model Draft

After creating the Draft Models, publish the Notebooks, which have the Model script.

You can publish a model draft to Data Studio from the Pipelines flow. Publishing can be initiated from either of the following locations:

- From the pipeline or draft screen.
- From the **Model Summary** screen by using the **Actions** icon (three dots)
- From **Model Summary** (Actions menu)

To publish from the **Model Summary** screen:

1. Navigate to the **Model Summary** screen.
2. Click the **Actions** icon (three dots).
3. Select **Publish Model Draft**.

> **Note**
>
> **(Limitation)**: When you are publishing from the **Model Summary** screen, the link information (for example, training and scoring links) is not retained because the **Publish** action is executed from the summarized content (selected paragraphs). As a result, the trainingor scoring links are defaulted to *default* in the published output. To preserve the configured links, publish the model draft from the pipeline or draft screen.

To publish:

1. Create a Draft Model. See the Create Draft Models section for more information.
2. Click next to corresponding Draft Model and select **Publish Data Studio** option.

   The Publish Model window is displayed.


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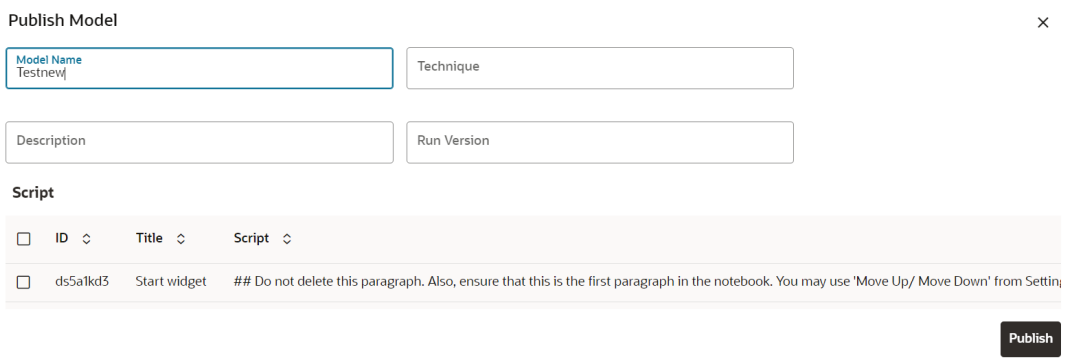
**Figure 18-66 Publish Model**




3. Enter the details as shown in the following table.

**Table 18-9 Field and its description for the Publish popup window**

| Field or Icon | Description |
|---|---|
| Model Name | The field displays the name of the Model. Modify the name if required. |
| Model Description | The field displays the description for the Model. Enter or modify the description if required. |
| Technique | Enter the registered technique to use. |
| Run Version | Select a run version. |
| Script | The table displays the Paragraphs created in the Training Model. Select the Paragraphs that you want to use to create the Scoring Model.<br>Track Output - Select this to track the output of the paragraph. |

4. Click **Publish**.

# Scope Detail

To view the scope details of the model:

1. Click **Launch Workspace** next to the corresponding Workspace to display the **Dashboard** window with application configuration and model creation menu.
2. Click **Model Pipelines** to display the **Model Pipelines** window.

   The window displays folders that contain models and model records in a table.
3. Click next to corresponding Model and select **Scope Detail** option. This is available for both Draft and Published models.

   The details such as Notebook, Inputs (Last execution details), Deployment Details, and Outputs (Last execution outputs) are displayed.


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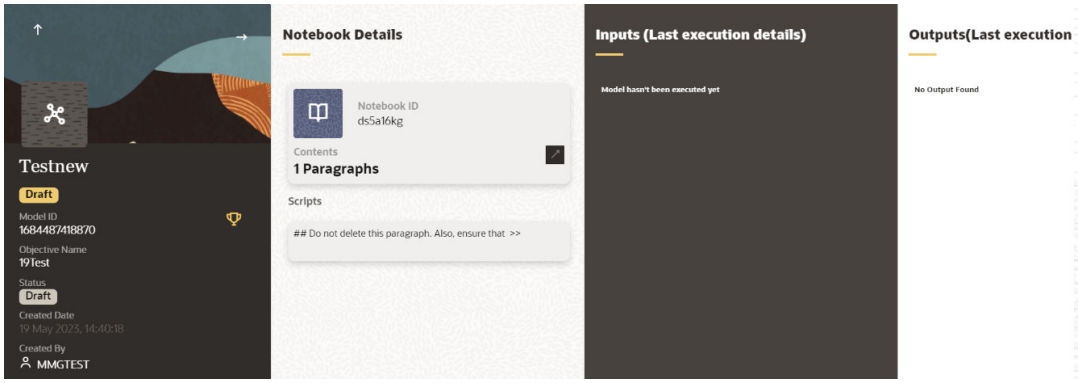
**Figure 18-67 Scope Details**




## View Model Details

You can view model information for deployed models, models that require approval, and so on.

To view model details:

1. Click **Launch Workspace** next to the corresponding Workspace to display the **Dashboard** window with application configuration and model creation menu.
2. Click **Model Pipelines** to display the **Model Pipelines** window.

   The window displays folders that contain models and model records in a table.

   The icon indicates that Model 1 is the champion.
3. Hover over the model records to view the various icons.

   The icon actions are listed in the following:

   a. Download

   b. Open in Pipeline Designer. See the Create Paragraphs using Pipeline Designer section for more details.

   c. Scope Detail. See the Scope Detail section for more details.

   d. Delete Model.

# Model Governance

After comparing models, you must understand the Model Governance system in the application. The Model Governance has an impact on how the application functions with the various user types and the requests they can place from the Model Details window. You must understand Model Governance before you request model acceptance, review models, or approve models for production.

There are three types of users:

- Requester
- Reviewer
- Approver

The User-Level Approval Restriction feature provides the user-level approval restriction for model deployment in MMG. This is controlled by the global configuration flag `IS_SELF_USER_AUTH_ALLOWED` within the `NEXTGENEMF_CONFIG` table. There are two possible flag values: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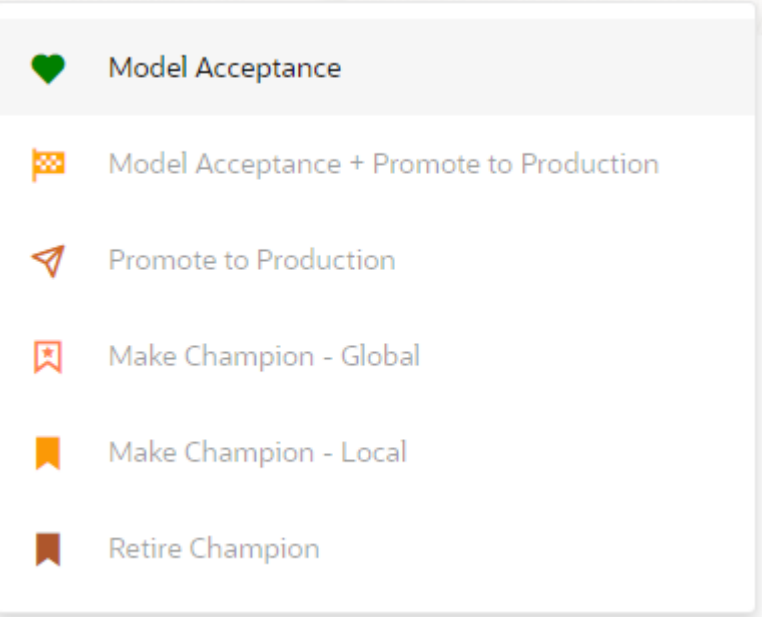
- **{*}Y{*}:** This is the default value and allows users to approve their own model submissions. This is backward compatible.
- **{*}N{*}:** This prevents users from approving models they have themselves requested for approval.

> **Note**
>
> You must restart the application everytime you update this value.

The request consists of the following phases in the Request drop-down list (see the Request Model Acceptance section for how to access the drop-down list in the Model Deployment window):

- Model Acceptance
- Model Acceptance + Promote to Production
- Promote to Production
- Make - Champion - Global
- Make - Champion - Local
- Retire Champions

**Figure 18-68 The Request Drop-down List**




The values in the drop-down list are active based on the type of user (Requester, Reviewer, or Approver) and the phase that the model is in (accepted, promoted to production, global champion, and so on). Let us look at these with a few examples.

**Example 1:**

Assume that you are a user with Requester privileges, and you create a model. Now you can request for the model to be accepted on the Model Details window from the **Request** drop-down list. The values enabled for selection are **Model Acceptance** and **Model Acceptance +**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**Promote to Production**. Let us proceed and assume that you select Model Acceptance, then a user with Reviewer privileges forwards your model to a user with Approver privileges. At this stage, the Approver can choose to reject or accept your model acceptance request. A rejection would bring the model back to the initial state with comments on the updates required before it can be requested for acceptance again. However, if the Approver accepts your model, then the **Make Champion- Local** selection is enabled when you log in. You can create many models and send them for acceptance. After acceptance, any model that is accepted can be made the champion on your local workspace at any time replacing the earlier local champion.

**Example 2:**

Assume that in the previous example, you selected **Model Acceptance + Promote to Production**, then a Reviewer forwards it to the Approver. The Approver, at this stage, chooses to promote the model to production by selecting **Promote to Production**. The model is now available in the production environment and the Approver can choose at any time to select a model from these models in production and select **Make Champion- Global**. If there exists a Champion model in the production environment, then it will be replaced by the new global champion. However, the earlier champion will still be available in the production environment along with other models and the Approver can choose to make it the global champion again at any time or select any of the other models and make one of them the global champion.

## Request Model Acceptance

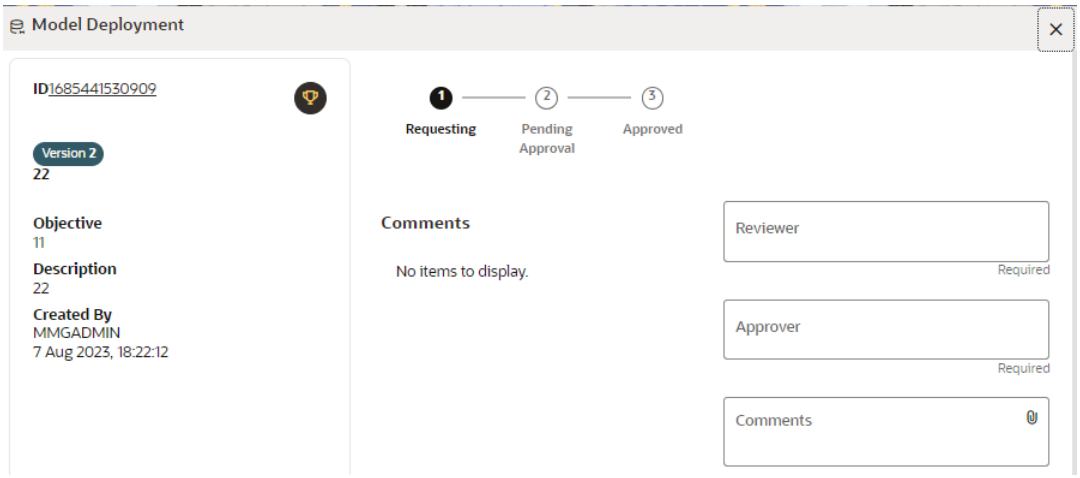
After comparing models, move the selected models to acceptance. Only a user with the Requester role can request for model acceptance. The model will be moved to review which will be available to Reviewer and Approver role, and then to acceptance is available to users with the Approver role, who can promote to production. See the Understand Model Governance section before you start here.

To request a model to promote to production, follow these steps:

1. Click **Model Pipeline** to display the **Model Pipeline** window.

   The window displays folders that contain models and model records in a table.
2. Click on the Deploy icon on the Model to open it.
3. If a model is a champion, the icon is displayed on it.
4. To make a model a champion from this window, place the mouse in the selected model columns. and click to display the **Model Details** window. If a model is a champion model, the icon is displayed.

**Figure 18-69 Model Deployment**





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5. Select the Reviewer group from the **Reviewers** drop-down list.
6. Select the Approver group from the **Approvers** drop-down list.
7. Enter comments in Comments and click **Attach** to attach files supporting the comments.
8. Use the following features on the window to perform additional actions.
   - View the model status change in the progress indicator. The Progress Indicator displays the various states of progress that the model has been through. Accordingly, you must request, review, or approve models.

**Figure 18-70 Model Approval Progress Indicator**




   - Click the type of **Request** from the drop-down list:
     - Model Acceptance: To review and accept the model creation.
     - Model Acceptance + Promote to Production: To review and promote the model to production.
     - Make Champion- Local: If the model is not the champion model, select to make it the local champion.
     - Promote to Production: To promote a model to production
     - Make Champion- Global: If the model is not the champion model, select to make it the Global champion.
     - Retire Champion: To retire a Champion model
   - Comment History: A record of comments entered in the cycle of model creation and approval with the feature to download attachments.

   The model sent for acceptance or for promotion to production is now displayed to a Reviewer to review it and then to Approver when signed in, who must either accept the request or reject it.

## Review Models and Move to Approve or Reject

The Reviewer must provide comments describing the action (approve or reject). If comments are related to rejection and if the Approver rejects, then model goes back to the Requester to make changes or to delete it. If comments are related to approval, then model moves further in the workflow and is displayed to an Approver. See the Understand Model Governance section before you start here.

To review a model:

1. Click **Launch Workspace** next to the corresponding Workspace to display the **Dashboard** window with application configuration and model creation menu.
2. Click **Model Pipelines** to display the **Model Pipelines** window.

   The window displays folders that contain models and model records in a table.
3. Click to display the **Model Details** window.


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4. Review the details and send it back to the Requester for modifications or send it to an Approver.

## Approve Models and Promote to Production

The models reviewed and set to promote to production by either the Requester or Reviewer is displayed to the Approver when signed in. The Approver has to either reject the model and send it back to the requester with supporting comments or approve it for pushing to production. See the Understand Model Governance section before you start here.

> **Note**
>
> When dataset has used the datasource which is of order (N) for example 5 , and the Production workspace does not contain the datasources at order 5, then promotion of models containing dataset from Sandbox to Production workspace fails.
> To remedify this issue, ensure that Sandbox and Production workspace contain the same number of Datasources before you perform promotion of models.

To approve or reject models:

1. Click **Launch Workspace** next to the corresponding Workspace to display the **Dashboard** window with application configuration and model creation menu.
2. Click **Model Pipelines** to display the **Model Pipelines** window.

   The window displays folders that contain models and model records in a table.
3. Select a model from the records in the objective.
4. Click to display the Model Details window.
5. Click **Approve** or **Reject** with appropriate comments.

## Deploy Models in Production and Make it a Global Champion

After approving the models, deploy it to the production environment. You must have an Approver function role and privileges to do this activity.

> **Note**
>
> Sandbox should have the production workspace attached in order to have this option enabled.

To deploy Models in production:

1. Click **Launch Workspace** next to the corresponding Workspace to display the **Dashboard** window with application configuration and model creation menu.
2. Click **Model Pipelines** to display the **Model Pipelines**window.

   The window displays folders that contain models and model records in a table.
3. Select the model to deploy and click **Model into Champion** to display the details of the model. If a model is a champion, the **Champion** icon is displayed.


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# Authorization Restrictions

MMG provides two types of self-authorization restrictions: user-level and group-level. These controls prevent users from authorizing changes that they have created and help organizations enforce the maker-checker principle and proper segregation of duties.

Configure these parameters in the `NEXTGENEMF_CONFIG` table in the MMG Configuration Schema. The supported values are `Y` and `N`. The default value for both parameters is `Y`

> **Note**
>
> After changing either parameter, restart the MMG application/services for the changes to take effect.

### User-Level Self Authorization Restriction

**Table 18-10 Configuration of User-Level Self Authorization Restriction**

| Parameter | Description | Default |
|---|---|---|
| `IS_SELF_USER_AUTH_ALLOWED` | Controls whether a user can authorize requests that were created by the same user. | Y |

#### Behavior

- Y:
  - Users can authorize requests that they created, provided they have the required authorization privileges and the group-level restriction permits the authorization..
  - Standard authorization workflow is followed.
- N:
  - Users cannot authorize requests that they created.
  - The application prevents authorization of self-created requests.
  - Another authorized user must complete the authorization.

#### Example

User Alice creates a Model Promotion request.

- If `IS_SELF_USER_AUTH_ALLOWED=Y`, Alice can authorize the request, provided she has the required authorization privileges and the group-level restriction permits the authorization.
- If `IS_SELF_USER_AUTH_ALLOWED=N`, Alice cannot authorize the request. Another authorized user, such as Bob, must complete the authorization..


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### Group-Level Self Authorization Restriction

**Table 18-11 Configuration of Group-Level Self Authorization Restriction**

| Parameter | Description | Default |
|---|---|---|
| IS_SELF_USR_GRP_AUTH_ALLOWED | Controls whether users belonging to the same user group as the request creator can authorize the request. | Y |

#### Behavior

- Y
  - Members of the request creator's user group can authorize the request, provided they have the required authorization privileges.
  - The request creator remains subject to the IS_SELF_USER_AUTH_ALLOWED parameter.
- N
  - Members of the request creator's user group cannot authorize the request.
  - An authorized user belonging to a different user group must complete the authorization.

#### Example

- Alice belongs to Group A.
- Bob belongs to Group A.
- Charlie belongs to Group B.
  Alice creates a request:

**Table 18-12 Behavior of Group-Level Self Authorization Restriction**

| Configuration | Who can authorize? |
|---|---|
| IS_SELF_USR_GRP_AUTH_ALLOWED=Y | Bob or Charlie, provided they have the required authorization privileges. Alice's ability to authorize the request depends on IS_SELF_USER_AUTH_ALLOWED. |
| IS_SELF_USR_GRP_AUTH_ALLOWED=N | Charlie or another authorized user belonging to a different user group. |

## Import a Model Data into a New Model

The model data from existing models in .dmp format and the existing model data in .dsnb can be imported during the creation of a new model.

> **Note**
>
> The import should happen inside an Objective only.


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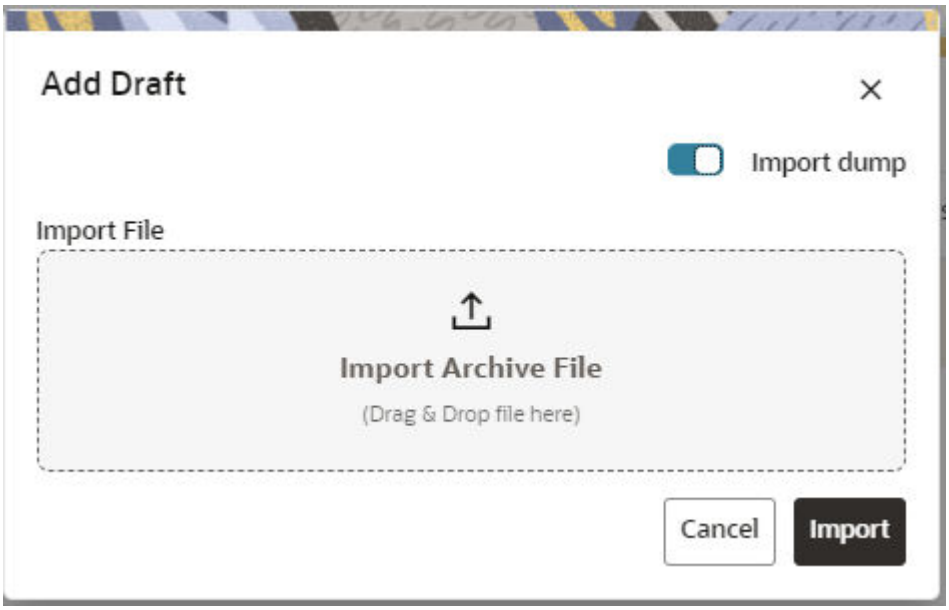
The import of model data lets you reuse and extend on model creation. This topic is part of the procedure of creating Draft Models and after creating a new model using this method, see the Create Draft Models section for instructions on how to proceed further.

To import model data:

1. Click **Launch Workspace** next to corresponding Workspace to Launch Workspace to display the **Dashboard** window with application configuration and model creation menu.
2. Click **Model Pipelines** to display the **Model Pipelines** window.

   The window displays folders that contain models and model records in a table.
3. Select an **Objective**.
4. Double click a model to display the model versions in the expanded display.
5. Hover over a model and click **Download** to download the model data dump.
6. Click **Add** and **Drafts** to display the **Model Details** dialog box for the creation of a new model.

**Figure 18-71 Model Details - Import Dump**




7. Drag the toggle switch to select **Import Dump**.
8. Drag and drop the file into the **Import Dump File** field or click in the box to open the file selector dialog and select a file.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> **Note**
>
> If the upload file size is more than 8 MB, you can increase the file size upto 100 MB by modifying the below properties. Restart of services are required once the file size is updated.
> mmg-ui/conf/application.properties:
>
> **********
>
> spring.servlet.multipart.max-file-size=8MB
>
> spring.servlet.multipart.max-request-size=8MB
>
> mmg-service/conf/application.properties:
>
> **********
>
> spring.servlet.multipart.max-file-size=8MB
>
> spring.servlet.multipart.max-request-size=8MB

9. Click **Import**. A new model is created by importing the model data dump of another model.

# Build via Modelling Stages

# Execute Models using Scheduler Service

The models that you have created require that they are executed using Scheduler Service before they can be available to the users of OFSAA applications. For more information on this, see the Scheduler Service.

## Define a Task

The following three Components are supported during the task creation:

- Model
- Populate Workspace
- Custom


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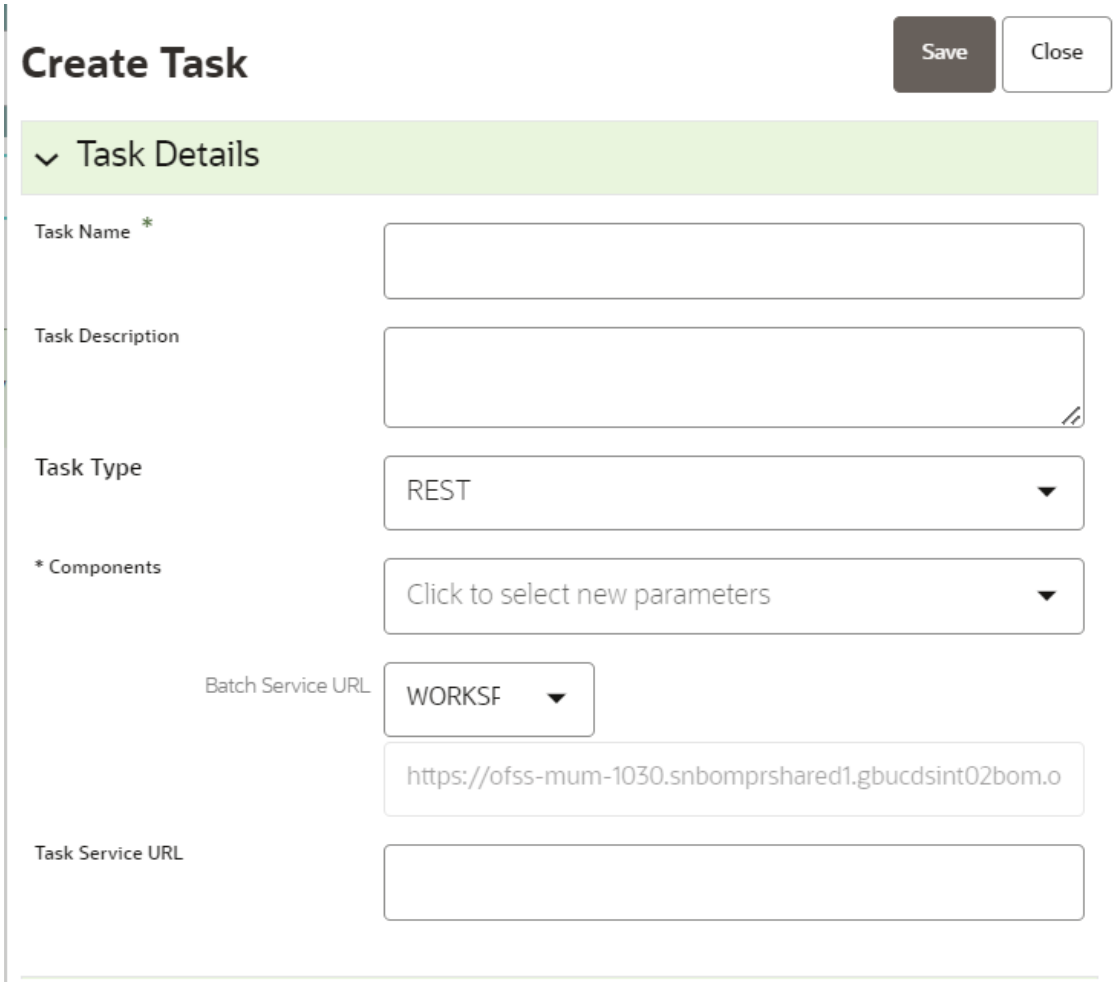
**Figure 18-72 Create Task**




Enter the following details in Task Details section:

- **Task Name**: Enter the task name.

> **Note**
>
> The Task Name must be alphanumeric and should not start with a number. The Task Name should not exceed 60 characters in length. The Task Name should not contain any special characters except underscore (_).

- **Task Description**: Enter the task description. No special characters are allowed in Task Description. Words like Select From or Delete From (identified as potential SQL injection vulnerable strings) should not be entered in the Description
- **Task Type**: Select the task type from the drop-down list. The options are REST and SCRIPT. You can enter Shell script for Model, Populate Workspace, Custom components. Status key in the curl command should be in uppercase as STATUS.
- **Batch Service URL**: Select the required Batch Service URL from the drop-down list. This can be blank, and you can provide the full URL in the Task Service URL field.
- **Task Service URL**: Enter task service URL if it is different from Batch Service URL.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> **Note**
>
> Task Parameters will vary based on the selected Component.

## When Component is Model

The following window shows the Task Parameters for Model Component.

**Figure 18-73 Task Parameters**




> **Note**
>
> Fields marked with * are mandatory fields.

The Scheduler Service feature provides a system-generated runtime parameter **RUNSKEY**, `$RUNSK$`, to support the delta processing of the Data Pipeline and Match Rules. **RUNSKEY** is generated during execution and is propagated from the batch to downstream tasks or components so they can process specific execution context. You will see `$RUNSK$` listed along with other runtime parameters such as; **RUNSKEY** and is not user-editable. This is populated by the scheduler service at runtime.

**RUNSKEY** lifecycle follows the `BatchRunID` behavior.

- **Rerun:** `$RUNSK$` changes. A new **RUNSKEY** is generated for the rerun execution.
- **Restart:** `$RUNSK$` remains the same. The restart continues the same execution context.
- **Batch Date**: Shows the batch execution date. You can enable or disable this parameter.
- **Batch Run ID**: Shows the batch execution run ID. You can enable or disable this parameter.
- **Objective**: Select the Object which you want to use for execution. For more information, see the Create Objective (Folders) section. The Sub Objective is displayed with path. For example, if Test1 is Objective and Test11 is Sub Objective, and you want to use Test11 Objective for execution, then select this field as Test1/Test11.
- **Model**: Select the Model of selected Objective. It can be any specific model of Objective or All models of Objective.


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  - If the ALL_CHAMPION is selected here, then Objectives with no Champion Model is skipped, and the Objectives with Champion Models gets executed.
  - If CHAMPION is selected, and no Champion is present, then Model Execution gets fail.
- **Link Type**: Select the link type for execution. For example: Training, Scoring, or Training+Scoring. For more information, see the Links in the Pipeline Designer section.
- **Synchronous Execution**: You can set this parameter to Yes or No.
  - If Synchronous Execution is set to Yes, then execution will wait for the notebook execution status.
  - If Synchronous Execution is set to No, then execution will not wait for the notebook execution status, it will trigger the notebook and update task status as successful in batch monitor.
- Optional Parameters: This is used pass the parameters dynamically.
  For example:

  model_group_name=LOB1,benford_flag=Y,benford_digit=1,from_date=01-Jul-2020,to_date=31-Jul-2021

  Model_group is parameter defined in model and value can be passed here.

The Create Task window also shows the following Header Parameters, which are not editable:

- User: logged in user name
- Workspace: shows the launched workspace name
- Locale: shows the locale. For example: en_US

## When Component is Populate Workspace

If you select Component as Populate Workspace, then to use the data population, enter the following parameters.

- Additional Parameters
- Data Filters - Global level
- Data Filters - Table level
- Data Filters - Hint

For more information, see the Populating Workspace section.


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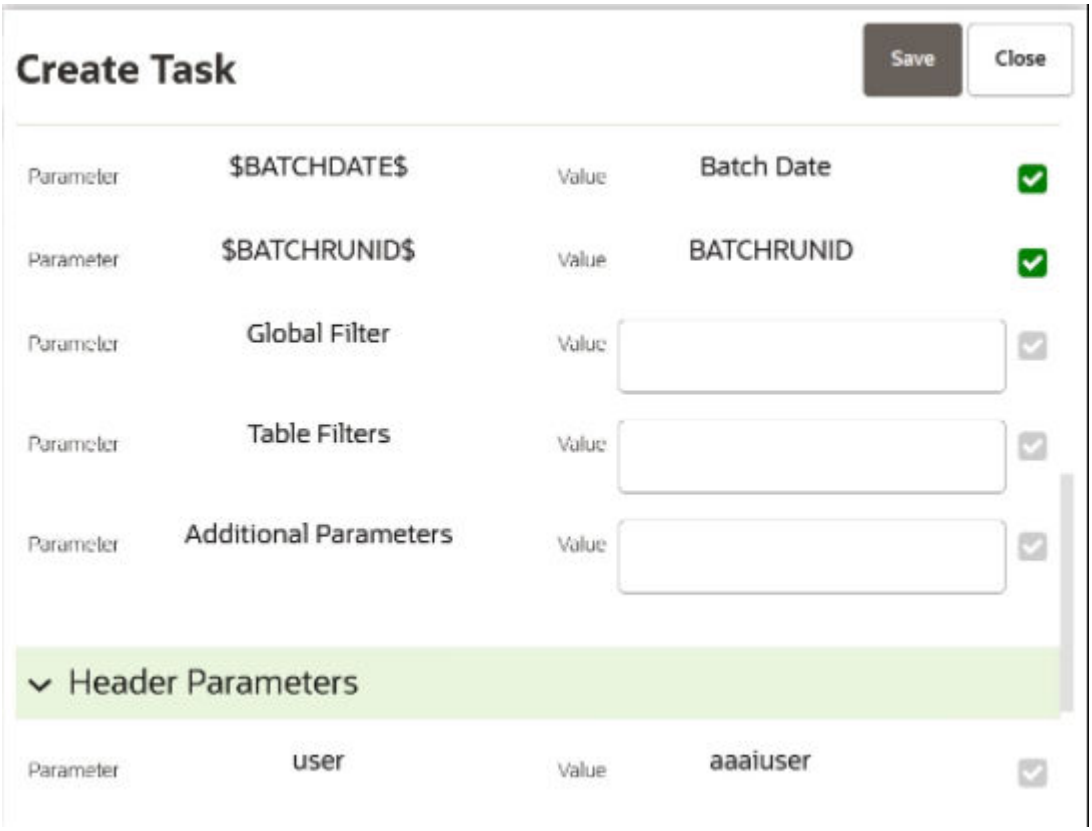
**Figure 18-74 Populate Workspace screen**




## Build via Modelling Stages

## Build via Modelling Stages

# Export/Import/Retire Models via Utility

You can import and export the models between Sandbox to Production or vice versa using the Utility.

To import the models:

- Navigate to `<MMG_PACK>OFS_MMG/bin` and execute in the following format:

  ```
  ./model_pipeline_utility.sh IMPORT TARGET_WORKSPACE LOGIN_USER LOCALE
  FILE_NAME OBJECTIVE_ID OVERWRITE_FLAG
  ```

**Table 18-13 Fields and icons on the Sandbox Summary page**

| Field | Description |
|---|---|
| Import | Command to import the Model into Workspace |
| Workspace | The name of the Workspace to which you are importing the Model |
| Login_User | The logged in user name. |


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**Table 18-13 (Cont.) Fields and icons on the Sandbox Summary page**

| Field | Description |
|---|---|
| Locale | The application language preferences<br>For example: en_US |
| File_name | The file name with the following format:<br>Workspace name_Model ID_Model version.zip<br>For example: `CS_1638105398036_0.zip` |
| Objective_ID | The ID of the objective. |

> **Note**
>
> For the OVERWRITE_FLAG, you enter the input as **Y**, the utility imports the models in the approved status.
> If you enter as **N**, the models are imported but not in the approved status.

To export the models, perform the following steps:

Prerequisite:

Before you export, ensure the Models and Drafts are available in the UI / setup.

1. Navigate to <MMG_PACK>OFS_MMG/bin and execute in the following format:
   `./model_pipeline_utility.sh MODEL EXPORT WORKSPACE_NAME LOGIN_USER LOCALE MODEL_ID MODEL_VERSION [v]`

**Table 18-14 Fields and icons on the Sandbox Summary page**

| Field | Description |
|---|---|
| Export | Command to export the Model from the Workspace |
| Workspace | The name of the Workspace from which the model is exported |
| Login_User | The logged in user name. |
| Locale | The application language preferences.<br>For example: en_US |
| Model ID | The Model ID |
| Model Version | The version of the Model |

> **Note**
>
> Currently, if the user gives Production Workspace name during the import of model dump through the utility, the utility migrates the dump to the Production Workspace as well. This should be restricted, as the models in sandbox may or may not be promoted, and the invalid status will be shown in the Production Workspace.

Before you retire, ensure the Models are in the published state.

1. Navigate to <MMG_PACK>OFS_MMG/bin and execute in the following format:


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```
./model_pipeline_utility.sh MODEL RETIRE WORKSPACE_NAME LOGIN_USER LOCALE
MODEL_ID MODEL_VERSION [v]
```

**Table 18-15 Fields and icons on the Sandbox Summary page**

| Field | Description |
|---|---|
| Retire | Command to retire the Model. |
| Workspace | The name of the Workspace from which the model is exported |
| Login_User | The logged in user name. |
| Locale | The application language preferences.<br>For example: en_US |
| Model ID | The Model ID |
| Model Version | The version of the Model |

**Note**

The migration utility allows administrators to import objects into any target workspace, including a Production workspace. If objects are imported directly into the Production workspace, then a few objects may appear in a non-final state (for example, *Pending Approval* or *Invalid*) until the required approvals or promotions are completed. Hence, you must plan the imports accordingly and then validate the object status after importing.

# View Models

The View Models feature launches the OFS Data Studio window. You can view models on this window.

To use View Models:

1. Click **Launch Workspace** next to the corresponding Workspace to display the **Dashboard** window with application configuration and model creation menu.
2. Click **Model Pipelines** to display the **Model Pipelines** window.

   The window displays folders that contain models and model records in a table.
3. Click **Action** next to corresponding Model and select Open in Pipeline Designer.

   See the Create Paragraphs in Pipeline Designer section for details on how to use the OFS Data Studio.

# Edit Models

The editing of models created versions that are different from the previously saved model and the cycle of Model Governance applies to any edited model. You can edit models from the OFS Data Studio window using Python scripting language.

You can edit the script of version 0 only even in Pipeline Designer and Studio. It is not possible in other versions.


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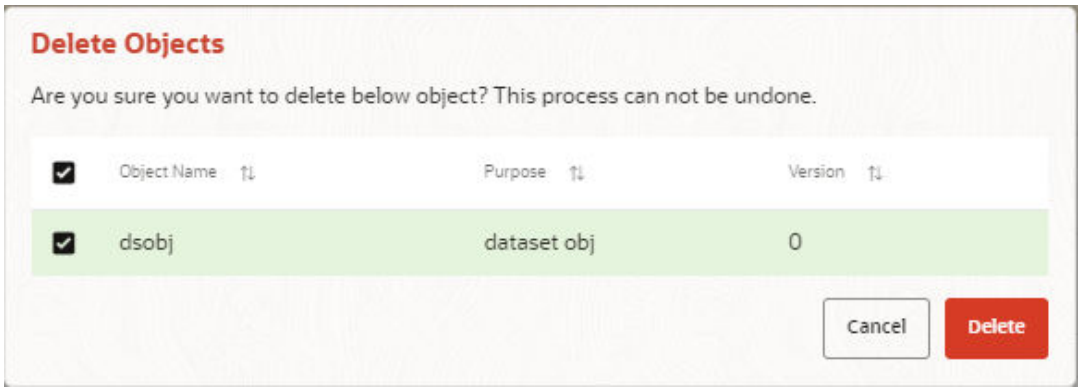
# Delete Objectives and Draft Models

To delete Objectives and Models that exist in the Objectives, follow these steps:

1. Click **Launch Workspace** next to the corresponding Workspace to display the **Dashboard** window with application configuration and model creation menu.
2. Click **Model Pipelines** to display the **Model Pipelines** window.

   The window displays objectives that contain models and model records in a table.
3. Click **Action** next to corresponding record (objective/draft) and select **Delete**.
4. You can select two or more objectives or models from the records.
5. Click **Delete** to display the Delete dialog box.
6. Click **Delete** to delete or click **Cancel** to cancel.

**Figure 18-75 Delete Objects screen**




> **Note**
>
> If the Model is promoted to Production, you cannot delete the model even it is retired.

# Programmatic Dynamic Forms and Fixed Dynamic Forms

The Programmatic Dynamic Forms and Fixed Dynamic Forms scripts are supported.

A dynamic form is a user input field that is generated from the code of a paragraph. Dynamic forms allow users to bind free variables in a paragraph.

**For Example:**

**Textbox**

The Textbox dynamic form allows users to input any string of characters. Its format is as follows:

- Click **Add Python Paragraph** in Model Studio to add a Paragraph in the Notebook and fetch the runtime parameters supported in Model Studio runtime as shown in the following example. This is available for all the interpreters.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For example, enter as follows:

```
%python
ds.textbox('Name', 'Default Value', 'Label')
```

Click **Play** to run the script and display.

**Figure 18-76 Run the script and display tab**



> **Note**
>
> In the current release, the MMG Studio supports Textbox, Select, Slider, Checkbox, Date Picker, Time Picker and DateTime Picker dynamic forms.


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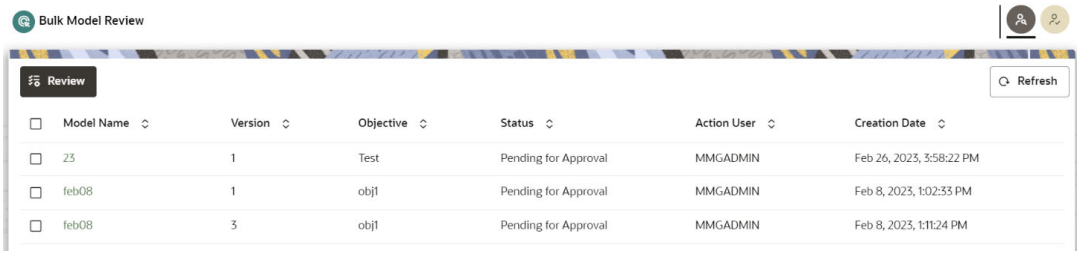
# 18.5 Model Actions

The Model Actions window allows you to view the list of models for which the Workflow action has been taken which requires review or approve across the workspace.

For example, when any Model User sends and Model for review or approval, the user receives the bulk Models in Model Actions window for review or approval. This helps when lot of models are received for review before deployment or some actions need to be performed on many models, such as making multiple models champion locally or globally, and so on.

1. Click **Launch Workspace** next to the corresponding Workspace to display the **Dashboard** window with application configuration and model creation menu.
2. Click Model Actions to view the list models pending an action such as approval.

**Figure 18-77 Review Models screen**




If you are a reviewer, Review Models screen is displayed and if you are an approver, Approve Models screen is displayed. This can be toggled in the header of the screen using Reviewer and Approver icon.

3. To review the model, follow these steps:
   a. Select the Model using the corresponding check box and click **Review**.
   b. Enter **Comments**, if any, and click **Review**.


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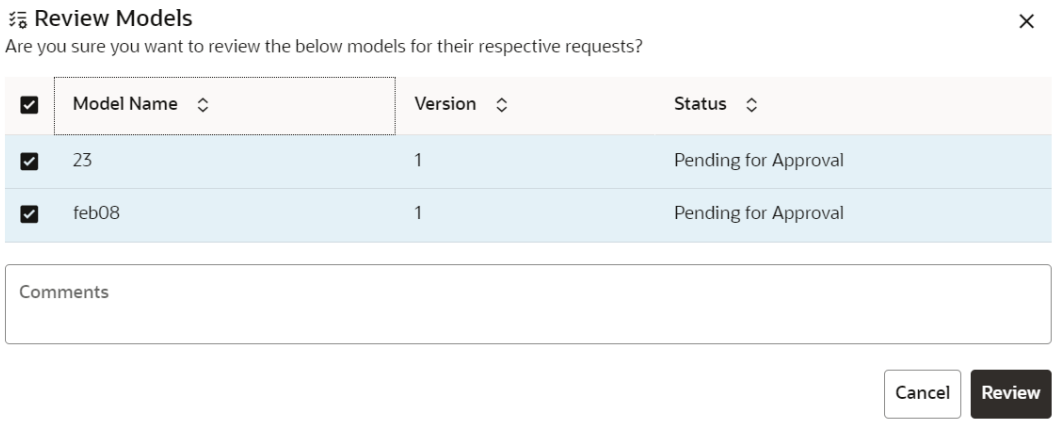
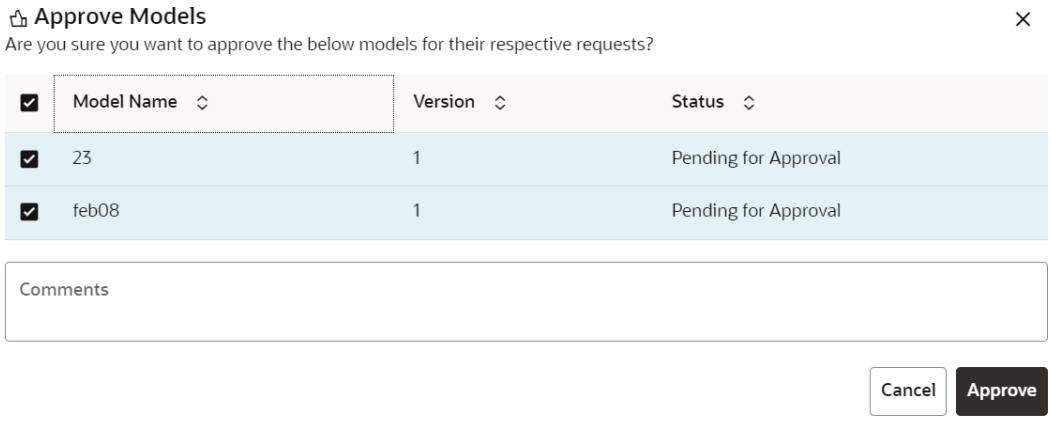
**Figure 18-78 Review Models window**




4. To approve or reject the models, follow these steps:
   a. Select the Model using the corresponding check box and click **Approve** or **Reject**.
   b. Enter the comments in Comments field of the **Approve Models** window or **Reject Models** window and click **Approve** or **Reject**.

**Figure 18-79 Approve Models screen**




# 18.6 Audit Trail

At any time, you can audit the models from the Audit Trail window. The Audit Trail window provides the complete details of model. This shows the information such as, when Model was created, who created the Model, workflow of Model, when this Model became champion or deployed, and so on.

The sequence of actions performed in the model lifecycle is listed in the table view and the timeline view (graphical representation).

To audit models:

1. Click **Launch Workspace** next to the corresponding Workspace to display the **Dashboard** window with application configuration and model creation menu.
2. In the Mega menu, click **More > Audit Trail** to view the time of the various actions performed on the model in the **Audit Trail** window.


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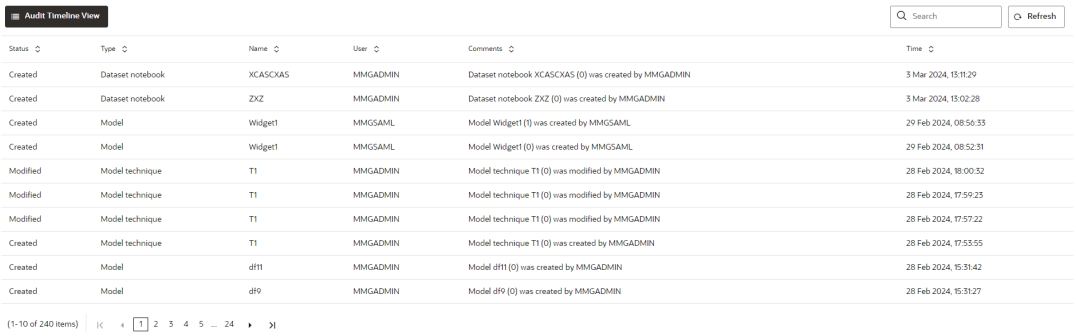
**Figure 18-80 Audit Trail window**

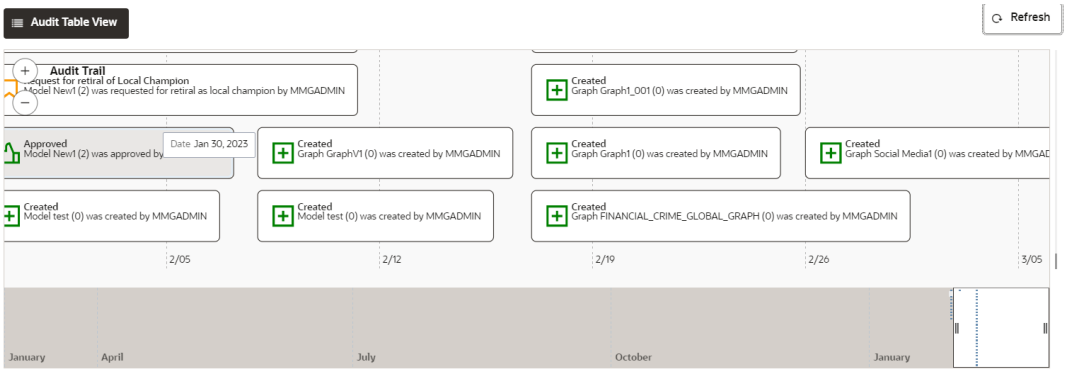



3. Click for Timeline View.

   Click to switch to the regular view. Click to refresh the Audit Trail window.

   You can search the models by entering the name in the search box.

**Figure 18-81 Audit Trail Window Timeline View with Horizontal Time Axis**





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# 19
# Graph Pipelines and Analytics

Create and manage graph pipelines, nodes, edges, properties and relationships. Configure graph refresh schedules, inspect execution and audit histories, and run graph analyses. For PGX connectivity, see Chapter 16; for scheduling, see Chapter 20.

## Chapter contents

19.1 Graphs 19-2

Source: MMG 26.2.0 User Guide. Procedures, screenshots and examples are incorporated into this STSA 8.1.2.8.0 draft; release-specific statements retain their source status.


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# 19.1 Graphs

The Graph Pipeline feature enables you to transform data in relational tables into a graph.

This feature uses the latest technology to harness the power of Graph Analytics to give Financial Institutions the ability to monitor the data financial institutions effectively. The data is organized as nodes, edges, and properties (property data is stored on the nodes or edges). The results of analytics algorithms are stored as transient properties of nodes and edges in the Graph.

Users can harness the power of Graph Analytics using our in-built in-memory Oracle Graph Analytics Engine (PGX).

The Graph Pipeline functionality allows users to define graphs easily, attach underlying data, and match pipelines to populate data in the graph.

The Graph Pipeline functionality allows users to quickly create and configure a graph for use in advanced analytics. It can also manage and schedule the tasks required to run populate the graph on a periodic basis.

The Graph Pipeline functionality allows you to:

- Creating Graph Model from their existing relational data model


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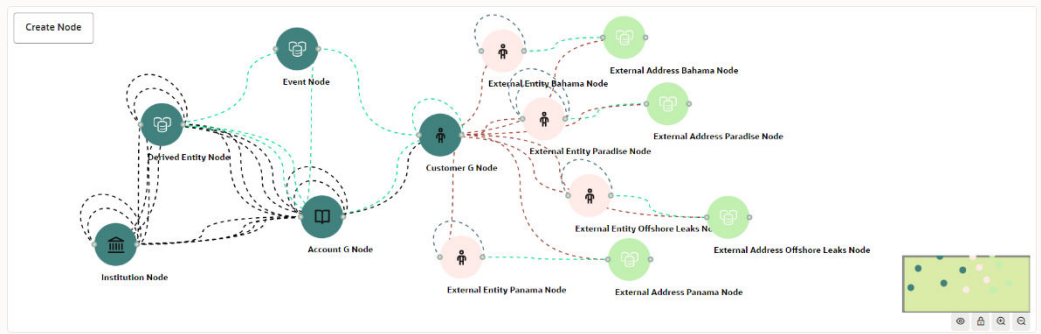
- Configuring the Graph Model through Pipeline UI
- Creating and Scheduling the data pipeline and matching (creation of similarity relationships) for created Graph Model
- Adding new sources and contextualizing the links quickly
- Standardizing the data before pushing it to Graph Model
- Using the following data source for Graph Model:
  - Oracle
  - File System (CSV)
- Using BD data source definitions for pre-seeded Workspace
- Using pre-configured Financial Crime Graph Model pipelines
- Using pre-seeded mappings of Graph Model properties with BD Data source properties
- Scheduling to create Graph by running pre-configured batches
- Blending data and getting insights from data quickly
- Load data into elastic search indexes so matching and entity resolution can occur in the graph
- Define matching rules for the generation of similarity edges in the graph.

An example of a preconfigured Financial Crime Graph Model with Nodes and Edges is provided here.

**Figure 19-1 Example of Graph Model**




The Graph Model defines the nodes and the relationship between them:

- **Node**: Represents a single entity with its attributes. The entity can be a single table or combination of tables merged on some common feature, it could be from a file, or any generalized component of multiple substructures merged for a specific reason/objective. For example, Customer.

  A customer could be a single entity.

  Customer, Salesperson, Manager, and so could be individual entities that can be structured together as a “Person” entity with a set of attributes persisted across individual entities.
- **Edge**: A connector between nodes or the same Node itself. Each edge can have a set of attributes associated with it. These edges will map to 'join' between two entities that could be direct or transitive.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- **Modeler Attributes**: Properties of the Node/Edge, and these are mandatory inputs. For example:

  A Customer Node will have properties like Customer ID, Name, Age, Gender, etc.

  A Transaction edge will have properties like Transaction ID, Date, Amount, From/To account, etc.

See the Adding a Graph Pipeline section for creating Graph, Nodes, Edges, and Scheduling.

# Accessing the Graph Summary Page

The Graph Summary page gives access to the various graph pipeline functions such as create, view and delete.

To access the Graph Summary page, follow these steps:

1. Click **Launch Workspace** next to the corresponding Workspace to display the **Dashboard** window with application configuration and model creation menu.
2. Click the **Graphs** icon.

   This displays the graph pipeline in a tabular format.

   The following table provides descriptions for the fields and icons on the Graph Summary page.

**Table 19-1 Graph Summary Details**

| Field or Icon | Description |
|---|---|
| Search | The field to search for a graph pipeline.<br>Enter specific terms in the field for which you want to search, and press Enter on the keyboard to display the results. |
| Name | The name of the graph pipeline. |
| Number of Nodes | The number of nodes present in the graph pipeline. |
| Number of Edges | The number of edges present in the graph pipeline. |
| Owner | The owner of the graph pipeline. |
| Created Date | The date on which the graph pipeline was created. |
| Delete | Click to delete multiple graph pipelines. |
| Add | Click to create a new graph pipeline. See Adding a Graph Pipeline section. |
| Action | Click **Action** icon to View/Edit/Delete/Download functions on the selected graph pipeline. |

> **Note**
>
> The user is now able to execute/schedule a batch with SYSDATE-X days functionality.

# Adding a Graph Pipeline

To add a graph pipeline:


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1. Navigate to Graph Summary page.

   This page displays the graph summary records in a table.

2. Click **Add**.

   The **Add Graph**pop-up window is displayed. Figure: Add Graph window.

**Figure 19-2 Add Graph window**




3. In the **Graph Name** field, enter a name for the graph. The name must be unique to a particular workspace.

4. In the **Graph Description**field, enter the description for the graph and click Add.

   OR

   You can import an existing Graph. Use the toggle button to select **Import Dump**.

   The following page is displayed.

   Browse the file and click **Import**. Once the Import is successful, the Graph Model page is displayed.

   The Maximum Age of Old session for a graph is 7 days by default. The Maximum age of old session of 7 days specifies that graph would be retained for a period of 7 days. You can modify the description and Max Age of Old session by clicking on the **Setting** icon. If you want the batch to be created in read-only mode for scheduler screen, enable the option.

5. Click **Save**.

   The user session of the Graph Pipeline will get refreshed after the set timeline.

6. You can perform the following:

   a. Create a Node

   b. Create an Edge

   c. Toggle drawing which will enable or disable the user from dragging components

   d. Zoom In and Zoom Out


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# Create a Node

To create a Node:

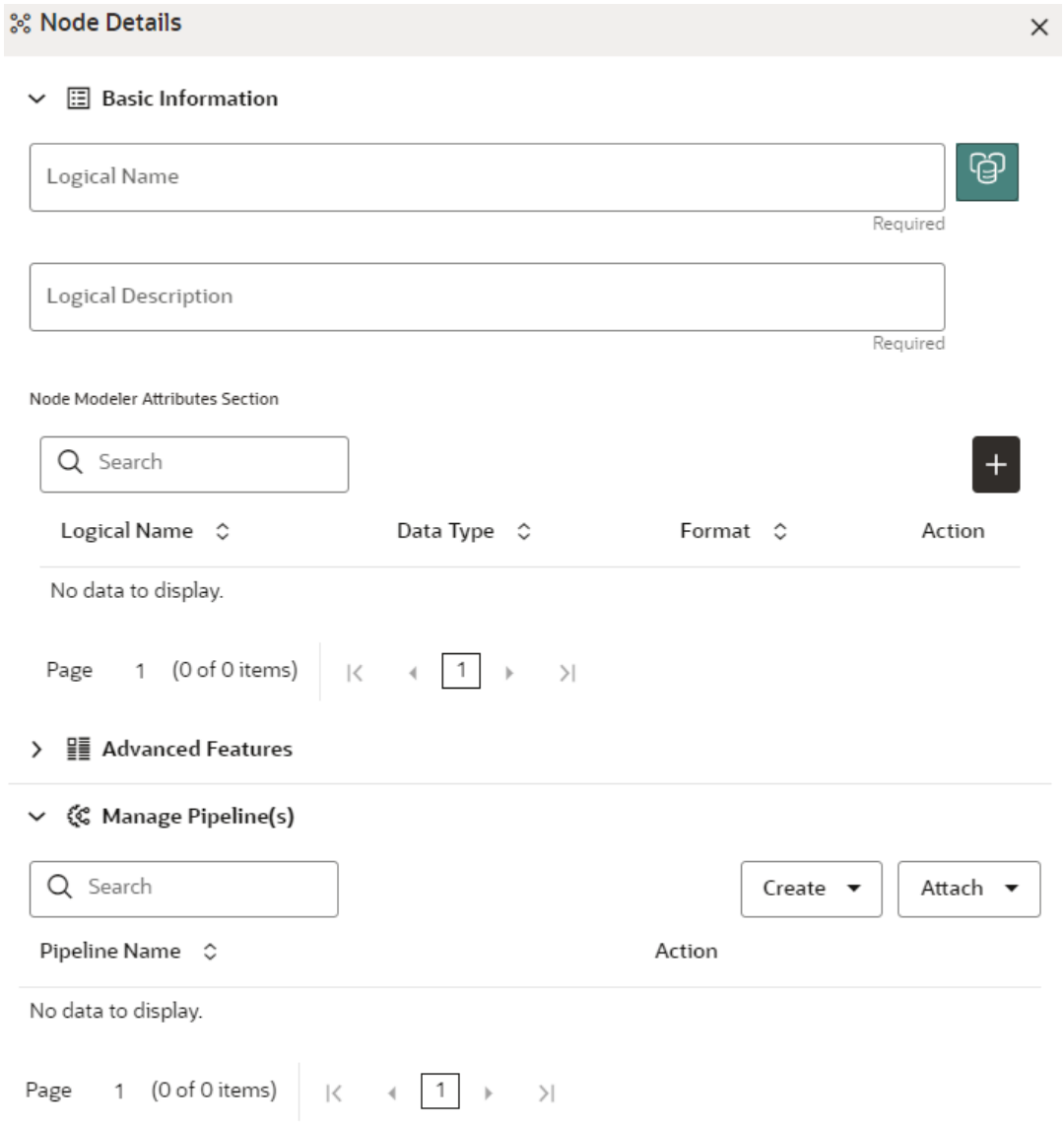
1. In the Graph Model page, click Create Node.

   OR

   Select the graph for which you want to create a Node, click on the Action button, and select the **Edit** option. In the Graph Model page, click **Create Node**.

   The **Node Details** screen is displayed.

**Figure 19-3 Node Details**




2. In the **Logical Name** field, enter a name for the Node or click **Setting** .

   The Setting pop-up window is displayed.


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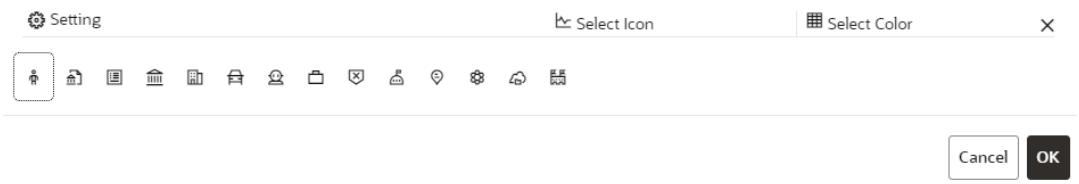
**Figure 19-4 Setting**




3. Select the required representation from the above Node icon.

   For example: Person, Institution, Account etc.

   Hover over the icon to view the definition of the node.

4. Based on your selection, the related Nodes are displayed. Select the Node, and you can choose the required color for the Node using the **Select Color** option.

5. The selected Node is displayed on the graph. To add attributes to the Node, click **Add** .

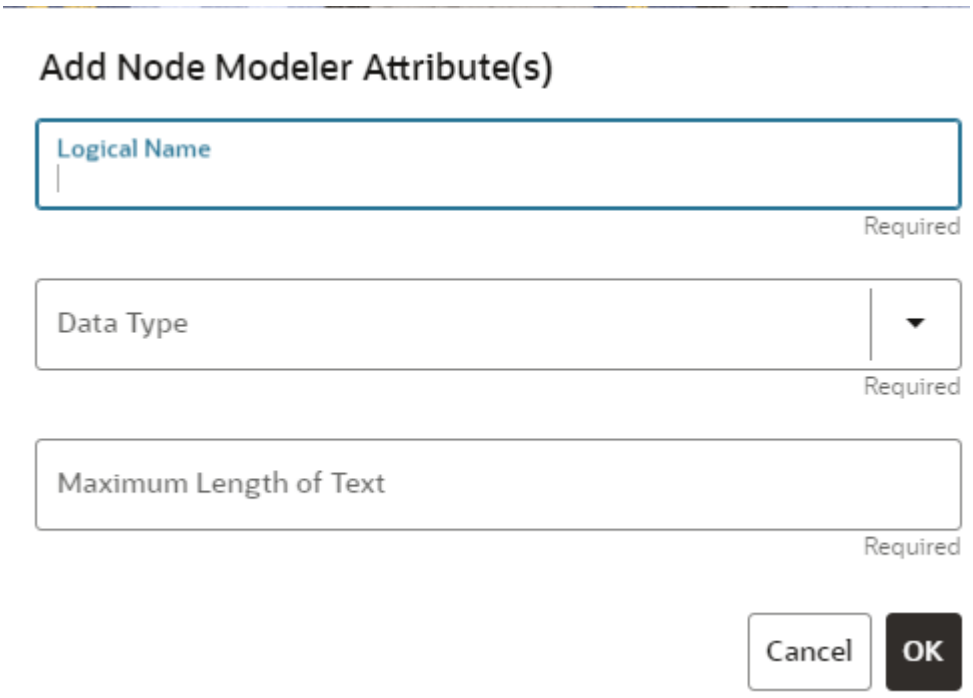
   Modeler attributes are the properties of Node/Edge, and these are mandatory inputs.

   For Example:

   Customer Node will have properties like Customer ID, Name, Age, Gender, etc.

   The **Add Node Modeler Attribute(s)**screen is displayed.

**Figure 19-5 Add Node Modeler Attribute(s) screen**




6. In the **Logical Name** field, enter the logical name for the modeler attribute.

   This field is mandatory.

7. Select the data type based on your requirements in the **Data Type** field drop-down.

   The available data types are Text, Number, and Date. This field is mandatory.

   Based on the data type selection, the following input field is displayed.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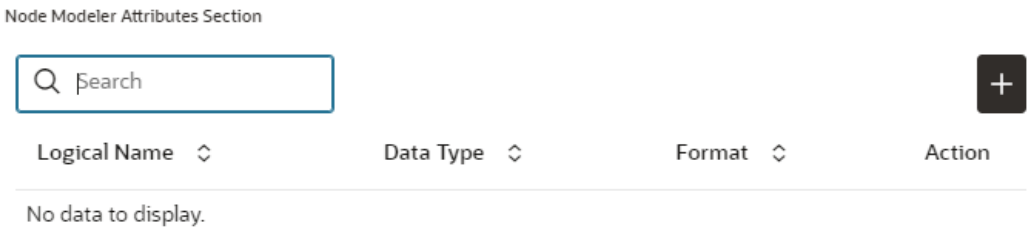
For example, the **Maximum Length** of Text field is displayed if the data type is selected as Text.

> **Note**
>
> Ensure the Maximum Length attribute is set to at least the field's length from which the data is to be populated.

8. Enter the data and click **OK**.

   The Node attributes are displayed on the Node Details page.

**Figure 19-6 Search**




You can add any number of modeler attributes based on your requirements by clicking on the Add icon.

9. Under the **Advanced Features** group, select the modeler attribute from the Column Identifier drop-down. All the created modeler attributes are displayed in this list.

**Figure 19-7 Advanced Features**




Under the **Manage Pipeline(s)** group, you can either create a new data pipeline or attach the existing pipeline.

The application uses data pipelines to prepare filtered data which can be used to create and run scenarios. Data pipelines prepare data by selecting and joining data sources to create virtual data tables, adding derived attributes to data, running derivations on the data to determine the risk associated with the entity, and so on.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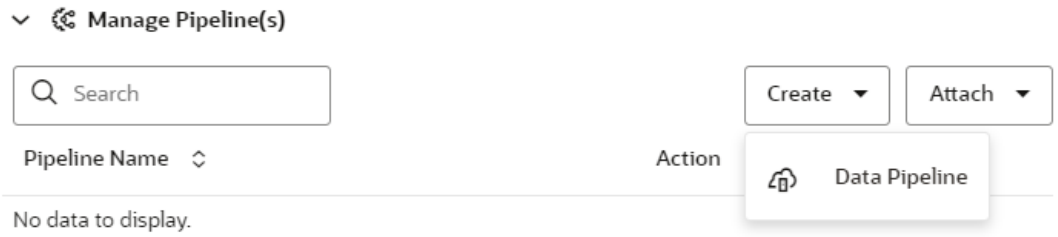
> **Note**
>
> The newly created data pipeline is not automatically added to the Node. You must attach the pipeline using the **Attach** drop-down option.

The selected data pipeline is displayed under the Manage Pipeline(s).

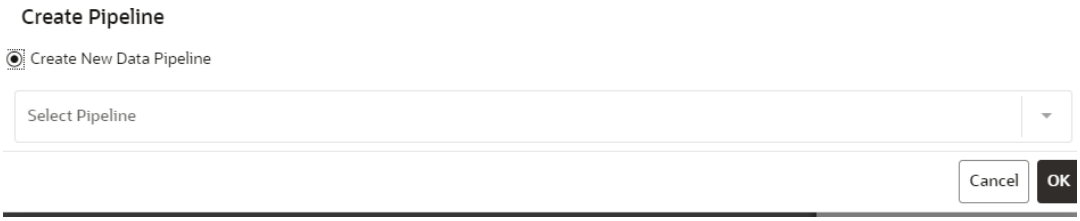
**Figure 19-8 Manage Pipeline(s)**




10. Click **Create** drop-down and select **Data Pipeline**.

    The **Create Pipeline** window is displayed.

**Figure 19-9 Create Pipeline**




11. Select the **Create New Data Pipeline** option and then click **Ok**.

    The Pipeline Designer page is displayed.

    - To create a data pipeline, see the Managing Data Pipeline section.
      OR
    - To clone from an existing data pipeline, see the Cloning from an Existing Data Pipeline section.

> **Note**
>
> The Persist of the Data pipeline of the corresponding node should be defined with the prescript. See the Prescript Condition section for more details.


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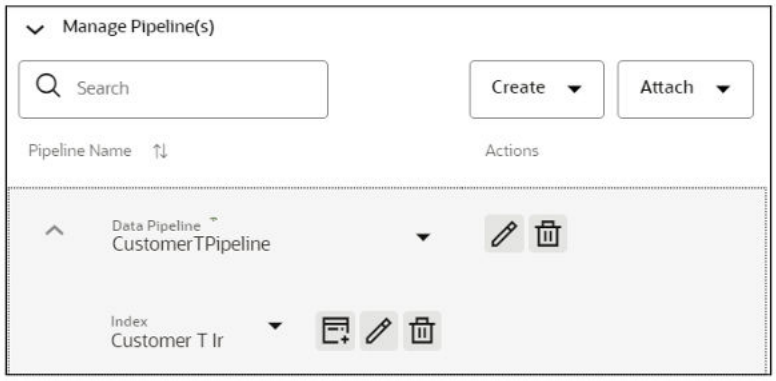
**Figure 19-10 Create an Index**

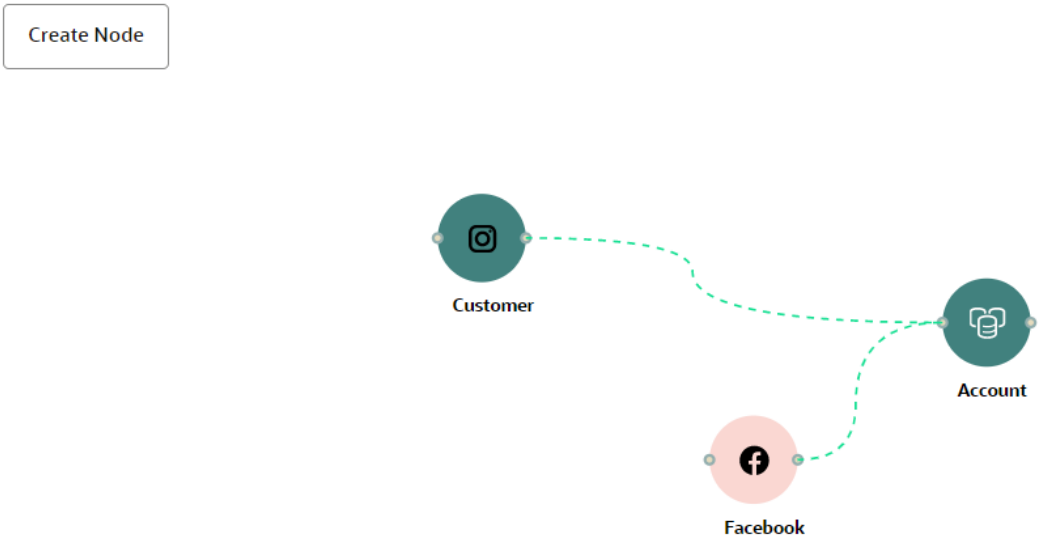



- To define an index for the data pipeline, see the Defining an Index section.

12. By clicking on the **Attach** drop-down, you can add any number of data pipelines to the Node-based on your requirements.
13. Click **OK**.

    The Node is created with pipeline Facebook and an account attached to it as shown in the below example.

**Figure 19-11 Graph with Node and Edge**




## Create an Edge

An Edge can be used to connect two different nodes or connect to itself. When compared to nodes, edges also capture the basic information like name, description, attributes to an edge, and possible pipelines that can be attached to an edge.


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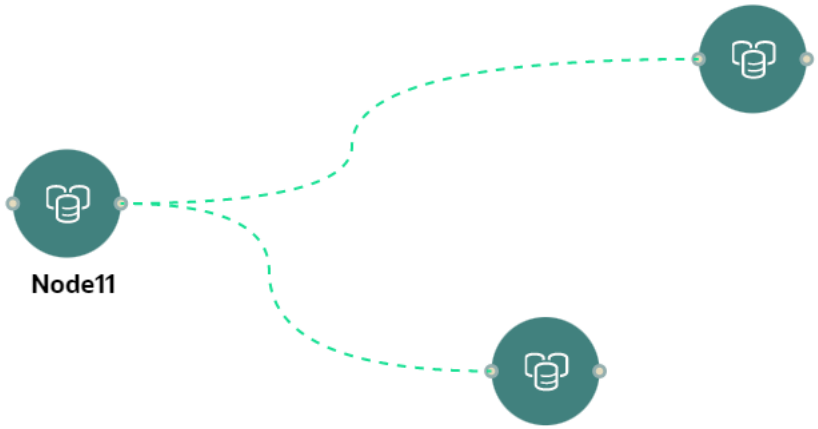
**Figure 19-12 Edge**




To create an edge, perform these steps:

1. Hover on the Node to create a relationship between them.

   The **Edge Details**screen is displayed.


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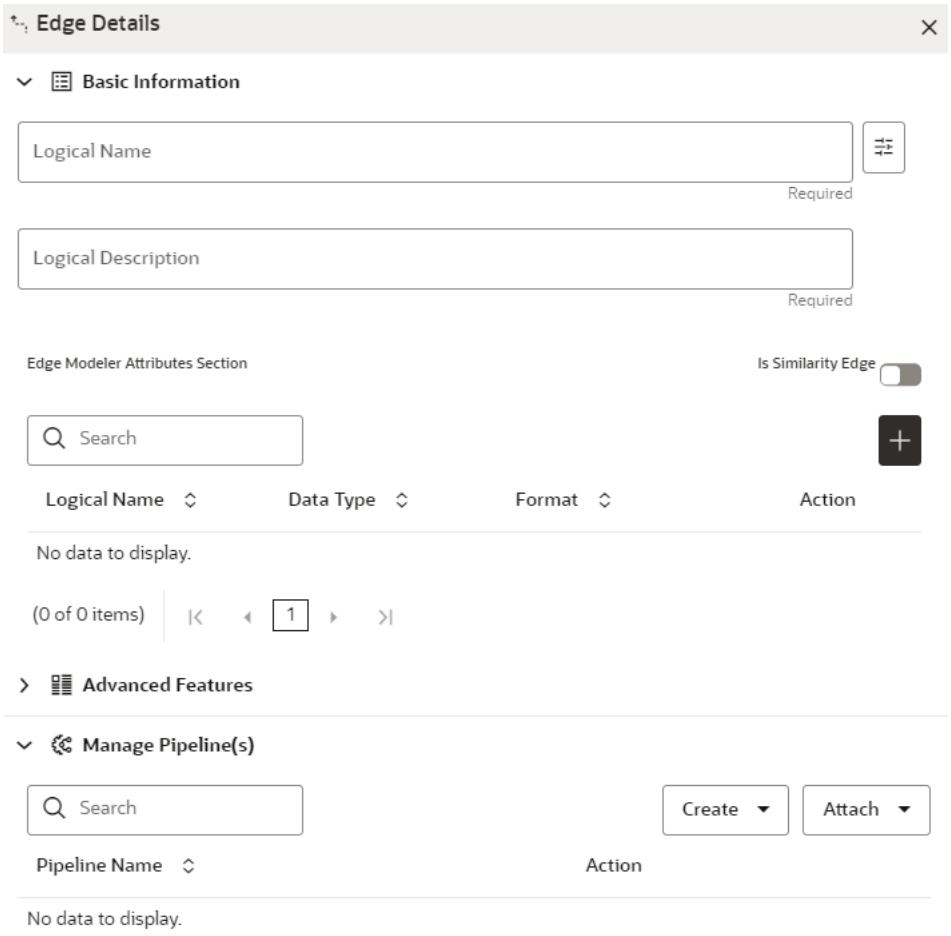
**Figure 19-13 Edge Details**




2. In the **Logical Name** field, enter the Node's name or click the **Setting** icon.

   The **Setting** pop-up window is displayed.

**Figure 19-14 Setting**




3. Select the required edge from the options displayed and choose the required color for the edge using the **Select Color** option.
4. Click **OK**.

   The selected edge is displayed on the graph pipeline.
5. To add attributes to the edge, click the **Add** icon.


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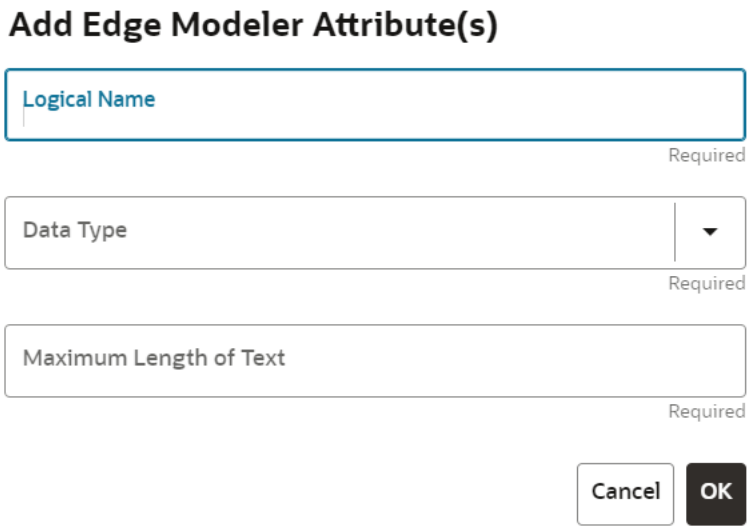
**Figure 19-15 Add Edge Modeler Attribute(s) screen**




The **Add Edge Modeler Attribute(s)** screen is displayed.

6. In the **Logical Name** field, enter the logical name for the edge attribute.

   This field is mandatory.

7. In the **Data Type** drop-down, select the data type based on your requirements.

   The available data types are Text, Number, and Date. This field is mandatory.

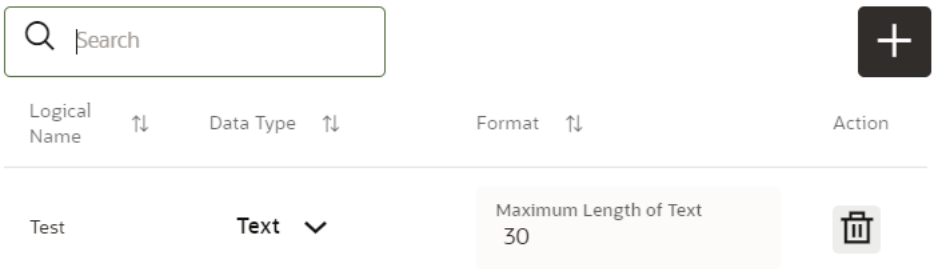
   Based on the data type selection, the following input field is displayed.

   For example, the **Maximum Length of Text** field is displayed if the data type is selected as **Text**.

8. Enter the data and click **Ok**.

   The edge attribute is displayed on the **Edge Details** page.

**Figure 19-16 Search**




By clicking on the **Add** icon, you can add any number of edge attributes based on your requirements.

OR


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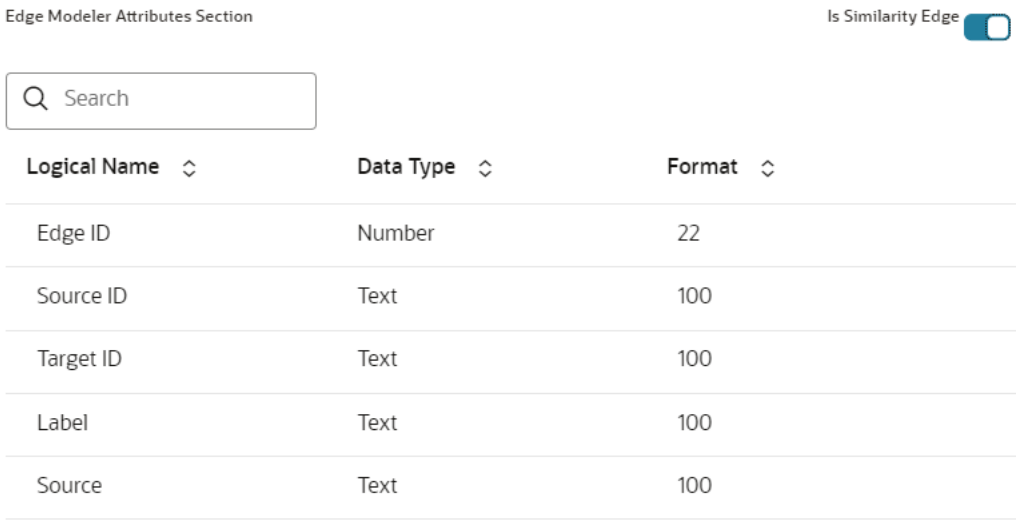
**Figure 19-17 Edge Details**




Click the **Is Similarity Edge** toggle button the **Edge Modeler Attributes** section to add the pre-defined set of attributes available in the edge.

**Similarity Edges**in the graph are created by Match Rules. If the edge is defined using Match Rule (under Manage Pipeline, by selecting Match Rule from drop down), the toggle button should be enabled to make it a Similarity Edge.

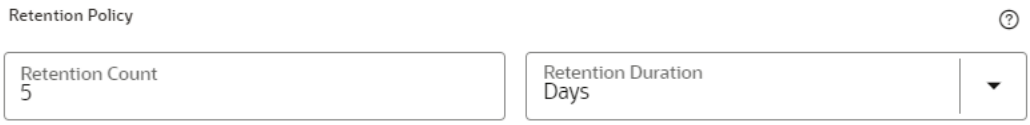
9. Under the **Advanced Features** group, you can specify the Edge Retention Policy.

   For example, An Edge Retention Policy of 7 Days specifies that the current edge would be retained in the physicalized Graph for a period of 7 Days.

10. Enter the retention count and select the retention duration from the drop-down.

    The available retention durations are Days, Weeks, and Months.

**Figure 19-18 Retention Durations tab**




11. Enable the **Pluggable Attribute**, then the corresponding drop-down will contain the list of attributes of the Edge.

    Pluggable edges are those edges whose data can be directly plugged in to the graph. In Financial Crime and Compliance domain, Transaction is a pluggable edge, which is generally large and is difficult to find out difference/ delta between two subsequent loads. Hence, it's data is provided for a range of dates which can be directly plugged in to the PGX memory while refreshing the graph.

    Any pluggable edge should have an identifier attribute, which is of "Date" data type. Figure: Pluggable Attribute.


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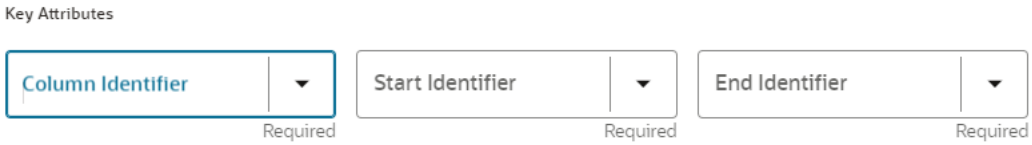
**Figure 19-19 Pluggable Attribute**




12. Under the **Key Attributes** field, select the Column, Start, and End identifier from the respective Identifier drop-down. Without these attributes, an edge cannot be created.

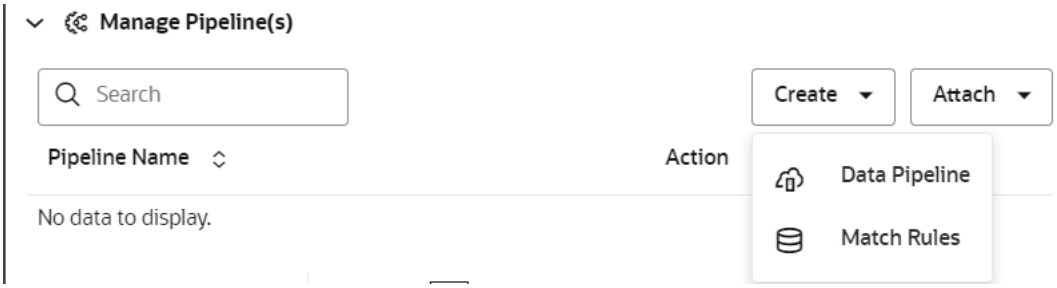
    All the created edge attributes are displayed under this drop-down.

**Figure 19-20 Key Attributes**




13. Under the **Manage Pipeline(s)** group, you can either create a new data pipeline if the edge is coming from source data and Match Rules, if a similarity edge is to be created between nodes or attach the existing pipeline and Match Rules.

**Figure 19-21 Manage Pipeline(s) for Edge**




14. Click **Create** drop-down and then select the Data Pipeline.

    The **Create Pipeline** window is displayed.

**Figure 19-22 Create Pipeline**




15. Select the **Create New Data Pipeline** option and then click **OK**.

    The Pipeline Designer page is displayed.

    - To create a data pipeline, see the Creating a New Data Pipeline section.

    OR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- To clone from an existing data pipeline, see the Cloning from an Existing Data Pipeline section.

> **Note**
>
> Define persist of the Data pipeline of the corresponding edge with the prescript. See the Prescript Condition section for more details.

16. Click **Create** drop-down and then select the **Match Rules** from the Manage Pipeline(s) group.

    The **Create Pipeline** window is displayed.

**Figure 19-23 Create Pipeline**




17. Select the **Create New Match Rule** option and then click **Ok**.

    The Create Match Ruleset window is displayed

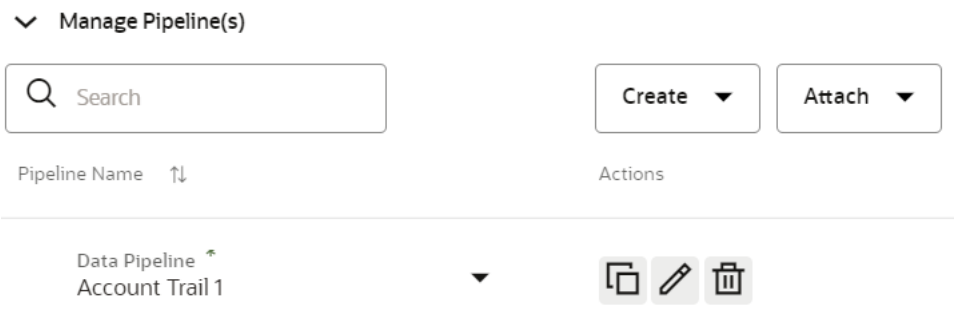
    - To create a Match Rule, see the Creating Match Ruleset section.
      OR
    - To clone from an existing match rule, see the Cloning Ruleset (Match) section.

> **Note**
>
> The newly created data pipeline and match rule are not automatically added to the edge. You must attach using the Attach drop-down option.

By clicking on the **Attach** drop-down, you can add any number of data pipelines/match rules to the Node-based on your requirements.

The selected data pipeline/match rule is displayed.

**Figure 19-24 Create Pipeline**





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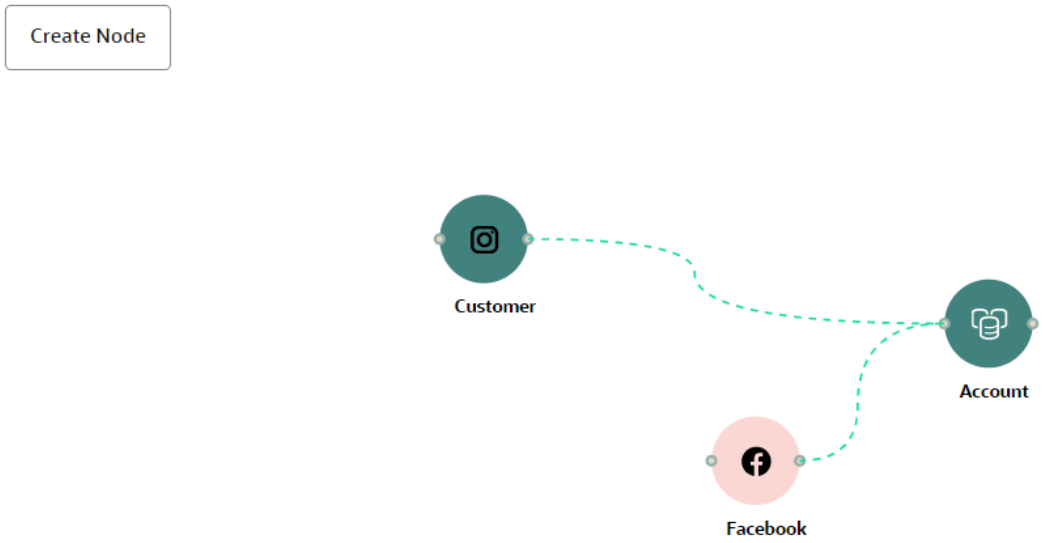
18. Click **OK**.

    An Edge is created between the Customer, Facebook, and Account as shown in the below example.

**Figure 19-25 Graph page**




## Zoom In and Zoom Out

You can zoom in or zoom out of the graph pipeline and view the data pipelines using the diagram present in the bottom right corner of the page.

## Edit a Graph Pipeline

To edit a graph pipeline, perform these steps.

1. In the **Graph Summary**page, select the graph pipeline you want to edit, click the Action icon, and select **Edit**.
2. In the **Graph Name**field, modify the graph pipeline name.

   The name must be unique to a particular workspace.
3. Click the **Setting** icon.
4. In the **Graph Description**field, enter the description for the graph pipeline and click **Save**.

   The following page is displayed.


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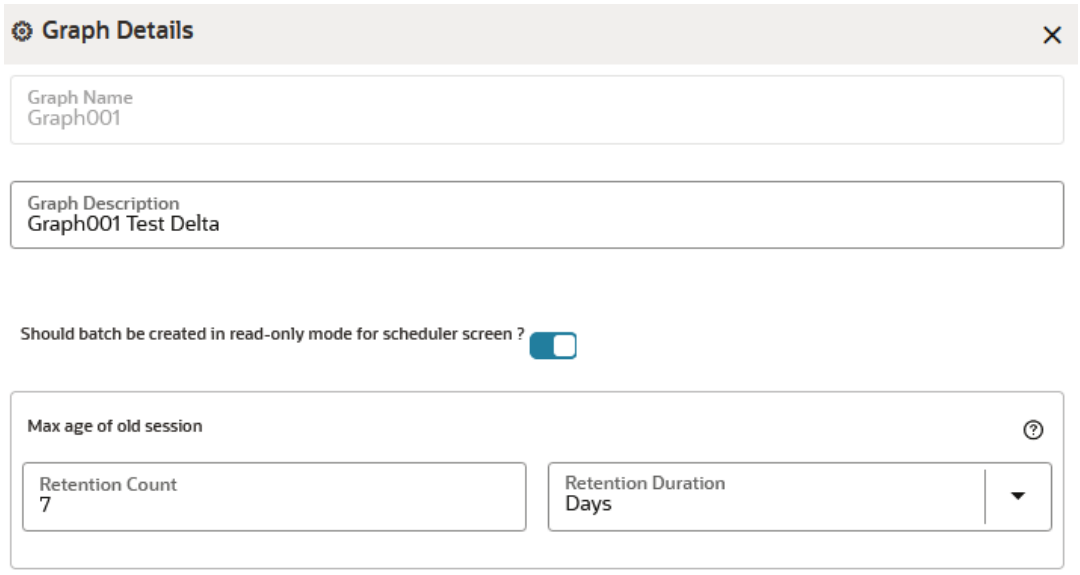
**Figure 19-26 Graph page**




The Maximum Age of Old session for a graph is 7 days by default. The Maximum age of old session of 7 days specifies that graph would be retained for a period of 7 days. You can modify the description and Max Age of Old session by clicking on the **Setting** icon. If you want the batch to be created in read-only mode for scheduler screen, enable the option.

5. Click **Save**.

   The user session of the Graph Pipeline will get refreshed after the set timeline.

## Delete a Graph Pipeline

To delete a graph pipeline:

- On the **Graph Summary**page, select the graph pipeline you want to delete, click the **Action**icon, and select **Delete**.

  To delete multiple graph pipelines, select the graph pipelines which you want to delete and click **Delete** icon in the Header.

## Edit a Node

To edit a node, perform these steps.

1. On the **Graph Summary** page, select the graph pipeline you want to edit, click the **Action** icon, and select **Edit**.
2. Hover over the graph pipeline and click **Edit** icon.

   The **Node Details**page is displayed.


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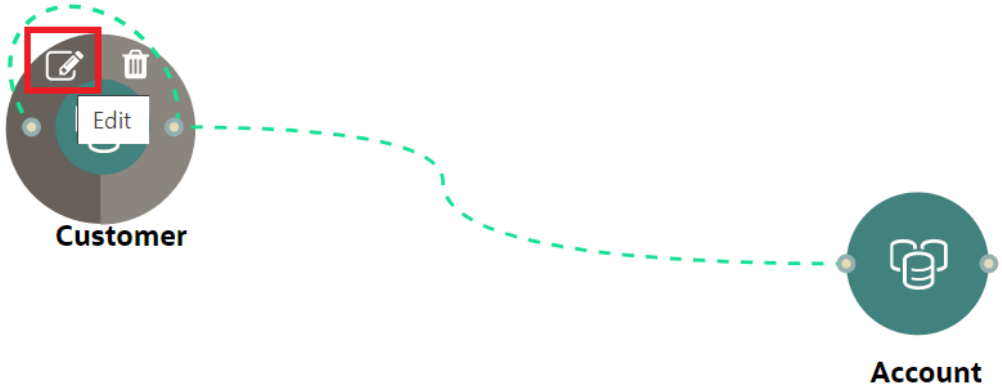
**Figure 19-27 Node Details page**




3. Perform the steps from 3 to 12 in the Creating a Node section.

> **Note**
>
> If you delete any attribute in the Node Modeler Attribute section of the Node Details page, you must delete the same attribute in the match rule details. For example:
>
> If the edge has two match rules and one is attached, and another match rule is not attached to the edge details. You need to remove attributes in both math rules for this case. To remove the deleted attribute from the Node Details page in the unattached match rule, perform the following:
>
> a. Navigate to **Edge Details > Manage Pipeline(s) > Attach**. Attach the new match rule, which is not attached to the node details.
> b. Click **Edit** and delete the attribute in the Ruleset Details, which is removed from the Node Details page.
> c. Click **Save**. The attribute is removed.
> d. Click **Delete** in Manage Pipeline(s) of the Edge Details page to remove the attached match rule.
> e. After saving in the Edge Details page, navigate to the Node Details page and delete the attribute again.
> f. Click **OK**. The attribute is removed from the node.

## Delete a Node

To delete a node:

1. On the **Graph Summary** page, select the graph pipeline you want to edit, click the **Action**icon, and select **Edit**.
2. Hover over the graph pipeline and click **Delete**icon.


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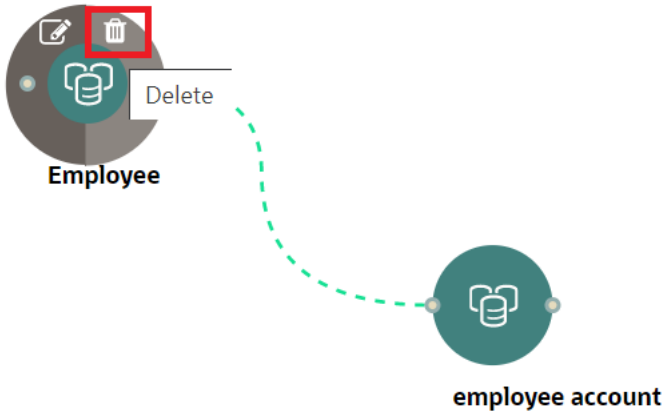
**Figure 19-28 Delete Node**




A confirmation dialog is displayed.

3. Click **Delete**.

   The Node is deleted.

## Schedule Details

> **Note**
>
> Currently, when you execute a Graph pipeline for the first time and navigates to the "Monitor Batch" screen, two "run ids" are generated for that batch.

To create a Graph Refresh Schedule:

1. Click **Launch Workspace** next to the corresponding Workspace to display the **Dashboard** window with application configuration and model creation menu.
2. Click the **Graphs** icon.

   This displays the graph pipeline in a table.
3. Click on the graph for which you want to create refresh schedule.
   - The Graph Model page is displayed.
4. Navigate to **Schedule Details** page and click **Add Schedule**.

   The **Manage Schedule** screen is displayed.


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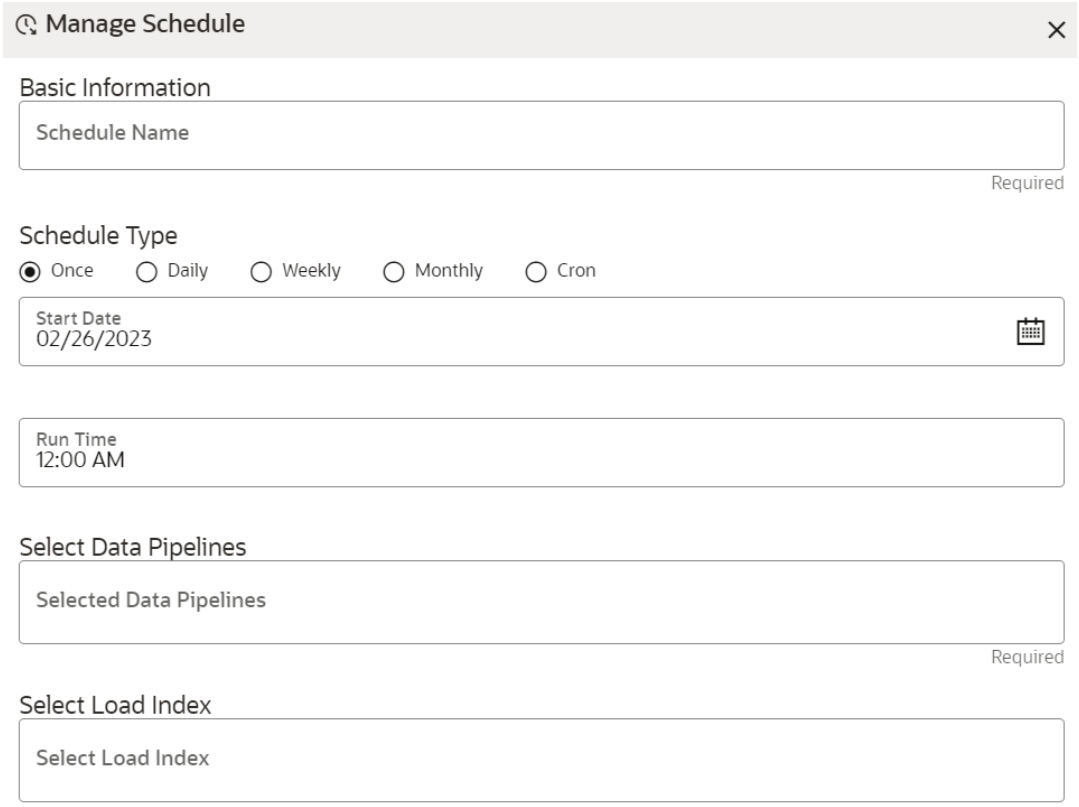
**Figure 19-29 Manage Schedule screen**




5. In the **Schedule Name**, enter the desired name.
6. Select the **Schedule Type** from the options.

   Based on the schedule type, the following input field is displayed.

> **Note**
>
> For more details and expressions of schedule type, click the **help** icon.

7. Click inside the **Select Task** field and select the tasks. You can select multiple tasks.
8. Click **Next** and add the values for the selected task, and the values are mandatory fields.


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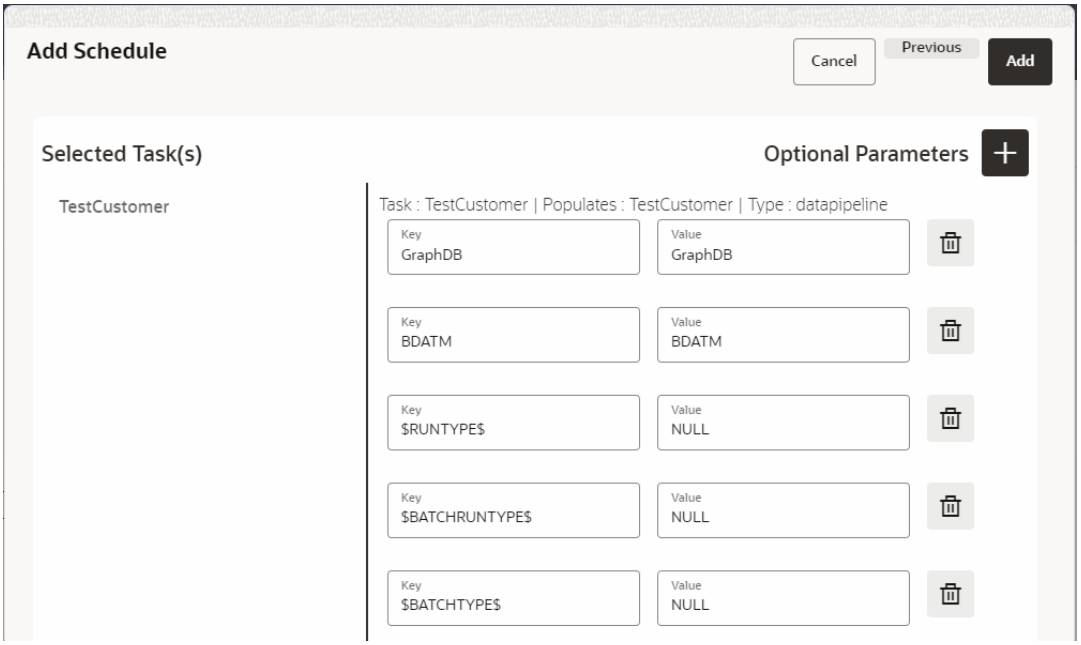
**Figure 19-30 Add Optional Parameters**




9. Click the **+** icon to add optional parameters for the selected task.

   For the Pre-configured Data pipeline, respective Key fields will be displayed. You can configure the respective key-value in the Value field as required and specified in the following table:

**Table 19-2 Optional Parameters for Data Pipeline**

| Name | Description | Default Value |
|---|---|---|
| $GRAPH_SCHEMA | Oracle wallet alias of graph schema.<br>Navigate to <OFS_COMPLIANCE_STUDIO >/wallet/ tnsnames.ora and check the Graph Schema alias name.<br>For example, graph_schema_alias | |
| $BD_SCHEMA | Oracle wallet alias of BD schema.<br>Navigate to <OFS_COMPLIANCE_STUDIO >/wallet/ tnsnames.ora and check the BD Schema alias name.<br>For example, bd_schema_alias | |
| $RUNTYPE$ | Indicates Run type. It can be either a production batch or a test batch.<br>If it is a production batch, set it as PROD and TEST for the test batch. | PROD |


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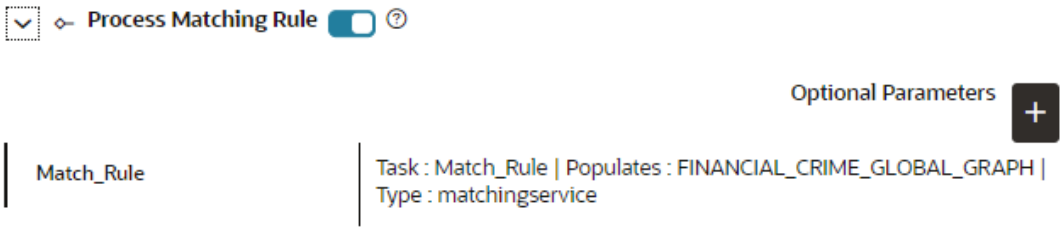
**Table 19-2 (Cont.) Optional Parameters for Data Pipeline**

| Name | Description | Default Value |
|---|---|---|
| $batchRunType$ | Indicates Batch Run type. It can be either run or re-run.<br>If it needs to execute once, set it as RUN and RE-RUN for re-executing after failure. | RUN |
| $BATCHTYPE$ | Indicates the batch type.<br>It should be DATA for the data pipeline task. | DATA |
| $JOBNAME$ | Name of the data pipeline to be executed. | |

10. To add Match Rules, enable the Process Matching Rule option and click + icon to add optional parameters.

    For more information on Match Rule, see the Creating Match Ruleset section.

**Figure 19-31 Process Matching Rule**




For the Pre-configured Match Rules, respective Key fields will be displayed. You can configure the respective key-value in the Value field as required and specified in the following table:

**Table 19-3 Optional Parameter for Match Rules**

| Name | Description | Default Value |
|---|---|---|
| datasource | Oracle wallet alias of graph schema.<br>Navigate to <OFS_COMPLIANCE_STUDIO >/wallet/ tnsnames.ora and check the Graph Schema alias name.<br>For example, graph_schema_alias | - |
| loadType | Execution Load Type. Available types are full and delta.<br>In this release, only the full mode is supported. | full |
| processingGroupName | Logical processing group name for the batch. You should set it as MAN. | MAN |


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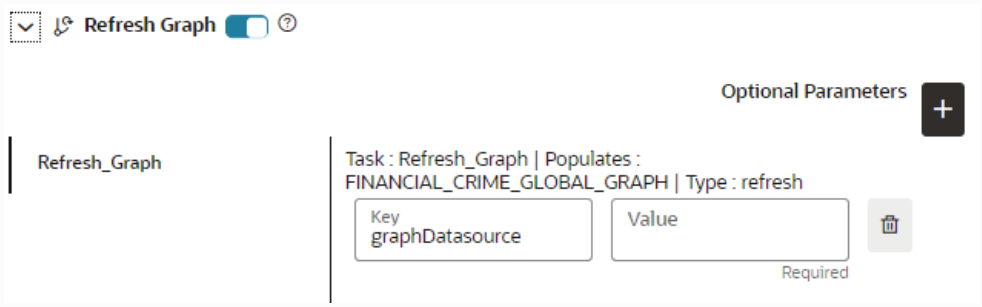
**Table 19-3 (Cont.) Optional Parameter for Match Rules**

| Name | Description | Default Value |
|---|---|---|
| basedOnPipelineId | Match rules can be executed based on pipeline Ids or ruleset Ids.<br>The value should be true while running from the Graph. | true |
| runSkey | A numeric value indicates the runskey of the execution. | 100 |
| runType | Indicates matching job that can be executed as part of graph or Entity Resolution.<br>It should be set as Graph. | graph |

11. Enable the **Refresh Graph** option and click **Add** to refresh the Graph to add optional parameters.

> **Note**
>
> The Key and Value parameters are not required.

**Figure 19-32 Refresh Graph**




> **Note**
>
> If you do not enable the Refresh Graph option, the pipeline will add nodes and edges to the Graph Schema but does not load into PGX.

> **Note**
>
> The user is now able to execute/schedule a batch with SYSDATE-X days functionality.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# Audit History

At any time, you can audit the Graphs from the Audit History page. This page provides the events on the Graph. This shows the information such as, when the Graph was created, who created the Graph and its status, and so on.

The sequence of actions performed on the Graph is listed in the table view and the timeline view (graphical representation).

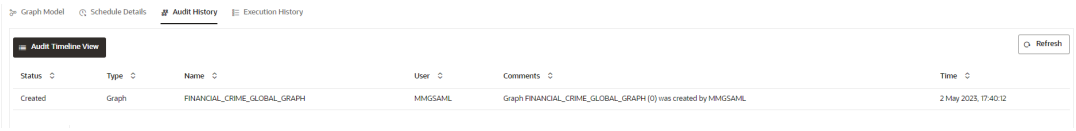
To view the audit history of the Graph, follow these steps:

1. Click **Launch Workspace** next to corresponding Workspace to Launch Workspace to display the **MMG Dashboard** window with application configuration and model creation menu.
2. Click the **Graphs**icon.

   This displays the graph pipeline in a table.
3. Click on the graph for which you want to view the audit history.

   The **Graph Model**page is displayed.
4. Navigate to **Audit History** page to view the details.

**Figure 19-33 Audit History**




Click for **Audit Timeline View** for Timeline View and **Audit Table View** to switch to the regular view. Click to **Refresh**to refresh the Audit History.

**Figure 19-34 Audit History window Timeline View with Horizontal Time Axis**




# Execution History

To view the Graph Execution History:

1. Click **Launch Workspace** next to the corresponding Workspace to display the **Dashboard** window with application configuration and model creation menu.
2. Click the **Graphs** icon.

   This displays the graph pipeline in a table.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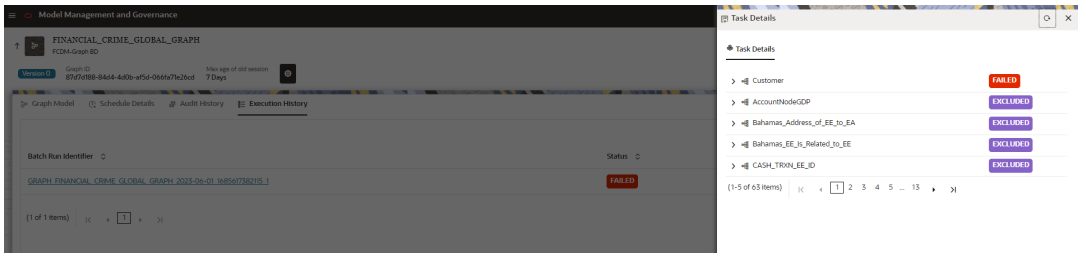
3. Click on the graph for which you want to view the execution history.

   The **Graph Model** page is displayed.

4. Navigate to **Execution History** page to view the details.

   This window displays the details such as Batch Run Identifier, Status, Start and end time of the execution. Click on the Batch Run Identifier to view the individual task details.

**Figure 19-35 Execution History page**




# Analyses

You can analyse, search, add, and delete a notebook from this page.

> **Note**
>
> In the current release, features such as Edit, Clone, and Credential version are not supported.

To analyse the Graph:

1. Click **Launch Workspace** next to the corresponding Workspace to display the **Dashboard** window with application configuration and model creation menu.
2. In the Mega menu, click **Modeling > Graphs**.

   This displays the graph pipeline in a table.

3. Click on the graph for which you want to view the execution history.

   The **Graph Model** page is displayed.

4. Navigate to **Analyses** page to view the details.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# 20
# Scheduler Service and Orchestration

Define batches, batch groups, tasks, dependencies and schedules. Execute, monitor and recover batch operations, manage scheduler configuration and use the scheduler transfer and shell utilities. Model-specific scheduler task inputs are also documented in Chapter 18.

## Chapter contents

20.1 Orchestration 20-2

Source: MMG 26.2.0 User Guide. Procedures, screenshots and examples are incorporated into this STSA 8.1.2.8.0 draft; release-specific statements retain their source status. The complete public API reference for scheduler operations is included in Appendix F.


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# 20.1 Orchestration

Orchestration covers the following:

- **Scheduler Dashboard**: Get an overview of the scheduled tasks and processes.
- **Define Batch**: Manage and configure batch definitions.
- **Define Tasks**: Create tasks, configure parameters, and set execution dependencies within a batch process.
- **Schedule Batch**: Set execution schedules for your batch processes.
- **Monitor Batch**: Track and monitor batch process executions.

# Scheduler Service

The Scheduler Service automates the running of models in the Compliance Studio application.

The Scheduler Service contains a graphical user interface and a single control point for defining and monitoring background executions.

The Scheduler Service is a service in the Infrastructure system that automates behind-the-scenes work that is necessary to sustain various enterprise applications and functionalities. This automation helps the applications to control unattended background jobs.

The Scheduler Service contains a graphical user interface and a single point of control for the definition and monitoring of background executions.

Following are the concepts or terminologies in the Scheduler Service:

- **Batch**: Date and time-based execution of the background tasks based on a defined period during which the resources were available for batch processing.
- **Job**: A batch job is a piece of a program meant to meet specific and business-critical functions. The program is a RESTful API used in a batch.
- **Job Dependency**: When the batch job is submitted, it is moved to the job queue until the system is ready to process. The system process the job based on chronological order or priority in case if more jobs are required to be executed in the job queue.
- **Schedule**: Batch jobs are used to automate the tasks that require to be performed on a regular basis but don’t necessarily need to occur during the day or have an employee interacted with the system are batch schedule. Jobs that happen on a regular basis are incorporated into batch schedules.

## API Endpoints for Export/Import Scheduler Objects

Header Parameters for each API:

- ofs_tenant_id - Tenant ID of the Application
- ofs_service_ID - Service ID of the Application
- ofs_workspace_ID - Workspace ID of the Application


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- ofs_remote_user - Used ID of the User. This parameter should be mapped to proper function.
- Content-Type: application/JSON

1. Batch Export API:
   HTTP Method - GET

   URL - /v1/rest/batch/:code
2. Batch Import API:
   HTTP Method - POST

   URL - /v1/rest/batch

   Request Body:

   ```
   {
   "objectcode": "<<BATCH_NAME>>",
   "objecttype": "BATCH",
   "objectsubtype": "",
   "overwrite": "Y",
   "objectdefinition":""
   }
   ```
3. Batch Group Export API:
   HTTP Method - GET

   URL - v1/rest/batchgroup/:code
4. Batch Group Import API
   HTTP Method:

   POST URL- /v1/rest/BatchGroup

   Request Body:

   ```
   {
   "objectcode": "<<BATCHGROUP_NAME>>",
   "objecttype": "BATCHGROUP",
   "objectsubtype": "",
   "overwrite": "Y",
   "objectdefinition":""
   }
   ```
5. Schedule Export API:
   HTTP Method- GET

   URL- v1/rest/schedule/:code
6. Schedule Import API HTTP Method - POST URL - /v1/rest/schedule
   **Request Body:**

   ```
   {
   "objectcode": "<<SCHEDULE_ID>>",
   "objecttype": "SCHEDULE",
   ```


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```
"objectsubtype": "",
"overwrite": "Y",
"objectdefinition":""
}
```

> **Note**
>
> 1. OverWrite flag can be **Y** or **N**
> 2. Objectdefinition will be obtained in export API same need to be paste during import in request body
> 3. In Schedule Export API code it is Schedule ID.
> 4. During import of schedule dependent batch or if BatchGroup is not migrated, the user have to use batch and BatchGroup import API to migrate updated definition in the Target environment.

# Batch Import Export Utility

This utility is used to export and import batch objects like batch, batchgroups and schedules. This script works in two modes Export and Import. The first parameter of the script decides which mode it is. The Export mode requires exactly five parameters, while the Import mode requires seven parameters. Sequence of the parameters is mentioned below:

**For Batch Export:**

./batch_export_import_utility.sh EXPORT WORKSPACE LOGIN_USER OBJECT_CODE OBJECT_TYPE

**For Batch Import:**

./batch_export_import_utility.sh IMPORT WORKSPACE LOGIN_USER OBJECT_CODE OBJECT_TYPE OVERWRITE FILE_NAME

**Table 20-1 Parameter Description**

| Parameter | Description | Example |
|---|---|---|
| WORKSPACE | Workspace from which/into which the batch object must be exported/imported. | CS |
| LOGIN_USER | Any valid user which has access to the system. | SAUSER |
| OBJECT_CODE | Code of the batch object being exported/imported. If object is of schedule type, please use schedule id instead of code. | BATCH_1 |
| OBJECT_TYPE | Type of the object. e.g., batch, batchgroup, schedule. Must be given in lowercase. | batch |
| OVERWRITE | 'Y' if you want to overwrite existing object while importing, 'N' if you don’t want to. | Y/N |


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**Table 20-1 (Cont.) Parameter Description**

| Parameter | Description | Example |
|---|---|---|
| FILE_NAME | The format is <workspace>/<object_type>/<object_code> | CS_batch_BATCH_1 |

# Scheduler Service Dashboard

1. Click **Launch Workspace** next to corresponding Workspace to display the **Dashboard** window with application configuration and model creation menu.
2. In the LHS menu, click **Scheduler Service**.

   This displays the executed runs in a table.

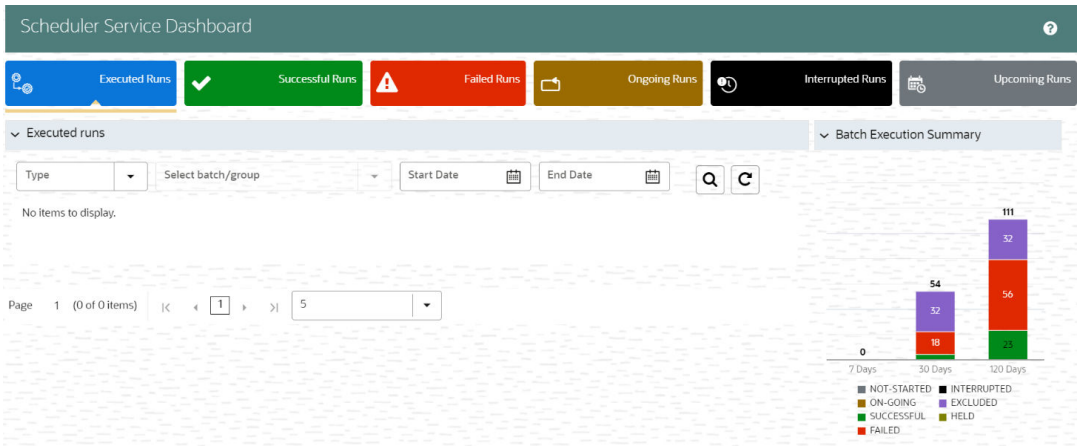
   To view the demonstration of the Dashboard window, see the Scheduler Service Introduction video.

   In the Scheduler Service window, you can view the following details:

   - The Executed Runs, Successful Runs, Failed Runs, Ongoing Runs, Interrupted Runs, and Upcoming Runs tabs. You can click the tabs to view the details of the Batches based on their status. For example, click **Ongoing Runs** to view the details of the batches that are currently running.
   - The Batches that were executed within the last 7 or 30 days contain details such as Batch Name, Batch Run ID, and Run Time. Click **30 days** to view the batches that were executed within the last 30 days.
   - The **Batch Execution Summary** pane displays the count of total batches executed that were executed within the last 7 days, 30 days, and 120 days. Additionally, you can see the separate count of successful batches, failed batches, interrupted batches, on-going batches, and the batches which are yet to start, by hovering your mouse over the batches.

   You can filter the executed runs based on Batch type, Batch/ group, start date and end date by selecting the corresponding options.

**Figure 20-1 Scheduler Service Dashboard**




On the **Scheduler Service** window, you can see: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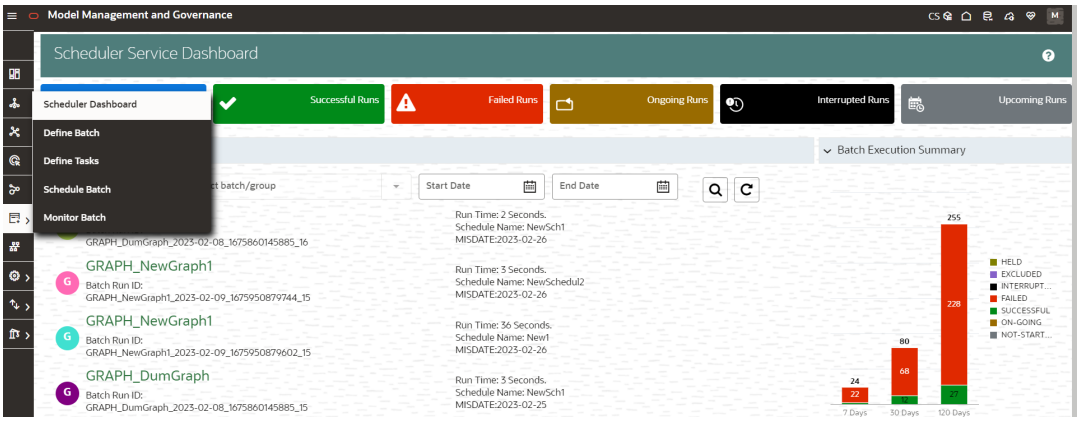
- Menu Navigation: Shows the menu options available in Scheduler Service.
- Quick Actions: Quick actions can be performed by using the buttons in this section.
- User Details: View the logged in user's details, help, and set your profile preferences.

**Figure 20-2 Header Details**




On the left side of the window, click the **Scheduler Service** icon to see available options in the Scheduler Service.

# Configure Batch and Batch Groups

This section describes about Configure Batch and Batch Groups.

## Create a Batch

The **Define Batch** window displays the details of an existing batches such as Batch ID, Batch Name, Batch Description, Last Modified By and Last Modified Date. You can create, edit, copy, and delete batches. You can also create a Batch Group, a list of batches that you have selected and grouped, and execute it.

To create a new batch and schedule and monitor the batch that you create:

1. Click **Define Batch** from the Header in the Dashboard window. After selecting the batch, click corresponding to the batch to proceed to create or edit tasks.
2. In the Define Batch window, click **Add**.

   The **Create a New Batch** window is displayed.
3. Specify the details as described in the following table.


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**Table 20-2 Fields in the Create a New Batch window and their Description**

| Field | Description |
|---|---|
| Batch Name | The Batch Name is generated based on the values provided by you.<br>**NOTE**:<br>• The Batch Name should be unique across the Information Domain.<br>• The Batch Name must be alphanumeric and should not start with a number.<br>• The Batch Name should not exceed 60 characters in length.<br>• The Batch Name should not contain any special characters except "_". |
| Batch Description | Enter a description for the Batch based on the Batch Name.<br>**NOTE**: The Batch description should be alphanumeric. The allowed special characters are: and <blank space>, along with spaces and alpha-numeric. It should not exceed 200 characters in length. |
| Service URL Name/ Service URL<br>Notify on Mail | • Select the Service URL name from the drop-down list, if it is available. The Service URL is displayed in the Service URL field.<br>• To add a new service URL, enter a name to identify it in the Service URL Name field and enter the proper URL in the Service URL field. You can give partial URL here and the remaining URL in the Task Service URL.<br>Choose this option to notify by an e-mail the batch execution status depending on the property selected. E-mail for the email notification is fetched from the IDCS configuration for the logged-in user.<br>**NOTE**: E-mail is a mandatory field in IDCS.<br>The BATCH_NOTIFY_FUNCT function has to be enabled to access this feature.<br>If it is not available for the logged-in user, this field is grayed out.<br>– Every Time: An e-mail is triggered irrespective of the batch status.<br>– Never: No e-mail will be triggered.<br>– On Error only: An e-mail is triggered only when the batch execution has failed/Error.<br>– On Interrupt only: An e-mail is triggered if the batch is successfully interrupted.<br>**NOTE**: **Never** is the default option. |

4. Click **Save**.

   The new Batch is created and displayed in the **Define Batch**window.

## Manage Batch

You can manage a batch by editing, copying, or delete them as required.

- **Edit**: Use the **Edit Batch** icon to edit the Batch Description, Service URL Name, Service URL. You can also add a new batch parameter. You cannot edit seeded batches.
- **Copy**: Use the **Copy Batch** option to copy a Batch that you want to clone or create instances in the system from the **Define Batch** window.


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- **Delete**: Use the **Delete** icon to delete a Batch that is no longer required in the system. You cannot delete seeded batches.

## Create a Batch Group

You can create a new batch group in the Define Batch window and schedule and monitor the batch group that you created.

To create a new Batch Group:

1. In the **Define Batch** window, click **Add**.

   The **Create a New Batch** window is displayed.

2. Select **Batch Group** option.
3. Specify the following fields:
   - Name
   - Description
   - Add Batches: This is a multi-select field. You can select the batches that you want to add to the group using this field.
   - Notify on mail

   > **Note**
   >
   > The Add Batches is a multi-select field, you can select the batches that you want to add to the group using this field.

   Choose the desired option to notify by an e-mail the batch execution status depending on the property selected. E-mail for the email notification is fetched from the IDCS configuration for the logged in user.

   > **Note**
   >
   > E-mail is a mandatory field in IDCS.

   The BATCH_NOTIFY_FUNCT function must be enabled to access this feature.

   If it is not available for the logged in user, this field is grayed out.

   - Every Time: An e-mail is triggered irrespective of the batch status.
   - Never: No e-mail will be triggered.
   - On Error only: An e-mail is triggered only when the batch execution has failed/Error.
   - On Interrupt only: An e-mail is triggered if the batch is successfully interrupted.

   > **Note**
   >
   > Never is the default option.

4. Click **Save**.

   The new Batch Group is created and displayed in the **Define Batch** window.


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## Manage Batch Group

You can manage a batch group by editing, copying, or delete them as required.

- **Edit**: Use the edit icon to edit the Batch Group name, Added Batches, and Batch Group Description.
- **Copy**: Use the copy option to copy a batch group that you want to clone or create instances in the system.
- **Delete**: Use the delete icon to delete a batch group that is no longer required in the system.

## Define Batch

The Define Batch window displays the details of all existing Batch like Batch ID, Batch Name, Batch Description, Last Modified By and Last Modified Date. This window allows you to create a new, edit, copy, and delete the batches. You can also create a Batch Group and execute the Batch Group which has the list of batches that you have selected and grouped.

To navigate to the Define Batch window, click Define Batch option from the Header in the Dashboard window. After selecting the batch, you can select the **Monitor** icon corresponding to the batch to proceed to create or edit tasks.

### Batch

Batch is a process of execution of the Date and time-based background tasks based on a defined period during which the resources were available for batch processing.

### Edit a Batch

The **Edit Batch** option allows you to edit the Batch details such as Batch Description, Service URL Name and Service URL and also add a new Batch Parameter.

> **Note**
>
> Seeded batches cannot be edited.

To modify a Batch, perform the following steps:

1. In the Define Batch window, click **Edit** corresponding to the Batch you want to modify.

   The **Edit Batch** window is displayed.
2. Modify the required Batch details.

   For more information, see Create a Batch section.
3. Click **Save**.

   The edited batch is saved and displayed in the Define Batch window.

### Copy a Batch

The **Copy Batch** option allows you to copy a Batch that you want to clone or create instances in the system from the **Define Batch** window.

To copy a Batch, perform the following steps:


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1. In the **Define Batch** window, click **Copy Batch** corresponding to the Batch that you want to copy.

   The **Copy Batch** window is displayed.
2. Specify the Batch details as you want to clone and copy the existing batch.

   For more information, see Create a Batch section.
3. Click **Save**.

   The copied batch is saved and displayed in the **Define Batch** window.

## Delete a Batch

The Delete Batch option allows you to delete a Batch that are no longer required in the system from the Define Batch window.

> **Note**
>
> Seeded batches cannot be deleted.

To delete a Batch, perform the following steps:

1. From the **Define Batch** window, click **Delete** corresponding to the Batch you want to delete.
2. Click **OK** in the confirmation dialog to confirm deletion.

   If the batch has any active schedules a warning is displayed.

   Upon confirmation, all schedules of the batch are also deleted.

# Batch Group

Batch Group is a process of grouping the batches that are required to be execute together for execution of the Date and time-based background tasks based on a defined period during which the resources were available for batch processing.

## Edit a Batch Group

The **Edit Batch Group** option allows you to edit the Batch Group details such as Batch Group name, Added Batches, and Batch Group Description.

To modify a Batch Group, perform the following steps:

1. In the **Define Batch** window, click **Batch Group** option to list the batch groups.
2. Click **Edit** corresponding to the Batch Group you want to modify.

   The **Edit Batch** window is displayed.
3. Modify the required Batch Group details.

   For more information, see Create a Batch Group section.
4. Click **Save**.

   The edited batch group is saved and displayed in the **Define Batch** window.


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### Copy a Batch Group

The **Copy Batch** option allows you to copy a Batch that you want to clone or create instances in the system from the Define Batch window.

To copy a Batch Group, perform the following steps:

1. In the **Define Batch** window, click Batch Group option to list the batch groups.
2. Click **Copy Batch** corresponding to the Batch Group that you want to copy.

   The Copy Batch window is displayed.
3. Specify the Batch Details as you want to clone and copy the existing batch.

   For more information, see Create a Batch Group section.
4. Click **Save**.

   The copied batch group is saved and displayed in the **Define Batch** window.

### Delete a Batch Group

The **Delete Batch** option allows you to delete a Batch that are no longer required in the system from the **Define Batch** window.

To delete a Batch Group, perform the following steps:

1. From the **Define Batch** window, click **Batch Group** option to list the batch groups.
2. Click **Delete** corresponding to the Batch Group you want to delete.
3. Click **OK** in the confirmation dialog to confirm deletion.

## Define Tasks

The **Define Tasks** window displays the list of tasks associated with a specific Batch definition. You can create new tasks, edit the existing tasks or delete unwanted tasks. Additionally, you can specify task precedence for each task in Task Precedence window and click the Schedule icon to Schedule the batch.

The **Define Tasks** window allows you to perform the following task operations for your batch and batch group:

- Batch
- Batch Group

### Batch

Batch is a process of execution of the Date and time-based background tasks based on a defined period during which the resources were available for batch processing. You can perform the following operation for the batch based on the task.

- Add a Task
- Modify a Task
- Define Task Precedence
- Delete a Task


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## Modify a Task

Modifying a task option allows you to modify the details of existing tasks of a Batch definition such as Task Description, Task Type, Batch Service URL and Task Service URL. You can also add a new task parameter and enable or disable already existing task parameters.

To modify a Task, perform the following steps:

1. From the **Define Task** window, select the Batch whose task details you want to modify, from the **Select** drop-down list.
2. Click **Edit** corresponding to the Task whose details you want to modify.

   The **Edit Task** window is displayed.
3. Modify the required Task Details.

   For more information, see Add a Task section.
4. Click **Save**.

## Delete a Task

You can remove a task from a Batch definition which are no longer required in the system by deleting it from the **Define Task** window.

To delete a Task, perform the following steps:

1. From the **Define Task** window, select the Batch whose task details you want to delete from the **Select** drop-down list.
2. Click **Delete** corresponding to the Task you want to delete.
3. Click **OK** in the confirmation dialog to confirm deletion.

## Batch Group

Batch Group is a process of grouping the batches that are required to be execute together for execution of the Date and time-based background tasks based on a defined period during which the resources were available for batch processing. You can perform the following operation for the batch based on the task.

- Define Task Precedence

## Define Task Precedence

Task Precedence indicates the execution-flow of a Batch. Task Precedence value facilitates you to determine the order in which the specific Tasks of a Batch are executed.

For example, consider a Batch consisting of 4 Task. The first 3 Task does not have a precedence defined and hence will be executed simultaneously during the Batch execution. But, Task 4 has a precedence value as task 1 which indicates that, Task 4 is executed only after Task 1 has been successfully executed.

You can set Task precedence between Tasks or define to run a Task after a set of other tasks. However, multiple tasks can be executed simultaneously, and cyclical execution of tasks is not permitted. If the precedence for a Task is not set, the Task is executed immediately on Batch execution.

To define the task precedence in the Define Task window, perform the following steps:

1. Click the **Menu** button corresponding to the task for which you want to add precedence task.


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The **Task Precedence Mapping** window is displayed.

The Task Precedence option is disabled if a batch has only one task associated.

a. Select the batch that you want to execute before the current task, from the Available Tasks pane and click **Move**. You can press Ctrl key for multiple selections.

b. To select all the listed batches, click **Move All**.

c. To remove a batch, select the task from the Selected Tasks pane and click **Remove**.

d. To remove all the selected batches, click **Remove All**.

2. Click **Save** to update Task Precedence in the batches.

3. Click **Preview** to view the Precedence information.

# Configure Tasks

The **Define Tasks** window displays the list of tasks associated with a specific Batch definition. You can create new tasks, edit existing tasks, or delete unwanted tasks. Additionally, you can specify task precedence for each task in the Task Precedence window and schedule the batch.

Use the **Define Tasks** window to perform task operations for your batch and batch group.

## Add Task to a Batch or Batch Group

You can add new tasks to a selected Batch or Batch Group definition.

To add new task:

1. Click **Define Tasks** from the Header panel.

   The **Define Task** window is displayed.

2. Select the Batch or Batch Group for which you want to add new task from the Select drop-down list.

3. Click **Add**.

   The **Create a New Task** window is displayed.

   When creating a task, there are multiple types of components to choose from:

   **Model**

   - **Model**: Select the Model of selected Objective. It can be any specific model of Objective or All models of Objective. If the ALL_CHAMPION is selected here, then Objectives with no Champion Model is skipped, and the Objectives with Champion Models gets executed. If CHAMPION is selected, and no Champion is present, then Model Execution gets fail.
   - **Objective**: Select the Object which you want to use for execution. For more information, see the Create Objective (Folders) section. The Sub Objective is displayed with path. For example, if Test1 is Objective and Test11 is Sub Objective, and you want to use Test11 Objective for execution, then select this field as Test1/Test11.
   - **Link Types**: You can set this parameter to **Yes** or **No**. If Synchronous Execution is set to **Yes**, then execution will wait for the notebook execution status. If Synchronous Execution is set to **No**, then execution will not wait for the notebook execution status, it will trigger the notebook and update task status as successful in batch monitor.
   - **Synchronous Executions**: You can set this parameter to **Yes** or **No**. If Synchronous Execution is set to **Yes**, then execution will wait for the notebook execution status. If


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Synchronous Execution is set to **No**, then execution will not wait for the notebook execution status, it will trigger the notebook and update task status as successful in batch monitor.

- **Optional Parameters**: This is used pass the parameters dynamically.

**Populate Workspace**

- **Global Filter**: Provided input will be applied as a data filter on all the tables selected for data sourcing.
- **Table Filter**: Users can provide data filters individually on the tables here. Please note that you may provide multiple table names for the same SQL filter. Global Filters will not be applicable for those tables on which filters have been applied individually. In case the same table name is provided in more than one rows here, the filter condition will be generated as a conjunction of all the provided filters.
- **Additional Parameters**: Additional parameters include source/target pre-scripts, fetch size, and commit size to optimize data processing and control execution behavior.

4. Enter the details as given here:

**Table 20-3 Fields in the Create a New Task window and their Description**

| Field | Description |
|---|---|
| Task Name | Enter the task name.<br>**NOTE:**<br>• The Task Name must be alphanumeric and should not start with a number.<br>• The Task Name should not exceed 60 characters in length.<br>• The Task Name should not contain any special characters except underscore (_). |
| Task Description | • Enter the task description along with spaces and alpha-numeric. No special characters are allowed in Task Description.<br>• Words like Select From or Delete From should not be entered in the Description. |
| Task Type | Select the task type from the drop-down list:<br>**Rest**: Used to invoke RESTful APIs. Only POST method is supported commonly used to trigger downstream services (For example: models, graphs and so on) or workflows.<br>**Executable**: Used to run shell scripts (.sh) or other system-level executables. |
| Batch Service URL | Select the required Batch Service URL from the drop-down list. This can be blank, and you can provide the full URL in the Task Service URL field.<br>**WORKSPACE_URL**: Seeded batch URL base endpoint of the batch service responsible for managing and orchestrating batch or batch group executions related to workspace APIs.<br>**MMG_SERVICE_URL**: Seeded batch URL base endpoint of the batch service responsible for managing and orchestrating batch or batch group executions related to MMG APIs (For example: Model Execution).<br>**CS_SERVICE_URL**: Seeded batch URL base endpoint of the batch service responsible for managing and orchestrating Batch or Batch Group executions related to CS APIs. |


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**Table 20-3 (Cont.) Fields in the Create a New Task window and their Description**

| Field | Description |
|---|---|
| Component | These are preceded metadata types, which can be executed through Scheduler. The user is allowed to select the required components with regards to the select Bacth URL, or the user can create their own CUSTOM URLs by selecting the CUSTOM component. |
| Task Service URL | Enter task service URL if it is different from Batch or Batch Group Service URL.<br>**Batch URL**: This is the base endpoint of the batch service responsible for managing and orchestrating batch or batch group executions. Users can append the task end points in the Define Task. There is nothing as Batch group service URL.<br>**Task Service URL**: This is the endpoint for executing individual tasks (For example, REST calls). Users can either provide an end point path to be appended to the Batch URL provided in the batch definition or specify a full REST URL for independent execution. |

5. From the Task Parameters pane, click **Add** to add a new Task Parameter. By default, all Batch level parameters are added and enabled as task parameters. To disable, deselect the check box corresponding to the task parameter ( )
   a. Enter the Parameter name in the **Param Name** field.
   b. Enter the Parameter value in the **Param Value** field.
   You can delete a parameter by clicking **Delete** corresponding to the parameter.
6. Click **Save**.

> **Note**
>
> **Header Parameter**: This parameters are passed in the request header of the execution API to provide metadata like workspace, service ID and so on.

## Manage Tasks

You can manage tasks by modifying or deleting tasks and also define task precedence.

- **Modify**: Use the edit icon to modify details of existing tasks of a Batch definition such as Task Description, Task Type, Batch Service URL, and Task Service URL. You can also add a new task parameter and enable or disable existing task parameters.
- **Delete**: Use the delete icon to remove a task from a Batch definition from the Define Task window.
- **Define Task Precedence**: Task Precedence specifies the execution-flow of a Batch. Task Precedence value facilitates you to determine the order in which the tasks of a Batch are executed.

For example, consider a Batch consisting of 4 tasks. The first 3 tasks do not have a precedence defined and hence will be executed simultaneously during the Batch execution. But, task 4 has a precedence value as task 1 which indicates that, task 4 is executed only after task 1 has been successfully executed.

You can set Task precedence between Tasks or define to run a Task after a set of other tasks. However, multiple tasks can be executed simultaneously; cyclical execution of tasks is not permitted. If the precedence for a task is not set, the task is executed immediately on execution of the Batch.


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To define the task precedence in the Define Task window:

1. Click **Menu** button corresponding to the task for which you want to add a precedence task.

   The **Task Precedence Mapping** window is displayed.

   > **Note**
   >
   > The Task Precedence option is disabled if a batch has only one task associated.
   >
   > a. Select one or multiple tasks you want to execute before the current task, from the **Available Tasks** pane and click >. Press Ctrl key to select multiple items.

2. Click **Save**.
3. Click **Preview** to view the precedence information.

## Define Task Precedence

Task Precedence specifies the execution-flow of a Batch. Task Precedence value facilitates you to determine the order in which the specific Tasks of a Batch are executed.

For example, consider a Batch consisting of 4 Task. The first 3 Task does not have a precedence defined and hence will be executed simultaneously during the Batch execution. But, Task 4 has a precedence value as task 1 which indicates that, Task 4 is executed only after Task 1 has been successfully executed.

You can set Task precedence between Tasks or define to run a Task after a set of other tasks. However, multiple tasks can be executed simultaneously, and cyclical execution of tasks is not permitted. If the precedence for a Task is not set, the Task is executed immediately on Batch execution.

To define the task precedence in the Define Task window:

1. Click the **Menu** button corresponding to the task for which you want to add precedence task.

   The **Task Precedence Mapping** window is displayed.

   > **Note**
   >
   > The Task Precedence option is disabled if a batch has only one task associated.

   a. Select the Task you want to execute before the current task, from the **Available Tasks** pane and click **Move**. You can press Ctrl key for multiple selections.
   b. To select all the listed Tasks, click **Move All**.
   c. To remove a Task, select the task from the Selected Tasks pane and click **Remove**.
   d. To remove all the selected Tasks, click **Remove All**.

2. Click **Save** to update Task Precedence.
3. Click **Preview** to view the Precedence information.


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## Exclude or Include Tasks

You can exclude tasks or include the excluded tasks during Batch Group Execution. The excluded task components are therefore executed in the normal process assuming that the excluded task have completed execution.

To exclude/include tasks, perform the following steps:

1. In the **Schedule Batch** window, click **Exclude Tasks**.

   The **Select Tasks** window is displayed.

2. To exclude tasks:

   a. Select the required task from the **Included Tasks** list and click **Move**. You can press Ctrl key for multiple selections.

   b. To exclude all tasks, click **Move All**.

3. To include the excluded tasks:

   a. Select the required task from the **Excluded Tasks** list and click **Remove**. You can press Ctrl key for multiple selections.

   b. To include all excluded tasks, click **Remove All**.

4. Click **Save**.

# Schedule Batch or Batch Group

Use the *Schedule Batch / Batch Group* feature to run, schedule, re-start, re-run batches in the Scheduler Service. After you upload the data in the required format into Object Storage, you must load the data into the system using the Scheduler Service. You can schedule them to run in a required pattern and view the run time status of the scheduled services using the Monitor Batch feature.

You can perform operations on batches and batch groups. Information in the following sections is applicable to both batches and batch groups. Where there are unique instructions for batches or batch groups, they are called out clearly.

The Scheduler UI displays the configured timezone and its display name across all batch scheduling screens. UTC (Coordinated Universal Time) is the default timezone. For the list of supported timezones, see the List of Supported Timezones topic.

## Execute a Batch/Batch Group

Use the Execute batch option to run a batch/batch group instantaneously.

To execute a batch:

1. Click **Schedule Batch**from the Header panel.

   The **Schedule**window is displayed.

2. Select the Batch Name from the **Select Name** drop down menu.

   For example, AMLDataLoad.

   You can preview the schedule of a Batch/Batch Group by clicking on Preview button.

3. Click **Execute**.

   The Execution Status Dialog Box is displayed with the Batch executed successfully message.


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This indicates the unique identification reference number for the batch and date of the batch execution.

4. In the **Execution Status** Dialog Box, click **Monitor** to monitor the batch.
5. If you want to exclude/include some tasks, click **Exclude Tasks**.

   For more information, see Exclude/Include Tasks section.
6. If you want to hold/release some tasks, click **Hold Tasks**.

   For more information, see Hold/Release Tasks section.
7. If you want to edit the dynamic parameters of the batch, click **Edit Dynamic Parameters** .

   For more information, see Edit Dynamic Parameters section.

## Schedule a Batch/Batch Group

You can schedule a Batch to run just for Once, Daily, Weekly, Monthly or a Cron Expression for scheduling the batches. You can also have a user defined schedule to schedule and run a batch/batch group.

### Schedule Once

To schedule a Batch to run once:

1. Click **Schedule Batch** from the Header panel.

   The **Schedule Batch** window is displayed.
2. In the Schedule Batch window, click **Once**.
3. Select the Batch or Batch Name you want to schedule for once from the **Select** list.
4. Enter a **Schedule Name**.
5. Click the date and time picker icons and select the date and time when you want to run the batch.
6. Click **Schedule**.

### Schedule Daily

To schedule a Batch to run daily:

1. In the **Schedule Batch** window, click **Daily**.
2. Select the Batch or Batch Name you want to schedule daily from the **Select** list.
3. Enter a **Schedule Name**.
4. Click the date and time picker icons and select the date and time when you want to run the batch.
5. Click **Schedule**.

### Schedule Weekly

To schedule a Batch to run weekly:

1. In the **Schedule Batch** window, click **Weekly**.
2. Select the batch or batch name you want to schedule weekly from the **Select** list.
3. Enter a **Schedule** Name.


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4. Click the date and time picker icons to select the start date, end date, and time when you want to run the batch.
5. Select the days of the week when you want to run the batch from the **Select Days of the Week** list.
6. Click **Schedule**.

## Schedule Monthly

To schedule a Batch to run monthly:

1. In the **Schedule Batch**window, click **Monthly**.
2. Select the Batch or Batch Name you want to schedule monthly from the Select list.
3. Enter a **Schedule** Name.
4. Click the date and time picker icons to select the start date, end date, and time when you want to run the batch.
5. Select the days of the week when you want to run the batch from the **Select Days of the Week** list.
6. Click **Schedule**.

## Schedule Cron Expression

To run a Batch in a user-defined schedule, you can have custom schedule with the help of Cron Expression. A Cron Expression is a string comprised of 6 or 7 fields separated by white space. Fields can contain any of the allowed values, along with various combinations of the allowed special characters for that field. For more information, click the information icon.

To create a customized schedule for a batch using a Cron Expression:

1. In the **Schedule Batch**window, click **Cron Expression**.
2. Select the batch or batch name you want to schedule from the Select list.
3. Enter a **Schedule Name**.
4. Enter the Cron Expression for your schedule. For more information about the Cron Expression, click the **Information**icon.
5. Click **Schedule**.

## Pause a Batch

You can pause a batch that has been executed. User can click on pause button and can pause schedule for between scheduled dates. Time is not supported for pause activity, if any schedule is paused for current date, it will be paused immediately. If pause start date is passed, user cannot change pause start date, rest fields can be manipulated and will be valid one minute before end of day.

If pause is expired, user cannot edit and delete but will be shown in UI.

To pause a batch:

1. From the Header panel, click **Schedule Batch** and then click the **Schedule** tab.
2. Select the batch you want to pause from the list.
3. For the batch you have selected to pause, select the scheduling type (Once, Daily, Weekly, Monthly, or Cron Expression).


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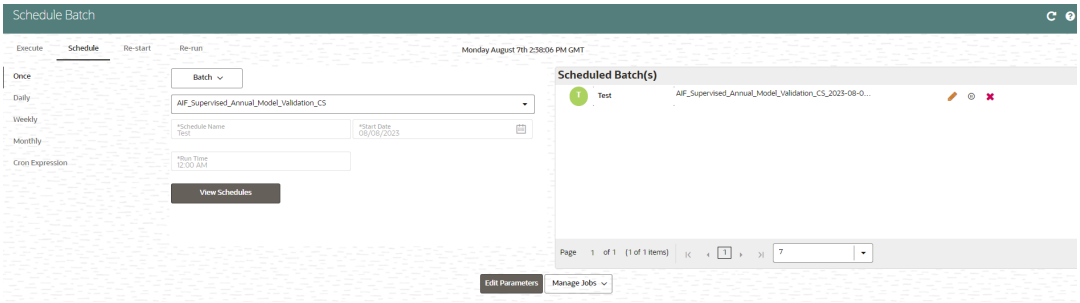
4. Click **View Schedules**.

   The scheduled batches are displayed on the right pane.

**Figure 20-3 Scheduled Batches**




5. Click the pause icon for the batch you want to pause.
6. In the **Manage Pause** screen, click **Add Pause**.
7. Select the **Pause Start** and **End Date**, add comments if required, and click +.

   The Pausing schedule appears in the Pause Summary.
8. Repeat the steps if you want to add multiple pausing schedules for the same batch.

## Re-start a Batch/Batch Group

You can restart a Batch which has not been executed successfully or which has been explicitly interrupted, or cancelled, or put on hold during the execution process. By restarting a Batch, you can continue Batch execution directly from the point of interruption or failure and complete executing the remaining tasks.

To re-start a batch:

1. Click **Schedule Batch**from the Header panel.

   The **Schedule** window is displayed.
2. From the **Schedule** window, select **Re-start** tab.
3. Select the Batch Group you want to re-start from the Select Name drop down menu.
4. Select the Batch Run ID.
5. Click **Re-start**.

## Re-run a Batch/Batch Group

You can re-run a Batch which has previously been executed. Rerun Batch facilitates you to run the Batch irrespective of the previous execution state. A new Batch Run ID is generated during the Rerun process and the Batch is executed as similar to the new Batch Run.

To re-run a batch:

1. Click **Schedule Batch** from the Header panel.

   The **Schedule Batch** window is displayed.
2. In the **Schedule Batch** window, select **Re-run** tab.
3. Select the Batch or Batch Name you want to re-run from the **Select Name** list.
4. Select the **Batch Run ID**.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5. Click **Re-run**.

## Edit Dynamic Parameters

Dynamic Parameters facilitate modification of dynamic parameters for the batch. You can change the param value and save the changes to the batch. The **Edit Dynamic Parameters** option is available in all the tab in the *Schedule Batch* window.

To edit the dynamic parameters for a batch/batch group:

1. In the **Schedule Batch** window, click **Edit Dynamic Parameters**.
2. In the **Edit Dynamic Params** window, modify the values as required.
3. Use the **SYSDATE-x** option to reference relative dates execute or schedule a batch. In the **Edit Dynamic Parameter** window, enter a value, for example; *SYSDATE-2*, to represent two days before the execution date/time. You must ensure that the value for *x* is a non-negative integer
4. Click **Save**.

   The modified parameters are applied to the Batch.

## Task Definitions of a Batch/Batch Group

You can modify the task definition state in the Batch Execution window to exclude or hold the defined task in a Batch from execution. The excluded tasks are therefore assumed to have completed execution and get excluded during the Batch Run.

While executing or scheduling a batch group from the Schedule Batch window, you can:

- Exclude a task or include the excluded task.
- Hold a task or release the held task.

## Exclude or Include Tasks

You can exclude tasks or include the excluded tasks during Batch/Batch Group Execution. The excluded task components are executed in the normal process assuming that the excluded tasks have completed execution.

To exclude/include tasks:

1. In the **Schedule Batch** window, click **Exclude Tasks**.

   The **Select Tasks** window is displayed.
2. To exclude tasks:
   a. Select one or multiple tasks from the Included Tasks list and click > or >> respectively. Press the Ctrl key and click to select multiple items.
3. To include the excluded tasks:
   a. Select one or multiple tasks from the **Excluded Tasks** list and click < or << respectively. Press the Ctrl key and click to select multiple items.
4. Click **Save**.

## Hold or Release Tasks

You can hold tasks or release the held tasks during Batch Group Execution. The tasks which are on hold along with the defined components are skipped during execution. However, at least one task should be available in a Batch without being held or excluded for Batch execution.


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To hold/release tasks:

1. In the **Schedule Batch** window, click **Hold Tasks**.

   The **Select Tasks** window is displayed.

2. To hold tasks:

   a. Select the required task from the **Released Tasks** list and click **Move**. You can press Ctrl key for multiple selections.

   b. To hold all tasks, click **Move All**.

3. To release held tasks:

   a. Select the required task from the **Held Tasks** list and click **Remove**. You can press Ctrl key for multiple selections.

   b. To release all held tasks, click **Remove All**.

4. Click **Save**.

## Pre-Conditions for a Batch Group

You can schedule the batches and set the pre-conditions within a Batch group with frequency as Weekly, Monthly, or based on an Interval for scheduling the batches. The batch that satisfies the configured pre-conditions are executed as part of the schedule.

> **Note**
>
> Pre-Conditions can only be applied when using the Schedule option in the Schedule Batch window.

### Weekly

To set the pre-conditions to the batches in a batch group weekly, perform the following steps:

1. In the **Schedule Batch** window, you can select either Once, Daily,Weekly, Monthly, or Cron Expression option based on the schedule that you want to run the batch group.
2. Select the Batch Group you want from the Select drop down menu.
3. Enter a Schedule Name.
4. Specify the other details displayed when you are selecting Once, Daily,Weekly, Monthly, or Cron Expression.
5. Click Pre-Conditions.
6. In the Pre-Conditions window, specify the Batch from the drop down and from the Frequency drop down and select Weekly.
7. Select the days from the Select Days drop down that you want to schedule the batch run within the selected week.
8. Click **Add** to add the specified entry.

   > **Note**
   >
   > Pre-Conditions can be added only to one batch at a time.

9. Click **Save**.


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The batch is executed based on the configured pre-conditions.

**Monthly**

To set the pre-conditions to the batches in a batch group monthly, perform the following steps:

1. In the **Schedule Batch** window, you can select either Once, Daily,Weekly, Monthly, or Cron Expression option based on the schedule that you want to run the batch group.
2. Select the Batch Group you want from the Select drop down menu.
3. Enter a Schedule Name.
4. Specify the other details displayed when you are selecting Once, Daily,Weekly, Monthly, or Cron Expression.
5. Click Pre-Conditions.
6. In the Pre-Conditions window, specify the Batch from the drop down and from the Frequency drop down and select Monthly.
7. Select the days from the Select Days drop down that you want to schedule the batch run within the selected week.
8. Click **Add** to add the specified entry.

> **Note**
>
> Pre-Conditions can be added only to one batch at a time.

9. Click **Save**.
   The batch is executed based on the configured pre-conditions.

**Interval**

To set the pre-conditions to the batches in a batch group based on an interval, perform the following steps:

1. In the **Schedule Batch** window, you can select either Once, Daily,Weekly, Monthly, or Cron Expression option based on the schedule that you want to run the batch group.
2. Select the Batch Group you want from the Select drop down menu.
3. Enter a Schedule Name.
4. Specify the other details displayed when you are selecting Once, Daily,Weekly, Monthly, or Cron Expression.
5. Click Pre-Conditions.
6. In the Pre-Conditions window, specify the Batch from the drop down and from the Frequency drop down and select Interval.
7. Select the interval from the Custom Recurrence (Repeat every) Days drop down that you want to schedule the batch run within the selected week.

> **Note**
>
> The Custom Recurrence can be set maximum to 60 days.

8. Click **Add** to add the specified entry.


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> **Note**
>
> Pre-Conditions can be added only to one batch at a time.

9. Click **Save**.
10. The batch is executed based on the configured pre-conditions.

## Edit Dynamic Parameters

Dynamic Parameters facilitates you to the modify the dynamic parameters for the batch. You can change the param value from the Edit Dynamic Params window and save the changes to the Batch. The Edit Dynamic Parameters option is available in all the tab in the **Schedule Batch** window.

To edit the dynamic parameters for a batch group, perform the following steps:

1. In the **Schedule Batch** window, click **Edit Dynamic Parameters**.

   The **Edit Dynamic Params**window is displayed.
2. In the **Edit Dynamic Params** window, modify the values as required.
3. Click **Save**.

   The modified parameters are applied to the Batch.

### Accessing Scheduler Optional Parameters Inside Studio Paragraphs

The Scheduler Service automates the running of models in the application. The Scheduler Service contains a graphical user interface and a single control point for defining and monitoring background executions.

For more details on the Scheduler Service, see Scheduler Service section.

To access the optional parameters passed from the Scheduler during execution of any models, run the following script:

```
To print
print('BATCHRUNID value is : ${$BATCHRUNID$}')
print('TASKID value is : ${$TASKID$}')
print('FICMISDATE value is : ${$FICMISDATE$}')
```

To access the optional parameters passed during execution of any models, run the following scripts:

```
%python
print('threshold value is : ${threshold}')
```

> **Note**
>
> Threshold is the optional parameter passed during the model execution.

From scheduler task/edit dynamic parameters, the aprameter set to a model can be passed in optional parameter textbox as parameterSets=Set1 where parameterSets is the key for paramter sets and Set1 is the actual set value.


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From EICS it is as below:

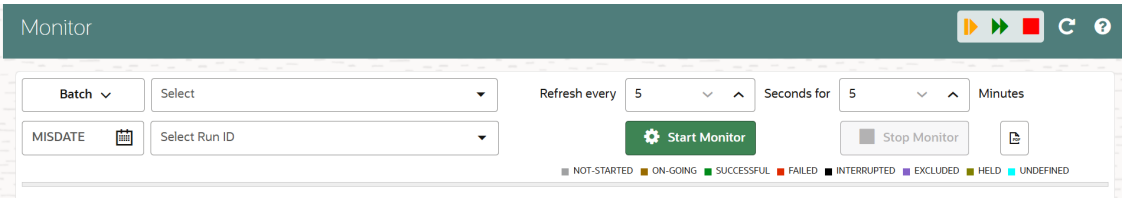
```
./EICSchedulerService.sh -o 1 -u mmgadmin -w CS -c ofsauser -s secret -x 232 -
b BatchModel -t rest -v '{"batchParams":
{"$FICMISDATE$":"2021-11-30","$BATCHRUNID$":"BATCHRUNID"},"taskRuntimeParams":
{"Task1":{"optionalparams":"parameterSets=Set1"},"Task2":
{"optionalparams":"parameterSets=Set2"}}
```

# Monitor Batch or Batch Groups

Use the Monitor Batch feature to view the status of executed batch/batch group along with the task's details. You can track the issues if any, on regular intervals and ensure smoother batch/ batch group execution. A visual representation as well as tabular view of the status of each task in the batch/batch group is available.

You can monitor operations for batches and batch groups using the Monitor Batch feature.

**Figure 20-4 Monitor Batch**




To monitor a batch/batch group:

1. Click **Monitor Batch** from the Header panel.
   The **Monitor** window is displayed.
2. Select the batch/batch group from the **Select** drop-down and then select the **Batch Run ID** from the **Run ID** list.
3. Click **Start Monitor**.
   The result is displayed in **Visualization** and **List View** tabs.
   - On the Visualization tab are charts and in List View are details in a tabular format with the following details:
     a. i. Batch Status: Displays the batch status—NOT-STARTED, ON-GOING, SUCCESSFUL, FAILED, INTERRUPTED, EXCLUDED, HELD, and UNDEFINED.
     b. Batch Start Time: The batch start time.
     c. Batch End Time: The batch end time.
     d. Task Details: Mouseover the task to display task status and additional details.
     e. More Information: The message returned by the Rest Service.
4. Select **Stop Monitor** if you wish to stop monitoring. You can also specify the Start and Stop Monitor options along with refresh interval by providing the Refresh every seconds and minutes information.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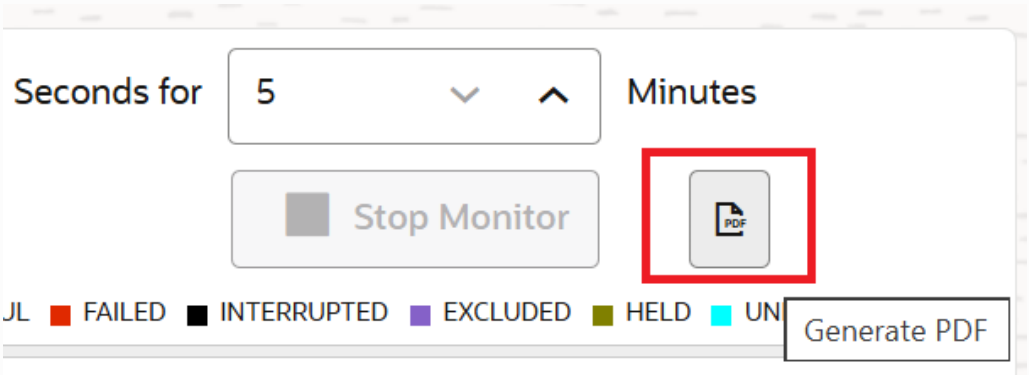
> **Note**
>
> - You can select the refresh interval and the duration of the auto refresh. The default refresh interval is 5 seconds and default duration 5 minutes. That is, data is refreshed every 5 seconds for the next 5 minutes.
> - The interval input range must be between 5 to 60 seconds and the duration input range between 5 to 180 minutes.
> - You can use the **Stop Monitor** button to stop the auto refresh.

5. To restart, rerun, or interrupt the monitoring, select the **Restart**, **Rerun**, or **Interrupt** buttons, respectively.
6. To view log information, click the log icon in the **List View** tab.
   The **Log Viewer** window appears displaying the log details.
7. Click the Download icon to download the log, or click the close icon to close the log viewer.

> **Note**
>
> On the **Batch Monitor** screen, click **Download PDF** to generate and download a PDF report for the selected batch run.
>
> **Figure 20-5 Generate PDF Icon**
>
> 
> 
>
> The PDF report is also saved in the `<ftpsharepath>/printservice/pdfs/scheduler/<DATE>/` path, where `<ftpsharepath>` is the FTP share path that was configured during the installation.

## Batch Group

Batch Group is a process of grouping the batches that are required to be execute together for execution of the Date and time-based background tasks based on a defined period during which the resources were available for batch processing.

To monitor a batch group:

1. Click **Monitor Batch** from the Header panel.

   The **Monitor** window is displayed.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2. Select the **Batch Group from the Select** drop-down and then select the **Batch Run ID from the Run ID** drop-down.
3. Click **Start Monitor**.

   The result is displayed in Visualization and List View tabs. Details of these tabs are as follows:

   - The Visualization tab displays the details in the form of a chart represented with the following details:
     - Batch Status: Displays the batch status, the different batch status are NOT-STARTED, ON-GOING, SUCCESSFUL, FAILED, INTERRUPTED, EXCLUDED, HELD, and UNDEFINED.
     - Batch Start Time: Displays the batch start time details.
     - Batch End Time: Displays the batch end time details.
     - Batch Details: Mouseover the task to display its status and details.
   - The **List View** tab displays the details in a tabular form with the following details:
     - Batch Status: Displays the batch status, the different batch status are NOT-STARTED, ON-GOING, SUCCESSFUL, FAILED, INTERRUPTED, EXCLUDED, HELD, and UNDEFINED.
     - Batch Start Time: Displays the batch start time details.
     - Batch End Time: Displays the batch end time details.
     - Batch Details: Mouseover the task to display its status and details.
     - More Information: The message returned by the Rest Service.
4. If you wish to stop the monitoring, select Stop Monitor. You can also specify the Start and Stop Monitor options along with refresh interval in the Refresh every seconds and minutes fields.

   > **Note**
   >
   > - You can select the refresh interval and the duration for the auto refresh. The refresh interval is defaulted to 5 seconds and duration is defaulted to 5 minutes. That is the refresh happens every 5 seconds for next 5 minutes.
   > - Range of interval input must be between 5 to 60 seconds and range of duration.
   > - Input should be between 5 to 180 minutes.
   > - You can use the Stop Monitor button to stop the auto refresh.

5. To restart the Batch Group, select **Restart**.
6. To rerun the Batch Group, select **Rerun**.
7. To interrupt the Batch Group, select **Interrupt**.

   To view the log information about the batch group, click **View Log** in the **List View**tab.


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# Scheduler Configuration

Scheduler Configuration UI allows you to manage the scheduler service configuration parameters.It also allows you to map specific user to batch and batchgroups for email notifications.

To access the Scheduler Configuration UI in the Scheduler Service page, follow these steps:

1. Go to the Home page of the application.
2. Navigate to **Batch Administration** in the left Navigation pane.
3. Under **Batch Administration**, click on **Scheduler Configuration**.

> **Note**
>
> Ensure you have the BATCH_ADMIN function code to access the Scheduler Configuration page.

## Batch to User Configuration

**Batch to User Configuration** menu allows you to map users to specific batch/batch group processes.This assignment ensures that emails are sent only to the specific users associated with each batch.

To access the Batch to User Configuration page, select **Batch to User Configuration** in the Scheduler Configuration UI.

> **Note**
>
> Click the **eye** icon on the **Batch to User Configuration** tile to view the page.

To search for a specific batch/batch group, enter the keywords in the Search field and click **Search**. You can search based on Batch Name, Batch Code, and Batch type.

> **Note**
>
> The system automatically sends an email to all users mapped to the BATCH_NOTIFY_FUNT function and BATCH_NOTIFY_ROLE role. If a batch/batch group is mapped to a user (and their email ID), the batch email notifications will be sent only to that configured batch user. If no batch-to-user configuration is provided or updated, email notifications will be sent to users with the above function and role.

Perform the following steps to add specific user(s) to the batch/batch group:

1. In Batch to User Configuration menu, click **Add** to add new batch/batch groups.
2. Select the batch type from the dropdown menu.
3. Select the required batch/batch group from the dropdown menu.
4. Select the required users from the dropdown menu.
5. Click **Create**, the *Batch User mapping is created successfully* message is displayed.


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### Action menu

Batch to user mapping configuration page lists all the batch/batch groups which are mapped to specific user(s).

1. Select the desired batch/batch group from the Batch to user mapping configuration page. Click **Action Menu** to view, modify, or delete batch/batch groups.
   a. **View**
   Clicking **View** allows users to see detailed information on the batch/batch group user mapping.
   b. **Edit**
   Edit the batch/batch group to user mapping configuration.You can either update the user details or remove the user.
   c. **Delete**
   The **Delete** option allows you to remove the user to batch/batch group mapping from the system.

## General Configuration

The **General Configuration menu** allows you to configure the parameters related to a scheduler service.

1. Under **Scheduler Configuration** menu, select **General Configuration**.

> ⓘ **Note**
>
> Click the **eye** icon on the **General Configuration** tile to view the page.

2. In Scheduler Service General Configuration Screen, click **Edit** to modify the configuration settings.
3. Modify the required details, refer to the **General configuration parameters** table below.

**Table 20-4 General configuration parameters**

| Parameter | Description | Default Value |
|---|---|---|
| Enable/disable general email notification | Enable/disable general email notifications to automatically alert users when a batch job is successful, failed, or is interrupted. | Enable |
| Enable/disable in-app notification | Enable/disable in-app notifications to alert users within the application when a batch job is successful, failed, or is interrupted. | Enable |


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**Table 20-4 (Cont.) General configuration parameters**

| Parameter | Description | Default Value |
|---|---|---|
| Enable/disable notification for threshold email | Enable/disable email notifications triggered when a batch execution exceeds its expected execution time threshold. For example, if a batch typically completes in 1 hour but now takes longer, an email is sent as its taking longer than expected time to complete. | Enable |
| Threshold email time notification percentage criteria | Defines the additional execution time (in percentage) allowed beyond the last successful batch completion time before sending a threshold notification email.<br>For example: If a batch previously completed successfully in 1 hour and the threshold is set to 20%, a threshold notification will be triggered if the batch exceeds 1 hour and 12 minutes (i.e., 60 minutes + 20%).<br>If multiple notifications are allowed (as per the Threshold email Notify Limit), the time for subsequent notifications will be calculated from the last notification time, adding the same threshold percentage again.<br>For instance, the next notification would be triggered after 20% of 72 minutes (i.e., 86.4 minutes), and so on. | 20 |
| Threshold email Notify Limit | Defines the maximum number of email notifications that can be sent when a batch exceeds its execution time threshold during a single run.<br>**Note**<br>If general email notification is disabled and only if the threshold email notification is enabled, scheduler sends only the threshold email. | 5 |


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**Table 20-4 (Cont.) General configuration parameters**

| Parameter | Description | Default Value |
|---|---|---|
| Batch to User mapping upper limit | Specifies the maximum number of users that can be mapped to a batch/batch group.You can configure a maximum of five user mappings per batch or batch group. | 10 |

4. Click **Save** to save the modified configurations.
   OR

   Click **Cancel** to discard the changes and revert to the previous settings.

# External Interface Component Scheduler Service

Use the **EICSchedulerService.sh** utility located in the `<installed path> mmg-home/bin` folder to perform basic scheduler operations.

**Prerequisites:**

- Ensure public and private keys are present in the conf folder and the corresponding path is present in `application.properties` of `mmg UI service`.
- You should be aware of the clientId/secret which will be used for basic authentication. (Currently, these values are stored in `application.properties` as `token.clientid` and token.secret).

**Table 20-5 List of possible flagged arguments to be passed while executing EICSchedulerService.sh**

| Flag | Description | Comments |
|---|---|---|
| -o | Operation Type: The operation the user wants to perform. | A mandatory argument for all type of requests.<br>Possible Values are:<br>1 – To trigger an object<br>2 – To get the current status of a run.<br>3 – To re-start an execution.<br>4 – To re-run an execution.<br>5 – To interrupt an execution. |
| -u | ofs_remote_user | A mandatory argument for all the type of requests |
| -w | Workspace Id | A mandatory argument for all the type of requests |
| -c | Client Id for authentication | A mandatory argument for all the type of requests<br>Currently, in mmg-ui application.properties the parameter token.clientid is set to ofsauser |


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**Table 20-5 (Cont.) List of possible flagged arguments to be passed while executing EICSchedulerService.sh**

| Flag | Description | Comments |
|---|---|---|
| -s | Client Secret for authentication | A mandatory argument for all the type of requests<br>Currently, in mmg-ui application.properties the parameter token.secret is set to secret |
| -b | Object Name | Batch or Batch Group Name. |
| -t | Object Type | For Batch, it is set to rest and for Batch Group, it is set to group. |
| -r | Batch Execution Id | Execution ID of the Batch or Batch Group. |
| -x | External Unique Id | The unique ID for every execution. Mandatory for execute and rerun operations. |
| -i | Included Jobs | In case of trigger, included jobs can be provided as comma separated values using this flag. |
| -e | Excluded Jobs | In case of trigger, excluded jobs can be provided as comma separated values using this flag. |
| -h | Held Jobs | In case of trigger, held jobs can be provided as comma separated values using this flag. |
| -v | Dynamic parameter list | This is an optional parameter to support passing of dynamic runtime parameters for Batch/ Task. |

**Table 20-6 List of possible exit codes returned by "EICSchedulerService.sh**

| API | Syntax | Description | Status Code | Code Description |
|---|---|---|---|---|
| Trigger | • **Execute batch "batch1":**<br>– **Syntax:** `./EICSchedulerService.sh -o 1 –u <ofs_remote_user> -w <Workspace Id> -c <Client Id for authentication>` | To execute a batch or a batch group | -4 | Invalid arguments passed in request/not enough params in Request body |
| | | | -5 | Invalid Request Headers |
| | | | -9 | Duplicate External Unique Id |
| | | | -3 | Batch or Batchgroup does not exist. |
| | | | -6 | No executable job is present. Batch with no task. |


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**Table 20-6 (Cont.) List of possible exit codes returned by "EICSchedulerService.sh**

| API | Syntax | Description | Status Code | Code Description |
|---|---|---|---|---|
| | -s < Client Secret for authentication > -x < External Unique Id > -b < Object Name > -t < Object Type><br>– **Example:** ./EICSchedulerService.sh -o 1 -u scheduser -w WS1 -c ofsauser -s secret -x batch1_1001 -b batch1 -t rests<br>• **Execute batch "batch1" with the Dynamic Parameter list**<br>– **Syntax:** ./EICSchedulerService.sh -o 1 –u < ofs_remote_user > -w < Workspace Id > -c < Client Id for authentication > -s < | | 0 | Batch or BatchGroup execution is success |


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**Table 20-6 (Cont.) List of possible exit codes returned by "EICSchedulerService.sh**

| API | Syntax | Description | Status Code | Code Description |
|---|---|---|---|---|
| | Client Secret for authentication > -x < External Unique Id > -b < Object Name > -t < Object Type> -v <Dynamic Runtime parameter list><br>– **Example:** ./EICSchedulerService.sh -o 1 -u mmgadmin -w CS -c ofsauser -s secret -x 232 -b BatchModel -t rest -v '{"batchParams":{"$FICMISDATE$":"2021-11-30","$BATCHRUNID$":"BATCHRUNID","param_1":"qwert","param_2":"abcde"},"taskRuntimeParams":{"Task1":{"p1":"1 | | -1 | Batch or BatchGroup execution is failed. |


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**Table 20-6 (Cont.) List of possible exit codes returned by “EICSchedulerService.sh**

| API | Syntax | Description | Status Code | Code Description |
|---|---|---|---|---|
| | 1102","p<br>2":"2220<br>2","abc"<br>:"123342<br>","extra<br>P":"wert<br>2y"},"Ta<br>sk2":<br>{"abc":"<br>1233","p<br>3":"3333<br>","extP2<br>":"0983"<br>}}}'<br><br>**Note**<br>The Task/Batchparameters should be et | | | |


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**Table 20-6 (Cont.) List of possible exit codes returned by "EICSchedulerService.sh**

| API | Syntax | Description | Status Code | Code Description |
|---|---|---|---|---|
| |  heactualparameterkey.<br>• **Execute batch "batch1" with "task1" and "task2" included:**<br>– **Syntax:** ./EICSchedulerService.sh -o 1 –u <ofs_remote_user> -w <Workspace Id > -c <Client Id for authentication > -s <Client Secret for authentication > -x <External Unique Id > -b < Object | | | |


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**Table 20-6 (Cont.) List of possible exit codes returned by "EICSchedulerService.sh**

| API | Syntax | Description | Status Code | Code Description |
|---|---|---|---|---|
| | Name > -t < Object Type> -I < Included Jobs with comma separated values><br>– **Example:** ./EICSchedulerService.sh -o 1 -u scheduser -w WS1 -c ofsauser -s secret -x batch1_1001 -b batch1 -t rest -i task1,task2<br>• **Execute batch "batch1" with "task1" as excluded and "task2" as held:**<br>– **Syntax:** ./EICSchedulerService.sh -o 1 –u < ofs_remote_user > -w < Workspace Id > -c < Client Id for authentication > | | | |


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**Table 20-6 (Cont.) List of possible exit codes returned by "EICSchedulerService.sh**

| API | Syntax | Description | Status Code | Code Description |
|---|---|---|---|---|
| | -s < Client Secret for authentication > -x < External Unique Id > -b < Object Name > -t < Object Type> -e < Excluded Jobs> -h < Held Jobs><br>– **Example:** ./EICSchedulerService.sh -o 1 -u scheduser -w WS1 -c ofsauser -s secret -x batch1_1001 -b batch1 -t rest -e task1 -h task2 | | | |
| Status | • **Get status of execution having runid = MMG_R1_2022-09-07_1662557327886_1:**<br>– **Syntax:** ./EICSchedulerService.sh -o 2–u < ofs_remote_user | To check the status | -3 | Batch or Batchgroup Run Id does not exist. |
| | | | -4 | Invalid arguments passed in request/not enough params in Request body |
| | | | -5 | Invalid Request Headers |
| | | | 0 | Batch or batchgroup status is success |


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**Table 20-6 (Cont.) List of possible exit codes returned by "EICSchedulerService.sh**

| API | Syntax | Description | Status Code | Code Description |
|---|---|---|---|---|
| | > -w < Workspace Id > -c < Client Id for authentication > -s < Client Secret for authentication > -r < Batch Execution Id><br>– **Example:** ./EICSchedulerService.sh -o 2 -u scheduser -w WS1 -c ofsauser -s secret -r MMG_R1_2022-09-07_1662557327886_1 | | -1 | Batch or batchgroup status is failed or API failed internally to return valid response status code. |
| | | | -2 | Batch or batchgroup status is interrupted. |
| | | | 1 | Batch or batchgroup status is not started. |
| | | | 2 | Batch or batchgroup status is ongoing. |
| | | | 5 | Batch or batchgroup status is held. |
| Restart | • **Restart execution for batch "MMG_R1" having runid = MMG_R1_2022-09-07_1662557327886_1:**<br>– **Syntax:** ./EICSchedulerService.sh -o 3-u < ofs_remote_user > -w < | To restart failed execution | -4 | Invalid arguments passed in request/not enough params in Request body |
| | | | -5 | Invalid Request Headers |
| | | | -3 | Batch or Batchgroup Run Id does not exist. |
| | | | -6 | No executable job is present. Batch with no task. |
| | | | 0 | Batch or BatchGroup restart is success |


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**Table 20-6 (Cont.) List of possible exit codes returned by "EICSchedulerService.sh**

| API | Syntax | Description | Status Code | Code Description |
|---|---|---|---|---|
| | Workspace Id > -c < Client Id for authentication > -s < Client Secret for authentication > -b < Object Name> -r < Batch Execution Id><br>– **Example:** ./EICSchedulerService.sh -o 3 -u scheduser -w WS1 -c ofsauser -s secret -b MMG_R1 -r MMG_R1_2022-09-07_1662557327886_1 | | -1 | Batch or BatchGroup restart is failed. |
| Rerun | • **Rerun execution for batch "batch1" having runid = batch1 -r batch1_2022-09-01_1662011065557_1:**<br>– **Syntax:** ./EICSchedulerService.sh -o 4–u < ofs_remo | To rerun the batch execution | -4 | Invalid arguments passed in request/not enough params in Request body |
| | | | -5 | Invalid Request Headers |
| | | | -3 | Batch or BatchgroupId or Run Id does not exist. |
| | | | 0 | Batch or BatchGroup rerun is success |


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**Table 20-6 (Cont.) List of possible exit codes returned by "EICSchedulerService.sh**

| API | Syntax | Description | Status Code | Code Description |
|---|---|---|---|---|
| | te_user > -w < Workspace Id > -c < Client Id for authentication > -s < Client Secret for authentication > -x < External Unique Id > -b < Object Name> -r < Batch Execution Id><br>– **Example:** ./EICSchedulerService.sh -o 4 -u scheduser -w WS1 -c ofsauser -s secret -x batch1_1002 -b batch1 -r batch1_2022-09-01_1662011065557_1 | | -1 | Batch or BatchGroup rerun is failed. |
| | | | -9 | Duplicate External Unique Id |
| Interrupt | • **Interrupt execution for batch "batch1" having runid = batch1_2022-** | To Interrupt the ongoing execution | -3 | Batch or Batchgroup Run Id does not exist. |
| | | | -4 | Invalid arguments passed in request/not enough params in Request body |


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**Table 20-6 (Cont.) List of possible exit codes returned by "EICSchedulerService.sh**

| API | Syntax | Description | Status Code | Code Description |
|---|---|---|---|---|
| | **09-07_166253 0601924_1:**<br>– **Syntax:** `./EICSchedulerService.sh -o 5–u < ofs_remote_user > -w < Workspace Id > -c < Client Id for authentication > -s < Client Secret for authentication > -b < Object Name> -r < Batch Execution Id>`<br>– **Example:** `./EICSchedulerService.sh -o 5 -u scheduser -w WS1 -c ofsauser -s secret -b batch1 -r batch1_2022-09-07_1662530601924_1` | | -5 | Invalid Request Headers |
| | | | 0 | Batch or BatchGroup interrupt is success |
| | | | -1 | Batch or BatchGroup interrupt is failed |
| | | | -7 | Batch or BatchGroup status is not ongoing or already interrupted. |


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**Table 20-6 (Cont.) List of possible exit codes returned by "EICSchedulerService.sh**

| API | Syntax | Description | Status Code | Code Description |
|---|---|---|---|---|

> **Note**
>
> - The status code **-10** can be a general code if the scheduler service APIs are unreachabale.
> - On successful request for execute/rerun, the batchrunid corresponding to external unique id will be stored in the AAICL_SS_EXT_BATCH_RUN_ID_MAPPING table.
> - External Unique ID is required only in case of execute/rerun request.
> - Invalid UserID status for EICSchedulerService.sh Utility
>
>  If the EICSchedulerService.sh utility fails with status as -5, then its due to invalid user. The error can be observed in the mmg-service.logs.

## Batch Utilities

A new utility, `batch_export_import_utility.sh`, to export and import batch/batchgroups/schedules is introduced in the following path: `OFS_MMG/bin/batch_export_import_utility.sh`.

The `# FTPSHARE` value in the utility must be manually updated before triggering the utility file.

The `# Export` value can be triggered by using the following command:

```
## ./batch_export_import_utility.sh EXPORT <workspace> <mmguser> <batchcode> batch/schedule/batchgroup ##
```

For example: `./batch_export_import_utility.sh EXPORT CS mmgadmin BatchRest batch`

The `# Import` value can be triggered by using the following command:

```
##./batch_export_import_utility.sh IMPORT <workspace> <mmguser> <batchcode> batch/schedule/batchgroup <OVERWRITE_flag> <filename without .txt extension>
```

For example: `./batch_export_import_utility.sh IMPORT DEMO7 mmgadmin BatchRest batch N CS_batch_BatchRest`

# MMG Scheduler Shell Utility (mmg_scheduler.sh)

The `mmg_scheduler.sh` utility provides a command-line interface to trigger and monitor OFS MMG batches or batch group executions. Use this utility to:

- Trigger an immediate batch or batch group execution by name.
- Include, exclude, or hold certain selected tasks within the execution.
- Optionally, specify custom batch parameters.
- Query the execution status of any batch or batch group by using its run ID.
- Monitor the progress automatically (auto-follow) or check its status as needed.

The `mmg_scheduler.sh` utility can be found in `OFS_MMG/bin`.


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**General Syntax**

```
./mmg_scheduler.sh [core options] [mode options] [execution options] [monitoring options]
```

The utility supports two main modes:

- **trigger** — Starts a batch or batch group execution.
- **status** — Queries status of an existing run using its run ID

**Core Options (Required for Most Commands)**

These options are typically required for both trigger and status calls:

- **-u <USER>**: MMG user identifier
- **-w <WORKSPACE>**: Workspace name
- **-c <CLIENT_ID>**: client ID
- **-s <CLIENT_SECRET>**: client secret
- **-B <BASE_URL>**: MMG base URL (for example: `"https://<MMG_SERVICE_HOST>:<MMG_GATEWAY_PORT>/<WEB_CONTEXT>/"`)
- **Triggering Execution**
  - **Trigger a Batch (Default)**
    ```
    ./mmg_scheduler.sh -m trigger -b <BATCH_NAME> -u <USER> -w <WORKSPACE> -c <CLIENT_ID> -s <CLIENT_SECRET> -B "https://<MMG_SERVICE_HOST>:<MMG_GATEWAY_PORT>/<WEB_CONTEXT>/"
    ```

    **Example**

    ```
    ./mmg_scheduler.sh -m trigger -b Batch_Model1 -u mmgadmin -w CS -c ofsauser -s secret -B "https://<MMG_SERVICE_HOST>:<MMG_GATEWAY_PORT>/<WEB_CONTEXT>/"
    ```
  - **Trigger a Batch Group**
    Use **-t group** to indicate that the name provided with **-b** is a **batch group**:

    ```
    ./mmg_scheduler.sh -m trigger -b <BATCH_GROUP_NAME> -t group -u <USER> -w <WORKSPACE> -c <CLIENT_ID> -s <CLIENT_SECRET> -B "https://<MMG_SERVICE_HOST>:<MMG_GATEWAY_PORT>/<WEB_CONTEXT>/"
    ```

    **Example**

    ```
    ./mmg_scheduler.sh -m trigger -b Batch_Group1 -t group -u mmgadmin -w CS -c ofsauser -s secret -B "https://<MMG_SERVICE_HOST>:<MMG_GATEWAY_PORT>/<WEB_CONTEXT>/"
    ```

The following table provides information on the additional options that are supported by this utility:


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**Table 20-7 Additional Options Supported by the mmg_scheduler.sh Utility**

| Option | Usage |
|---|---|
| Customize Task Execution | Include, Exclude, or Hold specific tasks:<br>• `-i TaskA,TaskB` - Use this to include only specified tasks<br>• `-e TaskC` - Use this to exclude specified tasks<br>• `-H TaskD` -Use this to keep specified tasks on hold (not run in this execution)<br>The `-i` task will always take precedence over the `-e` and `-H` options |
| Pass Custom Parameters | Use the following option to pass custom parameters:<br>Use **-v** to pass a JSON payload to specify:<br>• **batchParams**: parameters applied at the batch level<br>• **taskRuntimeParams**: task-specific parameters keyed by task name<br>`-v '\{"batchParams": {"param1":"value"},"taskRuntimeParams": \{"Task1":{"param":"value"}}}'`<br>**Example**<br>`./mmg_scheduler.sh -m trigger -b Batch_Model1 -v '{"batchParams": {"param1":"value1"},"taskRuntimeParams" :{"Task1":{"param":"value"}}}' -u mmgadmin -w CS -c ofsauser -s secret -B "https:// <MMG_SERVICE_HOST>:<MMG_GATEWAY_PORT>/ <WEB_CONTEXT>/"` |
| Monitoring & Polling Options | • `--follow` (default) - This option will poll the execution status automatically after being triggered.<br>– Use `-T <seconds>` to adjust the auto-follow timeout. The default timeout value is 20 seconds.<br>– Use `-n <seconds>` to change the polling interval. The default interval is 10 seconds.<br>• `--no-follow` - Only triggers the batch and does not monitor its status.<br>**Example: Trigger and follow for up to 10 minutes**<br>`./mmg_scheduler.sh -m trigger -b Batch_Group1 -t group -u mmgadmin -w CS -c ofsauser -s secret -B "https:// <your-server>:<mmguiport>/mmg8133/" --follow -T 600 -n 10` |


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**Table 20-7 (Cont.) Additional Options Supported by the mmg_scheduler.sh Utility**

| Option | Usage |
|---|---|
| Filter status by individual tasks | Use this to filter the status for individual selected tasks:<br>`-k TaskA,TaskB`<br>This filter is only applicable for the status option.<br>**Example**<br>`./mmg_scheduler.sh -m status -r Batch_RunID_12345 -k TaskA,TaskB -u mmgadmin -w CS -c ofsauser -s secret -B "https://<MMG_SERVICE_HOST>:<MMG_GATEWAY_PORT>/<WEB_CONTEXT>/"` |

- **Querying the Status by Run ID**
  Use **-m status** and provide the run ID by using **-r**.
  - **Syntax**

    ```
    ./mmg_scheduler.sh -m status -r <BATCH_RUN_ID> -u <USER> -w <WORKSPACE> -c <CLIENT_ID> -s <CLIENT_SECRET> -B "https://<MMG_SERVICE_HOST>:<MMG_GATEWAY_PORT>/<WEB_CONTEXT>/"
    ```

  - **Example**

    ```
    ./mmg_scheduler.sh -m status -r Batch_RunID_12345 -u mmgadmin -w CS -c ofsauser -s secret -B "https://<MMG_SERVICE_HOST>:<MMG_GATEWAY_PORT>/<WEB_CONTEXT>/"
    ```

### Help/Usage Information

To display the list of supported options and usage examples, run:

```
./mmg_scheduler.sh --help
```

### Authentication

The script requires valid OFS MMG credentials (client ID or secret), workspace, and user identity, as it has been configured in your OFS MMG deployment.

### Typical Workflow

The following is the typical work flow of the utility:

1. Trigger a batch or group job. This will return the batch run ID.
2. Auto-follow or manually follow and monitor the batch or batch group status. This will return the task or batch progress and results in real time.
3. Optional, you can re-query the job status any time by using the batch run ID.

### Handling Errors

Errors are clearly reported for invalid credentials, unreachable APIs or servers, or invalid batches or run IDs. For failed tasks, status, and errors, they can be viewed in the command output.

### Notes and Limitations

- The default polling automatically times out after 20 seconds unless it has been overridden.


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- Filtering and custom parameters support for batch groups might be limited.
- Always use the correct client ID or secret. These values are configured in the OFS MMG UI **application.property** file:
  - **aai.client.id**
  - **aai.client.secret**

  In the **application.property** file under **mmg-ui** service, the secret may appear masked (because it is sensitive). If the actual value is not visible, contact your MMG administrator (or the team managing your deployment secrets) to obtain the correct client ID/secret.
- For failures or unexpected results, check the command output for error messages.

# Scheduler Configuration / Admin User Interface

The Scheduler Configuration / Admin User Interface (UI) is used to manage the scheduler notification settings and to configure email notification recipients for specific batches or batch groups.

### Access Control

To access the Scheduler Configuration/Admin UI , you must have the **BATCH_ADMIN** role. By default, the **BATCH_ADMIN** role is mapped to the seeded user group **SCHEDULERADMIN**.

From the Orchestration page, navigate to the Scheduler Configuration/Admin UI.

### Scheduler Configuration/Admin UI Features

The Scheduler Configuration/Admin UI provides the following functionalities:

- **General Configuration** (system-level configuration parameters)
- **Batch/Batch Group to User Mapping** (workspace-level email mapping)
- **Batch/Batch Group to User Mapping** (workspace-level)

You can use this page to map specific users to a batch or batch group for email notifications. This configuration is workspace-specific.

### Access the Batch/Batch Group to User Mapping

In the Scheduler Configuration/Admin UI, select **Batch to User Configuration**. Click the **Eye** icon adjacent to the Batch to User Configuration tile (if applicable) to open the page.

### Search

To search for a batch or batch group, enter the desired keywords in the **Search** field and then click **Search**. This feature enables you to search by the batch name, batch code, and batch type.

### Add a Mapping

Perform the following steps to add a mapping:

1. Click **Add**.
2. Select the batch type.
3. Select the required batch or batch group.
4. Select the required user(s).
5. Click **Create**.


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A message appears informing you that indicating that the mapping was successfully created.

### Manage Existing Mappings (Action menu)

The **Batch to User Mapping** page lists all the batch or batch groups that are mapped to user(s). Use the **Action** menu to:

- **View:** This displays mapping details.
- **Edit:** Updates the mapped user list (add/remove users).
- **Delete:** Removes the batch/batch group to user mapping.
- Email notification behavior (mapping vs default recipients)

The system can send notifications to default recipients based on the configured notification role/function. If a batch/batch group is explicitly mapped to a user(s), notifications for that batch/batch group are sent only to the mapped user(s). If no batch-to-user mapping is configured for a batch/batch group, notifications are sent to the default recipients.

### General Configuration (system-level)

Use this page to update scheduler service configuration parameters. General Configuration values are system-level; a change made in one workspace is reflected across all workspaces.

#### Access General Configuration:

Perform the following steps to access the general configuration page:

1. In the Scheduler Configuration/Admin UI, select **General Configuration**.
2. Click the **Eye** icon on the **General Configuration** tile (if applicable) to open the page.
3. Update configuration values.
4. Click **Edit**.
5. Modify the required configuration values.
6. Click **Save** to apply the changes.
   OR

   Click **Cancel** to discard changes and revert to the previous values.

> **Note**
>
> - Batch/Batch Group to User Mapping is workspace-specific.
> - General Configuration is system-level and is effective across all workspaces.
> - Access to this page requires the **BATCH_ADMIN** role (seeded through the **SCHEDULERADMIN** group by default).


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# 21
# Model and AI Risk Management

Register models, use the MARM dashboard and inventory, and perform independent model validation. MARM validation is a separate workflow from model acceptance and production deployment in Chapter 18 and STSA object approval in Chapter 8.

## Chapter contents

21.1 Model and AI Risk Management (MARM) 21-2

Source: MMG 26.2.0 User Guide. Procedures, screenshots and examples are incorporated into this STSA 8.1.2.8.0 draft; release-specific statements retain their source status.


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# 21.1 Model and AI Risk Management (MARM)

The Oracle Financial Services Model and AI Risk Management (MARM) platform provides a robust, end-to-end framework for governing the lifecycle of models such as Machine Learning (ML) and statistical models.

This guide provides instructions for Modelers, Validators, and Risk Managers to navigate the system, ensure regulatory compliance (SR 11-7, SR 15-18), and mitigate model-related risks.

**Key Capabilities**

- **Model Dashboard**: A KPI driven central command center for model risk oversight, providing real-time visibility into the organization's model risk.
- **Centralized Model Inventory**: A single source of truth for all enterprise models.
- **Multi-Stage Validation**: Structured workflows for technical and conceptual assessments.
- **Automated Monitoring**: Real-time drift detection and performance back-testing.
- **Findings Management**: End-to-end tracking of model deficiencies and remediation.

# Getting Started with Model and AI Risk Management

This section outlines the requirements for using Model and AI Risk Management (MARM).

## Model Registration in MARM

To ensure a seamless transition between development and governance, MARM eliminates the need for redundant data entry by leveraging a unified ecosystem.

To initiate any model's validation in MARM, the model must first be available in MMG. MARM supports a pull-based approach, allowing users to onboard models from MMG for validation and monitoring.

There are two ways to register and use models:

- Local Model Registration
- External Model Registration

**Local Model Registration**

1. If the model is developed locally:
    a. Create the model within the environment.
    b. Provide the required Pipeline Metadata, including:
        i. Dataset
        ii. Model Type
        iii. Target Column
        iv. Prediction Column
        v. Date-Time Column


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vi. Training Start Date

vii. Training End Date

c. Publish the model pipeline.

Once published:

i. The model version is created and becomes a read-only model.

ii. You can pull it into MARM.

iii. The Validator can initiate the validation.

**External Model Registration**
Externally developed models can be on-boarded into MMG by creating the appropriate dataset and providing the correct training dates through the pipeline. MMG supports multiple source types, including files and tables.

Validation data does not need to be imported separately. MMG computes validation on demand using the actual dataset, based on dataset filters and the provided training or as-of dates.

> **Note**
>
> The current approach does not preserve historical validation results from the original external environment and assumes that the underlying data remains available for recomputation.

If the model is coming from an external source:

a. Register the model in MMG.

b. Ensure all required Pipeline Metadata is provided.

c. Additionally, register the associated datasets, as they are required for metadata selection.

d. Publish the model pipeline.
Once published:

i. The model version is created and becomes a read-only model.

ii. It can be pulled into MARM for further validation and usage.

**Running Example: Retail PD Model**

- **Model Name**: RETAIL_PD_MODEL_V1
- **Business Purpose**: Predicts the likelihood of a customer defaulting on a credit card.
- **Source**: Pulled directly from the MMG Modeler Workspace.
- **Validation due date**: 01-April-2026

# Access and Security

The MARM platform is secured through a robust Role-Based Access Control (RBAC) architecture.

Access to specific modules, data, and validation tools is strictly governed by the Role Groups assigned to your user profile.

**Authentication and Login**


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Accessing the system is a straightforward process designed for enterprise security:

- **Simple Credentials**: Users log in using their enterprise-authorized username and password credentials.
- **Role Identification**:
  - Two primary functions are defined: one for viewing validation results and another for executing validations. These functions are mapped to corresponding roles—read-only and execute—to separate viewing and action-based permissions.
  - Additionally, a dedicated user group (**MMG_MDL_VLDN_ADMIN**) is configured, which is assigned both roles, enabling full access to view and run validations. This structure ensures controlled access, clear separation of responsibilities, and governance over validation activities.

**Seamless Persona Switching**

It is designed for high-efficiency workflows, particularly for users with oversight responsibilities across the model lifecycle:

- **Integrated Ecosystem**: Either directly log-in as a model validator by selecting from initial login options or once logged into the **Modeler Workspace (MMG)**, users can navigate directly to the **Validator Framework via Switch to Validator Mode** option in top right profile icon's drop-down menu.
- **Single Session Access**: If your Role Group has permissions for both environments, you can switch between modeling and validation spaces.
- **No Re-authentication**: There is no requirement for a separate login or session interruption when moving between the Modeler and Validator interfaces, ensuring a continuous and fluid user experience.

# MARM Dashboard

The Executive Dashboard serves as the central command center for model risk oversight, providing real-time visibility into the organization's model landscape.

**Global Filters and Controls**

Users can refine and navigate models using a set of global filters and controls. These include filtering by workspace scope (all, production, or specific workspace), along with additional filters such as tier and status. A search option is available to quickly locate models using attributes like ID, name, version, objective, workspace, or dates. Users can reset all applied filters using the **Reset Filters** option.

**Table View and Actions**

**Real-Time KPIs**

Upon logging in, users are presented with a high-level summary of the model inventory's health and governance status. These KPIs provide immediate visibility into the validation lifecycle and the current risk landscape:

- **Total Tracked Models**: Represents the cumulative headcount of all models ever introduced to the validation framework, including those currently undergoing review and those with finalized assessments.
- **In-Progress Validation Cycle**: Tracks the total number of models currently active within the validation workflow, highlighting the current workload of the MRM team.
- **Completed Validation Cycle**: Displays the count of models that have successfully concluded the independent oversight process and have a finalized validation status.


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- **Overdue Validations**: Flags models that have surpassed their scheduled review dates, identifying critical gaps in governance that require immediate attention.
- **High Risk Tier**: A focused count of models classified under the highest risk category, ensuring these high-impact assets remain under constant executive visibility.
- **Due in Next 30 Days**: A proactive metric highlighting models approaching their validation or approval expiry within the month, allowing teams to initiate reviews early and prevent governance lapses.

**Interactive Visualization**

The MARM dashboard utilizes dynamic, color-coded visuals to transform complex inventory data into actionable risk insights.

- **Core Visualizations**: The system employs distribution charts to categorize the model universe across three governance tiers.
  - **Risk Distribution**: High-level views of Risk Tiers (High/Medium/Low), Business Domain concentration, and Model Type (Traditional vs. AI/ML).
  - **Operational Criticality**: Tracking Model Lifecycle Stages and Third-Party/Vendor model concentration.
  - **Governance Depth**: Analysis of Production Model Vintage to identify aging models requiring re-validation.
- **Click-Through Drill Down**: Every chart element is fully interactive and serves as a navigational shortcut.
  - **Filtered Redirection**: Clicking any segment (for example the "High Risk" slice of a pie chart) instantly redirects the user to the Model Inventory, pre-filtered to show only the models driving that specific metric.
  - **Contextual Access**: This eliminates manual searching, allowing users to jump from an executive metric directly to specific model metadata or validation records in a single click.

**Calendar and Deadline Integration**

The dashboard integrates a centralized Validation Calendar:

- Track upcoming regulatory deadlines and compliance milestones.
- View scheduled model reviews and optimum resource allocations to ensure no statutory deadlines are missed.
- **Operational Example**: For our RETAIL_PD_MODEL_V1, the calendar shows a validation deadline of 01-April-2026 and carries forward the count until validated.

# Model Inventory Management

Model list displays key details such as Name, Version, Objective, Workspace, Tier, Last Validation Date, Next Validation Due, and Status. The Name field is clickable, allowing users to navigate to model detail view.

Pagination is provided for easy navigation across records.

Common actions include:

- Filtering models based on required criteria
- Refining results using search
- Accessing model details by selecting the model name for further inspection or validation


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### Model Details View

The Details View is a central feature of the Model Inventory that allows users to access comprehensive model information from the main list. By clicking on any model in the inventory, it navigates to provide a 360-degree view of the model's structure and governance status.

- **Integrated Model Metadata and Lineage**: The view summarizes all core identifying information, including the model's technical specifications, open findings, versioning, and assigned risk tier.
- **Technical and Development Assets**: To support deep technical reviews, this provides direct access to the model's underlying assets:
  - **Model Pipeline and Code**: View the end-to-end execution pipeline and source code.
  - **Model Notebooks**: Access the original development notebooks for insights into the model's experimental phase.
  - **Model Documentation**: Centralized repository for whitepapers, technical specifications, and user manuals.
- **Governance and Action Center**: This also serves as the primary gateway for validation activities:
  - **Validation History**: A chronological log of all past validation cycles, outcomes, and recorded drift events.
  - **Launch or Resume Validation**: A high-priority action button that allows authorized users to initiate a new or resume draft validation cycle directly from the drawer.

## Validation Workflow

The MARM validation process is a systematic, six-stage flow designed to ensure model integrity—from initial data profiling to final report generation.

Each stage must be completed and approved sequentially to progress.

1. **Initiation Methods**: Validation can be launched using two primary entry points:
   a. **Model Inventory**: Perform the following:
      i. Search for the model in the model inventory list
      ii. Click on the model's Name. It will redirect to the **Model Details View** page.
      iii. Click the **Start New Validation** button for a fresh validation or **Resume Validation and Discard Draft** in case of on-going validation.
2. **Managing Validation States**
   a. **Start New Validation**: To start a new validation.
   b. **Resume Validation**: If a validation is already in progress, the system identifies the existing draft, allowing you to pick up exactly where you left off.
   c. **Discard Draft**: If the current analysis is no longer relevant, you can discard the active draft to enable a fresh validation launch.
3. Operational Example: RETAIL_PD_MODEL_V1 To begin the workflow for our PD model:
   a. Navigate to the **Model Inventory** and search for `RETAIL_PD_MODEL_V1`.
   b. If multiple versions are available for the same name, validator need to select the appropriate version.


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c. Click on the name `RETAIL_PD_MODEL_V1` from the list view It will redirect to the **Model Details View** page for this model.

Select **Start New Validation** or **Resume Validation**, if validation is already going on. The system will automatically pull the latest artifacts (code/data) to commence validation.

**Data Input and Profiling**

This stage provides a deep-dive into the data health and stability of the model, ensuring the input features remain consistent with the data used during the initial training phase.

- **Drift and Distribution Analysis**: The system automatically executes Python-based statistical profiling to identify Data Drift over time. It assesses the skewness and normality of the current dataset to determine if the model's original assumptions still hold true.
- **Comparison Configuration**: To perform the analysis, configure the following:
  a. **Current Dataset**: Define the period by entering a specific Date Range or selecting from presets: Last 7 days, 30 days, or 90 days.
  b. **Baseline Dataset**: Select the reference point for comparison, either the original Training data or the Last Validation Run (which automatically fetches the relevant historical dates and data).
- **Execution and Visualization**: Upon clicking Compute, the engine compares the datasets, automatically plotting distribution graphs for every feature. The system identifies "Drifted Features" where the statistical variance has breached system-defined thresholds.
- **Operational Insights**: These profiles provide the technical justification for model adjustments, such as tweaking specific parameters or adding new data transformations to handle outliers or noise.

**Operational Example: RETAIL_PD_MODEL_V1**

For the Retail PD model, the validator follows these steps to ensure data stability:

1. **Selection**: The validator selects the Last 90 days as the Current Dataset and checks the Training dataset option in the Baseline section to compare against the model's inception logic.
2. **Computation**: After clicking Compute, the system generates drift graphs for all input variables.
3. **Observation**: The system flags that the Average Credit Score in the applicant pool has drifted significantly (skewed lower) compared to the baseline. This insight is automatically captured in the drift table.
4. **Action**: The validator notes in the comments that the model may need a recalibration of weightings to remain accurate for the current economic climate and proceeds to the next validation step.

**Outcome Analysis & Backtesting**

The Backtesting Engine evaluates model performance by comparing predicted outcomes with actual observed values over a selected production window, and benchmarking the results against the training dataset and/or the last validation run. This helps assess predictive accuracy, consistency, and performance stability over time.

- **Core Functionality**: Comparison of model predictions against actual outcomes for a selected production period, with reference to historical benchmarks (training or previous validation results).
- **Workflow Process**:


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1. **Current Dataset Selection**: Define the period by inputting a specific Date Range or selecting from presets (Last 7 days, 30 days, or 90 days).
2. **Baseline Selection**: Choose the reference benchmark—either the Training dataset or the Last Validation Run—to automatically fetch comparison dates & data.
3. **Dynamic Metric Filtering**: Upon selecting the datasets, the system automatically filters and displays relevant statistical techniques (for example Gini, AUC, F1-Score) based on the Model Type (Regression or Classification).

- **Execution and Validation**: Clicking Compute triggers the engine to calculate and display a side-by-side metric comparison across the current, baseline, and last validation datasets. The Validator reviews these results, adds step-specific comments, and proceeds. Supports a comprehensive set of statistical metrics:
  - **For regression model**: MAE, MSE, RMSE, MAPE, R2 Score, Median AE, Max Error, Percentiles, Mean Error, Std. Error.
  - **For classification model**: True positive, True Negative, False Positive, False Negative, Accuracy, Precision, Recall, F1 Score, AUC ROC, PR AUC, Log Loss, Brier Score.

**Operational Example: RETAIL_PD_MODEL_V1**

To validate the predictive power of the Retail PD model, the validator executes the following steps:

- **Define Scope**: The validator selects the Last 90 days as the Current Dataset. Under the Baseline section, they select Training and Last Validation Run to enable a three-way performance comparison.
- **Technical Selection**: Because the system recognizes the PD model as a Classification type, it automatically populates metrics such as Gini, AUC, and ROC.
- **Compute**: The validator clicks Compute. The system generates a report comparing the current Gini coefficient (e.g., 0.62) against the Training Gini (e.g., 0.65) and the Last Validation Gini (e.g., 0.64).
- **Results and Documentation**: The system displays the performance graphs and metric tables. The validator observes that while there is a slight dip, the performance remains within acceptable limits.
- **Finalize**: The validator enters a comment noting the stability of the AUC/ROC curves and saves the step to proceed.

**Conceptual Soundness**

This stage evaluates the underlying logic and theoretical basis of the model through a structured assessment.

- **Questionnaire-Based Assessment**: The validator completes a targeted questionnaire by selecting the appropriate options for each question.
- **Final Review and Commentary**: After answering the questions, the validator provides an overall summary comment for the stage before moving to the next step.
- **Questionnaire Configurability**: To align with specific bank standards, the entire questionnaire is fully configurable. Users can update the questionnaire by modifying the JSON configuration file (`questionnaire.json`) in the MARM backend located at `configuration\configuration\marm\conceptual_soundness` without requiring code changes. There is a template file as well named `questionnaire.template.json` in the same folder that you can use to design a new questionnaire.


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**Operational Example**: For RETAIL_PD_MODEL_V1, the validator will answer questions regarding the as per the slandered and provide a final assessment of the model's theoretical fitness for credit risk.

### Model Tiering Review

The Model Tiering Review is a systematic assessment that classifies models into risk categories (e.g., High, Medium, or Low) based on their potential impact and complexity.

- **Automated Computation**: The system computes the final Risk Tier based on standard business logic. The validator selects scores for specific business parameters, such as Financial Impact and Regulatory Scope.
- **Tiering Criteria Configurability**: All tiering parameters and scoring weights are fully configurable via the back-end to align with specific internal organizational policies. Administrator can simply update the criteria by modifying the JSON configuration file i.e. criteria.json in the MARM back-end located at “\configuration\configuration\marm\tiering” without requiring code changes. There is a template file as well named `criteria.template.json` in the same folder that can be used to design the new criteria.

**Operational Example:** For RETAIL_PD_MODEL_V1, the validator checks all the criteria, read the description of criteria and each class in it & assigns the score. For this model, validator selects “High” class for "Regulatory Scope" and other parameters. The system then automatically calculates the model as final Tier on the basis of configuration.

### Final Review

This stage serves as the final validation closure checkpoint, consolidating key findings, schedule decisions, tier outcomes, and reviewer conclusions into a single sign-off step.

- **Findings Consolidation**: The system presents section-wise findings from prior validation stages (Data Profiling and Data Analysis, Outcome Analysis and Backtesting, Conceptual Soundness, and Model Tiering Review), including comment counts and full comment history (author, timestamp, and message), so validators can complete closure with full context.
- **Validation Schedule Decision**: Validators can explicitly choose whether to set the next validation date. If enabled, a date is selected in-line; if not select Do Not Set Now, no date is recorded for this cycle.
- **Tier Outcome Summary**: The page displays the computed model tier result from Model Tiering Review, including tier, risk level, total score, and recommendation text for final reference.
- **Finding Summary By Section**: A consolidated log that maps the validator's specific comments and qualitative insights to their corresponding workflow stages, providing a centralized audit trail of all identified issues and comments. Final Decision and Reviewer Notes: Validators select a final decision (Approve / Require changes / Reject) and can add final reviewer comments to document closure rationale, residual risk, and sign-off notes.
- **Completion and Submission**: The Finish action is enabled after final decision selection, and submission completes the run and returns the user to Model Details with confirmation.


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# 22
# MMG Object Migration

Create, inspect, execute and manage export and import definitions for MMG objects. Review prerequisites, dependencies, object types and migration logs. The migration REST reference is in Chapter 14; scheduler object transfer is in Chapter 20. STSA production metadata migration remains in Section 6.1.1.3.

## Chapter contents

22.1 Object Migration 22-2

Source: MMG 26.2.0 User Guide. Procedures, screenshots and examples are incorporated into this STSA 8.1.2.8.0 draft; release-specific statements retain their source status.


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# 22.1 Object Migration

Object Migration is the process of migrating or moving objects between environments.

You may want to migrate objects for reasons such as managing global deployments on multiple environments or creating multiple environments so that you can separate the development, testing, and production processes.

**Prerequisites to Migrating Objects**

In order to migrate objects, users must be mapped to the **Object Migration Admin Group**.

> **Note**
>
> Identity Administrator Group users cannot migrate objects if they are not mapped to the **Object Migration Admin Group**.

**Migration Object Types**

You can migrate (import/export) the following object types by clicking the Object Migration icon on the left menu.

- **Schedule**: Provides the instruction to schedule the execution of defined processes. When a schedule is migrated, the associated batch is also migrated.
- **Batch**: A group of jobs that are scheduled to automatically execute at a preset interval of time without any user intervention. When a batch is migrated, the batch and the associated pipeline information are also migrated.
- **Batch Group**: A set of individual batches are consolidated to form a single Batch Group. When you migrate a batch group all the batches, tasks, and pipeline information associated with that batch group are also migrated.
- **Pipeline**: A pipeline is an embedded data processing engine that filters, transforms, and migrates data on-the-fly. Pipelines consist of a set of data processing elements called widgets connected in series, where the output of one widget is the input to the next element.


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- **Threshold**: The threshold limit associated with values of set variables for scenarios in FCCM Cloud Service. These threshold values are set when scenarios are created or installed and can be changed, if required.
- **Job**: Jobs provide a set of instructions to execute Workflow Pipelines, based on the set threshold values.
- **PMF Process**: PMF Processes are defined to sequence the Workflow Pipelines, the applications, and to design the artifacts that participate in the pipelines, to implement the pipelines. When exporting a PMF Process, dependent metadata such as data fields, transition rules associated with the PMF process are taken care of.
- **Roles**: Roles are used to map functions to a defined set of groups to ensure user access system security.
- **Groups**: Groups are used to map Roles. Specific User Groups can perform only a set of functions associated with that group.

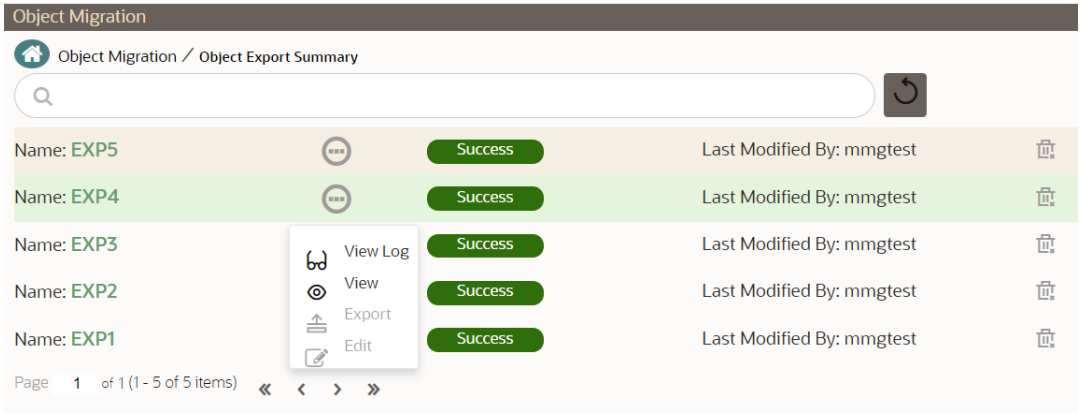
# Export Objects

To access the Object Export Summary page:

1. Click **Launch Workspace** next to corresponding Workspace to display the **Dashboard** window with application configuration and model creation menu.
2. Click the **Object Migration** icon and select **Export Objects**.

   The Object Export Summary page containing the records is displayed with the following details.

**Figure 22-1 Object Export Summary page**




- **Name**: The unique migration name assigned to the collection when the migration definition was created.
- **Object Migration Status**: The migration status of the record corresponding to the specified Definition Name. The three migration status values are as follows:
  - **Success** - Set to Success, when the object export is completed successfully.
  - **Saved** - Set to Saved, when the migration definition is ready for export and needs to import.
  - **Failed** - Set to failed, when the migration definition is not exported successfully.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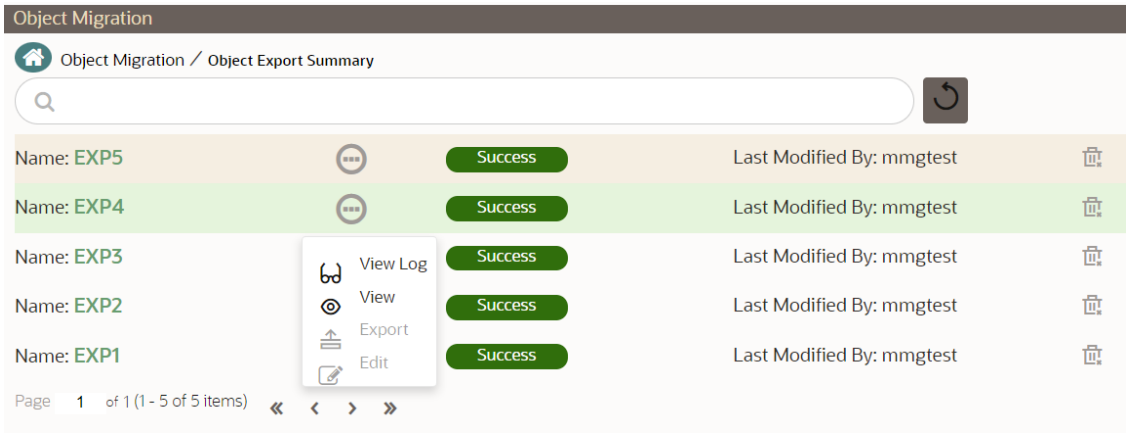
- **Last Modified By**: The ID of the Last Modified by user who has modified the record.

## Search Objects to Export

To search for a specific migration definition, type the first few letters of the user name that you want to search in the **Search** box and click the **Search** icon.

**Figure 22-2 Search Objects to Export**




Use the controls at the bottom of the page, to set the number of entries displayed per page and to navigate between pages.

## Create Migration Export Object Definitions

You can create Migration Export object definitions for the following object types.

- Batch Group
- Threshold
- PMF Process
- Batch
- Pipeline
- Schedule
- Job

To create a definition for export of objects to be migrated, do as follows:

1. Click **Add** in the **Object Export Summary** page to display the **Migration Definition** window.


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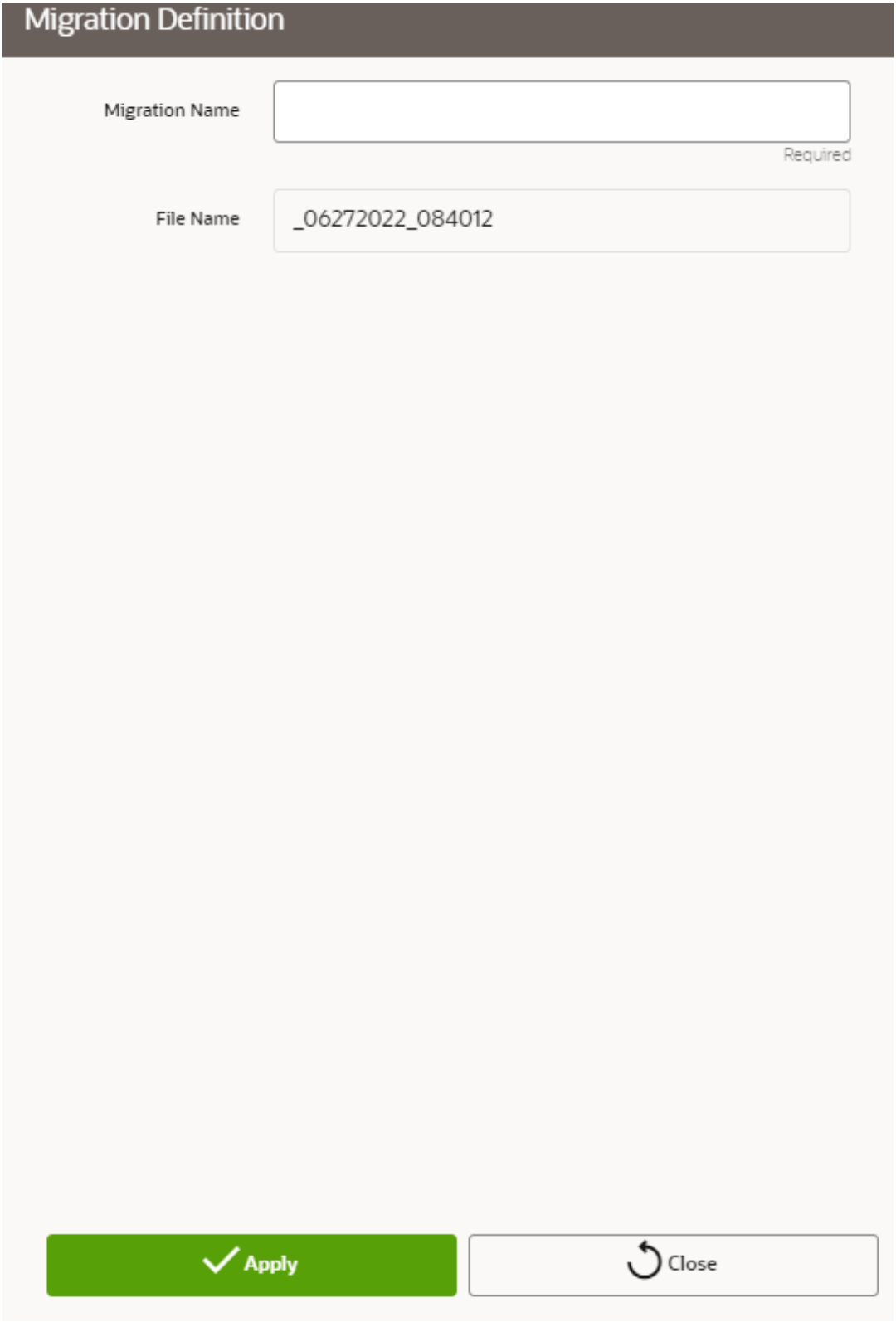
**Figure 22-3 Migration Definition window**




2. In the **Migration Definition** window, enter the details for the following:
   - **Migration Name**: Enter the code of the export of objects to be migrated definition. This is a unique identifier.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- **File Name**: The system auto-creates the file name of the objects that can be used to export the definition in the following format:
  - **For Business Objects**: Migration Name_BO_Time Stamp (MMDDYYY HHMMSS)
  - **For Identity Objects**: Migration Name_IDM_Time Stamp (MMDDYYY HHMMYY)

3. Click **Apply** to save the details.

   The Object Selection Page is displayed.

4. In the Object Selection page, select the required Object Type from the Object Types drop-down list. The object types listed for the System Configuration tab are, Schedule, Batch group, Batch, Pipeline, Threshold, Job and PMF process. For more information about the object types, refer Migration Object Types.

   You can also enter the first few letters in Search to add a particular object from a selected Object type.

   The list of objects is displayed.

5. Select the objects to be added to the Migrate Definition.

   The selected objects are added to the respective object type branch.

6. Click **Save**to create the Migrate Definition.

   A confirmation message is displayed, when the definition is saved successfully.

   The new migration definition is listed in the Object Export Summary page and the status is set to Saved.

> **Note**
>
> If the migration definition object is not created successfully and the status is set to Failed. Contact My Oracle Support of more information.

## View Migration Objects to be Exported

You can view and edit the migration objects from the **Object Export Summary** page.

To view the list of migration export objects associated with a migration definition, highlight the migration definition and click **Menu**button.

You can:

**Table 22-1 View Migration Export Objects**

| Field | Description |
|---|---|
| View Log | View the migration log details of the selected Migration Definition. For more information, refer to View Log of Migration Export Objects. |
| View | View the Object Details for a specific Migration Definition.<br>Click an object to view more details.<br>For more information, refer to Viewing Export Migration Object Details. |


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**Table 22-1 (Cont.) View Migration Export Objects**

| Field | Description |
|---|---|
| Export | Click Export to initiate Object Migration (Export) for a specific Migration Definition.<br>When the migration is completed, the status will change from Saved to Success.<br>For more information, refer to Exporting Migration Objects. |
| Edit | Click Edit to view and edit the objects linked to a Migration Definition.<br>For more information, refer to Editing Migration Export Definitions. |

## View Log of Migration Objects Exported

To view the log details of object with migration status Success or Failed, follow these steps. The view log facilitates you to view the log information of the definition for export of objects to be migrated with its status.

1. Highlight the migration definition and click Menu button and select View Log.

   The View Log page is displayed.

   The status of the export migration is displayed with the following details.

**Table 22-2 View Log of Migration Export Objects**

| Field | Description |
|---|---|
| Object Migration ID | The migration ID associated with the export object. |
| Object Type | The object type of the export object. |
| Object Code | The object code associated with the export object. |
| Creation Date | The date of creation of the export object. |
| Created By | The User Id of the User who created the export object. |
| Status | The migration status of the export object.<br>• Success - Indicates that the export migration was completed successfully.<br>• Failed - Indicates that the export migration did not complete |

> **Note**
>
> The View Log page for a migration object with status Saved will be empty.

2. Click **OK** to close the window.

## View Details of Exported Migration Objects

To view the list of objects added to a specific Migration Definition:


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1. Highlight the migration definition and click **Menu** button and select **View**.

   The list of migration objects added to the definition is displayed.

2. Double-click an object to view the object attribute details.

## Export Migration Objects

To export the list of objects added to a specific Migration Definition:

- Highlight the migration definition and click **Menu** button and select **Export**.

  The status is indicated as either Success or Failed.

> **Note**
>
> Use Object Migration (export) to export a set of objects within the same setup or across different setups.

## Edit Exported Migration Definitions

You can edit the migration export objects that are not exported and their status is Saved or Failed. If the object is already exported and the status is set to Success, you cannot edit the object details.

To edit a record of the definition of export of objects to be migrated, follow these steps. You can add more objects to export or remove existing objects.

1. Highlight the migration definition and click **Menu** button and select **Edit**.

   The Object Selection window is displayed.

2. Update the required details.

3. In the Object Selection window, select the required Object Type from the Object Types drop-down list.

   The object types listed for the System Configuration tab are, Batch_Group, PMF_Process, Batch and Schedule. For more information about the object types, refer Migration Object Types. You can also enter the first few letters in Search to add a particular object from a selected Object type.

   The list of objects is displayed.

4. Select the objects to be added to the Migrate Definition or to be deleted from the Migration Definition.

   The selected objects are added/deleted to the respective object type branch.

5. Click **Save** to edit the Migrate Definition.

   A confirmation message is displayed, when the definition is saved successfully.

   The edited migration definition is listed in the Object Export Summary page and the status is set to Saved.

6. Click **Save** to update the changes.

## Delete Exported Migration Definitions

You can only delete records in the Saved or Failed state; records in Success state cannot be deleted.


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To delete a migrate export object definition, highlight the record to be deleted and click the delete button. Click Yes to confirm and proceed with the deletion.

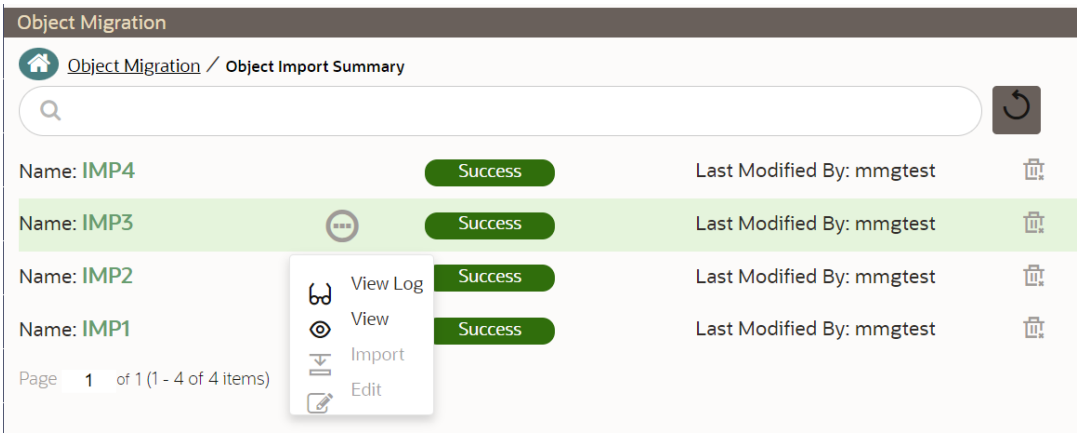
# Import Objects

To access the Object, Import Summary page:

1. Click **Launch Workspace** next to corresponding Workspace to display the **Dashboard** window with application configuration and model creation menu.
2. Click the **Object Migration** icon and select **Import Objects**.

   The Object Import Summary page containing the records is displayed with the following details.

**Figure 22-4 Object Import Summary page**




- **Name**: The unique migration name assigned to the collection when the migration definition was created.
- **Object Migration Status**: The migration status of the record corresponding to the specified Definition Name. The three migration status values are as follows:
  - **Success** - Set to Success, when the object import is completed successfully.
  - **Saved** - Set to Saved, when the migration definition is ready for import and needs to import.
  - **Failed** - Set to failed, when the migration definition is not imported successfully.
- **Last Modified By**: The ID of the Last Modified by user who has modified the record.

# Search Objects to Import

To search for a specific migration definition, type the first few letters of the user name that you want to search in the **Search**box and click search icon. The search results display the names that consist of your search string.


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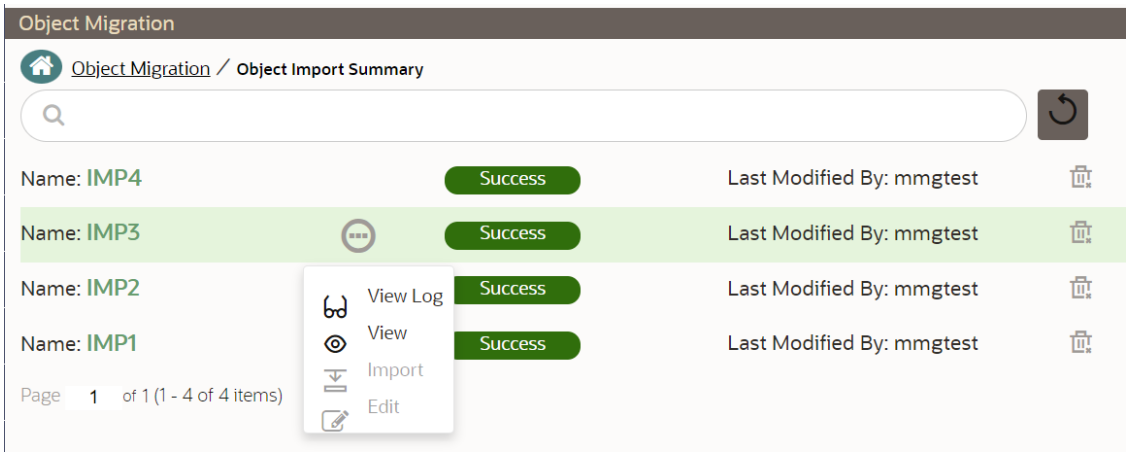
**Figure 22-5 Object Migration**




At the bottom of the page, you have controls to navigate the search entries and also specify the number of entries available on a single page.

## Create Import Object Definitions for Migrations

You can create Import Object definitions for migration for the following object types.

- Batch Group
- Threshold
- PMF Process
- Batch
- Pipeline
- Schedule
- Job

To create a definition for import of objects to be migrated, do as follows:

1. Click **Add** in the **Object Import Summary**page to display the **Migration Definition window**.


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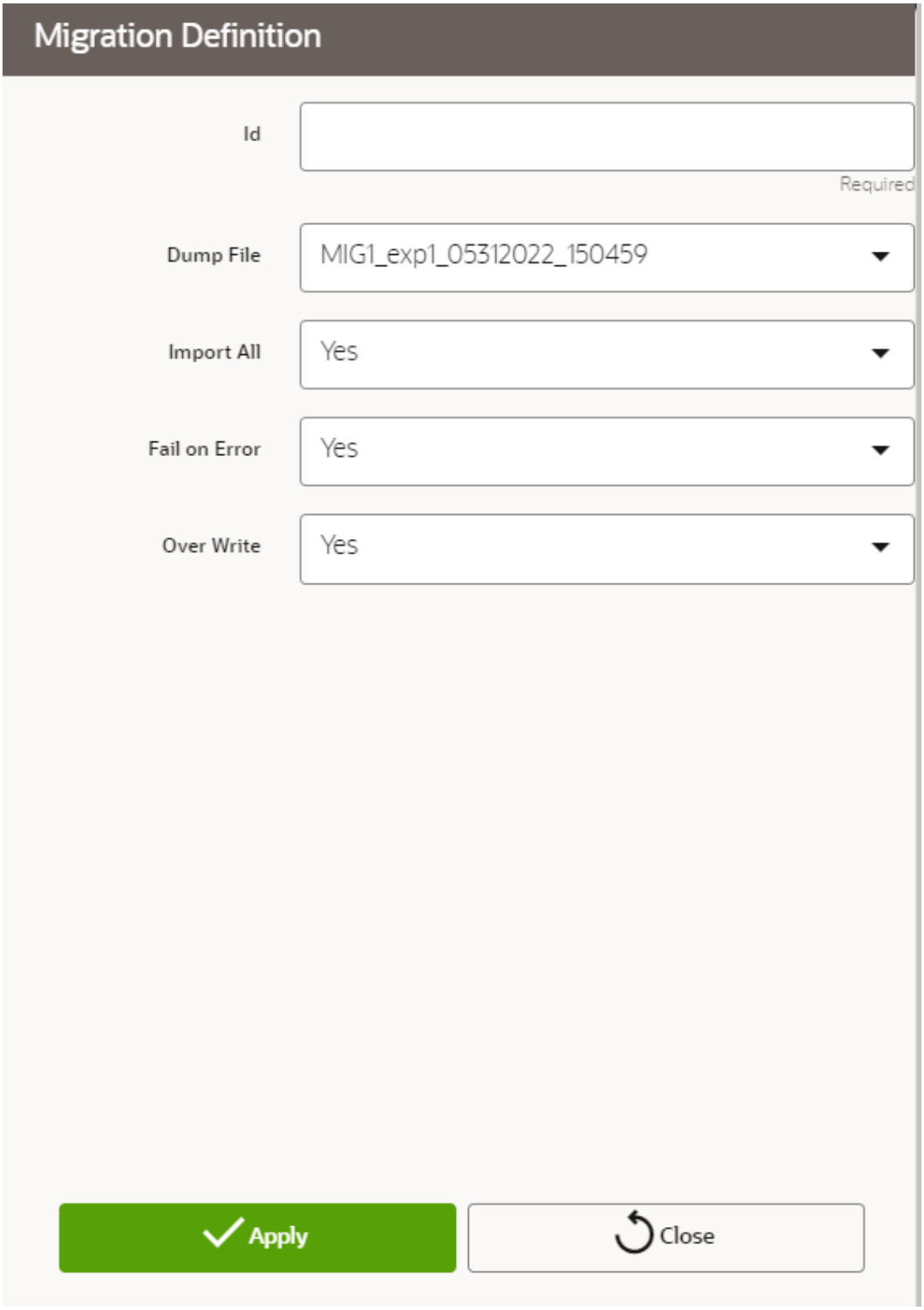
**Figure 22-6 Migration Definition window**




2. In the **Migration Definition window**, enter the details for the following:
   - **ID**: Enter a valid name for the new migration import definition. This is a unique identifier.
   - **Dump File**: Select the dump file to be utilized for creating the Migration Import Definition.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3. **Import All**: Select an option to import the nodes that are associated with the selected object type.

   You can edit this option if required, in the **Object Selection**page.

**Figure 22-7 Object Selection page**




   - **Yes** - Imports all the nodes that are included in the dump file.
   - **No** - Imports only those nodes that you can select in the Object Selection page.

4. **Fail on Error**: Select an option to proceed with the definition creation in case of an error.

   You can edit this option if required, in the **Object Selection**page.

   - **Yes** - Stops the creation process, if error is generated.
   - **No** - Creates the import definition even when error is generated. The node with the error is not included in the object creation.

5. **Overwrite**: Select an option to overwrite the existing definition file.

   You can edit this option if required, in the **Object Selection**page.

   - **Yes** - Replaces the existing Import definition.
   - **No** - Creates a new Import definition.

6. Click **Apply** to save the details.

   The **Object Selection** page is displayed.

7. In the **Object Selection** page, click **Add Members**, to add objects associated with specific object types.

8. In the **Object Selection** page, select the required **Object Type** from the **Object Types** drop-down list.

   The object types listed are, Schedule, Batch group, Batch, Pipeline, Threshold, Job and PMF process. For more information about the object types, refer Migration Object Types.

   You can also enter the first few letters in **Search** to add a particular object from a selected Object type.

   The list of objects is displayed.

9. Select the objects to be added to the Migrate Definition.

   You can select the objects only if you select **No** for **Import All**.

   The selected objects are added to the respective object type branch.

10. Click **Save** to create the Migrate Definition.

    A confirmation message is displayed, when the definition is saved successfully. The new migration definition is listed in the Object Import Summary page and the status is set to **Saved**.


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> **Note**
>
> If the migration definition object is not created successfully and the status is set to **Failed**, contact My Oracle Support of more information.

## View Migration Objects to be Imported

You can view and edit the migration objects from the Object Import Summary Page.

To view the list of imported migration objects associated with a migration definition, highlight the migration definition and click **Menu**button.

The following options are displayed.

**Table 22-3 Viewing Migration Import Objects**

| Field | Description |
|---|---|
| View Log | View the migration log details of the selected Migration Definition. For more information, refer to View Log of Migration Import Objects. |
| View | View the Object Details for a specific Migration Definition.<br>Click an object to view more details.<br>For more information, refer to Viewing Import Migration Object Details. |
| Export | Click **Export** to initiate Object Migration (Import) for a specific Migration Definition.<br>When the migration is completed, the status will change from Saved to Success.<br>For more information, refer to Importing Migration Objects. |
| Edit | Click **Edit** to view and edit the objects linked to a Migration Definition.<br>For more information, refer to Editing Migration Import Definitions. |

## View Log of Migration Objects Imported

To view the log information of a record of the definition for import of objects to be migrated, follow these steps. The view log facilitates you to view the log information of the definition for import of objects to be migrated with its status.

1. Highlight the migration definition and click **Menu** button and select **View Log**.

   The **View Log** page is displayed.

   The export migration status with the following details is displayed.

**Table 22-4 View Log of Migration Import Objects**

| Field | Description |
|---|---|
| Object Migration ID | The migration ID associated with the export object. |


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**Table 22-4 (Cont.) View Log of Migration Import Objects**

| Field | Description |
|---|---|
| Object Type | The object type of the export object. |
| Object Code | The object code associated with the export object. |
| Creation Date | The date of creation of the export object. |
| Created By | The User Id of the User who created the export object. |
| Status | The migration status of the export object.<br>• Success - Indicates that the export migration was completed successfully.<br>• Failed - Indicates that the export migration did not complete |

> **Note**
>
> The View Log Page for a migration object with status Saved will be empty

2. Click **OK** to close the window.

## View Details of Imported Migration Objects

To view the list of objects added to a specific Migration Definition:

1. Highlight the migration definition and click **Menu**button and select **View**.

   The list of migration objects added to the definition is displayed.

2. Double-click an object to view the object attribute details.

# Import Migration Objects

To export the list of objects added to a specific Migration Definition:

- Highlight the migration definition and click **Menu**button and select **Export**.

  After you export, the following types of status are displayed:

  - **Success**- When the object is migrated successfully.
  - **Failed**- When the object migration didn't complete.

> **Note**
>
> Object Migration (export) facilitates you to export a set of objects within the same setup or across different setups.

> **Note**
>
> Currently, if the user give production workspace a name during the import, the utility migrates the dump to the production workspace as well. This should be restricted, as the models in sandbox may or may not be promoted and the invalid status will be shown in the production.


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## Edit Imported Migration Definitions

You can edit the migration export objects that are not exported and their status is Saved or Failed. If the object is already exported and the status is set to Success, you cannot edit the object details.

To edit a record of the definition of export of objects to be migrated, follow these steps. You can add more objects to export or remove existing objects.

1. Highlight the migration definition and click **Menu** button and select **Edit**.

   The **Object Selection** window is displayed.
2. Update the required details.
3. In the **Object Selection** window, select the required **Object Type** from the **Object Types**drop-down list.

   The object types listed for the System Configuration tab are, Batch_Group, PMF_Process, Batch and Schedule. For more information about the object types, refer Migration Object Types.

   You can also enter the first few letters in **Search** to add a particular object from a selected Object type.

   The list of objects is displayed.
4. Select the objects to be added to the Migrate Definition or to be deleted from the Migration Definition.

   The selected objects are added/deleted to the respective object type branch.
5. Click **Save** to edit the Migrate Definition.

   A confirmation message is displayed, when the definition is saved successfully.

   The edited migration definition is listed in the Object Export Summary page and the status is set to Saved.
6. Click **Save** to update the changes.

## Delete Imported Migration Object Definitions

You can delete only a record that is set to Saved or Failed status and not a record that is in Success status.

To delete a migrate export object definition:

1. Highlight the record to be deleted and click the **Delete**button.
2. Click **Yes**to confirm and proceed with the deletion.

# Prerequisites to Migrate Objects

In order to migrate the objects, the users must be mapped to the **Object Migration Admin Group**.

> **Note**
>
> The Identity Administrator Group Users cannot migrate objects if they are not mapped to the **Object Migration Admin Group**.


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# Migration Object Types

You can migrate (import/export) the following Object Types by clicking the Object Migration icon on the left menu.

- Schedule
- Batch
- Batch Group
- Pipeline
- Threshold
- Job
- PMF_Process
- Roles
- Groups

## Schedule

Schedule provides the instruction to schedule the execution of defined processes. When a schedule is migrated, the associated batch is also migrated.

## Batch

A batch is a group of jobs that are scheduled to automatically execute at a preset interval of time, without any user's intervention. When a batch is migrated, the batch and the associated pipeline information are also migrated.

## Batch Group

A set of individual batches are consolidated to form a single Batch Group. When we migrate a Batch Group all the batches, tasks and pipeline information associated with that Batch Group are also migrated.

## Pipeline

A pipeline is an embedded data processing engine that runs inside the application to filter, transform, and migrate data on-the-fly. Pipelines are a set of data processing elements called widgets connected in series, where the output of one widget is the input to the next element.

## Threshold

The threshold limit associated with set variables values for scenarios in FCCM Cloud Service. These threshold values are set when scenarios are created or installed and can be changed, if required.

## Job

Jobs provide set of instructions to execute Workflow Pipelines, based on the set threshold values


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## PMF_Process

PMF_Processes are defined to sequence the Workflow Pipelines the applications, and to design the artifacts that participate in the Pipelines, to implement the Pipelines. Export of PMF_Process will take care of dependent metadata, such as data fields, transition rules associated to the PMF process, that are defined in PMF.

## Roles

Roles are used to map functions to a defined set of groups to ensure user access system security.

## Groups

Groups are used to map Roles. Specific User Groups can perform only set of functions associated with that group.


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# 23
# Data Transformation and Scenario Pipelines

Use the MMG Data Transformation Platform to author transformation and data pipelines, configure threshold sets, simulate conditions, manage jobs and batches, and inspect audit history. MMG DTP detection scenarios are distinct from STSA stress scenarios.

## Chapter contents

23.1 About Data Transformation Platform 23-2

Source: MMG 26.2.0 User Guide. Procedures, screenshots and examples are incorporated into this STSA 8.1.2.8.0 draft; release-specific statements retain their source status. FCCM/AML scenarios, roles and purge batches shown here are MMG source examples; their presence does not confirm that those assets are supplied with STSA.


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# 23.1 About Data Transformation Platform

Data Transformation Pipelines enable organizations to quickly respond to changes in regulations, adapt to new product introduction, counter more sophisticated money laundering techniques in a quick and cost-effective manner by removing dependency on Oracle to develop the scenarios and extensions most appropriate to their business requirements.

### Purpose

The purpose of the Data Transformation Platform is to provide Financial Institutions with full scenario configurability and extensibility, allowing them to quickly create scenario pipelines using complex logic, advanced configuration, leveraging extended data sources.

### User Personas

This guide is intended for users who are responsible for implementing the scenarios in line with the Risk analysis formulated by the compliance team and by Compliance Officers who need to understand the additional possibilities offered by scenarios based on data they are capturing, in order to make their AML program more effective and efficient. Oracle expects these users to be senior compliance officers, who have significant understanding of their data, the specific behaviors of interest, and the logic required to generate meaningful alerts.


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# Getting Started with Data Transformation Pipelines

This section explains how to create, copy, and configure data transformation pipelines, and how to use the widgets available in the DTP Pipeline Designer.

To access the DTP Pipeline Designer, follow these steps:

1. In the Applications landing page, click the **Navigation Menu** to access the Navigation List. The Navigation List displays the list of modules.
2. Expand **Business Processes** and then **Data Transformation Pipeline** in the Navigation List to view DTP menu options.
   - DTP Pipeline Designer
   - DTP Threshold Manager
   - DTP Jobs
   - DTP Audit History

To access Administrator functionalities, expand **Application Administration** and then Data Transformation Pipeline Admin.

These features are described in this guide.

## Downloading DTP Pipelines

The Download Pipelines feature enables you to download a version of an existing pipeline. The pipelines are saved in JSON format which can be imported into the application.

This is frequently used to download a pipeline from a non-production environment and then import the pipeline into a production environment.

1. Navigate to the DTP Pipeline Designer page.
2. Click the **Action** button corresponding to the pipeline that you want to download.
3. Click **Download** .
4. Select **JSON**. The Download Pipeline pane displays.
5. Enter the version of the pipeline to download in the **Pipeline Version** field. You can only enter numerals here.

> **Note**
>
> This should be the same as the current version of the pipeline you are downloading.

6. Click **Download**.
7. Select a folder to save the pipeline.
8. Enter a file name, using the following naming convention: fileName . filenameformat : pipelineName_versionNumber.json
9. Click **Save**. The pipeline JSON is downloaded.


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## Importing DTP Pipelines

You can import a new JSON version of an existing Data Transformation pipeline. This is frequently done to import a pipeline from a non-production environment into a production environment.

Before importing a pipeline, you must first download the pipeline using the steps in Downloading DTP Pipelines.

> **Note**
>
> You cannot import a pipeline that already exists in the environment. Before importing a pipeline, verify that this pipeline does not already exist in the environment. If so, delete the pipeline before importing the new version.

To import a pipeline, follow these steps:

1. Navigate to the DTP Pipeline Designer page.
2. Click **Import**. The Import pane opens.
3. Enter the required version of the pipeline to import in the **Version** field. You can also use the arrows to select the version number.

   The Version number provided should be the same as that in the downloaded .JSON file.
4. Drag and Drop the .JSON file of the pipeline to import into the box. You can also click the **Drag and Drop** box to browse to the location of the .JSON file. The pipeline should have the following naming convention: fileName . filenameformat : pipelineName_versionNumber.json

   > **Note**
   >
   > You can only import the .JSON file of a DTP pipeline.
5. Click **Import**. The pipeline is imported and added to the My Pipelines list.

## Copying DTP Pipelines

You can copy an existing pre-configured or user-configured pipeline and then configure it to meet your specific business requirements. This reduces the effort of creating and configuring a new pipeline when you only need to modify a few components of the pipeline.

Pre-configured pipelines that are included out-of the box cannot be modified. In order to customize these pipelines, you must first create a copy of those pipelines and save it as a new pipeline. You can then configure the newly copied pipeline according to your requirements.
To copy a pipeline, follow these steps.

1. Navigate to the DTP Pipeline Designer page.
2. Click the **Action** button  corresponding to the pipeline that you want to copy.


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3. Click **Copy** . The Copy Pipeline pane displays.
4. Provide the details as described in the following table.

**Table 23-1 Fields for Copying Pipelines and their Descriptions**

| Field | Description |
|---|---|
| Name | Displays the name of the pipeline that you want to copy. You cannot modify this field. |
| Copy As | Enter the name for the new pipeline that you want to create by copying the existing pipeline. This field allows only the following characters: A-Z a-z 0-9 '-' For example, Abc-123 or Abc123. |
| Pipeline Focus | Displays the focus for the pipeline that you want to copy. This will be the focus for the new pipeline. You cannot modify this field. |
| Search Tags | Enter the keywords for the pipeline. These keywords can be used as search tags while searching for a pipeline. Search tags are also used to group pipelines of the same type. These search tags appear as filters in the dashboard. |
| Description | Enter the description for the pipeline. |

5. Click **Save**. The pipeline is copied with all widgets and values provided in the original pipeline.

   You can now modify these components, if desired. See Editing DTP Pipelines for more information.

> **Note**
>
> When editing a pipeline, consider the impact your changes may have on subsequent widgets in the pipeline.
> For example, removing a mapped table or column in the Data Forge may impact how an existing Aggregator functions.

## Add DTP Pipelines (MMG)

You can add a new pipeline.

To add a new pipeline, follow these steps:

1. Navigate to the DTP Pipeline Designer page.
2. Click **Add Pipeline**. The Add Pipeline pane opens.
3. Provide the details as described in the following table.


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**Table 23-2 Fields for Creating Pipelines and their Descriptions**

| Field | Description |
|---|---|
| Name | Enter the name for the pipeline. This field allows only the following characters: A-Z a-z 0-9 '-' For example, Abc-123 or Abc123. |
| Pipeline Type | Select **Data Transformation** from the **Pipeline Type** drop-down list. |
| Focus | Select the **Focus** for your pipeline from the drop-down list. For more information about Focuses, see Creating Focus Types. |
| Add Search Tags | Enter the keywords for the pipeline. These keywords can be used as search tags while searching for a pipeline. Search tags are also used to group pipelines of the same type. These search tags appear as filters in the Pipeline page. |
| Description | Enter the description for the pipeline. |

4. Click **Create**. A new pipeline is created and displayed in the Pipeline page. You can perform the required configurations in the newly created pipeline using the Hamburger menu or by right-clicking on the canvas to view available widgets.

   For more information about widgets available in DTP pipelines, see Widgets in Data Transformation Pipelines.

5. Click **Save** to save the pipeline.

## Editing DTP Pipelines

You can configure user-defined pipelines to better address your business needs as requirements change.

> **Note**
>
> Pre-configured pipelines cannot be edited. You can only edit user-defined pipelines.

To edit pipelines, follow these steps:

1. Navigate to the DTP Pipeline Designer page.
2. Click the pipeline name of the pipeline you want to edit. The DTP Pipeline Designer displays the widgets used in this pipeline.
3. Perform the required configurations using the Hamburger menu or by right-clicking on the canvas to view available widgets.

   For more information about widgets available in DTP pipelines, see Widgets in Data Transformation Pipelines.

> **Note**
>
> When editing a pipeline, consider the impact your changes may have on subsequent widgets in the pipeline. For example, removing a mapped table or column in the Data Forge may impact how an existing Aggregator functions.


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4. Click **Save** to save the pipeline.

## Editing Pipeline Descriptions

You can edit the description and search tags for user-created pipelines.

> **Note**
>
> Pre-configured pipelines cannot be edited. You can only edit user-configure pipelines

To edit the description and search tags, follow these steps:

1. Navigate to the DTP Pipeline Designer page.
2. Click the Action button  corresponding to the pipeline that you want to copy.
3. Click **Edit** . The Edit Pipeline pane displays.
4. Modify the required details.

**Table 23-3 Fields for Editing Pipelines and their Descriptions**

| Field | Description |
|---|---|
| Name | Displays the name of the pipeline that you want to edit. You cannot modify this field. |
| Pipeline Focus | Displays the focus for the pipeline that you want to edit. This will be the focus for the new pipeline. You cannot modify this field. |
| Search Tags | Add or remove keywords for the pipeline. These keywords can be used as search tags while searching for a pipeline. Search tags are also used to group pipelines of the same type. These search tags appear as filters in the dashboard. |
| Description | Edit the description for the pipeline. |

5. Click **Save**.

# Deleting DTP Pipelines

You can delete a pipeline, if required for your implementation.

To delete a pipeline, follow these steps:

1. Navigate to the DTP Pipeline Designer page.
2. Click the **Action** button  corresponding to the pipeline that you want to delete.
3. Click **Delete** corresponding to the pipeline that you want to delete. A dialog box opens.
4. Enter a comment explaining why you are deleting the pipeline.
5. Click **Delete**. The selected pipeline is deleted.


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# Widgets in Data Transformation Pipelines

Depending on the pipeline type, specific widgets are available in the widgets pane of the pipeline. This topic describes the widgets in Data Transformation pipelines.

The following table describes the widgets available in Data Transformation pipelines.

**Table 23-4 Data Transformation Pipeline – Widgets and Descriptions**

| Widget | Name | Description |
|---|---|---|
|  | Calendar | Use this widget to add a Calendar, which allows you to designate and configure the schedule the scenario pipeline should be run according to. |
|  | Data Forge | Use this widget to select the source(s) (Tables) which form the dataset to be further used in the pipeline. |
|  | Business Filter | Use this widget to filter the data in the pipeline to create a subset of the data records which are available by applying the business filters. This allows you to search and analyze behaviors of interest. |
|  | Data Transformation | Use this widget to write complex expressions and transformation in Python. |
|  | Aggregator | Use this widget to define aggregators using available aggregations in the widget. |
|  | Evaluation | Use this widget to configure an evaluation. Evaluations are used to define conditions for the aggregations that are defined in the aggregator. Relevant data (aggregators) is compared against these conditions using logical comparisons to identify the early signals of increasing risk exposures in various areas of an enterprise, resulting in event generation. |
|  | Create Event | Use this widget to produce an event. This widget accepts inputs from evaluation and generates events based on evaluated output data from the evaluation widget. |
|  | Using the Additional Information Widget | Use this widget to provide specific types of information related to entities involved in an event, which can help investigators by displaying relevant information about the entities involved, offering a more comprehensive view of the event. |

## Using the Calendar Widget

The Calendar widget allows you to designate and configure the calendar for the scenario's look back and frequency periods.

Before adding or configuring a calendar, you must first have created the pipeline.

1. In the Pipeline Designer page, select the pipeline you want to add or modify the calendar for. The Pipeline Canvas displays.


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2. Right-click on the Canvas to display the list of widgets. Select **Calendar** . The Calendar widget is added to the pipeline Canvas. You can drag and drop the widget within the Canvas as needed.

3. Click **Options** then click **Edit** . The Calendar pane displays.

4. Provide the details as described in the following table.

**Table 23-5 Fields for Creating Calendars and their Descriptions**

| Field | Description |
|---|---|
| Name | Enter the name for the calendar. This field allows only the following characters: A-Z a-z 0-9 '_' For example, Abc_123 or Abc 123 |
| Lookback Type | Select the Lookback Type used in this pipeline using the drop-down list. This is the range of days of data monitored in each run of the detection process. Options include Days or Months. This controls the unit in which both the lookback period and frequency period are expressed. |
| Days | Select either **Calendar Days** or **Business Days** from the drop-down list. |
| Weekdays | Select all the days which should be considered Week Days from the list. |
| Holiday Master | Select the applicable holidays which should be considered in this calendar. This section is populated by the data provided in the FCC_AM_HOLIDAY_MASTER table. For more about how this table is populated, see AMLHolidayMasterDataLoad Batch Details. |

5. Click **Save**. A confirmation message displays.

## Using the Data Forge Widget

The Data Forge widget allows you to select the source(s) (Tables) which form the dataset to be further used in the pipeline.

Before adding or configuring a Data Forge, you must first have created the pipeline.

1. In the Pipeline Designer page, select the pipeline where you want to add or modify the Data Forge. The Pipeline Canvas displays.

2. To add a Data Forge to a Calendar, click **Add To** , and then select **Data Forge** .
   - Alternately, you can right-click on the Canvas to display the list of widgets, select **Data Forge** and associate the Data Forge with the Calendar.
   - You can also use the hamburger menu on the left side to display the Node Picker, which lists any externalized data forges already created. Drag and drop the data forge to the pipeline as desired.

3. Click **Options** then click **Edit** . The Data Forge pane displays.

4. Under **Basic Configuration**, provide the following details:


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a. Enter the **Name** for the Data Forge. This field allows only the following characters: A-Z a-z 0-9 '_' For example, Abc_123 or Abc 123

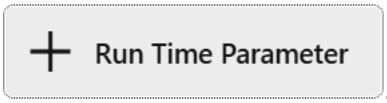
b. Select the **Type** from the drop-down list.

c. The **Externalize** selector allows you to externalize this data forge so that it can be used in additional pipelines. To access all externalized data forges, click the hamburger menu on the left side to display the Node Picker, which lists any externalized data forges already created.

d. Select one or more **Source Tables** using the drop-down list. Use the search bar in the list to find specific tables easily.

   To remove a source table from the Data Forge, click **Remove** ✕ beside the table name in the Source Tables field.

e. The **Connected Data Forges** lists any data forges which are associated with this data forge.

f. You can add a Runtime Parameter to the Data Forge by clicking **Add Run Time Parameter** 

. For more information about how to create run time parameters, see Creating Runtime Parameters.

5. The **Advanced Configuration** tab displays any Joins and Filters associated with this Data Forge.

> **Note**
>
> At least two sources (tables/dataforges) must be selected or connected for the join section to be enabled in the **Advance Configuration** tab.

- Expand **Joins** to view or create Joins associated with this Data Forge. The Output box provides a summary of all current Joins, with the Join configurations listed in detail below. You can add new Joins using the steps in Creating Joins.
- Expand **Filters** to view or create Filters associated with this Data Forge. The Output box provides a summary of all current Filters, with the Filter configurations listed in detail below. You can add new Filters using the steps in Creating Filters .

6. Use the **Mapped Columns** tab to view and map columns within the Data Forge. To map additional columns, follow these steps:

a. In the Mapped Columns tab, select a Source Table/Dataforge from the drop-down list. The available columns in this table display.

b. Select a Column from the list. Use the search bar in the list to find specific tables easily.

c. Click **Map**  to map the column. The column displays in the Mapped Columns list. You can edit the Mapped Column Name, if desired.

d. Alternately, click **Add Expression**  to open the Expression Builder. The Expression Builder is used to define free flow text filter conditions. To use the Expression Builder, follow these steps: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a. Select the required Dataset, Attribute and Runtime Parameters and operators. The resulting condition is displayed in the Condition field.

b. Click **Save**  to save the changes.

7. When you have finished configuring your Data Forge, click **Save**.

## Creating Joins

Joins allow you to combine or group multiple tables using various join operators.

1. In the Advanced Configuration tab, click **Add Join** 

. A new Join row is added to the list.
2. Use the **Include** selector to indicate whether or not this Join should be included.
3. Select a **Join Operator** from the drop-down list.

   The following types of join operators are available:

   - **Inner Join:** The Inner Join selects all rows from both participating tables as long as there is a match between the columns.
   - **Left Join:** The Left Join returns all rows from the left table, with the matching rows in the right table.
   - **Right Join:** The Right Join returns all rows from the right table, with the matching rows in the left table.
   - **Full Join:** The Full Join combines the results of both the left and right outer joins and returns all rows from the tables on both sides
4. Add a Join condition to the Join table by following these steps. You can add multiple groups and multiple conditions under each group.

   a. Click **Add Group** and then **Add Condition** .

   b. Specify rules for the condition. You can define the conditions using one of the following:

      - **Expression Builder:** You can form conditions using all the operators given in the Expression Builder. The Expression Builder is used to define free flow text filter conditions. To define a filter condition using the Expression Builder, follow these steps:

        i. Click **Exp**. The Expression Builder dialog box is displayed.

        ii. Select the required Dataset, Attribute and Runtime Parameters and operators. The resulting condition is displayed in the Condition field.

        iii. Click **Save**  to save the changes.

      - **Tables:** You can define conditions using the various columns of tables. The columns of the two tables are compared with each other using the required operators. To define conditions using tables, follow these steps:

        i. Select a Table or Data Forge for the left-hand side from the drop-down list.


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ii. Select a Column for the left-hand side from the drop-down list.

iii. Select an Operator from the drop-down list.

iv. Select a Table or Data Forge for the right-hand side from the drop-down list.

v. Select a Column for the right-hand side from the drop-down list.

- **Text:** You can define filter conditions using text. A particular column in a table is compared with the input text using the required operators. To define filter conditions using text, follow these steps:

  i. Click **Text**.

  ii. Select a Table or Data Forge for the left-hand side from the drop-down list.

  iii. Select a Column for the left-hand side from the drop-down list.

  iv. Select an Operator from the drop-down list.

  v. Enter the text in the field on the right-hand side.

## Creating Filters

You can configure a filter by defining various filter conditions.

1. In the Advanced Configuration tab, click **Add Group** 

. A new Filter Group row is added to the list.
2. Use the **Include** selector to indicate whether or not this Filter should be included.
3. Add a Filter condition by following these steps. You can add multiple groups and multiple conditions under each group.

   a. Click **Add Condition** 
.

   b. Specify rules for the condition. You can define the conditions using one of the following:

   - **Expression Builder:** You can form conditions using all the operators given in the Expression Builder. The Expression Builder is used to define free flow text filter conditions. To define a filter condition using the Expression Builder, follow these steps:

     i. Click **Exp**. The Expression Builder dialog box is displayed.

     ii. Select the required Dataset, Attribute and Runtime Parameters and operators. The resulting condition is displayed in the Condition field.

     iii. Click **Save** 
to save the changes.

   - **Tables:** You can define conditions using the various columns of tables. The columns of the two tables are compared with each other using the required operators. To define conditions using tables, follow these steps:

     i. Select a Table or Data Forge for the left-hand side from the drop-down list.

     ii. Select a Column for the left-hand side from the drop-down list.

     iii. Select an Operator from the drop-down list.


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iv. Select a Table or Data Forge for the right-hand side from the drop-down list.

v. Select a Column for the right-hand side from the drop-down list.

- **Text:** You can define filter conditions using text. A particular column in a table is compared with the input text using the required operators. To define filter conditions using text, follow these steps:

  i. Click **Text**.

  ii. Select a Table or Data Forge for the left-hand side from the drop-down list.

  iii. Select a Column for the left-hand side from the drop-down list.

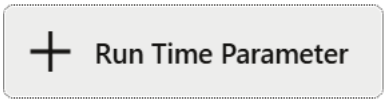
  iv. Select an Operator from the drop-down list.

  v. Enter the text in the field on the right-hand side.

## Creating Runtime Parameters

A Runtime parameter is a variable whose value can be defined and then called from within that same pipeline.

When you define a runtime parameter, you enter the default value to use. When you create or edit a job that includes a pipeline with runtime parameters, you can specify another value to override the default.
To create a runtime parameter, follow these steps:

1. Click **Add Runtime Parameter** 

. The New Runtime Parameter dialog box displays.
2. Provide the details as described in the following table:

**Table 23-6 Fields in New Runtime Parameter and their Descriptions**

| Field | Description |
|---|---|
| Name | Enter the name for the runtime parameter. Any spaces ( ) given in the Name field will be replaced with underscore (_) while saving the runtime parameter. |
| Description | Enter the description for the runtime parameter. |
| Datatype | Select the datatype for the runtime parameter from the drop-down list. |
| Default Value | Provide the default values for the runtime parameter. |

3. Click **OK**.The runtime parameter is created.

## Using the Business Filter Widget

The Business Filter widget to filter the data in the pipeline to create a subset of the data records which are available by applying the business filters. This allows you to search and analyze behaviors of interest

Before adding or configuring a Business Filter, you must first have created the pipeline and added either a Data Forge or Data Transformation.

1. In the Pipeline Designer page, select the pipeline where you want to add or modify the Business Filter. The Pipeline Canvas displays.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2. To add a Business Filter to a Data Forge, click **Add To** , and then select **Business Filter** . Alternately, you can right-click on the Canvas to display the list of widgets, select **Business Filter** and associate the Business Filter with the Data Forge.

> **Note**
>
> Business Filters must be associated with a Data Forge.

3. Click **Options**  then click **Edit** . The Business Filter pane displays.
4. Under **Basic Configuration**, provide the following details:
   a. Enter the **Name** for the business filter. This field allows only the following characters: A-Z a-z 0-9 '_' For example, Abc_123 or Abc 123
   b. **Connected Sources** lists the name of the connected Data Forge or Data Transformation.
5. Click **List of Filters** to add a Business Filter which has already been created for columns in your data set. Use the selectors to select one or more filters as needed.

   You can delete Business Filters from the List of Filters tab. Click **Delete** corresponding to the business filter that you want to delete. A dialog box opens. Click **Delete**.

   The system verifies that this business filter is not in use by any pipeline. If this filter is enabled in any pipeline, an error message displays and the business filter can not be deleted. Otherwise, the selected filter is deleted.
6. The **Questionnaire** tab lists the mapped filters, which are the filters you selected in the previous step. Based on the Filter Type, you can further refine the filter.
   a. For Include-Exclude types, use **Include** and **Exclude** to include or exclude one or more specific fields. For example, Include Retail Banking.
   b. For Yes-No types, use **Yes** and **No** to choose whether to enable this filter.
   c. For Filter types, use the drop-down lists to select the operators and code values. Select **Parameter** if you want to filter based on one or more specific fields.
   d. Use **Add Filter** to add a new business filter to the List of Filters.. For more information about how to add a filter, see Adding New Business Filters
   e. You can add additional conditions.
   f. You can add a Runtime Parameter to the Business Filter by clicking **Add Run Time Parameter** 

. For more information about how to create run time parameters, see Creating Runtime Parameters.
7. Click **Save**. A confirmation message displays.

## Adding New Business Filters

You can create new business filters as needed to meet your business requirements.

1. In the Business Filter pane, click **Add Filter**.
2. Provide the details as described in the following table.


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**Table 23-7 Fields for Creating Business Filters and their Descriptions**

| Field | Description |
|---|---|
| Name | Enter the **Name** for the business filter. This field allows only the following characters: A-Z a-z 0-9 '_' For example, Abc_123 or Abc 123 |
| Entities | Select which data set to create the filter from using the **Entities** drop-down list. |
| Attribute | Select the column on which you will be filtering the data from the **Attribute** drop-down list. All columns that were mapped in the Data Forge or Columns resulting from the connected Data Transformation widget will be displayed. |
| Filter Type | Select from the following options:<br>• **Include-Exclude**: Use the Input Codes section to select the input which should be included or excluded. Use the Input Codes section to feed the inputs in the form of CODES and logical Names. (for example, IND-Individual).<br>• **Yes-No**<br>• **Filter** |

3. Add the filter, using one of the following options. A confirmation message displays.
   - Click **Add** to add this Business Filter to the List of Filters.
   - Click **Add & Attach** to add this Business Filter to the List of Filters and attach it to the current data set.
4. When you have finished creating filter, click **Save**.

> **Note**
>
> Oracle recommends creating the following commonly used Business Filters in order to simplify future pipeline configuration.

**Table 23-8 Common Business Filters**

| Business Filter | Purpose |
|---|---|
| Account Business Type | Indicates which types of functional areas in which the account does business should be included when detecting behaviors of interest. |
| Account Holder Type | Indicates which types of internal or external customers should be included when detecting behaviors of interest. |
| Transaction Type | Indicates which transaction types are included when detecting behaviors of interest. |
| Transaction Purpose | Indicates which transaction purposes should be included when detecting behaviors of interest. |
| Party Role | Indicates which party roles are included when detecting behaviors of interest. |


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## Creating Custom Filters

The Custom Filter allows you to create business filters using the Expression Builder.

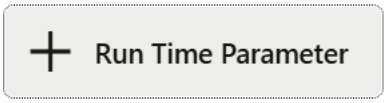
You can form filter conditions using all the operators given in the Expression Builder. The Expression Builder is used to define free flow text filter conditions. To define a filter condition using the Expression Builder, follow these steps:

1. In the Business Filter pane, click **Custom Filter**.
2. Select the required Dataset, Attribute, and operators to create the filter. The resulting condition is displayed in the **Condition Value** box.
3. Click **Save**  to create this filter
4. Create additional filters, as desired. When you have finished creating all the filters needed for this pipeline, click **Save** to save the changes.

## Creating Runtime Parameters

A Runtime parameter is a variable whose value can be defined and then called from within that same pipeline.

When you define a runtime parameter, you enter the default value to use. When you create or edit a job that includes a pipeline with runtime parameters, you can specify another value to override the default.
To create a runtime parameter, follow these steps:

1. Click **Add Runtime Parameter** 

. The New Runtime Parameter dialog box displays.
2. Provide the details as described in the following table:

**Table 23-9 Fields in New Runtime Parameter and their Descriptions**

| Field | Description |
|---|---|
| Name | Enter the name for the runtime parameter. Any spaces ( ) given in the Name field will be replaced with underscore (_) while saving the runtime parameter. |
| Description | Enter the description for the runtime parameter. |
| Datatype | Select the datatype for the runtime parameter from the drop-down list. |
| Default Value | Provide the default values for the runtime parameter. |

3. Click **OK**.The runtime parameter is created.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## Using the Data Transformation Widget

The Data Transformation widget allows you to write and import complex expression and transformation in Python and Java.

To use this widget effectively, you must have a working knowledge of scripting and Java or Python.

1. Create a pipeline, as shown in Adding DTP Pipelines.
2. Add a Data Transformation widget to the pipeline by right-clicking the Canvas to display the list of widgets and selecting **Data Transformation** .

   The Data Transformation widget can be stand-alone or associated with another widget, such as Business Filter, Evaluation, or Aggregator.

3. Click **Options**  then click **Edit** . The Data Transformation pane displays.
4. In Basic Configuration, provide the following details:
   a. Enter a **Name** for this Data Transformation.
   b. Select a **Runtime Parameter** from the drop-down list. To add a new Runtime Parameter, see Creating Runtime Parameters.
   c. For Data Transformations associated with another widget, map the columns in **Column Definition** using **Add Columns**. The **View Input Table Columns** shows which columns were mapped in the connected Data Forge.
5. The **Define Transformation** tab displays the script options.
   - **Standard**
     a. Select the **Type** from the drop-down list.
     b. Select the **Transform** from the drop-down list.
     c. Select **Interpreters** from the drop-down list. Python allows you call a custom python script.
        i. In the **Script** section, provide a description.
        ii. Enter or paste the python script you want to execute.

        > **Note**
        >
        > If this is a script you intend to reuse, you can create a template by clicking **Templates**, then **Add**. Enter the pertinent details about the script, enter or paste the script into the box, and click **Save**. Existing templates can be modified by clicking **Edit**. Editing a template updates the script in every pipeline which uses this template.

        To use an existing template, select **Use Template** and select the desired template from the **Script** drop-down list.
        iii. Click **Save**.
   - Selecting **Custom** allows you to create a notebook.


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Notebooks allow you to add and run paragraphs, invalidate session, edit, add, export the notebook, and so on. To understand the icons which display in the Notebook, see Common Screen Elements.

a. Click **Add Python Paragraph** to add a paragraph in the notebook and fetch the runtime parameters. This is available for all the interpreters.

b. Add paragraphs to the Notebook as desired.

c. Click **Play** to run the script and display the label.

6. You can import an existing notebook by selecting **Import Notebook**.
   - Click **Import Archive File** to select the .dsnb file from the file selector dialog and select a file. Click **Open**.
   - OR
   - Drag and drop the file into the **Import Archive File** field.

## Common Screen Elements in the Notebook

This topic describes common screen elements in the notebook that can be used to perform quick actions when preparing and executing the notebooks.

### Elements in the Notebook

| Icon Name | Action/Description |
|---|---|
| Modify Notebook  | Modifies the details of a notebook, such as a name, description, and (or) tags. |
| Hide Code  | Hides or shows the Code Section in all the paragraphs in a notebook. |
| Hide Result  | Hides or shows the Results Section in all the paragraphs in a notebook. |
| Re-initialize session  | Re-initialize the paragraph in a notebook.<br>**Note**: By default, the Start Widget gets executed automatically on clicking the Re-initialize icon. All other paragraphs need to be executed manually. |


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| Icon Name | Action/Description |
|---|---|
| Read-Only  | Sets the notebook to read-only mode.<br>**Note**: The notebook is protected from edit, clear result, delete, share, reset session, and run paragraphs in Read-only mode. |
| Write  | Set the notebook to write mode. |
| Run Paragraphs  | Executes all the paragraphs in a notebook in sequential order. |
| Invalidate Session  | Resets any connection or code executed in a notebook. |
| Delete Notebook  | To delete the selected notebook. |
| Clear Result  | Clears results for all the paragraphs in a notebook.<br>**Note**: This action clears all the results. You must rerun the paragraphs to view the results. |
| Clear Paragraph Dependencies  | Remove all defined paragraph dependencies. |
| Open as an iframe  | Opens a notebook in an Iframe. This allows a notebook to be embedded inside another webpage. |


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| Icon Name | Action/Description |
|---|---|
| Share Notebook  | Share the notebook with another user, user group, or role. |
| Clone Notebook  | Creates a copy of a notebook. All paragraphs in the current notebook are replicated in the new notebook. The cloned notebook is created with the default name, Copy of <Current Notebook Name>. |
| Export Notebook  | Export the notebook to your computer as a DNSB file. |
| Print Notebook  | To print a notebook in the PDF format and save it in your local machine. |
| Default Template  | To apply the overall look and feel of the notebook using the default template. |
| Layout  | Sets the preferred layout. The available layouts are Zeppelin and Jupyter. |
| Default Template  | Applies the overall look and feel of the notebook using the default template. |
| Show Panel  | Shows or hides the Paragraph Settings Bar Commands, Results Toolbar, and Settings Dialog for a selected paragraph in a panel to the notebook's right. |


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| Icon Name | Action/Description |
|---|---|
| Attach Credentials  | You can use this option to attach credentials (wallet and password) to the notebook to enable secure data access. |
| Versioning  | You can use this option to create versions for your notebook, which helps you analyze the changes based on the version control. |
| Run Paragraph  | To execute the code or query in a paragraph. |
| Enter Dependency Mode  | To add or remove dependent paragraphs. Paragraphs with dependent paragraphs are executed in the dependency order. |
| Comments  | To add comments to a paragraph. |
| Expand  | To expand a paragraph and view the paragraph in full-screen mode. |
| Show/Hide Line Numbers  | To show or hide line numbers in the code in a paragraph. **Note**:This button is applicable only to the code section. |
| Visibility  | To manage the visibility settings in a paragraph. It controls how a paragraph may be viewed by the author and other users who have access to the notebook. |


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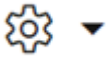
| Icon Name | Action/Description |
|---|---|
| Settings  | Users can perform the following actions:<br>• Resize the width of a paragraph<br>• Change the order of placement of the paragraphs by moving them up or down<br>• Run the all above or all below paragraph from the selected paragraph.<br>• Clear the paragraph result<br>• Open the notebook in Embedded window<br>• Disable the run action<br>• Clone the paragraph<br>• Delete a paragraph |

## Using the Aggregator Widget

Relevant data is compared against aggregators to identify the early signals of increasing risk exposures in various areas of an enterprise.

Before adding or configuring an Aggregator, you must first have created the pipeline, data forge, and business filter.

1. In the Pipeline Designer page, select the pipeline where you want to add or modify the Aggregator. The Pipeline Canvas displays.
2. To add an Aggregator to a Business Filter, click **Add To** , and then select **Aggregator**.

    Alternately, you can right-click on the Canvas to display the list of widgets, select **Aggregator** and associate the Aggregator with the Business Filter.

   An aggregator can be associated to another aggregator, if desired, to further refine the aggregated data. The fields will be populated only by data provided in the parent aggregator. When two aggregators are linked to another aggregator a new tab, **Aggregator Joins** , displays. For information on how to create aggregator joins, see Creating Aggregator Joins.
3. Click **Options**  then click **Edit** . The Aggregator pane displays.
4. Under **Basic Configuration**, enter the **Name** for the aggregator. This field allows only the following characters: A-Z a-z 0-9 '_' For example, Abc_123 or Abc 123s:
5. Click **List of Aggregators** to add an Aggregator which has already been created in your data set. Use the selectors to select one or more filters as needed. Use **View** to view the Aggregator Details.
6. The **Aggregators** tab lists the mapped aggregators, which are the aggregators you selected in the previous step. Click **Edit** to further define the aggregator.
   - Clicking **Edit** on a standard aggregator displays the add/edit aggregator tab, and the aggregator can be edited.
   - Clicking **Edit** on a custom aggregator opens the **Custom Aggregator**, which allows you to form aggregator conditions using all the operators given in the Expression Builder. The Expression Builder is used to define free flow text conditions. To define a condition using the Expression Builder, see Creating Custom Aggregators.
7. Click **Save**. A confirmation message displays.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## Adding and Editing Aggregators

You can create new aggregators or edit existing aggregators as needed to meet your business requirements.

1. Select the **Aggregator** from the drop-down list. This list contains the types of aggregation which are available for this Business Filter, such as Sum, Count or Average Monthly.
2. Enter a **Group By** clause. This allows you to group aggregators by the specified attribute across the pipeline. Grouping by a certain attribute will be applied to all aggregators used in the pipeline.
3. Select the **Attribute** from the drop-down list. This list contains the data forge tables and mapped columns.
4. Select the required **Look Back** option and provide the required Value details. You can further configure the Look Back period for the aggregator when building the expression.
5. Select the **Filter Attribute**.
6. Select the **Filter Operator**.
7. Select the required **Filter Value** option and provide the required details.
8. Add the aggregator using one of the following options. A confirmation message displays.
   - Click **Add** to add this aggregator to the List of Aggregators.
   - Click **Add & Attach** to add this aggregator to the List of Aggregators and attach it to the current data set.
9. When you have finished creating aggregators, click **Save**.

## Creating Custom Aggregators

The Custom Aggregator option allows you to create aggregators using the Expression Builder.

You can form aggregator conditions using all the operators given in the Expression Builder. The Expression Builder is used to define free flow text aggregator conditions. To define an aggregator condition using the Expression Builder, follow these steps:

1. In the Aggregator pane, click **Custom Aggregator**.
2. Enter the **Name** for the Aggregator. This field allows only the following characters: A-Z a-z 0-9 '_' For example, Abc_123 or Abc 123.
3. Select the required Attributes and Operators to create the Aggregator. The resulting condition is displayed in the **Condition Value** box.
4. Select the required **Look Back** option and provide the required Value details. You can further configure the Look Back period for the aggregator when building the expression.
5. Add the aggregator using one of the following options. A confirmation message displays.
   - Click **Add** to add this aggregator to the List of Aggregators.
   - Click **Add & Attach** to add this aggregator to the List of Aggregators and attach it to the current data set.
6. When you have finished creating aggregators, click **Save**.


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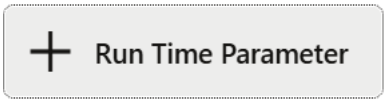
## Creating Runtime Parameters

A Runtime parameter is a variable whose value can be defined and then called from within that same pipeline.

When you define a runtime parameter, you enter the default value to use. When you create or edit a job that includes a pipeline with runtime parameters, you can specify another value to override the default.
To create a runtime parameter, follow these steps:

1. Click **Add Runtime Parameter** 

. The New Runtime Parameter dialog box displays.
2. Provide the details as described in the following table:

**Table 23-10 Fields in New Runtime Parameter and their Descriptions**

| Field | Description |
|---|---|
| Name | Enter the name for the runtime parameter. Any spaces ( ) given in the Name field will be replaced with underscore (_) while saving the runtime parameter. |
| Description | Enter the description for the runtime parameter. |
| Datatype | Select the datatype for the runtime parameter from the drop-down list. |
| Default Value | Provide the default values for the runtime parameter. |

3. Click **OK**.The runtime parameter is created.

## Creating Aggregator Joins

When two aggregators are linked to another aggregator you should create Aggregator Joins.

This tab will only display when two parent aggregators are associated with a child aggregator.

1. In the Aggregator Joins tab of the Aggregator pane, click **Add Join** 

. A new Join row is added to the list.
2. Use the **Include** selector to indicate whether or not this Join should be included in this aggregator.
3. Select a **Join Operator** from the drop-down list.

   The following types of join operators are available:

   - **Inner Join:** The Inner Join selects all rows from both participating tables as long as there is a match between the columns.
   - **Left Join:** The Left Join returns all rows from the left table, with the matching rows in the right table.
   - **Right Join:** The Right Join returns all rows from the right table, with the matching rows in the left table.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- **Full Join:** The Full Join combines the results of both the left and right outer joins and returns all rows from the tables on both sides

4. Add a Join condition to the Join table by following these steps. You can add multiple groups and multiple conditions under each group.

   a. Click **Add Group** and then **Add Condition** .

   b. Specify rules for the condition. You can define the conditions using one of the following:

      - **Expression Builder:** You can form conditions using all the operators given in the Expression Builder. The Expression Builder is used to define free flow text filter conditions. To define a filter condition using the Expression Builder, follow these steps:

        i. Click **Exp**. The Expression Builder dialog box is displayed.

        ii. Select the required Dataset, Attribute and Runtime Parameters and operators. The resulting condition is displayed in the Condition field.

        iii. Click **Save**  to save the changes.

      - **Tables:** You can define conditions using the various columns of tables. The columns of the two tables are compared with each other using the required operators. To define conditions using tables, follow these steps:

        i. Select a Table or Data Forge for the left-hand side from the drop-down list.

        ii. Select a Column for the left-hand side from the drop-down list.

        iii. Select an Operator from the drop-down list.

        iv. Select a Table or Data Forge for the right-hand side from the drop-down list.

        v. Select a Column for the right-hand side from the drop-down list.

      - **Text:** You can define filter conditions using text. A particular column in a table is compared with the input text using the required operators. To define filter conditions using text, follow these steps:

        i. Click **Text**.

        ii. Select a Table or Data Forge for the left-hand side from the drop-down list.

        iii. Select a Column for the left-hand side from the drop-down list.

        iv. Select an Operator from the drop-down list.

        v. Enter the text in the field on the right-hand side.

## Using the Evaluation Widget

Evaluations are used to define conditions for the measures that are defined in the aggregator. Evaluations perform logical comparisons against these conditions to generate events.

Before adding or configuring an Evaluation, you must first have created the pipeline, data forge, business filter, and aggregator.

1. In the Pipeline Designer page, select the pipeline where you want to add or modify the Evaluation. The Pipeline Canvas displays.


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2. To add an Evaluation to an Aggregator, click **Add To** , and then select **Evaluation** . Alternately, you can right-click on the Canvas to display the list of widgets, select **Evaluation** and associate the Evaluation with the Aggregator.
3. Click **Options**  then click **Edit** . The Evaluation pane displays.
4. Under **Basic Configuration**, enter the **Name** for the Evaluation. This field allows only the following characters: A-Z a-z 0-9 '_' For example, Abc_123 or Abc 123s:
5. The **Advanced Configuration** tab displays the detection logic and event generation criteria. Event generation criteria are shown in formula-style expressions in the Output box.
6. You can add multiple groups and multiple conditions under each group. Add conditions to the Group by clicking **Add Group** and then **Add Condition** 
7. Select the required Aggregator, operators, and conditions to build the evaluation. You can define the evaluation conditions using one of the following:
   - Expression Builder: You can form filter conditions using all the operators given in the Expression Builder. The Expression Builder is used to define free flow text conditions. To define a condition using the Expression Builder, follow these steps:
     a. Click **Exp**. The Expression Builder dialog box is displayed.
     b. Select the required Attribute and Runtime Parameters and operators. The resulting condition is displayed in the Condition Value field.
     c. Click **Save** to save the changes.
   - Text: You can define filter conditions using text. A particular column in a table is compared with the input text using the required operators. To define filter conditions using text, follow these steps:
     a. Click **Text**.
     b. Select an aggregator and operator, and then enter the text in the field on the right-hand side.
     c. Click **Save** to save the changes.
8. Use the Include selector to choose whether to include the condition group in this Evaluation.
9. Click **Save**. A confirmation message displays.

## Using the Create Event Widget

This widget accepts inputs from evaluation and generates events based on evaluated output data from the evaluation widget

In Scenario Pipelines, the Create Event widget is the final part of the pipeline and is used to produce an event. An event is a record of one or more pattern matches in a detection run, which is a signal for further investigation.

The Create Event widget can only be attached to an Evaluation widget. Multiple Evaluation widgets can be connected to one Create Event widget.
To create an event, follow these steps:


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1. In the Pipeline Designer page, select the pipeline where you want to add or modify the Create Event widget. The Pipeline Canvas displays.
2. To add Create Event to an Evaluation, click **Add To** , and then select **Create Event** . Alternately, you can right-click on the Canvas to display the list of widgets, select **Create Event** and associate the Create Event widget with the Evaluation.
3. Click **Options**  then click **Edit** . The Create Event pane displays.
4. Under **Basic Configuration**, select the **Event Type** from the drop-down list.

   You can add additional Event Types, using the steps in Creating Event Types.

   You must define the Focus associated with events generated from this widget.

   - Select the required **Data Forge** from the drop-down list. The values which display are based on the tables you mapped in the Data Forge widget.
   - Select the required **Focus Column** from the drop-down list. The values which display are based on the columns you mapped in the Data Forge widget.

     > **Note**
     >
     > You can only select one value in each drop-down list. The column selected should be a column which is unique to the table.

   - Use the **Bind IDs Configuration** tab to choose which types of information you want to display in the generated events. For more information about this tab, see Configuring Bind IDs.
5. Click **List of Highlights** to add Highlights which have already been created in your data set. This tab displays all relevant highlights from the aggregator. Use the selectors to select one or more highlights as needed.
6. The **Highlights** tab displays any Highlights associated with this pipeline.

   Highlights include the most salient facts associated with a match or alert, and are intended to aid with the understanding and possible disposition of an event. This tab includes the following details:

   - Highlight Name: This name will remain constant across the application.
   - New Highlight Name: A unique name for the highlight which will be used in the UI. This name can be changed as needed to meet your business requirements.
   - Column : The name of the column used to aggregate the highlight.

   You can add a new highlight by clicking **Add**, and following these steps:

   a. Select the **Attribute** from the drop-down list.
   b. Enter a **Name** for this highlight.
   c. Click **Save**.
7. The **Bind IDs Configuration** tab displays the tables and columns which you have mapped in the Data Forge widget. Use the selector to choose the Bind IDs you are associating with the Focus of the events generated by this widget.
8. When you have finished configuring the Create Event widget, click **Save**.


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## Configuring Bind IDs

Bind IDs are used to define the focal entity by selecting the data on which the analysis is centered.

These bindings determine the types of information which display in the generated events. To configure Bind IDs, follow these steps:

1. Click to open the **Bind IDs Configuration** tab in the Create Event pane of the Create Event widget. The Bind IDs Configuration tab displays all tables and columns which were mapped in the data forge for this pipeline.
2. Use the Bind ID selector to choose which types of information you want to display in the generated events. For example, to display Customer information in your events, select the **Customer Internal ID** column from the Customer Dimension table as your Bind ID.

> **Note**
>
> Bind IDs selected should be a column which is unique to the table.

The following table provides examples of some commonly selected Bind IDs.

**Table 23-11 Bind ID Examples**

| Focal Entity | Table Name | Column Name |
|---|---|---|
| Account | Account Dimension | Account Internal Identifier |
| Customer | Customer Dimension | Customer Internal Identifier |
| Transaction | Transactions | Transaction Internal ID |
| Account Profile | Account Summary | |

3. Click **Save**.

## Using the Additional Information Widget

The Additional Information widget allows you to provide additional context not considered by the scenario that will aid in investigating events generated by the Create Event widget in DTP scenario pipelines.

Oracle FCCM clients provide many types of data in Business tables which may not be required for a particular scenario pipeline to successfully generate an event. This information can provide essential context which will assist investigators as they disposition the events and cases. By adding one or more Additional Information widget, you can include this information in the event, so that it is available for compliance officers and investigators to consider.

The Additional Information widget can only be attached to a Create Event widget. Multiple Additional Information widgets can be connected to one Create Event widget.
To add an Additional Information widget, follow these steps:

1. In the Pipeline Designer page, select the pipeline where you want to add or modify the Additional Information widget. The Pipeline Canvas displays.
2. To add Additional Information to a Create Event widget, click **Add To**, and then select **Additional Information**.

   Alternately, you can right-click on the Canvas to display the list of widgets, select **Additional Information** and associate the widget with the Create Event widget.


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3. Click **Options** then click **Edit**. The Additional Information pane displays.
4. Under **Basic Configuration**, provide the following details:
   a. Enter the **Name** for the Additional Information widget. This field allows only the following characters: A-Z a-z 0-9 '_' For example, Abc_123 or Abc 123
   b. Select the **Source Entity Type** from the drop-down list.
   c. Select the **Target Entity Type** such as Customer, External Entity, Account Summary, and so on, from the drop-down list.
   d. Select one or more **Source Tables** using the drop-down list. Use the search bar in the list to find specific tables easily.

      The values which display in the Source Tables box are based on the tables you mapped in the Data Forge widget.

      To remove a source table, click **Remove** ✕ beside the table name in the Source Tables field.
   e. You can add a Runtime Parameter by clicking **Add Run Time Parameter**

      
      

      . For more information about how to create run time parameters, see Creating Runtime Parameters.
5. The **Advanced Configuration** tab displays any Joins and Filters associated with this widget

   > ⓘ **Note**
   >
   > At least two sources (tables/data forges) must be selected or connected for the join section to be enabled in the **Advance Configuration** tab.

   - Expand **Joins** to view or create Joins associated with this widget. The Output box provides a summary of all current Joins, with the Join configurations listed in detail below. You can add new Joins using the steps in Creating Joins.
   - Expand **Filters** to view or create Filters associated with this widget. The Output box provides a summary of all current Filters, with the Filter configurations listed in detail below. You can add new Filters using the steps in Creating Filters .
6. Use the **Mapped Columns** tab to view and map columns within the widget. To map additional columns, follow these steps:

   > ⓘ **Note**
   >
   > Mapped columns must be relevant from both the Source and Target tables.

   a. In the Mapped Columns tab, select a Source Table/Data forge from the drop-down list. The available columns in this table display.
   b. Select a Column from the list. Use the search bar in the list to find specific tables easily.


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c. Click **Map**  to map the column. The column displays in the Mapped Columns list. You can edit the Mapped Column Name, if desired.

d. Alternately, click **Add Expression**  to open the Expression Builder. The Expression Builder is used to define free flow text filter conditions. To use the Expression Builder, follow these steps:

a. Select the required Dataset, Attribute and Runtime Parameters and operators. The resulting condition is displayed in the Condition field.

b. Click **Save**  to save the changes.

7. When you have finished configuring your widget, click **Save**

## Creating Joins

Joins allow you to combine or group multiple tables using various join operators.

1. In the Advanced Configuration tab, click **Add Join** 

. A new Join row is added to the list.
2. Use the **Include** selector to indicate whether or not this Join should be included.
3. Select a **Join Operator** from the drop-down list.

   The following types of join operators are available:

   - **Inner Join:** The Inner Join selects all rows from both participating tables as long as there is a match between the columns.
   - **Left Join:** The Left Join returns all rows from the left table, with the matching rows in the right table.
   - **Right Join:** The Right Join returns all rows from the right table, with the matching rows in the left table.
   - **Full Join:** The Full Join combines the results of both the left and right outer joins and returns all rows from the tables on both sides
4. Add a Join condition to the Join table by following these steps. You can add multiple groups and multiple conditions under each group.

   a. Click **Add Group** and then **Add Condition** .

   b. Specify rules for the condition. You can define the conditions using one of the following:

      - **Expression Builder:** You can form conditions using all the operators given in the Expression Builder. The Expression Builder is used to define free flow text filter conditions. To define a filter condition using the Expression Builder, follow these steps:

        i. Click **Exp**. The Expression Builder dialog box is displayed.


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ii. Select the required Dataset, Attribute and Runtime Parameters and operators. The resulting condition is displayed in the Condition field.

iii. Click **Save**  to save the changes.

- **Tables:** You can define conditions using the various columns of tables. The columns of the two tables are compared with each other using the required operators. To define conditions using tables, follow these steps:

  i. Select a Table or Data Forge for the left-hand side from the drop-down list.

  ii. Select a Column for the left-hand side from the drop-down list.

  iii. Select an Operator from the drop-down list.

  iv. Select a Table or Data Forge for the right-hand side from the drop-down list.

  v. Select a Column for the right-hand side from the drop-down list.

- **Text:** You can define filter conditions using text. A particular column in a table is compared with the input text using the required operators. To define filter conditions using text, follow these steps:

  i. Click **Text**.

  ii. Select a Table or Data Forge for the left-hand side from the drop-down list.

  iii. Select a Column for the left-hand side from the drop-down list.

  iv. Select an Operator from the drop-down list.

  v. Enter the text in the field on the right-hand side.

## Creating Filters

You can configure a filter by defining various filter conditions.

1. In the Advanced Configuration tab, click **Add Group** 

. A new Filter Group row is added to the list.
2. Use the **Include** selector to indicate whether or not this Filter should be included.
3. Add a Filter condition by following these steps. You can add multiple groups and multiple conditions under each group.

   a. Click **Add Condition**  .

   b. Specify rules for the condition. You can define the conditions using one of the following:

   - **Expression Builder:** You can form conditions using all the operators given in the Expression Builder. The Expression Builder is used to define free flow text filter conditions. To define a filter condition using the Expression Builder, follow these steps:

     i. Click **Exp**. The Expression Builder dialog box is displayed.

     ii. Select the required Dataset, Attribute and Runtime Parameters and operators. The resulting condition is displayed in the Condition field.


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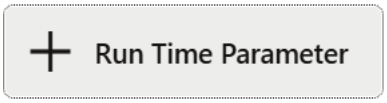
iii. Click **Save**  to save the changes.

- **Tables:** You can define conditions using the various columns of tables. The columns of the two tables are compared with each other using the required operators. To define conditions using tables, follow these steps:
  i. Select a Table or Data Forge for the left-hand side from the drop-down list.
  ii. Select a Column for the left-hand side from the drop-down list.
  iii. Select an Operator from the drop-down list.
  iv. Select a Table or Data Forge for the right-hand side from the drop-down list.
  v. Select a Column for the right-hand side from the drop-down list.
- **Text:** You can define filter conditions using text. A particular column in a table is compared with the input text using the required operators. To define filter conditions using text, follow these steps:
  i. Click **Text**.
  ii. Select a Table or Data Forge for the left-hand side from the drop-down list.
  iii. Select a Column for the left-hand side from the drop-down list.
  iv. Select an Operator from the drop-down list.
  v. Enter the text in the field on the right-hand side.

## Creating Runtime Parameters

A Runtime parameter is a variable whose value can be defined and then called from within that same pipeline.

When you define a runtime parameter, you enter the default value to use. When you create or edit a job that includes a pipeline with runtime parameters, you can specify another value to override the default.
To create a runtime parameter, follow these steps:

1. Click **Add Runtime Parameter** 

. The New Runtime Parameter dialog box displays.
2. Provide the details as described in the following table:

**Table 23-12 Fields in New Runtime Parameter and their Descriptions**

| Field | Description |
|---|---|
| Name | Enter the name for the runtime parameter. Any spaces ( ) given in the Name field will be replaced with underscore (_) while saving the runtime parameter. |
| Description | Enter the description for the runtime parameter. |
| Datatype | Select the datatype for the runtime parameter from the drop-down list. |
| Default Value | Provide the default values for the runtime parameter. |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3. Click **OK**.The runtime parameter is created.

# Managing Data Pipelines

Data pipelines prepare filtered data which can be used to create and run scenarios.

Data pipelines prepare data by selecting and joining data sources to create virtual tables of data, adding derived attributes to data, running derivations on the data to determine the risk associated with the entity, and so on.

## Widgets in Data Pipelines

The following table describes the widgets available in Data pipelines.

**Table 23-13 Data Pipeline – Widgets and Descriptions**

| Widget | Name | Description |
|---|---|---|
| **Figure 23-1 Persist Widget**  | Using the Persist Widget | Use this widget to write data to database tables so that it can be used in other pipelines. |
|  | Using the Data Forge Widget | Use this widget to select the source(s) (Tables) which form the dataset to be further used in the pipeline. |
|  | Using the Data Transformation Widget | Use this widget to write complex expressions and transformation in Python. |

## Using the Persist Widget

Use this widget to write data to database tables so that it can be used in other pipelines.

Before adding or configuring Persist, ensure that the Persist widget is properly connected to a Data Forge on the Pipeline Canvas; otherwise, it will not function as expected.

1. In the Pipeline Designer page, select the pipeline where you want to add or modify the Persist. The Pipeline Canvas displays.

2. To add a Persist to a Data Forge, click **Add To** , and then select **Persist**. 
   - Alternately, you can right-click on the Canvas to display the list of widgets, select **Persist**, and associate the Persist with the Data Forge.
   - You can also use the hamburger menu on the left side to display the Node Picker, which lists any externalized data forges already created. Drag and drop the data forge to the pipeline as desired.

3. Click **Options**  then click **Edit** . The Data Forge pane displays.


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4. Under **Basic Configuration**, provide the following details:

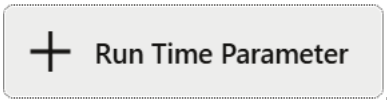
   Ensure that the Persist widget is connected to a Data Forge on the Pipeline Canvas. The Persist widget will not function unless it is associated with a Data Forge.

   a. In the **Name** field, enter a user-defined name for the Persist widget. (This field is not auto-populated.)

   b. Select the **Target Table** from the drop-down list.

   c. The **Source Data Forges** field displays the Data Forge selected in the Data Forge widget. This field is system-generated and disabled.

   > **Note**
   >
   > This value is inherited from the associated Data Forge and cannot be modified in the Persist widget.

   d. You can add a Runtime Parameter to the Data Forge by clicking **Add Run Time Parameter** 

. For more information about how to create run time parameters, see Creating Runtime Parameters.

5. The **Advanced Configuration** tab displays any Joins and Filters associated with this Data Forge.

   > **Note**
   >
   > At least two sources (dataforges) must be selected or connected for the join section to be enabled in the **Advance Configuration** tab.

   - Expand **Joins** to view or create Joins associated with this Data Forge. The Output box provides a summary of all current Joins, with the Join configurations listed in detail below. You can add new Joins using the steps in .Creating Joins
   - Expand **Filters** to view or create Filters associated with this Data Forge. The Output box provides a summary of all current Filters, with the Filter configurations listed in detail below. You can add new Filters using the steps in Creating Filters .

6. Use the **Map** tab to view and map columns within the Persist widget. To map columns, follow these steps:

   a. Click the **Map** tab.

   b. Under **Type**, select one of the following options:

      - **Incremental:** Maps data from the source dataset to the target table incrementally. Only new records are inserted during each run.
        For example, if 100 records are loaded on Day 1 and 110 records exist on Day 2, only the additional 10 new records are inserted into the target table.
      - **Full Load:** Inserts all filtered data into the target table along with Processing Date and Data Origin values during each run.

   c. The **Select a Data Forge** field displays a drop-down list of the Data Forges connected to the Persist widget. Select the required Data Forge from the list to define the source dataset for column mapping.

   d. The **Target Table** field displays the target table selected under Basic Configuration.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e. Do either of the following:

- If you select **Incremental** as Type, do the following:
  i. From the **Source Column** list, select the required column. Use the search bar to locate specific columns.
  ii. Select the corresponding Target Column.
  iii. In the **Selected Type** dialog box, select either Unique or Direct.
  iv. Click **Map**  to map the column. The column displays in the Mapped Columns list. You can edit the Mapped Column Name, if desired.
  v. The mapped column is displayed in the mapped columns list.
  vi. Repeat the steps to map additional columns, if required.
- If you select **Full Load** as Type, do the following:
  i. From the Source Column list, select the required column.
  ii. Select the corresponding Target Column.
  iii. Click **Map**  to map the column. The column displays in the Mapped Columns list. You can edit the Mapped Column Name, if desired.

> **Note**
>
> In Full Load, all filtered data is inserted into the target table during each run along with Processing Date and Data Origin.

f. Alternately, click **Add Expression**  to open the Expression Builder. The Expression Builder is used to define free flow text filter conditions. To use the Expression Builder, follow these steps:

a. Select the required Data Forge, Attribute and Runtime Parameters and operators. The resulting condition is displayed in the Condition field.

b. Click **Save**  to save the changes.

7. When you have finished configuring your Persist, click **Save**.

> **Note**
>
> If a batch fails or gets stuck, run the PurgeAMIngestion batch. While running the batch, edit the BatchRunId and pass the corresponding DTPIngestion batch run ID.

## Creating Joins

Joins allow you to combine or group multiple tables using various join operators.


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1. In the Advanced Configuration tab, click **Add Join** 

. A new Join row is added to the list.
2. Use the **Include** selector to indicate whether or not this Join should be included.
3. Select a **Join Operator** from the drop-down list.

   The following types of join operators are available:

   - **Inner Join:** The Inner Join selects all rows from both participating tables as long as there is a match between the columns.
   - **Left Join:** The Left Join returns all rows from the left table, with the matching rows in the right table.
   - **Right Join:** The Right Join returns all rows from the right table, with the matching rows in the left table.
   - **Full Join:** The Full Join combines the results of both the left and right outer joins and returns all rows from the tables on both sides
4. Add a Join condition to the Join table by following these steps. You can add multiple groups and multiple conditions under each group.

   a. Click **Add Group** and then **Add Condition** 
.

   b. Specify rules for the condition. You can define the conditions using one of the following:

      - **Expression Builder:** You can form conditions using all the operators given in the Expression Builder. The Expression Builder is used to define free flow text filter conditions. To define a filter condition using the Expression Builder, follow these steps:

        i. Click **Exp**. The Expression Builder dialog box is displayed.

        ii. Select the required Dataset, Attribute and Runtime Parameters and operators. The resulting condition is displayed in the Condition field.

        iii. Click **Save** 
to save the changes.
      - **Tables:** You can define conditions using the various columns of tables. The columns of the two tables are compared with each other using the required operators. To define conditions using tables, follow these steps:

        i. Select a Table or Data Forge for the left-hand side from the drop-down list.

        ii. Select a Column for the left-hand side from the drop-down list.

        iii. Select an Operator from the drop-down list.

        iv. Select a Table or Data Forge for the right-hand side from the drop-down list.

        v. Select a Column for the right-hand side from the drop-down list.
      - **Text:** You can define filter conditions using text. A particular column in a table is compared with the input text using the required operators. To define filter conditions using text, follow these steps:

        i. Click **Text**.


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ii. Select a Table or Data Forge for the left-hand side from the drop-down list.

iii. Select a Column for the left-hand side from the drop-down list.

iv. Select an Operator from the drop-down list.

v. Enter the text in the field on the right-hand side.

## Creating Filters

You can configure a filter by defining various filter conditions.

1. In the Advanced Configuration tab, click **Add Group** 

. A new Filter Group row is added to the list.
2. Use the **Include** selector to indicate whether or not this Filter should be included.
3. Add a Filter condition by following these steps. You can add multiple groups and multiple conditions under each group.

   a. Click **Add Condition** 
.

   b. Specify rules for the condition. You can define the conditions using one of the following:

   - **Expression Builder:** You can form conditions using all the operators given in the Expression Builder. The Expression Builder is used to define free flow text filter conditions. To define a filter condition using the Expression Builder, follow these steps:

     i. Click **Exp**. The Expression Builder dialog box is displayed.

     ii. Select the required Dataset, Attribute and Runtime Parameters and operators. The resulting condition is displayed in the Condition field.

     iii. Click **Save** 
to save the changes.

   - **Tables:** You can define conditions using the various columns of tables. The columns of the two tables are compared with each other using the required operators. To define conditions using tables, follow these steps:

     i. Select a Table or Data Forge for the left-hand side from the drop-down list.

     ii. Select a Column for the left-hand side from the drop-down list.

     iii. Select an Operator from the drop-down list.

     iv. Select a Table or Data Forge for the right-hand side from the drop-down list.

     v. Select a Column for the right-hand side from the drop-down list.

   - **Text:** You can define filter conditions using text. A particular column in a table is compared with the input text using the required operators. To define filter conditions using text, follow these steps:

     i. Click **Text**.

     ii. Select a Table or Data Forge for the left-hand side from the drop-down list.

     iii. Select a Column for the left-hand side from the drop-down list.


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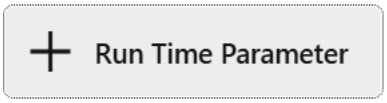
iv. Select an Operator from the drop-down list.

v. Enter the text in the field on the right-hand side.

## Creating Runtime Parameters

A Runtime parameter is a variable whose value can be defined and then called from within that same pipeline.

When you define a runtime parameter, you enter the default value to use. When you create or edit a job that includes a pipeline with runtime parameters, you can specify another value to override the default.
To create a runtime parameter, follow these steps:

1. Click **Add Runtime Parameter** 

. The New Runtime Parameter dialog box displays.
2. Provide the details as described in the following table:

**Table 23-14 Fields in New Runtime Parameter and their Descriptions**

| Field | Description |
|---|---|
| Name | Enter the name for the runtime parameter. Any spaces ( ) given in the Name field will be replaced with underscore (_) while saving the runtime parameter. |
| Description | Enter the description for the runtime parameter. |
| Datatype | Select the datatype for the runtime parameter from the drop-down list. |
| Default Value | Provide the default values for the runtime parameter. |

3. Click **OK**.The runtime parameter is created.

## Using the Data Forge Widget

The Data Forge widget allows you to select the source(s) (Tables) which form the dataset to be further used in the pipeline.

Before adding or configuring a Data Forge, you must first have created the pipeline.

1. In the Pipeline Designer page, select the pipeline where you want to add or modify the Data Forge. The Pipeline Canvas displays.
2. Click **Add To** and then select **Data Forge**. , and then select **Data Forge** .
   - Alternately, you can right-click on the Canvas to display the list of widgets, and then select Data Forge.
   - You can also use the hamburger menu on the left side to display the Node Picker, which lists any externalized data forges already created. Drag and drop the data forge to the pipeline as desired.
3. Click **Options**  then click **Edit** . The Data Forge pane displays.
4. Under **Basic Configuration**, provide the following details: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a. Enter the **Name** for the Data Forge. This field allows only the following characters: A-Z a-z 0-9 '_' For example, Abc_123 or Abc 123

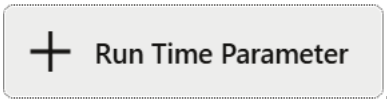
b. Select the **Type** from the drop-down list.

c. The **Externalize** selector allows you to externalize this data forge so that it can be used in additional pipelines. To access all externalized data forges, click the hamburger menu on the left side to display the Node Picker, which lists any externalized data forges already created.

d. Select one or more **Source Tables** using the drop-down list. Use the search bar in the list to find specific tables easily.

   To remove a source table from the Data Forge, click **Remove** ✕ beside the table name in the Source Tables field.

e. The **Connected Data Forges** lists any data forges which are associated with this data forge.

f. You can add a Runtime Parameter to the Data Forge by clicking **Add Run Time Parameter** 

. For more information about how to create run time parameters, see Creating Runtime Parameters.

5. The **Advanced Configuration** tab displays any Joins and Filters associated with this Data Forge.

> **Note**
>
> At least two sources (tables/dataforges) must be selected or connected for the join section to be enabled in the **Advance Configuration** tab.

- Expand **Joins** to view or create Joins associated with this Data Forge. The Output box provides a summary of all current Joins, with the Join configurations listed in detail below. You can add new Joins using the steps in Creating Joins.
- Expand **Filters** to view or create Filters associated with this Data Forge. The Output box provides a summary of all current Filters, with the Filter configurations listed in detail below. You can add new Filters using the steps in Creating Filters .

6. Use the **Mapped Columns** tab to view and map columns within the Data Forge. To map additional columns, follow these steps:

a. In the Mapped Columns tab, select a Source Table/Dataforge from the drop-down list. The available columns in this table display.

b. Select a Column from the list. Use the search bar in the list to find specific tables easily.

c. Click **Map**  to map the column. The column displays in the Mapped Columns list. You can edit the Mapped Column Name, if desired.

d. Alternately, click **Add Expression**  to open the Expression Builder. The Expression Builder is used to define free flow text filter conditions. To use the Expression Builder, follow these steps: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a. Select the required Dataset, Attribute and Runtime Parameters and operators. The resulting condition is displayed in the Condition field.

b. Click **Save**  to save the changes.

7. When you have finished configuring your Data Forge, click **Save**.

## Creating Joins

Joins allow you to combine or group multiple tables using various join operators.

1. In the Advanced Configuration tab, click **Add Join** 

. A new Join row is added to the list.
2. Use the **Include** selector to indicate whether or not this Join should be included.
3. Select a **Join Operator** from the drop-down list.

   The following types of join operators are available:

   - **Inner Join:** The Inner Join selects all rows from both participating tables as long as there is a match between the columns.
   - **Left Join:** The Left Join returns all rows from the left table, with the matching rows in the right table.
   - **Right Join:** The Right Join returns all rows from the right table, with the matching rows in the left table.
   - **Full Join:** The Full Join combines the results of both the left and right outer joins and returns all rows from the tables on both sides
4. Add a Join condition to the Join table by following these steps. You can add multiple groups and multiple conditions under each group.

   a. Click **Add Group** and then **Add Condition** .

   b. Specify rules for the condition. You can define the conditions using one of the following:

      - **Expression Builder:** You can form conditions using all the operators given in the Expression Builder. The Expression Builder is used to define free flow text filter conditions. To define a filter condition using the Expression Builder, follow these steps:

        i. Click **Exp**. The Expression Builder dialog box is displayed.

        ii. Select the required Dataset, Attribute and Runtime Parameters and operators. The resulting condition is displayed in the Condition field.

        iii. Click **Save**  to save the changes.

      - **Tables:** You can define conditions using the various columns of tables. The columns of the two tables are compared with each other using the required operators. To define conditions using tables, follow these steps:

        i. Select a Table or Data Forge for the left-hand side from the drop-down list.


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ii. Select a Column for the left-hand side from the drop-down list.

iii. Select an Operator from the drop-down list.

iv. Select a Table or Data Forge for the right-hand side from the drop-down list.

v. Select a Column for the right-hand side from the drop-down list.

- **Text:** You can define filter conditions using text. A particular column in a table is compared with the input text using the required operators. To define filter conditions using text, follow these steps:

  i. Click **Text**.

  ii. Select a Table or Data Forge for the left-hand side from the drop-down list.

  iii. Select a Column for the left-hand side from the drop-down list.

  iv. Select an Operator from the drop-down list.

  v. Enter the text in the field on the right-hand side.

## Creating Filters

You can configure a filter by defining various filter conditions.

1. In the Advanced Configuration tab, click **Add Group** 

. A new Filter Group row is added to the list.
2. Use the **Include** selector to indicate whether or not this Filter should be included.
3. Add a Filter condition by following these steps. You can add multiple groups and multiple conditions under each group.

   a. Click **Add Condition** 
.

   b. Specify rules for the condition. You can define the conditions using one of the following:

   - **Expression Builder:** You can form conditions using all the operators given in the Expression Builder. The Expression Builder is used to define free flow text filter conditions. To define a filter condition using the Expression Builder, follow these steps:

     i. Click **Exp**. The Expression Builder dialog box is displayed.

     ii. Select the required Dataset, Attribute and Runtime Parameters and operators. The resulting condition is displayed in the Condition field.

     iii. Click **Save** 
to save the changes.

   - **Tables:** You can define conditions using the various columns of tables. The columns of the two tables are compared with each other using the required operators. To define conditions using tables, follow these steps:

     i. Select a Table or Data Forge for the left-hand side from the drop-down list.

     ii. Select a Column for the left-hand side from the drop-down list.

     iii. Select an Operator from the drop-down list.


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iv. Select a Table or Data Forge for the right-hand side from the drop-down list.

v. Select a Column for the right-hand side from the drop-down list.

- **Text:** You can define filter conditions using text. A particular column in a table is compared with the input text using the required operators. To define filter conditions using text, follow these steps:

  i. Click **Text**.

  ii. Select a Table or Data Forge for the left-hand side from the drop-down list.

  iii. Select a Column for the left-hand side from the drop-down list.

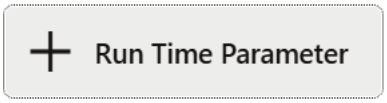
  iv. Select an Operator from the drop-down list.

  v. Enter the text in the field on the right-hand side.

## Creating Runtime Parameters

A Runtime parameter is a variable whose value can be defined and then called from within that same pipeline.

When you define a runtime parameter, you enter the default value to use. When you create or edit a job that includes a pipeline with runtime parameters, you can specify another value to override the default.
To create a runtime parameter, follow these steps:

1. Click **Add Runtime Parameter** 

. The New Runtime Parameter dialog box displays.
2. Provide the details as described in the following table:

**Table 23-15 Fields in New Runtime Parameter and their Descriptions**

| Field | Description |
|---|---|
| Name | Enter the name for the runtime parameter. Any spaces ( ) given in the Name field will be replaced with underscore (_) while saving the runtime parameter. |
| Description | Enter the description for the runtime parameter. |
| Datatype | Select the datatype for the runtime parameter from the drop-down list. |
| Default Value | Provide the default values for the runtime parameter. |

3. Click **OK**.The runtime parameter is created.

## Using the Data Transformation Widget

The Data Transformation widget allows you to write and import complex expression and transformation in Python and Java.

To use this widget effectively, you must have a working knowledge of scripting and Java or Python.

1. Create a pipeline, as shown in Adding DTP Pipelines.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2. Add a Data Transformation widget to the pipeline by right-clicking the Canvas to display the list of widgets and selecting **Data Transformation**  .

   The Data Transformation widget can be stand-alone or associated with another widget, such as Business Filter, Evaluation, or Aggregator.

3. Click **Options**  then click **Edit**  . The Data Transformation pane displays.
4. In Basic Configuration, provide the following details:
   a. Enter a **Name** for this Data Transformation.
   b. Select a **Runtime Parameter** from the drop-down list. To add a new Runtime Parameter, see Creating Runtime Parameters.
   c. For Data Transformations associated with another widget, map the columns in **Column Definition** using **Add Columns**. The **View Input Table Columns** shows which columns were mapped in the connected Data Forge.
5. The **Define Transformation** tab displays the script options.
   - **Standard**
     a. Select the **Type** from the drop-down list.
     b. Select the **Transform** from the drop-down list.
     c. Select **Interpreters** from the drop-down list. Python allows you call a custom python script.
        i. In the **Script** section, provide a description.
        ii. Enter or paste the python script you want to execute.

        > **Note**
        >
        > If this is a script you intend to reuse, you can create a template by clicking **Templates**, then **Add**. Enter the pertinent details about the script, enter or paste the script into the box, and click **Save**. Existing templates can be modified by clicking **Edit**. Editing a template updates the script in every pipeline which uses this template.

        To use an existing template, select **Use Template** and select the desired template from the **Script** drop-down list.
        iii. Click **Save**.
   - Selecting **Custom** allows you to create a notebook.
     Notebooks allow you to add and run paragraphs, invalidate session, edit, add, export the notebook, and so on. To understand the icons which display in the Notebook, see Common Screen Elements.
     a. Click **Add Python Paragraph** to add a paragraph in the notebook and fetch the runtime parameters. This is available for all the interpreters.
     b. Add paragraphs to the Notebook as desired.
     c. Click **Play** to run the script and display the label.
6. You can import an existing notebook by selecting **Import Notebook**.


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- Click **Import Archive File** to select the .dsnb file from the file selector dialog and select a file. Click **Open**.
- OR
- Drag and drop the file into the **Import Archive File** field.

## Common Screen Elements in the Notebook

This topic describes common screen elements in the notebook that can be used to perform quick actions when preparing and executing the notebooks.

### Elements in the Notebook

| Icon Name | Action/Description |
|---|---|
| Modify Notebook  | Modifies the details of a notebook, such as a name, description, and (or) tags. |
| Hide Code  | Hides or shows the Code Section in all the paragraphs in a notebook. |
| Hide Result  | Hides or shows the Results Section in all the paragraphs in a notebook. |
| Re-initialize session  | Re-initialize the paragraph in a notebook.<br>**Note**: By default, the Start Widget gets executed automatically on clicking the Re-initialize icon. All other paragraphs need to be executed manually. |
| Read-Only  | Sets the notebook to read-only mode.<br>**Note**: The notebook is protected from edit, clear result, delete, share, reset session, and run paragraphs in Read-only mode. |
| Write  | Set the notebook to write mode. |


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| Icon Name | Action/Description |
|---|---|
| Run Paragraphs  | Executes all the paragraphs in a notebook in sequential order. |
| Invalidate Session  | Resets any connection or code executed in a notebook. |
| Delete Notebook  | To delete the selected notebook. |
| Clear Result  | Clears results for all the paragraphs in a notebook.<br>**Note**: This action clears all the results. You must rerun the paragraphs to view the results. |
| Clear Paragraph Dependencies  | Remove all defined paragraph dependencies. |
| Open as an iframe  | Opens a notebook in an Iframe. This allows a notebook to be embedded inside another webpage. |
| Share Notebook  | Share the notebook with another user, user group, or role. |
| Clone Notebook  | Creates a copy of a notebook. All paragraphs in the current notebook are replicated in the new notebook. The cloned notebook is created with the default name, Copy of <Current Notebook Name>. |


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| Icon Name | Action/Description |
|---|---|
| Export Notebook  | Export the notebook to your computer as a DNSB file. |
| Print Notebook  | To print a notebook in the PDF format and save it in your local machine. |
| Default Template  | To apply the overall look and feel of the notebook using the default template. |
| Layout  | Sets the preferred layout. The available layouts are Zeppelin and Jupyter. |
| Default Template  | Applies the overall look and feel of the notebook using the default template. |
| Show Panel  | Shows or hides the Paragraph Settings Bar Commands, Results Toolbar, and Settings Dialog for a selected paragraph in a panel to the notebook's right. |
| Attach Credentials  | You can use this option to attach credentials (wallet and password) to the notebook to enable secure data access. |
| Versioning  | You can use this option to create versions for your notebook, which helps you analyze the changes based on the version control. |


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| Icon Name | Action/Description |
|---|---|
| Run Paragraph  | To execute the code or query in a paragraph. |
| Enter Dependency Mode  | To add or remove dependent paragraphs. Paragraphs with dependent paragraphs are executed in the dependency order. |
| Comments  | To add comments to a paragraph. |
| Expand  | To expand a paragraph and view the paragraph in full-screen mode. |
| Show/Hide Line Numbers  | To show or hide line numbers in the code in a paragraph.<br>**Note**:This button is applicable only to the code section. |
| Visibility  | To manage the visibility settings in a paragraph. It controls how a paragraph may be viewed by the author and other users who have access to the notebook. |
| Settings  | Users can perform the following actions:<br>• Resize the width of a paragraph<br>• Change the order of placement of the paragraphs by moving them up or down<br>• Run the all above or all below paragraph from the selected paragraph.<br>• Clear the paragraph result<br>• Open the notebook in Embedded window<br>• Disable the run action<br>• Clone the paragraph<br>• Delete a paragraph |


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# About Scenario Pipelines

Scenario Pipelines enable you to create scenarios by defining behavior that consists of events in a predetermined order.

You can use these events to thread multiple data streams together. Scenarios are used to identify behaviors of interest, potentially problematic behaviors with respect to securities, regulations, and possible money-laundering activities.

These scenarios consider whether the geographical location or entities involved warrant enhanced scrutiny; monitor activity between accounts, customers, correspondents, and other entities to reveal relationships that could indicate efforts to launder funds; address sudden, significant changes in transaction activity that could indicate money laundering or fraud; and detect other types of activities that are considered potentially suspicious or indicative of money laundering.

As part of configuring a scenario pipeline, parameters are defined, which are then tuned in the Threshold Manager.

## Pre-Configured DTP Scenario Pipelines

The application comes with the following ready-to-use, pre-configured scenario pipeline:

- Networks of Accounts and Entities and Customers- Account Focus
- CIB High Risk Geography Activity - Account Focus DTP
- Focal High Risk Entity - Customer Focus DTP
- Large Reportable Transaction - Customer Focus DTP
- Deviation from Peer Group - Total Activity - Account Focus

These templates are copies of existing Transaction Monitoring scenarios, included here as implementation samples demonstrating the technical capabilities of DTP pipeline widgets.

> **Note**
>
> Do not execute the same pipelines from **Data Transformation Pipeline** and **Scenario Pipeline** for the same MIS Date.

# Managing Threshold Sets (MMG)

FCCM Cloud Service uses tunable Thresholds to change variable values for scenarios.

When scenarios are created, thresholds are established. You can use the Threshold Editor to modify threshold values of scenarios, and create and edit threshold sets to fine-tune how that scenario finds matches, without changing the values defined at the data set or pattern level. These thresholds are applied to scenarios to find matches. Using this tool, you can enter a new value for a threshold (within a defined range) or reset the thresholds to their sample values.

Threshold sets allow you to run the same scenario multiple times against a variety of sources (for example, currencies, or jurisdictions) with separate threshold values for each source.


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> **Note**
>
> Changing threshold values can generate significantly more or fewer alerts, depending upon the modifications made.

## Accessing Threshold Sets

You can access the threshold sets through the Threshold Manager.

To access the All Threshold Sets page and view threshold sets, follow these steps:

1. In the Navigation List menu, click **Business Processes**, then click **Data Transformation Pipeline**.
2. Select **DTP Threshold Manager**. The All Threshold Sets page displays the complete list of threshold sets available in your implementation.
3. Select the check box for the threshold set you want to view, or click the threshold set name to view the threshold set details.

## Creating a Threshold Set

You can create new threshold sets in the Threshold Editor.

To create a new threshold set, follow these steps:

1. Navigate to the **Threshold Editor** page.
2. Click **Add**  in the top right corner. The New Threshold Set page displays.
3. Enter the following values:
   a. Enter a **Name** for this threshold set.
   b. The scenario associated with this threshold set displays additional configurable parameters. These parameters are specific to the selected scenario.
   c. Select one or more **Jurisdictions** for this threshold set using the drop-down list. Jurisdiction refers to the division of data in the database based on criteria such as geographical boundaries, legal entities, and so on.
   d. Select the **Period Type** used in this threshold set using the drop-down list. Options include Days or Months. By default, the period type is **Days**.
   e. Enter the **Lookback Period** for this threshold set. Lookback period refers to the number of days or months to lookback from the current date or time to create a time window which is used to consider cases for correlation.
   f. Enter the **Frequency Period** for this threshold set. Frequency period refers to how frequently the scenario should be run, by number of days or months.
   g. Enter any **Comments** you have for this threshold set.
   h. Enter the threshold values you want this threshold set to be updated with in the **New Value** field.
4. 
   - Click **Save**  to save the values. A new threshold set is created and a message displays: *New Threshold Set created successfully*.


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- Click **Save & Simulate**. A new threshold set is created, and the Create Simulator Conditions page displays. For more information about the Threshold Simulator, see Threshold Simulator.

## Copying a Threshold Set

Copy an existing threshold set before modifying the values.

To copy and modify an existing threshold set, follow these steps:

1. Navigate to the Threshold Manager page.
2. Select the check box for the threshold set you want to copy.
3. Click **Copy** . The Copy Threshold Set window displays.
4. Enter the following values:
   a. Enter a **Name** for this threshold set.
   b. The scenario associated with this threshold set displays additional configurable parameters. These parameters are specific to the selected scenario.
   c. Select one or more **Jurisdictions** for this threshold set using the drop-down list. Jurisdiction refers to the division of data in the database based on criteria such as geographical boundaries, legal entities, and so on.
   d. Select the **Period Type** used in this threshold set using the drop-down list. Options include Days or Months. By default, the period type is **Days**.
   e. Enter the **Lookback Period** for this threshold set. Lookback period refers to the number of days or months to lookback from the current date or time to create a time window which is used to consider cases for correlation.
   f. Enter the **Frequency Period** for this threshold set. Frequency period refers to how frequently the scenario should be run, by number of days or months.
   g. Enter any **Comments** you have for this threshold set.
   h. Enter the threshold values you want this threshold set to be updated with in the **New Value** field.
5. Click **Save**  to save the values.

## Editing Threshold Sets

You can modify user-defined threshold sets in the Threshold Editor.

To edit a threshold set, follow these steps:

1. Navigate to the Threshold Editor page. The existing threshold sets are displayed.
2. Select the check box corresponding to the threshold set you want to edit.
3. Click **Edit** . The Edit Threshold page is displayed.

   Alternatively, you can click **Edit** when viewing a threshold set in the View Threshold Set window.
4. Modify the required details.


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a. Select one or more **Jurisdictions** for this threshold set using the drop-down list. Jurisdiction refers to the division of data in the database based on criteria such as geographical boundaries, legal entities, and so on.

b. Select the **Period Type** used in this threshold set using the drop-down list. Options include Days or Months. By default, the period type is **Days**.

c. Enter the **Lookback Period** for this threshold set. Lookback period refers to the number of days or months to lookback from the current date or time to create a time window which is used to consider cases for correlation.

d. Enter the **Frequency Period** for this threshold set. Frequency period refers to how frequently the scenario should be run, by number of days or months.

e. Enter any **Comments** you have for this threshold set.

f. Enter the threshold values you want this threshold set to be updated with in the **New Value** field.

> **Note**
>
> You can modify the values of the existing parameters only, you cannot add new parameters.

5.

- Click **Save**  to save the values. A new threshold set is created and a message displays: *New Threshold Set created successfully*.
- Click **Save as New** to save the edited threshold set as a new threshold set. The New Threshold window opens. Enter a name for the threshold set and click **Save**. A new threshold set is created and a message displays: *New Threshold Set created successfully*.
- Click **Save & Simulate**. A new threshold set is created, and the Create Simulator Conditions page displays. For more information about the Threshold Simulator, seeThreshold Simulator.

## Deleting Threshold Sets

You can delete user-defined threshold sets in the Threshold Editor.

To delete a threshold set, follow these steps:

1. Navigate to the Threshold Editor page. The existing threshold sets are displayed.
2. Select the check box corresponding to the threshold set you want to delete.
3. Click **Delete** . A message displays: *Are you sure you want to delete <threshold set>?*
4. Enter the reason for deletion in the **Your Comment** box. This is mandatory.
5. Click **Delete**. The threshold set is deleted.

## About Threshold Simulator

The Threshold Simulator is used to run selected scenario pipelines against the selected threshold sets to find the matches obtained from these combinations.

These matches enable you to identify the events generated for the combination on a specified date. This can be helpful when you want to see which events would be generated with different


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threshold settings and be able to explain why your scenario is configured as it is, such as during audits.

## View Simulator Conditions

You can view Simulator Conditions using the Threshold Manager.

To view simulator conditions for a threshold set, follow these steps:

1. In the Navigation List menu click **Business Processes**, then **Data Transformation Pipeline**.
2. Select **DTP Threshold Manager**. The All Threshold Sets page displays.
3. In the All Thresholds page, select the check box corresponding to the threshold set you want to view simulation details for.
4. Click **Simulation History** . The Simulation Details for this threshold set opens as a new tab.
5. Click the **Simulation Run ID** for the simulation you want to view conditions for. The View Threshold Set pop-up window displays the details of this threshold set.

   If you want to make modifications to these conditions, click **Edit & Simulate** . The Edit Threshold Set pop-up window displays. Follow the steps in Edit Simulator Conditions to make these changes.

## Edit Simulator Conditions

You can edit Simulator Conditions using the Threshold Manager.

To edit existing simulator conditions for a threshold set, follow these steps:

1. In the All Thresholds page, select the check box corresponding to the threshold set you want to edit.
2. Click **Simulation History** . The Simulation Details for this threshold set opens as a new tab.
3. Select the check box corresponding to the **Simulation Run ID** for the simulation you want to edit.
4. Click **Edit** . The Edit Simulator Conditions pop-up window displays.

   Alternatively, you can access the Edit Simulator Conditions window by clicking **Edit & Simulate** in the View Simulator Conditions window.
5. To make modifications to these conditions, update the following values:
   a. Select one or more **Jurisdictions** for this threshold set using the drop-down list. Jurisdiction refers to the division of data in the database based on criteria such as geographical boundaries, legal entities, and so on.
   b. Enter the **Lookback Period** for this threshold set. Lookback period refers to the number of seconds, minutes, hours, or days to lookback from the current date or time to create a time window which is used to consider cases for correlation.
   c. Enter the **Frequency Period** for this threshold set. Frequency period refers to how frequently the scenario should be run.


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d. Enter the threshold values you want this threshold set to be updated with in the **New Value** field. Select the Batch Date as the date for the data you want to test the thresholds against. This can be the current date or a past date.

e. Enter the Data Origin.

6. Click **Save & Simulate** to run the modified simulation. After running a simulation, the Simulator History window displays the result with the number of event matches and details of each event. You can view the following details:
   - Simulation ID: ID for this simulation run.
   - Data Origin: Data Origin of the data set the simulated scenario conditions are run against.
   - Jurisdiction: Jurisdiction the simulated scenario conditions are run for.
   - Batch Date: Date the simulated scenario conditions are run for.
   - Results: Number of event matches generated by the simulated scenario conditions during the run.
   - Event Details: Details for each event generated by the simulated scenario conditions during the run.
     - Event ID
     - Focus Name
     - Focus Type
     - Highlights

## Creating New Simulator Conditions

You can create new Simulator Conditions using the Threshold Manager.

To create new simulator conditions for a threshold set, follow these steps:

1. In the **All Thresholds** page, select the check box corresponding to the threshold set you want to create new simulator conditions for.
2. Click **Simulation History** . The Simulation Details for this threshold set opens as a new tab.
3. Click **Open Simulator**. The Create Simulator Condition pop-up window displays.

   Alternatively, you can access the Create Simulator window by clicking **Open Simulator** in the All Thresholds page. The Create Simulator Condition pop-up window displays.
4. Create the simulator conditions by providing the following details:
   a. Select the required scenario from the **Select Scenario** drop-down list.
   b. Select the required threshold set from the **Select Threshold** drop-down list.
   c. Select the **Batch Date** as the date for the data you want to test the thresholds against. This can be the current date or a past date.
   d. Enter the **Data Origin**.
5. Click **Save**.


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## Running Existing Threshold Sets

You can run a simulation for existing scenario threshold sets.

To run the threshold simulator for an existing scenario threshold set, follow these steps:

1. In the All Thresholds page, select the check box corresponding to the threshold set you want to run the simulator for.
2. Click **Open Simulator**. The Simulator Conditions pop-up window displays.

   Alternatively, you can also run existing threshold set from the Simulation Details tab by clicking Open Simulator. The Simulator Conditions pop-up window displays.
3. Provide the following details:
   a. Select the **Batch Date** as the date for the data you want to test the thresholds against. This can be the current date or a past date.
   b. Enter the **Data Origin**.
   c.
   d. Select one or more **Jurisdictions** for this threshold set using the drop-down list. Jurisdiction refers to the division of data in the database based on criteria such as geographical boundaries, legal entities, and so on.
   e. Enter the **Lookback Period** for this threshold set. Lookback period refers to the number of seconds, minutes, hours, or days to lookback from the current date or time to create a time window which is used to consider cases for correlation.
   f. Enter the **Frequency Period** for this threshold set. Frequency period refers to how frequently the scenario should be run.
   g. Enter any comments you have for this threshold set.
   h. Enter the threshold values you want for this threshold set in the **New Value** field.
4. Click **Save & Simulate** to run the modified simulation. After running a simulation, the Simulator History window displays the result with the number of event matches and details of each event. You can view the following details:
   - Simulation ID: ID for this simulation run.
   - Data Origin: Data Origin of the data set the simulated scenario conditions are run against.
   - Jurisdiction: Jurisdiction the simulated scenario conditions are run for.
   - Batch Date: Date the simulated scenario conditions are run for.
   - Results: Number of event matches generated by the simulated scenario conditions during the run.
   - Event Details: Details for each event generated by the simulated scenario conditions during the run.
     – Event ID
     – Focus Name
     – Focus Type
     – Highlights


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### Viewing Simulation Details

When a threshold set simulation has completed, you can view the details of all thresholds in this simulation and their results in the Simulation Details.

This allows you to determine whether your threshold set is generating the expected detection results or if further modification is required.You can also view the Simulation Details for all runs of a threshold set which has been previously run. To open the Simulation Details, follow these steps:

1. In the All Thresholds page, select the check box corresponding to the threshold set you want to view simulation details for.
2. Click **Simulation History** . The Simulation Details for this threshold set opens as a new tab. You can view the following details:
   - Simulation Run: ID for this simulation run with the scenario name.
   - Jurisdiction: Jurisdiction the simulated scenario conditions are run for.
   - Run Date and Time: Date and time the simulation was run.
   - User ID: User who ran the simulation.

   You can export the results of the threshold set simulation runs in .xlsx format by selecting the check boxes for one or more simulation runs and clicking **Export Results**.
   You can delete a simulation run by selecting the check boxes for one or more simulation runs and clicking **Delete**. The Delete pop-up window displays: *Are you sure you want to delete <Simulation ID>*? Enter a comment and click **Delete**. A confirmation message displays.

   To return to the All Threshold Sets tab, click the **All Thresholds List** tab.

## Using Jobs (MMG)

The application uses jobs to define the instructions for executing the data pipelines or scenario pipelines against threshold sets, for example, running a scenario or loading data.

These jobs can be included in batches (groups of jobs) which run at configured intervals against the selected threshold to detect and generate events. This allows the jobs to run automatically, without requiring your involvement. Jobs can also be used to monitor the execution of jobs.

To access the DTP Jobs page, follow these steps:

1. In the Applications landing page, click the **Navigation Menu**  to access the Navigation List.
2. Click **Business Processes**, then click **Data Transformation Pipeline** in the Navigation List to view all DTP menu options.
3. Select **DTP Jobs**. The DTP Jobs page opens.

## Creating Jobs

You can create new jobs to run in batches.

To create a new job, follow these steps:


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1. Navigate to the **DTP Jobs** page.
2. Click **Create Job** . The Create Job pane is displayed.
3. Provide the details as described in the following table:

**Table 23-16 Fields to Create Jobs**

| Field | Description |
|---|---|
| Job Name | Enter the name for the job. |
| Pipeline Type | Select the pipeline type for which you want to create the job. The available options are Data and Scenario. |
| Pipeline | Select the pipeline from the drop-down list for which you want to create a job. |
| Threshold | Select the threshold set from the drop-down list. The drop-down list displays the list of thresholds that are created for the selected scenario pipeline.<br>The job is run against the selected threshold to detect and generate events. |

4. Click **Save** to save the changes. A new job is created and displayed in the Jobs page.

## Editing Jobs

You can edit or delete user-defined jobs

To edit a job, follow these steps:

> **Note**
>
> Pre-configured jobs cannot be edited or deleted. You can only edit or delete user-defined jobs.

1. Navigate to the **DTP Jobs** page.
2. Click on the Job that you want to modify and click **Options** then click **Edit** . The Edit Job pane displays.
3. Modify the required details in the Edit Job pane on the right-hand side.
4. Click **Save** to save the changes. The job is modified.

## Deleting Jobs

You can edit or delete user-defined jobs.

To delete a job, follow these steps:


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> **Note**
>
> Pre-configured jobs cannot be edited or deleted. You can only edit or delete user-defined jobs.

1. Navigate to the **DTP Jobs** page.
2. Click on the Job that you want to modify and click **Options** ••• then click **Delete**. The job is deleted.

## Viewing Execution Monitor

The Execution Monitor enables you to view the complete history of job execution, including the start and end time, status, log messages generated during job execution, and so on. This will help you see how your jobs are progressing and detect any recurring issues.

To view the execution monitor, follow these steps:

1. Navigate to the Applications landing page.
2. Click the **Navigation Menu** to access the **Navigation List**. The Navigation List displays the list of modules.
3. Expand **Data Transformation Pipeline** in the Navigation List to view all DTP menu options.
4. Click **DTP Jobs** in the Navigation List. The Jobs page opens in a new window.
5. On the Jobs page, click the job for which you want to view the execution monitor.
6. The Execution History pane displays the historical information of the selected job. The details include the Batch Run ID, the date and time during which a job is executed, status of the job execution, and so on.

   Use the **Task** and **Sort By** drop-down lists to manage how these details display.
7. Click **Monitor Execution** corresponding to the Batch Run ID for which you want to view more information.
8. The Execution Monitor page is displayed in a new window. The page contains details of the pipeline for which the job is created. The widgets in the pipeline are represented in different colors. Widgets are color coded to indicate the widget type and status of the job:
   - Completed
   - Failed
   - Pending
   - Not Started
9. Clicking **Log Messages**

   

   displays the Log Messages pane which lists a complete log of messages generated during the execution of the pipeline.
10. Click each widget to view the Log Messages dialog box with detailed information about the widget.

    The following information is included:


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- **Log Messages**: Start and End Date
- **Query/REST Parameters**: The query that is being executed by this widget.
- **Parameters**: The relevant parameters being used in this widget.
- **Errors**: Details for any errors that occurred in this widget during Job execution.

## User Group and Roles Mapping

This section provides the User Group, User Role mapping, and activities for Oracle FCCM Data Transformation Pipeline Cloud Service.

This table shows the User Groups and Roles required for activation of Oracle FCCM Data Transformation Pipeline Cloud Service.

**Table 23-17 User Group and Roles Mapping in Oracle FCCM Data Transformation Pipeline Cloud Service**

| Group | User Role | Functions | Menu Parent | Menu |
|---|---|---|---|---|
| DTPCONFIGGRP | DTPCONFIGROLE | DTPPIPELINEACC | Data Transformation Pipeline | DTP Pipeline Designer |


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**Table 23-17 (Cont.) User Group and Roles Mapping in Oracle FCCM Data Transformation Pipeline Cloud Service**

| Group | User Role | Functions | Menu Parent | Menu |
|---|---|---|---|---|
| DTPCONFIGGRP | DTPCONFIGROLE | DTPTHRESHOLDACC | Data Transformation Pipeline | DTP Threshold Manager |


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**Table 23-17 (Cont.) User Group and Roles Mapping in Oracle FCCM Data Transformation Pipeline Cloud Service**

| Group | User Role | Functions | Menu Parent | Menu |
|---|---|---|---|---|
| DTPCONFIGGRP | DTPCONFIGROLE | DTPJOBSACC | Data Transformation Pipeline | DTP Jobs |


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**Table 23-17 (Cont.) User Group and Roles Mapping in Oracle FCCM Data Transformation Pipeline Cloud Service**

| Group | User Role | Functions | Menu Parent | Menu |
|---|---|---|---|---|
| DTPCONFIGGRP | DTPCONFIGROLE | DTPAUDITACC | Data Transformation Pipeline | DTP Audit Screen |


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**Table 23-17 (Cont.) User Group and Roles Mapping in Oracle FCCM Data Transformation Pipeline Cloud Service**

| Group | User Role | Functions | Menu Parent | Menu |
|---|---|---|---|---|
| DTPADMNGRP | DTPADMNROLE | DTPFOCUSTYPEACC | Data Transformation Pipeline Admin | Focus Type |


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**Table 23-17 (Cont.) User Group and Roles Mapping in Oracle FCCM Data Transformation Pipeline Cloud Service**

| Group | User Role | Functions | Menu Parent | Menu |
|---|---|---|---|---|
| DTPADMNGRP | DTPADMNROLE | DTPEVENTTYPEACC | Data Transformation Pipeline Admin | Event Type |

# Managing Batches

A batch is a group of jobs that are scheduled to run at a defined interval of time, in sequence, automatically, without user involvement.

Oracle FCCM Cloud Service uses the Scheduler Service to create, schedule, execute and manage batches. A batch is a group of jobs that are scheduled to run at a defined interval of time, in sequence, automatically, without user involvement. Each batch begins with a StartBatch, includes any additional jobs that should be run in this batch, and then completes with the Endbatch.


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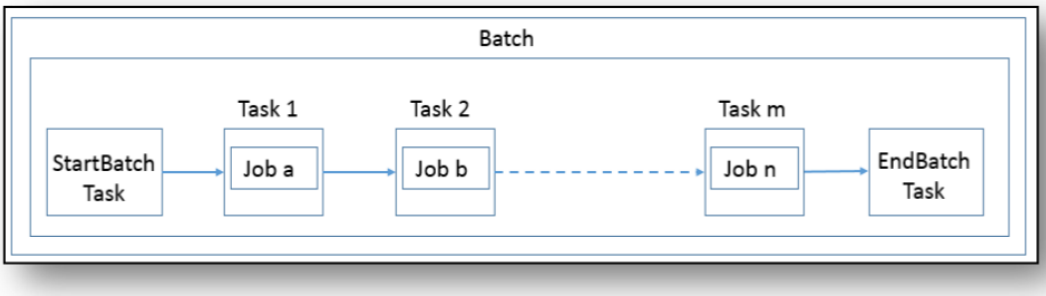
> **Note**
>
> Oracle recommends that you first copy, customize, and then use the pre-configured batches as required.

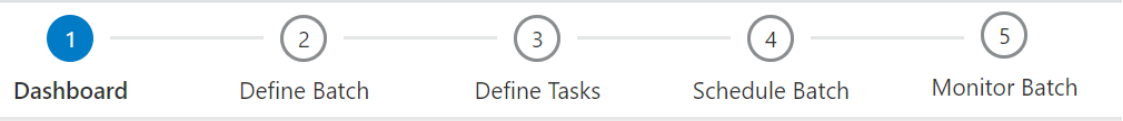
**Figure 23-2 Flow of Batch**




To execute the batches, use the Schedule Batch feature in the Scheduler Service. For more information, see Scheduler Service. You can use the Scheduler Service to first define the batch, then define which tasks should be included in this batch.

Next, you must schedule the batch. When the batch runs, you can monitor the batch to verify it is executing as intended. Click the Batch Scheduling Flow to navigate through the Scheduler Service.

**Figure 23-3 Scheduler Service -- Batch Scheduling Flow**




## Pre-Configured Batches

The application contains certain pre-configured batches that can be used to run the default data. You must create new batches to run customer-specific data.

### DTPTMScenario Batch Details

The following table provides the tasks that are configured for the DTPTMScenario batch. These tasks must be executed in the following order:

**Table 23-18 DTPTMScenario Batch Details**

| Sequence | Tasks for DTPTMScenario Batch | Jobs for DTPTMScenario Batch | Pipelines for DTPTMScenario Batch |
|---|---|---|---|
| 1 | StartBatch | Not Applicable | Not Applicable |


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**Table 23-18 (Cont.) DTPTMScenario Batch Details**

| Sequence | Tasks for DTPTMScenario Batch | Jobs for DTPTMScenario Batch | Pipelines for DTPTMScenario Batch |
|---|---|---|---|
| 2 | CIBHRGAC | CIB High Risk Geography Activity - Account Focus - DTP | CIB High Risk Geography Activity - Account Focus - DTP |
| 3 | FHRECU | Focal High Risk Entity - Customer Focus DTP | Focal High Risk Entity - Customer Focus DTP |
| 4 | LRTCU | Large Reportable Transaction - Customer Focus DTP | Large Reportable Transaction - Customer Focus DTP |
| 5 | NOA | Networks of Accounts and Entities and Customers - Account Focus | Networks of Accounts and Entities and Customers - Account Focus |
| 6 | DPGTAAC | Deviation from Peer Group - Total Activity - Account Focus | Deviation from Peer Group - Total Activity - Account Focus |
| 7 | EndBatch | Not Applicable | Not Applicable |

## Purge Batch Details

Purge batches are used when your batch has not executed successfully to purge the data and execute the batch again.

If your batch has not executed successfully, has been explicitly interrupted or canceled, or was put on hold during the execution process, then you can purge the data and execute the batch again.

> **Note**
>
> Purge batches are not a regular required activity. They should only be used when other methods to re-run the batches are not successful.

To purge the data which was partially processed during the interrupted or canceled batch execution, follow the steps described in the following table.


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> **Note**
>
> Purge Batches should be run in the reverse order of batch execution.
>
> 1. Ingestion
> 2. DTPTMScenario
> 3. CMIngestion
> 4. AMLtoCaseManagement
>
> Then the purge batch order should be:
>
> 1. AMLtoCaseManagement
> 2. CMIngestion
> 3. DTPTMScenario
> 4. Ingestion

**Table 23-19 Executing Purge Batches**

| Failed Batch Name | Purge Batch | Steps to Purge | Additional Considerations |
|---|---|---|---|
| DTPTMScenario | PurgeDTPTMTables | 1. Run the PurgeDTPTMTables batches by providing the failed batchrunID as input parameter in the field $FCCBATCHRUNID$.<br>2. Execute the Ingestion batch for the batch date. | – |

### PurgeDTPTMTables Batch Details

The following table provides the tasks that are configured for the PurgeDTPTMTables batch. These tasks must be executed in the following order:

**Table 23-20 PurgeDTPTMTables Batch Details**

| Sequence | Tasks for PurgeDTPTMTables Batch | Jobs for PurgeDTPTMTables Batch | Pipelines for PurgeDTPTMTables Batch |
|---|---|---|---|
| 1 | StartBatch | Not Applicable | Not Applicable |
| 2 | DeleteTMAlertsTable | Purge TM Alerts Tables | Purge TM Alerts Tables |
| 3 | EndBatch | Not Applicable | Not Applicable |

### PurgeAMIngestionTables Batch Details

The following table provides the tasks that are configured for the PurgeAMIngestionTables batch. These tasks must be executed in the following order:


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**Table 23-21 PurgeAMIngestionTables Batch Details**

| Sequence | Tasks for PurgeAMIngestionTables Batch | Jobs for PurgeAMIngestionTables Batch | Pipelines for PurgeAMIngestionTables Batch |
|---|---|---|---|
| 1 | StartBatch | Not Applicable | Not Applicable |
| 2 | DeleteAMTable | Delete Business Data | Delete Business Data |
| 3 | EndBatch | Not Applicable | Not Applicable |

> **Note**
>
> There are no Out of the Box data pipelines associated with DTP.

# Administrative Tasks

Certain tasks are frequently performed by Supervisor or Administrator users.

This section tells how to perform the following administrative tasks:

- Viewing Audit History
- Creating Focus Types
- Creating Event Types

## Viewing Audit History

The Audit History provides a record of changes made to pipelines or threshold configuration.

For example, changing a pipeline name, adding or modifying widgets in the pipeline, creating or deleting a threshold set, changing threshold set configurations, and so on.

This allows you to view the changes made to a scenario before executing the scenario, and to detect and mitigate the risk of internal employee manipulation, as required by auditors and regulators.

You can also filter the results to show updates made to a specific pipeline since the last tuning cycle or last regulatory exam. If needed, you can export the Audit History data in .csv or .xls format to analyze further.

### Accessing Audit History

You can access the Audit History from the Navigation List.

1. Navigate to the Applications landing page.
2. Click the **Navigation Menu**  to access the **Navigation List**. The Navigation List displays the list of modules.
3. Click **Business Processes** and then click **Data Transformation Pipeline** in the Navigation List to view all DTP menu options.
4. Select **DTP Audit Screen**. The Audit History page displays.

   The following table describes the columns which display in the Audit History.


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**Table 23-22 Columns in the Audit History**

| Column | Description |
|---|---|
| Component | Type of component the action was taken on. For example, Data Transformation Pipeline or Threshold. |
| Component Name | Name of the threshold or pipeline the action was taken on. For example, if you are viewing the Audit History for a scenario pipeline, the scenario name will display. |
| Sub Component | Type of sub component the action was taken on. For example, Business Filter, Aggregation, Evaluation, and so on. If there is no sub component, this column will appear blank. |
| Sub Component Name | Name of the sub component the action was taken on. For example, if a scenario Risk Indicator was updated, the name of the Risk Indicator will display, such as *Total of Very High Risk Amount Percentage*.If there is no sub component, this column will appear blank. |
| Action | Type of action that was taken. The DTP Audit History tracks the following types of actions:<br>• Copy: An existing component has been copied with a new name. For example, an existing scenario pipeline is copied and then configured to meet your specific business needs.<br>• Bulk Delete:A widget or pipeline is deleted at the parent level without deleting its underlying parameters.<br>• Delete: A parameter or threshold is deleted.<br>• Edit: A change has been made to an existing component or subcomponent.<br>• Export:A pipeline or threshold set has been downloaded.<br>• Import: A pipeline or threshold set has been imported.<br>• Insert: A new threshold has been added to an existing pipeline. |
| Current State | The current state of the component which was acted upon. Compare the Current State with the Previous State to see the change which was made. |
| Previous State | The previous state of the component which was acted upon. Compare the Current State with the Previous State to see the change which was made. |
| Updated By | User who took the action. |
| Date & Time | Date and Time the action was taken. |

## Filtering Audit History

The Filter option allows you to search and narrow down the results of the Audit History.

You can use a combination of these search criteria to quickly find the components you are interested in. If you don’t enter any value in any search field, it is equivalent to selecting all the criteria.


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To filter the Audit History, follow these steps:

1. In the Audit History page, click **Filter** . The Filter criteria appear on the left-hand-side pane.
2. Select one or more criteria using the drop-down list selectors. You can filter by the following criteria:
   - Updated by
   - Action
   - Component
   - Component Name
   - From Date
   - To Date
3. Click **Apply** to filter the Audit History by the selected criteria.
   - Click **Reset** to clear the filter criteria.
   - Click **Close** to remove all filters.

### Exporting Audit History

If needed, you can export the Audit History data in .csv or .xls format to analyze further.

Filter the Audit History data as desired, using the steps in Filtering Audit History.

To export the Audit History, follow these steps:

1. In the Audit History page, click **Export** to expand the output options.
2. Select from the following output options:
   - CSV
   - XLS
3. Select a folder to save the exported data.
4. Enter a file name, if desired.
5. Click **Save**. The exported Audit History is saved.

## Creating Focus Types (MMG)

Organizations can create and configure Focus Types according to their business needs.

A Focus Type describes the main entity on which the analysis, report, or calculation is centered. For example, a focal entity might be a customer whose transactions are being analyzed for suspicious activity. Focusing on the entity of interest ensures the granularity required for regulatory, risk, and business reporting or monitoring is appropriate. Relevant data is aggregated, filtered, or analyzed specifically for that entity.

The Account and Customer focus types are provided out-of-the-box, but you can create additional focus types to meet your organization's business needs.

To create a focus type, follow these steps:

1. Navigate to the Applications landing page.
2. Click the **Navigation Menu** to access the **Navigation List**. The Navigation List displays the list of modules.


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3. Click **Application Administration**, then **Data Transformation Pipeline Admin**.
4. Select **Focus Type**. The Focus Type admin page displays with a sortable list of current focus types.
5. Click **Add** . The Add Focus Type pane opens.
6. Enter a **Name** for the Focus Type, such as External Entity. Valid characters include: A-Z a-z '-', with a maximum length of 100 Characters. For example, ABCDef or Abc-Def.
7. Click **Save**. A Focus Type ID is generated for this type and the new focus type is added to the list.

## Creating Event Types (MMG)

Organizations can create and configure Event Types according to their business needs.

Event Types, such as AML, show the designated classification for the behavior being detected when an event is generated.

To create an event type, follow these steps:

1. Navigate to the Applications landing page.
2. Click the **Navigation Menu** to access the **Navigation List**. The Navigation List displays the list of modules.
3. Click **Application Administration**, then **Data Transformation Pipeline Admin**.
4. Select **Event Type**. The Event Type admin page displays with a sortable list of current event types.
5. Click **Add** . The Add Event Type pane opens.
6. Enter a **Name** for the event type, such as Anti Money Laundering. Valid characters include: A-Z a-z '-', with a maximum length of 100 Characters. For example, ABCDef or Abc Def.
7. Enter a **Code** for the event type, such as AML.
8. Click **Save**. An Event Type ID is generated for this type and the new event type is added to the list.

If you want to delete an Event Type, click **Delete** . A verification message displays. Click **Delete** to remove the event type from the list.


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A

# Appendix A – Scenario Weightage Template: Complete DML Configuration Example

## A.1 Overview

This appendix provides the complete Data Manipulation Language (DML) scripts required to configure the Scenario Weightage template end-to-end using the Template Builder framework.

The configuration includes:

- Creation of combinations
- Mapping combinations to groups
- Template creation
- COM table registration
- Group-to-template mapping
- Dependency configuration

> **Note**
>
> Template Code used in this example: `TEMP_SCEN`.

## A.2 Create Combinations

Combinations are defined by mapping component types and their associated properties in the `AF_TB_COMBINATION_MAPPING_DETAIL` table.

For this template, three combinations are created:

- `CARTESIAN_TABLE VERSION`
- `VERSION_DROPDOWN`
- `SQL_PROJECT_DROPDOWN`

The following properties are configured in `AF_TB_COMBINATION_MAPPING_DETAIL`:

### A.2.1 Cartesian Table Combination

The following CARTESIAN_TABLE combination defines the configuration for the Cartesian table component used in the template.

- **Combination Code:** `CARTESIAN_TABLE`
- **Component Type:** `COMP_CARTESIAN_TABLE`


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> **Note**
>
> This combination maps the required component properties in `AF_TB_COMBINATION_MAPPING_DETAIL` to control column structure, JSON key mapping, and dependent API behavior.

The following properties are configured in `AF_TB_COMBINATION_MAPPING_DETAIL`:

```
INSERT INTO AF_TB_COMBINATION_MAPPING_DETAIL
(V_COMPONENT_TYPE_CODE, V_COMBINATION_CODE, V_PROPERTY_CODE, V_VALUE)
VALUES
('COMP_CARTESIAN_TABLE','CARTESIAN_TABLE','PROP_CART_COLUMN_NAME','Scenario
List');

INSERT INTO AF_TB_COMBINATION_MAPPING_DETAIL
(V_COMPONENT_TYPE_CODE, V_COMBINATION_CODE, V_PROPERTY_CODE, V_VALUE)
VALUES
('COMP_CARTESIAN_TABLE','CARTESIAN_TABLE','PROP_CART_COLUMN_TYPE','scenario');

INSERT INTO AF_TB_COMBINATION_MAPPING_DETAIL
(V_COMPONENT_TYPE_CODE, V_COMBINATION_CODE, V_PROPERTY_CODE, V_VALUE)
VALUES
('COMP_CARTESIAN_TABLE','CARTESIAN_TABLE','PROP_FINAL_JSON_KEY','subclass');

INSERT INTO AF_TB_COMBINATION_MAPPING_DETAIL
(V_COMPONENT_TYPE_CODE, V_COMBINATION_CODE, V_PROPERTY_CODE, V_VALUE)
VALUES (
  'COMP_CARTESIAN_TABLE',
  'CARTESIAN_TABLE',
  'PROP_DEPENDENT_API',
  'template-config/project/dependency-list?
projectCode={{queryProject}}&version={{version}}&objTypeCode=EST_SCENARIO'
);
```

## A.2.2 Version Dropdown Combination

The `VERSION_DROPDOWN` combination defines the configuration for the version selection drop down within the template.

- **Combination Code:** `VERSION_DROPDOWN`
- **Component Type:** `COMP_SINGLE_SELECT_DROPDOWN`

The following properties are configured:

```
INSERT INTO AF_TB_COMBINATION_MAPPING_DETAIL
VALUES ('COMP_SINGLE_SELECT_DROPDOWN','VERSION_DROPDOWN','PROP_REQUIRED','N');

INSERT INTO AF_TB_COMBINATION_MAPPING_DETAIL
VALUES (
  'COMP_SINGLE_SELECT_DROPDOWN',
  'VERSION_DROPDOWN',
  'PROP_DEPENDENT_SQL',
  '"SELECT AAICL_OBJECT_B.N_VERSION AS ""label"",
```


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```
          AAICL_OBJECT_B.N_VERSION AS ""value""
     FROM AAICL_OBJECT_B
    WHERE AAICL_OBJECT_B.V_OBJ_CODE = {{queryProject}}"'
);

INSERT INTO AF_TB_COMBINATION_MAPPING_DETAIL
VALUES
('COMP_SINGLE_SELECT_DROPDOWN','VERSION_DROPDOWN','PROP_FINAL_JSON_KEY','versi
on');
```

## A.2.3 Project Dropdown Combination

The SQL_PROJECT_DROPDOWN combination defines the configuration for the project selection drop down within the template.

- **Combination Code:** SQL_PROJECT_DROPDOWN
- **Component Type:** COMP_SINGLE_SELECT_DROPDOWN

The following properties are configured:

```
INSERT INTO AF_TB_COMBINATION_MAPPING_DETAIL
VALUES (
  'COMP_SINGLE_SELECT_DROPDOWN',
  'SQL_PROJECT_DROPDOWN',
  'PROP_FINAL_JSON_KEY',
  '"SELECT DISTINCT
        s.V_OBJ_NAME AS ""label"",
        v.V_OBJ_CODE AS ""value""
    FROM AAICL_OBJECT_B v
    LEFT JOIN AAICL_OBJECT_TL s
      ON v.V_OBJ_ID = s.V_OBJ_ID
   WHERE v.V_OBJ_TYPE_CODE = ''EST_PROJECT''"'
);

INSERT INTO AF_TB_COMBINATION_MAPPING_DETAIL
VALUES
('COMP_SINGLE_SELECT_DROPDOWN','SQL_PROJECT_DROPDOWN','PROP_SQL','queryProject
');
```

# A.3 Map Combinations to Groups

After defining the combinations, they must be organized into logical groups to control layout structure and component ordering within the template. This grouping is configured in the AF_TB_COMBINATION_GROUP_MAPPING table.

Two groups are created:

- GROUP_CARTESIAN_TABLE
- GROUP_DROPDOWN

The mappings are defined as follows:

```
INSERT INTO AF_TB_COMBINATION_GROUP_MAPPING
(V_GROUP_CODE, V_COMBINATION_CODE, N_COMPONENT_ORDER, F_SUMMARY_CHECK)
```


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```
VALUES ('GROUP_CARTESIAN_TABLE','CARTESIAN_TABLE',1,'N');

INSERT INTO AF_TB_COMBINATION_GROUP_MAPPING
VALUES ('GROUP_DROPDOWN','SQL_PROJECT_DROPDOWN',1,'Y');

INSERT INTO AF_TB_COMBINATION_GROUP_MAPPING
VALUES ('GROUP_DROPDOWN','VERSION_DROPDOWN',2,'N');
```

These mappings determine:

- Which combinations belong to each group
- The display order of components within the group
- Whether summary behavior is enabled for specific components

## A.4 Create the Template

Once combinations and groups are configured, the template must be created by inserting its metadata into the `AF_TB_TEMPLATE_MASTER` table.

The template details are as follows:

- **Template Name:** Scenario Weightage
- **Template Code:** TEMP_SCEN

The template is created as follows:

```
INSERT INTO AF_TB_TEMPLATE_MASTER
(F_WORKFLOW, V_TEMPLATE_CODE, V_TEMPLATE_NAME, V_TEMPLATE_DESCRIPTION,
 D_CREATED_DATE, D_MODIFIED_DATE,
 V_WORKSPACE_ID, V_TENANT_ID, V_SERVICE_ID, V_CUSTOM_OBJ_CODE)
VALUES (
  'N',
  'TEMP_SCEN',
  'Scenario Weightage',
  'Scenario Weightage',
  NULL, NULL,
  '##workspaceId','##tenantId','##serviceId',NULL
);
```

> **Note**
>
> - This step establishes the template definition and associates it with the required workspace, tenant, and service context.
> - If an **ID** column is present in the scripts and requires manual numeric input, provide a sufficiently large and unique value to avoid conflicts with existing records.

## A.5 Register Template in COM Tables

After creating the template, it must be registered in the COM object type tables to enable system-level recognition and execution.


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> **Note**
>
> - The **Object Type Code** must match the template code **(TEMP_SCEN)**.
> - Use a sufficiently high sequence number (if applicable in your environment) to avoid conflicts with existing object types.

## A.5.1 Register in AAICL_OBJ_TYPE_B

This step registers the template as a technical object type in the base COM object table.

Insert the following record into AAICL_OBJ_TYPE_B.

```
INSERT INTO AAICL_OBJ_TYPE_B
(V_OBJ_TYPE_CODE, V_CLASSNAME, F_VERSIONING, V_WORKFLOW_MODE)
VALUES (
  'TEMP_SCEN',
  'com.ofs.aai.service.common.CommonObjectService',
  'Y',
  'COM'
);
```

## A.5.2 Register in AAICL_OBJ_TYPE_TL

This step registers the localized name and description of the template in the COM translation table.

Insert the following record into `AAICL_OBJ_TYPE_TL`

```
INSERT INTO AAICL_OBJ_TYPE_TL
(V_OBJ_TYPE_CODE, V_LOCALE_CODE, V_OBJ_TYPE_NAME, V_OBJ_TYPE_DESC)
VALUES ('TEMP_SCEN','en-US','Scenario Weightage','Scenario Weightage');
```

# A.6 Map Groups to Template

Map the defined groups to the template using the `AF_TB_TEMPLATE_GROUP_MAPPING` table.

Insert the following records:

```
INSERT INTO AF_TB_TEMPLATE_GROUP_MAPPING
(V_TEMPLATE_CODE, N_GROUP_ORDER, V_GROUP_CODE, V_GROUP_TITLE_CODE,
 V_WORKSPACE_ID, V_TENANT_ID, V_SERVICE_ID)
VALUES (
  'TEMP_SCEN',
  1,
  'GROUP_DROPDOWN',
  'GROUP_PROJECT_DROPDOWN',
  '##workspaceId','##tenantId','##serviceId'
);

INSERT INTO AF_TB_TEMPLATE_GROUP_MAPPING
VALUES (
```


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```
  'TEMP_SCEN',
  2,
  'GROUP_CARTESIAN_TABLE',
  'GROUP_CARTESIAN_TABLE',
  '##workspaceId','##tenantId','##serviceId'
);
```

# A.7 Configure Combination Dependencies

Configure the combination dependencies for the template using the AF_TB_COMBINATION_DEP_MAPPING table.

Insert the following records:

```
INSERT INTO AF_TB_COMBINATION_DEP_MAPPING
(V_TEMPLATE_CODE, V_PARENT_COMBINATION_CODE, V_CHILD_COMBINATION_CODE,
F_ACTIVE)
VALUES ('TEMP_SCEN','SQL_PROJECT_DROPDOWN','VERSION_DROPDOWN','Y');

INSERT INTO AF_TB_COMBINATION_DEP_MAPPING
VALUES ('TEMP_SCEN','VERSION_DROPDOWN','CARTESIAN_TABLE','Y');
```

# A.8 Final Dependency Flow

The execution sequence of components within the template is as follows:

- Project Dropdown
- Version Dropdown
- Cartesian Table

This completes the end-to-end configuration of the Scenario Weightage template.


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B

# Reference Calculators

The following sections describe the reference calculators, their business definitions, provisioning steps, and execution guidance.

## B.1 Risk Weight Asset Model Data Ingestion and Provisioning

RWA Model and its input/output assets, templates, hierarchies, variables, metrics, scenarios, Analysis Configuration, Project, and result dimensions. Includes the provisioning utility prerequisites, run instructions, and completion checks.

Select the title above to open the complete RWA documentation.


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# B.1 Risk Weight Asset Model Data Ingestion and Provisioning

## B.1.1 Introduction

Enterprise RWA Stress Assessment is an indicative Standardised Approach RWA calculator. It helps risk, finance and capital-management users assess how exposure amounts, counterparty credit quality and eligible collateral affect Risk-Weighted Assets (RWA) for a selected reporting date or stress scenario. The calculation approach is designed in accordance with the Basel Framework standardised approach for credit risk, including Basel d424 requirements.

The assessment brings approved exposure, obligor and collateral data together with risk-weight and credit-risk-mitigation assumptions. It assigns risk weights, recognises eligible credit risk mitigation and produces detailed and aggregated RWA results. Users can use these outputs to identify the portfolios and risk drivers that contribute most to RWA, compare baseline and stressed positions, and support capital planning.

RWA is a key input to capital adequacy assessment. When the calculated RWA is combined with the institution's capital position and applicable regulatory capital ratios, users can estimate the capital needed to support the assessed portfolio and evaluate the impact of a stressed outcome on CET1, Tier 1 and total capital ratios.

This calculator is indicative only. It does not constitute regulatory advice, a regulatory reporting engine, intellectual property for a regulatory methodology, or continuous compliance monitoring. Users remain responsible for applying their institution's approved policies, jurisdiction-specific rules, data controls, governance processes and independent validation before relying on results for regulatory, financial or business decisions.


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# B.1.2 Quick Navigation

**Guide to this document**

| If you need to | Refer to |
|---|---|
| Understand the purpose, intended use and limitations of the calculator | Section B.1.1 Introduction |
| Find the relevant section quickly | Section B.1.2 Quick Navigation |
| Understand the RWA Model, its inputs, calculation treatment and outputs | Section B.1.3 What is RWA Model |
| Follow the provisioning procedure | Section B.1.4 Steps for Provisioning |
| Review the definitions created by provisioning | Section B.1.5 What User Gets on Provisioning |
| Find provisioned model onboarding, input/output tables, templates, hierarchies, variables, metrics, configurations, scenarios or Project details | Sections B.1.5.1 to B.1.5.8 |
| Understand available and selected result dimensions | Section B.1.6 Result Dimensions |
| Run the Project and find the detailed, aggregate and run-level results | Section B.1.7 How to Execute and View Results |
| Run an assessment with approved new variables or scenarios | Section B.1.8 Executing with New Variables or Scenarios |

# B.1.3 What is RWA Model

The RWA Model is an indicative calculator that assesses the credit-risk weight applied to an exposure and calculates the associated Risk-Weighted Assets. It uses approved data and assumptions to provide a transparent view of how the characteristics of an exposure and the effect of eligible credit risk mitigation influence the resulting RWA.

The model uses exposure data, including the exposure amount, asset class and reporting date; obligor data, including the counterparty characteristics and rating information; and collateral data where credit risk mitigation is available. It also uses the approved risk-weight and CRM haircut assumptions that determine the applicable treatment.

The RWA Model is implemented as a Python code component. STSA provisioning connects this calculation code to the approved input data, reference assumptions and result assets; the model then applies the configured rules to each exposure for the selected reporting date or scenario.

## B.1.3.1 Model Building Blocks

In simple terms, the model works by taking a picture of each exposure, enriching it with information about the counterparty and any collateral, applying the relevant risk-weight and credit-risk-mitigation assumptions, and recording both the result and the reasoning behind it.


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- Input data. The model receives exposure records that describe the amount at risk, the asset class, the reporting date, currency, jurisdiction and other treatment indicators. It also receives counterparty information, such as the obligor identity, rating information, counterparty classification and applicable qualifying information. Where credit risk mitigation is available, it receives collateral or guarantee information, including the recognised amount, class, currency, maturity and relationship to the exposure.
- Parameters and reference assumptions. The provisioned configuration supplies the assumptions that control how the calculation is applied. These include risk-weight values and the conditions for selecting them, collateral eligibility rules, credit-risk-mitigation haircuts, the chosen collateral treatment approach, and applicable jurisdiction or effective-date conditions. The parameters are maintained as controlled reference data, rather than being hard-coded into each calculation run.
- Hierarchies. Hierarchies are the controlled classifications used to group and select data consistently. They organise values such as asset class, party type, jurisdiction, rating and rating status, collateral class, residual maturity and loan-to-value category. They allow the model, scenarios and reporting to use the same business categories when deciding which treatment applies or when summarising results.
- Templates. Templates hold the reusable risk-weight and credit-risk-mitigation assumptions. Risk-weight templates cover the relevant exposure types and their rating, treatment or other qualifying conditions. Credit-risk-mitigation templates hold collateral eligibility and haircut assumptions. The model selects the appropriate template row using the exposure and counterparty classifications, so the decision can be traced back to the configured assumptions.
- Output data. The model produces a detailed result for each exposure or exposure slice, showing the exposure amount, applicable risk weight, recognised credit-risk mitigation and calculated RWA. It also produces aggregated RWA views, calculation-run information, data-quality outcomes and calculation lineage so users can reconcile results and understand the treatment that was applied.

For an exposure without eligible collateral, the model determines the applicable standard risk weight and applies it to the exposure amount to calculate RWA. Where eligible collateral is present, the model applies the relevant CRM treatment and applicable haircuts to recognise the risk-mitigating effect of that collateral before determining the final risk weight and RWA.

The model produces detailed exposure-slice results, aggregated exposure and RWA results, and calculation-run information. These outputs help users trace the treatment applied to an exposure, understand the effect of collateral, and assess the overall RWA position for the selected reporting date or scenario.

# B.1.4 Steps for Provisioning

Use the RWA provisioning utility after creating and synchronising the target sandbox. Provisioning adds the RWA definitions described in this section; it does not create the sandbox or execute the RWA calculation.

## B.1.4.1 Before you begin

- Create the target sandbox and import **DIM_RUN**, **DIM_RUN_TYPE** and **DIM_DATES**. Complete the normal workspace synchronisation successfully.
- Confirm that STSA, Data Model Management (DMM), Data Catalog and OpenMetadata, MMG Model Service, and the Project pipeline and process services are available.


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- Use an authorised STSA application user with access to the target workspace and the required provisioning permissions. Confirm the workspace identifier and its registered service ID with the administrator.
- Run from the STSA application server using the installation operating-system account. Bash, curl, jq and base64 must be available. The account needs read access to the installed configuration and write access to the utility log and temporary directories.
- Confirm that the installation uses tenant **MMG1**, which is fixed in the packaged utility. Confirm connectivity to the configured STSA and MMG addresses before starting.

## B.1.4.2 Utility location and configuration

The installation package places **provision_rwa_sandbox.sh** in the following directory. If it is supplied separately, place it in the same location without changing the installed directory structure.

```
<OFS_STSA>/bin/utility/provision_rwa_sandbox.sh
```

**<OFS_STSA>** represents the installed OFS_STSA directory. Replace this placeholder with the actual path; do not type the angle brackets as part of the path.

**Backend configuration**
<OFS_STSA>/stsa-service/conf/application.properties
Confirm that **BASE_URL** identifies the installed STSA backend, including its correct HTTP or HTTPS scheme and context path. Confirm that **mmg.url** identifies the installed MMG service, unless the administrator supplies the MMG_BASE_URL environment override.

**Authentication configuration**
<OFS_STSA>/stsa-ui-service/conf/application.properties
Confirm that **token.clientid** and **token.secret** are configured. The utility obtains its authentication token automatically. Do not include passwords or token values in the execution command or shared documentation.

## B.1.4.3 Run the provisioning utility

1. Open a terminal on the application server and change to the utility directory. Replace the path below with the actual installation path.

```
cd "/path/to/OFS_STSA/bin/utility"
```

Remain in this directory: the utility reads the backend configuration relative to the current working directory. Use **Bash**, not **sh**, and do not start the utility by double-clicking the file.

2. Prepare the four mandatory arguments in the order shown.


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**Table B-1 RWA Provisioning Utility Arguments**

| Position | Argument | Value to provide |
|---|---|---|
| 1 | WORKSPACE_NAME | Identifier of the existing, successfully synchronised sandbox. |
| 2 | LOGIN_USER | Authorised STSA application user; not the operating-system login or database password. |
| 3 | LOCALE | Locale accepted by the installation, for example en_US. |
| 4 | SERVICE_ID | Service ID under which the target workspace is registered in this installation. |

3. Start provisioning. Replace every placeholder and preserve the argument order.

```
bash provision_rwa_sandbox.sh \
  "<WORKSPACE_NAME>" "<LOGIN_USER>" \
  "<LOCALE>" "<SERVICE_ID>"
```

Using **bash** explicitly does not require an executable-bit change. The packaged RWA flow does not require a table-list argument. Wait for the response; do not start another provisioning request while the first is running.

### B.1.4.4 Verify completion and review logs

The utility prints the provisioning response and writes a timestamped log beside the script:

```
<OFS_STSA>/bin/utility/logs/RWA/
RWA_YYYYMMDD_HHMMSS.log
```

Confirm that the response identifies the intended workspace, reports **status: SUCCESS** and **successful: true**, and shows successful provisioning stages. Verify the definitions described in Section B.1.5 and the selected result dimensions in Section B.1.6 in STSA.

The utility retains some generic "Sync Schema" console messages. Determine the outcome from the returned JSON and stage messages, not from these generic messages or the shell exit status alone.

If provisioning fails or reports partial failure, review the failed stage and the timestamped utility log. Ask the administrator to review the corresponding STSA service logs, correct the cause, and confirm that the previous request has finished before rerunning with the same workspace arguments. Do not run parallel retries.

Successful provisioning confirms that the definitions are configured. Before executing the Project, confirm that approved input data is available for the intended reporting date and perform a controlled validation and reconciliation as described in Section B.1.7.

## B.1.5 What User Gets on Provisioning

Provisioning creates the controlled RWA definitions that connect approved source data, reusable assumptions, the Python RWA Model and its results. It creates configuration; it does not itself run the RWA calculation.


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**Table B-2 RWA Provisioned Definitions**

| STSA object type | Provisioned definitions |
|---|---|
| Model and pipeline | RWA Model, its published model pipeline and model onboarding configuration |
| Input and output assets | Eight input assets, three output assets and their logical-reference mappings |
| Templates and hierarchies | 18 template definitions and 45 hierarchy definitions |
| Variables and metrics | Four scenario variables and ten output metrics |
| Scenarios and analysis configuration | Two credit and collateral stress scenarios and Enterprise RWA Stress Configuration |
| Project and result dimensions | Enterprise RWA Stress Assessment, its Project Data Pipeline and reusable result dimensions |

Upon provisioning, users receive the following RWA model components and supporting configuration required to execute the project and review results.

## B.1.5.1 RWA Model

Provisioning creates the RWA Model as a Python code component and publishes a model pipeline around it. The pipeline provides the controlled route through which source data and reference assumptions are supplied to the code, and through which detailed, aggregate and run-level results are produced.

Model onboarding is the controlled STSA process that connects this approved model pipeline to the approved source data, reference date, logical input references, output assets and portfolio scope. It does not change the RWA calculation logic, risk-weight methodology or regulatory interpretation. Its purpose is to ensure that the RWA Model receives the intended data and that calculated results are written to the intended result assets.

For this RWA Model, onboarding connects exposure, obligor and collateral staging data with approved risk-weight and CRM haircut assumptions. It maps the reporting date, connects business-friendly input references to physical source columns, and identifies detailed, aggregate and run-level result assets. Use an approved mapping specification, select approved data assets and scope, and use Review and Validate to resolve mapping issues before submission.

A completed onboarding configuration confirms that the connection is configured. It does not by itself confirm that the input data is current, the model has run successfully or the results are suitable for business use. A controlled validation run and reconciliation should be completed using representative data before the configuration is used for an assessment.

If an approved onboarding needs a controlled change, copy the existing onboarding configuration and update the copy. Review and validate the copied mappings before using it; do not assume that copying confirms data readiness or result suitability.


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## B.1.5.2 Input Tables and Output Tables

The provisioned model pipeline connects the input tables and output tables listed below. These exact tables and logical references are created as part of provisioning.

**Table B-3 RWA Input Assets and Logical References**

| Input asset or logical reference | Purpose |
|---|---|
| STG_RWA_ACCOUNT_EXPOSURE | Exposure staging data, including exposure amount, asset class and reporting date. |
| STG_RWA_OBLIGOR_LEVEL | Obligor and rating staging data. |
| STG_RWA_COLLATERAL | Collateral staging data and collateral market value. |
| CRM template / INPUT_CRM Haircut | CRM haircut assumptions. |
| Corporate template / INPUT_Corporate Risk Weight | Corporate risk-weight assumptions. |
| Retail template / INPUT_Retail Risk Weight | Retail risk-weight assumptions. |
| Residential RE template / INPUT_Residential Real Estate Risk Weight | Residential real-estate risk-weight assumptions. |
| Commercial RE template / INPUT_Commercial Real Estate Risk Weight | Commercial real-estate risk-weight assumptions. |

**Table B-4 RWA Output Assets**

| Output table | Purpose |
|---|---|
| FCT_RWA_RESULT_SLICE | Detailed exposure-slice results. |
| FCT_RWA_AGGREGATE | Aggregated exposure and RWA results. |
| FCT_RWA_RUN | RWA calculation run information. |

Date and supporting-data mappings. DIMENSION.DATE maps to D_REPORTING_DATE on the three staging input tables and to FIC_MIS_DATE on the five selected template tables. STG_RWA_RUN_CONTROL is a supporting run-control table, not an additional asset in the eight-input onboarding list.

## B.1.5.3 Templates and Hierarchies

The RWA Template configuration provides reusable risk-weight and Credit Risk Mitigation (CRM) haircut assumptions. Seventeen templates belong to Risk Weight; the CRM template belongs to Haircut.


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**Table B-5 RWA Templates and Clusters**

| Template definition | Cluster |
|---|---|
| Sovereign ECA | Risk Weight |
| Sovereign ECRA | Risk Weight |
| Sovereign Treatment | Risk Weight |
| Bank | Risk Weight |
| PSE | Risk Weight |
| MDB | Risk Weight |
| Corporate | Risk Weight |
| Covered Bond | Risk Weight |
| DD Override | Risk Weight |
| Defaulted | Risk Weight |
| Equity | Risk Weight |
| Other Asset | Risk Weight |
| Spec Lending | Risk Weight |
| Retail | Risk Weight |
| Residential RE | Risk Weight |
| Commercial RE | Risk Weight |
| ADC | Risk Weight |
| CRM | Haircut |

Physicalized tables hold the template assumptions used by sandbox processing. The current model-onboarding configuration explicitly selects the Corporate, Retail, Residential RE, Commercial RE and CRM tables as model input assets.

**Template names and business input names.** A template display name may differ from the corresponding model input label. For example, the CRM template supplies the CRM Haircut input, and Commercial RE supplies Commercial Real Estate Risk Weight.

Abbreviations: ADC - Acquisition, Development and Construction; DD - Due Diligence; ECA - Export Credit Agency; ECRA - External Credit Risk Assessment; MDB - Multilateral Development Bank; PSE - Public Sector Entity; RE - Real Estate.

**Indicative template data.** The data currently populated in these templates is illustrative and is provided only for indicative assessment; it does not constitute, and no claim is made of, compliance with Basel d424.


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# B.1.5.3.1 Hierarchy Definitions

Hierarchies provide the classifications used by RWA templates, variable dimensions and scenario selections. The following names are the hierarchy display names; they do not have a leading RWA prefix.

**Table B-6 RWA Hierarchy Definitions**

| Business area | Hierarchy definitions |
|---|---|
| Core classifications | Asset Class; Party Type; Jurisdiction; Rating; Rating Source; Rating Status |
| Sovereign and public-sector treatment | Sovereign Treatment; ECA Bucket; PSE Treatment; MDB Treatment |
| Banking | Bank Maturity Type; Bank Rating Bucket; Bank RW Bucket |
| Corporate and covered bonds | Corporate Segment; Covered Bond Treatment |
| Rating buckets | Rating Bucket Corporate; Rating Bucket Covered Bond; Rating Bucket MDB; Rating Bucket PSE; Rating Bucket Sovereign; Rating Bucket Spec Lending |
| Real estate | CRE Approach; CRE Split Tranche; LTV Band; Real Estate Treatment; Residential RE Asset Class |
| Retail | Retail Obligor Type; Retail Qualifying Status; Retail Treatment |
| Acquisition, development and construction | ADC Category; ADC Treatment |
| Specialised lending | SL Category; SL Treatment |
| Credit Risk Mitigation | CRM Collateral Class; CRM Haircut Type; CRM Issuer Category; CRM Rating Bucket; CRM Residual Maturity Bucket |
| Due-diligence overrides | DD Override Bucket; DD Override Method |
| Default treatment | Default Provision Bucket; Default Treatment |
| Equity and other assets | Equity Category; Equity Treatment; Other Asset Category |

The Rating hierarchy supplies ordered rating categories. Party Type and Asset Class support the selection of obligor and exposure segments. CRM Collateral Class and CRM Residual Maturity Bucket support collateral-specific scenario selections.

Additional abbreviations: CRE - Commercial Real Estate; LTV - Loan-to-Value; RW - Risk Weight; SL - Specialised Lending.

**Hierarchies and result dimensions.** Hierarchy names such as Asset Class and Party Type are distinct from the reusable result-dimension definitions named RWA Asset Class and RWA Party Type.


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## B.1.5.4 Variables

Four variables identify the source values that the two supplied scenarios stress. They are also associated with Enterprise RWA Stress Configuration.

**Table B-7 RWA Variable Definitions**

| Variable definition | Type and business purpose | Input logical reference |
|---|---|---|
| Obligor Rating | Ordered categorical rating. Applies credit-rating changes to obligors. | INPUT_RWA Rating |
| Exposure Amount | Numeric. Applies changes to exposure amounts. | INPUT_Exposure Amount RWA |
| Collateral Market Value | Numeric. Applies market-value changes to collateral. | INPUT_Collateral Market Value RWA |
| Collateral Haircut | Numeric. Applies changes to CRM haircut assumptions. | INPUT_CRM Haircut |

**Table B-8 Variable Analysis Dimensions**

| Variable | Dimensions and supporting configuration |
|---|---|
| Obligor Rating | Party Type dimension and the ordered Rating hierarchy. Rating-agency, scale and rank information support rating changes. |
| Exposure Amount | Date and Asset Class. |
| Collateral Market Value | Date, CRM Collateral Class and residual maturity represented through the Code Value dimension. |
| Collateral Haircut | Date, CRM Collateral Class and residual maturity represented through the Code Value dimension. |

Source relationships. Obligor Rating uses STG_RWA_OBLIGOR_LEVEL.V_RATING_STRING; Exposure Amount uses STG_RWA_ACCOUNT_EXPOSURE.N_EAD_AMOUNT; Collateral Market Value uses STG_RWA_COLLATERAL.N_COLLATERAL_VALUE. Collateral Haircut uses N_HAIRCUT_PCT on the physicalized CRM template.

To create a new RWA variable, first create the input-variable mapping to the appropriate logical reference during Model Onboarding. Then create the variable, select its source and data type, add the required analysis dimensions, and validate the mapping before associating the variable with a scenario.

For a controlled change, copy the closest approved variable and update the copy rather than changing the approved definition directly. Confirm that the copied variable still maps to the intended source, dimensions and data type, then validate it before adding it to a scenario.

## B.1.5.5 Metrics

Ten metrics are associated with the target RWA model pipeline. Each metric uses an OUTPUT logical reference beneath its matching business term in the EST glossary.


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**Table B-9 Detailed RWA Metrics**

| Metric and output logical reference | Physical column and business meaning |
|---|---|
| Eligible Collateral Value RWA<br>OUTPUT_Eligible Collateral Value RWA | N_CRM_RECOGNIZED_AMOUNT<br>Recognised collateral amount |
| Gross Exposure RWA<br>OUTPUT_Gross Exposure RWA | N_EAD_SLICE_AMOUNT<br>Exposure amount for the result slice |
| Net Exposure RWA<br>OUTPUT_Net Exposure RWA | N_CRM_ADJUSTED_EXPOSURE_AMOUNT<br>Exposure after CRM adjustment |
| Risk Weight RWA<br>OUTPUT_Risk Weight RWA | N_FINAL_RW_PCT<br>Final assigned risk weight |
| Risk Weighted Assets RWA<br>OUTPUT_Risk Weighted Assets RWA | N_RWA_AMOUNT<br>Calculated RWA for the result slice |

**Table B-10 Aggregated RWA Metrics**

| Metric and output logical reference | Physical column |
|---|---|
| Eligible Collateral aggregated RWA<br>OUTPUT_Eligible Collateral aggregated RWA | N_CRM_RECOGNIZED_AMOUNT |
| Gross Exposure aggregated RWA<br>OUTPUT_Gross Exposure aggregated RWA | N_TOTAL_EAD_AMOUNT |
| Net Exposure aggregated RWA<br>OUTPUT_Net Exposure aggregated RWA | N_CRM_RECOGNIZED_AMOUNT |
| RWA aggregated RWA<br>OUTPUT_RWA aggregated RWA | N_TOTAL_RWA_AMOUNT |
| Risk Weight aggregated RWA<br>OUTPUT_Risk Weight aggregated RWA | N_WEIGHTED_AVG_RW_PCT |

**Business confirmation required.** The current Net Exposure aggregated RWA definition maps to N_CRM_RECOGNIZED_AMOUNT, the same column used by Eligible Collateral aggregated RWA. Confirm the intended mapping before using or describing this metric as aggregated net exposure.

To onboard a new RWA metric, first create the output-metric mapping to the appropriate logical reference during Model Onboarding. Then create the metric, give it a clear business meaning, map it to the correct result table and column, and validate the mapping before using it in an Analysis Configuration.

For a change to an existing metric, copy the closest approved metric and update the copy. For example, a copy of Gross Exposure RWA can be used when the same RWA calculation needs to be reported using an additional breakdown, such as by business unit or country. Confirm that the copied metric points to the intended model-pipeline output and does not change the underlying RWA calculation.


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## B.1.5.6 Analysis Configuration

Enterprise RWA Stress Configuration connects the RWA Model, the four business variables and the ten result metrics. Metric resolution identifies the result table and column supplied by the target model pipeline.

**Table B-11 RWA Analysis Configuration**

| STSA definition | Associations and purpose |
|---|---|
| Enterprise RWA Stress Configuration Analysis Configuration | Connects RWA Model, the four business variables and the ten result metrics. Metric resolution identifies the result table and column supplied by the target model pipeline. |

Create a new RWA Analysis Configuration when an approved assessment needs a different combination of model, variables or metrics. The configuration is the controlled connection between the RWA Model and the selected business variables and output measures; it does not alter the model calculation itself.

**Table B-12 Creating a New RWA Analysis Configuration**

| Step | What to do |
|---|---|
| 1. Define the assessment need | Identify the approved model, variables, metrics and output view required for the assessment. |
| 2. Create the configuration | Create an RWA Analysis Configuration with a clear name that describes the intended assessment. |
| 3. Connect the RWA Model | Select the approved RWA Model and confirm that its input and output mappings are available. |
| 4. Add variables and metrics | Associate the approved RWA variables and result metrics. |
| 5. Validate | Review and validate the configuration and its result mappings before it is used by a Project. |

For a controlled change, copy Enterprise RWA Stress Configuration and update the copy. Validate the copied configuration, its linked scenarios and the resulting Project setup before use.

## B.1.5.7 Scenarios

Both supplied scenarios use Obligor Rating, Exposure Amount, Collateral Market Value and Collateral Haircut. The seeded reference date is 31 March 2026.

Selective Credit and Collateral Deterioration represents targeted deterioration in selected counterparty, exposure and collateral segments. Enterprise-Wide Credit and Collateral Market Stress applies broader credit and collateral stress across the configured portfolio segments.


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**Table B-13 RWA Scenario Stress Components**

| Stress component | Selective scenario | Enterprise-wide scenario |
|---|---|---|
| Obligor Rating | One-notch deterioration for Bank, Corporate, Individual, MDB, Securities Firm and SME parties. PSE and Sovereign ratings remain unchanged. | Two-notch deterioration across configured party types, except A, A+, A-, AA, AA+ and AA-, which remain unchanged. Rating boundaries and special values follow the grid. |
| Exposure Amount | Bank: +3%. Corporate SME: +5%. Other configured asset classes: no increase. | Corporate SME: +15%. Bank and Corporate: +10%. PSE and Sovereign: +2%. Other configured asset classes: +5%. |
| Collateral Market Value | Selected class- and maturity-based reductions. Examples: convertible bonds -12%, gold -5%, main-index equity -15%. | Larger reductions for selected segments. Examples: convertible bonds -28%, gold -12%, main-index equity -35%. |
| Collateral Haircut | Selected increases for convertible bonds, main-index equity, and specified sovereign/MDB debt maturity buckets. | Larger configured haircut increases for the selected stressed collateral segments. |

**Supplied scenario assumptions.** These are preconfigured scenario assumptions, not regulatory requirements or recommended stress levels. Review the complete scenario grids and their units before using the configuration for an assessment. The rating grids preserve MSG and OTH as special values.

**Table B-14 Creating a New RWA Scenario**

| Step | What to do |
|---|---|
| 1. Define the purpose | Document the approved stress hypothesis, the portfolio or segment to be assessed, and the intended reference date. |
| 2. Create the scenario | Create a new RWA Scenario and give it a clear business name, for example Corporate Exposure Increase Stress. |
| 3. Select time horizon and frequency | Select the approved time horizon and frequency for the scenario. |
| 4. Select variables | Add the approved RWA variables to stress, such as Exposure Amount and Collateral Market Value. |
| 5. Set the affected population | Select the relevant dimensions and members. For example, select the Corporate asset class when the exposure increase applies only to Corporate exposures. |
| 6. Enter and review shocks | Enter the approved shock values and units, then review the variable assignments, dimension selections and values before validation and use. |

For a change to an existing scenario, copy the closest scenario and update the copy rather than altering the approved original. Review the variable assignments, selected populations, units and shock values before the copied scenario is used for an assessment.


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### B.1.5.8 Project

Enterprise RWA Stress Assessment, version 1, is the provisioned STSA Project. It brings together Enterprise RWA Stress Configuration, the approved scenarios, the selected reference date and the execution assets needed to run the assessment.

The Project Data Pipeline prepares the configured staging and template inputs. Creating and executing the Project pipeline provides the controlled sequence that prepares data, applies the selected scenario where relevant, invokes the RWA model pipeline, and writes results to the detailed, aggregate and run-level output tables.

The Project includes a baseline execution context for comparison with the two stress scenarios. The baseline is not a third user-defined Scenario object, and scenario-specific processing should not be interpreted as cumulatively applying both scenarios to one result.

**Table B-15 RWA Project**

| STSA definition | Purpose |
|---|---|
| Enterprise RWA Stress Assessment Project, version 1 | Uses Enterprise RWA Stress Configuration and both supplied scenarios. The seeded reference date is 31 March 2026. |
| Project Data Pipeline | Prepares inputs and provides the controlled execution path for the Project. |

## B.1.6 Result Dimensions

Three reusable result-dimension definitions are supplied. Their names and numeric key mappings support result classification.

**Table B-16 Reusable RWA Result Dimensions**

| Result dimension | Dimension table | Display column / key column | Description and example members |
|---|---|---|---|
| RWA Asset Class | DIM_RWA_ASSET_CLASS | V_ASSET_CLASS_NAME<br>N_ASSET_CLASS_SKEY | Classifies exposures by regulatory asset class. Examples: Sovereign, Bank, Corporate and Retail. |
| RWA Party Type | DIM_RWA_PARTY_TYPE | V_PARTY_TYPE_NAME<br>N_PARTY_TYPE_SKEY | Classifies the obligor or counterparty type. Examples: Bank, Corporate, Individual and Sovereign. |
| RWA Jurisdiction | DIM_RWA_JURISDICTION | V_JURISDICTION_NAME<br>N_JURISDICTION_SKEY | Classifies exposures by jurisdiction. The supplied configuration contains GLOBAL as its jurisdiction member. |


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**Table B-17 Project Result-Dimension Mappings**

| Project result dimension | Result mapping |
|---|---|
| RWA Asset Class | FCT_RWA_RESULT_SLICE.N_ASSET_CLASS_SKEY |
| RWA Party Type | FCT_RWA_RESULT_SLICE.N_PARTY_TYPE_SKEY |

Available does not mean selected. RWA Jurisdiction is available as a reusable definition but is not selected for this Project. The supplied Project does not include a result-dimension mapping to FCT_RWA_AGGREGATE.

## B.1.7 How to Execute and View Results

Before executing the Project, confirm that the required source data is available for the intended reference date and that model inputs, mappings and scenario assumptions are appropriate for the business use case. Create or select the Project pipeline, select the baseline or one approved scenario, and execute the Project using the approved portfolio scope.

After execution, review detailed results in FCT_RWA_RESULT_SLICE, aggregated results in FCT_RWA_AGGREGATE and calculation-run information in FCT_RWA_RUN. These tables have different purposes and should not be treated as interchangeable result sources.

**Table B-18 Result Review Guide**

| Result area | How to use it |
|---|---|
| Detailed results | Use FCT_RWA_RESULT_SLICE to trace exposure-level or exposure-slice treatment, including risk weight, recognised CRM and calculated RWA. |
| Aggregated results | Use FCT_RWA_AGGREGATE to review portfolio-level exposure and RWA results across the selected result dimensions. |
| Run information | Use FCT_RWA_RUN to confirm the calculation run and investigate run-level information. |

## B.1.8 Executing with New Variables or Scenarios

When a new variable or scenario is created, first complete and validate its onboarding or configuration changes. A new variable must have an approved input mapping to its logical reference; a new metric must have an approved output mapping; and a new scenario must use approved variables, dimensions, members, time horizon, frequency and shock values.

Copy the approved Analysis Configuration and Project where a controlled change is required, then associate the validated variable, metric or scenario with the copied configuration and Project. Create or update the Project Data Pipeline as required, validate the full setup, and run a controlled test using representative data before using results for an assessment.

Compare the new execution with the baseline or applicable approved scenario. Reconcile detailed, aggregate and run-level results, and confirm that the intended new variable or scenario was applied before relying on the outcome.


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C

# VAR Model

This appendix describes the Vector Autoregression (VAR) model, including responsibilities, provisioning, data preparation, execution, results, mapping and saving scenarios, and troubleshooting.

C.1 Overview and responsibilities

C.2 Provisioning the VAR Model

C.3 Data preparation and execution

C.4 Results and worked example

C.5 Mapping and saving scenarios

C.6 Troubleshooting, outputs, and FAQs


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# C.1 Overview and responsibilities

STSA includes a packaged Vector Autoregression (VAR) model that helps risk and finance users develop forward-looking scenarios from reviewed historical time series. VAR models relationships among selected variables: each variable can depend on its own past observations and those of the other variables. This gives users a structured way to explore how economic and financial conditions may evolve together for stress assessment.

The model produces a deterministic baseline, simulated future paths, named scenarios and diagnostic evidence. Users can compare the paths, assess their direction and severity, and review the diagnostics and limitations before selecting scenarios for their intended purpose. The simulated paths represent outcomes under the model's assumptions; they are not predictions or calibrated probabilities of real-world events.

After an administrator provisions the model and verifies its approved version, analysts run it through the MMG interactive dashboard. Analysts review the historical data and outputs, confirm the mapping of each selected variable to its STSA target, and check whether each scenario will create or update a target. They can then save selected named paths to STSA, open the saved scenarios to verify their values, and complete the applicable review and approval process.

Users can also create scenarios in the scenario wizard by entering shock values in the interface or by exporting and re-importing the Variable Pathways Excel workbook. The packaged VAR workflow provides an additional way to generate scenario paths from historical data. For the model workflow, see *Provisioning the VAR Model* and *Data preparation and execution*.

## C.1.1 Roles and permissions

**VAR responsibilities.** Ensure that the operator can access the target workspace and model and can execute the authorized model version. Saving generated scenarios requires the applicable scenario create or modify permissions. In the existing permission matrix, these operations use `EST_SCENARIO_ADD` and `EST_SCENARIO_MOD`; viewing saved results uses the scenario viewing permissions. Grant review and approval privileges separately to the responsible users. Membership of a modeling group alone does not establish scenario create, modify, review, or approval access.

The administrator provisions and verifies the approved model. The analyst prepares data, executes the model, and reviews mappings and save targets. The scenario owner verifies saved results and completes the applicable review and approval process. For the procedure, see Data preparation and execution.

## C.1.2 Purpose and prerequisites

Before starting, confirm the following:

- The administrator has verified the correct workspace, model ID, approved nonzero version, and supported MMG/Data Studio runtime.
- The runtime can read the historical CSV. A file available only on the analyst's computer is insufficient.
- Selected numeric series have reviewed definitions, units, frequency, dates, and sufficient cleaned history.


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- Suitable target variables exist in STSA. The operator has the required scenario create or modify access.
- The model owner has agreed the purpose, validation criteria, and acceptable limitations.

**Workflow**

1. Prepare and identify the historical dataset.
2. Open the authorized model through **Building Blocks > Models**, verify its version, and open **Model Definition > Dashboard > Interactive**.
3. Start initialization, configure the model, and generate paths.
4. Review diagnostics, effective settings, and output files.
5. Reconcile every required variable and inspect CREATE/UPDATE targets.
6. Confirm mappings, execute saving, and independently verify the resulting scenarios.
7. Complete the applicable scenario review and approval workflow.

**Review responsibility.** Simulation results do not determine whether a scenario is economically suitable. Review variable directions, weights, severity, uncertainty, and limitations before saving. A scenario percentile is a position in the simulated score distribution, not a calibrated probability of a real-world event.

## C.1.3 Workflow checkpoints

**Generate scenarios using VAR when required.** Prepare reviewed historical time series, open the provisioned VAR model, and run its Interactive workflow. Review the modeled paths and diagnostics, confirm variable mappings and save targets, then save and verify the selected scenarios. Complete their applicable review and approval process before using them in a project. See Data preparation and execution.

**VAR workflow checkpoints.** Model approval, calculation completion, mapping confirmation, successful scenario saving, and scenario approval are separate checkpoints. Check each applicable result before continuing.

| Checkpoint | What to verify |
|---|---|
| Model approval | Correct workspace, model ID, nonzero version, and Approved status. |
| Calculation completion | Current run outputs and diagnostics are available and reviewed. |
| Mapping confirmation | Every required variable and its target identity have been reviewed and confirmed. |
| Scenario saving | Each intended scenario is present with the expected values, dates, variables, and actual status. |
| Scenario approval | The scenario has completed the applicable STSA review and approval workflow. |

A model's Approved status and an execution card's COMPLETED indicator do not establish approval of the generated scenarios. See Data preparation and execution.


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# C.2 Provisioning the VAR Model

The provisioning utility makes the packaged VAR Scenario Generator available in the selected workspace and verifies an Approved model version. Provisioning can import, publish, request acceptance, and approve the model. It does not execute the historical-data workflow or save or approve generated STSA scenarios.

## C.2.1 Before you begin

Confirm Bash, curl, and jq are available on the installation host. The utility must be executable, the installation layout must be intact, and its log and temporary-file locations must be writable. Confirm the target workspace and service identifiers, authentication configuration, service connectivity, and eligible reviewer/approver identities with the administrator.

## C.2.2 Run the utility

1. Open a Bash session on the STSA installation host.
2. Replace all placeholders with values for the intended environment.
3. Run the command once and retain its result and log.

```
cd "<STSA_INSTALL_HOME>/bin/utility"
./provision_var_model.sh \
  "<WORKSPACE_ID>" "<LOGIN_USER>" "<LOCALE>" "<SERVICE_ID>"
```

| Position | Argument | Required value |
|---|---|---|
| 1 | WORKSPACE | Technical workspace ID. |
| 2 | LOGIN_USER | Requester context for the operation. |
| 3 | LOCALE | Locale accepted by the deployment. |
| 4 | SERVICE_ID | Target deployment's service identifier. |

The four arguments have no positional defaults. The tenant defaults to `MMG1` when `STSA_TENANT_ID` is empty or unset; tenant is not a fifth argument.

## C.2.3 Verify provisioning and reuse

An illustrative command is shown below. Replace the values; this example does not identify an actual workspace or authorized user.

```
./provision_var_model.sh "WORKSPACE1" "MMGUSER" "en_US" "VSERVICE1"
```

Success requires exit code `0`, HTTP `200`, top-level `status=SUCCESS`, and an Approved result for each model. Verify the exact model ID and a version greater than zero. HTTP success alone is insufficient. HTTP `207` with `PARTIAL_FAILURE` means provisioning is incomplete even when some archives succeeded.


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| Existing state | Expected handling |
|---|---|
| No matching model | Import and complete publication, acceptance, approval, and verification. |
| Matching draft or published model | Resume the remaining lifecycle stages. |
| Pending approval | Resume approval and verification. |
| Matching Approved model | Reuse the selected version and verify it. |
| Rejected or ambiguous model | Investigate the conflict before a coordinated rerun. |

Reuse is based on model/objective metadata. Replacing an archive does not force an approved model upgrade. The backend processes its configured packaged ZIP resources; a ZIP beside the utility is not automatically imported. The utility has no archive-selection, force, or dry-run command-line option.

## C.2.4 Handover and incomplete requests

Retain the workspace, archive, model ID/version, final status, reuse indication, timestamp/timezone, and utility log. Give the analyst the approved model identity, runtime prerequisites, and data location requirements.

After a timeout or incomplete response, inspect the current server-side model state and whether the original request is still progressing. Resolve the cause before a single coordinated rerun. Completed lifecycle actions are not automatically rolled back. Continue with Data preparation and execution.


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## C.2.5 Provisioning configuration and logs

Paths resolve from the utility's installation directory. The expected layout includes:

```
<STSA_INSTALL_HOME>/bin/utility/provision_var_model.sh
<STSA_INSTALL_HOME>/stsa-service/conf/application.properties
<STSA_INSTALL_HOME>/stsa-ui-service/conf/application.properties
```

The service properties supply `BASE_URL` and `mmg.url`. Nonempty environment variables `BASE_URL` and `MMG_BASE_URL` override the URLs used by the utility; the service properties file must still exist. The backend's own MMG connection configuration remains separately configured.

Authentication uses the first applicable source:

1. A nonempty `STSA_AUTH_TOKEN`.
2. Both `STSA_USERNAME` and `STSA_PASSWORD` when supplied together.
3. Both `token.clientid` and `token.secret` from the UI properties file.

The requester argument supplies request context and is separate from the bearer-token principal. An invalid direct token is not automatically refreshed. Ask the administrator to resolve authentication problems without exposing credentials in logs or support material.

Logs are written under the utility directory at `logs/VAR_MODEL/VAR_MODEL_YYYYMMDD_HHMMSS.log`. Use the timestamp to correlate the request with service logs and resulting model identity.

| Configured limit | Value and meaning |
|---|---|
| Connection timeout | 10 seconds for each shell HTTP call. |
| Token request timeout | 30 seconds total for the token call. |
| Provisioning request timeout | 420 seconds total for the deployment call. |
| Backend state polling | Default interval 2 seconds; timeout 120 seconds per polling operation. |

These are configured request/polling limits, not a predicted notebook runtime. Notebook duration depends on data, variables, lags, simulations, validation, plotting, and service latency.

## C.2.6 Model approval and handover

For the packaged VAR model, the provisioning process can complete model publication and approval. Verify the exact model ID, nonzero version, and Approved status before handing it to an analyst. See Workflows for Models in the STSA User's Guide when manual lifecycle action is required. An approved model does not approve scenarios generated from it; those scenarios follow the applicable STSA object workflow. See Provisioning the VAR Model.


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# C.3 Data preparation and execution

## C.3.1 Selecting the approved model

**Using the packaged VAR model.** If an approved VAR model is already available in the workspace, open that model and verify its version before execution. The model creation procedure in the STSA User's Guide is for creating a model definition. To use the packaged generator, follow Data preparation and execution. If the model is unavailable, ask the administrator to complete Provisioning the VAR Model.

For the VAR Scenario Generator, verify the model ID and the approved nonzero version supplied by the administrator. If several versions exist, select the version authorized for the run. Record the selected identity and follow Data preparation and execution for Dashboard and Interactive execution.

## C.3.2 Preparing historical data

The default file is `var_time_series_data.csv` under the directory returned by `fetch_ftpshare()`. Configure `CSV_PATH` if using another runtime-accessible file. The default date column is `date`; the packaged variables are `GDP_Growth`, `Inflation`, `FEDFUNDS`, and `UNRATE`.

| Check | Preparation and current behavior |
|---|---|
| Dates | Use parseable, consistent dates. Rows with invalid dates are dropped. |
| Numeric values | Required values are converted to numbers. Rows missing any modeled value are dropped. |
| Duplicate dates | The last row for a date is retained; dates are then sorted. Resolve conflicting duplicates before execution. |
| Missing periods | The notebook does not resample, aggregate, or fill gaps. Prepare aligned observations at the intended frequency. |
| Units | Keep percentages, percentage points, fractions, growth rates, and index levels distinct. Mapping does not perform an automatic unit conversion. |
| Variable selection | Select relevant, nonconstant series; the implemented guardrail allows at most eight variables. The first selected series is the primary variable. |
| History | Assess the cleaned sample, differencing losses, lag burden, and holdout with the model owner. More variables and lags require more information. |

### Data preparation procedure

1. Record the source, extraction date, file identity, units, and intended use.
2. Check headers, parsing, duplicates, missing values, and aligned dates.
3. Make the file readable by the notebook runtime and set the exact path.


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4. After loading, compare the cleaned row count and date range with the input. Investigate unexpected losses before fitting.

**Frequency behavior.** A horizon of eight represents eight periods. Setting `FREQUENCY` to quarterly does not convert monthly observations to quarterly data. Future dates prefer the frequency inferred from the historical index; the configured frequency is a fallback. Review the generated dates and the frequency used for STSA before saving.

**Sufficiency.** Passing a program guardrail does not establish statistical adequacy. Backtesting reserves the latest holdout observations, further reducing the fitting sample. Review the actual fitted lag and all data sufficiency warnings.

## C.3.3 Configuring the model

Review the printed effective configuration after execution starts. The standard workflow builds its settings centrally; it does not automatically read an arbitrary external JSON/YAML configuration file. Some settings may require notebook configuration because a particular dashboard exposes only a subset.

| Parameter | Default | Purpose and accepted values |
|---|---|---|
| `CSV_PATH` | FTP-share CSV | Runtime-accessible historical file. |
| `DATE_COLUMN` | `date` | Exact date-column header. |
| `COLUMNS` | Four packaged series | Ordered numeric columns; first is primary. |
| `COLUMNS_TO_DROP` | Empty tuple | Optional columns to remove; retain required series. |
| `FREQUENCY` | `quarterly` | `monthly`, `quarterly`, or `yearly`; align with input dates. |
| `HORIZON` | `8` | Positive number of future periods. |
| `N_SIMULATIONS` | `1000` | Positive count of simulated paths. |
| `RANDOM_SEED` | `2024` | Repeatability with the same data, code, settings, and runtime. |
| `SHOCK_METHOD` | `bootstrap` | Sample residual vectors; `parametric` uses multivariate-normal shocks. |
| `MAX_LAG` | `7` | Positive lag-search limit, capped for feasible estimation. |
| `FORCE_LAG` | `None` | Optional positive fixed lag, still subject to the feasible limit. |
| `LAG_SELECTION_IC` | `bic` | `aic`, `bic`, `hqic`, or `fpe`. |
| `RANKING_METRIC` | `composite` | `composite` or `primary`. |
| `COMPOSITE_WEIGHTS` | `None` | Derive weights from selected series/data; explicit weights must match variable names. |


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Use the effective fitted lag shown in the output when interpreting the model. Increasing paths or the forecast horizon does not guarantee a better model. Derived variable labels and aliases assist matching but still require business review.

**Scenario and validation settings**

| Parameter | Default | Practical effect |
|---|---|---|
| USE_QUICK_BUILDER | True | Build named scenarios automatically. |
| N_PESSIMISTIC | 5 | Five downside definitions. |
| N_BASELINE | 1 | One baseline-band definition. |
| N_OPTIMISTIC | 5 | Five upside definitions. |
| PESSIMISTIC_RANGE | (5, 25) | Downside target percentiles. |
| OPTIMISTIC_RANGE | (75, 95) | Upside target percentiles. |
| BAND_WIDTH | 5 | Target percentile plus/minus five percentile points, clipped to 0-100. |
| BACKTEST_HOLDOUT | 8 | Latest observations reserved for backtesting. |
| COVERAGE_CONFIDENCE | 0.90 | Interval target strictly between 0 and 1. |
| MONTE_CARLO_PLOT_PATHS | 150 | Paths requested for simulation plots. |
| SENSITIVITY_SEEDS | 2024-2028 | Default five seeds for comparison. |
| SENSITIVITY_N_VALUES | 200, 500, 1000 | Default simulation counts for comparison. |

**False and zero limitation.** Several settings treat false, zero, or empty input as a request to use the default. In the packaged central configuration, `USE_QUICK_BUILDER=False` becomes `True`, zero scenario counts return to their defaults, and seed `0` becomes `2024`. Verify the effective values. Do not rely on those entries to disable the builder or scenario categories. Refer configuration changes that require another route to the model administrator.

**Keep runs separate.** Outputs use an execution-specific directory. A nonblank `VAR_EXECUTION_ID` supplies the output identifier; otherwise a timestamp is used. Use a unique, simple identifier for a distinct run. Reusing a directory can retain older scenario JSON files that an `all` selection would include.

## C.3.4 Executing the model in MMG

1. Open the authorized VAR model. Verify its model ID, approved status, and nonzero version.
2. In **Model Definition**, select **Dashboard**.
3. Click **Interactive** to provide inputs and review results in stages. Review the three stage cards and their responsibilities below.


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| Stage | Displayed label and responsibility |
|---|---|
| 1 | **Start widget** initializes the notebook and imports libraries. |
| 2 | **Define centralized configuration** prepares data, fits the model, generates paths, validates, and exports. |
| 3 | **Review STSA variable mapping and approve publish selections** reviews mappings and saves selected scenarios to STSA. |

### Initialize the execution

4. On a fresh execution, click **Start** on **Start widget** once.
5. Review `$FICMISDATE$`, `$BATCHRUNID$`, and `$TASKID$` under **Parameters**. Retain the generated context unless your administrator requires a specific value.
6. Allow initialization to finish. Inspect **Reports** for errors. When **Next** becomes available, record the MMG session ID and click **Next**.

**Expected result:** Stage 2 becomes active.

- **Execution paused!** indicates an interactive checkpoint. Inspect the active stage and any errors before continuing.
- **No previously created session found** can appear before session assignment. **No items to display** refers to the Reports list. Neither message alone establishes success or failure.
- A **COMPLETED** card does not establish that a fresh run started or that a scenario was approved.
- Use the stage execution controls. The model-level **Publish** action concerns the model lifecycle.
- Retain the model ID/version, MMG session ID, batch/task context, and printed output execution ID. The session and output IDs serve different purposes.


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**Configure and review the modeling stage**

7. Confirm Stage **2 / 3** and review the available inputs under **Parameters**.

- `CSV_PATH` identifies the historical file accessible to the notebook runtime.
- `DATE_COLUMN` identifies the date-column header.
- `COLUMNS` identifies the ordered series to model.
- `COLUMNS_TO_DROP` identifies any columns to exclude.

In the default route, `None` allows a notebook fallback; it is not a literal filename or column name. The dashboard exposes only a subset of notebook parameters. Use the configuration reference to review additional settings.

8. Click **Execute Stage** once and allow the modeling stage to run.
9. Review the printed effective configuration and generated outputs. Check the following:

- The input path, selected series, cleaned row count, and historical date range are correct.
- The fitted lag, transformations, and stability results are suitable for the intended model.
- The diagnostics and backtest results meet the model owner's review criteria.
- The generated dates, forecast horizon, output execution ID, and exported paths belong to the intended run.

10. Resolve errors or unsuitable results before continuing. An empty **Reports** list does not establish that validation passed.
11. At the interactive checkpoint, confirm that Stage 2 is ready and its outputs have been reviewed. Click **Next**.

**Expected result:** Stage **3 / 3** opens the variable reconciliation review. If data or model settings change, rerun the dependent modeling and export steps so mapping uses the revised outputs.


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# C.4 Results and worked example

## C.4.1 Understanding results

| Concept | Interpretation and review |
|---|---|
| Lag | Number of earlier periods used in each equation. Review the fitted lag, which can be lower than the requested limit. |
| Stationarity | A series whose statistical behavior is sufficiently stable for the modeling assumptions. The notebook uses ADF testing and first differences when indicated. A remaining warning needs review. |
| Differencing | Modeling changes between observations. Files ending in `_levels.csv` restore the original modeled units for interpretation. |
| Deterministic baseline | Fitted forecast without newly sampled shocks. This supplies the saved grid's Current Value path. |
| Monte Carlo paths | Alternative futures generated by residual bootstrap or parametric shocks under the fitted assumptions. |
| Named scenarios | Average paths around target score percentiles; the nearest path is used if the selected window is empty. |
| Baseline band | `baseline_1` is centered on the 50th score percentile and can differ from the deterministic baseline. |
| Stress overlay | A separately exported stress path. It is not automatically one of the named JSON scenarios selected for saving. |

**Review diagnostics together**

Inspect stability and residual behavior, including autocorrelation and normality. An unstable fit stops execution. Granger tests describe predictive relationships within the fitted specification; they do not establish economic causation. Impulse responses and variance decomposition help explain the fitted model.

Backtesting fits earlier history and compares forecasts with the holdout. Review variable-level errors and empirical interval coverage. The 0.90 interval target does not guarantee future coverage. Compare seeds, path counts, and lag choices to assess sensitivity.

There is no universal diagnostic pass threshold for business acceptance. Record the model owner's decision, supporting evidence, and accepted limitations. Review composite scoring directions and weights before interpreting a lower score as adverse for the intended business purpose.


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# C.4.2 Worked quarterly example

**Illustrative workflow.** The following values demonstrate CSV structure. They are invented examples, not execution results; three observations are insufficient for a production VAR model. Use a sufficiently long, reviewed quarterly dataset with these headers.

```
date,GDP_Growth,Inflation,FEDFUNDS,UNRATE
2023-01-01,2.1,4.2,4.5,3.6
2023-04-01,2.4,3.8,5.0,3.7
2023-07-01,2.0,3.4,5.3,3.8
```

| Example setting | Value and required check |
|---|---|
| Series | GDP_Growth, Inflation, FEDFUNDS, UNRATE in that order; growth is primary. |
| Frequency and horizon | Quarterly input and eight future periods; verify eight generated quarterly dates. |
| Fitting | Maximum lag 7, no forced lag, BIC selection; inspect effective lag and stability. |
| Simulation | 1,000 paths, seed 2024, bootstrap shocks. |
| Named scenarios | Five downside, one baseline-band, five upside; review directions and severity. |
| Backtest | Holdout 8 and coverage target 0.90; inspect observed performance. |

For a regular quarter-start historical series, a horizon of eight produces eight future quarter-start dates after the final observation if that index is used. Verify the actual dates in the run output.

Suppose the reviewer selects three paths. Before rerunning the mapping review, set the notebook-context selection to filename stems that exist in the current execution:

```
import os
os.environ["STSA_SCENARIOS_TO_SAVE"] = (
    "severe_downside,baseline_1,upside"
)
```

Verify the three selected files, all four variable mappings, the CREATE/UPDATE targets, and eight observation dates. No forecast values, diagnostic scores, or successful saves are assumed in this example.


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# C.5 Mapping and saving scenarios

`STSA_SCENARIOS_TO_SAVE` defaults to `all`, which selects every JSON file in the current scenario directory in sorted order. To select a subset, use comma-separated filename stems and ensure all requested files exist. Rerun the review after changing the selection.

1. Inspect the selected scenario files and required variables in Stage **3 / 3**.
2. Review each source variable and its suggested STSA target. Compare their meaning, units, frequency, identity, and version.
3. Correct wrong or missing suggestions through the override selector. Resolve unavailable targets before continuing.
4. Select the checkbox for every required variable after reviewing its mapping. For the packaged configuration, review `GDP_Growth`, `Inflation`, `FEDFUNDS`, and `UNRATE`.
5. Inspect the mapping audit and every CREATE/UPDATE target. Verify the actual target codes and IDs for the current workspace and run.

- Review high-scoring and tied suggestions. Suggestion confidence is a matching heuristic, not forecast confidence.
- Select every required row. Leaving a required checkbox unchecked blocks saving; it does not exclude the series from the scenario.
- Identify controls by their displayed purpose. Generated control suffixes and target codes can vary between runs and workspaces.

An administrator can provide explicit mappings from source variable names to verified STSA object IDs. If interactive controls are unavailable, the notebook provides `MANUAL_SELECTED_VARIABLES`, `MANUAL_STSA_MAPPING_OVERRIDES`, and `MANUAL_CONFIRM_SELECTION` fallbacks. These still require complete review and confirmation; rerun the mapping review after changing them.

**Confirm saving and verify persisted results**

6. Review all overrides and confirm the exact target IDs for UPDATE operations. Resolve unexpected matches before saving.
7. Select **Confirm selected mappings and continue** after reviewing every required mapping.
8. Click **Execute Stage** once. This stage writes the selected scenarios to STSA. Inspect the response for each selected scenario.
9. Refresh the STSA **Scenario** summary. Locate each intended scenario by name and review its actual version, status, and variable frequency.
10. Open each saved scenario and compare it with the files from the same execution. Verify the following:

- The scenario identity and CREATE/UPDATE target match the reviewed selection.
- The mapped variables and units match the reviewed source series.
- The frequency, horizon, and observation dates match the generated output.
- Representative baseline and scenario values match the execution files.
- Applicable dimension requirements and validation messages have been reviewed.

11. Retain the save report and independent verification evidence. Complete the applicable STSA scenario review and approval workflow.


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Some report fields can fall back to request values when a response omits them. Therefore, the report alone does not establish the persisted state. Execution completion, mapping confirmation, saving, and scenario approval remain separate checkpoints.

### Reviewing save effects

#### Existing target selection

The selected JSON filename stem supplies the scenario name. The preview identifies CREATE or UPDATE and includes the existing target code/ID when a match is found. Matching considers normalized names or descriptions and supported suffixed forms; it is broader than exact name equality. Where multiple records match, the helper chooses the newest by modification/creation ordering.

Inspect the actual target identity. An UPDATE can change a previously approved scenario. The generator sets draft authorization status in the update request and does not perform scenario approval. Verify the actual resulting version/status in STSA.

#### Generated grid meaning

- Current Value uses the deterministic baseline forecast path, not a single last historical observation or the `baseline_1` named path.
- The named scenario path is repeated across the derived MIS-date columns; these are not independently conditioned forecasts for each MIS date.
- The default shock type is `AB`, the extrapolation-required flag is `N`, and the standard payload has an empty scenario-variable-dimension list.
- Observation dates follow the generated forecast index. Check baseline/date alignment and any downstream dimension requirements before approval.

Baseline and named-path files must come from the same execution. The helper prefers matching baseline dates but can fall back to the first horizon rows. Independent checks should confirm that values and dates align as intended.

#### Explicit mapping example

The following JSON illustrates the shape of an administrator-supplied mapping. Replace placeholders with verified object IDs; do not substitute a display name or assume an object code is an object ID.

```
{
  "GDP_Growth": "<STSA_OBJECT_ID_FOR_GDP>",
  "Inflation": "<STSA_OBJECT_ID_FOR_INFLATION>",
  "FEDFUNDS": "<STSA_OBJECT_ID_FOR_POLICY_RATE>",
  "UNRATE": "<STSA_OBJECT_ID_FOR_UNEMPLOYMENT>"
}
```


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## C.5.1 Verifying saved scenarios

**Verifying VAR-generated scenarios.** Refresh the Scenario summary and open every scenario selected for saving. Check its object identity, version and actual status; mapped variables and units; frequency, horizon and dates; and representative baseline and scenario values against the same model execution's output files. Review any applicable dimension requirements and validation messages.

The notebook's save report is useful supporting evidence, but it does not replace reading the persisted scenario. After verification, follow the applicable STSA review and approval workflow. See Mapping and saving scenarios.

## C.5.2 Updates from the VAR generator

**Updates from the VAR generator.** Before saving, inspect the notebook's CREATE/UPDATE preview and verify the identity of each existing target. A matched scenario can be updated, including a previously approved scenario. The generator prepares an update with draft authorization status and does not perform scenario review or approval. Read back the saved object and its actual version/status, then complete the applicable workflow. Do not assume the UI editing behavior described in the STSA User's Guide establishes the outcome of a notebook save. See Reviewing save effects.


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# C.6 Troubleshooting, outputs, and FAQs

## C.6.1 Troubleshooting and output references

Use the printed `OUTPUT_DIR`, normally `<fetch_ftpshare()>/var_output_csv/<EXECUTION_ID>/`. Keep the files from each run together. Scenario files are in `scenario_library/`; plots are in `plots/`.

| File or group | Review purpose |
|---|---|
| `baseline_future_forecast_levels.csv` | Deterministic baseline in original units; used to construct the saved grid. |
| `stress_future_forecast_levels.csv` | Separate stress-overlay forecast in original units. |
| `monte_carlo_future_scenarios_levels.csv` | All simulated future paths in long form. |
| `named_scenarios_levels.csv` | Selected named paths by scenario, date, and variable. |
| `scenario_scores.csv` | Ranking evidence for the simulations. |
| `named_scenario_extraction_report.csv` | Target percentiles, windows, and contributing paths. |
| `stationarity_report.csv` | Transformations and ADF outcomes. |
| `jarque_bera_diagnostics.csv` | Residual-normality diagnostics. |
| `granger_causality_diagnostics.csv` | Predictive-dependence diagnostics. |
| `backtest_variable_metrics.csv` | Holdout errors and coverage. |
| `seed_sensitivity.csv`, `n_sensitivity.csv`, `lag_sensitivity.csv` | Sensitivity to seeds, simulations, and lag choices. |
| `run_summary.json` | Configuration and model/validation summaries. |
| `output_contract_preview.json` | Compact output inventory. |
| `scenario_library/<scenario_name>.json` | Individual named-scenario scaffold for reconciliation and saving. |

The baseline, stress, and Monte Carlo exports also have model-space CSV counterparts without the `_levels` suffix. Some series in those files can be differences. Use the levels outputs for comparisons in the original units.

Scaffold JSON is not a complete STSA save request. Reconciliation supplies live identities and the baseline grid before saving. File existence alone does not establish acceptable diagnostics or successful persistence.


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### Recovering from an interrupted save

| Symptom | Check and action |
|---|---|
| Model unavailable | Verify workspace, selected model/version, and provisioning result. |
| Missing file or columns | Check runtime path, exact headers, selected columns, and access. |
| Too little usable data or failed fit | Inspect dropped rows, gaps, constant/redundant series, transformations, and lag burden with the model owner. |
| Unstable model or poor diagnostics | Resolve the specification or data issue before mapping and saving. Do not bypass stability checks. |
| Unexpected settings | Inspect effective configuration, including false/zero fallback behavior. |
| Paused execution or empty Reports | Inspect the active stage, errors, output files, and available continuation control. |
| Missing mapping or blocked save | Resolve every required target, select all required rows, and confirm the final mapping review. |
| Unexpected UPDATE | Verify matched code/ID and resolve the target before proceeding. |
| Timeout or incomplete save | Inspect persisted state and whether the original request remains active. |

Saving occurs sequentially and has no automatic batch rollback. A later failure does not undo earlier writes.

1. Stop repeated save attempts. Preserve the session/output IDs, selected files, preview, and responses.
2. Refresh STSA and inspect every intended target. Record what actually saved and each current identity/status.
3. Determine whether the original operation is still active; resolve the reported cause.
4. Select the files requiring recovery and rerun mapping/preview against current state. Previously new targets may now require UPDATE.
5. Review the revised targets, execute the recovery once, and independently verify each result.

For support, provide sanitized errors, input identity, effective configuration, failing stage, selected targets, and verification evidence. Coordinate corrections to already saved business data through the supported STSA process.


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## C.6.2 Logging and support

**VAR provisioning logs.** The provisioning utility writes logs relative to its own directory:

```
<STSA_INSTALL_HOME>/bin/utility/logs/VAR_MODEL/
  VAR_MODEL_YYYYMMDD_HHMMSS.log
```

For a provisioning issue, retain the target workspace, request time and timezone, script exit code, response status, model ID/version, and failed stage. A client timeout does not establish that the server stopped processing the request.

For a model execution issue, retain the MMG session ID, batch/task context, failing stage or notebook paragraph, sanitized error, and the output execution ID. The output execution ID identifies the directory under `var_output_csv`; it is separate from the MMG session ID.

For a saving issue, also retain the selected scenario files, mapping audit, CREATE/UPDATE preview, per-scenario responses, and the results read back from STSA. See Troubleshooting and output references.

Exclude passwords, bearer tokens, authorization headers, and credential-bearing configuration files from a support handover.

## C.6.3 Recovering after a failed test or save

Inspect the failure details and current state of the affected objects before taking corrective action. Preserve execution identifiers and logs, determine which operations completed, and use the supported recovery procedure for the failed step. For a VAR scenario save, earlier writes can remain even when a later write fails; there is no automatic batch rollback. Read back each intended scenario and review the refreshed save targets before retrying. Do not delete scenarios as a general rollback method.

## C.6.4 Frequently asked questions

1. **Can STSA generate scenarios from historical time series?**

Yes. The packaged Vector Autoregression (VAR) model estimates relationships among selected time series and generates forward-looking baseline and simulated paths. An analyst reviews the outputs and saves selected named scenarios after mapping and target confirmation. In this workflow, VAR means Vector Autoregression. See Data preparation and execution.

2. **Does approval of the VAR model approve its generated scenarios?**

No. Model approval confirms the model lifecycle state. Generated scenarios must be saved, independently verified in STSA, and submitted through their applicable review and approval workflow. Mapping confirmation and execution completion are also separate from scenario approval.

3. **Why does the VAR interactive execution pause?**

Interactive execution pauses at input and review checkpoints. Check the active stage, inspect any errors, and use the displayed Next or Execute Stage control when the stage is ready. A paused message or empty Reports area alone does not establish failure or successful validation. See Executing the model in MMG.


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4. **How do I confirm that generated VAR scenarios were saved?**

Refresh the Scenario summary and open each intended target. Compare its identity, actual status, variables, dates, and representative values with the files from the same model run. A completed notebook or successful-looking report does not replace this persisted-result check. Complete the applicable scenario approval process after verification.

5. **What if a required VAR variable cannot be mapped?**

Review the available STSA variables, their units and identities, and the override choices. If the correct target is unavailable, arrange its creation or access through the responsible administrator, then refresh the mapping review. Every required variable must be resolved, selected, and confirmed before saving. Leaving a required row unchecked does not remove the variable from the scenario.

6. **How do I recover when only some VAR scenarios were saved?**

Stop repeated save attempts. Preserve the original selection and responses, inspect each target in STSA, and establish whether the original request is still active. Resolve the cause, select the files requiring recovery, rerun mapping and CREATE/UPDATE review against current state, then save once and verify the results. A target that previously required CREATE can require UPDATE after a partial save. See Recovering from an interrupted save.


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D

# Frequently Asked Questions (FAQs)

## D.1 General Overview

1. **What is the purpose of STSA?**
   STSA is a financial analytics tool to conduct enterprise-wide stress testing and scenario analysis for regulatory compliance, risk management, and decision-making.
2. **How does STSA help with financial risk assessment?**
   STSA allows users to define scenarios, create stress testing models, and analyze credit, market, liquidity, and operational risks to simulate downturns and take preventive actions.
3. **Is STSA only for regulatory stress testing?**
   No. It also supports internal planning, capital allocation, and broader risk assessment beyond regulatory exercises.

## D.2 Getting Started

1. **How do I access STSA for the first time?**
   You need a valid user account provided by your system administrator. Log in using your credentials through the STSA application interface.
2. **What are the system requirements for using STSA?**
   STSA requires a compatible web browser and access to an authorized database. Ensure that you have proper network permissions to connect to the system.
3. **How do I reset my password if I forget it?**
   You can reset your password either by using the **Forgot Password** option on the login page or by contacting your system administrator.
4. **What are the different types of users in STSA?**
   STSA supports various user roles such as Business Analyst, Data Analyst, Administrator, and Technical Analyst, each with specific privileges.
5. **How do I request access to a specific role in STSA?**
   Contact your system administrator to request a role change. The administrator can assign new roles based on your responsibilities.

## D.3 Workspaces and Data Management

1. **What does it mean to create a new workspace?**
   Creating a new workspace in STSA means setting up an isolated environment where you can perform stress testing and scenario analysis without affecting the production data. This workspace includes a sandbox, metadata, and configurations that allow users to experiment with different financial risk models safely.
2. **What does it mean to create a new workspace?**
   Creating a new workspace in STSA means setting up an isolated environment where you can perform stress testing and scenario analysis without affecting the production data. This workspace includes a sandbox, metadata, and configurations that allow users to experiment with different financial risk models safely.


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3. **Does it mean I have to create another equivalent to production?**
   Not necessarily. While a workspace is based on production data, it is not a full replica of the production environment. You can migrate selected data and metadata to the workspace, ensuring it contains only the necessary components for testing. This process helps maintain efficiency while avoiding the complexities of duplicating everything from production.
4. **I have taken a lot of time to set this up and perfect this over the year, so how simple is the new creation going to be?**
   Because you have already perfected your setup, creating a new workspace should be relatively simple. You can:
   - **Use templates** from previous setups to quickly configure a new workspace.
   - **Migrate metadata** and configurations instead of manually recreating them.
   - **Leverage automation** features within STSA to speed up the setup process.
5. **What is the time taken for me to create a workspace?**
   The time required depends on the complexity of your environment, but typically:
   - **Basic workspace setup –** A few minutes if using templates or cloning from an existing workspace.
   - **Data migration and sandbox population –** Can take a few hours if large datasets are involved.
   - **Custom configurations and validation –** Depends on specific requirements but can take additional time.
6. **Why can't we handle stress testing and scenario analytics in the production environment itself?**
   Running stress tests in production is not recommended because:
   - **Performance Impact –** Stress testing can consume high computational resources, slowing down production systems.
   - **Data Integrity Risks –** Scenario shocks and stress tests modify data, which could lead to unintended changes in live production data.
   - **Regulatory Compliance –** Most financial institutions require a controlled environment for risk simulations separate from live operations.
   - **Flexibility for Testing –** A sandbox allows multiple iterations of stress tests without impacting real transactions.
7. **How do I know if the sandbox is ready for me to perform stress testing?**
   You can check the Execution History and Workspace Status in STSA:
   - If the data population status is complete, your sandbox is ready.
   - Ensure that all required models, variables, and portfolios are available in the sandbox.
   - Run a small test scenario to verify that everything is functioning correctly.
8. **How easy and how often do I have to sync it up?**
   - **Ease of Syncing –** Syncing is relatively straightforward using automated object migration and sandbox updates in STSA.
   - **Frequency of Syncing** – The best practice is to sync:
     - Whenever new models or changes are introduced in production
     - Before major stress testing cycles (quarterly or annually)
     - Before regulatory reporting deadlines


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9. **How do I create a new workspace?**
   Navigate to the **Workspace Summary** page, click **Add Workspace**, and follow the setup wizard to configure a new workspace.
10. **What is a sandbox, and why is it needed?**
    A sandbox is a testing environment where users can work with cloned data from production without affecting live operations.
11. **How do I migrate production data to a sandbox?**
    Use the **Object Migration** feature to copy production metadata into a sandbox for stress testing.
12. **What is the difference between a sandbox and production data?**
    The sandbox contains test data and configurations, while the production environment holds live, operational data.
13. **Can I create multiple sandboxes for different tests?**
    Yes, STSA allows multiple sandboxes to be created for separate testing scenarios.
14. **How do I add and manage data in a sandbox?**
    Use the **Populate Workspace** feature to add data from production to your sandbox.
15. **What happens if I delete a sandbox?**
    All associated data, configurations, and test results will be permanently removed.
16. **How do I check the status of data population in a sandbox?**
    In the **Workspace Summary** section, go to **Execution History** to view the population progress.
17. **What types of data can I add to a sandbox?**
    You can add dimensions, portfolios, risk models, scenario variables, and financial data.
18. **Does the creation of a workspace entail movement of data?**
    Yes, creating a workspace involves migrating metadata and selected datasets from production. However, the movement of data depends on your setup:
    - For historical data, you may choose to move large datasets.
    - If only metadata (models, variables, and configurations) is required, data movement can be minimal.
19. **How much data is required for us to perform stress testing?**
    - **Minimum Data** – Only key financial metrics, risk factors, and necessary variables are required.
    - **Full-Scale Testing** – If you're running detailed portfolio-level stress tests, you may need complete transaction-level data.
    - **Regulatory Compliance** – Depending on compliance requirements, you may need at least several years' worth of data.
20. **How and when is data moved into the workspace for stress testing?**
    - **Data Movement Process**:
      a. During workspace creation, select the production datasets to migrate.
      b. The data is copied into the sandbox through the **Populate Workspace** process.
      c. The system might apply filters and transformations to select relevant data.
    - **When Data Moves**:
      a. Initially when the workspace is created
      b. Whenever the sandbox is refreshed with updated production data


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21. **What is the level of user engagement required in this process?**
    - **Initial Setup** – Requires manual selection of data sources and configuration.
    - **Data Syncing** – Can be scheduled or automated, requiring minimal user intervention.
    - **Monitoring** – Users should validate that the correct data has been migrated before running tests.
22. **Because I have already performed executions in the data in production and may have already used this for reporting, I would like to ensure that the same base data is used for stress testing. How do I ensure that the data in the ST workspace is consistent with the data in production?**
    To ensure data consistency:
    - Use the same source tables from production.
    - Enable automated data syncs before each stress test execution.
    - Perform validation checks by comparing sample records from production and ST workspace.
23. **Is there a possibility that the data doesn't match or there will be inconsistencies?**
    Yes, possible inconsistencies can occur due to:
    - **Timing differences** – If production data updates after migration, there may be differences.
    - **Partial data movement** – If not all relevant tables are copied, results may vary.
    - **Incorrect filters applied** – Ensure that the filters used during migration match those used in production reporting.
24. **How can I ensure that all data required for stress testing is available before commencing the stress test?**
    To ensure that all data required for stress testing is available before commencing the stress test:
    - Use the **Data Validation Reports** in STSA to confirm the presence of all necessary data.
    - Run a sample execution before the full stress test to check for missing data.
    - Compare sandbox data with reference production datasets.
25. **How many times does the data move from production to the sandbox?**
    - Data movement depends on your setup:
      - Initial migration during workspace creation
      - Periodic updates when syncing with production
      - Before each major stress test cycle, if required
    - Few institutions refresh their sandbox monthly, quarterly, or yearly, depending on regulatory and internal needs.

## D.4 Stress Testing and Scenario Analysis

1. **What is a scenario in STSA?**
   A scenario represents a set of assumptions about financial conditions used for stress testing.
2. **How do I create a new stress test scenario?**


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Navigate to **Scenarios**, click **Create Scenario**, and define shock values and other parameters.

3. **Can I clone an existing scenario for modifications?**
   Yes, STSA allows users to duplicate and modify existing scenarios.
4. **What types of variables can be used in scenario analysis?**
   Variables include exchange rates, macroeconomic indicators, credit ratings, interest rates, and liquidity factors.
5. **How do I input shock values into a scenario?**

In the scenario wizard, enter shock values through the user interface or export and re-import the Variable Pathways Excel workbook.

6. **What is the purpose of portfolios in stress testing?**
   Portfolios help group financial assets and assess their exposure to risk.
7. **How do I create a portfolio in STSA?**
   Navigate to **Portfolios**, click **Create Portfolio**, and define relevant parameters.
8. **What are the different ways to define and manage risk metrics?**
   Risk metrics can be created using predefined templates or manually customized.
9. **Can I compare different stress test results in STSA?**
   Yes, STSA allows users to compare multiple scenarios and analyze their impact.
10. **How do I configure analysis settings for a test?**
    Use the **Analysis Configuration** section to define key parameters.
11. **What if there are multiple scenarios?**
    - STSA allows running multiple scenarios within the same workspace.
    - Each scenario can have different shock values, economic assumptions, and variables.
    - You can compare scenario results side-by-side in reports.
12. **What if there are multiple scenarios, and each scenario has multiple executions with different dates in the future?**
    - STSA allows you to define multiple execution runs for each scenario.
    - Each execution can have a specific future date for analysis.
    - You can schedule runs to simulate different economic conditions over time.
13. **How do you manage multiple executions for the same date?**
    - STSA supports versioning of executions, allowing different runs to be saved and compared.
    - You can tag executions with unique identifiers to differentiate them.
    - The Execution History tab allows users to review and analyze multiple runs for the same date.


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# D.5 Model and Data Governance

1. **What is the role of model management in STSA?**
   It allows users to register, validate, and approve risk models for stress testing.
2. **How do I import external models into STSA?**
   Use the **Model Management** feature to upload third-party models.
3. **How do I manage variables in STSA?**
   Navigate to **Variables**, to create, edit, and delete variables.
4. **How do I approve or reject models in STSA?**
   Models must be reviewed and approved by users with appropriate roles.
5. **What are pre-seeded glossaries, and how are they used?**
   Pre-seeded glossaries contain predefined financial terms used for standardization.
6. **How do I link a glossary term to a data table?**
   Use the **Glossary Mapping** feature in the Data Catalog.
7. **What is the Data Catalog, and why is it important?**
   The Data Catalog organizes and standardizes financial data for easy retrieval.
8. **How do I register a new database service in STSA?**
   Navigate to **Data Catalog** > **Database Services** and click **Add Service**.
9. **How do I ensure my stress testing data is accurate?**
   Use the built-in validation and audit features to check data quality.
10. **How can I ensure that the same models and processes used in production are used in stress testing as well?**
    To ensure that the same models and processes from production are available in stress testing:
    - **Migrate Metadata –** Use the Object Migration feature to move models, rules, and configurations from production to the ST workspace.
    - **Use Version Control –** Maintain a version-controlled repository of models to track updates and apply consistent versions across environments.
    - **Perform Regular Syncing –** Periodically sync models and processes between production and the ST workspace to ensure alignment.

# D.6 Analysis, Reporting, and Execution

1. **How do I run a stress test in STSA?**
   To run a stress test:
   a. Create a project by selecting relevant **Analysis Configuration** and **Scenarios**.
   b. Review for any validation alerts present in **Project Canvas**.
   c. Continue with creation of project pipeline if there are no validation alerts.
   d. Review the pipeline and send the project for review and approval.


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e. After the project is approved, open the project in view mode and add relevant run parameters.

f. Click **Run Project for execution**.
The **Execution status** is displayed under **Latest Execution** section in the **Execution & Results** tab of project.

g. From the **Action** menu against project name in **Latest Execution** section of **Execution & Results tab**, click **View Results** to view the reports.

2. **What is a composite pipeline, and how does it work?**
A composite pipeline is a structured workflow in STSA that sequences multiple processes, runs, and models for a stress test. It ensures that different risk factors, models, and scenarios are executed in a logical order to get a comprehensive stress test result.

3. **How do I sequence runs in an analysis?**
To sequence runs in an analysis:

a. Go to the **Analysis Configuration** module and create a new or edit an existing analysis configuration.

b. Select required portfolios and metrics.

> **Note**
>
> Based on selected metrics, corresponding models and process will be auto selected.

c. Add additional models, if required in model step.

d. Navigate to the **Process** screen, where the composite pipeline will be automatically created or modified.

e. To rearrange the sequence, click the **View** option from the **Action Menu** next to the selected Composite Pipeline.

f. Open the drawer, click **Manual Sequence** to adjust the process order manually, and then click **Save**.

g. Alternatively, the user can click the **Edit Canvas** option from the **Action Menu** next to the Composite Pipeline and rearrange the order directly in the canvas.

4. **What types of reports are available in STSA?**
STSA provides various pre-configured reports, including:

- **Trend & Composition Reports**
- **Variance from Base Reference Date**
- **Variance Between Scenarios**
- **Variance Between Two Dates for a Given Scenario**

5. **How do I view and interpret reports?**
To view and interpret reports:

a. Open the required project in **View** mode.

b. Navigate to **Latest Execution** under **Execution & Results** tab.

c. Click **View Results** from the **Action Menu**.
You will be redirected to the **Trends & Composition Reports** screen for the selected project execution.


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d. Apply relevant filters for period, portfolios, and scenarios as needed.
The results will be displayed in a graphical format.

e. Use the **drill-down** feature to analyze specific metrics and navigate to different reports.

6. **Can I export reports for external review?**
Yes, STSA allows you to export reports in various formats such as **Excel**, **PDF**, and **CSV** for sharing with regulators or internal stakeholders.

7. **How do I configure custom reports?**
To configure custom reports:

> **Note**
>
> The user must have the necessary privileges to create a workbook.

a. On the Home page, click **Create**, then select **Workbook**.

b. In the **Add Data** dialog box that opens, select a dataset and click **Add to Workbook**.

c. In the **Data Panel**, locate the required data columns and drag them onto the Visualize canvas to start building visualizations.

d. Click **Save**.

> **Note**
>
> For more details, refer to the following link:Create a Workbook and Add Visualizations

8. **How do I track the execution history of a test?**

a. Navigate to the **Execution & Results** tab within the project.

b. In the **Execution History** section, select the required execution details.

9. **What happens if a test fails to execute?**
If a test fails:

- You can view the execution status in the **Execution & Results** tab of the project.
- Under the **Latest Execution** section, the execution status for each scenario is displayed.
- Ensure that all the necessary permissions are granted.
- Click **View Execution** from the **Action** Menu next to the failed task to open the monitor and check where the execution failed.
- Analyze the failure details, review logs, fix the issue, and Run Project again.


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# D.7 User Management and Permissions

1. **How do I add a new user to STSA?**
   To add a new user to STSA:
   a. Navigate to **User Management** in the admin panel.
   b. Click **Add User** and enter the required details (username, email, and so on.).
   c. Assign appropriate **roles and user groups**.
   d. Click **Save** to create the user profile.
2. **How do I assign roles and privileges to a user?**
   To assign roles and privileges to a user:
   a. Go to **User Management** > **Roles & Permissions**.
   b. Select the user and choose a predefined role (for example, Analyst, Administrator).
   c. Assign **custom privileges** if needed.
   d. Click **Save** to apply the changes.
3. **What are the predefined user groups in STSA?**
   STSA has several predefined user groups, including:
   - **Modeling User Group (MDLUSR)** – For users working on financial models.
   - **Scenario Admin Group (SCENARIOADMIN)** – Manages stress testing scenarios.
   - **Portfolio Admin Group (PORTFOLIOADMIN)** – Handles portfolio configurations.
   - **Metrics Admin Group (METRICSADMIN)** – Manages financial risk metrics.
   - **Workspace Admin Group (WKSPADMIN)** – Handles user access and data management.
4. **Can I customize user permissions?**
   Yes, administrators can modify user roles by assigning custom permissions for specific features like **data access**, **report generation**, and **model execution**.
5. **How do I change my user role?**
   Your role is assigned by the administrator. To request a role change:
   a. Contact your STSA administrator and specify the role you need.
   b. The admin will update your access in the **User Management** section.
6. **How do I remove a user from STSA?**
   To remove a user from STSA:
   a. Navigate to **User Management**.
   b. Select the user you want to remove.
   c. Click **Deactivate or Delete User**.
   d. Confirm the action to remove the user permanently.


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7. **How do I check my access rights in STSA?**
   To check the access rights in STSA:
   a. Go to **Profile Settings** > **Access Rights**.
   b. Review the list of permissions assigned to your account.
   c. If you need additional access, contact your administrator.

# D.8 Troubleshooting and Support

1. **What should I do if I encounter an error message?**
   Check the logs and error messages or contact support.
2. **Where can I check system logs for troubleshooting?**
   Logs can be accessed through the **Execution History** section.
3. **How do I rollback a failed test or scenario?**

Inspect the failure details and current state of the affected objects before taking corrective action. Preserve execution identifiers and logs, determine which operations completed, and use the supported recovery procedure for the failed step. Do not delete scenarios as a general rollback method.

4. **Who do I contact for technical support?**
   Reach out to your system administrator or Oracle Support.
5. **Where can I find additional STSA documentation?**
   Oracle provides detailed user guides and online help resources.


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# E
# APIs for Model Pipelines

All the listed APIs/Functions can be utilized by users in Model Pipelines.

**Table E-1 Python Paragraph Scripting**

| API Type | Functionality | Prerequisite | Notebook Execution Script | Notebook Script Input | Minimum Supported Version |
|---|---|---|---|---|---|
| Set User | Set the user for a session | - | %python<br>from mmg.constants import *<br>user = "SAUSER"<br>set_user(user) | user - username to be set | 8.1.1 |
| Get User | Get the user that has been set | Set User | %python<br>from mmg.constants import *<br>get_user() | - | 8.1.1 |
| Attach Workspace | Attach the workspace for a session | - | %python<br>from mmg.workspace import attach_workspace<br>workspace = "CS"<br>attach_workspace(workspace) | workspace- workspace to be attached | 8.1.1 |
| Get Workspace | Get the workspace that has been attached | Attach Workspace | %python<br>from mmg.workspace import get_workspace<br>get_workspace() | | 8.1.1 |
| List Workspaces | Lists all workspaces available to a user | Set User | %python<br>from mmg.workspace import list_workspaces<br>list_workspaces() | | 8.1.1 |


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**Table E-1 (Cont.) Python Paragraph Scripting**

| API Type | Functionality | Prerequisite | Notebook Execution Script | Notebook Script Input | Minimum Supported Version |
|---|---|---|---|---|---|
| Check AIF | Check if AIF is set or not | Set User | %python<br>from mmg.workspace import check_aif<br>check_aif() | | 8.1.1 |
| List All Data Sources | List all data sources available in a workspace for a set user. The default workspace chosen is the one that is attached. | Set User, Attach Workspace | %python<br>from mmg.workspace import list_datasources<br>list_datasources(order=None) | order - None ensures that all the data sources will be listed for the attached workspace | 8.1.1 |
| List All Data Sources of Workspace | List all Data Sources of a specific Workspace that is not the attached workspace for a set user. | Set User | %python<br>from mmg.workspace import list_datasources<br>workspace="HELLO NEW"<br>list_datasources(workspace,order=None) | workspace - Name of workspace for which data sources should be listed<br>order - None ensures that ALL data sources will be listed for that workspace | 8.1.1 |
| Fetch First Order Data Source | This method will fetch the data source related to attached workspace with default order 1. | Set User, Attach Workspace | %python<br>from mmg.workspace import list_datasources<br>list_datasources() | order - 1<br>by default, if not specified | 8.1.1 |
| Fetch First Order Data Source of Workspace | This method will fetch the data source with default order 1 related to specified workspace. | Set User | %python<br>from mmg.workspace import list_datasources<br>workspace="CS"<br>list_datasources(workspace) | workspace - Name of workspace for which data source should be listed<br>order- 1 by default if not specified | 8.1.1 |


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**Table E-1 (Cont.) Python Paragraph Scripting**

| API Type | Functionality | Prerequisite | Notebook Execution Script | Notebook Script Input | Minimum Supported Version |
|---|---|---|---|---|---|
| Fetch Nth Order Data Source | This method will fetch the data source related to attached workspace with given order | Set User, Attach Workspace | %python<br>from mmg.workspace import list_datasources<br>list_datasources(order=2) | order - Order of data source to be fetched | 8.1.1 |
| Fetch Nth Order Data Source of Workspace | This method will fetch the data source with given order related to specified workspace. | Set User | %python<br>from mmg.workspace import list_datasources<br>workspace="CS"<br>list_datasources(workspace,order=2) | workspace - Name of workspace for which data source should be listed<br>order = Order of data source to be fetched | 8.1.1 |


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**Table E-1 (Cont.) Python Paragraph Scripting**

| API Type | Functionality | Prerequisite | Notebook Execution Script | Notebook Script Input | Minimum Supported Version |
|---|---|---|---|---|---|
| Get Connection Object | Returns an Oracle DB / SQLAlchemy connection object for the data source of order 1 in the attached workspace. | Set User, Attach Workspace | Python:<br>`from mmg.workspace import get_conn`<br>`conn = get_conn()`<br>`# conn = get_conn(conn_type=None)`<br>`import oracledb`<br>`if not isinstance(conn, oracledb.Connection):`<br>`print("Not Conn Object")`<br>`print(conn)` | | 8.1.2.0 |

**Note**

If conn_type is None or oracledb (or not specified), the API returns an oracledb.Connection by default. If conn_type="sqlalchemy", the API creates a connection object by using create_engine() from SQLAlchemy.


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**Table E-1 (Cont.) Python Paragraph Scripting**

| API Type | Functionality | Prerequisite | Notebook Execution Script | Notebook Script Input | Minimum Supported Version |
|---|---|---|---|---|---|
| Get Connection Object To Specific Data Source | Returns an Oracle DB / SQLAlchemy connection object to the specified data source (by name). | Set User | Python:<br>`from mmg.workspace import get_conn`<br>`datasource = "DS"`<br>`conn = get_conn(datasource, conn_type=None)`<br>`import oracledb`<br>`if not isinstance(conn, oracledb.Connection):`<br>`print("Not Conn Object")`<br>`print(conn)`<br>datasource = Name of the datasource for which the connection object must be returned. | datasource - Name of datasource for which the connection object has to be returned | 8.1.2.0 |

**Note**

If conn_type is None or oracledb (or not specified), the API returns an oracledb.Connection by default. If conn_type="sqlalchemy", the API creates a connection object by using create_engine() from SQLAlchemy.


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**Table E-1 (Cont.) Python Paragraph Scripting**

| API Type | Functionality | Prerequisite | Notebook Execution Script | Notebook Script Input | Minimum Supported Version |
|---|---|---|---|---|---|
| Get Connection Object To Data Source Using Order | Returns an Oracle DB / SQLAlchemy connection object to the data source of the specified order in the attached workspace. | Set User, Attach Workspace | Python:<br>`from mmg.workspace import get_conn`<br>`datasource = 2`<br>`conn = get_conn(datasource, conn_type=None)`<br>`import oracledb`<br>`if not isinstance(conn, oracledb.Connection):`<br>`print("Not Conn Object")`<br>`print(conn)`<br>datasource = Order number of the datasource in the attached workspace for which the connection object must be returned. | datasource - Order number of datasource in attached workspace for which the connection object has to be returned | 8.1.2.0 |

**Note**

If conn_type is None or oracledb (or not specified), the API returns an oracledb.Connection by default. If conn_type="sqlalchemy", the API creates a connection object by using create_engine() from SQLAlchemy.


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**Table E-1 (Cont.) Python Paragraph Scripting**

| API Type | Functionality | Prerequisite | Notebook Execution Script | Notebook Script Input | Minimum Supported Version |
|---|---|---|---|---|---|
| Test Connection Object | This script can be used to test the connection object to data source | Get Connection Object<br>OR<br>Get Connection Object To Specific Data Source<br>OR<br>Get Connection Object To Data Source Using Order | %python<br>query="SELECT table_name FROM user_tables"<br>cur = conn.cursor()<br>cur.execute(query)<br>print(cur.fetchall())<br>if cur:<br>cur.close() | | 8.1.2.0 |

> **Note**
>
> The property RESTRICT_UNMAPPED_DATASTORES_ACCESS has been introduced in the NEXTGENEMF_CONFIG table to control datastore access within notebook sessions. By default, this property is set to false, which means access to all datastores is allowed. If a user wants to restrict access so that only the datastores attached to the current workspace are accessible, the value of this property must be set to true. When enabled, the get_conn() OR get_connection() method will only allow connections to those datastores that are mapped to the same workspace as the notebook session. This restriction is effective only when the session-mode in the application.yml file is configured as NOTEBOOK_USER. The property accepts only two values: true or false.


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**Table E-2 PYTHON LINEPARSER APIs (for MMG version 8.1.0)**

| API Type | Functionality | Notebook Execution Script | Note |
|---|---|---|---|
| Attach Workspace | Attach the workspace for a session | %python<br>mmg.attachWorkspace(workspace)<br>#eg-mmg.attachWorkspace("CS") | workspace - workspace to be attached (String)<br>Sets 'mmg' python variable which contains the information about the attached workspace.<br>Output- Print a boolean in one line on the status of workspace attachment and another line of boolean on status of AIF enabled and attached. |
| List Workspaces | Lists all workspaces available to a user | %python<br>mmg.listWorkspaces() | Sets 'ofs_wsList' python variable which is the list of all available workspaces.<br>Output- Print the list of workspaces. |
| Check AIF | Check if AIF is set or not | %python<br>print(aif__isAttached) | Output- Boolean on the status of AIF. |
| Get Connection Object | Returns cx_Oracle Connection Object | %python<br>mmg.getConnection(schema_name)<br>#eg-mmg.getConnection("OFSAA") | schema_name = name of the schema for which connection is required (String).<br>Sets 'conn' python variable which is the cx_Oracle connection object to be used for firing queries. |
| Publish | Fetch and sets the Notebook JSON dump | %python<br>mmg.publish() | Sets 'emf_para' python variable which is the JSON dump for the notebook component.<br>Output- Print the set 'emf_para' value. |
| Register | Register the Notebook | %python<br>mmg.register(register)<br>#eg-mmg.register({"modelname":"model1",\<br>#"modeldescription":"Model description"})<br>#eg-mmg.register(emf_para) {After doing mmg.publish()} | register - JSON Stringify object for RegisterNotebookBean Object.<br>Sets 'publishedNotebookId' python variable which is the studio notebook id for the published version.<br>Output- Prints the published notebook id. |


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**Table E-2 (Cont.) PYTHON LINEPARSER APIs (for MMG version 8.1.0)**

| API Type | Functionality | Notebook Execution Script | Note |
|---|---|---|---|
| Load Flat File | - | %python<br>mmg.loadFlatFile()<br>#eg- mmg.loadFlatFile()<br>Incomplete | |
| Profile Data | - | %python<br>mmg.profileData(code,title)<br>#eg-mmg.profileData(ABC,XYZ) | |

**Table E-3 MMG Library Python APIs**

| Index | API Type | Functionality | Prerequisite | Notebook Execution Script |
|---|---|---|---|---|
| 1 | Set User | Set the user for a session | | `%python from mmg.constants import * user = "SAUSER" set_user(user)` |
| 2 | Get User | Get the user that has been set | Set User | `%python from mmg.constants import * get_user()` |
| 3 | Attach Workspace | Attach the workspace for a session | | `%python from mmg.workspace import attach_workspace workspace = "CS" attach_workspace(workspace)` |
| 4 | Get Workspace | Get the workspace that has been attached | Attach Workspace | `%python from mmg.workspace import get_workspace get_workspace()` |
| 5 | Get Base URL | Get MMG Studio Service Base URL | | `%python from mmg.constants import * get_mmg_studio_service_url()` |
| 6 | List Workspaces | Lists all workspaces available to a user | Set User | `%python from mmg.workspace import list_workspaces list_workspaces()` |


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**Table E-3 (Cont.) MMG Library Python APIs**

| Index | API Type | Functionality | Prerequisite | Notebook Execution Script |
|---|---|---|---|---|
| 7 | Check AIF | Check if AIF is set or not | Set User | `%python from mmg.workspace import check_aif check_aif()` |
| 8 | List All Data Sources | List all data sources available in a workspace for a set user. The default workspace chosen is the one that is attached. | Set User, Attach Workspace | `%python from mmg.workspace import list_datasources list_datasources(order=None)` |
| 9 | List All Data Sources of Workspace | List All Data Sources of a specific Workspace that is not the attached workspace for a set user | Set User | `%python from mmg.workspace import list_datasources workspace="HELLO NEW" list_datasources(workspace,order=None)` |
| 10 | Fetch First Order Data Source | This method will fetch the data source related to attached workspace with default order 1 | Set User, Attach Workspace | `%python from mmg.workspace import list_datasources list_datasources()` |
| 11 | Fetch First Order Data Source of Workspace | This method will fetch the data source with default order 1 related to specified workspace | Set User | `%python from mmg.workspace import list_datasources workspace="CS" list_datasources(workspace)` |
| 12 | Fetch Nth Order Data Source | This method will fetch the data source related to attached workspace with given order | Set User, Attach Workspace | `%python from mmg.workspace import list_datasources list_datasources(order=2)` |


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**Table E-3 (Cont.) MMG Library Python APIs**

| Index | API Type | Functionality | Prerequisite | Notebook Execution Script |
|---|---|---|---|---|
| 13 | Fetch Nth Order Data Source of Workspace | This method will fetch the data source with given order related to specified workspace | Set User | `%python from mmg.workspace import list_datasources workspace="CS" list_datasources(workspace,order=2)` |
| 14 | Get Connection Object | Returns Oracle/ SQL Alchemy Connection Object to Data Source of order 1 in attached workspace | Set User, Attach Workspace | `%python import cx_Oracle from mmg.workspace import get_connection conn=get_connection() if not isinstance(conn,cx_Oracle.connect): print("Not Conn Object") print(conn)` |
| 15 | Get Connection Object To Specific Data Source | Returns Oracle/ SQL Alchemy Connection Object to specified Data Source | Set User | `%python import cx_Oracle from mmg.workspace import get_connection datasource="DS" conn=get_connection(datasource, conn_type=None) if not isinstance(conn,cx_Oracle.connect): print("Not Conn Object") print(conn)` |


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**Table E-3 (Cont.) MMG Library Python APIs**

| Index | API Type | Functionality | Prerequisite | Notebook Execution Script |
|---|---|---|---|---|
| 16 | Get Connection Object To Data Source Using Order | Returns Oracle/ SQL Alchemy Connection Object to Data Source of specified order in attached workspace | Set User, Attach Workspace | `%python import cx_Oracle from mmg.workspace import get_connection datasource=2 conn=get_connection(datasource, conn_type=None) if not isinstance(conn,cx_Oracle.connect): print("Not Conn Object") print(conn)` |
| 17 | Get Connection Object | Returns Oracle/ SQL Alchemy Connection Object to Data Source of order 1 in attached workspace | Set User, Attach Workspace | `%python import oracledb from mmg.workspace import get_conn conn=get_conn() if not isinstance(conn,oracledb.Connection): print("Not Conn Object") print(conn)` |
| 18 | Get Connection Object To Specific Data Source | Returns Oracle/ SQL Alchemy Connection Object to specified Data Source | Set User | `%python import oracledb from mmg.workspace import get_conn datasource="DS" conn=get_conn(datasource, conn_type=None) if not isinstance(conn,oracledb.Connection): print("Not Conn Object") print(conn)` |


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**Table E-3 (Cont.) MMG Library Python APIs**

| Index | API Type | Functionality | Prerequisite | Notebook Execution Script |
|---|---|---|---|---|
| 19 | Get Connection Object To Data Source Using Order | Returns Oracle/ SQL Alchemy Connection Object to Data Source of specified order in attached workspace | Set User, Attach Workspace | `%python import oracledb from mmg.workspace import get_conn datasource=2 conn=get_conn(datasource, conn_type=None) if not isinstance(conn,oracledb.Connection): print("Not Conn Object") print(conn)` |
| 20 | Get Objective Hierarchy | Returns the complete objective hierarchy including pipeline name | | `%python print(objectiveId)` |
| 21 | Fetch FTPSHARE Path | Get complete ftpshare path on the server | | `%python from mmg.datasets import fetch_ftpshare fetch_ftpshare()` |
| 22 | Get Pipeline Name | Get the Pipeline Name to which the current notebook is attached | Attach Workspace | `%python from mmg.constants import get_pipeline_name get_pipeline_name()` |
| 23 | Get Pipeline ID | Get ID of Pipeline to which the current notebook is attached | Attach Workspace | `%python from mmg.constants import get_pipeline_id get_pipeline_id()` |
| 24 | Get Pipeline Version | Get version of Pipeline to which the current notebook is attached | Attach Workspace | `%python from mmg.constants import get_pipeline_version get_pipeline_version()` |


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**Table E-3 (Cont.) MMG Library Python APIs**

| Index | API Type | Functionality | Prerequisite | Notebook Execution Script |
|---|---|---|---|---|
| 25 | Get MISDATE | Return MISDATE from pipeline execution if set otherwise takes default value provided | Attach Workspace | `%python misdate=ds.date_picker(name='$FICMISDATE$',format='yyyy-MM-dd', default_value='2000-01-01', label='FICMISDATE') print(misdate)` |
| 26 | Get BATCHRUNID | Returns BATCHRUNID if set from pipeline, otherwise takes default value | | `%python batchrunid=ds.textbox(name='$BATCHRUNID$',default_value='Batch_auto',label='BATCHRUNID') print(batchrunid)` |
| 27 | Get TASKID | Returns TASKID if set from pipeline, otherwise takes default value | | `%python taskid=ds.textbox(name='$TASKID$',default_value='task1',label='TASKID') print(taskid)` |

## Miscellaneous Helper Python Scripts

**Table E-4 Miscellaneous Helper Python Scripts**

| Index | Name | Description | Prerequisite | Script |
|---|---|---|---|---|
| 1 | Create Connection Object Using Wallet Alias | This script can be used to test the connection to any Oracle database using wallet alias. Make sure to close connection object after use. | | `%python wallet_alias = "WALLET_ALIAS_NAME" import oracledb oracledb.init_oracle_client() conn = oracledb.connect(dsn=wallet_alias` |


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**Table E-4 (Cont.) Miscellaneous Helper Python Scripts**

| Index | Name | Description | Prerequisite | Script |
|---|---|---|---|---|
| 2 | Test Connection Object | This script can be used to test the connection object to data source | Get Connection Object OR Get Connection Object To Specific Data Source OR Get Connection Object To Data Source Using Order | `%python query="SELECT table_name FROM user_tables" cur = conn.cursor() cur.execute(query) print(cur.fetchall()) if cur: cur.close()` |
| 3 | Close Connection Object | | Connection Object should be created using any of the above methods | `%python query="SELECT table_name FROM user_tables" cur = conn.cursor() cur.execute(query) print(cur.fetchall()) if cur: cur.close()` |
| 4 | Close Cursor | | Cursor Object should be created using any of the above methods | `%python if cur: cur.close()` |
| 5 | Check environment variables | For example:<br>Check wallet alias value of MMG_LIB_WALLET_ALIAS | | `%python import os print(os.environ['MMG_LIB_WALLET_ALIAS'])` |


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**Table E-4 (Cont.) Miscellaneous Helper Python Scripts**

| Index | Name | Description | Prerequisite | Script |
|---|---|---|---|---|
| 6 | Save Dataframe to a File | Save dataframe to a file stored on server | | `%python from mmg.datasets import fetch_ftpshare, save_dataframe from mmg.workspace import get_workspace from mmg.constants import get_pipeline_version misdate=ds.date_picker(name='$FICMISDATE$', format='yyyy-MM-dd', default_value='2000-01-01', label='FICMISDATE') batchrunid=ds.textbox(name='$BATCHRUNID$', default_value='Batch_auto', label='BATCHRUNID') taskid=ds.textbox(name='$TASKID$', default_value='task1', label='TASKID') filename="df.csv" filepath=fetch_ftpshare() + "/mmg/" + get_workspace() + "/pipelines/" + objectiveId + "/" + get_pipeline_version() + "/output/" + misdate + "/" + batchrunid + "/" + taskid + "/" + filename res=save_dataframe(df,filepath` |


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**Table E-4 (Cont.) Miscellaneous Helper Python Scripts**

| Index | Name | Description | Prerequisite | Script |
|---|---|---|---|---|
| | | | | ) message=res["messages"] if res["status"]=="ERROR": raise Exception(message) else: print(message) |

## Python Linepraser APIs (for MMG version 8.1.0)

**Table E-5 Python Linepraser APIs (for MMG version 8.1.0)**

| Index | API Type | Functionality | Notebook Execution Script | Note |
|---|---|---|---|---|
| 1 | Attach Workspace | Attach the workspace for a session | %python mmg.attachWorkspace(workspace) #eg- mmg.attachWorkspace("CS") | workspace = workspace to be attached (String) Sets 'mmg' python variable which contains the information about the attached workspace Output- Print a boolean in one line on the status of workspace attachment and another line of boolean on status of AIFenabled and attached |
| 2 | List Workspaces | Lists all workspaces available to a user | %python mmg.listWorkspaces() | Sets 'ofs_wsList' python variable which is the list of all available workspaces Output- Print the list of workspaces |
| 3 | Check AIF | Check if AIF is set or not | %python print(aif__isAttached) | Output- Boolean on the status of AIF |


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**Table E-5 (Cont.) Python Linepraser APIs (for MMG version 8.1.0)**

| Index | API Type | Functionality | Notebook Execution Script | Note |
|---|---|---|---|---|
| 4 | Get Connection Object | Returns cx_Oracle Connection Object | `%python mmg.getConnection(schema_name) #eg- mmg.getConnection("OFSAA")` | schema_name = Name of the schema for which connection is required (String)<br>Sets 'conn' python variable which is the cx_Oracle connection object to be used for firing queries |
| 5 | Publish | Fetch and sets the Notebook JSON dump | `%python mmg.publish()` | Sets 'emf_para' python variable which is the JSON dump for the notebook component Output- Print the set 'emf_para' value |
| 6 | Register | Register the Notebook | `%python mmg.register(register) #eg- mmg.register({"modelname":"model1",\ #"modeldescription":"Model description"}) #eg- mmg.register(emf_para) {After doing mmg.publish()}` | register = JSON Stringify object for RegisterNotebookBean Object Sets 'publishedNotebookId' python variable which is the studio notebook id for the published version. Output- Prints the published notebook ID |
| 7 | Load Flat File | `%python mmg.loadFlatFile() #eg- mmg.loadFlatFile() Incomplete` | | |
| 8 | Profile Data | | `%python mmg.profileData(code,title) #eg- mmg.profileData(ABC,XYZ)` | code = title = |


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# F
# Public APIs for Scheduler Operations

Public APIs for Scheduler Operations

The following APIs are exposed for the Scheduler Operations.

> **Note**
>
> 1. All the below APIs are POST requests.
> 2. All the APIs accept below values in request header:
>    - ofs_tenant_id - Optional
>    - ofs_service_id - Optional
>    - ofs_workspace_id - Respective workspace id where the batch needs to be created
>    - ofs_remote_user – MMG login user The ofs_workspace_id and ofs_remote_user are mandatory fields.

Base URL: `http(s)://<MMG_Service_HostName>:<MMG-Service_Port>/<CONETXTNAME>/`

**Table F-1 APIs for Scheduler Operations**

| Functionality | API | Sample Request JSON | Sample Response JSON | Comments |
|---|---|---|---|---|
| Execute Immediate | rest-api/v1/external/trigger | {<br>"batchName": "batch1",<br>"batchType": "rest",<br>"includedTasks" :"task1,task2",<br>"excludedTasks" :"task1,task2",<br>"heldTasks":"task1,task2"<br>} | {<br>"severity": "info",<br>"summary": "Object triggered successfully with Run Id:<br>batch1_2022-08-17_1660721567845_1",<br>"batchRunId": "batch1_2022-08-17_1660721567845_1",<br>"details": "Object triggered successfully.",<br>"status": "success",<br>"statusCode": "0"<br>} | • The includedTasks/ excludedTasks/ heldTasks are options keys.<br>• The batchType will be “group” for batch group execution. |


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**Table F-1 (Cont.) APIs for Scheduler Operations**

| Functionality | API | Sample Request JSON | Sample Response JSON | Comments |
|---|---|---|---|---|
| Execution Status | rest-api/v1/external/status | { "batchRunId": "batch1_2022-08-17_1660721567845_1", "tasks": ["task1","task2"] } | { "severity": "info", "batchRunId": "batch1_2022-08-17_1660721567845_1", "taskStatusList": [ { "taskCode": "task1", "taskStatus": "SUCCESSFUL", "statusCode": "0" }, { "taskCode": "task2", "taskStatus": "EXCLUDED", "statusCode": "4" } ], "batchStatusCode": "0", "batchList": [], "batchStatus": "SUCCESSFUL", "status": "success", "statusCode": "0" } | • "tasks" is options key.<br>If not passed, then response will contain status all the tasks inside a batch. |
| Rerun | rest-api/v1/external/rerun | { "batchName": "batchgroup1", "batchRunId": "batchgroup1_2022-08-17_1660720814942_1" } | { "severity": "info", "summary": "Object triggered successfully for rerun with Run Id: batchgroup1_2022-08-17_1660730049819_1", "batchRunId": "batchgroup1_2022-08-17_1660730049819_1", "details": "Object triggered successfully.", "status": "success", "statusCode": "0" } | |


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**Table F-1 (Cont.) APIs for Scheduler Operations**

| Functionality | API | Sample Request JSON | Sample Response JSON | Comments |
|---|---|---|---|---|
| Restart | rest-api/v1/external/restart | { "batchName": "MMG_R1", "batchRunId": "MMG_R1_2022-07-15_1657867378160_1" } | { "severity": "info", "summary": "Object triggered successfully for restart with Run Id: MMG_R1_2022-07-15_1657867378160_1 ", "batchRunId": "MMG_R1_2022-07-15_1657867378160_1", "details": "Object triggered successfully.", "status": "success", "statusCode": "0" } | |
| Interrupt | rest-api/v1/external/interrupt | { "batchName": "B2001", "batchRunId": "B2001_2022-05-22_1653222717896_1" } | { "summary": "Execution interrupted successfully for Run Id: B2001_2022-05-30_1653233511394_1", "severity": "info", "batchRunId": "B2001_2022-05-30_1653233511394_1", "details": "Execution interrupted successfully.", "statusCode": "0", "status": "success" } | |

**Table F-2 Failed Response Body**

| Failed Sample Response JSON | Description |
|---|---|
| Batch Status Failed | { "severity": "info", "batchRunId": "BT-BI-EXCHG_RATES_EOD_2022-05-27_1653662703599_1", "batchStatusCode": "-1", "batchList": [], "batchStatus": "FAILED", "statusCode": "0", "status": "success" } |


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**Table F-2 (Cont.) Failed Response Body**

| Failed Sample Response JSON | Description |
|---|---|
| Object Not found | {<br>"severity": "error",<br>"summary": "Object does not exist.",<br>"details": "Object does not exist.",<br>"error": {<br>"errorCode": "OBJECT_NOT_EXIST",<br>"errorMsg": "Object does not exist."<br>},<br>"statusCode": "-3",<br>"status": "failed"<br>} |

**Table F-3 Status Codes in the Response Body**

| Status Code | Description |
|---|---|
| 0 | Success |
| 1 | Not Started |
| 2 | Ongoing |
| 4 | Excluded |
| 5 | Held |
| -1 | Failure |
| -2 | Interrupted |
| -3 | Object does not exist |
| -4 | Invalid arguments passed in request/not enough parameters in the Request body |
| -5 | Invalid request headers/request headers missing |
| -6 | No executable job is present |
| -7 | Job is already interrupted |


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G

# OFSAA Support

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# Glossary


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