Oracle Financial Services Market Risk Measurement and Management

User Guide

Release 8.1.0.0.0

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OFS Market Risk Measurement and Management User Guide

Document Control

Version Number	Revision Date	Change Log
1.0	June 2020	This is the first release of the OFS MRMM Release 8.1.0.0.0 User Guide.
2.0	October 2020	Added updates for Release 8.1.0.1

Table of Contents

1 Preface

Welcome to release v8.1.0.0.0 of the Oracle Financial Services Market Risk Measurement and Management User Guide. This section provides a brief description of the scope, intended audience, related information sources, the organization of the user guide, and abbreviations used in the user guide.

Topics:

1.1 Scope of the Guide

Oracle Financial Services Market Risk Measurement and Management (OFS MRMM) User Guide, release v8.1.0.0.0 contains all the essential information required by a user to understand and use the user interface and functionalities in the application. It includes a description of the system functions and capabilities and details the step-by-step process for system access and use.

1.2 Intended Audience

This manual is intended for the following audience:

- Trading Desk Managers for assessing the risk of their portfolio
- Business Analysts for generating internal risk reports
- Manager-Finance and Manager-Risk for analyzing and evaluating output metrics, which will help to restructure the portfolio in accordance with business needs.
- Administrators for managing system access, data load process, and setup data.

1.3 What is New in this Release

The Oracle Financial Services Market Risk Measurement and Management Release v8.1.0.1.0 is an enhancement of the existing Oracle Financial Services Market Risk Management Release v8.1.0.0.0.

- Calculation of Component VaR.
- Hybrid model and Monte Carlo VaR using Monte Carlo Simulation.
- Equity Spot and FX Spot instruments are supported.
- FX Option cash flows migration from MRMM to ALM is supported.
- New Dashboard Reports are introduced for Monte Carlo VaR and Component VaR. Model validation with Back-testing and Profit & Loss Attribution test.

1.4 Installing this Major Release

For detailed instructions to install this Major Release, see the Oracle Financial Services Market Risk Measurement and Management Installation Guide Release 8.1.0.0.0.

1.5 Access to Oracle Support

Oracle customers have access to electronic support through My Oracle Support.

For information, visit: http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info

Or visit http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs if you are hearing impaired.

1.6 Related Information Sources

You can access the following documents online from the Oracle Help Center (OHC) documentation Library for OFS MRMM 8.1:

- OFS Market Risk Measurement and Management Release Notes. Release 8.1.0.0.0
- OFS Market Risk Measurement and Management Installation Guide, Release 8.1.0.0.0

You can access the OFS AAI documentation online from the documentation library for OFS AAAI 8.x:

- OFS Advanced Analytical Applications Infrastructure (OFS AAAI) Application Pack Installation and Configuration Guide
- OFS Analytical Applications Infrastructure User Guide

The additional documents are:

- OFS Analytical Applications Infrastructure Security Guide
- OFSAAI FAQ Document
- OFS Analytical Applications 8.1.0.0.0 Technology Matrix

1.7 Conventions and Acronyms

The following table describes the conventions used in this document.

Table 1: Document Conventions

Convention	Meaning
boldface	Boldface type indicates graphical user interface elements associated with an action or terms defined in text or the glossary.
italic	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
`monospace`	Monospace type indicates commands within a paragraph, URLs, code in examples, file names, text that appears on the screen, or text that you enter.
Hyperlink	Hyperlink type indicates the links to external websites, internal document links to sections.

The following table lists the abbreviations used in this document.

Table 2: Abbreviations

Conventions	Description
CAS	Cross Asset Server
CVA	Credit Valuation Adjustment
DM	Data Model
DRC	Default Risk Charge
DVA	Debt Valuation Adjustment
EE	Expected Exposure
ENE	Expected Negative Exposure
EOD	End of Day
EPE	Expected Positive Exposure
ES	Expected Shortfall
FRTB	Fundamental Review of Trading Book
FVA	Funding Valuation Adjustment
IMA	Internal Models Approach
IMCC	Internally Modelled Capital Charge
MRF	Modellable Risk Factor
MRMM	Market Risk Measurement and Management
NMRF	Non-Modellable Risk Factor
OFSAA	Oracle Financial Services Analytical Applications
OFSAAI	Oracle Financial Services Analytical Applications Infrastructure
P&L	Profit and Loss
PFE	Positive Future Exposure
RF	Risk Factor
SES	Stressed Capital Add-on
VaR	Value at Risk

2 Introduction to MRMM

OFS MRMM enables banks to accurately measure, evaluate, monitor, and manage market risk. Additionally, it enables banks to proactively comply with the regulatory requirements of capital calculation as per the Internal Models Approach (IMA). This solution combines, OFSAA's deep expertise with the Numerix analytics (Numerix Cross Asset Server and Numerix Oneview Enterprise Platform), to ensure that all the critical elements of a market risk program from pricing, valuations, risk assessment, monitoring and management, stress testing to data governance, data storage, and final regulatory submissions are fully addressed.

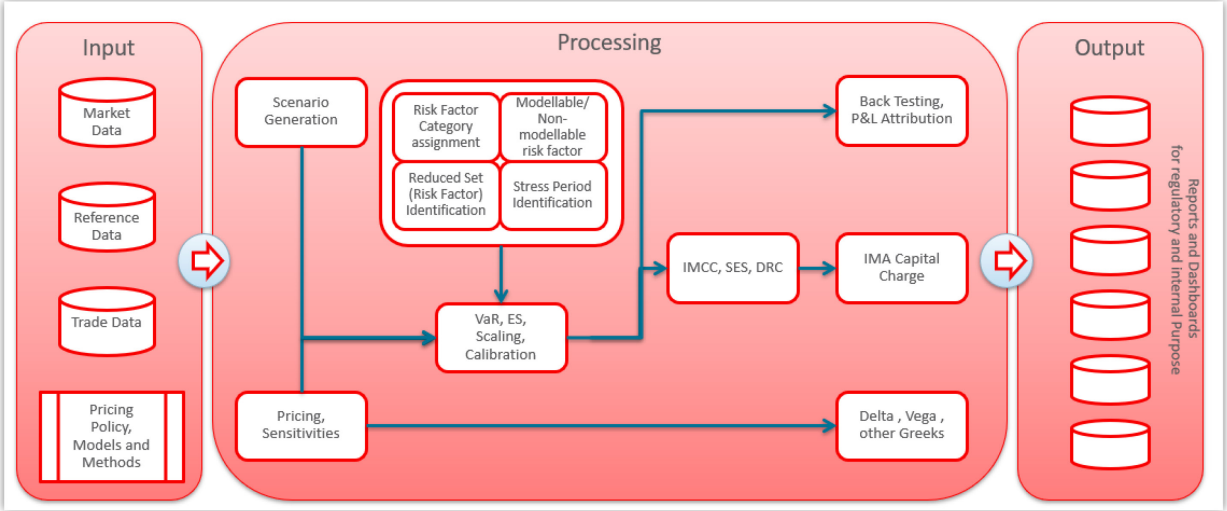
OFS MRMM enables banks and financial institutions to comply with the latest market risk capital regulations, such as the Fundamental Review of Trading Book (FRTB).

Topics:

2.1 Process Flow

The following image illustrates the process flow of the OFS MRMM solution.

Figure 1: MRMM Process Flow



Input Data Requirement: The following types of data are expected as input to the solution:

- **Trade Data**: This is data of on-balance and off-balance sheet positions, settled and unsettled trades or deals belonging to trading book that you want to price and calculate risk measures. For example, data of bonds in which investment has been made, or swap transactions entered with the counterparty.
- **Reference Data**: These are dimensions and attributes that describe the trade data. These are used to define business rules, and view reports. For example, Product, Legal Entity, Currency, Netting Agreement, and Credit Support Annex.

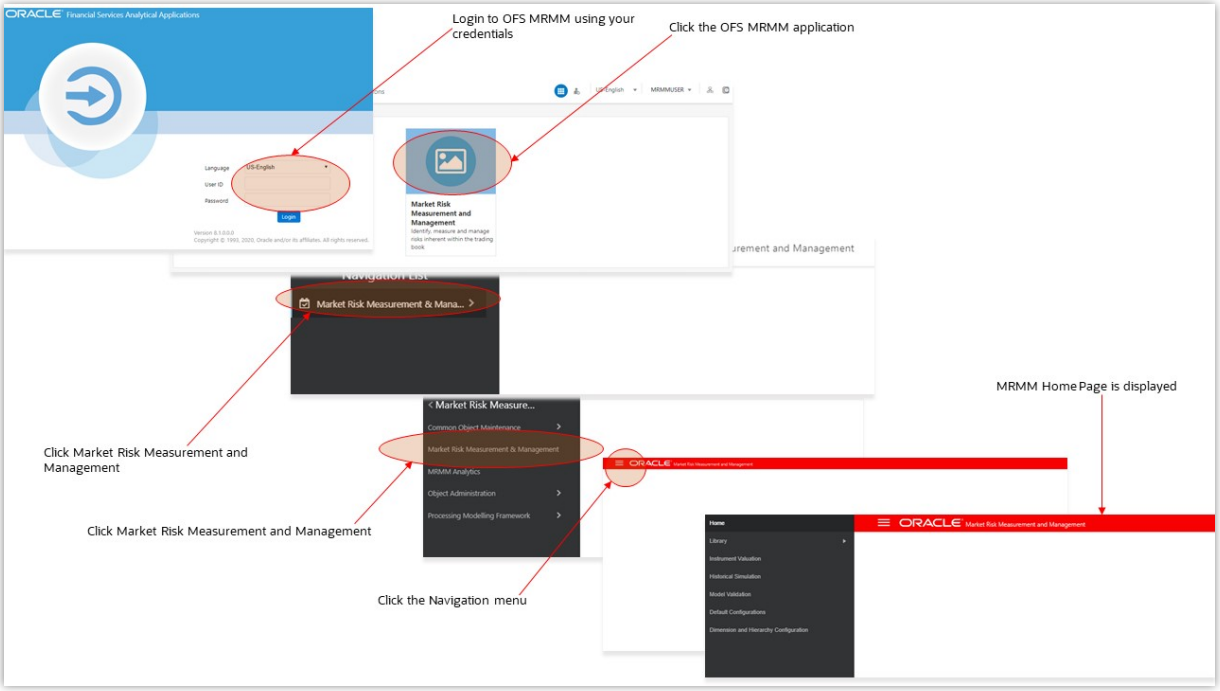
- **Market Data**: These are price quotes, yield curves, volatility surface, and other forms for financial market data that are supplied by designated agencies such as Bloomberg, Reuters, and various exchanges, or market makers. For example, Interest Rate Curve, Equity prices, Foreign Exchange spot and forward rates, and so on.

- **User Configurations (Processing)**: To process this data and achieve desired results, such as the price of a trade or capital requirement for the trading book, you must perform the following system configurations:
  - **Dimension and Hierarchy Configuration**: In this section, select the dimension that must be available for further configurations in MRMM, and specify the hierarchy for each selected dimension. The hierarchy must be pre-defined in **Dimension Management.** See Dimension Management section in the OFS Analytical Applications Infrastructure User Guide for details.
  - **Default Configuration**: In this section you need to define the default values used by various components of MRMM. It includes the following:
    - Currency
    - Currency Pair
    - Model and Method
    - Model Parameters
    - Instrument Type Classification
    - Liquidity Horizon
  - **Library**: In this section you must define the portfolios, configure rules for identification of modellable and non-modellable risk factors, and create market scenarios and pricing policies. It includes the following:
    - Portfolio
    - Risk Factor
    - RFET
    - Stress Scenarios
    - Pricing policy
    - Bucket definition
  - **Instrument Valuation**: In this section you must perform the valuation of instruments and positions in a trading book.
  - **Historical Simulation**: In this section you must measure the VaR, ES and other FRTB computations using the IMA approach for the Portfolio or Trading Desk.
  - **Model Validation**: In this section you must validate the models.
  - **Monte Carlo Simulation**: In this section you must compute the Monte Carlo VaR and other CVA measures for the counterparties.
- **Output**: MRMM has predefined reports to view and analyze data and results. The reports are presented in multiple dashboards which can be modified as per the specific requirements.

2.2 Logging into OFS MRMM Application

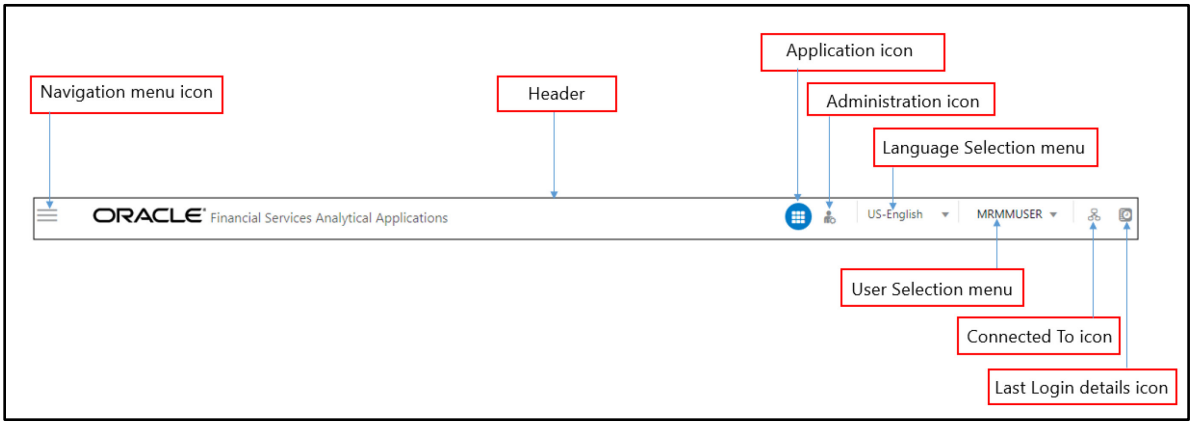
To log in to the OFS MRMM Application, follow these steps:

Figure 2: OFS MRMM Application Navigation



1. Access the OFS MRMM application using the login credentials (**User ID** and **Password**) provided and select the preferred language to navigate. The built-in security system ensures that you are only permitted to access the window and actions based on the authorization.
2. After logging in to OFSAA Home screen, the landing page is displayed.

Figure 3: Illustration of the Icons in OFSAA Landing Page Header



Use the information provided in the following table to set the application preferences.

Table 3: Icons in the OFSAA Landing Page Masthead and Their Descriptions

Field	Description
User Menu	Click this drop-down to select the options: **Preferences**, **About**, **Change Password,** or **Logout**.
Application Icon	Click this icon to view all the applications installed in your environment. Click the icon and select **Financial Services Market Risk Measurement and Management**.
Language Menu US-English	This menu displays the language you selected in the OFSAA Login Window. The language options displayed in the Language Menu are based on the language packs installed in your OFSAA instance. Using this menu, you can change the language at any point in time.
Administration Icon	Click this icon to navigate to the **Administration** window. The Administration window displays modules such as **System Configuration**, **Identity Management**, **Database Details**, **Create New Application**, **Information Domain**, **Translation Tools,** and **Process Modelling Framework**.
Last Login Details	Click this icon to view the details of the last login and last failed login.
Object Administration	Object Administration is an integral part of the infrastructure and facilitates system administrators to define the security framework. See the OFS Advanced Analytics Infrastructure User Guide for details.
Common Object Maintenance	Common Object Maintenance is an integral part of the infrastructure system and facilitates system administrators to define the security framework with the capacity to restrict access to the data and metadata in the warehouse, based on a flexible, fine-grained access control mechanism. See the OFS Advanced Analytics Infrastructure User Guide for details.
Processing Modelling Framework	This module facilitates built-in tooling for orchestration of human and automatic workflow interfaces. See the OFS Advanced Analytics Infrastructure User Guide for details.

3. Select **Market Risk Measurement and Management** in the OFSAA landing page.
4. Select **Market Risk Measurement and Management** in the Left-Hand Side (LHS) pane. The Market Risk Measurement and Management landing page is displayed.
5. For ease of navigation, click the **Navigation Menu** to view the following options:
   - Library
   - Instrument Valuation
   - Historical Simulation
   - Model Validation
   - Default Configuration
   - Dimension and Hierarchy Configuration

2.3 Components of OFS MRMM

This section provides an overview of the functionalities available in MRMM:

- **Instrument Valuation**

  This component delivers the following functionalities:

  - Pricing of each trade in a portfolio or trading desk.
  - Calculation of Greeks for instruments.
  - Computation of sensitivities (such as Delta, Vega) as per the regulatory requirements for the Fundamental Review of the Trading Desk (FRTB) standardized approach.

  See the Instrument Valuation section for details.

- **Historical Simulation**

  This component delivers the following functionalities:

  - Risk factor reduced set identification and Liquidity Horizon, are available as a download.
  - Stress period identification as per the regulatory requirements for the FRTB Internal Models Approach (IMA).
  - Identification of Modellable and Non-Modellable risk factors is available through the RFET functionality.
  - Historical VaR and Expected Shortfall (ES) from a non-regulatory perspective.
  - Stress calibrated ES, as per the regulatory requirements for FRTB IMA.
  - Stressed capital add-on and Internal Modelled Capital Charge (IMCC), as per regulatory requirements for FRTB IMA.

  See the Historical Simulation section for details.

- **Model Validation**

  This component delivers the following functionalities:

  - VaR model backtesting.
  - Actual, Hypothetical and Risk-Theoretical Profit and Loss (P&L) are available as downloads.
  - Backtesting and P&L Attribution test, as per requirements for FRTB IMA.
  - Zone classification, as per requirements for FRTB IMA.

  See the Model Validation section for details.

- **Market Risk – Monte Carlo Simulation**

  This component delivers the following functionalities:

  - Credit Value Adjustment (CVA) measures (Trade and Group level)
  - Potential Future Exposure (PFE) measures (Trade and Group level)
  - Monte Carlo VaR (Group level)

  See Market Risk – Monte Carlo Simulation for details.

3 Library Definitions

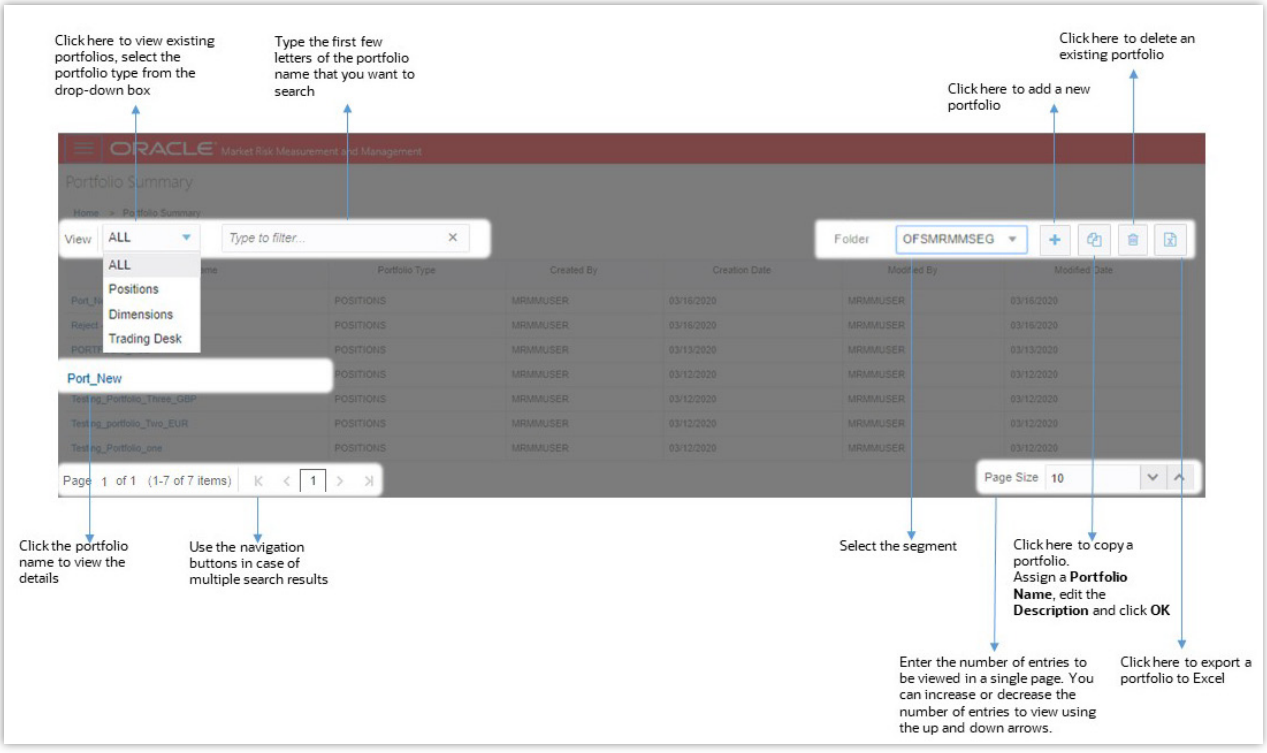
This section enables you to create a library of definitions that are used across all the MRMM components.

Topics:

3.1 Common UI Elements

This section describes the common UI elements in the **Library** menu.

Figure 4: Common UI Elements in the Library Menu Windows



The following table describes the common UI elements in the Library menu windows.

Table 4: Common UI Elements in the Library Menu Windows

Sl. No.	Element	Description
1	View	Click the **View** drop-down list to view existing definitions.
2	Search	Type the first few letters of the definition name that you want to search in the search box. The summaries whose names consist of your search string are displayed in a tabular format. In the **Name** column, click the name of the definitions you want to view. If there are multiple results for your search, try refining the search string by providing the exact names of the portfolio. From the breadcrumb on top, click the respective feature **Summary** link to return to the summary window after viewing details of the definition.
3	Add 	Enables you to add a new definition.
4	Copy 	Enables you to copy a definition. This is available for **Portfolio** only. Assign a **Portfolio Name**, edit the **Description** and click **OK**.
5	Delete 	Enables you to delete an existing definition in the respective feature summary window. To delete a definition, follow these steps: 1. Select the definition name in the respective feature **Summary** window and click **Delete**  . A confirmation dialog box is displayed. 2. Click **OK** to delete the portfolio. **Note**: You can perform this action for Portfolio, Risk Factor, RFET, Stress Scenario, Bucket Definition, and Pricing Policy.
6	Export 	Enables you to export a definition to Excel, for offline viewing. To export a definition, follow these steps: 1. Select the definition name in the respective feature **Summary** window and click **Export**  . 2. The portfolio is exported as an XLS file and gets downloaded. **Note**: You can perform this action for Portfolio, Risk Factor, RFET, Stress Scenario, Bucket Definition, and Pricing Policy.
7	Approve  or Reject  definitions	To approve or reject a definition, follow these steps: 1. Select the definition from the respective feature **Summary** window. The feature **Definition** window is displayed. 2. Click **Edit**  . The Approve and Reject icons get enabled. If you wish to edit any fields, modify the fields and approve or reject. 3. Click **Approve**  or **Reject**  . The respective message is displayed. Approved definitions cannot be edited. **Note**: You can perform this action for Portfolio and Bucket Definition.

8	Page View Options	• Page Size  Enter the number of entries to be viewed on a single page in the Page Size field on the bottom. You can increase or decrease the number of entries to view, using the up and down arrows. • Page Navigation  To navigate easily, use the **First Page**, **Previous Page**, **Next Page** or **Last Page** buttons in the **View** bar. To navigate to the desired page, type a different page number in the **View** bar control and press **Enter**.

3.2 Portfolio

A portfolio is a group of financial instruments bundled together. It gives business users the flexibility to analyze a group of instruments together, which results in better business decisions. This section discusses the procedure for defining and maintaining a Portfolio.

A portfolio is the base for any evaluations performed in MRMM. For example, in Instrument Valuation, all the analysis that are performed are at the granularity of the portfolio. Portfolio definition functionality provides flexibility to create a portfolio based on positions, dimensions, or trading desks. The business hierarchy provides flexibility to cut across any supported hierarchy and create a desired portfolio for further analysis. Alternatively, MRMM also provides the option to select individual instruments and create a portfolio. The options provide a wider view of analysis using various dimensions.

You can define a portfolio to specify the criteria for portfolio identification of on and off-balance sheet exposures. This will be available to calculate risk measures for portfolio-level analysis. Portfolio defined in this section will be used in the analysis of instrument valuations and portfolio valuations.

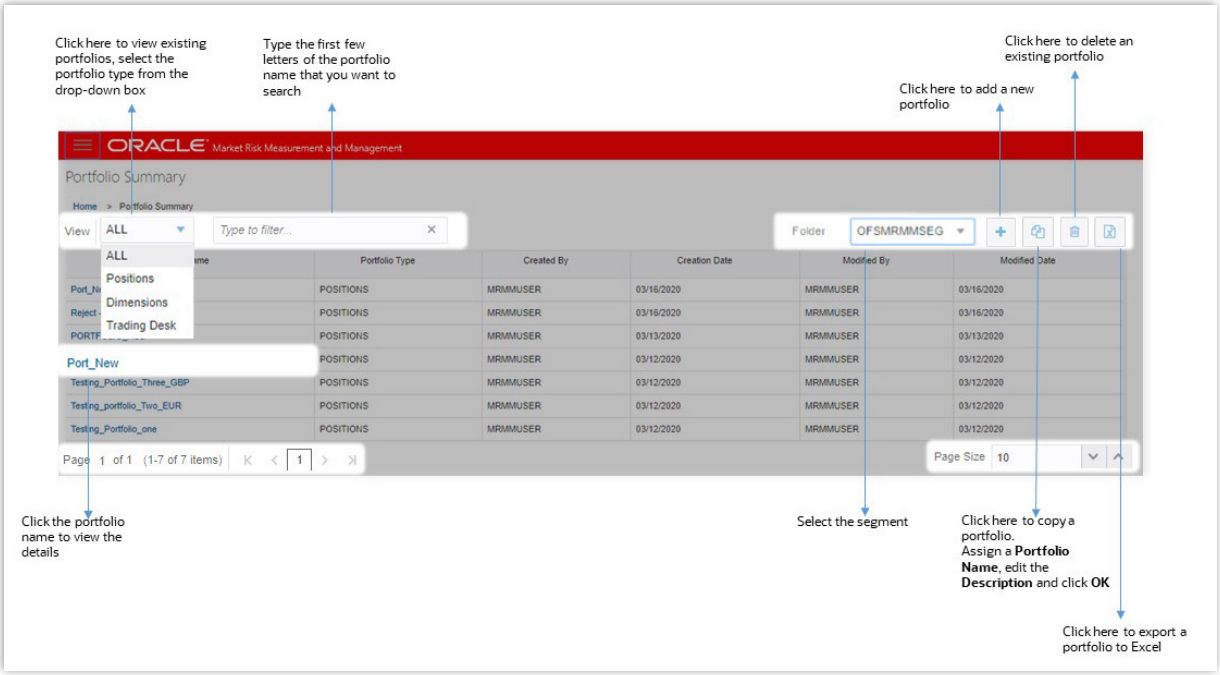
Topics:

3.2.1 Navigate to the Portfolio Summary Window

From the **MRMM Home** page, select **Market Risk Measurement and Management**. Click the **Navigation Menu**, select **Library**, and then select **Portfolio**. In the **View** drop-down list, select the type of portfolio you want to view. The available options are **All**, **Positions**, **Dimensions**, **Trading Desk**.

See the Common UI Elements section for details on tasks such as view, search, copy, delete, export, approve, reject, and page view options.

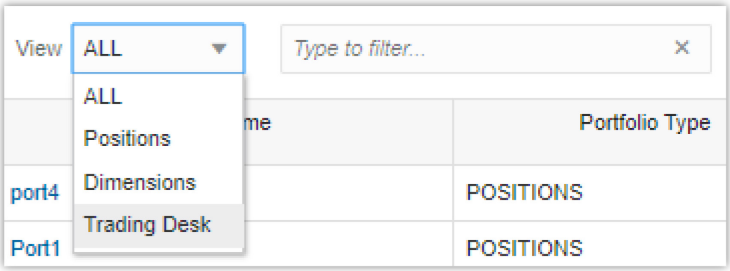
Figure 5: Portfolio Summary Window



3.2.2 View and Search for a Portfolio

In the **Portfolio Summary** window, follow these steps:

Figure 6: Portfolio Summary - View Drop-down List



1. In the **View** drop-down list, select the type of portfolio. The available options are **All**, **Positions**, **Dimensions**, and **Trading Desk**.
2. Select the Portfolio you want to view and click the portfolio name. The **Portfolio Definition** window opens and displays the details of the selected Portfolio. You cannot edit any details in view mode.
3. In the **Search** field, type the first few letters of the portfolio that you want to search. The summaries whose names consist of your search string are displayed in a tabular format.

- In the **Portfolio Name** column, click the name of the portfolio you want to view. If there are multiple results for your search, try refining the search string by providing the exact names of the portfolio.
- Use the page navigation buttons at the bottom of the table for multiple search results.

- From the breadcrumb on top, click the **Portfolio Summary** link to return to the summary window after viewing details of the portfolio.

3.2.3 Define a Portfolio

Portfolios can be created based on multiple filters, represented as portfolio type. You can define a portfolio based on Positions, Dimensions, or Trading Desk. The portfolios created in this window are used for computations in the MRMM Instrument Valuation module.

In the **Portfolio Summary** window, click **Add** to create a new portfolio. The **Portfolio Definition** window is displayed.

3.2.4 Define a Portfolio – Based on Positions

To define a new Portfolio based on Positions, follow these steps:

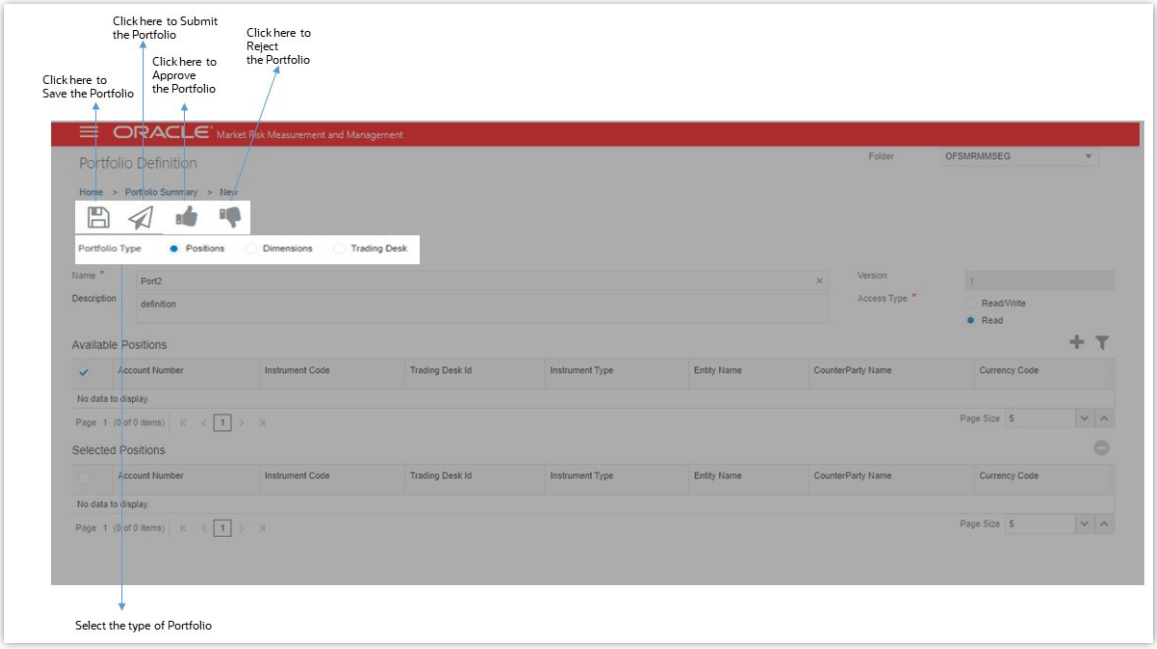
1. In the **Portfolio Definition** window, populate the details mentioned in the following table. Fields marked in red asterisk (*) are mandatory.

Table 5: Portfolio Definition Based on Position - Fields and Descriptions

Fields	Description
Name*	Enter the portfolio name.
Description	Enter a short description of the portfolio.
Folder	Select the folder in which you want to save the definition.
Access Type*	Specify whether the Portfolio is Read-Only/ Read-Write.
Version	Displays the workflow version.
Portfolio Type	Select **Position.** In this option, the portfolio can be defined at a most granular level based on trades or positions. This indicates that specific positions can be selected and defined as a part of the portfolio definition- these positions can be selected by applying filters such as Instrument type, currency, and so on.
Available Positions	Displays the available positions.
Selected Positions	Displays the selected positions.
Filters	If you have selected the Available Position option, then you will be provided with filters such as **Instrument Type**, **Entity Name**, **Counterparty Name**, **Currency**.

2. Select **Positions** in **Portfolio Type**.

Figure 7: Portfolio Definition Window - Position



3. Click **Filter** to add the required Available Positions for **Instrument Type**, **Entity Name**, **Counterparty Name**, or **Currency**, and click **Apply**. The application allows multiple selections for this section. The filtered positions are listed in the **Available Positions** section. Click **Reset** to refresh the list. You can sort the columns in ascending or descending order, using the **sorter** .
4. You can select multiple entries using *Ctrl + Click* to group the required entries in the Available Positions and click **Add** . These selected entries from **Available Positions** are added in the **Selected Position** section.
5. If you want to remove any entry from the **Selected Position**, select the entry and click **Remove** .
6. Click **Submit** to save and submit the portfolio for approval. A confirmation dialog box is displayed.

   Or,

   Click **Save** to update the portfolio before submitting it for approval.
7. Click **OK**. You can now view the Portfolio in the **Portfolio Summary** window.

3.2.5 Define a Portfolio – Based on Dimensions

To define a new Portfolio based on dimensions, follow these steps:

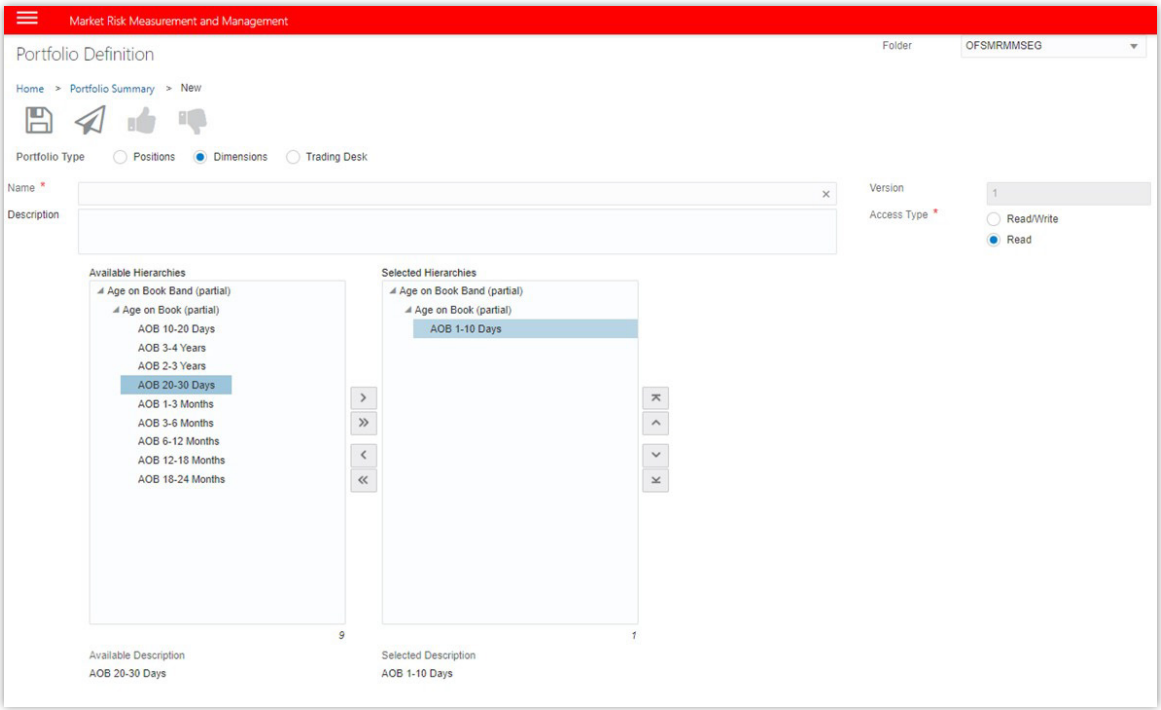
1. In the **Portfolio Definition** window, populate the details mentioned in the following table. Fields marked in red asterisk (*) are mandatory.

Table 6: Portfolio Definition Based on Dimensions - Fields and Descriptions

Fields	Description
Name*	Enter the portfolio name.
Description	Enter a short description of the portfolio.
Folder	Select the folder in which you want to save the definition.
Access Type*	Specify whether the Portfolio is Read-Only/Read-Write.
Version	Displays the workflow version.
Portfolio Type	Select **Dimension**. In this option, the portfolio can be defined based on a more aggregate level as compared to the position type. You can apply filters based on dimensions such as Country, Market Risk Asset class, and so on.
Available Hierarchies	Displays the available hierarchies.
Selected Hierarchies	Displays the selected hierarchies.

2. Select **Dimensions** in **Portfolio Type**.

Figure 8: Portfolio Definition Window - Dimension



3. To select one value, select the value and click **Move**  , to select all the Available Values, click **Move All**  . To remove any selected value from the list, select the value and click **Remove** . To remove all the selected values, click **Remove All**  .
4. Click **Submit**  to save and submit the portfolio for approval. A confirmation dialog box is displayed.

   Or,

   Click **Save**  to update the portfolio before submitting it for approval.
5. Click **OK**. You can now view the Portfolio in the **Portfolio Summary** window.

3.2.6 Define a Portfolio – Based on Trading Desk

To define a new Portfolio based on the trading desk, follow these steps:

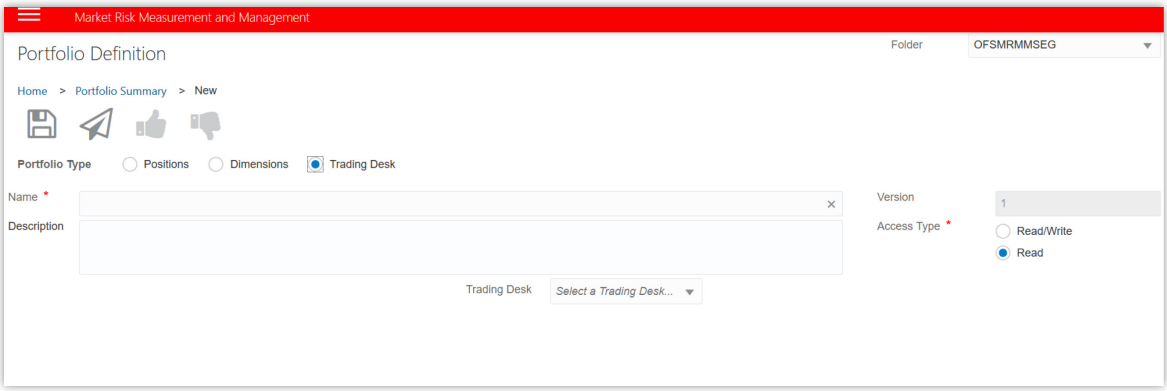
1. In the **Portfolio Definition** window, populate the details mentioned in the following table. Fields marked in red asterisk (*) are mandatory.

Table 7: Portfolio Definition Based on Trading Desk - Fields and Descriptions

Fields	Description
Name*	Enter the portfolio name.
Description	Enter a short description of the portfolio.
Folder	Select the folder in which you want to save the definition.
Access Type*	Specify whether the Portfolio is Read-Only/ Read-Write.
Version	Displays the workflow version.
Portfolio Type	Select **Trading Desk**. This option allows a trading desk to be represented as a separate portfolio.
Trading Desk	Displays the available trading desk information. Select the required trading desk from the drop-down list.

2. Select **Trading Desk** in **Portfolio Type**.

Figure 9: Portfolio Definition Window – Trading Desk



3. Enter details in the fields **Name** and **Description**.
4. Select a **Trading Desk** from the drop-down list.
5. Click **Submit** to save and submit the portfolio for approval. A confirmation dialog box is displayed.

   Or,

   Click **Save** to update the portfolio before submitting it for approval.
6. Click **OK**. You can now view the Portfolio in the **Portfolio Summary** window.

3.2.7 Edit a Portfolio

You can edit a portfolio at any point from the **Portfolio Summary** window. To edit an existing portfolio, follow these steps:

1. Click the **Portfolio Name** you want to edit.
2. Click **Edit** and modify the required fields.
3. Click **Save**. The updated information can be viewed in the **Portfolio Summary** page.

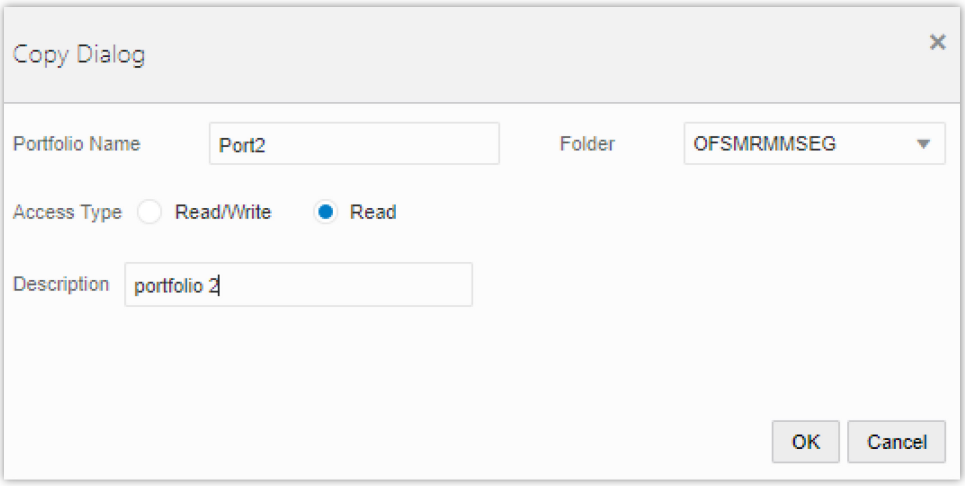
> **NOTE** You can edit the portfolio in the draft stage only.

3.2.8 Copy a Portfolio

You can copy a portfolio at any given point from the **Portfolio Summary** window. To copy an existing portfolio, follow these steps:

1. Select the **Portfolio Name** and click **Copy** . The Copy Dialog box is displayed.
2. Assign a new **Portfolio Name** and edit the **Description** field if required.
3. You cannot modify the fields **Access Type** and **Folder**.

Figure 10: Copy a Portfolio – Dialog Box



4. Click **OK**. You can view the created copy in the **Portfolio Summary** window.

3.3 Risk Factor

This window displays the preseeded risk factors in OFS MRMM. It is a repository of various risk factors covering the market data elements that are used for the pricing of different financial instruments of the bank.

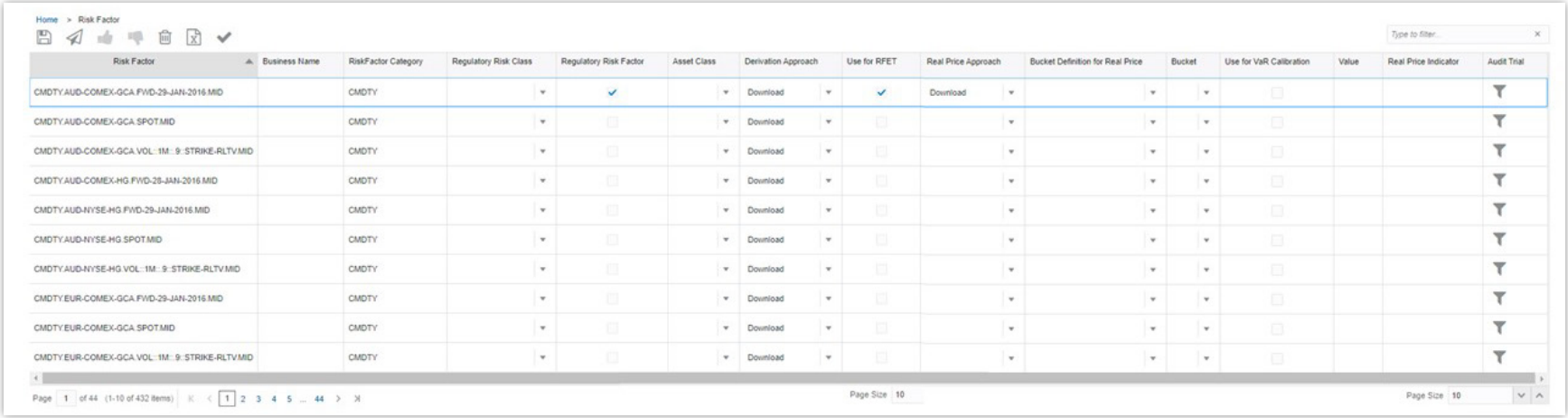
In Release 8.1, this window is enhanced to include the columns for the modellable and non-modellable Risk Factor Eligibility Test (RFET) under FRTB.

3.3.1 Navigate to the Risk Factor Window

From the **MRMM Home** page, select **Market Risk Measurement and Management**, click the **Navigation Menu**  , select **Library**, and then select **Risk Factor**.

See the Common UI Elements section for details on tasks such as view, search, copy, delete, export, approve, reject, and page view options.

Figure 11: Risk Factor Page



3.3.2 Define a Risk Factor

To define a new Risk Factor, follow these steps:

1. In the **Risk Factor** window, for every risk factor you want to test for RFET, populate the required details mentioned in the following table.

Table 8: Risk Factor Window - Columns and Descriptions

Columns	Description
Risk Factor	Displays the risk factor name.
Business Name	Assign a business name to the risk factor.
Risk Factor Category	Displays the preseeded risk factor categories.
Regulatory Risk class	Select the regulatory risk class for the risk factor.
Regulatory Risk Factor	Select the check box if the risk factor is regulatory in nature.
Asset Class	Select the asset class from the drop-down list.
Derivation Approach	Select the derivation approach as Download.
Use for RFET	Select the check box if the risk factor is to be used for RFET.
Real Price Approach	Specify the approach for real price computation. Select Download or Bucket from the drop-down list.
Bucket Definition for Real Price	Select the bucket definition to be used for real price computation from the drop-down list.
Bucket	Select the bucket from the drop-down list.
Use for VaR Calibration	Select the check box if the risk factor is to be used for VaR Calibration.
Value	This is the value generated after executing the risk factor.
Real Price Indicator	This is the value generated after executing the risk factor.
Audit Trail	Click the **Filter** to view details such as **Approved By**, **Approved On**, **Added On**, and **Approval Status**.

2. Click **Submit** to save and submit the risk factor for approval. After a risk factor is submitted, it cannot be edited until it is approved or rejected. A confirmation dialog box is displayed.

   Or,

   Click **Save** to update the risk factor before submitting it for approval.
3. Click **OK**. The risk factor created in this module is used for RFET computations in the **RFET** window.

3.3.3 Approve or Reject a Risk Factor

To approve or reject a risk factor, follow these steps:

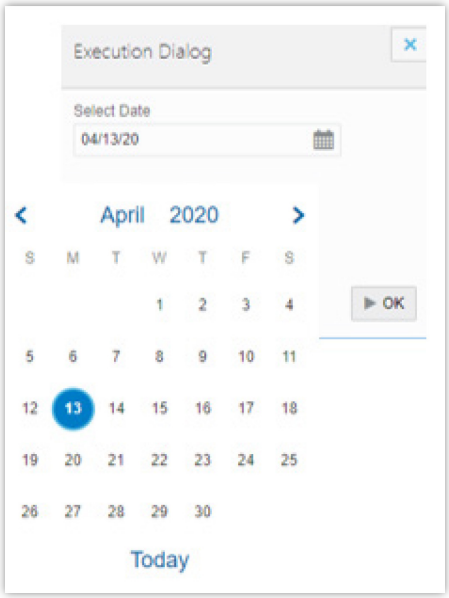
1. In the **Risk Factor** window, submit the risk factor for approval.
2. Click **Approve** or **Reject** .The respective message is displayed.
3. Click **OK**.

3.3.4 Execute a Risk Factor

To execute a risk factor, follow these steps:

1. Select the risk factor and click **Execute** .
2. Specify a date in the Date editor.

Figure 12: Executing a Risk Factor - Date editor



3. Click **OK**. A confirmation dialog box is displayed.
4. Click **OK**. The risk factor is executed successfully.

3.4 RFET

A risk factor is referred to as modellable when the price of the risk factor is real and is continuously available. All the risk factors must be classified into modellable and non-modellable.

As part of the FRTB regulations, every risk factor the bank or financial institution wants to get through has to go undergo checks for Real Price (RP) and Risk Factor Eligibility Test (RFET). After Identifying the data sourced from the data provider, the bank transactions, and committed quotes against the selected risk factors banks must perform an RFET and calculate if the value is real price.

RFET analysis aims to find if a risk factor has enough data points in a year. Banks or Financial institutions must identify at least 24 real price observations for the risk factor for the observation period. Additionally, over the historical period there must not be a 90-day period in which fewer than four real price observations have been identified for the risk factor. The preceding criteria must be monitored on a monthly basis; or the bank must identify at least 100 real price observations over the selected historical period for the risk factor. The results of the RFET test enables you to find out if the outcome is modellable or non-modellable.

Rules are set for the risk factors before proceeding for the identification of the modellable risk factors. After the configuration of rules, modellable or non-modellable classification is performed.

Real Price can be identified as follows:

- Download: In the download approach, you must specify the real price as per the download value and as part of the market data, specify the Real Price indicator as Yes or No.
- Bucket: In the bucket approach, you must obtain all the instruments associated with a bucket and perform the following validation. If any one instrument passes the following criteria then mark the risk factor price as Real Price.

The RP value is computed as Yes for each risk factor if the following conditions are met:

Table 9: Identification of Real Price for Each Risk Factor

Vendor Certified	Arms Length Transaction	Committed Quote	Transaction of Same Instrument	Real Price
Yes	Yes	Yes	NA	Yes
No	Yes	No	NA	Yes
No	No	Yes	NA	Yes
No	No	No	Obtain all the transactions performed for the instrument on a specific business day. If any of the transaction price matches with the instrument price, then the risk factor is marked as Real Price.	

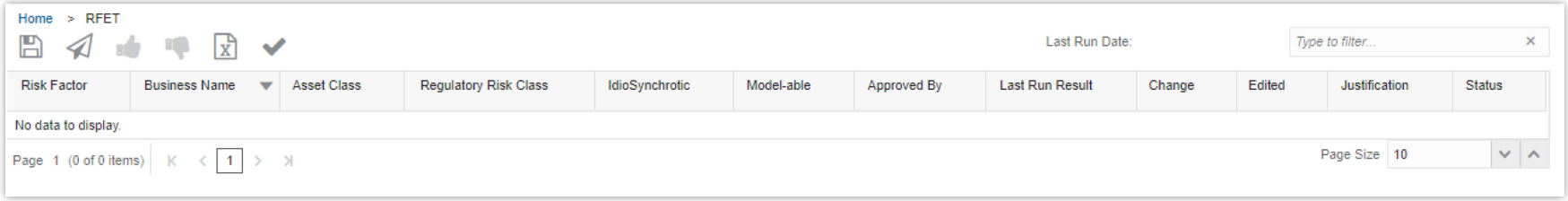
The flag for **Modellable** is computed with values as **Yes** or **No**. Risk Factor is identified as Modellable if **Real Price** is **Yes** and **Continuously Available** is **Yes**.

3.4.1 Navigate to the RFET Window

From the **MRMM Home** page, select **Market Risk Measurement and Management**, click **Navigation Menu**, select **Library**, and then select **RFET**.

See the section Common UI Elements, for details on tasks such as view, search, copy, delete, export, approve, reject, and page view options.

Figure 13: RFET Page



3.4.2 RFET Test

In this window you can identify risk factors as modellable or non-modellable.

To test a risk factor for RFET, follow these steps:

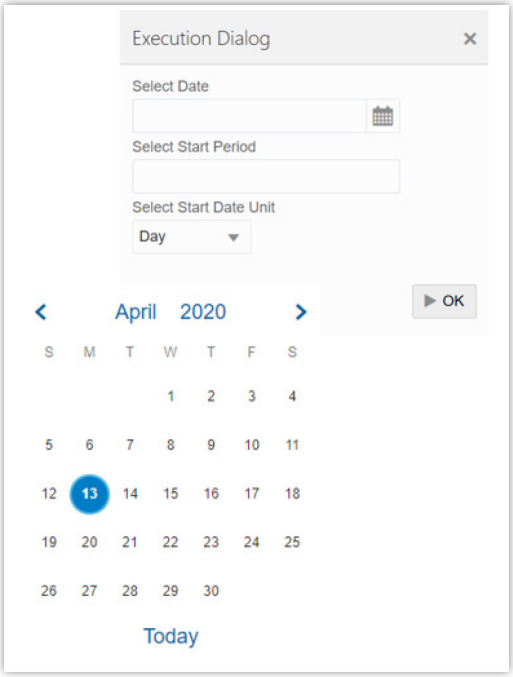
1. In the RFET window, the required details mentioned in the following table are populated.

Table 10: RFET Window - Columns and Descriptions

Columns	Description
Risk Factor	Displays the risk factor name.
Business Name	Displays the business name assigned to the risk factor.
Asset Class	Displays the asset class of the risk factor.
Regulatory Risk class	Displays the regulatory risk class of the risk factor.
Idiosyncratic	Displays if the risk factor is idiosyncratic. You can modify this field.
Model-able	Displays if the risk factor is modellable or non-modellable. After execution, you can modify this field and mention the justification in the **Justification** field.
Approved By	Displays the approver of the risk factor.
Last Run result	Displays the result after the last execution.
Change	Displays whether the result of the RFET was modified after the last run execution.
Edited	Displays the modification made to the result of the RFET after the last run execution.
Justification	If you change the status of the RFET, justify the reason in this field.
Status	Displays the execution status.

2. Select the RFET and click **Execute** .
3. Click **Calendar** to select a date from the Date editor window. In the **Select Start Date Unit** field, specify the number of historical days to be considered for the RFET execution.

Figure 14: RFET Execution – Date Editor



4. Click **OK**. A confirmation dialog box is displayed.
5. Click **OK** to confirm.
6. Click **Submit** to save and submit the RFET for approval. After an RFET is submitted, it cannot be edited until it is approved or rejected. A confirmation dialog box is displayed.

   Or,

   Click **Save** to update the RFET before submitting it for approval.
7. Click **OK**.

3.4.3 Edit an RFET

To edit an existing RFET, follow these steps:

1. Double-click the risk factor you want to edit from the RFET window. The fields become editable.
2. In the columns **Change**, **Edited**, and **Justification**, mention the relevant details.
3. Click **Submit** .

3.4.4 Approve or Reject an RFET

To approve or reject an RFET, follow these steps:

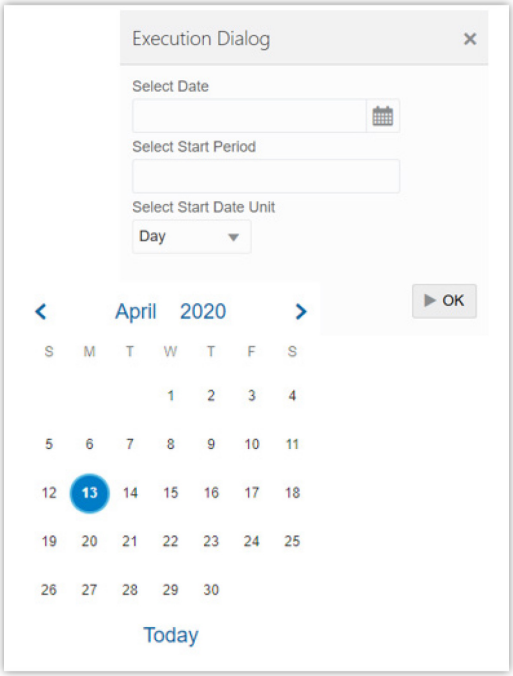
1. In the **RFET** window, submit the RFET for approval.
2. Click **Approve** or **Reject** .The respective message is displayed.

3.4.5 Execute an RFET

To execute an RFET, follow these steps:

1. Select the RFET and click **Execute**
2. Click **Calendar** to select a date from the Date editor window. In the **Select Start Date Unit** field, specify the number of historical days to be considered for the RFET execution.

Figure 15: RFET Execution – Date Editor



3. Click **OK**. A confirmation dialog box is displayed.
4. Click **OK** to confirm.

3.5 Stress Scenario

OFS MRMM uses a variety of market data such as Rate, Price, Curve, and Volatility to perform Instrument and Portfolio level risk analysis.

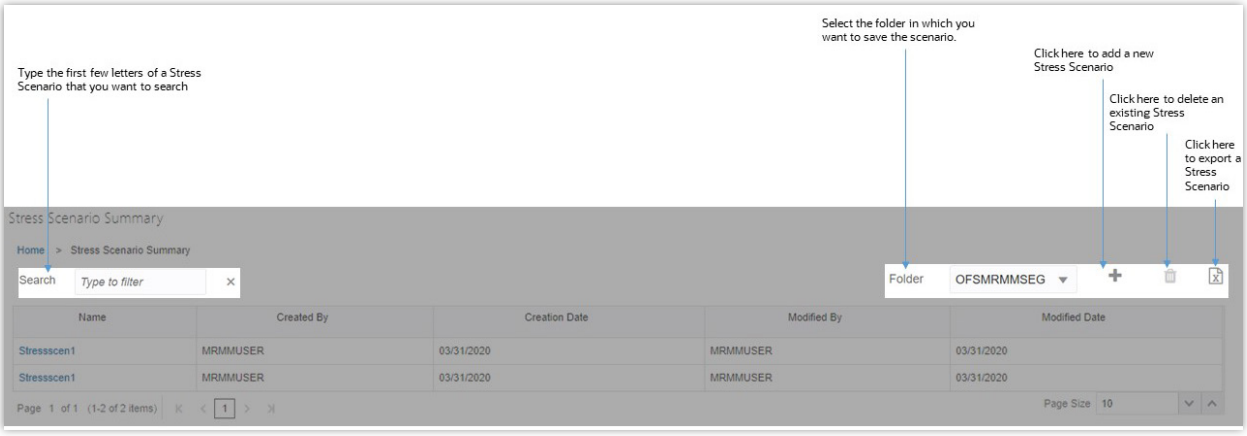
A scenario is a set of changes that can be applied to a base market. Current market data can be used for business as usual analysis. However, to perform What-if analysis and other scenario analysis modified market data is required. Market Scenarios section in the MRMM application enables you to define market data under multiple scenarios, which can be further used to perform valuations.

3.5.1 Navigate to the Stress Scenario Summary Window

From the **MRMM Home** page, select **Market Risk Measurement and Management**, click **Navigation Menu**, select **Library**, and then select **Stress Scenario**.

In the **Stress Scenario Summary** window, click **Add** to create a new stress scenario. The **Stress Scenario Definition** window is displayed. See the Common UI Elements section, for details on tasks such as view, search, copy, delete, export, approve, reject, and page view options.

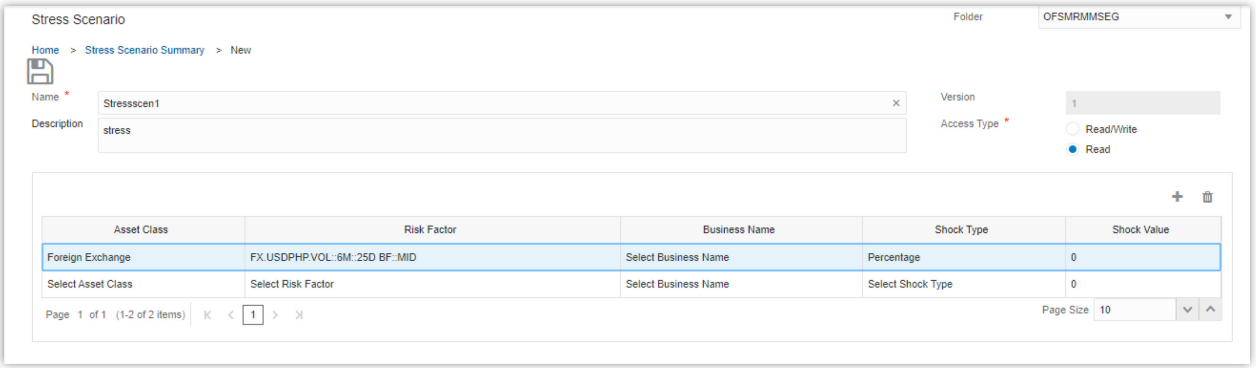
Figure 16: Stress Scenario Summary Window



3.5.2 Define a Stress Scenario

You can define a new scenario in the **Stress Scenario Definition** window.

Figure 17: Stress Scenario Definition Window



To define a new stress scenario, follow these steps:

1. In the **Stress Scenario Definition** window populate the details mentioned in the following table. Fields marked in red asterisk (*) are mandatory.

Table 11: Stress Scenario Definition Window - Fields and Descriptions

Fields	Description
Name*	Enter the stress scenario name.
Description	Enter a short description for the stress scenario
Folder	Select the folder in which you want to save the scenario.
Access Type*	Specify whether the scenario is Read-Only/Read-Write
Version	Displays the workflow version.

2. Click **Add** , and select the **Asset Class**, **Risk Factor**, and **Business Name** from the drop-down list. If the risk factor has been assigned a business name, it is displayed.

3. Select the **Shock Type** and assign a **Shock Value**. For details, see Shock Definition Parameters. You can create multiple shocks in a scenario.
4. Click **Delete** to delete any entry from the table.
5. Click **Save**. A confirmation dialog box is displayed.
6. Click **OK**. The Scenario is defined and displayed in the summary page.

3.5.3 Shock Definition Parameters

Shock can be defined at the level of risk factor, market data, and market quotes. You need to select the risk factors based on which the shock needs to be defined. You can select multiple risk factors and define unique scenarios.

The shocks defined above are used to revalue the portfolio subjected to stress using the perturbed values. For example, if the scenario consists of all risk factors relevant to a yield curve for a specific currency type, the instruments for which these risk factors are mapped for pricing will be revalued with the perturbed values.

For example, if the shock value for IR-USD-LIBOR-3M is 1% and that for IR-USD-LIBOR-6M is 2%.for a particular stress scenario definition. In this case a three-month term point will be shocked by 1% and six month risk factor curve will be shocked by 2%.

3.5.3.1 Type of Shocks

Shock types are defined as a set of additive and multiplicative operations. It results in either an increase or decrease of the base market quotes. Shock can be defined as Percent, Basis Points, or Absolute Value.

3.5.3.1.1 Shock in Terms of Percent

In this scenario the shock value is defined in terms of percent. For example: 1%, -2% and so on. This is applicable to all the risk factors.

Following are a few examples:

- Example 1:

  If the Base quote = 2 and the Shock value = - 2%

  Modified quote = 2 * [1 + (-2%)] = 1.96
- Example 2:

  If the Base quote = 2 and the Shock value = 1%

  Modified quote = 2 * [1 + (1%)] = 2.02

3.5.3.1.2 Shock in Terms of Basis Points

In this scenario the shock value is defined in terms of Basis Points (BP). For example, 1 BP up, 5 BP down and so on. This is applicable to risk factors expressed in terms of rate such as Interest Rate, Swap Rate, and Forward Rate Agreement (FRA) Rate, and so on. Following are a few examples:

- Example 1:

  If the Base quote = 2 and the Shock value = - 5 BP

  Modified quote = 2 + (-0.05) = 1.95

- Example 2:

  If the Base quote = 2 and the Shock value = 4 BP

  Modified quote = 2 + 0.04 = 2.04

3.5.3.1.3 Shock in Terms of Absolute Value

In this scenario the shock value is defined in absolute terms. For example, USD 10 up, GBP 5 down and so on. This is applicable to risk factors expressed in terms of price such as Equity Spot Price, Index, Futures, Bond Price, and so on. Following are a few examples:

- Example 1:

  If the Base quote = 112 and the Shock value = 5

  Modified quote = 112 + 5 = 117

- Example 2:

  If the Base quote = 112 and the Shock value = - 8

  Modified quote = 112 + (- 8) = 94

3.6 Pricing Policy

Pricing policy enables you to select models and methods to be used for pricing the instrument. On this page, you can define the pricing policies to be used for instrument pricing.

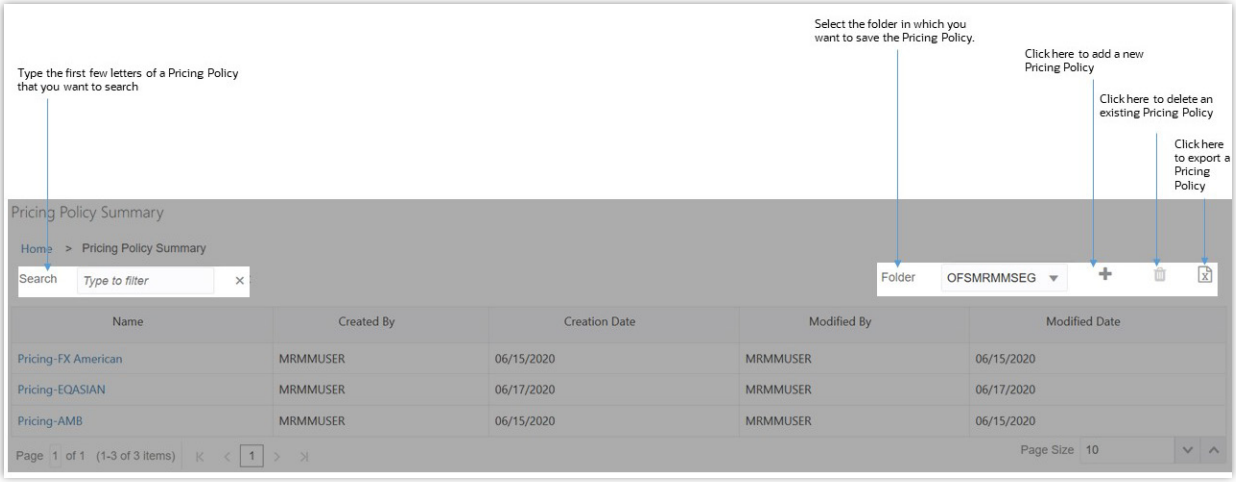
The Define option allows you to select the models and methods at the granularity level of Instrument Type and Currency. The pricing policy of an instrument can be defined based on the instruments considered for valuation. You can select the models and methods for the corresponding Instrument type and Currency.

3.6.1 Navigate to the Pricing Policy Summary Window

From the **MRMM Home** page, select **Market Risk Measurement and Management**, click **Navigation Menu**  , select **Library**, and then select **Pricing Policy**.

In the **Pricing Policy Summary** window, click **Add**  to create a new pricing policy. The **Pricing Policy Definition** window is displayed. See the Common UI Elements section for details on tasks such as view, search, copy, delete, export, approve, reject, and page view options.

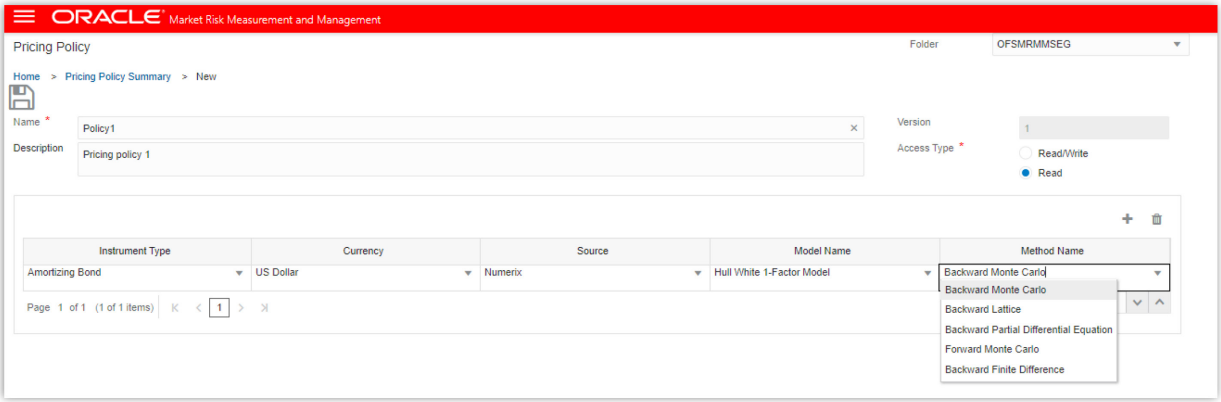
Figure 18: Pricing Policy Summary Window



3.6.2 Define a Pricing Policy

You can define a new Pricing Policy in the **Pricing Policy Definition** window.

Figure 19: Pricing Policy Definition Window



To define a pricing policy, follow these steps:

1. In the **Pricing Policy Definition** window populate the details mentioned in the following table. Fields marked in red asterisk (*) are mandatory.

Table 12: Pricing Policy Definition – Fields and Descriptions

Fields	Description
Name*	Enter the pricing policy name.
Description	Enter a short description for the pricing policy.
Folder	Select the folder in which you want to save the policy.
Access Type*	Specify whether the policy is Read-Only/Read-Write.
Version	Displays the workflow version.

2. Click **Add** , and select the **Instrument Type**, **Currency**, **Source**, **Model Name**, and **Method Name**. You can create multiple entries in a pricing policy.

   NOTE Release 8.1 supports only Numerix as the Source.

3. Click to delete any entry from the table.
4. Click **Save** . A confirmation dialog box is displayed.
5. Click **OK**. The pricing policy is defined and displayed in the **Pricing Policy Summary** window.

3.7 Bucket Definition

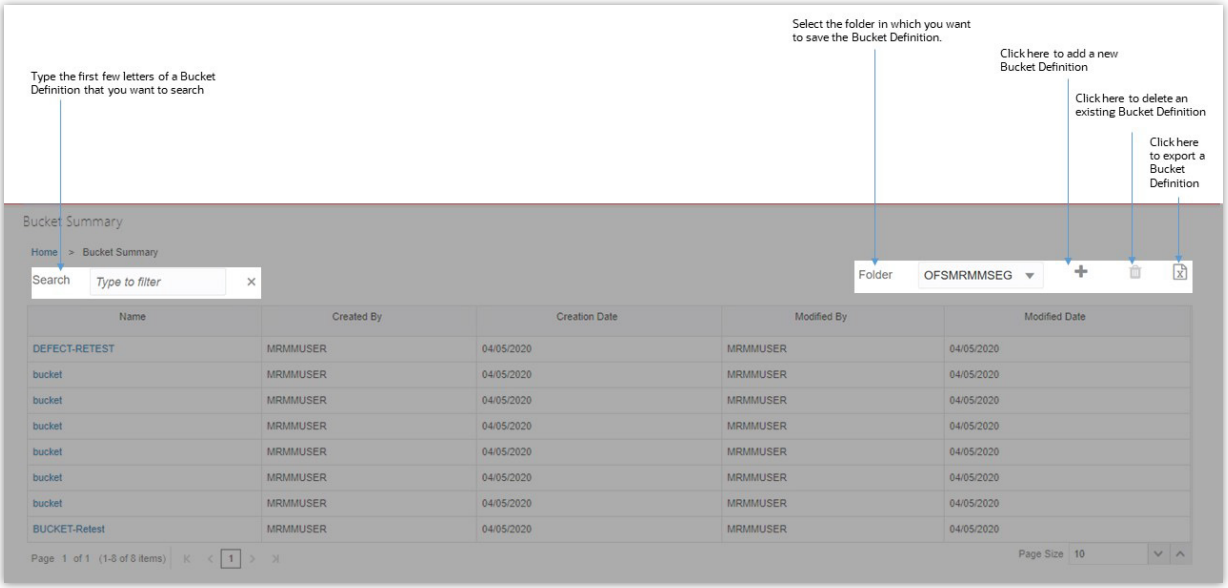
FRTB guidelines allow the banks to define risk buckets based on the group of risk factors with similar characteristics. A bucket can be defined as a set of risk factors that are grouped together by common characteristics.

3.7.1 Navigate to the Bucket Summary Window

From the **MRMM Home** page, select **Market Risk Measurement and Management**, click **Navigation Menu** , select **Library**, and then select **Bucket Definition**.

In the **Bucket Summary** window, click **Add** to create a new bucket definition. The **Bucket Definition** window is displayed. See the Common UI Elements section for details on tasks such as view, search, copy, delete, export, approve, reject, and page view options.

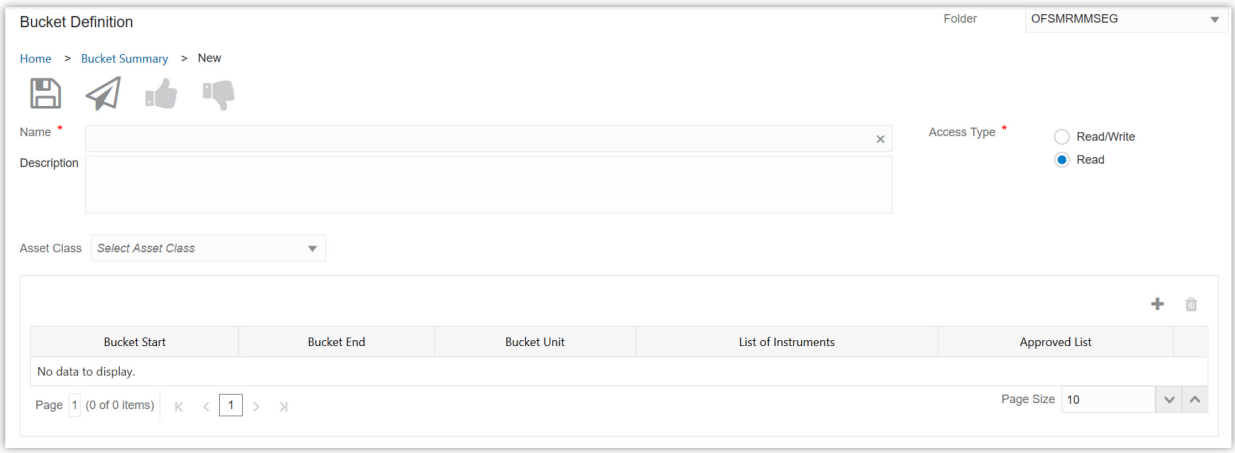
Figure 20: Bucket Summary Window



3.7.2 Define a Bucket

You can define a new bucket in the **Bucket Definition** window.

Figure 21: Bucket Definition Window



To define a new bucket, follow these steps:

1. In the **Bucket Definition** window, populate the details mentioned in the following table. Fields marked in red asterisk (*) are mandatory.

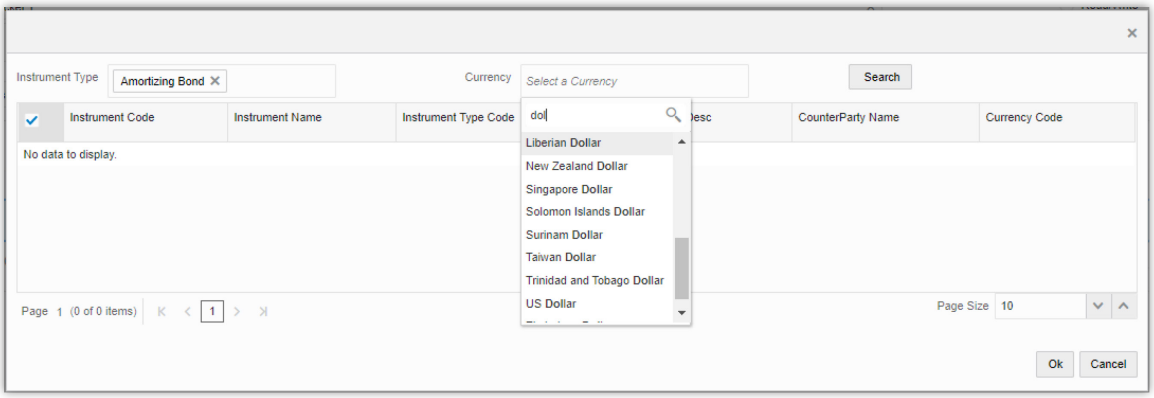
   Table 13: Bucket Definition: Fields and Descriptions

Fields	Description
Name*	Enter the bucket name.
Description	Enter a short description for the bucket.
Folder	Select the folder in which you want to save the bucket.
Access Type*	Specify whether the bucket is Read-Only/Read-Write.
Version	Displays the workflow version.

2. Select the **Asset Class** from the drop-down list.
3. Click **Add** , and specify details for fields **Bucket Start** and **Bucket End.** Enter numeric values in these fields.
4. Specify the **Bucket Unit** in terms of Day, Month, or Year. Select the relevant option from the drop-down list.
5. Click **Filter** to add instruments in the **List of Instruments** column**.** All the instruments that the bank has exposure such as Bonds, Equity, and so on, must be added here. The List of Instruments column is updated after the Bucket definition is saved.

   The following window is displayed. You can create multiple entries in a definition.

Figure 22: Add Instruments in the Bucket Definition



6. Specify the **Instrument Type** and **Currency** and click **Search**. The results get listed in the columns **Instrument Code**, **Instrument Name**, **Instrument Type Code**, **Instrument Type Desc, Counterparty Name**, and **Currency Code**. Click **OK**.
7. The Approved List column is updated after the bucket definition is approved.
8. Click **Submit** to save and submit the bucket for approval. A confirmation dialog box is displayed.

   Or,

   Click **Save** to update the bucket before submitting it for approval. A confirmation dialog box is displayed. After Save the Bucket Start, Bucket End and Bucket Unit fields become uneditable.
9. Click **OK.** The bucket is defined and displayed in the summary page.

3.7.3 Approve or Reject a Bucket Definition

To approve or reject a bucket definition, follow these steps:

1. Select the bucket definition from the **Bucket Definition Summary** window. The **Bucket Definition** window is displayed.
2. Click **Edit** .
3. Click **Approve** or **Reject** .

The respective message is displayed. Approved bucket definitions cannot be edited.

3.8 Hybrid Model

Hybrid model is a combination of models used to price multi-asset class deals. The Monte Carlo technique used for Counterparty Risk calculation requires a global hybrid model to be constructed and used for the exposure calculation of each trade. The hybrid model is composed of a set of component models, for which parameters, correlation values, and calibration strategies must be defined.

Rule within a hybrid model defines a pattern that is used to match the name of the underlyings specified by the trades. If a rule's pattern matches the name of an underlying, other attributes in the Rule element specify what type of model should be generated, and the parameters for that (such as calibration strategy, and primary or secondary selection). Multiple rules can match an underlying, since the same underlying can require multiple factor models.

3.8.1 Navigate to the Hybrid Model Window

From the **MRMM Home** page, select **Market Risk Measurement and Management**, click Navigation Menu , select **Library**, and then select **Hybrid Model**.

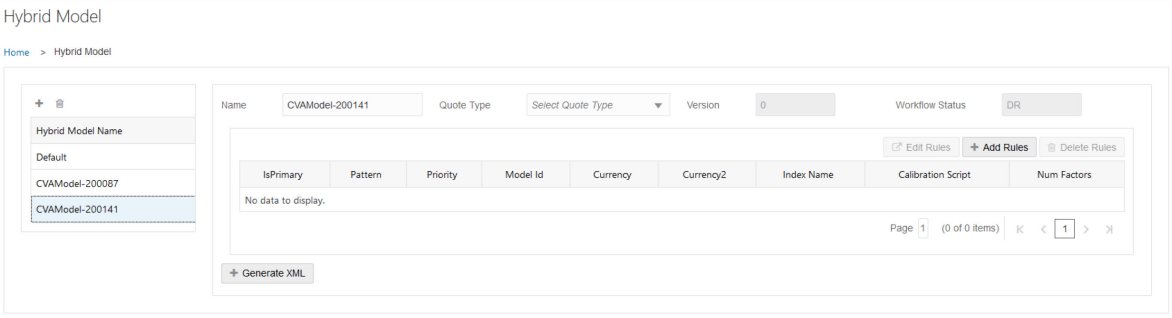
3.8.2 Adding a Hybrid Model

This section details the procedure for adding a hybrid model. The following table describes the fields in the Hybrid Model window:

To add a hybrid model, follow the below steps:

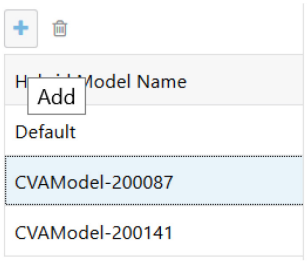
1. Navigate to the **Hybrid Model** window.

Figure 23 Hybrid Model Definition Screen



2. Click **Add** . A new model is created.

Figure 24 Hybrid Model Add



3. Select the new model. It is added in the definition pane. Populate the relevant details in the fields.

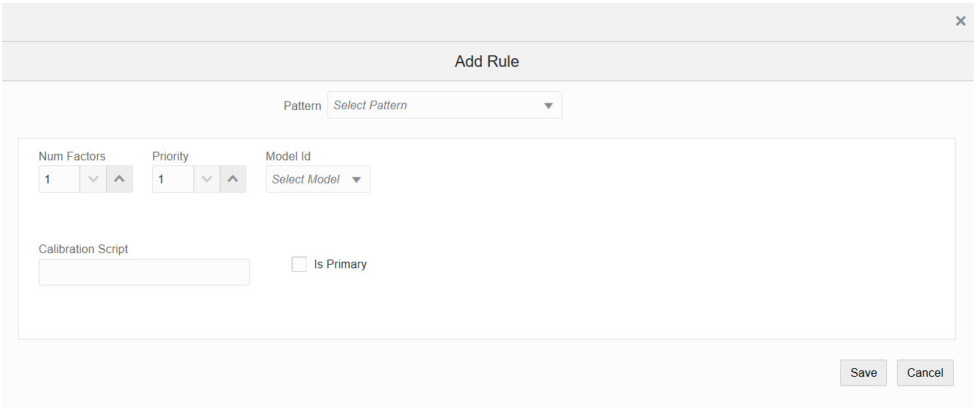
Table 14 Fields and their Descriptions in Hybrid Model Pane

Fields	Description
Fields marked in red asterisk(*) are mandatory	
Name*	The Hybrid Model name is displayed.
Quote Type	Correlation factors are found by looking in the market data, and this element notes how to form the full key of those correctly factor quote keys. Select any one value from available list – ASK, BID, FIX, LAST, MID Select the **Quote Type** from the drop-down list.

Fields	Description
Fields marked in red asterisk(*) are mandatory	
Version*	Displays the workflow version.
Workflow Status	Displays the status of the workflow.

4. Click **Add Rules** + Add Rules. The **Add Rule** Window is displayed.

Figure 25 Add Rule Window



a. Select the **Pattern** from the drop-down list. It defines a pattern with positional strings that is used to match the name of an underlying. This determines if the rule is applicable for a specific trade's underlying. If the pattern matches, the rule is used to generate one or more factor models in the output hybrid model setup. For example, "IR.<Currency>" will match any underlying with the pattern that it starts with the string "IR." and ends with some currency string. The positional strings are set with the specified name (or names), and will be substituted in the value of other attributes of the rule. Based on the selected Pattern, the fields are displayed. Enter the relevant details in the fields. The below table lists the mapping between pattern and fields displayed:

Table 15 Fields and their Descriptions in Add Rules Window

Pattern	Fields	Description
Common fields	Number Factor	The number of factors for the underlying component model, if it can be configured with multiple factors. Specify the Num Factor.
	Priority	It indicates the priority that is used when two or more pattern match the name of an underlying. Specify the Priority.
	Model ID	This field indicates the ID string of the model to be created for the single-factor model. It can refer to positional

Pattern	Fields	Description
		strings found when the Pattern was matched. For example, “IR.MODEL.HW1F.<Currency>" will be the string "IR.MODEL.HW1F.USD" if the previous example’s Pattern matched the underlying "IR.USD". Select the Model ID from the drop-down list.
	Is Primary	Set this to "true" or "false" to indicate if the generated model is a primary or secondary one. Secondary models are separate from other secondary models, and are only correlated with the primary models. Check the Is Primary check box, if applicable.
	Calibration Script	A Numerix Extension Library (NXEL) script function to call to generate the calibration instruments for the model
IR.Currency	Currency	Select the Currency.
FX.<Basecurrency>/<Termcurrency>	Base Currency	Select the Base Currency.
	Term Currency	Select the Term Currency.
CR.<Currency>-<ReferenceEntity>_<DebtType>_<RestructuringClause>	Currency	Select the Currency.
	Debt Type	Select the Debt Type.
	Reference Entity	Select the Reference Entity.
	Restructuring Clause	Select the Restructuring Clause.
EQ.<Currency>-<Exchange>-<Ticker>	Currency	Select the Currency.
	Exchange	Select the Exchange.
	Ticker	Select the Ticker.
CMDTY.<Currency>-<Exchange>-<Ticker>	Currency	Select the Currency.
	Exchange	Select the Exchange.
	Ticker	Select the Ticker.
CPI.<Currency>-<InflationIndex>	Currency	Select the Currency.
	Inflation Index	Select the Inflation Index.
RR.<Currency>-<InflationIndex>	Currency	Select the Currency.
	Inflation Index	Select the Inflation Index.

b. Click **Save**.

5. Click **Generate XML**. A message XML generation is Successful is displayed. This file is used while defining a business definition in Monte-Carlo simulation user interface, Hybrid Model Name field.

3.8.3 Edit a Hybrid Rule

You can edit all the fields in an XML if it is not used in any business definition.

3.8.4 Delete a Hybrid Rule

You can delete XMLs which are not used in any business definition.

4 Default Configurations

In this section you can specify the default parameters and characteristics to be used by the application during valuation. If the application fails to obtain values from trade, instrument, or other specific configurations, then it uses these default values.

Topics:

4.1 Navigate to the Default Configurations Window

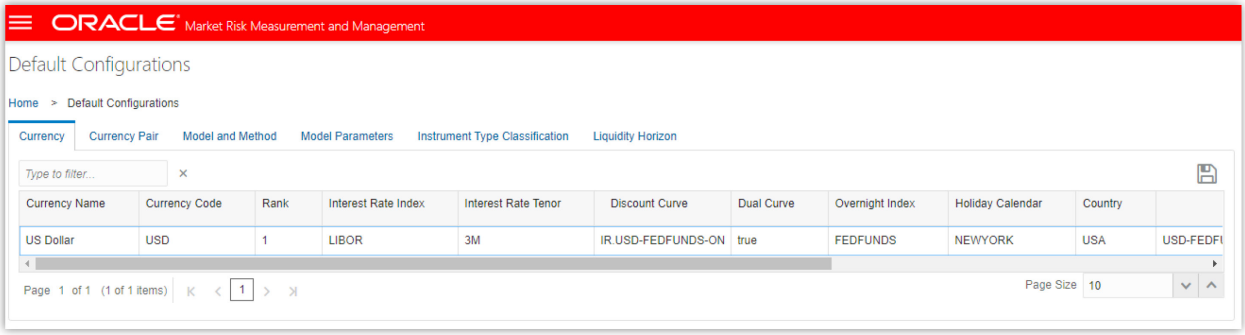
From the **MRMM Home** page, select **Market Risk Measurement and Management**, click **Navigation Menu**  , select **Default Configurations**.

4.2 Currency

In this window, you can define the default values at the granularity of currency. If you do not define the values at the instrument granularity, then the default values are used for processing. For each active currency, you can specify characteristics, such as:

- Currency Name
- Country Code
- Rank
- Interest Rate Index
- Interest Rate Tenor
- Discount Curve
- Dual Curve
- Overnight Index
- Holiday Calendar
- Country
- Allowed Yield Curves
- Bond Type
- Issuer

Figure 26: Default Configurations- Currency Window



The following table describes the fields in the Currency window.

Table 16: Default Configurations – Fields and Descriptions in Currency Window

Fields	Description
Currency Name	This field displays the list of all currencies which are available in currency dimensions.
Currency Code	This field displays the code of the selected currency.
Rank	Rank represents the contribution of currency in global foreign exchange market turnover. Higher the turnover, the higher the rank of currency. For example, USD is the most traded currency in the world and is assigned rank 1.
Interest Rate Index	Provide the default index rate associated with currency such as LIBOR, Euribor, and so on. It is the standard interest rate index or yield curve which is used for the pricing of a trading book instrument. For example, LIBOR for USD, MIBOR for INR.
Interest Rate Tenor	Select the default tenor for the given Interest Rate Index, such as 3M, 6M, and so on. It represents the term point of the interest rate index mentioned above. It is expressed as Tenor and unit of the term period. For example, 3 months term point is expressed as 3M.
Discount Curve	Select the default discounting curve associated with the currency. It is the default interest rate index or yield curve which is used to discount cash flows during the pricing of a trading book instrument. For example, USD-LIBOR-3M.
Dual curve	Specify True and False. This field indicates whether two separate indexes are used to construct a risk-free discount curve. For example: In the US market, OIS swaps with tenor greater than 2 years are not as liquid as Federal funds/LIBOR basis swaps, which are called Feds. Therefore, overnight index swaps are usually used to construct the first two years of the risk-free discount curve, while Fed funds/LIBOR basis swaps with maturities of 3-30 years are used to build the longer end of the curve.
Overnight Index	It is the interest rate index/curve that is designated as the overnight rate for the selected currency. For example, SONIA for GBP and EONI for EUR.
Holiday Calendar	Specify the default holiday calendar to be used for the corresponding currency. It indicates the default calendar which will be used to price any instrument denominated in the selected currency.
Country	This indicates the country code of the currency.

Fields	Description
Allowed Yield Curve	This is the list of all interest rate curves which are allowed to be used by the application. For a specific currency, all the possible interest rate index or yield curves that the application can use are stored here.
Bond Type	This indicates the type of bond.
Issue	This indicates the issuer of the bond.

In this window you can only update the information for the seeded Currencies. See Rate Management - Currencies section, for steps to add a new currency. To update Currency, follow these steps:

1. Select the currency row that needs to be updated, and enter the details for **Rank**, **Interest Rate Index**, **Interest Rate Tenor**, **Discount Curve**, **Dual Curve**, **Overnight Index**, **Holiday Calendar**, **Country, Allowed Yield Curve, Bond Type, and Issuer.**

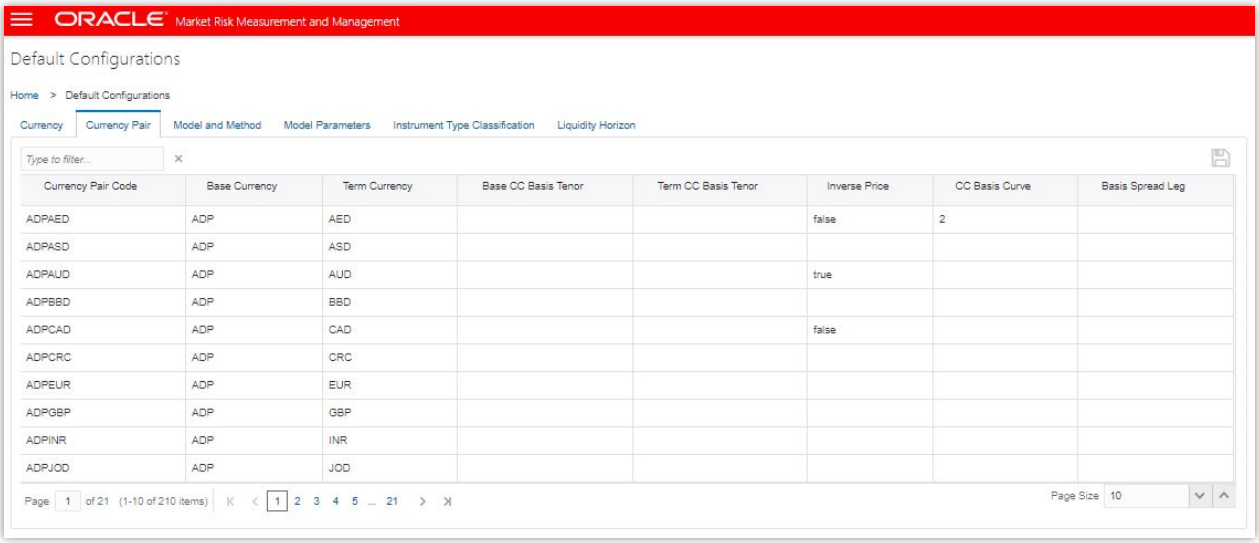
> **NOTE** Use the **F2** key, or click on any other row to come out of **Edit** mode in a table, before updating or navigating to a different tab.

2. Click **Save** . The Currency values are saved.

4.3 Currency Pair

The Currency Pair window enables you to provide default values at the granularity of the currency pair. This is used for the pricing of cross-currency instruments. If you do not define the values at the instrument granularity, then the default seeded values are used for processing.

Figure 27: Default Configurations – Currency Pair Window



The following table describes the fields in the Currency Pair window.

Table 17: Default Configurations – Fields and Descriptions in Currency Pair Window

Fields	Description
Currency Pair Code	A currency pair is the quotation and pricing structure of the currencies traded in the market.
Base Currency	The first listed currency in currency pair is called the base currency.
Term Currency	The second listed currency in currency pair is called the term currency.
Base CC Basis Tenor	Specify the tenor of the interest rate index of the base currency. This is represented as a tenor and tenor unit. For example, 3M.
Term CC Basis Tenor	The tenor of interest rate index of term currency. This is represented as a tenor and tenor unit. For example, 3M.
Inverse Price	This is an indicator field with values as TRUE or FALSE. The value TRUE allows the usage of the inverse price of currency pair with preference to direct price, FALSE will use only direct price.
CC Basis Curve	Select the default currency basis curve to be used for the corresponding currency pair. Example: AUD-LIBOR-3M/USD-LIBOR-3M.
Basis Spread Leg	Specify the currency (from currency pair) which should be used as basis spread leg. For example, AUD.

To define the currency pair, follow these steps:

1. Select the Currency Pair Code row that needs to be updated and enter the details for **Base CC Basis Tenor**, **Term CC Basis Tenor**, **Inverse Price**, **CC Basis Curve**, **and Basis Spread Leg**.

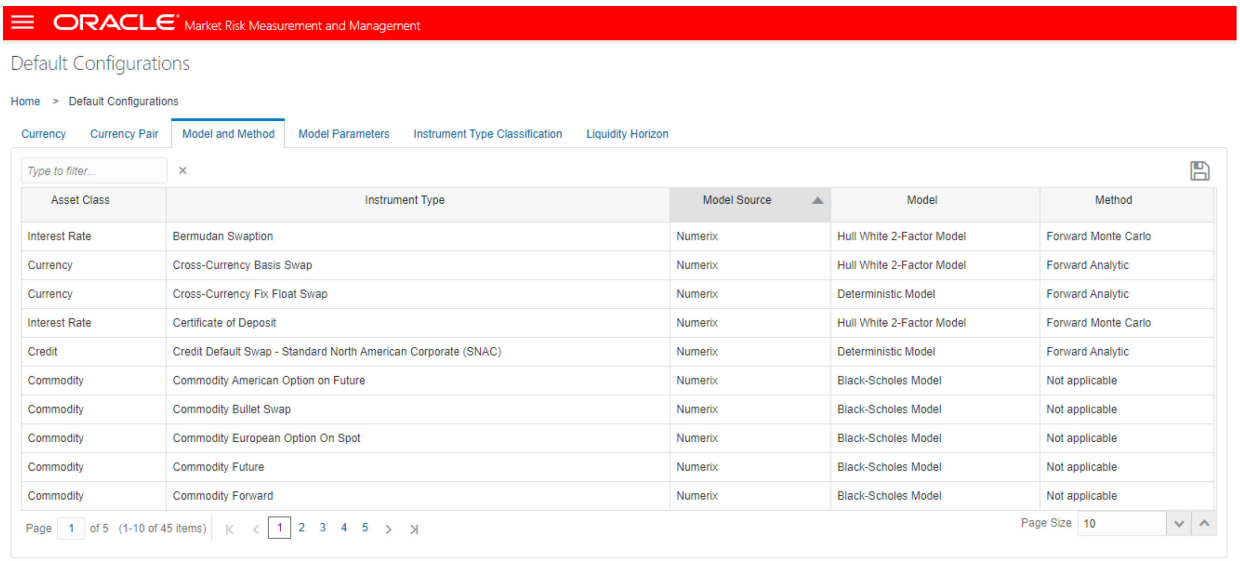
> **NOTE** Use the **F2** key, or click on any other row to come out of Edit mode in a table, before updating or navigating to a different tab.

2. Click **Save**  . The currency pair values are updated.

4.4 Model and Method

For a specific instrument type, you can select models and methods that will be used to price the instruments. Values defined in this window are used if the models and methods are not provided as input with data, or if you have not provided value in the pricing policy in the business definitions of Instrument Valuation, or VaR components. Default models and methods are specified at the granularity of instrument type.

Figure 28: Default Configurations – Model and Method Window



The following table describes the fields in the Model and Method window.

Table 18: Default Configurations – Fields and Descriptions in Models and Method Window

Fields	Description
Asset Class	Displays the asset class (Interest Rate, Equity, Commodity, and so on) of instrument type for which models and methods need to be defined.
Model Source	Displays the source of the Model. It is Numerix by default.
Instrument Type	Displays the instrument types.
Model	Select the model to be used for the specific instrument type from the drop-down list.
Method	Select the method to be used for the selected model from the drop-down list.

To define the default model and methods, follow these steps:

1. Select the instrument type row to be updated.
2. Select the **Model** and the **Method** from the drop-down list.

> **NOTE** Use the **F2** key, or click on any other row to come out of **Edit** mode in a table, before updating or navigating to a different tab.

3. Click **Save** . Each instrument type is mapped to one of the asset class and its value is displayed.

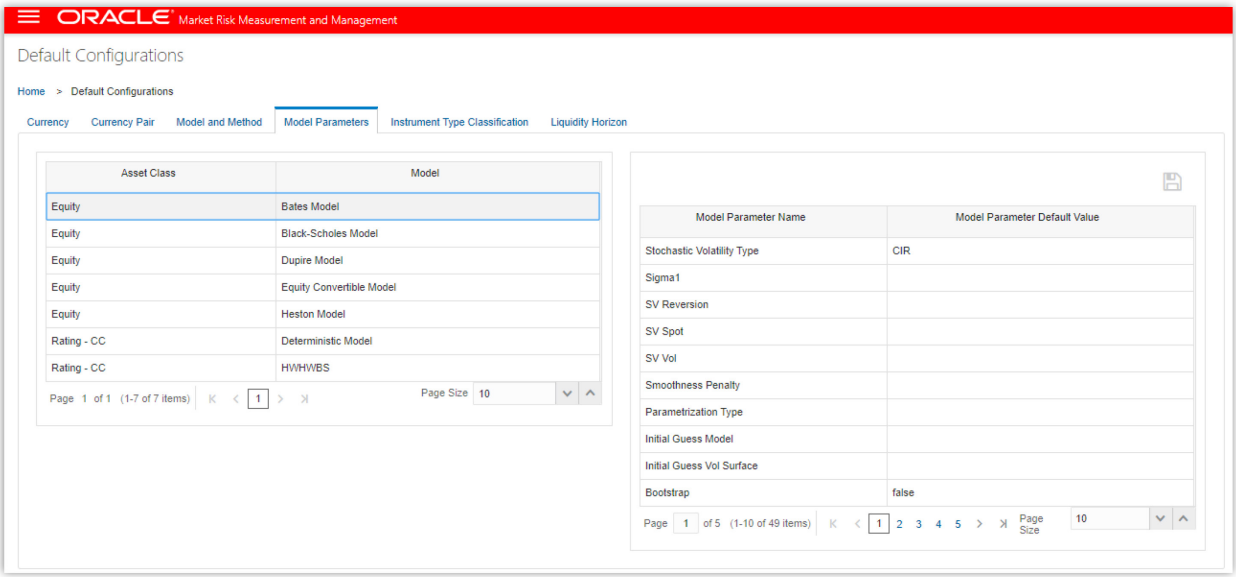
> **NOTE** Model and Methods to be selected for a specific instrument type is limited to the models that are applicable to the corresponding asset class. See Annexure E: List of Models and Methods for details.

4.5 Model Parameters

You can define parameters for models that are used for pricing and calibration. Default model parameters are specified for each model used in the MRMM application.

The model table displays the asset classes and their corresponding models. Each model has a specific list of inputs that are required. Input for each model is integrated with the instrument parameters. For example, the currency is integrated with market data used such as volatility parameters for some of the instrument types. You can define the default value for such parameters in this window. In a scenario where data for the parameter is missing, the values assigned to the model parameter is used, while pricing the instrument with the corresponding model.

Figure 29: Default Configurations: Model Parameters Window



The following table describes the fields in the Model Parameters window.

Table 19: Default Configurations – Fields and Descriptions in Model Parameter Window

Fields	Description
Asset Class	Displays the type of asset for which model and method needs to be defined.
Model	Displays the model name.
Model Parameter Name	Displays the model parameters associated with the selected model.
Model Parameter Default Value	Specify a value for the model parameter.

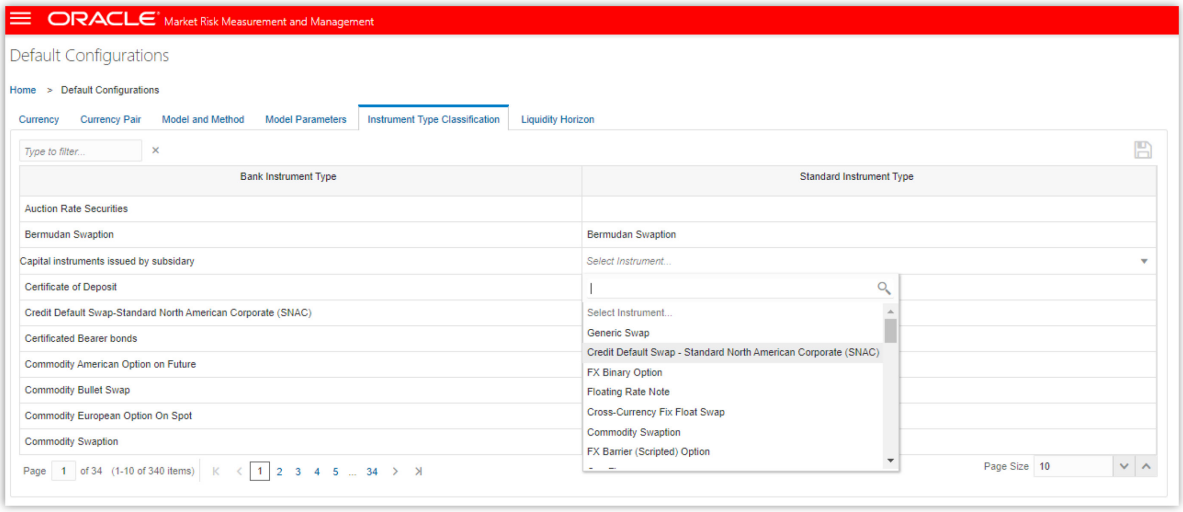
To define the default model parameter value, follow these steps:

1. Select the model for which model parameter values should be updated. When you select a model, then all the parameters associated with the model are displayed in the model parameter table on the Right-Hand Side (RHS) of the window. Enter the default model parameter value against each model parameter. In this table you can either provide any default value or choose to leave it blank.
2. Click **Save** . The updated values are displayed.

4.6 Instrument Type Classification

The configuration and processing in OFS Market Risk Measurement and Management is primarily based on the instrument type. The list of instrument types and their names generally differ for each financial institution. The table in the Instrument Type Classification window allows you to map the instrument type as per the financial institution, and the standard instrument type names used in the MRMM application.

Figure 30: Default Configuration – Instrument Type Classification Window



The following table describes the fields in the Instrument Type Classification window.

Table 20: Default Configurations – Fields and Descriptions in Instrument Type Classification Window

Fields	Description
Bank Instrument Type	The instrument type name as specified in the instrument type dimension.
Standard Instrument Type	The instrument type name as used by the MRMM application. Select the Standard Instrument Type from the drop-down list.

To select the standard instrument type for a specific bank instrument, follow these steps:

1. Click any **Bank Instrument Type**. Select the **Standard Instrument Type** from the drop-down list on the RHS column.

> **NOTE** Use the **F2** key, or click on any other row to come out of **Edit** mode in a table, before updating or navigating to a different tab.

2. Click **Save** . The mapping is saved.

4.7 Liquidity Horizon

OFS MRMM incorporates the risk of market liquidity, by varying the liquidity horizons for calculating regulatory Expected Shortfall. This enables you to mitigate the risk of a sudden, and severe impairment of market liquidity across asset markets. The Liquidity horizon for each risk factor category is specified through the MRMM User Interface (UI) either at a global level or individually for each trading desk and portfolio. The default values applied by the application are as per Basel regulation (Reference: BCBS document d352).

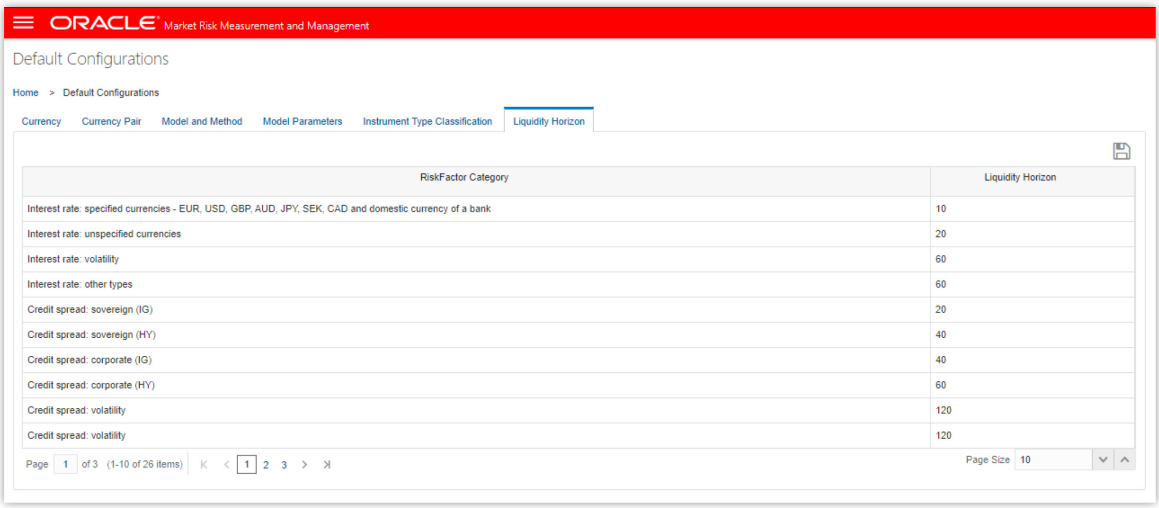
The Liquidity Horizon window provides a mapping between the risk factor category and the values associated with each category. The following figure lists the default liquidity horizon values as per Basel regulation (Reference: BCBS document d352).

> **NOTE** Release 8.1 does not support defining the Liquidity Horizon. It is available as a download for FRTB computations.

Figure 31: Risk Factor Category and Associated Value

Risk factor category	*n*	Risk factor category	*n*
Interest rate: specified currencies - EUR, USD, GBP, AUD, JPY, SEK, CAD and domestic currency of a bank	10	Equity price (small cap): volatility	60
Interest rate: – unspecified currencies	20	Equity: other types	60
Interest rate: volatility	60	FX rate: specified currency pairs[37]	10
Interest rate: other types	60	FX rate: currency pairs	20
Credit spread: sovereign (IG)	20	FX: volatility	40
Credit spread: sovereign (HY)	40	FX: other types	40
Credit spread: corporate (IG)	40	Energy and carbon emissions trading price	20
Credit spread: corporate (HY)	60	Precious metals and non-ferrous metals price	20
Credit spread: volatility	120	Other commodities price	60
Credit spread: other types	120	Energy and carbon emissions trading price: volatility	60
		Precious metals and non-ferrous metals price: volatility	60
Equity price (large cap)	10	Other commodities price: volatility	120
Equity price (small cap)	20	Commodity: other types	120
Equity price (large cap): volatility	20		

Figure 32: Default Configuration: Liquidity Horizon Window



The liquidity horizon can be defined for each portfolio and trading desk individually. To assign a risk factor value to each risk factor category, follow these steps:

1. Select any **Risk Factor Category** and update the Liquidity Horizon or risk factor value.

> **NOTE** Use the **F2** key, or click any other row to come out of **Edit** mode in a table, before updating or navigating to a different tab.

2. Click **Save** . If the Risk Factor values are not defined for any Liquidity Horizon or are partially defined, then the application considers default values for those items.

5 Dimension and Hierarchy Configuration

You can select dimensions from the available list to create a portfolio and decide the aggregation of results such as Value at Risk (VaR). For every selected dimension you must select a hierarchy that will be used to select members to define a trading book portfolio. The dimensions are pre-seeded in the application. You must create at least one hierarchy for all the dimensions that you intend to use in portfolio definition. For steps to create a hierarchy, see OFS Advanced Analytics Infrastructure User Guide on OHC Documentation Library.

5.1 Navigate to the Dimensions and Hierarchy Window

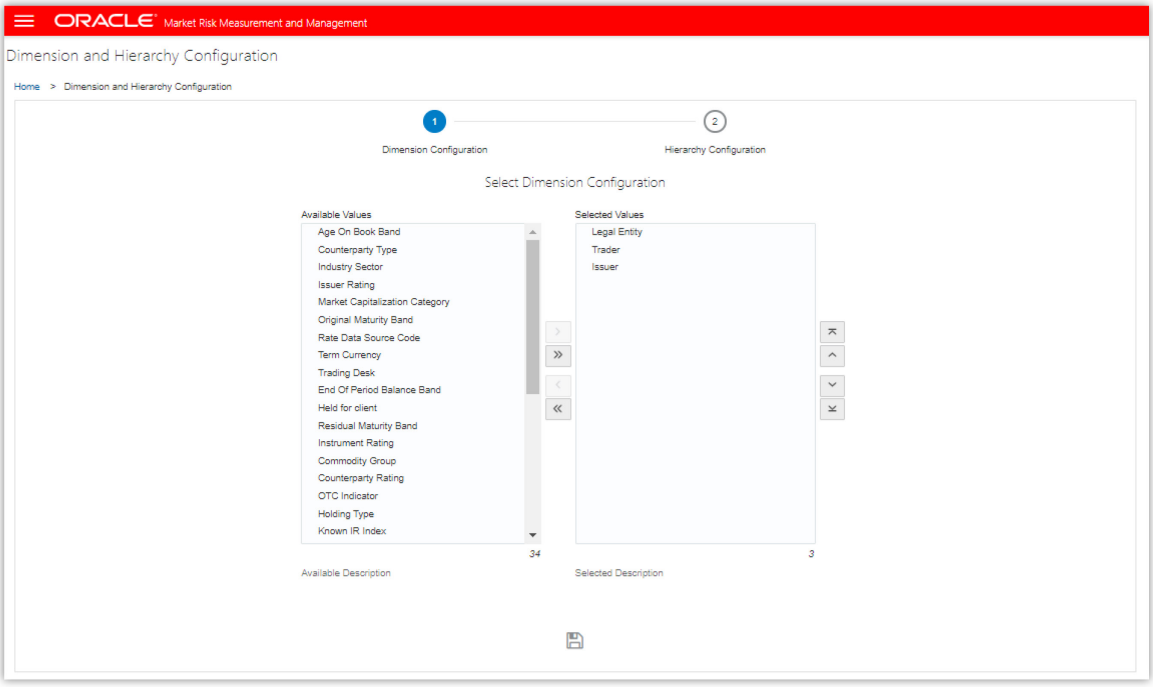
From the **MRMM Home** page, select **Market Risk Measurement and Management**, click **Navigation Menu**, select **Dimension and Hierarchy Configuration**.

In this window, you can configure the Dimensions and Hierarchies.

5.2 Configure Dimensions

This window enables you to select one or multiple dimensions from the available list of dimensions.

Figure 33: Configuring Dimensions



The following table describes the fields in the Dimension and Hierarchy Configuration window.

Table 21: Dimension Configuration – Fields and Descriptions

Fields	Description
Available Values	Displays the list of available dimensions.
Selected Values	Displays the list of selected dimensions.

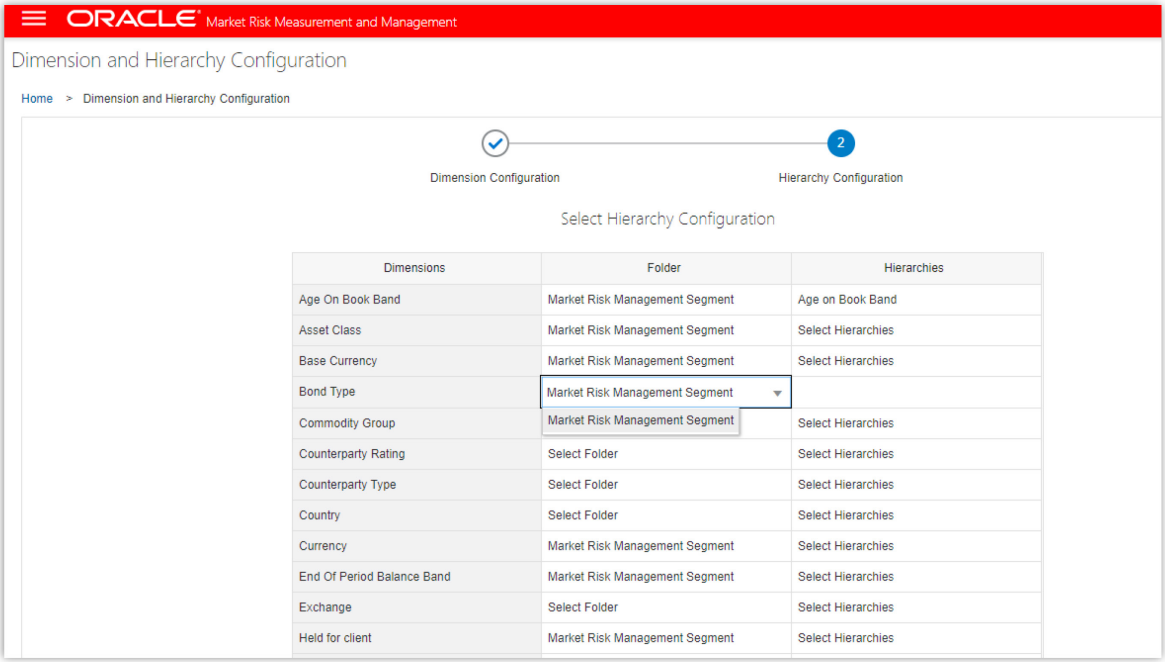
To configure dimensions, follow these steps:

1. To add the dimensions, select the dimension from the **Available Values** and add to the list of **Selected Values** by using **Move** . To select multiple values, use **Ctrl** or **Shift** key. To select all the Available Values, use **Move All** . To remove any selected value from the list use, **Remove** . To remove all the selected values use **Remove All** .
2. Click **Save** to update the selected dimensions list. The selected dimensions are populated in the Dimension and Hierarchy Configuration window.

5.3 Configuring Hierarchies

This window enables you to update one hierarchy each for the selected dimensions.

Figure 34: Configuring Hierarchies



The following table describes the fields in the Dimension and Hierarchy Configuration window.

Table 22: Configuring Hierarchies – Fields and Descriptions

Fields	Description
Dimensions	Displays name of the dimension selected in Dimension Configuration.
Folder	Select the folder from the drop-down list where the hierarchy has been defined.
Hierarchies	Select the Hierarchy.

To configure a hierarchy, follow these steps:

1. In the **Dimension and Hierarchy Configuration** window, select **Hierarchy Configuration**.
2. Update the **Folder** and **Hierarchies** fields.

3. Click **Save**  . The configured hierarchies are used to define portfolios.

6 Instrument Valuation

OFS MRMM Instrument Valuation module enables you to create and analyze different perspectives of viewing the valuation of instruments. This section details the instrument granularity computations and metrics using NUMERIX including the price computation of instruments in the portfolio. This module addresses the requirements of both regulatory reporting and internal risk management. You can perform the valuation of instruments and positions in the trading book using pre-defined models and methods based on the trading desk and/or portfolio. The following computations are provided in this module:

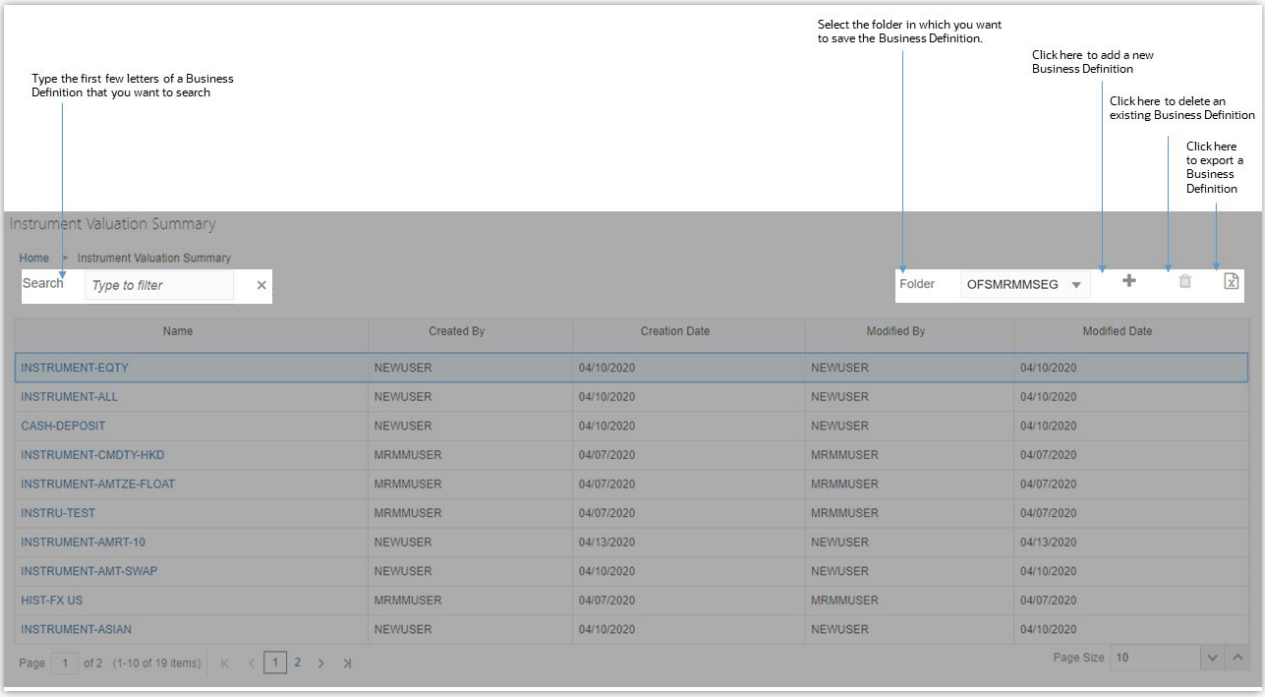
- The present value of the instrument
- The cash flow of the instrument
- Greeks and sensitivity associated with the instrument
- Yield Risk report of the instrument

Topics:

6.1 Navigate to the Instrument Valuation Summary Window

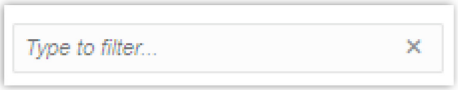
From the **MRMM Home** page, select **Market Risk Measurement and Management**, click **Navigation Menu**, select **Instrument Valuation**.

Figure 35: Instrument Valuation Summary Page



6.2 Search for an Instrument Valuation Definition

Figure 36: Instrument Valuation Summary Window – Search Field



In the **Search** field, type the first few letters of the business definition name that you want to search. The summaries whose names consist of your search string are displayed in a tabular format.

From the breadcrumb on top, click the **Instrument Valuation Summary** link to return to the summary window after viewing details of the business definition.

6.3 Page View Options

The page view option details are provided in this section.

Figure 37: Page Size Field

Enter the number of entries to be viewed on a single page in the Page Size field on the bottom. You can increase or decrease the number of entries to view, using the up and down arrows.

Figure 38: Page Navigation

To navigate easily use the **First Page**, **Previous Page**, **Next Page** or **Last Page** buttons in the View bar.

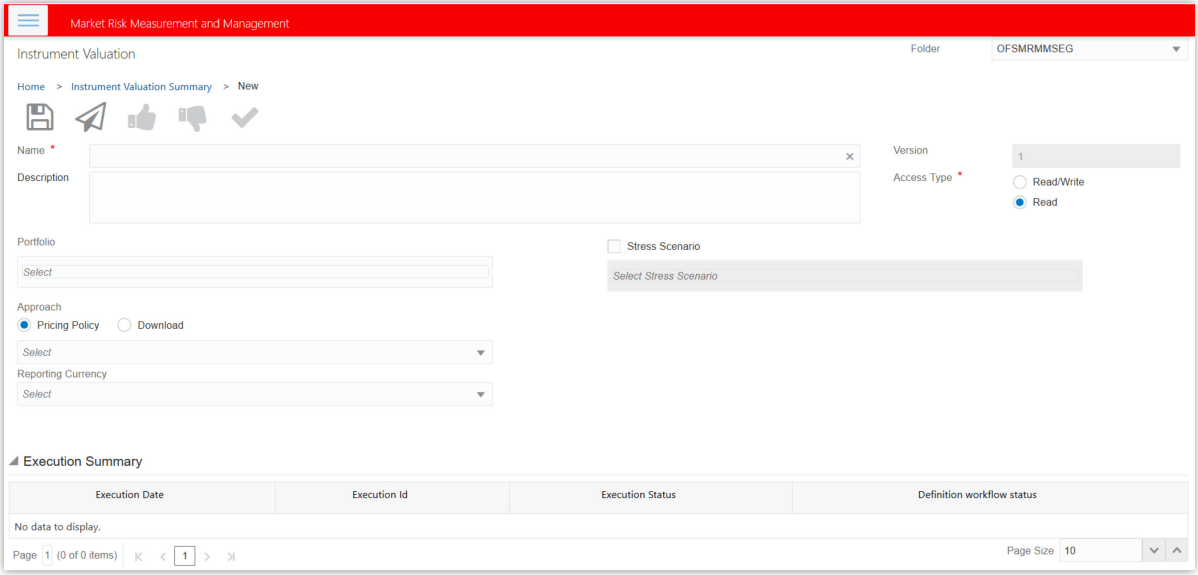
To navigate to the desired page, type a different page number in the View bar control, and press Enter.

6.4 Create and Execute a Business Definition

To define a new Instrument Valuation - business definition, follow these steps:

1. In the **Instrument Valuation Summary** window, click **Add** . The definition window is displayed.

Figure 39: Instrument Valuation Definition Window



2. Populate the details mentioned in the following table. Fields marked in red asterisk (*) are mandatory.

Table 23: Instrument Valuation Definition Window – Fields and Descriptions

Fields	Description
Name*	Enter the name of the business definition.
Description	Provide a description of the business definition.
Folder	Select the folder where the definition should be created
Version	Displays the workflow version of the business definition.
Access Type*	Specify the access type for the Business Definition, whether it is Read-Only or Read-Write

Fields	Description
Portfolio	Select the portfolio from the drop-down list. You can add multiple portfolios.
Pricing Policy Approach	You can either download or define the pricing policy • **Download**: If you select the Download option, then with all the corresponding instrument data, you will need to provide the models and methods to be used for pricing. In the case of some instrument data the download values have not been provided, then default models will be used for pricing. • **Pricing Policy**: Select the pricing policy from the drop-down list.
Reporting Currency	The currency in which all the output for a given definition will be computed. Select the currency type from the drop-down list.
Stress Scenario	Select the scenario to be executed. You can add multiple scenarios. If you do not select any stress scenario, the baseline scenario is added by default.
Execution Summary	Displays the execution history of the business scenarios. Select the execution to be marked as EOD execution.

3. Click **Submit** to save and submit the definition for approval. A confirmation dialog box is displayed.

   Or,

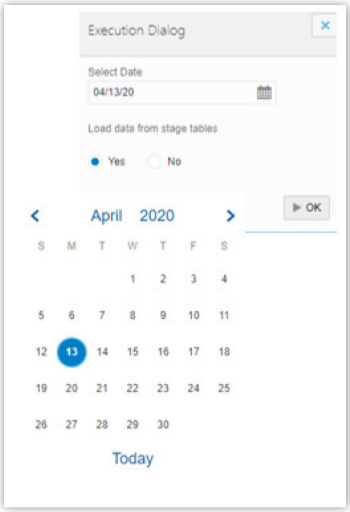
   Click **Save** to update the definition before submitting it for approval.
4. If you want to execute the business definition, follow the steps in the Execute a Business Definition section.
5. **Execution Summary** displays the execution history of the business scenarios. Select the execution to be marked as EOD execution. You can view details of the execution, such as **Execution Date**, **Execution ID**, **Execution Status,** and **Definition Workflow Status** in the **Execution Summary** table.
6. The definition can be viewed in the summary window. They are further used for in the analytics to generate reports.

6.4.1 Execute a Business Definition

To execute a business definition, follow these steps:

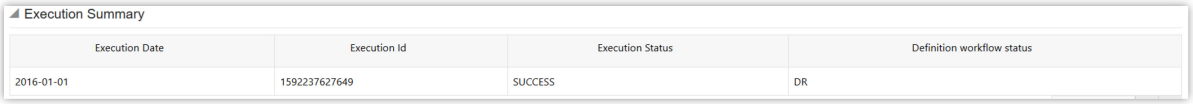
1. Click the business definition name in the Summary page. The definition window is displayed.
2. Click **Edit**.
3. Click **Execute** to trigger an Adhoc run. A pop-up message with a date-time editor is displayed.
4. Specify the date on which the execution must be performed.
5. If you want to load trade and market data from stage tables, select **Yes** in the field **Load Data From Stage Tables**, else select **No**. Click **OK** (▶ OK). The execution is triggered.

Figure 40: Instrument Valuation Execution - Date-Time Editor



6. Click **OK**. A confirmation dialog box is displayed.
7. Click **OK** to confirm.
8. You can view details of the execution, such as **Execution Date**, **Execution ID**, **Execution Status,** and **Definition Workflow Status** in the **Execution Summary** table.

Figure 41: Instrument Valuation-Execution Summary



6.5 Edit a Business Definition

To edit a business definition, follow these steps:

1. In the **Summary** window, click the name of the definition you want to edit.
2. Click **Edit** . All the fields become editable.
3. Edit the definition as required and click **Save** . A confirmation dialog box is displayed.
4. Click **OK**. The definition is updated in the summary window.

> **NOTE** You can only edit business definitions in draft stage.

6.6 Export a Business Definition

You can export a business definition at any point from the Summary window, for offline viewing. To export a business definition, select the definition name and click **Export** . The definition is exported as an XLS file and gets downloaded.

6.7 Approve or Reject a Business Definition

To approve or reject a business definition, follow these steps:

1. Select the business definition from the **Summary** window. The Definition window is displayed.
2. Click **Edit**  .
3. Click **Approve**  or **Reject**  . The respective confirmation message is displayed.
4. Click **OK**.

> **NOTE** You can only edit business definitions in the draft stage. Approved definitions cannot be edited.

6.8 Delete a Business Definition

You can delete a business definition at any point from the **Summary** window. To delete a business definition, follow these steps:

1. Select the definition name and click **Delete**  . A confirmation dialog box is displayed.
2. Click **OK** to delete the business definition.

7 Historical Simulation

This module primarily aims to measure the risk of your portfolio and (or) trading desk and deliver the portfolio granularity metrics using NUMERIX and historical simulation. MRMM Historical Simulation enables you to compute VaR, Expected Shortfall for regulatory and non-regulatory requirements, IMA capital charges, and addresses the requirements of both regulatory reporting and internal risk management, as per FTRB guidelines.

FRTB has dependency on the risk factors, liquidity horizon information and reduced set. You must provide the required information in the following tables as a download at the portfolio level:

- Liquidity Horizon - FSI_MR_RF_LIQ_HOR_CATEGORY
- Reduced Set Identification - FSI_MR_PORT_RISK_RED_RSK_FACTR

See the Download Specification for more details.

> **NOTE** Modellable and non-modellable risk factor identification is achieved through the RFET module.
>
> You must provide the stress period information as part of the FRTB definition in the Portfolio User Interface.

The module provides the following computation:

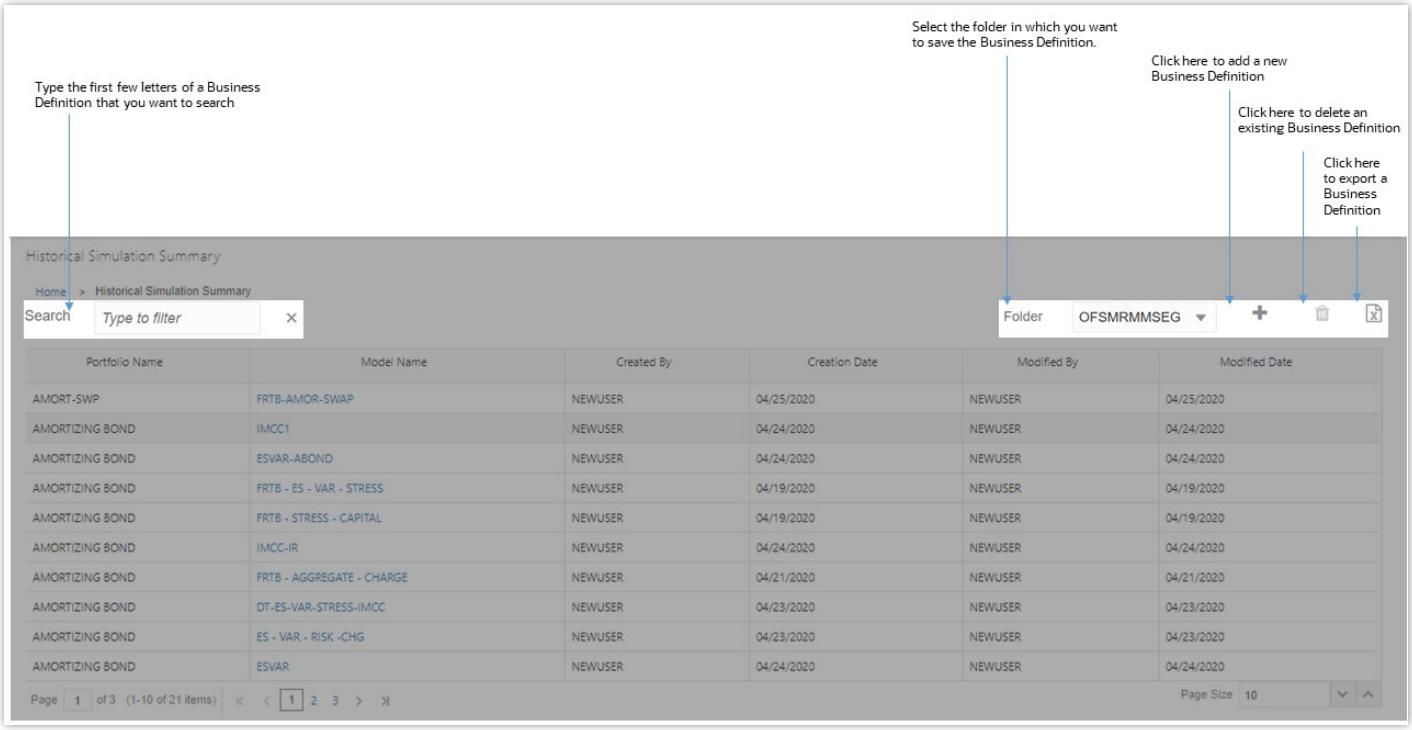
- ES and VaR
- Stress calibrated ES
- Internally modelled capital charge (IMCC)
- Stressed capital add-on
- Aggregated Charge

Topics:

7.1 Navigate to the Historical Simulation Summary Window

From the **MRMM Home** page, select **Market Risk Measurement and Management**, click **Navigation Menu**  , then click **Simulation** and select **Historical Simulation**.

Figure 42: Historical Simulation Summary Window



7.2 Search for a Business Definition

In the Search field, type the first few letters of the business definition name that you want to search. The summaries whose names consist of your search string are displayed in a tabular format.

Figure 43: Historical Simulation Summary Window – Search Box

From the breadcrumb on top, click the **Historical Simulation Summary** link to return to the summary window after viewing details of the business definition.

7.3 Page View Options

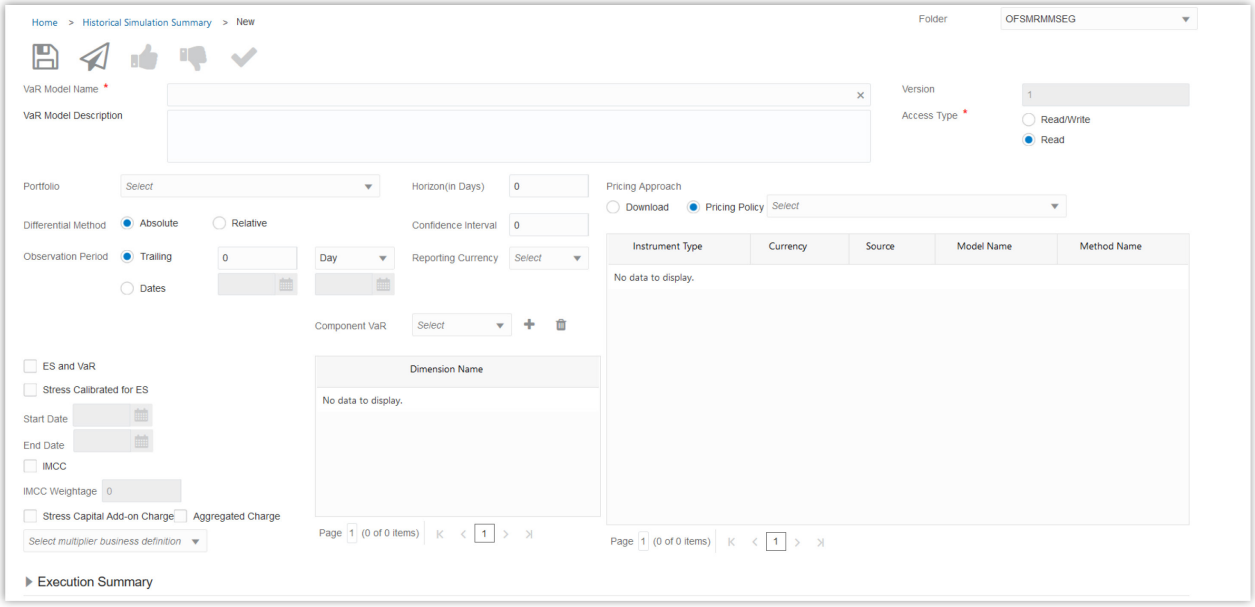
See the Page View Options section for details.

7.4 Create and Execute a New Business Definition

To define a new Historical Simulation - business definition, follow these steps:

1. In the **Historical Simulation Summary** window, click **Add** . The definition window is displayed.

Figure 44: Historical Simulation Definition Window



2. Populate the details mentioned in the following table. Fields marked in red asterisk (*) are mandatory.

Table 24: Historical Simulation Definition Window – Fields and Descriptions

Fields	Description
VaR Model Name*	Enter the name of the VaR model.
VaR Model Description	Provide a description of the VaR model.
Version	Displays the workflow version of the business definition.
Access Type*	Specify the access type.
Folder	Select the folder.
Portfolio	Select the Portfolio from the drop-down list.
Differential Method	Select the differential method whether **Absolute** or **Relative**. This is the interpolation method used for interpolating missing values in historical data. This parameter indicates how to construct the simulated market from the execution date's market. You can select Absolute, or Relative. The following formula explains the computation of scenario values under each method. $$Absolute\ difference\ = RF_t - RF_{t-1}$$ $$RF_{Scenario\ Value} = RF_{Execution\ date} + Absolute\ difference$$ $$Relative\ difference\ = (RF_t/RF_{t-1}) - 1$$ $$RF_{Scenario\ Value} = RF_{Execution\ date}\ (1 + Relative\ difference)$$ Where, RF is the risk factor, and t is the number of execution days.

Fields	Description
Observation Period	This is the current historical observation period to be considered for the computation of VaR. The current historical period starts from the execution date until the period specified in this column. The observation period is computed relative to the execution date. Specify the current observation period for computation of VaR, whether **Trailing** or **Dates.** • **Trailing**: Specify the number of Historical Days or Months or Years. • **Dates**: Specify the time period between which you want to compute the VaR. Select the From and To dates by using the Date-Time editor.
Horizon (in Days)	The time horizon over which you can compute the VaR number output. Specify the horizon in terms of days.
Confidence Interval	Confidence is the percentage value that you need to define the VaR numbers. Specify the confidence value required for calculating the output.
Reporting Currency*	The currency in which all the output for a given definition will be computed. Select the currency code from the drop-down list.
Output Metrics	Select the list of desired outputs. This section allows you to select the list of desired outputs mentioned below. The outputs are: • ES and VaR: Select this option to calculate the Expected Shortfall (ES) and Value at Risk (VaR) and Component VaR, using the current observation period. • Stress Calibrated for ES: Select this option to specify the stress window. If you choose to define the observation period, toggle the Identified Period button and provide the Observation Start Date and Observation End Date. • Internally Modelled Capital Charge: Select this option to specify the relative weight assigned to the firm's internal model. This output is required to compute Internally Modelled Capital Charge (IMCC). • Stress Capital Add-on Charge: Select this option to set the computation of stress scenario capital charge (SES) with execution. • Aggregated Charge: Select this option to set the computation of Aggregated Charge with execution. Computation of aggregated charge requires a multiplier. A multiplier is the number that is associated with the number of exceptions arrived in Model Validation. Select the business definition defined in the Model Validation module from the drop-down list, to add a multiplier. If not selected, the system will take 1.5 as the default value of the multiplier. For details on the computations, see Historical Simulation – Output Metrics

Fields	Description
Analyze By	You can select the dimensions for analyzing the VaR. Analyze by functionality enables you to view the VaR outputs at different granularity. For a selected dimension the application creates the tree structure of its nodes and provides the output. For Example, if you select Instrument Type in Analyze by at the time of Historical simulation run. If a portfolio has three instrument types such as Equity, Equity Forward, and Bonds. Then the application generates VaR numbers at following granularities: • VaR at Group level • VaR for underlying Account under the Node = "Bonds" • VaR for the underlying Equity Forward contracts under the node = "Equity Forward" • VaR for Equity contracts under the node = "Equity" To add dimensions, follow these steps: 1. Select dimensions for analyzing the VaR and ES numbers from the drop-down list. 2. Click **Add** . You can add multiple dimensions. 3. Click **Delete** to remove a dimension.
Pricing Approach	Select the models and methods to be used for instrument pricing. You can **Download** or Select a **Pricing Policy**. Once you select the Pricing Policy from the drop-down list, the details such as **Instrument Type**, **Currency**, **Source**, **Model Name,** and **Method Name** are populated in the table.
Execution Summary	Displays the execution history of the business scenarios. It displays details such as **Execution Date**, **Execution ID**, **Execution Status**, **Definition Workflow Status**, **EOD Execution**. Select the execution to be marked as EOD execution.

3. Click **Submit** to save and submit the definition for approval. A confirmation dialog box is displayed.

   Or,

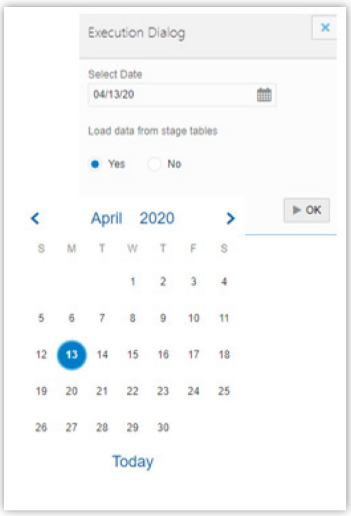
   Click **Save** to update the definition before submitting it for approval.
4. If you want to execute the business definition, follow the steps in the Execute a Business Definition section.
5. **Execution Summary** displays the execution history of the business scenarios. Select the execution to be marked as EOD execution. You can view details of the execution, such as **Execution Date**, **Execution ID**, **Execution Status,** and **Definition Workflow Status** in the **Execution Summary** table.
6. The definition can be viewed in the summary window. They are further used for in the analytics to generate reports.

7.4.1 Execute a Business Definition

To execute a business definition, follow these steps:

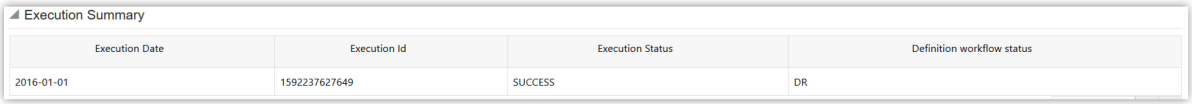
1. Click the business definition name in the Summary page. The definition window is displayed.
2. Click **Edit** .
3. Click **Execute** to trigger an Adhoc run. A pop-up message with a date-time editor is displayed.
4. Specify the date on which the execution must be performed.
5. If you want to load trade and market data from stage tables, select **Yes** in the field **Load Data From Stage Tables**, else select **No**. Click **OK** OK. The execution is triggered.

Figure 45: Historical Simulation Execution - Date-Time Editor



6. Click **OK**. A confirmation dialog box is displayed.
7. Click **OK** to confirm.
8. You can view details of the execution, such as **Execution Date**, **Execution ID**, **Execution Status,** and **Definition Workflow Status** in the **Execution Summary** table.

Figure 46: Historical Simulation-Execution Summary



7.5 Edit a Business Definition

See the Edit a Business Definition section for details.

7.6 Export a Business Definition

See the Export a Business Definition section for details.

7.7 Approve or Reject a Business Definition

See the Approve or Reject a Business Definition section for details.

7.8 Delete a Business Definition

See the Delete a Business Definition section for details.

8 Model Validation

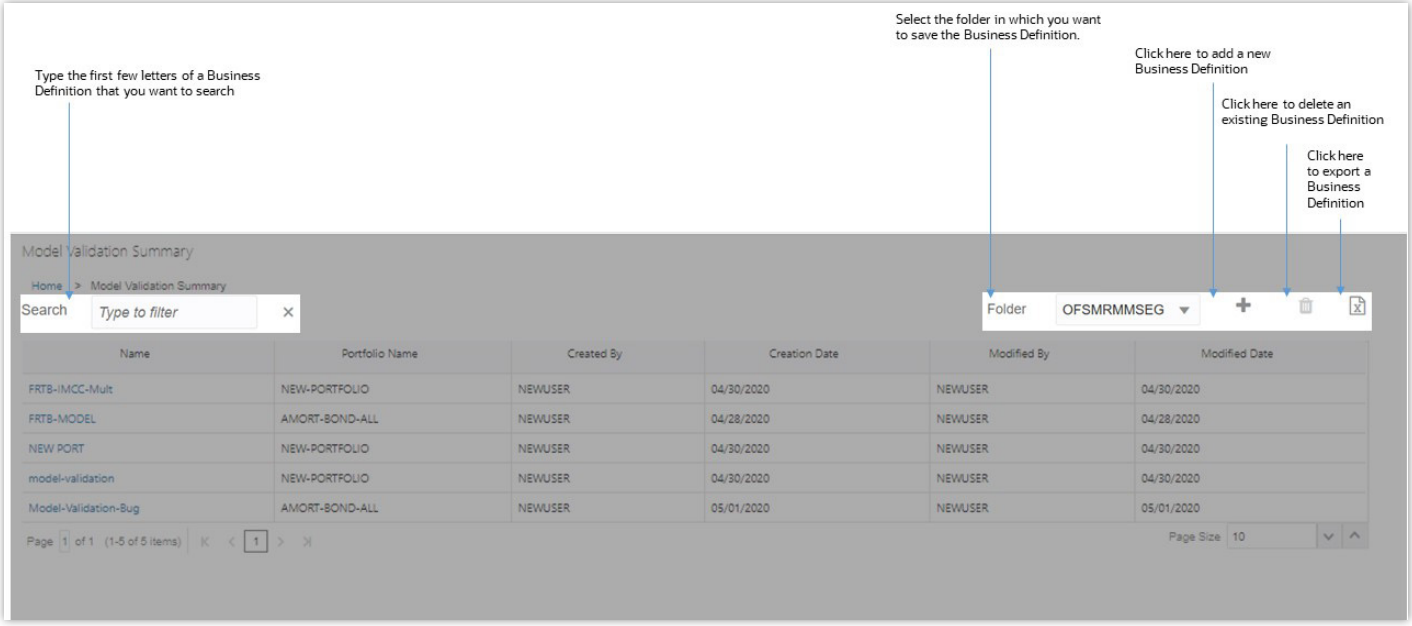
This module enables you to ensure that your models meet prescribed standards. OFS Market Risk Model Validation Module enables you to validate the historical VaR model. You can use Profit and Loss (P&L) attribution and back-testing to decide whether your trading desks are eligible to follow IMA capital requirements. The module provides computation Actual and Profit and Loss (P&L) attribution.

Topics:

8.1 Navigate to the Model Validation Summary window

From the **MRMM Home** page, select **Market Risk Measurement and Management**, click **Navigation Menu** , select **Model Validation**.

Figure 47: Model Validation Summary Window



8.2 Search for a Business Definition

In the Search field, type the first few letters of the business definition name that you want to search. The summaries whose names consist of your search string are displayed in a tabular format.

Figure 48: Model Validation Summary Window – Search Box

From the breadcrumb on top, click the **Model Validation Summary** link to return to the summary window after viewing details of the business definition.

8.3 Page View Options

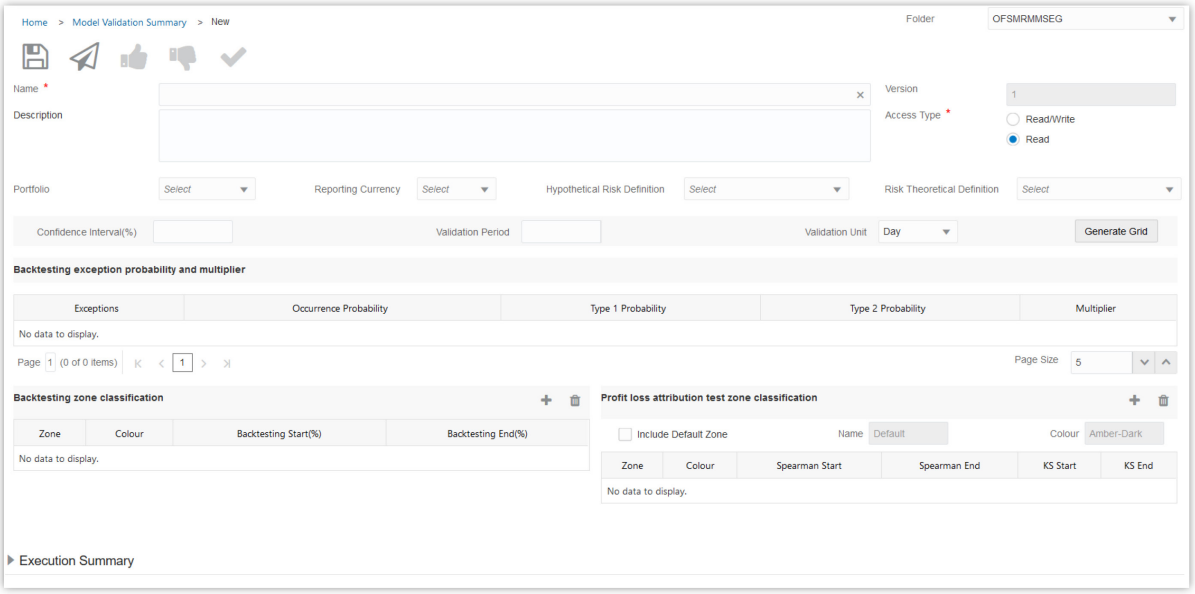
See the Page View Options section for details.

8.4 Create and Execute a New Business Definition

To define a new Model Validation - business definition, follow these steps:

1. In the **Model Validation Summary** window, click **Add** . The definition window is displayed.

Figure 49: Model Validation Definition Window



2. Populate the details mentioned in the following table. Fields marked in red asterisk (*) are mandatory.

Table 25: Model Validation Definition Window – Fields and Descriptions

Fields	Description
Name*	Enter the name of the business definition.
Description	Provide a description of the business definition.
Version	Displays the workflow version of the business definition.
Access Type	Specify the access type
Folder	Select the folder.
Portfolio	Select the Portfolio from the drop-down list.
Reporting Currency*	The currency in which all the output for a given definition will be computed. Select the currency code from the drop-down list.
Hypothetical*	Select the business definition created in the module Market Risk – Historical Simulation, to be considered for Hypothetical from the drop-down list. Actual and Hypothetical P&L are computed using business definitions selected for Hypothetical. **Actual P&L** is the difference in portfolio value as of time t and time t-1, where t is any specified historical date. Additionally, Actual P&L incorporates the change in instrument data for calculating P&L. Actual P&L is available as a download in this release. Populate data into the stage table STG_MR_PORTFLO_ACT_PNL_VALUE. **Hypothetical P&L** for time t is the difference in portfolio value computed with market data as of time t and instrument data as of time t, and, portfolio value computed with market data as off time t+1 and Instrument data as of time t. Hypothetical P&L is available as a download in this release. Follow the below process to upload portfolio values to be considered for model validation: Populate data into the Fact table FCT_MR_PORTFOLIO_VALUE. **NOTE**: During execution, in the Date editor if you select the option **Load Data from Stage Tables**, then input is taken from these two tables. See the OFS MRMM Download specification document available in OHC Documentation Library for the column details in the FCT_MR_PORTFOLIO_VALUE table.
Risk Theoretical*	Select the definition to be considered for Risk Theoretical from the drop-down list. Populate data into the Fact table FCT_MR_PORTFOLIO_VALUE table. **NOTE**: During execution, in the Date editor if you select the option **Load Data from Stage Tables**, then input is taken from these two tables. This is the P&L calculated by the risk factors generated from the pricing models of the trading desk. Risk Theoretical P&L is available as a download in this release.
Confidence Interval	Confidence is the percentage value that you need to define the VaR numbers. Specify the confidence value required for calculating the output.
Validation Period	Specify the period of validation.
Validation Unit	Specify the validation unit from the drop-down list, whether Day, Month, or Year.

3. Click **Generate Grid**. A table is generated with the field columns mentioned in the following table.

Figure 50: Backtesting Exception Probability and Multiplier

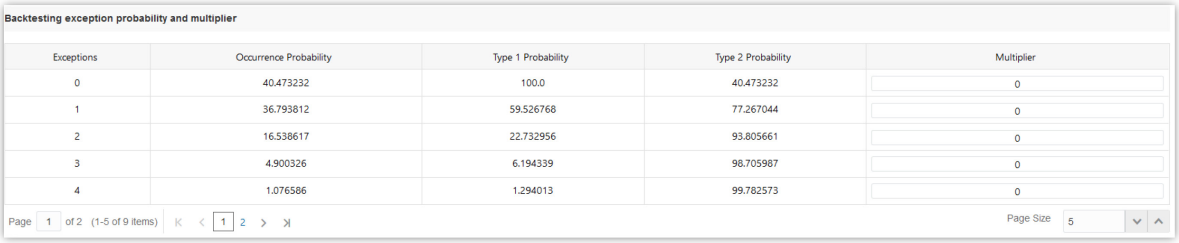


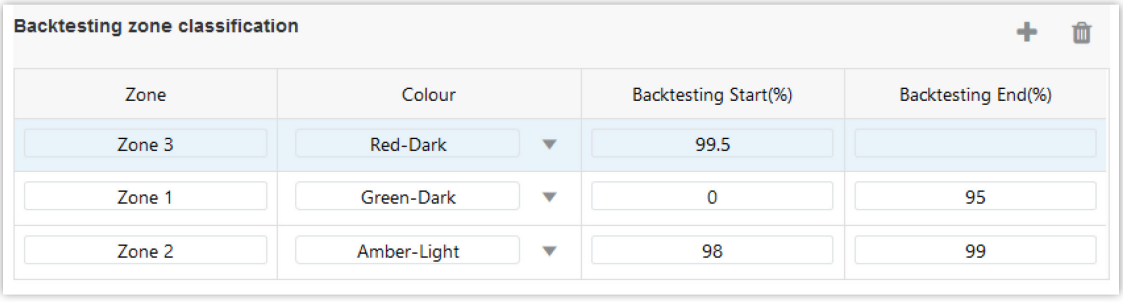
Table 26: Backtesting Exception Probability and Multiplier- Fields and Descriptions

Fields	Description
Exception	Displays the exceptions. This is the auto-populated number of exceptions starting with 0 and will keep on increasing
Occurrence Probability	Displays the exact probability of obtaining the corresponding number of exceptions.
Type 1 Probability	Probability of rejecting model (Type 1): This is a system computed column. Type 1 is the probability that using a given number of exceptions as the cut-off for rejecting a model will imply the rejection of an accurate model. Column is reverse-cumulative of Probability of occurrence (Column 2) starting with 100%.
Type 2 Probability	Probability of accepting model (Type 2): This is a system computed column. Type 2 is the probability that using a given number of exceptions as the cut-off for rejecting a model will imply acceptance of an inaccurate model Column is cumulative of Probability of occurrence (Column 2) starting from 0%.
Multiplier	Displays the multiplier value/multiplication factor for the capital which is sufficient to return the model to a 99th percentile standard.

4. In the **Backtesting Zone Classification** pane, follow these steps:

c. Click Add 

Figure 51: Backtesting Zone Classification



d. Specify details for the fields **Zone**, **Color**, **Backtesting Start** percentage, and **Backtesting End** percentage, as explained in the following table.

e. Click Delete  to remove an entry.

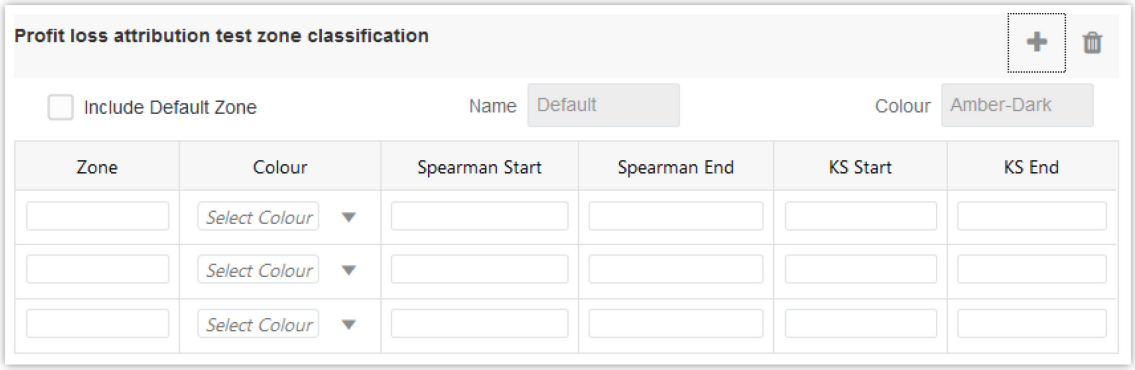
Table 27: Backtesting Zone Classification - Fields and Descriptions

Fields	Description
Zone	Specify the probability range for the three zones. **NOTE**: You must add one Zone with the range covering the number of days selected as specified in **Validation Period** and **Validation Unit**.
Color	Select the color you want to assign to the zone, from the drop-down list.
Backtesting Start (%)	Specify the value in percentage.
Backtesting End (%)	Specify the value in percentage.

5. In the **Profit Loss Attribution Test Zone Classification** pane, follow these steps:

   a. Click **Add** .

   Figure 52: Profit Loss Attribution Test Zone Classification



   b. Specify details for the fields **Zone**, **Color**, **Spearman Start**, **Spearmen End**, **KS Start,** and **KS End** as explained in the following table.

   c. Click **Delete** to remove an entry.

Table 28: Profit Loss Attribution Test Zone Classification - Fields and Descriptions

Fields	Description
Include Default Zone	This zone represents the catch-all scenario for one or both metrics. If the values do not fall under previously assigned zones, then they fall into this Default zone. You cannot add any values to the start and end limits for both KS Test and Spearman Test.
Name	This field is editable only if the Default Zone checkbox is checked. Assign a name to the default zone.
Color	This field is updated only if the Default Zone checkbox is checked. The color for the default zone is dark Amber.
Zone	Specify the probability range for the three zones.
Color	Specify the colors for the zones.
Spearman Start	Specify the value for Spearman Start.
Spearman End	Specify the value for Spearman End.
KS Start	Specify the value for KS Start.
KS End	Specify the value for KS End.

NOTE The combination of Spearman's start and end and KS start, and end should not overlap with previous or next zone.

6. Click **Submit** to save and submit the definition for approval. A confirmation dialog box is displayed.

   Or,

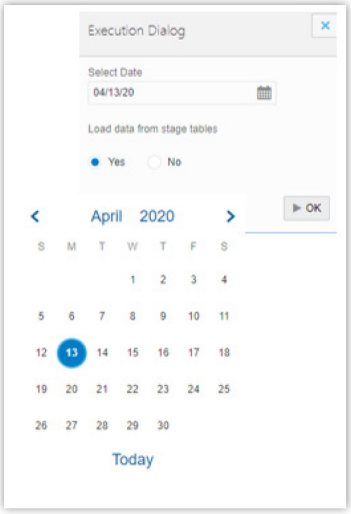
   Click **Save** to update the definition before submitting it for approval.
7. If you want to execute the business definition, follow the steps in the Execute a Business Definition section.
8. **Execution Summary** displays the execution history of the business scenarios. Select the execution to be marked as EOD execution. You can view details of the execution, such as **Execution Date**, **Execution ID**, **Execution Status,** and **Definition Workflow Status** in the **Execution Summary** table.
9. The definition can be viewed in the summary window. They are further used for in the analytics to generate reports.

8.4.1 Execute a Business Definition

To execute a business definition, follow these steps:

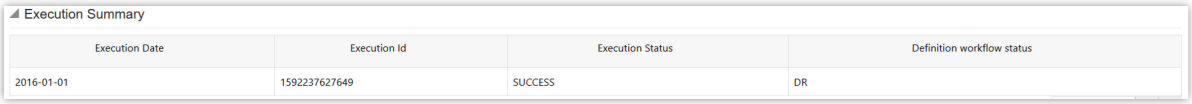
1. Click the business definition name in the Summary page. The definition window is displayed.
2. Click **Edit** .
3. Click **Execute** to trigger an Adhoc run. A pop-up message with a date-time editor is displayed.
4. Specify the date on which the execution must be performed.
5. If you want to load trade and market data from stage tables, select **Yes** in the field **Load Data From Stage Tables**, else select **No**. Click OK . The execution is triggered.

Figure 53: Model Validation Execution - Date-Time Editor



6. Click **OK**. A confirmation dialog box is displayed.
7. Click **OK** to confirm.
8. **Execution Summary** displays the execution history of the business scenarios. Select the execution to be marked as EOD execution. You can view details of the execution, such as **Execution Date**, **Execution ID**, **Execution Status,** and **Definition Workflow Status** in the **Execution Summary** table.

Figure 54: Model Validation Execution Summary



8.5 Edit a Business Definition

See the Edit a Business Definition section for details.

8.6 Export a Business Definition

See the Export a Business Definition section for details.

8.7 Approve or Reject a Business Definition

See the Approve or Reject a Business Definition section for details.

8.8 Delete a Business Definition

See the Delete a Business Definition section for details.

9 Market Risk - Monte Carlo Simulation, XVA and PFE

The Market Risk-Monte Carlo Simulation module enables you to derive counterparty risk measures and Monte-Carlo Value at Risk (VaR) at the counterparty level and self-counterparty level. The module enables the application to calculate counterparty risk, which provides a measure of the adjustments that should be made to the value of deals, to predict the possibility of a defaulting counterparty.

Valuation (XVA) adjustments such as Credit Valuation Adjustment (CVA), Debt Valuation Adjustment (DVA), Funding Valuation Adjustment (FVA). CVA, DVA, and FVA provide a single value which can be used as an adjustment to the total value of a set of positions in a portfolio, considering collateral that can be posted between the counterparties as determined by the Credit Support Annex (CSA) agreements.

Future exposures such as Potential Future Exposure (PFE), Expected Positive Exposure EPE, Expected Negative Exposure (ENE), and Expected Exposure (EE). They provide a measure of the potential loss or gain due to future market changes and are reported as a table of values for user-specified future observation dates.

Counterparty risk values are portfolio-level measures such as values for groups of trades instead of single quantities for each trade. Future exposures are computed using American Monte Carlo techniques, for a user-specified number of Monte Carlo paths and set of future observation dates. To do this, a global hybrid model must be constructed and used by all the trades in the simulation. The hybrid model consists of a set of individual factor models that simulate the dynamics of underlyings of the selected trades.

The inputs required to set up a calculation of counterparty risk are:

- Definitions for all the counterparties and self-counterparties that will be used by the trades in the calculation.
- Each trade must identify which counterparty and self-counterparty, netting set and which CSA (that is, sub-netting set) it is associated with, and be able to identify the list of underlyings used by that trade.
- Counterparties and self-counterparties must be organized into the following hierarchy:
  - Parent counterparty: At the top level of the hierarchy, there is a list of separate counterparty entities. Each counterparty is considered as a separate entity.
  - Child counterparty (Legal entity): Within each parent counterparty, there is a list of one or multiple child counterparties. Each child has a unique name within that parent counterparty.
  - Netting Agreement or Sets: Under each child counterparty there are one or multiple netting sets. Each netting set has a unique name within that counterparty, and defines the level at which all the counterparty risk measures are calculated directly from the results of netting exposures from different trades, after accounting for the collaterals. At least one netting set must be defined for each counterparty.
  - Sub-Netting Agreement or Margin Set or CSA: At the lowest level of the hierarchy, under each netting set there can be a set of margin sets. Each margin set has a unique name within that netting set, and at this level the individual parameters that define the CSA used to calculate collateral exchange are defined. This allows you to define separate parameters for subsets of trades that must have specialized collateral calculation rules, although allowing the net result of exposures and collateral from those trades to be offset or netted with exposures from other sets of trades under the same netting set.

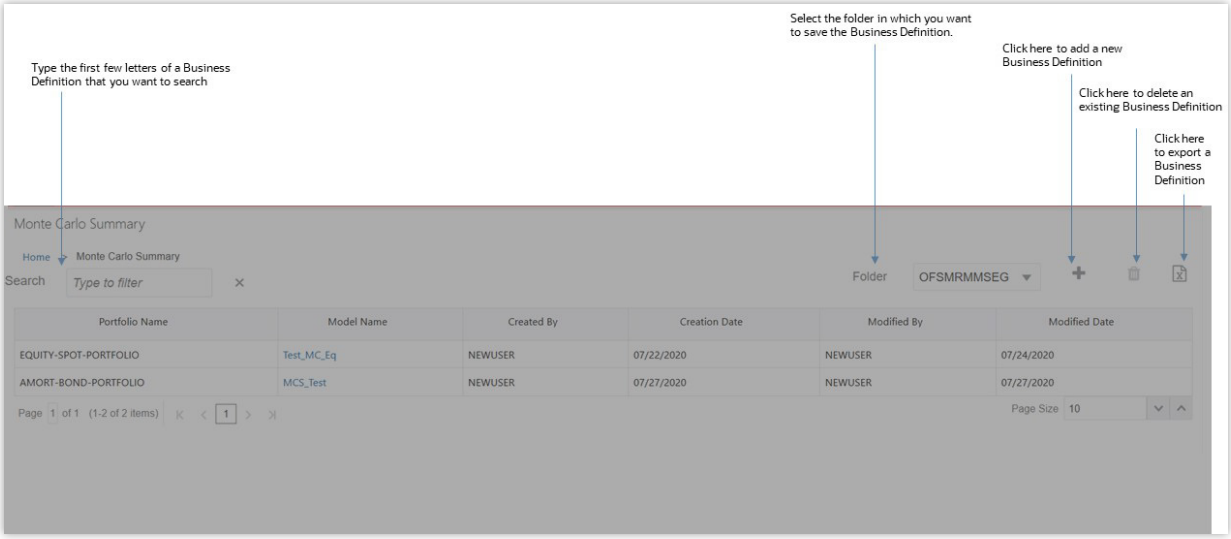
It is also possible to define a margin set to consider those trades that are not collateralized. These trades should be placed in a margin set named *Residual*.

Topics:

9.1 Navigate to the Monte Carlo Summary window

From the **MRMM Home** page, select **Market Risk Measurement and Management**, click **Navigation Menu** , select **Simulation** and then select **Monte Carlo Simulation**.

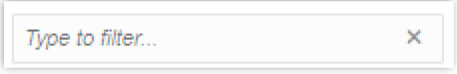
Figure 55: Monte Carlo Summary Window



9.2 Search for a Business Definition

In the Search field, type the first few letters of the business definition name that you want to search. The summaries whose names consist of your search string are displayed in a tabular format.

Figure 56: Monte Carlo Simulation Summary Window – Search Box



From the breadcrumb on top, click the **Monte Carlo Summary** link to return to the summary window after viewing details of the business definition.

9.3 Page View Options

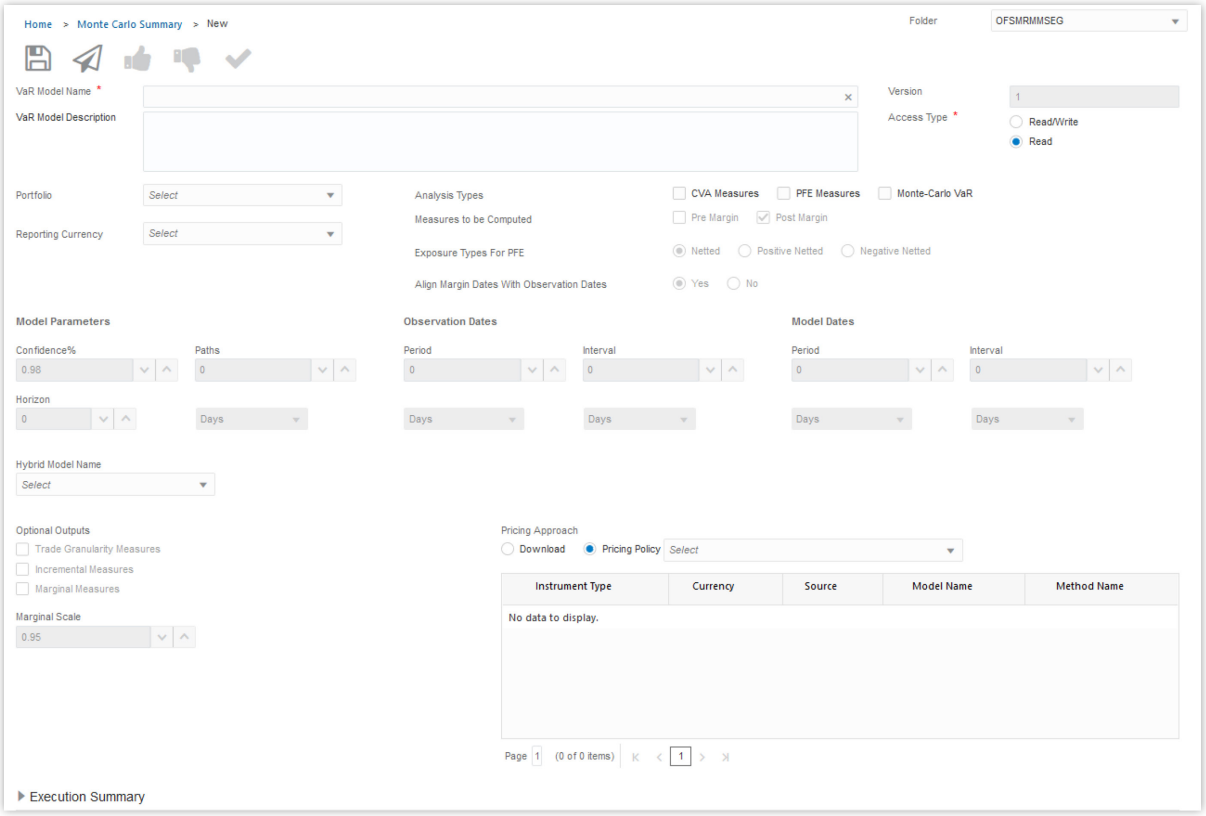
See the Page View Options section for details.

9.4 Create and Execute a New Business Definition

A business definition allows you to set business specific parameters required for analysis. To define a new Monte Carlo Simulation - business definition, follow these steps:

1. In the **Monte Carlo Summary** window, click **Add** . The definition window is displayed.

Figure 57: Monte Carlo Simulation Definition Window



2. Populate the details mentioned in the following table. Fields marked in red asterisk (*) are mandatory.

Table 29: Monte Carlo Simulation Definition Window – Fields and Descriptions

Fields	Description
VaR Model Name*	Enter the name of the business definition.
VaR Model Description	Provide a description of the business definition.
Version	Displays the workflow version of the business definition.
Access Type	Displays the access type
Folder	Select the folder.

Portfolio*	Select the Portfolio from the drop-down list.
Reporting Currency*	The currency in which all the output for a given definition will be computed. Select the currency code from the drop-down list.
Analysis Types	Select the various computation measures for the business definition. You can select one or multiple purposes. You can select both CVA and PFE or Monte Carlo VaR. Each of the subsequent inputs will be enabled or disabled based on the selected purpose. • CVA Measures • PFE Measures • Monte-Carlo VaR
Measures to be Computed	Select pre-margin exposure or post-margin exposures to calculate the counterparty measures. The default value is Post-Margin.
Exposure Types for PFE	Select the types of exposures to be used for calculating PFE from the following options: • Netted: It is the sum of pre-margin or post-margin exposures. • Positive Netted: It is the sum of positive exposures calculated at the netting set level. • Negative Netted: It is the sum of negative exposures calculated at the netting set level.
Align Margin Dates with Observation Dates	This option enables you to specify whether the Margin (Model) Dates and Observation Dates should be same. Select **Yes** or **No**. If you select Yes, the Model Date field becomes non-editable.
Model Parameters	Specify the values for the following fields: • **Confidence**: Specify the Confidence. Confidence level is required for PFE calculations. • **Paths**: Specify the Number of paths. This is the number of Monte-Carlo paths to be used for the simulations. • **Horizon**: It is the time horizon over which the VaR is computed. This option is available if you select the **Analysis Type** as **Monte-Carlo VaR**. Specify the horizon in terms of days, months or years. For example, if the horizon is specified as 10 Days then the run will be executed for VaR outputs with observation date as 10 Days: 10 Days.
Observation Dates	Observation dates are the future dates on which you want to calculate PFE and use for the exposures to capture the future behavior during CVA computation. Specify the observation date in Period <Days, Months, Year>: Interval <Days, Months, Year> format. For example, 30Y:1M, indicates that one observation date will be generated every month till 30 years.
Model Dates	Model dates are additional dates that are used in the simulation internally, but not used for the final reporting, to obtain better simulation results and capture more behavior of the deals during their schedules. Specify the model date in <Period> :< Interval> format. For example, 30Y:30D which indicates that observation dates are to be generated, every day for the next 30 years.
Hybrid Model Name	The hybrid model is a set of models to be used for individual risk factor for generating the paths under Monte Carlo simulation. Select the strategy from the drop-down menu. See Hybrid Model for details.
Optional Outputs	Specify the desired optional outputs: • Trade Granularity Measures: Select this check box to calculate measures at the

	trade level (in addition to the counterparty level). This is set to false by default. • Incremental Measures: Select this check box to calculate incremental measures. This is only available for XVA and PFE and is set to false by default. • Marginal Measures: Select this check box to calculate marginal measures. This is only available for XVA and is set to false by default.
Marginal Scale	The scaling value used for marginal XVA calculations. The default value is 0.95.
Pricing Policy	It allows you to select the pricing policy models and methods to be used for instrument pricing. You can either download or define the pricing policy. See section Pricing Policy for details. For the selected Pricing Policy, the details such as **Instrument Type**, **Currency**, **Source**, **Model Name**, **Method Name** are displayed.

3. Click **Submit** to save and submit the definition for approval. A confirmation dialog box is displayed.

   Or,

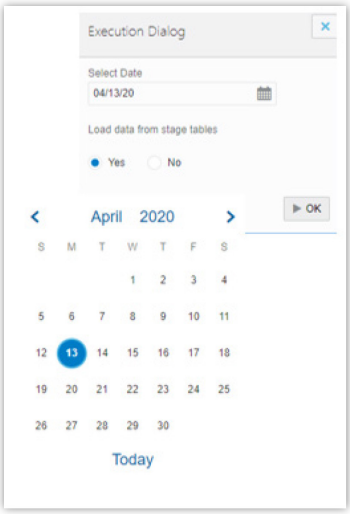
   Click **Save** to update the definition before submitting it for approval.
4. If you want to execute the business definition, follow the steps in the Execute a Business Definition section.
5. **Execution Summary** displays the execution history of the business scenarios. Select the execution to be marked as EOD execution. You can view details of the execution, such as **Execution Date**, **Execution ID**, **Execution Status,** and **Definition Workflow Status** in the **Execution Summary** table.
6. The definition can be viewed in the **Summary** window. They are further used for in the analytics to generate reports.

9.4.1 Execute a Business Definition

To execute a business definition, follow these steps:

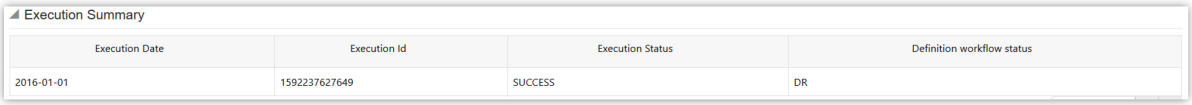
1. Click the business definition name in the **Summary** page. The definition window is displayed.
2. Click **Edit** .
3. Click **Execute** to trigger an Ad hoc run. A message with a date-time editor dialog box is displayed.
4. Specify the date on which the execution must be performed.
5. If you want to load trade and market data from stage tables, select **Yes** in the field **Load Data From Stage Tables**, else select **No**. Click **OK** OK . The execution is triggered.

Figure 58: Monte Carlo Simulation Execution - Date-Time Editor



6. Click **OK**. A confirmation dialog box is displayed.
7. Click **OK** to confirm.
8. **Execution Summary** displays the execution history of the business scenarios. Select the execution to be marked as EOD execution. You can view details of the execution, such as **Execution Date**, **Execution ID**, **Execution Status,** and **Definition Workflow Status** in the **Execution Summary** table.

Figure 59: Monte Carlo Simulation Execution Summary



9.5 Edit a Business Definition

See the Edit a Business Definition section for details.

9.6 Export a Business Definition

See the Export a Business Definition section for details.

9.7 Approve or Reject a Business Definition

See the Approve or Reject a Business Definition section for details.

9.8 Delete a Business Definition

See the Delete a Business Definition section for details.

10 OFSAA Rate Management-Currencies

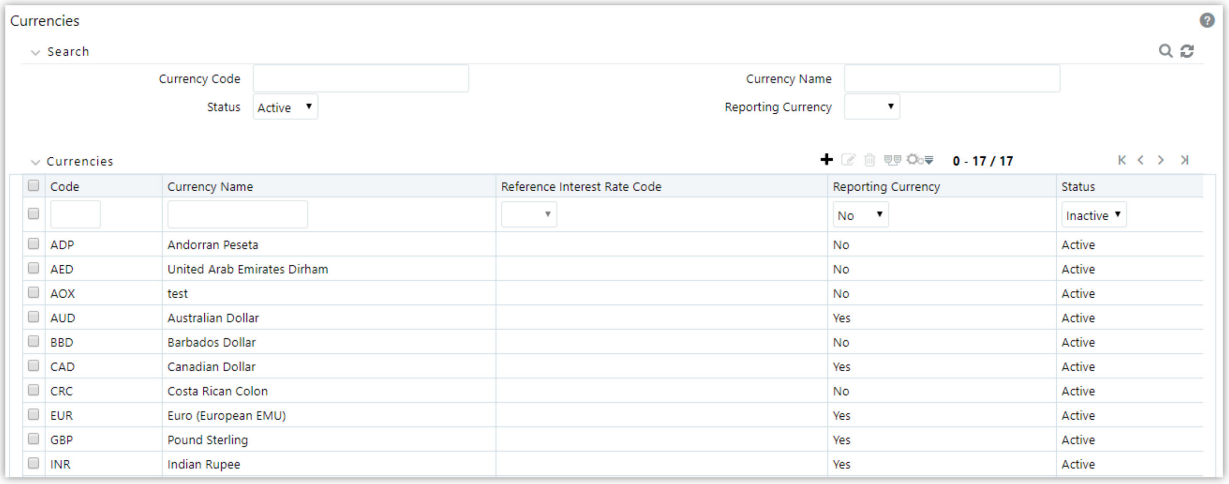
Financial institutions commonly transact business in multiple currencies. Such transactions demand functional capabilities for multi-currency accounting and currency rate management.

OFSAA Rate Management's Currency module supports the definitions and maintenance of currencies. Currency definitions are fundamental to the definition of both interest rate yield curves and currency exchange rates. A key attribute of every yield curve is the currency with which it is associated, and currency exchange rates can only be established between defined currencies. OFSAA Rate Management provides a comprehensive list of ISO-defined currencies; you may also define and add your own user-defined currencies.

10.1 Navigate to the Currencies Window

From the **MRMM Home** page, click **Common Object Maintenance**, then select **Rate Management** and select **Currencies**.

Figure 60: Currencies Window



10.2 Search for a Currency

To search for a currency, follow these steps:

1. On the **Currencies** window, under **Search**, provide the search criteria and click the **Search** icon.

   The searched currency is displayed in a tabular format.

2. Click the icon to clear the search criteria and refresh the page.

> **NOTE** You can control the number of rows to display on the window by selecting **Pagination Options**.

10.3 Add a New Currency

To add a new currency, follow these steps:

1. In the **Currencies** window, enter the following currency details in the text boxes:
   - **Currency Code**: For seeded currencies, these are ISO Currency Codes. For user-defined currencies, this can be any pure character string (no numbers) up to a length of 3 characters.
   - **Currency Name**: For seeded currencies, these are ISO Currency Codes. For user-defined currencies, this can be any string up to a length of 40 characters.
   - **Reference Interest Rate Code**: Add the reference Interest Rate Code for selected currencies.
   - **Status**: The status of any currency can be either **Active** or **Inactive**.

   > **NOTE** You must *activate* a currency before you can configure default configurations for it. See Default Configurations for details.

   - **Reporting Currency**: A reporting currency is an active currency to which balances in other currencies may be consolidated in order to facilitate reporting. Balances in reporting currencies may be, in turn, consolidated to the functional currency. For example, an American multinational bank might consolidate its holdings in Asian currencies to the Japanese yen (reporting currency) and its balances in European currencies to the Euro (reporting currency) after which it might consolidate these reporting currencies to the U.S. dollar (functional currency). The value can be **Yes** or **No**.
2. To add multiple currencies at once, click **Add** + . A new row is added. Do this to add as many currencies as required, and then provide details for each currency.
3. Click **Save**. The newly added currency or currencies are displayed in the table.

> **NOTE** If you do not see the currency you just added, click the **Sorter** on the column headers to sort the tabular column in ascending or descending order.

10.4 Edit a Currency

To edit a currency, follow these steps:

1. Select the check box corresponding to the currency you want to edit and click **Edit** .

   All the fields except the **Currency Code** become editable.
2. Edit the currency as required and click **Save**.

10.5 Delete a Currency

To delete a currency, select the check box corresponding to the currency you want to delete and click **Delete** . A confirmation dialog box appears. On confirmation, the currency is deleted.

11 Holiday Calendar

A Holiday is a day designated as having special significance for which individuals, a government, or some religious groups have deemed that observance is warranted, and thus no business is carried on this day. The Holiday Calendar code can range from 1 to 99999.

11.1 Navigate to the Holiday Calendar window

From the **MRMM Home** page, click **Common Object Maintenance**, then select **Holiday Calendar**.

11.2 Search for a Holiday Calendar

To search for a holiday calendar, follow these steps:

1. Navigate to the **Holiday Calendar summary** page. This page is the gateway to all the Holiday Calendars and related functionality. You can navigate to other pages related to Holiday Calendar from this page.
2. In the **Search** field, type the first few letters of the holiday calendar name that you want to search. The summaries whose names consist of your search string are displayed in a tabular format.
3. In the **Name** column, click the name of the holiday calendar you want to view. If there are multiple results for your search, try refining the search string by providing the exact names of the summary. Use the navigation buttons at the bottom of the table in case of multiple search results.

> **NOTE** You can control the number of rows to display on the window by selecting Pagination Options from the Page Navigation bar.

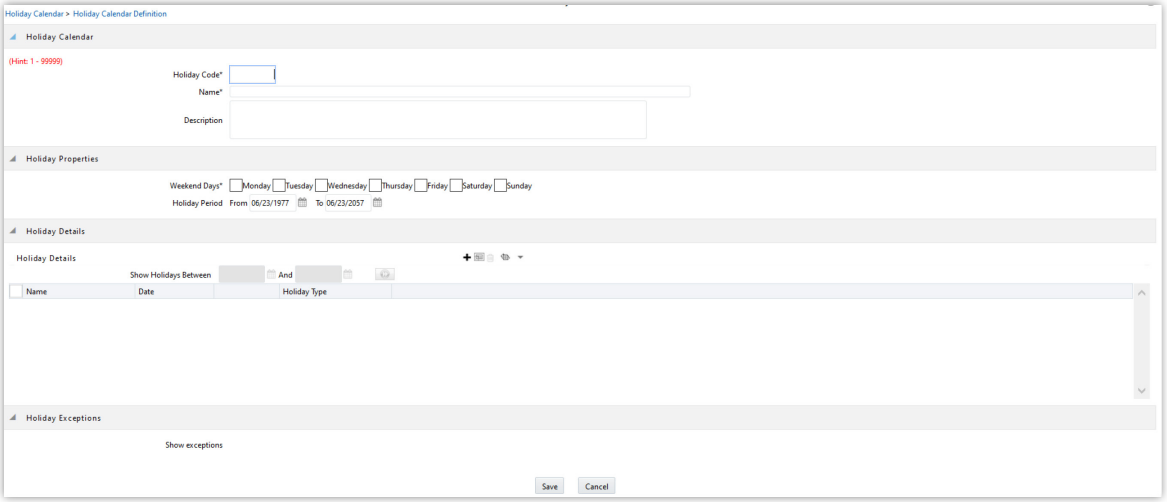
11.3 Create a Holiday Calendar

You create holiday calendars to capture holidays for a date range for any organization. It is possible to create and use multiple holiday calendars.

To create a Holiday Calendar, follow these steps:

1. Navigate to the **Holiday Calendar Summary** page.
2. Click **Add**. The **Holiday Calendar** details page is displayed.

Figure 61: Holiday Calendar Definition Window



3. Enter a code value for the new holiday calendar.

> **NOTE** The code is a numeric identifier for the holiday calendar. The code value must be a number between **1** and **99999**. The code value you assign to the new holiday calendar must be unique.

4. Enter the name and a brief description of the holiday calendar.

> **NOTE** The name you assign to the holiday calendar must be unique and can hold a maximum of 30 characters.

5. In the **Holiday Properties** grid, select not more than two weekend days. Then select the **Holiday Period**. The Holiday Period can be defined for a range of up to 40 years less than the current date and 40 years greater than the current date, totally spanning a maximum of 80 years.
6. In the **Holiday Details** grid, define the Holiday details for any period within the holiday range defined in Step 5. There are two types of holidays that can be defined: **Fixed** and **Moving**.
   - **Fixed Holiday**: It is deemed as a holiday for every year in the holiday period, for that particular day. For example, 25th December – Christmas, is a fixed holiday.

> **NOTE** To define a fixed holiday, input the holiday date for the first occurrence in the date range. For example, if your Date Range runs from 01-JAN-2000 to 31-DEC-2050, you should input the fixed holiday, Christmas, as 25-DEC-2000. The holiday calendar procedure will populate all subsequent 25-DEC entries in the holiday list table (FSI_HOLIDAY_LIST). A HOLIDAY_TYPE **code = 0** is a Fixed type holiday, **code = 1** is a Moving type holiday, and **code = 2** is a weekend.
>
> The holiday calendar procedure will also ensure that holiday and weekend entries are not duplicated. For example, if weekends are defined as Saturday and Sunday and Christmas falls on a weekend day, there will be only one entry in the FSI_ HOLIDAY_LIST table. The **PREVIOUS_WORKINGDAY** and **NEXT_WORKINGDAY** fields designate the valid prior and following working days, respectively.

- **Moving Holiday**: It is deemed as a holiday only for that particular date and year, and not for every year in the holiday period. All occurrences of a moving holiday must be input manually.

7. Once the holiday calendar definition is saved, its status in the summary page is marked as defined.
8. A holiday calendar created can also be deleted. Select one or more rows of holiday calendar definitions and click **Delete**.

11.3.1 Excel Import or Export

The Excel import or export functionality is used for adding or editing holiday exceptions.

11.3.2 Execute a Holiday Calendar

You execute a holiday calendar definition to generate calendar dates listing the various types of holidays for a given holiday period.

You must have predefined Rules to execute a holiday calendar. To execute a holiday calendar, follow these steps:

1. Navigate to the **Holiday Calendar Summary** page.
2. Search for a rule.
3. Select a Holiday Calendar and click the **Generate Calendar Dates**  to execute the selected holiday calendar.

   Holiday list for the holiday ID #1 generated successfully message appears (where #1 is the holiday calendar code).
4. The holiday list can be confirmed by querying the FSI_HOLIDAY_LIST table.
5. The status of a holiday calendar is displayed as processed in the status column if the holiday dates have been generated.

   NOTE If you do not want to Generate Calendar dates immediately, you can select that particular holiday calendar anytime later from the summary page with its status defined, and, then click the **Generate Calendar Dates**  to execute the selected holiday calendar.
6. The generated holiday list is no longer valid if the following is true:
   - There is a change in the definition of the holiday calendar.
   - There is any update or modification to the Holiday Exceptions defined for that holiday calendar.

   In such a scenario, the following message is displayed, and the holiday calendar state is changed to Defined until the holiday list is regenerated with a new definition.

   "*This holiday calendar has been modified. Please generate the holiday list again*".

11.3.3 Holiday Exceptions

Holiday exceptions can be specified for a well-defined holiday calendar, with the status - **Processed**. Generating the holiday list populates the holidays (weekends, fixed, and moving) along with the working days. Then the **Show Exceptions** button is enabled on the details page. Any changes in the holiday definition, disables the **Show Exceptions** button. In such a scenario, you must generate the holiday list again to define or view the exceptions.

To specify holiday exceptions, follow these steps:

1. Click **Show Exceptions** in the **Holiday Exceptions** table. The **Holiday Exceptions** window is displayed.
2. The search block in the **Exceptions** page has the following fields:
   - **From (Year)**, **To (year)**: Denotes the range of years which is a subset of the generated holiday list for which exceptions are required to be defined.
   - **Fixed Holidays**: You can filter the list of holidays by the type of Fixed Holidays.
   - **Moving Holidays**: You can filter the list of holidays by the type of Moving Holidays.
   - **Holiday Date**: You can define exceptions for a particular known holiday date.
   - **All Exceptions**: This check box when selected lists all the exceptions, if already defined, for the holidays within the From, To Date range.
3. In the **Holiday Exceptions** section, you can define two types of exceptions:
   - **Not a holiday**: Any holiday can be marked as not a holiday, in which case that day is removed from the **Holiday List**. If the drop-down list in the exception type is selected as **Not a Holiday**, then the **shift to** date picker field is disabled.

     For example, Good Friday earlier considered as a holiday in the holiday calendar can be marked as **Not a Holiday** in the **Exceptions Window**. Additionally, you can mention comments or remarks in the **Notes Text Box**, next to the **Exception Type** drop-down list.
   - **Shift to**: Any holiday can be shifted to another day, in which case the earlier declared holiday is removed from the **Holiday List**, while the shifted to, day is included as a holiday.

11.3.4 Excel Import or Export

The Excel import or export functionality is used for adding or editing holiday exceptions.

12 Market Risk Measurement and Management Reports

OFS MRMM enables banks to accurately measure, evaluate, monitor, and manage market risk and to proactively comply with regulatory requirements of capital calculation as per Internal Models Approach (IMA). The solution ensures that all critical elements of a market risk program from pricing, valuations, risk assessment, monitoring and management, stress testing to data governance, data storage, and final regulatory submissions are fully addressed.

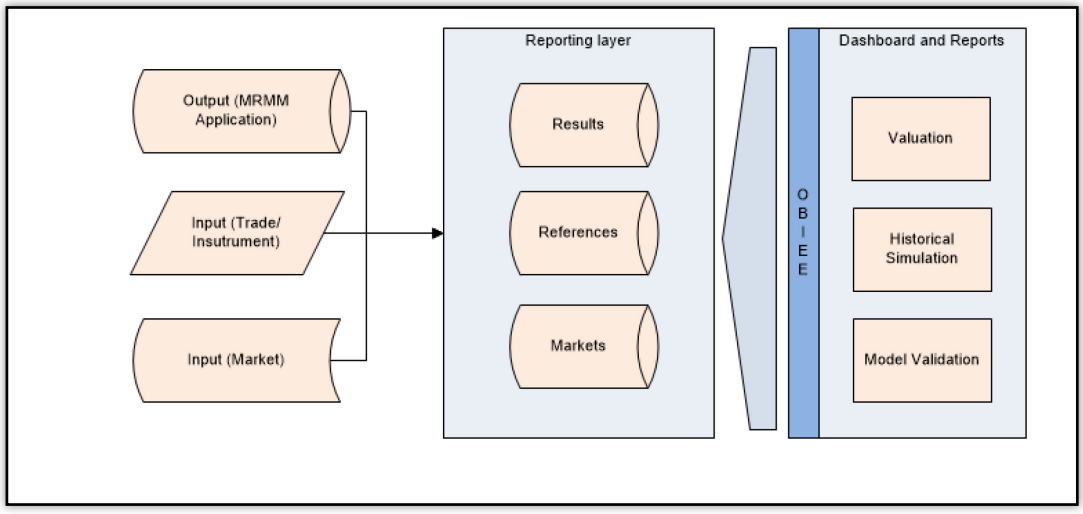
The seeded reports and dashboards integrate the results generated by the application with Oracle Business Intelligence or Oracle Analytics Server, giving users the ability to perform queries on results. This ability enables you to access seeded reports and dashboards and to quickly develop new reports on a wide variety of information. It is expected that pre-built dashboards and reports may not be sufficient for every user, and hence the tool gives the ability to modify standard reports and also create new reports as per requirements. You can implement these reports as they are available or modify them to the required specifications.

Topics:

12.1 Process Flow

The following figure depicts a high-level process flow of MRMM Analytics.

Figure 62: MRMM Analytics Process Flow



The output obtained from MRMM processing is obtained at various granularities – trade level and aggregated. The results are then transformed on the way to the reporting layer of the MRMM data model. Once the data is in the reporting layer it is accessed by OBIEE to present dashboard and reports.

12.2 Data Flow

This section explains the data flow, Dimension population and Dimension table population in MRMM analytics.

Topics:

12.2.1 Dimension Population

In OFSAA, Hierarchies are defined and managed through the common infrastructure, Dimension Management User Interface. The related parent/ child hierarchy data must first be converted to a flattened and level-based format before it is used in MRMM analytics. The dimension population process involves both the hierarchy flattening process and movement of the dimension data from processing dimension tables to the common reporting dimension tables, shared by all the OFSAA Business Intelligence (BI)l applications.

The Dimension Population process has the following two components:

12.2.1.1 Hierarchy Flattening

This section explains the hierarchy flattening process.

Topics:

12.2.1.1.1 Overview of Hierarchy Flattening Process

The Hierarchies are maintained in the Dimension Management component of OFSAA Infrastructure. From the **Financial Services Application** menu, navigate to **Master Maintenance** select **Dimension Management** then select **Hierarchies**.

The Hierarchy Flattening process is used to move hierarchy data from the parent/child storage data structure to a level-based storage data structure. In the Hierarchy Dimension Population, the hierarchy data for any hierarchy created on seeded or user-defined dimensions are stored within dimension specific hierarchy tables for the respective dimensions. The Hierarchy Flattening process copies this data to the REV_HIER_FLATTENED table in the BI data model after flattening is completed.

For example:

The hierarchy data of one or more Product Hierarchies created on the Product dimension (a seeded dimension) is stored in the DIM_PRODUCTS_HIER table. Assuming there is a user-defined dimension (for example, Legal Entity) and a hierarchy has been defined on this dimension, then the hierarchy data is stored in the DIM_LE_HIER table (assuming this is the hierarchy table created for this hierarchy).

The hierarchy data in the preceding example is moved to REV_HIER_FLATTENED in the BI data model by the hierarchy flattening process.

Database components used by this transformation are:

- **REV_BATCHHIERFLATTEN**: This is the Oracle database function.
- **REV_HIER_TRANSFORMATON_BIAPPS**: This is the Oracle database Package called by the preceding function.

The Hierarchy Flattening process includes the following features:

- The user has the choice to process a single hierarchy or all the hierarchies belonging to a particular dimension as part of a single execution.
- Any change made to the hierarchy using the **Hierarchy Management Maintenance** window changes the flag FLATTENED_ROWS_COMPLETION_CODE in the REV_ HIER_DEFINITIONS to Pending. This improves the processing efficiency as the flattening process avoids hierarchies that are not modified.

12.2.1.1.2 Prerequisites and Troubleshooting

The prerequisites and troubleshooting steps are:

1. Complete all the post-installation steps mentioned in the Oracle Financial Services Analytical Applications Infrastructure (OFSAAI) Installation and Configuration Guide and the OFS MRMM installation Guide.
2. The Hierarchies are maintained in the Dimension Management component of OFSAA Infrastructure. From the **OFSAA Home** page, navigate to **Master Maintenance**, select **Dimension Management**, and then select **Hierarchies**.

The steps mentioned subsequently in this section are debugging steps and must be checked only if the hierarchy flattening process has failed.

Seeded Hierarchies which are included with the installation and any hierarchies created using the Dimension Management user interface must have the required data in the tables used by the Hierarchy Flattening process.

- Check the database (atomic schema) to confirm the FLATTENED_ROWS_COMPLETION_CODE column in the REV_HIER_DEFINITIONS table is updated with the value Pending for the Hierarchy ID being processed. This column will have the value Pending for any new hierarchy created or modified using the OFSAAI Hierarchy Management UI.
- Check if the REV_DIMENSIONS_B table has a row for the dimension that is being processed. Verify this using a database SQL query. See the Executing the Hierarchy Flattening Transformation section for details.
- Check if the REV_HIERARCHIES table has a row for the hierarchy ID that is being processed. Verify this using a database SQL query. See the Executing the Hierarchy Flattening Transformation section for details.
- Application users must be mapped to a role with the seeded batch execution function (BATPRO).
- By default, this SMS function is mapped to the SMS Role: Data Centre Manager (SYSOPC).
- OFS MRMM seeds three user-profiles: MRMM Administrator, MRMM Analyst, and MRMM Approver. After installation of MRMM, the system administrator should additionally map the BATPRO function with the required MRMM roles.

Before executing a batch, verify if the following services are running on the application server:

- Iccserver
- Router
- AM
- Messageserver

For details on how to check if the services are up and how to start the services if you find them not running, see the OFS Advanced Analytics Infrastructure User Guide .

You must create Batch Processes for executing flattening and movement procedures. This process is explained in the Executing the Hierarchy Flattening Transformation section.

- The flattening procedure takes Dimension ID and Hierarchy sys ID as additional parameters; Dimension ID is mandatory whereas Hierarchy ID is optional.
- These processes can also be run using the Simplified Batch window, which allows for the execution of stored procedures

12.2.1.1.3 Tables Used by the Hierarchy Flattening Process

The hierarchy flattening process uses the following tables:

- **REV_HIERARCHIES**: This is the master table for hierarchies with one row per hierarchy.
- **REV_DIMENSIONS_B**: This is the master table for dimensions with one row per dimension.
- **REV_HIER_DEFINITIONS**: The FLATTENED_ROWS_COMPLETION_CODE column is checked to determine if the hierarchy can be processed.
- **DIM_<DIMENSIONNAME>_HIER**: This table stores the parent or child hierarchy data and is the source for the transformation. For example, DIM_PRODUCTS_HIER.
- **REV_HIER_FLATTENED**: This is the output table for the transformation into which the flattened hierarchy data gets populated.

12.2.1.1.4 Executing the Hierarchy Flattening Process

To execute the function from the **Operations** module of OFSAAI, define a new Batch and an underlying Task definition from the **Batch Maintenance** window of OFSAAI.

To define a new task for a Batch definition, follow these steps:

1. Select the check box adjacent to the newly created **Batch Name** in the **Batch Maintenance** window.
2. Click **Add** from the **Task Details** grid. The **Task Definition** window is displayed.
3. Enter the **Task ID** and **Description**.
4. Select **Transform Data** from the drop-down list.
5. Select the following from the **Dynamic Parameters** drop-down list:
   - **Datastore Type**: Select the appropriate datastore type from the drop-down list:
   - **Datastore Name**: Select the appropriate datastore name from the drop-down list.
   - **IP address**: Select the IP address from the drop-down list.

- **Rule Name**: Select BATCH_HIERTRANSFORMATION from the drop-down list of available transformations. (This is a seeded Data Transformation procedure installed as part of the MRMMBI application. If you do not see this procedure in the list, contact My Oracle support).
- **Parameter List**: These are comma-separated values of Dimension ID and Hierarchy ID.

  Execute the following query in the database to find the value and use the value in the Dimension ID column to process the dimension name and description:

  ```
  SELECT B.DIMENSION_ID, T.DIMENSION_NAME, T.DESCRIPTION FROM
  REV_DIMENSIONS_B B INNER JOIN REV_DIMENSIONS_TL T ON
  B.DIMENSION_ID = T.DIMENSION_ID AND T.DIMENSION_NAME LIKE '<DIMENSION
  NAME>'
  ```

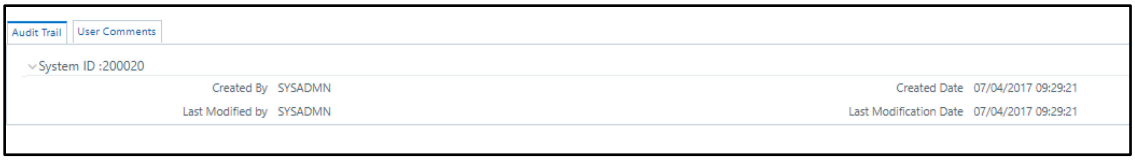
  — Replace the tag <DIMENSION NAME> in this query with the Dimension Name you find in the UI (Navigate to **OFSAA Home**, select **Master Maintenance**, and then select **Dimension Management**. This is the Dimension on which the Hierarchy you want to flatten is configured. You must create separate Batches for each Dimension.

- **Hierarchy ID Values**

  If all the Hierarchies belonging to a Dimension are to be processed, then provide null (in lower case) as the parameter value. Otherwise, provide the System Identifier of the Hierarchy that must be transformed.

  For example, you can find the Hierarchy ID through the Hierarchy user interface at the bottom of the window, as depicted in the following figure.

  Figure 63: Hierarchy ID Values

  You can also execute the following query to find the unique system identifier for a specific Hierarchy:

  ```
  SELECT B.OBJECT_DEFINITION_ID, SHORT_DESC, LONG_DESC FROM
  FSI_M_OBJECT_DEFINITION_B B INNER JOIN FSI_M_OBJECT_ DEFINITION_TL T ON
  B.OBJECT_DEFINITION_ID =T.OBJECT_ DEFINITION_ID AND B.ID_TYPE =<ID_TYPE>
  ```

  Use the value in the HIERARCHY_ID column as the parameter for the hierarchy to be processed.

  <ID_TYPE> represents the dimension number to which a particular hierarchy belongs.

  For example, if all the Hierarchies for the GL Account Dimension must be processed, the parameter list should be given as follows:

  '2', null, where '2' is the Dimension ID for the seeded Dimension GL Account.

  If a particular Hierarchy with code 1000018112 must be processed, the parameter list should be given as follows:

  '2', '1000018112'

6. Click **Save**.

   The Task definition is saved for the selected Batch.

7. Execute the Batch.

You can execute a Batch definition from the Batch Execution section of the OFSAAI Operations module.

> **NOTE** This process can also be run using the Simplified Batch user interface. In the optional parameters field within the Simplified Batch window, specify the parameters mentioned above.

Alternatively, you can execute hierarchy transformation directly on the database by using the following SQLPLUS commands.

- **Function Name**: REV_BATCHHIERFLATTEN
- **Parameters**: BATCH_RUN_ID, MIS_DATE, PDIMENSIONID, and PHIERARCHYID.
- **Sample Parameter Values**: 'Batch1' , '20091231' , '2', and '1000018112'.

> **NOTE** This process can also be run using the Simplified Batch user interface. In the optional parameters field within the Simplified Batch window, specify the parameters mentioned above.

The first paragraph should contain the command overview or a short description of the reference information.

12.2.1.1.5 Checking the Execution Status

The status of execution can be monitored using the **Batch Monitor** section of the OFSAAI **Operations** module.

The status messages in Batch Monitor are:

- **N**: Not Started
- **O**: On Going
- **F**: Failure
- **S**: Success

The **Event Log** window in the **Batch Monitor** provides logs for execution with the top row being the most recent. Any errors generated during execution are listed here.

Even if you see **Successful** as the status in **Batch Monitor** it is recommended to go through the **Event Log** and verify if there are any errors.

Alternatively, you can access the execution log on the application server in the `$FIC_DB_HOME/log/date` directory. The file name will have the Batch Execution ID.

You can access the database level operations log by querying the `FSI_MESSAGE_ LOG` table. The Batch Run ID column can be filtered for identifying the relevant log.

If you are unable to navigate to these locations, verify the `.profile` file in the Installation Home.

12.2.1.2 Dimension Table Population

The dimension table population process serves two purposes:

- Move flattened hierarchy data from operational tables to the BI Tables.
- Execute the SCD process against each processed dimension.

Run the dimension table population after the initial creation of a hierarchy and after any modifications to a hierarchy.

Dimensional data changes are handled in the MRMM analytics solution using the SCD component.

Topics:

12.2.1.2.1 Overview of SCD Process

SCDs are used to maintain the history of dimension-member changes over time. SCD is a required process and is tied into the BI application. Without this process, the updated information will not be reflected in MRMMBI. For example, if the Active Time Bucket Definition was changed for an MRMM Process Execution, the SCD process is required to reflect the new Active Time Bucket details into the Result Area. It is mandatory to run the SCD process if the hierarchies have changed.

For more information on SCDs, see:

- Oracle Data Integrator Best Practices for a Data Warehouse
- Oracle Warehouse Builder Data Modelling, ETL, and Data Quality Guide, 11g Release 2 (11.2), Part #E10935-03

The SCD component is delivered through an executable. For the MRMMBI solution, the types of SCD supported are Type 1 and Type 2.

- **Type 1 SCD Methodology**

  The Type 1 methodology overwrites old data with new data and therefore does not track changes to the data across time.

  For example:

  Consider a Dimension Table, DIM_PRODUCT

N_PRODUCT_SKEY	V_PRODUCT_NAME	D_START_DATE	D_END_DATE	F_LATEST_RECORD_INDICATOR
1	Personal Loan	5/31/2010	12/31/9999	Y

  Where,

  - N_PRODUCT_SKEY is the surrogate key column which is a unique key for each record in the dimension table.

- V_PRODUCT_NAME is the product name.
- D_START_DATE indicates the date from which this product record is valid.
- D_END_DATE indicates the date to which this product record is valid.
- F_LATEST_RECORD_INDICATOR: A value 'Y' indicates this is the latest record in the dimension table for this product and 'N' indicates it is not.

If the V_ PRODUCT_NAME column is set as a Type 1 and if there is a change in the product name to 'Personal Loan' from 'PL' in the earlier example in the next processing period, then the record changes as shown in the following table:

N_ PRODUCT_ SKEY	V_PRODUCT_ NAME	D_START_ DATE	D_END_DATE	F_LATEST_RECORD_ INDICATOR
1	Personal Loan	6/30/2010	12/31/9999	Y

- **Type 2 SCD Methodology**

  The Type 2 method tracks historical data by creating multiple records for a given natural key in the dimensional tables with separate surrogate keys. With Type 2, the historical changes in dimensional data are preserved. In the earlier example, for the change in product name from 'PL' to 'Personal Loan' if history will be preserved then the V_PRODUCT_NAME column must be set as Type 2 in which case when SCD is processed for the processing period in which the change happens it will insert a new record as shown in the following example:

N_PRODUCT_SKEY	V_PRODUCT_NAME	D_START_DATE
1	Personal Loan	5/31/2010
1	Personal Loan	6/30/2010

A new record is inserted to the product dimension table with the new product name and the latest record indicator for this is set as 'Y' indicating this is the latest record for the personal loan product and the same flag for the earlier record is set to 'N'

12.2.1.1.2.2 Prerequisites

Following are the prerequisites:

- The hierarchy flattening process has been run.
- The setup tables accessed by the SCD component, including SETUP_MASTER, SYS_TBL_MASTER, and SYS_STG_JOIN_MASTER have the required entries.
- Having entries in the table SETUP_MASTER is optional. By default, SCD maintains only a history of changes to all the members within a dimension, without the context of any hierarchy. If instead, you wish to maintain the history of changes with respect to a specific hierarchy, the SETUP_MASTER table can be used for this purpose.

  This is achieved by specifying the sys-ID of the required hierarchies, in the table SETUP_MASTER. This table is referenced during SCD execution and if a hierarchy ID is found, it is included during the SCD process.

The column V_COMPONENT_DESC is used to identify the dimension-type and V_ COMPONENT_VALUE for the hierarchy sys-ID.

The permissible values for the V_COMPONENT_DESC are listed in the following table.

Table 30: Permissible values for the V_COMPONENT_DESC

V_COMPONENT DESC	Meaning
PRODUCT_HIER1	Signifies the PRODUCT dimension
ORG_UNIT_HIER11	Signifies the ORG UNIT dimension
GL_ACCOUNT_HIER1	Signifies the GL ACCOUNT dimension
COMMON_COA_HIER1	Signifies the COMMON COA dimension

Separate rows in this table are seeded for different hierarchy sys-IDs, one-row corresponding to each of the four dimensions, that is PRODUCT, ORG UNIT, COMMON COA, and GL ACCOUNT. Add entries in this table only if you add a user-defined dimension.

The SYS_TBL_MASTER and SYS_STG_JOIN_MASTER tables are seeded for the Org unit, GL Account, Product, and Common COA dimensions. Add entries in these tables only if you add user-defined dimensions.

Database Views with the name DIM_<Dimension Name>_V are seeded along with the seeded dimensions during the MRMMBI installation. These views present data from the dimension tables and the flattened hierarchy data. For example, DIM_ PRODUCT_V in a usable format. New views should be included for any new dimensions defined.

12.2.1.2.3 Tables Used by the SCD Component

These tables are described in the following sections:

- **SETUP_MASTER**

  Rows for each of the four key dimensions PRODUCT, ORG UNIT, COMMON COA, and GL ACCOUNT are seeded into this table during the MRMMBI Installation.

  Following is the table structure:

  - **V_COMPONENT_CODE**: This column acts as a primary key.
  - **V_COMPONENT_DESC**: This column contains a standard value used within the database view for a flattened hierarchy.
  - **V_COMPONENT_VALUE**: This column contains the unique hierarchy identifier for the reporting hierarchies to be used in MRMMBI.

    Hierarchy unique identifiers can be obtained by executing the following query:

    ```
    Select b.object_definition_id, short_desc,long_desc from
    fsi_m_object_definition_b b inner join fsi_m_object_definition_tlt on
    b.object_definition_id = t.object_definition_id and b.id_type = 5 and
    b.leaf_num_id = <dimension_id>;
    ```

    <dimension_id> represents the dimension number to which a particular hierarchy belongs.

  Alternatively, the unique system identifier for each hierarchy can be found at the bottom of the Hierarchy Management page while in EDIT mode.

The following rows are seeded into the SETUP_MASTER table, exactly as follows, with the exception of V_COMPONENT_VALUE. This value should reflect the unique system identifier of the Reporting Hierarchy for each dimension.

Table 31: Rows Seeded into the SETUP_MASTER table

V_COMPONENT_CODE	V_COMPONENT_DESCRIPTION	V_COMPONENT_VALUE
22	PRODUCT_HIER1	1000018711
88	ORG_UNIT_HIER1	100573
90	GL_ ACCOUNT_HIER1	100574
91	COMMON_COA_HIER1	100575

- **SYS_TBL_MASTER**

  The MRMMBI application installer populates one row per dimension for the seeded dimensions in this table.

Table 32: Rows Seeded into the SYS_TBL_MASTER table

Column Name	Data Type	Column Description
MAP_REF_NUM	Number (3) NOT NULL	The mapping reference number for this unique mapping of a source to a dimension.
TBL_NM	VARCHAR2(30) NOT NULL	Dimension Table Name
STG_TBL_NM	VARCHAR2(30) NOT NULL	Staging Table Name
SRC_PRTY	NUMBER(2) NULL	The priority of the Source when multiple sources are mapped to the same target.
SRC_PROC_SEQ	NUMBER(2) NOT NULL	The sequence in which the various sources for the DIMENSION will be taken up for processing.
SRC_TYP	VARCHAR2(30) NOT NULL	The type of the Source for a Dimension, for example Transaction Or Master Source.
DT_OFFSET	NUMBER(2) NOT NULL	The offset for calculating the Start Date based on the FRD.
SRC_KEY	NUMBER(3) NULL	Source Key

For example, the following data is inserted by the application installer for the product dimension.

Table 33: Data Inserted by The Application Installer for the Product Dimension

Column Name	Data Type
MAP_REF_NUM	NUMBER(3) NOT NULL
TBL_NM	VARCHAR2(30) NOT NULL
STG_TBL_NM	VARCHAR2(30) NOT NULL
SRC_PRTY	NUMBER(2)

No changes are required to this table if the standard key dimensions are being used within MRMMBI. If any new dimensions have been added a row will have to be inserted to this table manually.

- **SYS_STG_JOIN_MASTER**

  The MRMMBI application installer populates this table for the seeded dimensions.

Table 34: Rows Seeded into the SYS_STG_JOIN_MASTER table

Column Name	Data Type	Column Description
MAP_REF_NUM	NUMBER (3) NOT NULL	The Mapping Reference Number for this unique mapping of a Source to a Dimension Table
COL_NM	VARCHAR2(30) NOT NULL	Name of the column in the Dimension Table
COL_TYP	VARCHAR2(20) NOT NULL	Type of column. The possible values are mentioned in the section following the table.
STG_COL_NM	VARCHAR2(30) NOT NULL	Name of the column in the Staging Table
SCD_TYP_ID	NUMBER (3) NOT NULL	SCD type for the column
PRTY_LOOKUP_REQD	CHAR(1) NOT NULL	Column to determine whether Lookup is required for Priority of Source against the Source Key Column or not
COL_DATATYPE	VARCHAR2(15) NULL	Column Data Type
COL_FORMAT	VARCHAR2(15) NULL	Column Format

The possible values for column type (the column COL_TYPE) in SYS_STG_JOIN_ MASTER is:

- PK - Primary Dimension Value (maybe multiple for a given "Mapping Reference Number")
- SK - Surrogate Key
- DA - Dimensional Attribute (maybe multiple for a given "Mapping Reference Number")
- SD - Start Date
- ED - End Date
- LRI - Latest Record Indicator (Current Flag)
- CSK - Current Surrogate Key
- PSK - Previous Surrogate Key
- SS - Source Key
- LUD - Last Updated Date / Time
- LUB - Last Updated By

For example, the following data is inserted by the application installer for the Product Dimension.

Table 35: Data Inserted By The Application Installer For The Product Dimension

Column Name	Data Type
MAP_REF_NUM	6
COL_NM	V_PRODUCT_NAME
COL_TYP	DA
STG_COL_NM	V_PRODUCT_NAME
SCD_TYP_ID	2
PRTY_LOOKUP_REQD_ FLG	N
COL_DATATYPE	VARCHAR
COL_FORMAT	

No changes are required to this table if the standard dimensions are being used within MRMMBI. If any new dimensions have been added, a row must be inserted to this table manually.

- DIM_<dimensionname>_V: The database view which SCD uses as the source.

  For example, DIM_PRODUCTS_V

  These views come as part of the application installation.

  For any new dimension added, a View must be created similar to DIM_ PRODUCTS_V.

  DIM_<dimensionname>: Output table to which SCD writes the dimension data. A sequence should be added for every user-defined dimension.

  For example, create sequence SEQ_DIM_<DIM> minvalue 1 maxvalue 999999999999999999999999999 increment by 1.

12.2.1.2.4 Executing the SCD Component

You can execute the function from the Operations (formerly Information Command Center (ICC) framework) module of OFSAAI. Define a new Batch and an underlying Task definition from the Batch Maintenance window of OFSAAI.

To define a new task for a Batch definition, follow these steps:

1. Select the check box adjacent to the newly created **Batch Name** in the **Batch Maintenance** window.
2. Click **Add** from the **Task Details** section. The **Task Definition** window is displayed.
3. Enter the **Task ID** and **Description**.
4. Select **Run Executable** from the drop-down list.
5. Select the following from the **Dynamic Parameters** drop-down list:
   - Executable: scd,<map_ref_num>

     For example, scd,125.

A third optional parameter (N/Y) passed during SCD execution (such as SCD,<map_ref_num>,<N/Y>) determines if a soft delete should be executed on for old records. The default parameter value is 'N'. For example, if the records are not part of the STG tables and SCD is executed with a parameter 'Y', then the older records in the DIM table will get soft-deleted by setting the LRI indicator to 'N'.

Table 36: Mapping between scd and the Target Table

map_ref_num	Target Table that is Updated
scd,168	DIM_PARTY
scd-343	DIM_DATA_ORIGIN
scd,653	DIM_INSTRUMENT_CONTRACT
scd,666	DIM_BANDS
scd,679	DIM_BOND_TYPE
scd,270	DIM_ORG_STRUCTURE
scd,126	DIM_ORG_UNIT
scd,128	DIM_PRODUCT
scd,676	DIM_PARTY_TYPE
scd,678	DIM_INDUSTRY
scd,675	DIM_PARTY
scd,670	DIM_TRADING_DESK
scd,682	DIM_CREDIT_RATING
scd,674	DIM_MARKET_CENTRE
scd,677	DIM_INSTRUMENT_TYPE
scd,681	DIM_IRC
scd,669	DIM_BANDS
scd,680	DIM_BANDS
scd,671	Dim_Employee
scd,459	DIM_STOCK_TICKER
scd,667	DIM_BANDS
scd,254	dim_region
scd,673	DIM_INFL_INDEX
scd,456	DIM_UNDERLYING
scd,335	DIM_CUSTOMER
scd,69	DIM_MITIGANT
scd,187	DIM_NETTING_AGREEMENT
scd,471	DIM_SUB_NETTING_AGREEMENT
scd,70	DIM_MITIGANT_TYPE

- **Wait**: When the file is being executed, you can either wait until the execution is complete or proceed with the next task. Select the checkbox for **Yes** or **No**. Click **Yes** to wait for the execution to be complete. Click **No** to proceed with the next task.
- **Batch Parameter**: Select **Y** (upper case required).

6. Click **Save**.

   The Task definition is saved for the selected Batch.

7. Execute the Batch.

   You can execute a Batch definition from the **Batch Execution** section of an **OFSAAI Operations** module.

   You cannot execute the SCD process from the simplified batch window.

12.2.1.2.5 Checking the Execution Status

The Batch execution status can be monitored through the **Batch Monitor** section of the OFSAAI **Operations** module.

The status messages in the batch monitor are:

- **N**: Not Started
- **O**: On Going
- **F**: Failure
- **S**: Success

You can access the ICC execution log on the application server in the `$FIC_ DB_HOME/log/ficgen` directory.

Sample Path: `/dbfiles/home/oracle/OFSAAI/ficdb/log/ficgen`
The file name contains the Batch Execution ID.

You can access the detailed SCD component log on the application server under the

`<ftp-share>/<infodom name>/logs` directory.

The file name contains the Batch Execution ID.

Sample Path: `/dbfiles/home/oracle/ftpshare/OFSAADEMO/logs`

> **NOTE** Check the `.profile` file in the installation home if you are not able to find the paths mentioned earlier.

SCD Process Scenarios

> **NOTE** It is not necessary to run SCD for all dimensions. In certain cases, you should specify the specific dimension requiring updates.

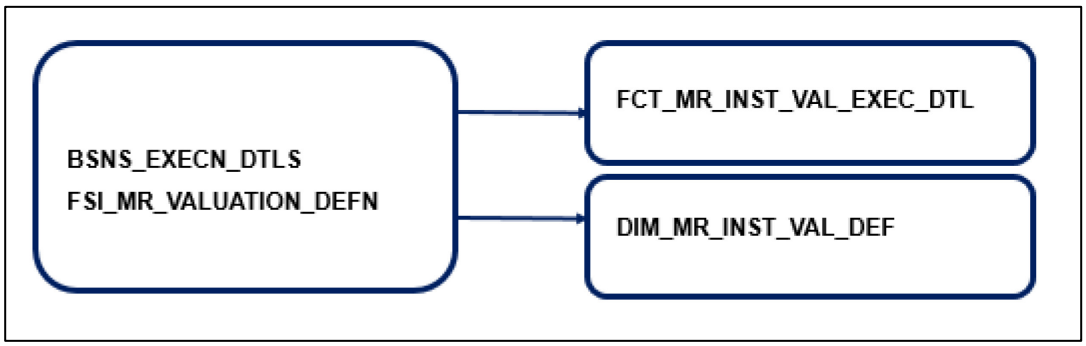
12.3 MR Results Transformation

This section provides information on the data flows for the different modules in OFS MRMM.

12.3.1 Data Flows for Market Risk Instrument Valuation

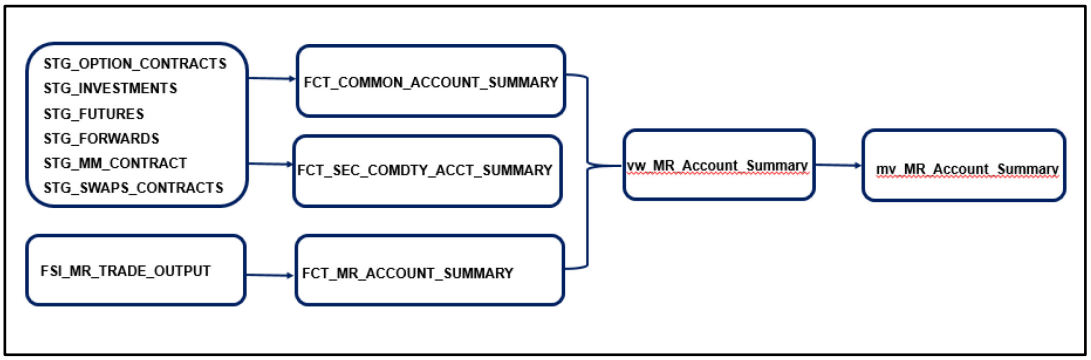
Following are the data flows for Market Risk Instrument Valuation.

Figure 64: Data Flow of Business Definition and Execution Detail



The FCT_MR_INST_VAL_EXEC_DTL table stores details of Fact Market Risk Instrument Valuation Execution.

Figure 65: Data Flow of Input Data and Trade Level Results

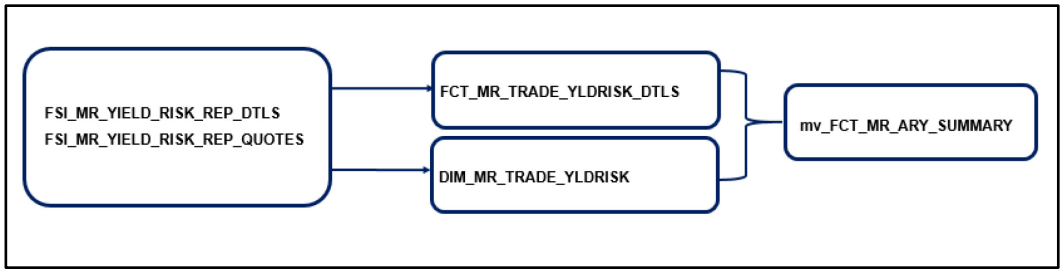


The FCT_MR_ACCOUNT_SUMMARY table stores results of the valuation process in the market risk application of OFSAA. Output at account/contract/trade level like price, present value, delta, gamma, and other results of the pricing model are stored here. This entity is used together with Common Account Summary and Security Commodity Account Summary for reporting.

The FCT_COMMON_ACCOUNT_SUMMARY table stores common account level information that usually comes as input through staging. This table is shared by all OFSAA BI applications and contains dimensional values, attributes, and financial measures which are generally applicable to the individual account records.

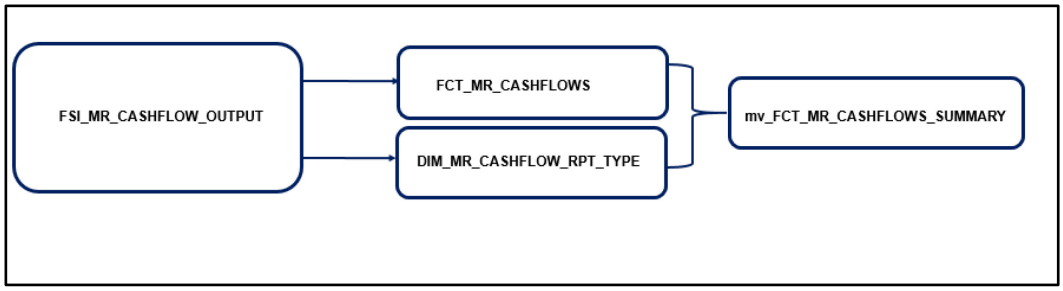
The FCT_SEC_COMDTY_ACCOUNT_SUMMARY table stores input data related to financial instruments like bonds, commodities, forex, and so on. which are used in valuation and market risk analysis. These data are received directly from the operational front office or trading systems of a bank. This entity is used together with Common Account Summary and MR Account Summary for reporting.

Figure 66: Data Flow of Yield Risk Report



The FCT_MR_TRADE_YLDRISK_DTLS stores detail of risk factor level sensitivities and other measures generated during the pricing or valuation of trade. These risk factors are in the form of yield curves and their term points which impact price. Each account/contract/trade generally have multiple records in this table. Data here is read with those in Market Risk Yield Risk Report Quotes tables.

Figure 67: Data Flow of Trade Level Cash Flows



The FCT_MR_CASHFLOWS table stores detail of cash flows generated during the pricing or valuation of trade. Output at account/contract/trade level like cash flow date, accrual dates, interest, and principal cash flows, discount rate, discounted cash flows and other results of pricing model are stored here. Each account/contract/trade generally have multiple records in this table.

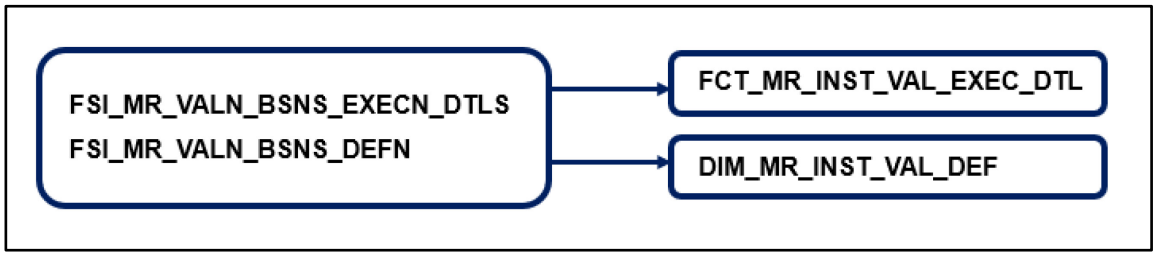
Table 37: Source and Destination Tables of T2Ts Used in Instrument Valuation

Sl. No	T2T	Source Table	Destination Table
1	T2T_MRMM_ACCOUNT_OUTPUT_FCT_POP	FSI_MR_TRADE_OUTPUT	FCT_MR_ACCOUNT_SUMMARY
2	T2T_MRMM_CASHFLOWS_FCT_POP	FSI_MR_CASHFLOW_OUTPUT	FCT_MR_TRADE_CASH_FLOWS
3	T2T_MRMM_TRADE_YIELD_RISK_POP	FSI_MR_YIELD_RISK_REP_DTLS	FCT_MR_TRSDE_YLDRISK_DTLS
4	T2T_MRMM_YIELD_RISK_DTLS_FCT_POP	FSI_MR_YIELD_RISK_REP_QUOTES	DIM_MR_TRSDE_YLDRISK
5	T2T_MRMM_INST_VAL_EXC_DTLS_POP	FSI_MR_VALN_BSNS_EXECN_DTLS	FCT_MR_INST_VAL_EXEC_DT

12.3.2 Data Flows Market Risk Historical Simulation

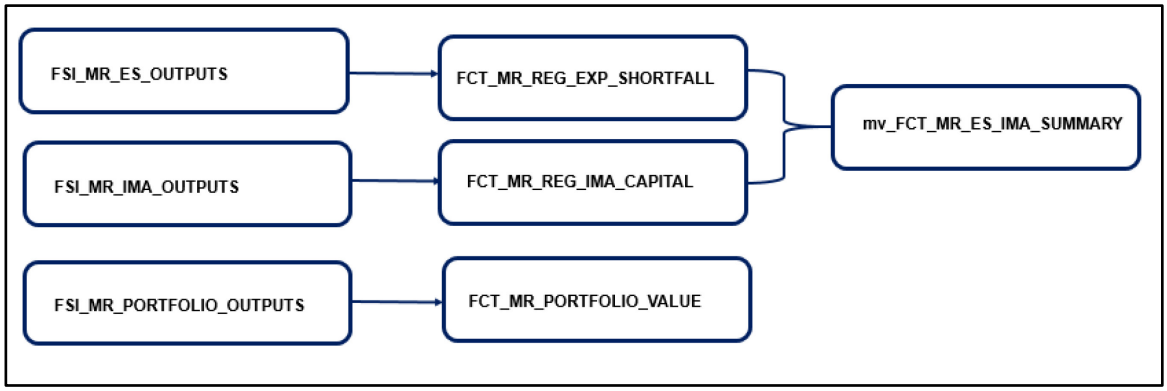
Following are the data flows for Market Risk Historical Simulation.

Figure 68 Data Flow of Business Definition and Execution Detail



FCT_MR_HIST_SIM_EXEC_DTL stores mapping between the business definition and the execution detail of each business definition which is executed in the historical simulation service of Market Risk Application. This information is used to view reports in BI.

Figure 69 Data Flow of Regulatory Results

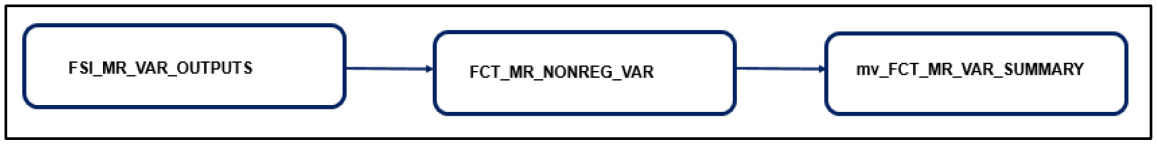


The FCT_MR_PORTFOLIO_VALUE table stores the actual and hypothetical value of a portfolio or trading desk. These are the output of the market risk Portfolio validation process.

The FCT_MR_REG_EXP_SHORTFALL table stores regulatory Conditional Value-at-Risk related measures (Expected Shortfall for the full set and reduced set of risk factors, Stress Calibrated Expected Shortfall) which are the output of market risk (FRTB) process. The data is available at an aggregated level of portfolio and trading desk.

The FCT_MR_REG_IMA_CAPITAL table stores regulatory results (Internally modeled capital charge, stressed capital add-on, aggregated capital charge, and default risk charge) of market risk (FRTB) process. The data is available at an aggregated level of portfolio and trading desk.

Figure 70 Data Flow of Non-Regulatory Results



The FCT_MR_NONREG_VAR table stores non-regulatory Value-at-Risk related measures (Expected Tail Gain, Expected Tail Loss, Value at Risk, Gain at Risk) which are the output of market risk process. The data is available at an aggregated level of portfolio and trading desk.

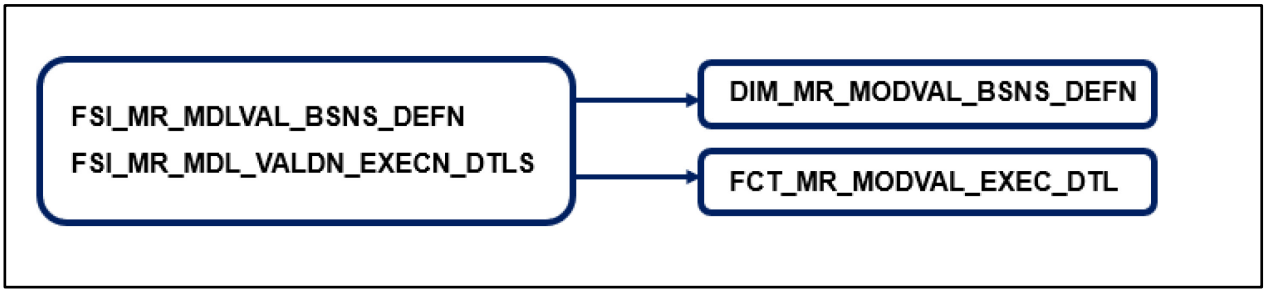
Table 38: Source and Destination Tables of T2Ts Used in Historical Simulation

Sl. No.	T2T	Source Table	Destination Table
1	T2T_MRMM_NONREG_VAR_FCT_POP	FSI_MR_VAR_OUTPUT	FCT_MR_NONREG_VAR
2	T2T_MR_PORTFOLIO_VALUE_FCT_POP	FSI_MAR_PORTFOLIO_OUTPUT	FCT_MR_PORTFOLIO_VALUE
3	T2T_MRMM_EXP_SHORTFALL_FCT_POP	FSI_MR_ES_OUTPUT	FCT_MR_REG_EXP_SHORTFAL
4	T2T_MRMM_IMA_CAPITAL_FCT_POP	FSI_MR_IMA_OUTPUT	FCT_MR_REG_IMA_CAPITAL
5	T2T_MRMM_HIST_SIM_EXC_DTL_POP	FSI_MR_PORT_RISK_EXECN_DTLS	FCT_MR_HIST_SIM_EXEC_DTL

12.3.3 Data Flows Model Validation

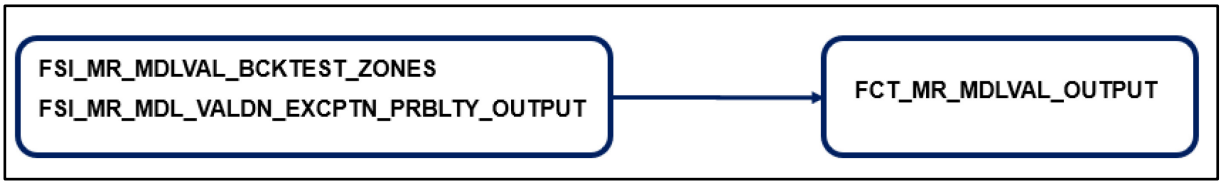
Following are the data flows for Model Validation.

Figure 71 Data Flow of Business Definition and Execution Detail



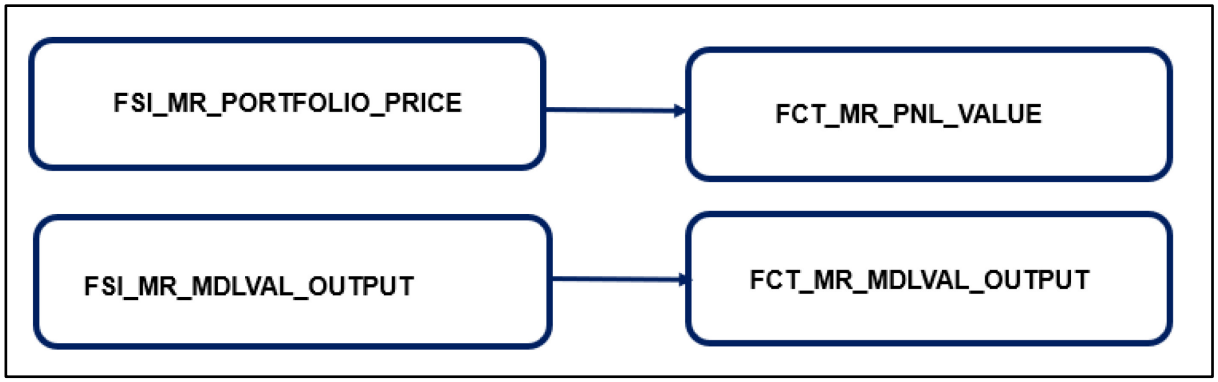
The FCT_MR_MODVAL_EXEC_DTL table stores metadata and execution detail of each business definition which is created in the Model Validation service of Market Risk Application. This information is used to view reports in BI.

Figure 72 Data Flow of FRTB IMA Backtesting and Exception Probability Results



The FCT_MR_MODVAL_EXCPTN_PRBLTY table stores Risk Model Validation Exception Probability of each business definition which is created in Model Validation service of Market Risk Application. This information is used to view reports in BI.

Figure 73 Data Flow of Profit and Loss Summary and Backtesting Results



The FCT_MR_PNL_VALUE table stores the actual and hypothetical Profit and Loss value of a portfolio or trading desk. These are the output of the market risk model validation process.

The FCT_MR_BACK_TESTING table stores the backtesting and Profit-Loss attribution results of the portfolio and trading desk. The data here is used to decide if a trading desk of the bank is eligible to follow the Internal Models Method for regulatory calculation or not. These are the output of the market risk model validation process.

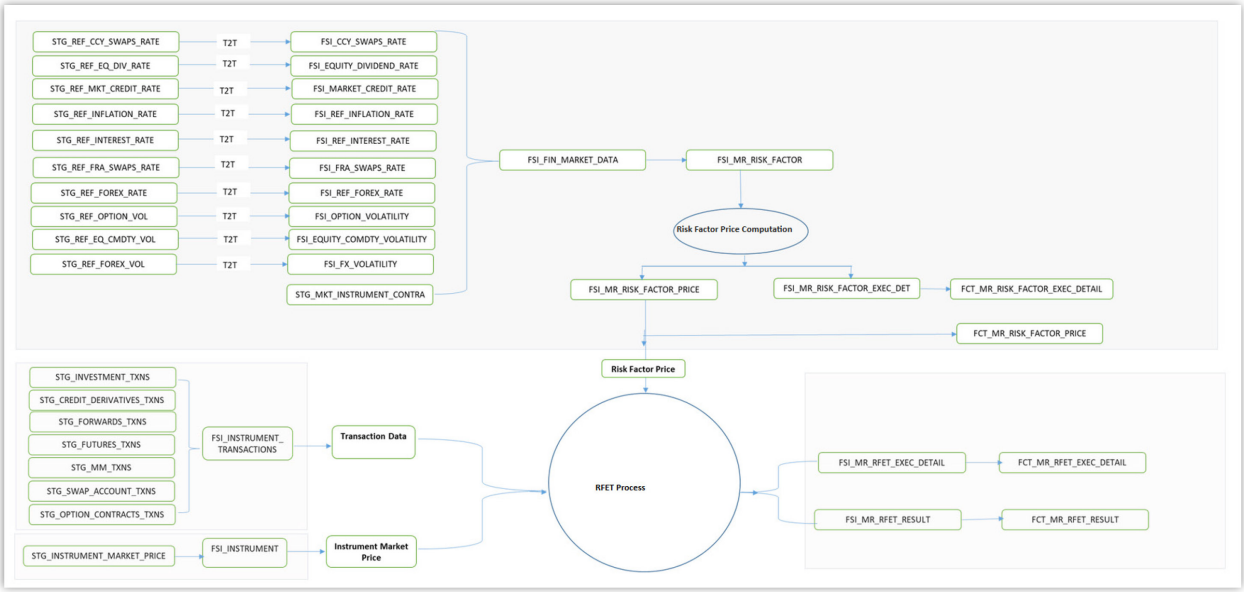
Table 39: Source and Destination Tables of T2Ts Used in Model Validation

Sl. No.	T2T	Source Table	Destination Table
1	T2T_MR_MDL_BACKTESTING_FCT_POP	FSI_MR_MDL_VALDN_OUTPUT	FCT_MR_BACK_TESTING
2	T2T_MRMM_PNL_VALUE_FCT_POP	FSI_MR_PORTFOLIO_PRICE	FCT_MR_PNL_VALUE
3	T2T_MRMM_MDLVAL_EXC_DTL_POP	FSI_MR_MDL_VALDN_EXECN_DTLS	FCT_MR_MODVAL_EXEC_DTL

12.3.4 Data Flows RFET

The data flow for RFET is as follows.

Figure 74 Data Flow of RFET

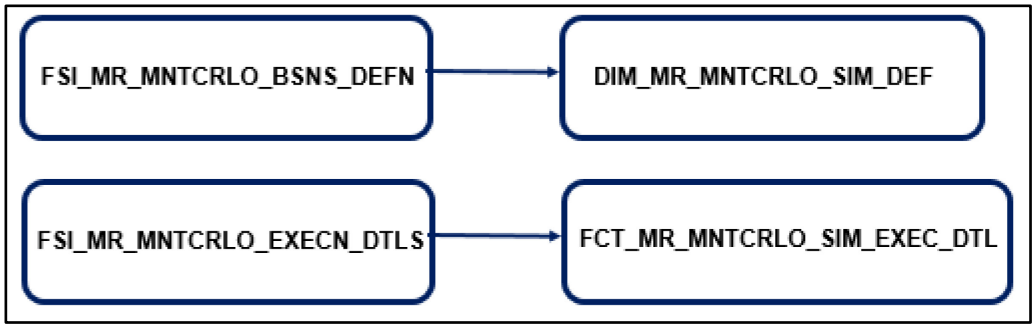


The RFET module identifies modellable and non-modellable risk factors. The Transaction Data, Instrument Market Price Data, and Risk Factor Price Data are considered as an input for RFET computation.

12.3.5 Data Flows Monte Carlo

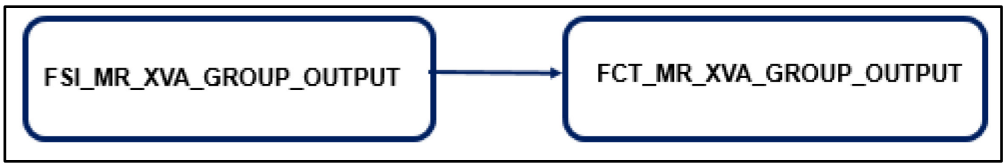
The following are the data flows for Market Data.

Figure 75 Data flow of Monte-Carlo business definition and execution



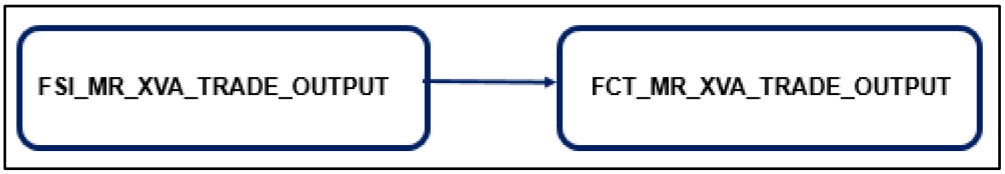
The FCT_MR_MNTCRLO_SIM_EXEC_DTL table stores mapping between the business definition and execution detail of each business definition which is executed in Monte Carlo simulation service of Market Risk Application. This information is used to view reports in BI.

Figure 76 Data flow of fsi_mr_xva_group_output



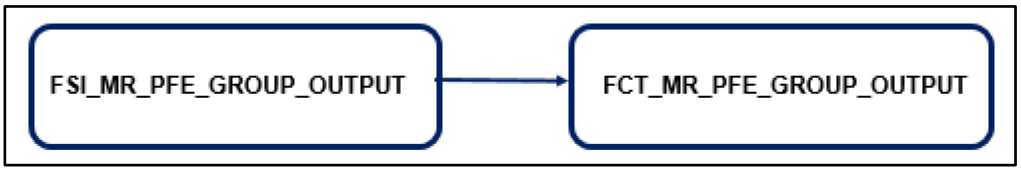
The FCT_MR_XVA_GROUP_OUTPUT table stores all valuation adjustments also called as XVA (refers to CVA-Credit Valuation Adjustment, DVA-Debt Valuation Adjustment, FVA-Funding Valuation Adjustment and KVA-Capital Valuation Adjustment) for the set of counterparties group wise.

Figure 77 Data flow of fsi_mr_xva_trade_output



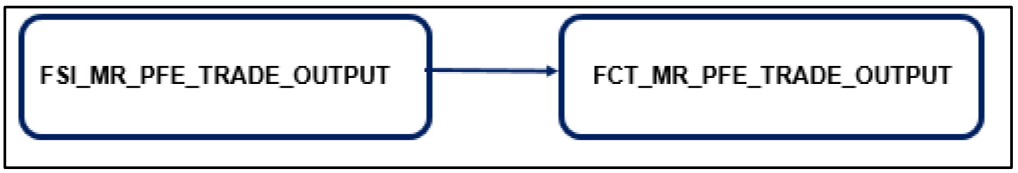
The FCT_MR_XVA_TRADE_OUTPUT table stores all valuation adjustments also called as XVA (refers to CVA-Credit Valuation Adjustment, DVA-Debt Valuation Adjustment, FVA-Funding Valuation Adjustment and KVA-Capital Valuation Adjustment) for the set of counterparties individual trade wise.

Figure 78 Data flow of fsi_mr_pfe_group_output



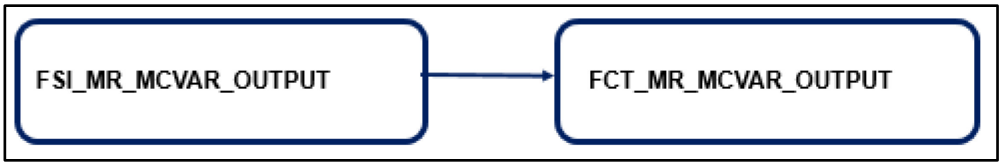
The FCT_MR_PFE_GROUP_OUTPUT table stores the Potential Future Exposure measures for the set of counterparties for the group wise.

Figure 79 Data flow of fsi_mr_pfe_trade_output



The FCT_MR_PFE_TRADE_OUTPUT table stores the Potential Future Exposure measures for the set of counterparties for the individual trade wise.

Figure 80 Data flow of fsi_mr_pfe_trade_output



The FCT_MR_MCVAR_OUTPUT table stores the Monte Carlo Value At Risk and Expected tail loss measures for the set of counterparties.

Table 40: Source and Destination Tables of T2Ts Used in Monte Carlo

Sl. No.	T2T	Source Table	Destination Table
1	T2T_MRMM_MNTCRLO_SIM_EXC_DTL_POP	FSI_MR_MNTCRLO_EXECN_DTLS	FCT_MR_MNTCRLO_SIM_EXEC_DTL
2	T2T_MR_XVA_GROUP_OUTPUT_FCT_POP	FSI_MR_XVA_GROUP_OUTPUT	FCT_MR_XVA_GROUP_OUTPUT
3	T2T_MR_XVA_TRADE_OUTPUT_FCT_POP	FSI_MR_XVA_TRADE_OUTPUT	FCT_MR_XVA_TRADE_OUTPUT
4	T2T_MR_PFE_GROUP_OUTPUT_FCT_POP	FSI_MR_PFE_GROUP_OUTPUT	FCT_MR_PFE_GROUP_OUTPUT
5	T2T_MR_PFE_TRADE_OUTPUT_FCT_POP	FSI_MR_PFE_TRADE_OUTPUT	FCT_MR_PFE_TRADE_OUTPUT
6	T2T_MR_MCVAR_OUTPUT_FCT_POP	FSI_MR_MCVAR_OUTPUT	FCT_MR_MCVAR_OUTPUT

13 Account Summary Population

This chapter provides information about Account Summary Population in the Oracle Financial Services Market Risk Measurement and Management application and step-by-step instructions to use this section. It describes how and when to execute the data movement processes needed to populate account-level data in the reporting mart.

Account Summary tables are account level BI tables that are used to consolidate information from the various product-specific tables used in both the Staging Area and Operational Processing areas. The Account Summary tables in the MRMM BI data model are loaded from both the Staging Area tables and operational Instrument Tables using the Table to Table (T2T) component of the OFSAAI framework.

Topics:

13.1 Overview of Account Summary Tables

Account Summary tables are loaded from the staging product processor tables using the Table to Table (T2T) component of Oracle Financial Services Analytical Applications Infrastructure (OFSAAI) framework.

Customer account-level data from the Oracle Financial Services Analytical Applications (OFSAA) staging product processor tables must be consolidated into a standardized relational Business Intelligence (BI) data model. This consolidation is done to have all the staging product processor table data in a single Fact table. The Account Summary table data can be used for building cubes that allow rollup of data for a dimension or a combination of dimensions. This relational BI model consists of multiple vertically partitioned Account Summary tables such as FCT_COMMON_ACCOUNT_SUMMARY, FCT_SEC_COMDTY_ACCT_SUMMARY, and FCT_MR_ACCOUNT_SUMMARY that are organized by application subject area. FCT_COMMON_ACCOUNT_SUMMARY table is shared by all OFSAA BI applications and contains dimensional values, attributes, and financial measures which are generally applicable to the individual account records. This data is sourced directly from the staging area.

13.2 Overview of Account Summary Population

Upon installation of the MRMM BI, you will see multiple T2T process definitions for each Instrument table. Each T2T process maps account/trade table data to the Account Summary tables mentioned above. The T2T process definitions are primarily direct column to column mappings from trade to Fact table and in certain cases might have expressions that apply SQL functions or do arithmetic operations on instrument columns before moving them to the Fact table.

Database functions are used for conversion if there is a data type difference between the mapped columns of an Instrument Table.

For example:

TO_NUMBER(TO_CHAR(NEXT_PAYMENT_DATE,'YYYYMMDD')).

Or an arithmetic operation if a currency conversion is required for a balance column.

In addition, a surrogate key is populated in Fact (BI) table dimension columns by doing SQL joins between the trade tables and Dimension tables, based on the relevant ID column and populating the surrogate key from the Dimension Table for each Instrument dimension ID value.

While moving data using the T2T processes, the account number linkage between Staging, Instrument, and Fact table records is preserved since the movement happens at an account level. In addition, the unique Account Number links the data flowing into Fact tables from both EPM instrument tables and ERM account level tables.

13.2.1 Prerequisites

Following are the prerequisites for Account Summary population:

1. Complete all the post-install steps mentioned in the Oracle Financial Services Analytical Applications Infrastructure (OFSAAI) Installation and Configuration Guide and the OFS MRMM installation Guide.
2. Application users must be mapped to a role that has the seeded batch execution function (BATPRO).
3. Before executing a batch, check if the following services are running on the application server:
   - Iccserver
   - Router
   - AM
   - Messageserver

   For details on how to check if the services are up and how to start the services if you find them not running, see the OFS Advanced Analytics Infrastructure User Guide.
4. Create Batches for executing the function. This is explained in the Executing the Account Summary Population T2T section.
5. Complete the Dimension Table Population steps before you execute the T2T batch. For more details, see Dimension Population.

13.2.2 Tables Used by the Account Summary Population T2T Process

Table to Table seeded definitions are provided for loading data into Fact Common Account Summary and Fact securities and commodity account summary.

Table 41: Table to Table Seeded Definitions

Sl. No.	Source Table Name	Destination Table Name	T2T Definition Name
1	STG_FUTURES	FCT_SEC_COMDTY_ACCT_SUMMARY	T2T_FUTURES_SEC_CMTY_ACCT_FCT_POP
		FCT_COMMON_ACCOUNT_SUMMARY	T2T_STG_FUTURES_CAS
2	STG_FORWARDS	FCT_SEC_COMDTY_ACCT_SUMMARY	T2T_FORWARDS_SEC_CMDTY_FCT_POP

Sl. No.	Source Table Name	Destination Table Name	T2T Definition Name
		FCT_COMMON_ACCOUNT_SUMMARY	T2T_STG_FORWARDS_CAS
3	STG_INVESTMENTS	FCT_SEC_COMDTY_ACCT_SUMMARY	T2T_INVESTMENTS_SEC_CMDTY_FCT_POP
		FCT_COMMON_ACCOUNT_SUMMARY	T2T_STG_INVESTMENTS_CAS
4	STG_MM_CONTRACTS	FCT_SEC_COMDTY_ACCT_SUMMARY	T2T_MM_CONTRACT_SEC_CMDTY_FCT_POP
		FCT_COMMON_ACCOUNT_SUMMARY	T2T_STG_MM_CAS
5	STG_SWAPS_CONTRACTS	FCT_SEC_COMDTY_ACCT_SUMMARY	T2T_SWAPS_CONTR_SEC_CMDTY_FCT_POP
		FCT_COMMON_ACCOUNT_SUMMARY	T2T_STG_SWAPS_CONTRACTS_CAS
6	STG_OPTION_CONTRACTS	FCT_SEC_COMDTY_ACCT_SUMMARY	T2T_OPTIONS_SEC_CMDTY_FCT_POP
		FCT_COMMON_ACCOUNT_SUMMARY	T2T_STG_OPTIONS_CAS

13.3 Executing the Account Summary Population T2T

This section details the process of executing Account Summary Population T2Ts.

Topics:

13.3.1 Executing Through Batch

The Fact Common Account Summary table must be loaded prior to loading any of the other Account Summary tables. You can execute the T2T component from the OFSAA Infrastructure ICC framework (accessed through the application Batch Operations window).

> **NOTE** Before executing Account Summary Population T2Ts, manually configure the SETUP_MASTER table with the required GAAP code. For an account, load only one GAAP_CODE to the Fact Common Account Summary. By default, the MRMM installer will seed the following entry into SETUP_MASTER. While executing through the batch, the RUN Skey will be defaulted to -1.

Table 42: GAAP Code

V_COMPONENT_ CODE	V_COMPONENT_DESC	V_COMPONENT_VALUE
DEFAULT_GAAP	DEFAULT_GAAP	USGAAP

Configuration: For all other GAAP codes, update the SETUP_MASTER table manually before running each Account Summary Population T2Ts.

13.3.2 Fact Common Account Summary Batch Execution

The following steps describe how to execute the MRMMBI Account Summary T2T processes from the OFSAAI Batch Processing framework.

You can execute the function from the **Operations** module of OFSAAI. Define a new Batch and an underlying Task definition from the **Batch Maintenance** window of OFSAAI.

Execute a seeded batch, <INFODOM>_MRMM_ACCT_SUMMARY_REP_POP for the required MIS Date.

Alternatively, follow these steps:

1. From the **Home** menu, click **Operations** and select **Batch Maintenance**.
2. Click **New Batch**. Enter the **Batch Name** and **Description**.
3. Click **Save**.
4. Click the check box in the **Batch Name** container to select the Batch, you created in the earlier step.
5. Enter the **Task ID** and **Description**.
6. Select **Load Data** from the **Components** list.
7. Select the following from the **Dynamic Parameters List**:
   - **Datastore Type**: Select the appropriate datastore from the list.
   - **Datastore Name:** Select the appropriate name from the list.
   - **IP address**: Select the IP address from the list.
   - **Load Mode**: Select Table to Table from the list.
   - **Source Name**: Select <T2T Source Name> from the list.
   - **File Name**: Select the T2T name for the source stage channel table you want to process. See the Tables Used by the Account Summary Population T2T Process section.
   - The data file name will be blank for any Table to Table Load mode.
   - The default value refers to currency calculation. If there is any need for currency conversion in T2T transactions, the Default value must be provided. For example, the default value is [DRCY]='USD', here 'USD' acts as the reporting currency parameter to T2T.
8. Repeat Steps 4 to 8 for adding the remaining T2Ts within the same batch definition.
9. Click **Save**. The Task definition is saved for the selected Batch.
10. Execute the Batch created in the preceding steps.
11. You can execute a Batch definition from the **Batch Execution** section of the OFSAAI **Operations** module.

13.4 Checking the Execution Status

The execution status can be monitored using the Batch Monitor window.

> **NOTE** For more comprehensive coverage of configuration and execution of a batch, see the OFS Advanced Analytics Infrastructure User Guide.

The status messages in Batch Monitor are:

- **N** - Not Started
- **O** - On Going
- **F** - Failure
- **S** – Success

You can access the execution log on the application server in the `$FIC_DB_HOME/log/t2t` directory. The file name contains the batch execution ID.

The error log table in the atomic schema is: FCT_COMMON_ACCOUNT_SUMMARY$

13.5 Account Summary T2Ts

You can retrieve the T2T definitions as an excel document for reference from the metadata browser of the **Unified Metadata Manager** (UMM) component of OFSAAI.

14 Dashboard - Home

The following table displays the page level filters which are applicable to all the reports in this dashboard.

Table 43: Parameters in the Dashboard - Home

Dashboard Name	Home
Subject Area	Not applicable
Page-Level Filters	• View Type • As of Date • Business definition • Business execution ID
Page-Level Display Parameters	Not applicable

The following reports are displayed as part of the Home dashboard:

- Variance
- Heat Map
- Metric by Stress Scenario
- Metric by Portfolio
- Top 10 Age On Book

14.1 Variance

This section describes the parameters of the Variance report.

Table 44: Variance Report Parameters

Report Name	Variance
Report Level Filters	Not applicable
Report Description	This report displays the variance in Portfolio Value (Mark-to-Market) over the previous working day.
Report Type	Tabular Report
Dimensions	Dim Portfolio
Base Measures	• MTM1 • MTM2
Computed Measures	Variance

14.2 Heat Map

This section describes the parameters of the Heat Map report.

Table 45: Heat Map Report Parameters

Report Name	Heat Map
Report Level Filters	• Stress Scenario • Metric: MTM, Delta, Gamma, Phi, Rho, Sigma, Theta, Vanna, Vega, Volga
Report Description	This report compares the values of key risk measures (Base Measures) across portfolios and stress scenarios. Users can identify portfolios with the highest risk (as measured by selected risk measure) under baseline and stress scenarios.
Report Type	**Graphical Report**: Heat Map
Dimensions	Dim Portfolio
Base Measures	• MTM • Delta • Gamma • Phi • Rho • Sigma • Theta • Vanna • Vega • Volga
Computed Measures	Not applicable

14.3 Metric by Stress Scenario

This section describes the parameters of the Metric by Stress Scenario report.

Table 46: Metric by Stress Scenario Report Parameters

Report Name	Metric by Stress Scenario
Report Level Filters	• Portfolio • Stress Scenario
Report Description	This report displays all risk measures computed by application for a selected portfolio and scenario.
Report Type	**Graphical report**: Radar Report
Dimensions	Stress Scenario

Report Name	Metric by Stress Scenario
Base Measures	• MTM • Delta • Gamma • Phi • Rho • Sigma • Theta • Vanna • Vega • Volga
Computed Measures	Not applicable

14.4 Metric by Portfolio

This section describes the parameters of the Metric by Portfolio report.

Table 47: Metric by Portfolio Report Parameters

Report Name	Metric by Portfolio
Report Level Filters	Stress Scenario
Report Description	This report displays risk metrics across portfolios in a single view. Users can compare results under selected stress scenarios.

Report Type	**Graphical report**:
	• Bar graph
	  ▪ Metrics are displayed on the x-axis.
	  ▪ Portfolios are displayed on the y-axis.

Dimensions	• Portfolio • Stress Scenario
Base Measures	• MTM • Delta • Gamma • Phi • Rho • Sigma • Theta • Vanna • Vega • Volga
Computed Measures	Not applicable

14.5 Top 10 Age on Book

This section describes the parameters of the Top 10 Age on Book report.

Table 48: Top 10 Age on Book Report Parameters

Report Name	Top 10 Age on Book
Report Level Filters	Rank
Report Description	This tabular report lists positions based on aging. The report is sorted based on age-on-book of each individual position.
Report Type	**Tabular report**: The following are displayed as column items: • Account Number • Age • MTM
Dimensions	Dim Account
Base Measures	MTM
Computed Measures	Not applicable

15 Dashboard - Portfolio

The following table displays the page level filters which are applicable to all the reports in this dashboard.

Table 49: Parameters in the Dashboard - Portfolio

Dashboard Name	Portfolio
Subject Area	Not applicable
Page-Level Filters	• As of Date • Business Definition • Execution ID • Portfolio
Page-Level Display Parameters	Not applicable

The following reports are displayed as part of the Portfolio dashboard:

- Portfolio Variance
- Heat Map
- Metric by Stress
- Portfolio Trend

15.1 Portfolio Variance

This section describes the parameters of the Portfolio Variance report.

Table 50: Portfolio Variance Report Parameters

Report Name	Portfolio Variance
Report Level Filters	• Metric • Asset Class • Reporting Currency • Stress Scenario
Report Description	This report compares portfolio value over two days. If there are multiple runs in a day, the last run is taken as reference for this report.
Report Type	**Graphical report**: Performance Tile and Gauge
Dimensions	Not applicable
Base Measures	• MTM1 • MTM2
Computed Measures	Variance

15.2 Heat Map

This section describes the parameters of the Heat Map report.

Table 51: Heat Map Report Parameters

Report Name	Heat Map
Report Level Filters	• Metric • Asset Class • Reporting Currency • Stress Scenario
Report Description	This report compares the values of key risk measures (Base Measures) stress scenarios and instrument types. Users can identify portfolios with the highest risk (as measured by selected risk measure) under baseline and stress scenarios.
Report Type	**Graphical report**: Heat Map
Dimensions	Account
Base Measures	MTM
Computed Measures	Not applicable

15.3 Metric by Stress

This section describes the parameters of the Metric by Stress report.

Table 52: Metric by Stress Report Parameters

Report Name	Metric by Stress
Report Level Filters	• Metric1 • Metric 2 • Stress Scenario
Report Description	This report enables the user to compare key risk metrics for a selected portfolio under baseline and stress scenarios.
Report Type	Graphical report • Bar Graph: ▪ x- axis: Metric1 ▪ y-axis: Metric2
Dimensions	Stress Scenario
Base Measures	• MTM • Delta • Gamma • Phi • Rho

	• Sigma • Theta • Vanna • Vega • Volga
Computed Measures	Not applicable

15.4 Portfolio Trend

This section describes the parameters of the Portfolio Trend report.

Table 53: Portfolio Trend Report Parameters

Report Name	Portfolio Trend
Report Level Filters	Not applicable
Report Description	This report displays the key risk measures on the last 30 executions of the selected portfolio.
Report Type	**Graphical report:** • Line Graph ▪ x-axis: Last 30 executions and date ▪ y-axis: Metrics
Dimensions	Date
Base Measures	• MTM • Delta • Gamma • Phi • Rho • Sigma • Theta • Vanna • Vega • Volga
Computed Measures	Not applicable

16 Dashboard - Trading Desk

The following table displays the page level filters which are applicable to all the reports in this dashboard.

Table 54: Parameters in the Dashboard – Trading Desk

Dashboard Name	Trading Desk
Subject Area	Not applicable
Page-Level Filters	• As of Date • Business Definition • Execution ID • Trading Desk • Metric • Asset Class • Reporting Currency • Stress Scenario
Page-Level Display Parameters	Not applicable

The following reports are displayed as part of the Trading Desk dashboard:

- Trading Desk Variance
- Heat Map
- Metric by Stress
- Trading Desk Trend

16.1 Trading Desk Variance

This section describes the parameters of the Trading Desk Variance report.

Table 55: Trading Desk Variance Report Parameters

Report Name	Trading Desk Variance
Report Level Filters	• Metric • Asset Class • Reporting Currency • Stress Scenario
Report Description	This report compares the trading desk portfolio value over 2 days. If there are multiple runs in a day, the last run is taken as reference for this report.
Report Type	**Graphical report**: Performance Tile and Gauge
Dimensions	Not applicable
Base Measures	• MTM1 • MTM2
Computed Measures	Variance

16.2 Heat Map

This section describes the parameters of the Heat Map report.

Table 56: Heat Map Report Parameters

Report Name	Heat Map
Report Level Filters	• Metric • Asset Class • Reporting Currency • Stress Scenario
Report Description	The heat map compares values of key risk measures (Base Measures) stress scenarios and instrument types. Users can identify trading desks with the highest risk (as measured by selected risk measure) under baseline and stress scenarios.
Report Type	**Graphical report**: Heat Map
Dimensions	Account
Base Measures	MTM
Computed Measures	Not applicable

16.3 Metric by Stress

This section describes the parameters of the Metric by Stress report.

Table 57: Metric by Stress Report Parameters

Report Name	Metric by Stress
Report Level Filters	• Metric1 • Metric 2 • Stress Scenario
Report Description	This report enables the user to compare key risk metrics for a selected trading desk under baseline and stress scenarios.
Report Type	**Graphical report**: • Bar Graph: ▪ x-axis: Metric1 ▪ y-axis: Metric2
Dimensions	Stress Scenario
Base Measures	• MTM • Delta • Gamma • Phi • Rho • Sigma • Theta • Vanna • Vega • Volga
Computed Measures	Not applicable

16.4 Trading Desk Trend

This section describes the parameters of the Trading Desk Trend report.

Table 58: Trading Desk Trend Report Parameters

Report Name	Trading Desk Trend
Report Level Filters	Not applicable
Report Description	This report displays the trend of the key risk measures on last 30 executions of the selected trading desk.
Report Type	**Graphical report:** • Line Graph ▪ x-axis: Last 30 executions and date ▪ y-axis: Metrics
Dimensions	Date
Base Measures	• MTM • Delta • Gamma • Phi • Rho • Sigma • Theta • Vanna • Vega • Volga
Computed Measures	Not applicable

17 Dashboard - Risk Factor

The following table displays the page level filters which are applicable to all the reports in this dashboard.

Table 59: Parameters in the Dashboard – Risk Factor

Dashboard Name	Risk factor
Subject Area	Not applicable
Page-Level Filters	• Risk factor • Risk factor By Business • Number of Days
Page-Level Display Parameters	Not applicable

The following reports are displayed as part of the Risk Factor dashboard:

- Value By Risk Factor

17.1 Value By Risk Factor

This section describes the parameters of the Value by Risk Factor report.

Table 60: Value by Risk Factor Report Parameters

Report Name	Value By Risk Factor
Report Level Filters	Not applicable
Report Description	This report lists all the market data that were used for risk and valuation computations.
Report Type	**Tabular Report** It has the following columns: • Risk Factor Name • Risk Factor Value
Dimensions	Risk Factor
Base Measures	Risk factor value
Computed Measures	Not applicable

18 Dashboard - Position

The following table displays the page level filters which are applicable to all the reports in this dashboard.

Table 61: Parameters in the Dashboard - Position

Dashboard Name	Position
Subject Area	Not applicable
Page-Level Filters	Not applicable
Page-Level Display Parameters	Not applicable

The following reports are displayed as part of the Position dashboard:

- Trade Output
- Cash Flow Report

18.1 Trade Output

This section describes the parameters of the Trade Output report.

Table 62: Trade Output Report Parameters

Report Name	Trade Output
Report Level Filters	Not applicable
Report Description	This is a detailed report on the results of the valuation process. The report provides metrics computed for each position included in the run.
Report Type	**Tabular Report**: It has the following columns: • Present Value • Present Value Pay Leg • Present Value Receive Leg • Fair Spread Pay • Fair Spread Receive • Accrued Interest • Clean Price • Dirty Price • Dirty Price Pay • Dirty Price Receive • Clean Price Pay • Clean Price Receive • Delta

	• Gamma • Fixing Date • Maturity Date • Settlement Date • Black Volatility • Bond Equivalent Yield • Break Even Spread • Call Probability • Cleaprice 100 Rcy • Contractual Spread • Conventional Spread • Convexity • Cpi Accrued Amount • Cpi Actual Value • Cpi Base • Cpi Present Value • Cpi Spot Rate • Current Yield • Default Probability • Delta Trader • Discount Margin • Discount Rate • Forward Delta • Forward Delta Trader • Forward Rate • Futures Delta • Futures Delta Trader • Gamma Trader • Holding Probability • Implied Forward Fx Rate • Implied Forward Points • Implied Volatility • Index Ratio • Index Value • Model Price • Model Price Adjustment • Model Value Delta • Model Value Rho • Modified Duration • Nominal Discount Factor • Nominal Yield • Normal Implied Volatility • Option Adjusted Spread • Option Present Value • Phi • Phi Trader

	• Predicted Forward Cpi Rate • Present Value Delta • Present Value Rho • Quote Margin • Recovery Rate • Rho • Rho Trader • Sigma • Spread • Strike • Theta • Vanna • Vanna Trader • Vega • Vega Trader • Volga • Volga Trader • Yield To Call • Yield To Maturity • Yield To Put • Yield To Worst • Z Spread • Implied Forward Price • V Account Number
Dimensions	Dim Account
Base Measures	
Computed Measures	Not applicable

18.2 Cash Flow Report

This section describes the parameters of the Cash Flow report.

Table 63: Cash Flow Report Parameters

Report Name	Cash Flow Report
Report Level Filters	Not applicable
Report Description	The cash flow report provides date level cash flows for each position. In addition to cash flow, the report also provides cash flow level metrics computed by application.
Report Type	**Tabular Report:** It has the following columns: • Accrual End Date • Accrual Start Date • Fixing Date • Payment Date • Caplet Price • Cashflow • Cashflow Present Value • Cash Flow Pv • Cashflow • Coupon Amount • Coupon Rate • Day Count • Day Count Fraction • Discount Factor • Fixed Cashflow • Floating Cashflow • Futures Price • Notional Amount Cashflow • Survival Probability • Swap Rate • Unit Delta • Unit Gamma • Unit Price • Unit Vega • Account Name
Dimensions	Dim Account
Base Measures	Fact MR Cash Flow Summary
Computed Measures	Not applicable

19 Dashboard – Risk Factor Sources

The following table displays the page level filters which are applicable to all the reports in this dashboard.

Table 64: Parameters in the Dashboard – Risk Factor Sources

Dashboard Name	Risk Factor Sources
Subject Area	MR Risk Factors – Sources
Page-Level Filters	• Date • Risk Factor Execution ID
Page-Level Display Parameters	Not applicable

The following reports are displayed as part of the Risk Factor Sources dashboard:

- Risk Factor Classification
- Risk Factor – Is Real
- Risk Factor Source Details
- Risk Factor Source Time - Series

19.1 Risk Factor Source Classification

This section describes the parameters of the Risk Factor Source Classification report.

Note: Only approved executions are viewable in the report.

Table 65: Risk Factor Source Classification Report Parameters

Report Name	Risk Factor Source Classification
Report Level Filters	Not applicable
Report Description	The Risk Factor Source classification report provides the break-up of risk factors into different Regulatory Risk Class.
Report Type	**Tabular Report**: It has the following columns: Regulatory Risk Class • CSR - Securitizations CTP • CSR - Securitizations non-CTP • Commodity Risk • Credit Spread Risk CSR • Equity Risk • Foreign Exchange Risk • General Interest Rate Risk – GIRR

	It has the following rows: • Source • Custom • Download • Missing • Numerix • **Graphical Report**: • Pie Chart provides the further granular break-up of the sources of risk factors across the Regulatory Risk classes.
Dimensions	• Dim MR Risk Factor • Dim Dates • Dim MR Workflow Status
Base Measures	Real Price value
Computed Measures	Not applicable

19.2 Risk Factor Source – Is Real

This section describes the parameters of the Risk Factor Source – Is Real report.

Note: Only approved executions are viewable in the report.

Table 66: Risk Factor Source – Is Real Report Parameters

Report Name	Risk Factor Source – Is Real
Report Level Filters	Not applicable
Report Description	The Risk Factor Source – Is Real Report provides the breakup of the Risk factors into Real and Not Real.
Report Type	**Tabular Report**: It has the following columns: • CSR - Securitizations CTP • CSR - Securitizations non-CTP • Commodity Risk • Credit Spread Risk CSR • Equity Risk • Foreign Exchange Risk • General Interest rate Risk – GIRR It has the following rows: • Is real • Nor real • Real • Grand Total: • **Graphical Report:** • Bar Graph. ▪ The y-axis displays the Regulatory Risk Class

	▪ The x-axis displays the Count of Risk Factors
Dimensions	• Dim MR Risk Factor • Dim Dates • Dim MR Workflow Status
Base Measures	Count of Risk Factors
Computed Measures	Not applicable

19.3 Risk Factor Source Details

This section describes the parameters of the Risk Factor Source Details report.

Note: Only approved executions are viewable in the report.

Table 67: Risk Factor Source Details Report Parameters

Report Name	Risk Factor Source Details
Report Level Filters	• Risk Class • Source of Data
Report Description	This report provides the drill-down based on the regulatory risk classes and source of data.
Report Type	**Tabular Report**: It has the following columns: • Source of Value • Risk Factor • Regulatory Risk Class • Source of Data • Bucketed RF • Value
Dimensions	• Dim MR Risk Factor • Dim Dates • Dim MR Workflow Status
Base Measures	Real Price value
Computed Measures	Not applicable

19.4 Risk Factor Source Time - Series

This section describes the parameters of the Risk Factor Time - Series report.

Note: Only approved executions are viewable in the report.

Table 68: Risk Factor Source Time - Series Report Parameters

Report Name	Risk Factor Time – Series
Report Level Filters	• Risk Factor • Period from • Period To
Report Description	This report provides the line graph of the Real Price value over the user-specified interval.
Report Type	• **Graphical Report**: Line Graph • The y-axis displays Real Price Value • The x-axis displays the Calendar Date
Dimensions	• Dim MR Risk Factor • Dim Dates • Dim MR Workflow Status
Base Measures	Real Price Value
Computed Measures	Not applicable

20 Dashboard – Risk Factor RFET Results

The following table displays the page level filters which are applicable to all the reports in this dashboard.

Table 69: Parameters in the Dashboard – Risk Factor RFET Results

Dashboard Name	Risk Factor RFET Results
Subject Area	MR Risk Factors: Sources
Page-Level Filters	As of Date
Page-Level Display Parameters	Not applicable

The following reports are displayed as part of the Risk Factor RFET Results dashboard:

- MR Risk Factor Eligibility Test Result Summary
- MR Risk factor Eligibility Test Result
- MR Risk Factor RFET Status Change
- Risk Class - Instrument Type
- Risk Class - Instrument Breakdown

20.1 MR Risk Factor Eligibility Test Result Summary

This section describes the parameters of the MR Risk Factor Eligibility Test Result Summary report.

Note: Only approved executions are viewable in the report.

Table 70: MR Risk Factor Eligibility Test Result Summary Report Parameters

Report Name	MR Risk Factor Eligibility Test Result Summary
Report Level Filters	Default applied Filter: Workflow Status Code is “AP”
Report Description	This report provides the count of Modellable and Non-modellable risk factors across the regulatory risk class.
Report Type	• **Graphical Report**: Bar Graph • X axis: Risk Class (Modellable/Non-Modellable) • Y-axis: Count of Risk Factors
Dimensions	• Dim MR Risk Factor • Dim MR Workflow Status • Dim Dates
Base Measures	Count of Risk Factors
Computed Measures	Not applicable

20.2 MR Risk Factor Eligibility Test Result

This section describes the parameters of the MR Risk factor Eligibility Test Result report.

Note: Only approved executions are viewable in the report.

Table 71: MR Risk factor Eligibility Test Result Report Parameters

Report Name	MR Risk factor Eligibility Test Result
Report Level Filters	• Risk Class • Modellable
Report Description	This report provides the results and details of the RFET testing.
Report Type	**Tabular Report**: It has the following columns: • Risk Class • Risk Factor • Bucketed RF • Modellable • Source of Value
Dimensions	• Dim MR Risk Factor • Dim MR Workflow Status • Dim Dates
Base Measures	Not applicable
Computed Measures	Not applicable

20.3 MR Risk Factor RFET Status Change

This section describes the parameters of the MR Risk Factor RFET Status Change report.

Note: Only approved executions are viewable in the report.

Table 72: MR Risk Factor RFET Status Change Report Parameters

Report Name	MR Risk Factor RFET Status Change
Report Level Filters	• As of Date • Previous Date • Risk Class • Risk Factor
Report Description	This Report provides the RFET result (Modellable/Non-Modellable) status change between two days.
Report Type	**Tabular Report**: It has the following columns: • Risk Factor • Modellable Flag
Dimensions	• Dim MR Risk Factor Bucket • Dim MR Risk Factor • Dim Instrument Contract • Dim Dates
Base Measures	Not applicable
Computed Measures	Not applicable

20.4 Risk class- Instrument Type

This section describes the parameters of the Risk Class - Instrument Type report.

Table 73: Risk class- Instrument Type Report Parameters

Report Name	Risk class- Instrument Type
Report Level Filters	Risk Class
Report Description	This report provides the breakup of Instruments that are used for the Bucketing approach testing of the RFET test.
Report Type	• **Graphical Report**: Bar Graph • y-axis displays Transactions (Count) • The x-axis displays the Instrument Type (Instrument Types)
Dimensions	• Dim MR Risk Factor Bucket • Dim MR Risk Factor • Dim Instrument Contract • Dim Dates

Base Measures	Count of Risk Factors
Computed Measures	Not applicable

20.5 Risk class- Instrument Breakdown

This section describes the parameters of the Risk Class - Instrument Breakdown report.

Table 74: Risk class- Instrument Breakdown Report Parameters

Report Name	Risk class- Instrument Breakdown
Report Level Filters	Not applicable
Report Description	This report provides the details of the Instruments types that were referred for the RFET test under the bucketing approach.
Report Type	**Tabular Report**: It has the following columns: • Instrument type • Instrument Name • Currency • Risk Factor
Dimensions	• Dim MR Risk Factor Bucket • Dim MR Risk Factor • Dim Instrument Contract • Dim Dates
Base Measures	Not applicable
Computed Measures	Not applicable

21 Dashboard – Model Validation Summary

The following table displays the page level filters which are applicable to all the reports in this dashboard.

Table 75: Parameters in the Dashboard – Model Validation Summary

Dashboard Name	Model Validation Summary
Subject Area	MR Model Validation
Page-Level Filters	As of Date
Page-Level Display Parameters	Not applicable

The following reports are displayed as part of the Model Validation Summary dashboard:

- Backtesting Model Validation Summary
- Profit and Loss Attribution Test Summary

21.1 Backtesting Model Validation Summary

This section describes the parameters of the Model Validation Summary report.

Note: The application considers the latest execution ID for Portfolio and Confidence Interval %.

Table 76: Backtesting Model Validation Summary Report Parameters

Report Name	Backtesting Model Validation Summary
Report Level Filters	Not applicable
Report Description	This report provides a consolidated view of the backtesting in a single screen for different portfolios that were executed as part of the Profit and Loss attribution test.
Report Type	**Tabular Report:** • The report includes three sub-reports: • **VaR at 97.5% confidence** It has the following columns: ▪ Portfolio ▪ Zone ▪ Range ▪ Number of Exceptions • **VaR at 99 % confidence** It has the following columns: ▪ Portfolio ▪ Zone ▪ Range

	▪ Number of Exceptions • **Backtesting Combined Result (97.5 % and 99 % confidence)** It has the following columns: ▪ Portfolio ▪ Zone
Dimensions	• Dim MR MDLVAL Business Definition • Dim MR Portfolio • Dim Date • Dim MR Backtesting Zones
Base Measures	No. of Exceptions
Computed Measures	Not applicable

21.2 Profit and Loss Attribution Test Summary

This section describes the parameters of the Profit and Loss Attribution Test Summary report.

Note: The application considers the latest execution ID for Portfolio.

Table 77: Profit and Loss Attribution Test Summary Report Parameters

Report Name	Profit and Loss Attribution Test Summary
Report Level Filters	Not applicable
Report Description	This summary report provides a consolidated view of the Profit and Loss Attribution test summary in a single screen for different Portfolios that were executed as part of the profit and loss attribution test.
Report Type	**Tabular Report:** It has the following columns: • Portfolio • Zone • KS test metric • Spearman Correlation metric
Dimensions	• Dim MR MDLVAL Business Definition • Dim MR Portfolio • Dim Date • Dim MR MDLVAL P&L Zones
Base Measures	• KS Test Metric Final Value • Spearman Correlation Metric Final value
Computed Measures	Not applicable

22 Dashboard – Backtesting Trading Desk

The following table displays the page level filters which are applicable to all the reports in this dashboard.

Table 78: Parameters in the Dashboard – Backtesting Trading Desk

Dashboard Name	Backtesting Trading Desk
Subject Area	MR Model Validation
Page-Level Filters	• As of Date • Portfolio • Confidence Leve; (%) **NOTE**: The latest Execution ID at Portfolio and Confidence Interval % as on date is considered for execution.
Page-Level Display Parameters	Not applicable

The following report is displayed as part of the Backtesting Trading Desk dashboard:

- Backtesting Trading Desk Level

22.1 Backtesting Trading Desk Level

This section describes the parameters of the Backtesting Trading Desk Level.

Table 79: Backtesting Trading Desk Level Report Parameters

Report Name	Backtesting Trading Desk Level
Report Level Filters	Not applicable
Report Description	This report provides detailed information on day wise exceptions of Hypothetical P&L and Actual P&L along with the total exceptions and zone classification.
Report Type	**Tabular Report:** It has the following columns: ▪ Date ▪ VaR ▪ Actual PL ▪ Hypothetical PL ▪ Difference (APL-VaR) ▪ Difference (HPL - VaR) ▪ Exception (APL/VaR) ▪ Exception (HPL/VaR)Range **Graphical Reports:** • Line Graph: ▪ x-axis displaying Date

	▪ y-axis displaying Var, Actual PL, Hypothetical PL • Line graph: ▪ x-axis representing Date ▪ y-axis representing Difference (APL-VaR) and Difference (APL-VaR) • Bar Graph: ▪ x-axis representing Exception/No Exception ▪ y-axis representing Count of Exceptions (APL/VaR) • Bar Graph: ▪ x-axis representing Exception/No Exception ▪ y-axis representing Count of Exceptions (HPL/VaR)
Dimensions	• Dim MR MDLVAL Business Definition • Dim MR Portfolio • Dim Date • Dim MR Backtesting Zones
Base Measures	Not applicable
Computed Measures	Not applicable

23 Dashboard – Profit and Loss Attribution Test Details

The following table displays the page level filters which are applicable to all the reports in this dashboard.

Table 80: Parameters in the Dashboard –Profit and Loss Attribution Test Details

Dashboard Name	Profit and Loss Attribution Test Details
Subject Area	MR Model Validation
Page-Level Filters	• As of Date • Portfolio
Page-Level Display Parameters	Not applicable

The following report is displayed as part of the Profit and Loss Attribution Test Details dashboard:

- Profit and Loss Attribution Test Criteria

23.1 Profit and Loss Attribution Test Criteria

This section describes the parameters of the Profit and Loss Attribution Test Criteria report.

Table 81: Profit and Loss Attribution Test Criteria Report Parameters

Report Name	Profit and Loss Attribution Test Criteria
Report Level Filters	Not applicable
Report Description	This report provides detail on the day-wise rank of HPL; Rank of RTPL; Expected Cumulative Distribution function (RTPL); Expected Cumulative Distribution function (RTPL); Expected Cumulative Distribution function (RTPL) and KS test and Spearman correlation output along with the zone classification.

Report Type	**Tabular Report**:
	It has the following columns:
	• Date
	• RTPL
	• HPL
	• KS test Details
	  ▪ Expected Distribution RTPL
	  ▪ Expected Distribution HPL
	  ▪ Difference between Expected Distribution
	• Spearman Correlation Test Details
	  ▪ Rank of RTPL (RRTPL)
	  ▪ Rank of HPL (RHPL))

	Graphical Reports: • Scatter Plot Chart: ▪ x-axis representing Rank of HPL(RHPL) ▪ y-axis representing Rank of RTPL (RRTPL) • Line Graph: ▪ x-axis representing Date ▪ y-axis representing Difference Between Expected Distribution (RTPL and HPL)
Dimensions	• Dim MR MDLVAL Business Definition • Dim MR Portfolio • Dim Date • Dim MR MDLVAL P&L Zones
Base Measures	• RTPL • HPL
Computed Measures	Not applicable

24 Dashboard – FRTB Summary

The following table displays the page level filters which are applicable to all the reports in this dashboard.

Table 82: Parameters in the Dashboard –FRTB Summary

Dashboard Name	FRTB Summary
Subject Area	MR Historical Simulation
Page-Level Filters	• Business Execution Date • Portfolios
Page-Level Display Parameters	Not applicable

The following report is displayed as part of the FRTB Summary dashboard:

- FRTB Summary
- IMCC Summary

24.1 FRTB Summary

This section describes the parameters of the FRTB Summary report.

Table 83: FRTB Summary Report Parameters

Report Name	FRTB Summary
Report Level Filters	Not applicable
Report Description	This report provides information on the component-wise break-up of different elements of IMA capital charge.
Report Type	• **Tabular Report:** It has the following columns: • Portfolio • IMCC • SES (Total) • Final Capital Charge
Dimensions	Dim MR Hist Simulation Business
Base Measures	• IMCC • SES Total • Final Capital Charge
Computed Measures	Not applicable

24.2 IMCC Summary

This section describes the parameters of the IMCC Summary report.

Table 84: IMCC Summary Report Parameters

Report Name	IMCC Summary
Report Level Filters	Not applicable
Report Description	This report displays the IMCC values for 10 days (default configuration) and provides a graphical representation for the IMCC Values of 10 days. This feature enables the users to get a sense of IMCC fluctuation during a two-week period.
Report Type	**Tabular Report:** This report includes two sub-reports: IMCC Summary It has the following rows: • Portfolios • Total • Portfolio MR **Graphical Report** • IMCC Historical Graph • Bar Graph ▪ x-axis representing Date ▪ y-axis representing IMCC Value
Dimensions	Dim MR Hist Simulation Business
Base Measures	Internally Modeled Capital Charge in Reporting Currency
Computed Measures	Not applicable

25 Dashboard – VaR Summary

The following table displays the page level filters which are applicable to all the reports in this dashboard.

Table 85: Parameters in the Dashboard –VaR Summary

Dashboard Name	VaR Summary
Subject Area	MR Historical Simulation
Page-Level Filters	• Business Execution Date • Portfolios
Page-Level Display Parameters	Not applicable

The following report is displayed as part of the VaR Summary dashboard:

- VaR Summary

25.1 VaR Summary

This section describes the parameters of the VaR Summary report.

Table 86: VaR Summary Report Parameters

Report Name	VaR Summary
Report Level Filters	Not applicable
Report Description	This report provides portfolio wise VaR, ES and Component VaR for different Confidence level and horizon (i.e. 1day 99%, 10 day 99% and 10 day 97.5%).
Report Type	**Tabular Report:** It has the following columns: (Illustrative columns based on the assumption that 1-day 99%, 10-day 99% and 10-day 97.5% execution are performed) • 1-Day: 99 % (ES, VAR) • 10-Day: 99 % (ES, VAR) • 1-Day: 97.5 % (ES, VAR) • 10-Day: 97.5 % (ES, VAR) It has the following rows: • Portfolios • Grand Total • Portfolio MR
Dimensions	• Dim MR Hist Simulation Business • Dim Date
Base Measures	Expected Tail Loss in Reporting Currency
Computed Measures	Not applicable

26 Dashboard – Component VaR

The following table displays the page level filters which are applicable to all the reports in this dashboard.

Table 87: Parameters in the Dashboard - Component VaR

Dashboard Name	Component VaR
Subject Area	MR Historical Simulation
Page-Level Filters	• Business Execution Date • Portfolios
Page-Level Display Parameters	Not applicable

The following reports are displayed as part of the Component VaR dashboard:

- Portfolio VaR
- Component VaR
- Profit & Loss - Trade
- Profit & Loss - Portfolio
- Profit & Loss - Histogram
- Profit & Loss - Graph

26.1 Portfolio VaR

This section describes the parameters of the Portfolio VaR report.

Table 88: Portfolio VaR Report Parameters

Report Name	Portfolio VaR
Report Level Filters	Not applicable
Report Description	This report provides the VaR of the selected portfolio.
Report Type	**Tabular Report:** It has the following columns: • Portfolio • Simulated Value • Net Present Value • Var It has the following row: • Portfolios are listed as rows.
Dimensions	• Portfolio

Base Measures	• Simulated Value • Net Present Value • Var
Computed Measures	Not Applicable

26.2 Component VaR

This section describes the parameters of the Component VaR report.

Table 89: Component VaR Report Parameters

Report Name	Component VaR
Report Level Filters	Analyze By
Report Description	This report provides the Component VaR for a selected portfolio. The lower most granularity of the component VaR is at the account level.
Report Type	**Tabular Report:** It has the following columns: • Trade ID • Simulated Value • Net Present Value • CVar It has the following row: • Trade IDs are listed
Dimensions	Trade ID
Base Measures	• Simulated Value • Net Present Value CVar
Computed Measures	NA

26.3 Profit & Loss - Trade

This section describes the parameters of the Profit & Loss - Trade report.

Table 90: Profit & Loss - Trade Report Parameters

Report Name	Profit & Loss - Trade
Report Level Filters	Trade ID
Report Description	This report provides the daily P&L of a selected trade.
Report Type	**Tabular Report:** It has the following columns:

	• Trade ID • Market ID • Simulated Value • Net Present Value • Profit & Loss It has the following row: • Trade IDs are listed
Dimensions	• Trade ID • Market ID
Base Measures	• Simulated Value • Net Present Value • Profit & Loss
Computed Measures	NA

26.4 Profit & Loss - Portfolio

This section describes the parameters of the Profit & Loss - Portfolio report.

Table 91: Profit & Loss - Portfolio Report Parameters

Report Name	Profit & Loss - Portfolio
Report Level Filters	Portfolio
Report Description	This report provides the daily P&L of a selected portfolio.
Report Type	**Tabular Report:** It has the following columns: • Portfolio • Market ID • Simulated Value • Net Present Value • Profit & Loss It has the following row: • Portfolios are listed
Dimensions	• Portfolio • Market ID
Base Measures	• Simulated Value • Net Present Value • Profit & Loss
Computed Measures	NA

26.5 Profit & Loss - Histogram

This section describes the parameters of the Profit & Loss - Histogram report.

Table 92: Profit & Loss - Histogram Report Parameters

Report Name	Profit & Loss - Histogram
Report Level Filters	Trade ID
Report Description	This report provides the histogram graph based on the daily P&L of a selected trade.
Report Type	**Graphical Report:** • x-axis displays Profit & Loss • y-axis displays Count of Market IDs
Dimensions	• Market ID • Trade ID
Base Measures	Profit and Loss
Computed Measures	NA

26.6 Profit & Loss - Graph

This section describes the parameters of the Profit & Loss - Graph report.

Table 93: Profit & Loss - Graph Report Parameters

Report Name	Profit & Loss - Graph
Report Level Filters	Not applicable
Report Description	This report provides the graph of the simulated Present Value and Net Present Value.
Report Type	**Graphical Report:** • x-axis displays Market ID • y-axis displays Simulated Value, Net Present Value
Dimensions	• Market ID • Trade ID
Base Measures	• Simulated PV • Net Present Value
Computed Measures	NA

27 Dashboard – ES Breakup

The following table displays the page level filters which are applicable to all the reports in this dashboard.

Table 94: Parameters in the Dashboard – ES Breakup

Dashboard Name	ES Breakup
Subject Area	MR Historical Simulation
Page-Level Filters	• Business Execution Date • Portfolios
Page-Level Display Parameters	Not applicable

The following reports are displayed as part of the ES Breakup dashboard:

- Liquidity Adjusted ES (Full Set, Current Period)
- Liquidity Adjusted ES (Full Set, Current Period) Liquidity Horizon wise Breakup
- Liquidity Adjusted ES (Reduced Set, Current Period)
- Liquidity Adjusted ES (Reduced Set, Current Period) Liquidity Horizon wise Breakup
- Liquidity Adjusted ES (Reduced Set, Stress Period)
- Liquidity Adjusted ES (Reduced Set, Stress Period) Liquidity Horizon wise Breakup

27.1 Liquidity Adjusted ES (Full Set, Current Period)

This section describes the parameters of the Liquidity adjusted ES (Full Set, Current Period) report.

Table 95: Liquidity Adjusted ES (Full Set, Current Period) Report Parameters

Report Name	Liquidity Adjusted ES (Full Set, Current Period)
Report Level Filters	Not applicable
Report Description	This report provides the Liquidity Adjusted ES (Full Set, Current Period) across different regulatory asset classes (IR, EQ, CR, and so on) and at a combined level.
Report Type	**Tabular Report:** It has the following columns: • ES Type • Total It has the following rows: • Full Set of Risk Factors (Current Period) - All • Full Set of Risk Factors (Current Period) - CMDTY • Full Set of Risk Factors (Current Period) - CR • Full Set of Risk Factors (Current Period) - EQ • Full Set of Risk Factors (Current Period) - FX

	• Full Set of Risk Factors (Current Period) - IR
Dimensions	Dim MR Hist Simulation Business
Base Measures	Expected Tail Loss in Reporting Currency
Computed Measures	Not applicable

27.2 Liquidity Adjusted ES (Full Set, Current Period) Liquidity Horizon Wise Breakup

This section describes the parameters of the Liquidity Adjusted ES (Full Set, Current Period) Liquidity Horizon wise Breakup report.

Table 96: Liquidity Adjusted ES (Full Set, Current Period) Liquidity Horizon wise Breakup Report Parameters

Report Name	Liquidity Adjusted ES (Full Set, Current Period) Liquidity Horizon wise Breakup
Report Level Filters	Not applicable
Report Description	This report provides the Liquidity Adjusted ES (Full Set, Current Period) across different regulatory asset classes (IR, EQ, CR, and so on) and at a combined level in the tabular form.
Report Type	**Tabular Report:** It has the following columns: • ES Type • Liquidity horizon (10, 20, 40, 60, 120) It has the following rows: • Full Set of Risk Factors (Current Period) - All • Full Set of Risk Factors (Current Period) - CMDTY • Full Set of Risk Factors (Current Period) - CR • Full Set of Risk Factors (Current Period) - EQ • Full Set of Risk Factors (Current Period) - FX • Full Set of Risk Factors (Current Period) - IR **Graphical Report**: • x-axis representing ES Type • y-axis representing Liquidity Horizon
Dimensions	Dim MR Hist Simulation Business
Base Measures	Expected Tail Loss in Reporting Currency
Computed Measures	Not applicable

27.3 Liquidity Adjusted ES (Reduced Set, Current Period)

This section describes the parameters of the Liquidity Adjusted ES (Reduced Set, Current Period) report.

Table 97: Liquidity Adjusted ES (Reduced Set, Current Period) Report Parameters

Report Name	Liquidity Adjusted ES (Reduced Set, Current Period)
Report Level Filters	Not applicable
Report Description	This report provides the Liquidity Adjusted ES (Reduced Set, Current Period) across different regulatory asset classes (IR, EQ, CR, and so on) and at a combined level in the tabular form.
Report Type	**Tabular Report**: It has the following columns: • ES Type • Total It has the following rows: • Reduced Set of Risk Factors (Current Period) - All • Reduced Set of Risk Factors (Current Period) - CMDTY • Reduced Set of Risk Factors (Current Period) - CR • Reduced Set of Risk Factors (Current Period) - EQ • Reduced Set of Risk Factors (Current Period) - FX • Reduced Set of Risk Factors (Current Period) - IR
Dimensions	Dim MR Hist Simulation Business
Base Measures	Expected Tail Loss in Reporting Currency
Computed Measures	Not applicable

27.4 Liquidity Adjusted ES (Reduced Set, Current Period) Liquidity Horizon wise Breakup

This section describes the parameters of the Liquidity Adjusted ES (Reduced Set, Current Period) Liquidity Horizon wise Breakup report.

Table 98: Liquidity Adjusted ES (Reduced Set, Current Period) Liquidity Horizon wise Breakup Report Parameters

Report Name	Liquidity Adjusted ES (Reduced Set, Current Period) Liquidity Horizon wise Breakup
Report Level Filters	Not applicable
Report Description	This report provides the Liquidity Adjusted ES (Reduced Set, Current Period) across different regulatory asset classes (IR, EQ, CR, and so on) and at the combined level.

Report Type	**Tabular Report**: It has the following columns: • ES Type • Liquidity horizon (10, 20, 40, 60, 120) It has the following rows: • Reduced Set of Risk Factors (Current Period) - All • Reduced Set of Risk Factors (Current Period) - CMDTY • Reduced Set of Risk Factors (Current Period) - CR • Reduced Set of Risk Factors (Current Period) - EQ • Reduced Set of Risk Factors (Current Period) - FX • Reduced Set of Risk Factors (Current Period) - IR **Graphical Report:** • x-axis representing ES Type • y-axis representing Liquidity Horizon
Dimensions	Dim MR Hist Simulation Business
Base Measures	Expected Tail Loss in Reporting Currency
Computed Measures	Not applicable

27.5 Liquidity Adjusted ES (Reduced Set, Stress Period)

This section describes the parameters of the Liquidity Adjusted ES (Reduced Set, Stress Period) report.

Table 99: Liquidity Adjusted ES (Reduced Set, Stress Period) Report Parameters

Report Name	Liquidity Adjusted ES (Reduced Set, Stress Period)
Report Level Filters	Not applicable
Report Description	This report provides the Liquidity Adjusted ES (Reduced Set, Stress Period) across different regulatory asset classes (IR, EQ, CR, and so on) and at the combined level.
Report Type	**Tabular Report:** It has the following columns: • ES Type • Total It has the following rows: • Reduced Set of Risk Factors (Stress Period) - All • Reduced Set of Risk Factors (Stress Period) - CMDTY • Reduced Set of Risk Factors (Stress Period) - CR • Reduced Set of Risk Factors (Stress Period) - EQ • Reduced Set of Risk Factors (Stress Period) - FX • Reduced Set of Risk Factors (Stress Period) - IR
Dimensions	Dim MR Hist Simulation Business

Base Measures	Expected Tail Loss in Reporting Currency
Computed Measures	Not applicable

27.6 Liquidity Adjusted ES (Reduced Set, Stress Period) Liquidity Horizon wise Breakup

This section describes the parameters of the Liquidity Adjusted ES (Reduced Set, Stress Period) Liquidity Horizon wise Breakup report.

Table 100: Liquidity Adjusted ES (Reduced Set, Stress Period) Liquidity Horizon wise Breakup Report Parameters

Report Name	Liquidity Adjusted ES (Reduced Set, Stress Period) Liquidity Horizon wise Breakup
Report Level Filters	Not applicable
Report Description	This report provides the Liquidity Adjusted ES (Reduced Set, Stress Period) across different regulatory asset classes (IR, EQ, CR, and so on) and at the combined level.
Report Type	**Tabular Report**: It has the following columns: • ES Type • Liquidity horizon (10, 20, 40, 60, 120) It has the following rows: • Reduced Set of Risk Factors (Stress Period) - All • Reduced Set of Risk Factors (Stress Period) - CMDTY • Reduced Set of Risk Factors (Stress Period) - CR • Reduced Set of Risk Factors (Stress Period) - EQ • Reduced Set of Risk Factors (Stress Period) - FX • Reduced Set of Risk Factors (Stress Period) - IR **Graphical Report**: • x-axis representing ES Type • y-axis representing Liquidity Horizon
Dimensions	Dim MR Hist Simulation Business
Base Measures	Expected Tail Loss in Reporting Currency
Computed Measures	Not applicable

28 Dashboard – VaR Analyze By

The following table displays the page level filters which are applicable to all the reports in this dashboard.

Table 101: Parameters in the Dashboard – VaR Analyze By

Dashboard Name	VaR Analyze By
Subject Area	MR Historical Simulation
Page-Level Filters	• Business Execution Date • Portfolios
Page-Level Display Parameters	Not applicable

The following reports are displayed as part of the VaR Analyze By dashboard:

- VaR Analyze By

28.1 VaR Analyze By

This section describes the parameters of the VaR-Analyze By report.

Table 102: VaR-Analyze By Report Parameters

Report Name	VaR-Analyze By
Report Level Filters	Analyze By (organizational Unit, Issuer Type)
Report Description	This report enables users to select various dimensions (which were selected at the time of the VaR execution) for analyzing the VaR at a different level. Analyze By functionality enables you to view the VaR outputs at different dimensions granularity. For a selected dimension, the application creates the tree structure of its nodes and provides the output.
Report Type	**Tabular Report:** It has the following columns: • Organisation Unit • Account • Var It has the following rows: • Organisation Units are listed
Dimensions	• Dim Account • Dim Org Unit • Dim Issuer Type • Dim Date
Base Measures	VaR
Computed Measures	Not applicable

29 Dashboard – Monte Carlo VaR

The following table displays the page level filters which are applicable to all the reports in this dashboard.

Table 103: Parameters in the Dashboard - Monte Carlo VaR

Dashboard Name	Monte Carlo VaR
Subject Area	MR Monte Carlo
Page-Level Filters	• Portfolio • MIS Date • Definition • EOD Execution • Execution ID • Amount In • Entity Name • Parent Counterparty ID • Adjustment Type
Page-Level Display Parameters	Not applicable

The following reports are displayed as part of the Component VaR dashboard:

- Monte Carlo VaR
- Monte Carlo VaR Graph

29.1 Monte Carlo VaR

This section describes the parameters of the Monte Carlo VaR report.

Table 104: Monte Carlo VaR Report Parameters

Report Name	Monte Carlo VaR
Report Level Filters	Not applicable
Report Description	This report provides the Monte-Carlo VaR at the counterparty level.
Report Type	**Tabular Report:** It has the following columns: • Portfolio • Entity Name • Parent counterparty ID • Adjustment type • 1-Day -95% - Value at Risk • 1-Day -95% - Expected Shortfall

	It has the following row: • Portfolios are listed
Dimensions	• Portfolio • Entity Name • Parent counterparty ID • Adjustment type
Base Measures	• Value at Risk • Expected Shortfall
Computed Measures	NA

29.2 Monte Carlo VaR-Graph

This section describes the parameters of the Monte Carlo VaR-Graph report.

Table 105: Monte Carlo VaR-Graph Report Parameters

Report Name	Profit & Loss - Histogram
Report Level Filters	Trade ID
Report Description	This report provides a graphical representation of the Monte-Carlo VaR at the counterparty level.
Report Type	**Graphical Report:** • x-axis displays Observation Date • y-axis displays Value at Risk, Expected Shortfall (ETL)
Dimensions	• Portfolio • Entity Name • Parent counterparty ID • Adjustment type
Base Measures	• Value at Risk • Expected Shortfall
Computed Measures	NA

30 Dashboard – XVA

The following table displays the page level filters which are applicable to all the reports in this dashboard.

Table 106: Parameters in the Dashboard - XVA

Dashboard Name	XVA
Subject Area	MR Monte Carlo
Page-Level Filters	• Portfolio • MIS Date • Definition • EOD Execution • Execution ID • Amount In • Entity Name • Parent Counterparty ID • Counterparty • XVA Result Type
Page-Level Display Parameters	Not applicable

The following reports are displayed as part of the Component VaR dashboard:

- XVA Details
- Trade Level XVA

30.1 XVA Details

This section describes the parameters of the XVA Details report.

Table 107: XVA Details Report Parameters

Report Name	XVA Details
Report Level Filters	Not applicable
Report Description	This report provides the XVA measure such as CVA, BVA, DVA, XVA and so on at the Counterparty level.
Report Type	**Tabular Report:** It has the following columns: • Portfolio • Entity Name • Parent counterparty ID • Counterparty ID • Netting • Sub-netting

	• XVA Result Type • BCVA Unilateral • BCVA Bilateral • Collateral VA • CVA Unilateral • CVA Bilateral • DVA Unilateral • DVA Bilateral • Funding Cost Adjustment • Funding Value Adjustment • Capital Valuation Adjustment It has the following row: • Portfolios are listed
Dimensions	• Portfolio • Entity Name • Parent counterparty ID • Counterparty ID • Netting • Sub-netting • XVA Result Type
Base Measures	• BCVA Unilateral • BCVA Bilateral • Collateral VA • CVA Unilateral • CVA Bilateral • DVA Unilateral • DVA Bilateral • Funding Cost Adjustment • Funding Value Adjustment • Capital Valuation Adjustment
Computed Measures	NA

30.2 Trade Level XVA

This section describes the parameters of the Trade Level XVA report.

Table 108: Trade Level XVA Report Parameters

Report Name	Trade Level XVA
Report Level Filters	Not applicable
Report Description	This report provides the XVA measures such as CVA, BVA, DVA, XVA and so on at the trade level for a Counterparty.
Report Type	**Tabular Report:** It has the following columns:

	• Portfolio • Entity Name • Parent counterparty ID • Counterparty ID • Netting • Sub-netting • XVA Result Type • Account Number • BCVA Unilateral • BCVA Bilateral • Collateral VA • CVA Unilateral • CVA Bilateral • DVA Unilateral • DVA Bilateral • Funding Cost Adjustment • Funding Value Adjustment • Capital Valuation Adjustment It has the following row: • Portfolios are listed
Dimensions	• Portfolio • Entity Name • Parent counterparty ID • Counterparty ID • Netting • Sub-netting • XVA Result Type • Account Number
Base Measures	• BCVA Unilateral • BCVA Bilateral • Collateral VA • CVA Unilateral • CVA Bilateral • DVA Unilateral • DVA Bilateral • Funding Cost Adjustment • Funding Value Adjustment • Capital Valuation Adjustment
Computed Measures	NA

31 Dashboard – Incremental XVA

The following table displays the page level filters which are applicable to all the reports in this dashboard.

Table 109: Parameters in the Dashboard - Incremental XVA

Dashboard Name	Incremental XVA
Subject Area	MR Monte Carlo
Page-Level Filters	• Portfolio • MIS Date • Definition • EOD Execution • Execution ID • Amount In • Entity Name • Parent Counterparty ID • Counterparty • XVA Result Type
Page-Level Display Parameters	Not applicable

The following report is displayed as part of the Component VaR dashboard:

- Incremental Trade Level XVA

31.1 Incremental Trade Level XVA

This section describes the parameters of the Incremental Trade Level XVA report.

Table 110: Incremental Trade Level XVA Report Parameters

Report Name	Incremental Trade Level XVA
Report Level Filters	Trade ID
Report Description	This report provides the incremental XVA measures such as CVA, BVA, DVA, XVA and so on at the trade level for a Counterparty.
Report Type	**Tabular Report:** It has the following columns: • Portfolio • Entity Name • Parent counterparty ID • Counterparty ID • Netting • Sub-netting • XVA Result Type

	• Observation Date • BCVA Unilateral • BCVA Bilateral • Collateral VA • CVA Unilateral • CVA Bilateral • DVA Unilateral • DVA Bilateral • Funding Cost Adjustment • Funding Value Adjustment • Capital Valuation Adjustment It has the following row: • Portfolios are listed
Dimensions	• Portfolio • Entity Name • Parent counterparty ID • Counterparty ID • Netting • Sub-netting • XVA Result Type • Observation Date
Base Measures	• BCVA Unilateral • BCVA Bilateral • Collateral VA • CVA Unilateral • CVA Bilateral • DVA Unilateral • DVA Bilateral • Funding Cost Adjustment • Funding Value Adjustment • Capital Valuation Adjustment
Computed Measures	NA

32 Dashboard – PFE

The following table displays the page level filters which are applicable to all the reports in this dashboard.

Table 111: Parameters in the Dashboard - PFE

Dashboard Name	PFE
Subject Area	MR Monte Carlo
Page-Level Filters	• Portfolio • MIS Date • Definition • EOD Execution • Execution ID • Amount In • Entity Name • Parent Counterparty ID • Counterparty • PFE Result Type
Page-Level Display Parameters	Not applicable

The following report is displayed as part of the PFE dashboard:

- PFE Details
- Trade Level PFE

32.1 PFE Details

This section describes the parameters of the PFE Details report.

Table 112: PFE Details Report Parameters

Report Name	PFE Details
Report Level Filters	Not applicable
Report Description	This Report provides the PFE related details like EPE, ENE, PFE, and so on at the Counterparty level.
Report Type	**Tabular Report:** It has the following columns: • Portfolio • Counterparty ID • Netting • Sub-netting • PFE Result Type • Potential Future Exposure

	• Expected Positive Exposure • Expected Negative Exposure • Expected Exposure • Expected Potential Future Exposure • Effective Expected Positive Exposure • Effective Expected Negative Exposure • Effective Expected Exposure • Average Potential Future Exposure • Average Expected Positive Exposure • Average Expected Negative Exposure • Average Expected Exposure It has the following row: • Portfolios are listed
Dimensions	• Portfolio • Counterparty ID • Netting • Sub-netting • PFE Result Type
Base Measures	• Potential Future Exposure • Expected Positive Exposure • Expected Negative Exposure • Expected Exposure • Expected Potential Future Exposure • Effective Expected Positive Exposure • Effective Expected Negative Exposure • Effective Expected Exposure • Average Potential Future Exposure • Average Expected Positive Exposure • Average Expected Negative Exposure • Average Expected Exposure
Computed Measures	NA

32.2 Trade Level PFE

This section describes the parameters of the Trade Level PFE report.

Table 113: Trade Level PFE Report Parameters

Report Name	Trade level PFE
Report Level Filters	Not applicable
Report Description	This Report provides the PFE related details like EPE, ENE, PFE, and so on at the Trade level for a counterparty.
Report Type	**Tabular Report:** It has the following columns:

	• Portfolio • Entity Name • Parent Counterparty ID • Counterparty ID • Netting • Sub-netting • PFE Result Type • Account Number • Potential Future Exposure • Expected Positive Exposure • Expected Negative Exposure • Expected Exposure • Expected Potential Future Exposure • Effective Expected Positive Exposure • Effective Expected Negative Exposure • Effective Expected Exposure • Average Potential Future Exposure • Average Expected Positive Exposure • Average Expected Negative Exposure • Average Expected Exposure It has the following row: • Portfolios are listed
Dimensions	• Portfolio • Entity Name • Parent Counterparty ID • Counterparty ID • Netting • Sub-netting • PFE Result Type • Account Number
Base Measures	• Potential Future Exposure • Expected Positive Exposure • Expected Negative Exposure • Expected Exposure • Expected Potential Future Exposure • Effective Expected Positive Exposure • Effective Expected Negative Exposure • Effective Expected Exposure • Average Potential Future Exposure • Average Expected Positive Exposure • Average Expected Negative Exposure • Average Expected Exposure
Computed Measures	NA

33 Dashboard – Incremental PFE

The following table displays the page level filters which are applicable to all the reports in this dashboard.

Table 114: Parameters in the Dashboard - Incremental PFE

Dashboard Name	Incremental PFE
Subject Area	MR Monte Carlo
Page-Level Filters	• Portfolio • MIS Date • Definition • EOD Execution • Execution ID • Amount In • Entity Name • Parent Counterparty ID • Counterparty • PFE Result Type
Page-Level Display Parameters	Not applicable

The following report is displayed as part of the PFE dashboard:

- Incremental Trade Level PFE

33.1 Incremental Trade Level PFE

This section describes the parameters of the Incremental Trade Level PFE report.

Table 115: Incremental Trade Level PFE Report Parameters

Report Name	Incremental Trade level PFE
Report Level Filters	Trade ID
Report Description	This report provides the incremental PFE date wise on the observation dates for various trades of a counterparty.
Report Type	**Tabular Report:** It has the following columns: • Portfolio • Entity Name • Parent Counterparty ID • Counterparty ID • Netting • Sub-netting • PFE Result Type

	• Observation Date • Potential Future Exposure • Expected Positive Exposure • Expected Negative Exposure • Expected Exposure • Effective Potential Future Exposure • Effective Expected Positive Exposure • Effective Expected Negative Exposure • Effective Expected Exposure • Average Potential Future Exposure • Average Expected Positive Exposure • Average Expected Negative Exposure • Average Expected Exposure It has the following row: • Portfolios are listed
Dimensions	• Portfolio • Entity Name • Parent Counterparty ID • Counterparty ID • Netting • Sub-netting • PFE Result Type • Observation Date
Base Measures	• Potential Future Exposure • Expected Positive Exposure • Expected Negative Exposure • Expected Exposure • Effective Potential Future Exposure • Effective Expected Positive Exposure • Effective Expected Negative Exposure • Effective Expected Exposure • Average Potential Future Exposure • Average Expected Positive Exposure • Average Expected Negative Exposure • Average Expected Exposure
Computed Measures	NA

34 MRMM to ALM Cash Flow Integration

The seeded batch (MRMM_CASH_FLW_MOV_TO_ALM) Post Load Change (PLC) handles the movements of cash flows generated in MRMM to the STG_ACCOUNT_CASH_FLOWS table. You must add this task in a new Batch which must be executed at the end of the day, for generating cash flows for the instrument type, FX European Option. OFS MRMM populates the generated cash flows in the STG_ACCOUNT_CASH_FLOWS table for further processing in OFS Asset and Liability Management (ALM) batches.

The cash flows are executed and populated into the ALM Processing and Reporting tables. You can view the MRMM cash flows in the ALM GAP reports. For detailed information about the cash flow loader, see the *Cash Flow Loader* section, in the Data Model Utilities User Guide.

> **NOTE** The current release of OFS MRMM supports cash flow integration for FX European Option only.

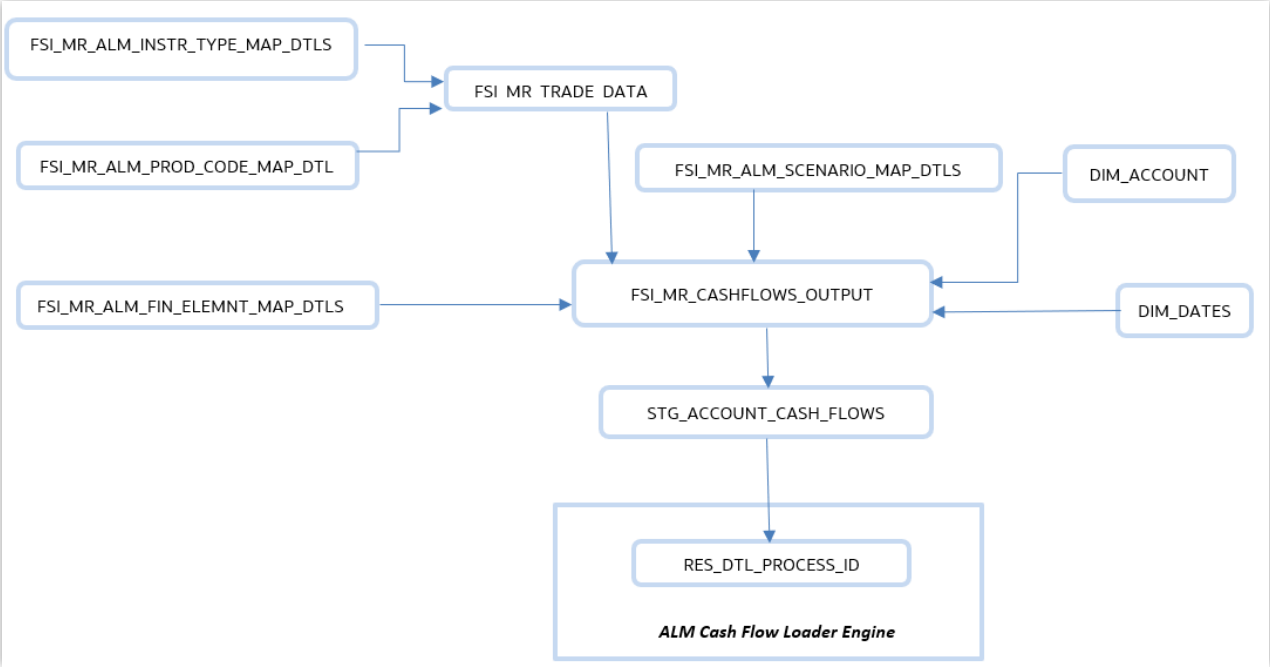
The following table lists the tables involved in the Cash Flow Integration process.

Table 116: Tables involved in MRMM and ALM Cash Flow Integration

Sl. No	Table Name	Description
1	FSI_MR_ALM_SCENARIO_MAP_DTLS	This table stores the mapping of the MRMM Scenario IDs with the corresponding ALM Scenario ID.
2	FSI_MR_ALM_PROD_CODE_MAP_DTLS	This table stores the mapping of the MRMM Product Code and the corresponding ALM Product Code.

The following illustration describes the data flow of MRMM to ALM Cash Flow integration.

Figure 81: Data Flow Diagram – MRMM to ALM Cash Flow Integration



35 Appendix A: OFSAA Infrastructure Components Used in OFS MRMM

OFS MRMM uses the following components and frameworks of OFSAA infrastructure. You can access these components under **Common Object Maintenance** in the OFSAAI landing page. See the OFS Advanced Analytics Infrastructure User Guide for features and details.

- **Data Model Maintenance**: OFS MRMM uses the Data Model Maintenance module of OFSAA. You can upload the data model using this component.
- **Data Management**: Data Management tools such as Data Sources, Data Mapping, Data File Mapping, and Post Load Changes. Data Quality Rules and Data Quality Groups in the OFSAA Data Quality Framework. OFS MRMM uses Excel Upload (Atomic), Forms Designer, Forms Authorization, Data Entry from the Data Entry Forms, and Queries module of OFSAA.
- **Unified Analytical Metadata**: OFS MRMM uses Dimension Management (Member, Attribute, and Hierarchy Management) from the Unified Analytical Metadata module of OFSAA.
- **Rate Management**: See OFSAA Rate Management – Currencies, for details.
- **Holiday Calendar**: See Holiday Calendar, for details.
- **Operations**: OFS MRMM uses Batch Maintenance, Batch Execution, Batch Monitor, Batch Cancellation, Batch Scheduler, and View Log from Operations module of OFSAA.
- **Process Modeling Framework**: OFS MRMM uses the Process Modeling Framework module of OFSAA.
- **Rule Run Framework**: Process Modeling Framework internally uses Process and Run from the OFSAA Run Rule Framework

36 Appendix B: Details of Market Data

Market Data refers to the multiple types of data required from the financial market to price interest rate, equity, foreign exchange, and other types of products. The following types of market data are required by the OFS MRMM application:

- **Rate**: These are daily input of FX spot, IR cash, repo rates, and so on.
- **Prices**: These are daily input of a number of spot prices, such as equity spot prices, bond spot prices, and for all exchange-traded futures and options contract types.
- **Curves**: These include the following:
  - **Yield curves:** They represent the market data for the term structure of interest rates:
    - Basic yield curve identified by currency and index.
    - Cross-currency basis curves identified by a currency-index pair (currency-index/currency-index).
    - Cross-currency swap curves identified by a currency-index pair (currency-index/currency-index where the first index is FIXED).
    - Single currency basis curves identified by currency-index pair and an additional money market index.
  - **Dividend curves**: These are methods to represent the dividends for the equity and can be created using either dividend yields or discrete dividends that can be expressed either as yield or absolute amounts:
    - Constant value: Yield represented as a specific percentage of equity's market price on a specific date.
    - Dividend yield: Dividend expressed as a percentage of equity's market price.
    - Absolute dividend: Absolute amount of dividend.
  - **Repo and bond repo curves**: Repo curves are used to model the cost of carrying a share associated with repurchase agreements.
  - **Fair strike curves**: These are used when pricing products such as EQ Variable Swap deals. A Fair Strike curve provides market quotes for variable swaps, in the form of a tabular list of dates and fair strike market quotes.
  - **Volatility spread curves**: These are used when pricing products such as EQ Variable Swap deals. Volatility spread curves provide volatility basis term structures that comprise a collection of dates and associated strike adjustments.
  - **Credit curves**: These are inputs such as Recovery Rate, Credit Spread, Survival Probabilities required by credit models for a specific counterparty.
  - **Real rate curves**: These are nominal yield curve adjusted for inflation by a Consumer Price Index.
  - **Commodity forward curves**: These are built from the futures prices of the underlying commodity for several contract months.
- **Volatilities**: These include the following:
  - **Cap Volatilities**:
  - **Swaption Volatilities:** Swaption volatility cubes are used to aggregate a number of swaption surfaces and generate a full 3-dimensional surface for volatility overstrikes.

- **FX Volatilities**: Matrix of FX volatilities are required for use with FX options.
- **Equity Volatilities**: Equity volatility surfaces are presented as two matrices, one for call volatilities and one for put volatilities.

- **Fixings**: These are historical fixing rates/spot rates/value of the following categories, for example, Libor is set, or "fixed", every day:
  - Interest rate
  - FX spot
  - Inflation index

The market data is specified in a uniquely identifiable and logical form. These can be raw or derived data and shock can be applied to the data to create different Market Scenarios, for example, one or more shifts applied to selected market data. This data will be sourced through stage tables. The logical quote structure in which market data is expected is provided in the following table. When data moves from stage table to processing, appropriate values are concatenated to form the required quote.

Table 117: Expected Logical Quote Structure for Market Data

Type	Asset Class	Market Data Type Code	Market Data Type	Market Data Description	Logical Quote structure
Curve	CR	CDS	Single-Name Credit Default Swaps	Single-name credit default swap (Spread and Recovery)	CR.Currency-ReferenceEntity_DebtType_RestructuringClause.CDS-Tenor.Indicator.QuoteType Example: CR.USD-DELLN_SNRFOR_MR.CDS-30Y.SPREAD.MID
Curve	CR	CR_IDX_SWAP	Credit Index Swaps	Credit index swap (Spread and Recovery)	CR.Currency-Index_Series_Version.CDIX-Tenor.Indicator.QuoteType Example: CR.EUR.ITRAXXMAIN_S15_V2.CDIX-5Y.RECOVERY
Curve	CR	SP	Survival Probabilities	Survival Probabilities	CR.Currency-ReferenceEntity_DebtType_RestructuringClause.SP-Maturity.QuoteType Example: CR.USD-AET_SNRFOR_CR.SP-20-Jun-2013.MID
Curve	EQ	EQ_DIV	Equity Dividends	Equity Dividends	EQ.Currency-{Exchange}-Ticker.DIV.[Structure] Example: EQ.USD-NYSE-IBM.DIV.CONT
Curve	INFL	INFL_SEASONALITY	Seasonality	Seasonality	INFL.Currency-InflationIndex.SEASONALITY-Month Example: INFL.USD-CPI.SEASONALITY-JAN

Type	Asset Class	Market Data Type Code	Market Data Type	Market Data Description	Logical Quote structure
Curve	IR	BASIS_SWAP	Basis Swaps	Basis Swap	IR.[TargetUnderlying]/[KnownUnderlying].BASIS-Mat.QuoteType where [Underlying] = Currency-IRIndex-IRIndexTenor Example: IR.JPY-LIBOR-6M/JPY-LIBOR-3M.BASIS-1M.MID
Curve	IR	BASIS_SWAP_XCCY	Cross-currency Basis Swaps	Cross-currency Basis Swap	IR.[TargetUnderlying]/[KnownUnderlying].BASIS-Mat.QuoteType where [Underlying] = Currency-IRIndex-IRIndexTenor Example: IR.JPY-LIBOR-3M/USD-LIBOR-3M.BASIS-5Y.MID
Curve	IR	CASH	Cash	Cash Instrument	IR.Currency-IRIndex.CASH-InstrumentTenor.QuoteType Example: IR.USD.LIBOR.CASH-1M.BID
Curve	IR	SWAP_XCCY	Cross-currency Fixed/Float Swaps	Cross-currency fixed-for-floating swap	IR.[UnderlyingFixed]/[UnderlyingFloating].SWAPMarketType-Mat.QuoteType where [Underlying] = Currency-IRIndex-IRIndexTenor; For [UnderlyingFixed], IRIndexTenor is FIXED Example: IR.TWD-FIXED/USD-LIBOR-6M.SWAP-5Y.MID
Curve	IR	SWAP_XCCY_ND	Cross-currency Fixed/Float Swaps-Offshore	Cross-currency fixed-for-floating swap – Offshore (Non-deliverable) market	IR.[UnderlyingFixed]/[UnderlyingFloating].SWAPMarketType-Mat.QuoteType where [Underlying] = Currency-IRIndex-IRIndexTenor; For [UnderlyingFixed], IRIndexTenor is FIXED Example: IR.TWD-FIXED/USD-LIBOR-6M.SWAPND-7Y.MID
Curve	IR	SWAP_XCCY_ONSHORE	Cross-currency Fixed/Float Swaps-Onshore	Cross-currency fixed-for-floating swap – Onshore market	IR.[UnderlyingFixed]/[UnderlyingFloating].SWAPMarketType-Mat.QuoteType where [Underlying] = Currency-IRIndex-IRIndexTenor; For [UnderlyingFixed], IRIndexTenor is FIXED Example: IR.TWD-FIXED/USD-LIBOR-6M.SWAPONSHORE-4Y.MID
Price	CMDTY	CMDTY_FWD	Commodity Forward	Commodity Forward	CMDTY.Currency-Exchange-Symbol.FWD-Mat.QuoteType Example: CMDTY.USD-COMEX-GCA.FWD-28-Aug-2013.MID

Type	Asset Class	Market Data Type Code	Market Data Type	Market Data Description	Logical Quote structure
Price	CMDTY	CMDTY_SPOT	Commodity Spot	Commodity Spot	CMDTY.Currency-Exchange-Symbol.SPOT.QuoteType Example: CMDTY.USD-NYMEX-NG.SPOT.ASK
Price	EQ	EQ_FUT	Equity Futures	Equity Futures	EQ.Currency-Exchange-ContCode.FUT-MatCode.QuoteType Example: EQ.USD-NYSE-ESZ12.FUT-Z12.MID
Price	EQ	EQ_SPOT	Equity Spot	Equity Spot	EQ.Currency-{Exchange}-Ticker.SPOT.QuoteType Example: EQ.USD-NYSE-IBM.SPOT.MID
Price	EQ	EQDIV_FUT	Equity Dividends from Equity Dividend Futures	Equity dividend key with the dividend curve stripped from equity dividend futures	EQ.Currency-Exchange-ContractCode.DIV.FUT-MaturityCode.QuoteType Example: EQ.USD-NYSE-ESZ12.DIV.FUT-Z12.MID
Price	EQ	EQDIV_SWAP	Equity Dividends from Equity Dividend Swaps	Equity dividend key with the dividend curve stripped from equity dividend swaps	EQ.Currency-{Exchange}-Ticker.DIV.SWAP.Tenor.QuoteType Example: EQ.USD-NYSE-IBM.DIV.SWAP.1M.MID
Price	INFL	INFL_BOND	Inflation-Linked Bonds	Inflation-Linked Bonds (Price and Yield)	INFL.Currency-Type-Issuer-InflationIndex.ILBOND-Coupon-IssueDate.Maturity.Indicator.QuoteType Example: INFL.JPY-JGBI-MOF-JCPI.ILBOND-0.04234-09-Aug-2010.13-Aug-2015.Yield.MID
Price	INFL	INFL_YOYOPTION	Year-on-Year Options	Year-on-Year Options	INFL.Currency-InflationIndex.YOYOPTION-Flavour-Strike-Maturity.PRICE.QuoteType Example: INFL.EUR-EURCPI.YOYOPTION-CAP-0.02-30Y.PRICE.MID
Price	INFL	INFL_ZCIIOPTION	Zero-Coupon Inflation-Indexed Options	Zero-Coupon Inflation-Indexed Options	INFL.Currency-InfationIndex.ZCIIOPTION-Flavour-Strike-Maturity.PRICE.QuoteType Example: INFL.EUR-EURCPI.ZCIIOPTION-FLOOR-0.00-7Y.PRICE.MID

Type	Asset Class	Market Data Type Code	Market Data Type	Market Data Description	Logical Quote structure
Price	INFL	INFL_ZCIIS	Zero-Coupon Inflation-Indexed Swaps	Zero-Coupon Inflation-Indexed Swaps	INFL.Currency-InflationIndex.ZCIIS-Maturity.QuoteType Example: INFL.EUR-HICP.ZCIIS-2Y.MID
Price	IR	CORP_BOND	Corporate Bonds	Corporate Bonds (Price and Yield)	IR.Currency-Type-Issuer.BOND-Coupon-IssueDate.Maturity.Indicator.QuoteType Example: IR.USD-USCORPORATE-MSFT.BOND-0.00875-27-SEP-2010.27- SEP-2013.YIELD.MID
Price	IR	SOV_BILL	Sovereign Bills	Sovereign Bills (Price and Yield)	IR.Currency-Type-Issuer.BILL-0-IssueDate.Maturity.Indicator.QuoteType Example: IR.USD-USTreasury-USGovt.BILL-0-01-Apr-2011.01-Oct-2017.Price.MID
Price	IR	SOV_BOND	Sovereign Bonds	Sovereign Bonds (Price and Yield)	IR.Currency-Type-Issuer.BOND-Coupon-IssueDate.Maturity.Indicator.QuoteType Example: IR.USD-USTreasury-USGovt.BOND-0.0125-01-Apr-2011.01-Oct-2017.Price.MID
Rate	FX	FX_FWD	Forex Forward	Foreign exchange forward	FX.BaseCurrencyTermCurrency.FWD-Maturity.QuoteType Example: FX.JPYUSD.FWD-ON.MID
Rate	FX	FX_FWDND	Forex Forward Offshore	Foreign exchange forward	FX.BaseCurrencyTermCurrency.FWDND-Maturity.QuoteType Example: FX.GBPUSD.FWDND-18-Apr-2022.MID
Rate	FX	FX_FWDONSHORE	Forex Forward Onshore	Foreign exchange forward	FX.BaseCurrencyTermCurremcy.FWDONSHORE-Maturity.QuoteType Example: FX.EURUSD.FWDONSHORE-1Y.MID
Rate	FX	FX_SPOT	Forex Spot	Foreign exchange spot	FX.BaseCurrencyTermCurrency-SPOT.QuoteType Example: FX.AUDUSD-SPOT.MID
Rate	IR	FRA	Forward rate agreement	Forward rate agreement	IR.Currency-IRIndex-IRIndexTenor.FRA-Period.QuoteType Example: IR.GBP-LIBOR-6M.FRA-12M-18M.MID

Type	Asset Class	Market Data Type Code	Market Data Type	Market Data Description	Logical Quote structure
Rate	IR	ON_SWAP	Overnight Indexed Swaps	Overnight Indexed Swaps	IR.Currency-IRIndex-ON.SWAP-Tenor.QuoteType Example: IR.USD-FEDFUNDS-ON.SWAP-5Y.BID
Rate	IR	SWAP	Swaps	Swap	IR.Currency-IRIndex-IRIndexTenor.SWAP-Tenor.QuoteType Example: I R.CHF-LIBOR-3M.SWAP-5Y.LAST
Volatility	CMDTY	CMDTY_VOL	Commodity Volatility	Represent a point on a commodity volatility surface	CMDTY.Currency-Exchange-Symbol.VOL::Maturity::Strike::StrikeType.QuoteType Example: CMDTY.USD-COMEX-GCA.VOL::16-Oct-2012::1490.58::STRIKE-ABSLT.MID
Volatility	EQ	EQ_SPOT_VOL	Equity Volatility	Represent a point on an equity volatility surface	EQ.Currency-{Exchange}-Ticker.SPOT.VOL.Maturity::Strike::StrikeType.QuoteType Example: EQ.USD-NYSE-SPX.SPOT.VOL::3m::1506.527::STRIKE-ABSLT.MID
Volatility	FX	FX_VOL	Forex Volatility	Represent a point on a FX volatility surface	FX.BaseCurrTermCurr.VOL::Tenor::[FXStrike]::QuoteType Example: FX.USDJPY.VOL::1m::25D CALL::ASK
Volatility	IR	CAP_VOL	Caps	Represent a point on a cap volatility surface	IR.[Underlying].[Instrument]::QuoteType where [Underlying] = Currency-IRIndex-IRIndexTenor.VOL and [Instrument] = CAP.CapTen::CapStrike Example: IR.USD-LIBOR-3M.VOL.CAP::1Y::ATM::MID
Volatility	IR	SWPT_VOL	Swaptions	Represent a point on a swaption volatility surface	IR.[Underlying].[Instrument]::QuoteType where [Underlying] = Currency-IRIndex-IRIndexTenor.VOL and [Instrument] = SWPT.SwaptionStrike::OptionTenor::SwapTenor Example: IR.USD-LIBOR-3M.VOL.SWPT.ATM::9Y::10Y::MID

Type	Asset Class	Market Data Type Code	Market Data Type	Market Data Description	Logical Quote structure
Volatility	IR	SWPT_VOL_CUBE	Swaption Cubes	Represent a point on a swaption volatility cube	IR.[Underlying].SWPT.StrikeType::Strike::OptionTenor::SwapTenor::DataType.QuoteType where [Underlying] = Currency-IRIndex-IRIndexTenor.VOL Example: IR.USD-LIBOR-3M.VOL.SWPT.RLTV.ATM+150bps::2Y::2Y::LOGNORMAL.MID
Volatility	IR	SWPT_VOL_CUBE_SHIFT	Swaption Cube Shifts	Specify a shift of the swaption volatility cube	IR.[Underlying].SWPT.StrikeType::Strike::OptionTenor::SwapTenor::SHIFT where [Underlying] = Currency-IRIndex-IRIndexTenor.VOL Example: IR.USD-LIBOR-3M.VOL.SWPT.RLTV.ATM+150bps::2Y::2Y::SHIFT

The logical quote structure in which fixings data is expected is provided in the following table. When data moves from stage table to processing, appropriate values are concatenated to form the required quote.

Table 118: Logical Quote Structure for Fixing Data

Asset Class	Logical Quote structure	Remarks
IR	Currency-Interest Rate Index-Tenor	Historical fixing/spot interest rate is required. For example: USD-LIBOR-3M
FX	BaseCurrencyTermCurrency-SPOT	The historical spot exchange rate is required in the form “1 unit of base currency = n unit of term currency”. For example: AUDJPY-SPOT
INFL	Currency-Inflation Index	The historical value of the inflation index is required. For example: USD-CPI

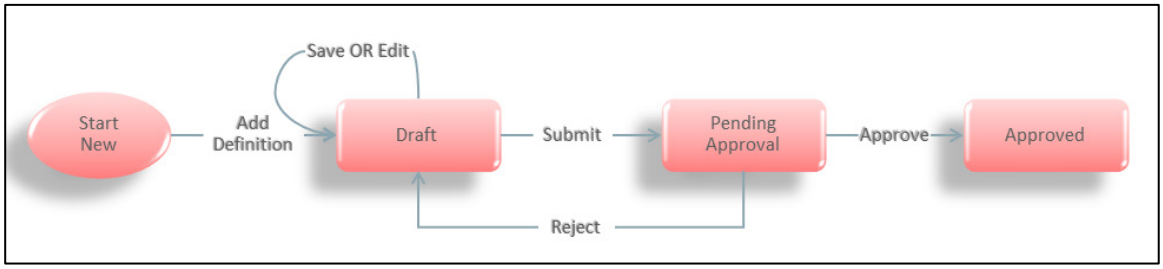
37 Appendix C: Approval Workflow

OFS MRMM supports approval workflows based on user roles. A one-step maker-checker approval is supported for business assumption definition and Run definition to ensure that computations are carried out using the right input data.

A definition goes through multiple stages, each with a different status before it can be used for computation. For instance, when a new business assumption is defined and saved, it will be in 'Draft' status. When the definition is edited and sent for authorization, the status of the definition changes to 'Pending Approval' and so on. Each stage requires action from the relevant user based on the role assigned to her. Similarly, a Run definition goes through the same stages of approval.

The approval workflow and the logical change in each status are depicted as part of the following process flow.

Figure 82: Approval Workflow



Each definition goes through multiple stages and has a status associated with it in each stage and the following table explains the status at each stage.

Table 119: Approval Workflow Status

Status	Description
Draft	When a new definition is created and saved for the first time it is in 'Draft' status. While in Draft status, the user is allowed to make any necessary edits without a change in the version number.
Pending Approval	When a definition is sent for approval but is not yet approved by the approver the status changes to 'Pending Approval'. This does not result in a change in the version number.
Draft	When a definition is rejected by the approver, it changes to 'Draft' status and is required to be updated or rectified. This results in a change in the version number. After the necessary updates have been made, it goes through the approval process again. You are allowed to delete a version in 'Draft' status.
Approved	When a definition has been approved its status changes to 'Approved'. This does not result in a change in the version number.

The following actions are permissible when a definition is in 'Draft' status:

- Click **View** in the summary window to view a definition. You cannot edit the values in View mode.
- You can edit the definition by clicking Edit in the summary window and make the required changes. This does not result in a new version.

- You can copy the definition and save it with a new name by clicking Copy in the summary window. The new definition will have the same attributes as the existing definition and will be created as version 0. This definition will be in 'Draft' status and the necessary edits can be made.
- You are allowed to delete any definition which is in 'Draft' status, by selecting the definition from the summary window and clicking Delete.
- Once the definition is finalized, you can initiate the approval process by opening the definition in edit mode and clicking Send for Approval in the definition window. This changes the status of the definition to 'Pending Approval'.
- You can view the approval workflow for the definition in the Approval Summary window, by clicking Approval Summary. This window provides details of each change in the approval status.
- Once the definition is finalized, it is sent for approval, and its status changes to 'Pending Approval'. The icons which are enabled in the 'Pending Approval' status are as follows: View, Copy, Approve, Reject, and Approval Summary.
- The following actions are permissible when a definition is in 'Pending Approval' status:
- You can view the definition by clicking View in the summary window. You cannot edit the values in View mode.
- You can copy the definition and save it with a new name by clicking Copy in the summary window. The new definition will have the same attributes as the existing definition and will be created as version 0. This definition will be in 'Draft' status and the necessary edits can be made.
- You can approve the definition, if you have the appropriate access rights, by clicking Approve. You can add comments. The status changes to 'Approved' when you have completed the approval process.
- You can reject the definition, if you have the appropriate access rights, by clicking Reject. You can add comments. Rejecting a definition changes the status back to 'Draft'.
- You can view the approval workflow for the definition in the Approval Summary window, by clicking Approval Summary. This window provides details of each change in the approval status. This window provides details of each change in the approval status.

> **NOTE** The Approve or Reject buttons are present only for users who are mapped to the MR Approver role.

The following actions are permissible when a definition is in 'Approved' status:

- You can view the definition by clicking View in the summary window. You cannot edit the values in View mode.
- You can edit the definition by clicking Edit in the summary window and make the required changes. The definition is still in 'In Review' status.
- You can copy the definition and save it with a new name by clicking Copy in the summary window. The new definition will have the same attributes as the existing definition and will be created as version 0. This definition will be in 'Draft' status and the necessary edits can be made.
- You can view the approval workflow for the definition in the Approval Summary window, by clicking Approval Summary. This window provides details of each change in the approval status.
- An approved definition cannot be edited.

38 Appendix D: List of Instruments Supported by OFS MRMM

OFS MRMM supports the following instruments.

Table 120: Instruments Supported by MRMM

Sl. No.	Asset Class	Name of the Instrument	MRMM Release Version
1	Interest Rate	Amortizing Bond	8.0.5.0.0
2	Interest Rate	Basis Swap	8.0.5.0.0
3	Interest Rate	Amortizing Floating Rate Note	8.0.5.0.0
4	Credit	Credit Asset Swap	8.0.5.0.0
5	Equity	Equity Future	8.0.5.0.0
6	Interest Rate	Cross-Currency Basis Swap	8.0.5.0.0
7	Inflation	Inflation Zero Coupon Swap	8.0.5.0.0
8	Interest Rate	Cash Deposit	8.0.5.0.0
9	Interest Rate	Certificado de Deposito Bancario	8.0.5.0.0
10	Interest Rate	CapFloor	8.0.5.0.0
11	Commodity	Commodity Forward	8.0.5.0.0
12	Commodity	Commodity Future	8.0.5.0.0
13	Interest Rate	Sovereign bond	8.0.5.0.0
14	Forex	FX Forward	8.0.5.0.0
15	Interest Rate	Floating Rate Note	8.0.5.0.0
16	Interest Rate	Forward rate Agreement	8.0.5.0.0
17	Interest Rate	Treasury Bill	8.0.5.0.0
18	Interest Rate	Vanilla IR Swap	8.0.5.0.0
19	Equity	Equity Variance Swap	8.0.5.0.0
20	Interest Rate	Callable Bond	8.0.5.0.0
21	Commodity	Commodity American Option on Future	8.0.5.0.0
22	Interest Rate	Cross-Currency Fix Float Swap	8.0.5.0.0
23	Equity	Equity American Option	8.0.5.0.0
24	Forex	FX American Option	8.0.5.0.0
25	Interest Rate	Amortizing Swap	8.0.5.0.0

Sl. No.	Asset Class	Name of the Instrument	MRMM Release Version
26	Commodity	Commodity European Option On Spot	8.0.5.0.0
27	Equity	Equity Asian Option	8.0.5.0.0
28	Forex	FX Asian Option	8.0.5.0.0
29	Equity	European Swaption	8.0.5.0.0
30	Interest Rate	Generic Swap	8.0.5.0.0
31	Inflation	Inflation Linked Bond	8.0.5.0.0
32	Forex	FX European Option	8.0.5.0.0
33	Equity	Equity European Option	8.0.5.0.0
34	Forex	FX Variance Swap	8.0.5.0.0
35	Equity	Equity Convertible Bond Option	8.0.5.0.0
36	Equity	Equity Total Return Swap	8.0.5.0.0
37	Commodity	Commodity Swaption	8.0.5.0.0
38	Commodity	Commodity Bullet Swap	8.0.5.0.0
39	Credit	Credit Default Swap - Standard North American Corporate (SNAC)	8.0.5.0.0
40	Forex	FX Pivot	8.0.6.0.0
41	Forex	FX Dual Target Forward	8.0.6.0.0
42	Forex	FX Binary Option	8.0.6.0.0
43	Forex	FX Digital	8.0.6.0.0
44	Forex	FX Barrier Scripted	8.0.6.0.0
45	Forex	FX Spot*	8.1.0.1.0
46	Equity	Spot Equity	8.1.0.1.0

*FX Spot product is supported and captured through FX Forward pricing template.

39 Appendix E: List of Models and Methods

OFS MRMM supports the following models and methods.

Table 121: List of Models and Methods

Instrument Type	Model	Method	Asset Class
Commodity American Option on Future	Commodity Black Model	Backward Monte Carlo	Commodity
Commodity American Option on Future	Commodity Black Model	Forward Monte Carlo	Commodity
Commodity American Option on Future	Commodity Black Model	JuZhong	Commodity
Commodity American Option on Future	Commodity Black Model	CDVM JuZhong	Commodity
Commodity Bullet Swap	Commodity Black Model	Forward Monte Carlo	Commodity
Equity Convertible Bond Option	EQ Convertible Model	Backward Partial Differential Equation	Equity
Equity Convertible Bond Option	EQ Convertible Model	Backward Monte Carlo	Equity
Equity American Option	EQ Black-Scholes Model	Backward Partial Differential Equation	Equity
Equity American Option	EQ Black-Scholes Model	CDVM JuZhong	Equity
Equity American Option	EQ Black-Scholes Model	JuZhong	Equity
Equity Asian Option	EQ Deterministic Model	Vecer Discrete Partial Differential Equation	Equity
Equity Total Return Swap	EQ Deterministic Model	Not applicable	Equity
Equity Total Return Swap	EQ Black-Scholes Model	Backward Analytic	Equity
Equity Total Return Swap	EQ Black-Scholes Model	Backward Finite Difference	Equity
Equity Total Return Swap	EQ Black-Scholes Model	Backward Lattice	Equity
Equity Total Return Swap	EQ Black-Scholes Model	Backward Partial Differential Equation	Equity
Equity Total Return Swap	EQ Black-Scholes Model	Backward Tree	Equity
Equity Total Return Swap	EQ Black-Scholes Model	Forward Analytic	Equity
Equity Total Return Swap	EQ Black-Scholes Model	Forward Monte Carlo	Equity
Equity Total Return Swap	EQ Bates Model	Backward Finite Difference	Equity
Equity Total Return Swap	EQ Bates Model	Backward Monte Carlo	Equity
Equity Total Return Swap	EQ Bates Model	Forward Monte Carlo	Equity
Equity Total Return Swap	EQ Dupire Model	Backward Analytic	Equity
Equity Total Return Swap	EQ Dupire Model	Backward Finite Difference	Equity

Equity Total Return Swap	EQ Dupire Model	Backward Monte Carlo	Equity
Equity Total Return Swap	EQ Dupire Model	Backward Partial Differential Equation	Equity
Equity Total Return Swap	EQ Dupire Model	Backward Tree	Equity
Equity Total Return Swap	EQ Dupire Model	Forward Analytic	Equity
Equity Total Return Swap	EQ Dupire Model	Forward Monte Carlo	Equity
Equity Total Return Swap	EQ Heston Model	Backward Analytic	Equity
Equity Total Return Swap	EQ Heston Model	Backward Finite Difference	Equity
Equity Total Return Swap	EQ Heston Model	Backward Monte Carlo	Equity
Equity Total Return Swap	EQ Heston Model	Backward Partial Differential Equation	Equity
Equity Total Return Swap	EQ Heston Model	Forward Analytic	Equity
Equity Total Return Swap	EQ Heston Model	Forward Monte Carlo	Equity
FX Asian Option	FX Dupire Model	Backward Analytic	Forex
FX Asian Option	FX Dupire Model	Backward Finite Difference	Forex
FX Asian Option	FX Dupire Model	Backward Monte Carlo	Forex
FX Asian Option	FX Dupire Model	Backward Partial Differential Equation	Forex
FX Asian Option	FX Dupire Model	Backward Tree	Forex
FX Asian Option	FX Dupire Model	Forward Analytic	Forex
FX Asian Option	FX Dupire Model	Forward Monte Carlo	Forex
FX Asian Option	FX Black Model	Backward Analytic	Forex
FX Asian Option	FX Black Model	Backward Finite Difference	Forex
FX Asian Option	FX Black Model	Backward Lattice	Forex
FX Asian Option	FX Black Model	Backward Partial Differential Equation	Forex
FX Asian Option	FX Black Model	Backward Tree	Forex
FX Asian Option	FX Black Model	Forward Analytic	Forex
FX Asian Option	FX Black Model	Forward Monte Carlo	Forex
FX Asian Option	FX Deterministic Model	Not applicable	Forex
FX Asian Option	FX Heston Model	Backward Analytic	Forex
FX Asian Option	FX Heston Model	Backward Finite Difference	Forex
FX Asian Option	FX Heston Model	Backward Monte Carlo	Forex
FX Asian Option	FX Heston Model	Backward Partial Differential Equation	Forex
FX Asian Option	FX Heston Model	Forward Analytic	Forex

FX Asian Option	FX Heston Model	Forward Monte Carlo	Forex
Amortizing Bond	IR Deterministic Model	Backward Analytic	Interest Rate
Amortizing Bond	IR Deterministic Model	Forward Analytic	Interest Rate
Amortizing Bond	IR LIBOR Market Model	Backward Monte Carlo	Interest Rate
Amortizing Bond	IR LIBOR Market Model	Forward Monte Carlo	Interest Rate
Amortizing Bond	IR Hull White 1-Factor Model	Backward Lattice	Interest Rate
Amortizing Bond	IR Hull White 1-Factor Model	Backward Monte Carlo	Interest Rate
Amortizing Bond	IR Hull White 1-Factor Model	Backward Partial Differential Equation	Interest Rate
Amortizing Bond	IR Hull White 1-Factor Model	Backward Tree	Interest Rate
Amortizing Bond	IR Hull White 1-Factor Model	Forward Monte Carlo	Interest Rate
Amortizing Bond	IR Hull White 2-Factor Model	Backward Lattice	Interest Rate
Amortizing Bond	IR Hull White 2-Factor Model	Backward Monte Carlo	Interest Rate
Amortizing Bond	IR Hull White 2-Factor Model	Backward Partial Differential Equation	Interest Rate
Amortizing Bond	IR Hull White 2-Factor Model	Forward Monte Carlo	Interest Rate
Amortizing Floating Rate Note	IR Deterministic Model	Backward Analytic	Interest Rate
Amortizing Floating Rate Note	IR Deterministic Model	Forward Analytic	Interest Rate
Amortizing Floating Rate Note	IR LIBOR Market Model	Backward Monte Carlo	Interest Rate
Amortizing Floating Rate Note	IR LIBOR Market Model	Forward Monte Carlo	Interest Rate
Amortizing Floating Rate Note	IR Hull White 1-Factor Model	Backward Lattice	Interest Rate
Amortizing Floating Rate Note	IR Hull White 1-Factor Model	Backward Monte Carlo	Interest Rate
Amortizing Floating Rate Note	IR Hull White 1-Factor Model	Backward Partial Differential Equation	Interest Rate
Amortizing Floating Rate Note	IR Hull White 1-Factor Model	Backward Tree	Interest Rate
Amortizing Floating Rate Note	IR Hull White 1-Factor Model	Forward Monte Carlo	Interest Rate
Amortizing Floating Rate Note	IR Hull White 2-Factor Model	Backward Lattice	Interest Rate
Amortizing Floating Rate Note	IR Hull White 2-Factor Model	Backward Monte Carlo	Interest Rate
Amortizing Floating Rate Note	IR Hull White 2-Factor Model	Backward Partial Differential Equation	Interest Rate
Amortizing Floating Rate Note	IR Hull White 2-Factor Model	Forward Monte Carlo	Interest Rate
Amortizing Swap	IR Deterministic Model	Backward Analytic	Interest Rate
Amortizing Swap	IR Deterministic Model	Forward Analytic	Interest Rate
Amortizing Swap	IR LIBOR Market Model	Backward Monte Carlo	Interest Rate
Amortizing Swap	IR LIBOR Market Model	Forward Monte Carlo	Interest Rate
Amortizing Swap	IR Hull White 1-Factor Model	Backward Lattice	Interest Rate
Amortizing Swap	IR Hull White 1-Factor Model	Backward Monte Carlo	Interest Rate

Amortizing Swap	IR Hull White 1-Factor Model	Backward Partial Differential Equation	Interest Rate
Amortizing Swap	IR Hull White 1-Factor Model	Backward Tree	Interest Rate
Amortizing Swap	IR Hull White 1-Factor Model	Forward Monte Carlo	Interest Rate
Amortizing Swap	IR Hull White 2-Factor Model	Backward Lattice	Interest Rate
Amortizing Swap	IR Hull White 2-Factor Model	Backward Monte Carlo	Interest Rate
Amortizing Swap	IR Hull White 2-Factor Model	Backward Partial Differential Equation	Interest Rate
Amortizing Swap	IR Hull White 2-Factor Model	Forward Monte Carlo	Interest Rate
Callable Bond	IR Deterministic Model	Backward Analytic	Interest Rate
Callable Bond	IR Deterministic Model	Forward Analytic	Interest Rate
Callable Bond	IR LIBOR Market Model	Backward Monte Carlo	Interest Rate
Callable Bond	IR LIBOR Market Model	Forward Monte Carlo	Interest Rate
Callable Bond	IR Hull White 1-Factor Model	Backward Lattice	Interest Rate
Callable Bond	IR Hull White 1-Factor Model	Backward Monte Carlo	Interest Rate
Callable Bond	IR Hull White 1-Factor Model	Backward Partial Differential Equation	Interest Rate
Callable Bond	IR Hull White 1-Factor Model	Backward Tree	Interest Rate
Callable Bond	IR Hull White 1-Factor Model	Forward Monte Carlo	Interest Rate
Callable Bond	IR Hull White 2-Factor Model	Backward Lattice	Interest Rate
Callable Bond	IR Hull White 2-Factor Model	Backward Monte Carlo	Interest Rate
Callable Bond	IR Hull White 2-Factor Model	Backward Partial Differential Equation	Interest Rate
Callable Bond	IR Hull White 2-Factor Model	Forward Monte Carlo	Interest Rate
Certificate of Deposit	IR Deterministic Model	Backward Analytic	Interest Rate
Certificate of Deposit	IR Deterministic Model	Forward Analytic	Interest Rate
Certificate of Deposit	IR LIBOR Market Model	Backward Monte Carlo	Interest Rate
Certificate of Deposit	IR LIBOR Market Model	Forward Monte Carlo	Interest Rate
Certificate of Deposit	IR Hull White 1-Factor Model	Backward Lattice	Interest Rate
Certificate of Deposit	IR Hull White 1-Factor Model	Backward Monte Carlo	Interest Rate
Certificate of Deposit	IR Hull White 1-Factor Model	Backward Partial Differential Equation	Interest Rate
Certificate of Deposit	IR Hull White 1-Factor Model	Backward Tree	Interest Rate
Certificate of Deposit	IR Hull White 1-Factor Model	Forward Monte Carlo	Interest Rate
Certificate of Deposit	IR Hull White 2-Factor Model	Backward Lattice	Interest Rate
Certificate of Deposit	IR Hull White 2-Factor Model	Backward Monte Carlo	Interest Rate
Certificate of Deposit	IR Hull White 2-Factor Model	Backward Partial Differential Equation	Interest Rate
Certificate of Deposit	IR Hull White 2-Factor Model	Forward Monte Carlo	Interest Rate

Commodity Swaption	Commodity Black Model	Not applicable	Commodity
European Swaption	IR Hull White 2-Factor Model	Backward Lattice	Interest Rate
European Swaption	IR Hull White 2-Factor Model	Backward Monte Carlo	Interest Rate
European Swaption	IR Hull White 2-Factor Model	Backward Partial Differential Equation	Interest Rate
European Swaption	IR Hull White 2-Factor Model	Forward Monte Carlo	Interest Rate
European Swaption	IR Hull White 1-Factor Model	Backward Lattice	Interest Rate
European Swaption	IR Hull White 1-Factor Model	Backward Monte Carlo	Interest Rate
European Swaption	IR Hull White 1-Factor Model	Backward Partial Differential Equation	Interest Rate
European Swaption	IR Hull White 1-Factor Model	Backward Tree	Interest Rate
European Swaption	IR Hull White 1-Factor Model	Forward Monte Carlo	Interest Rate
European Swaption	IR LIBOR Market Model	Backward Monte Carlo	Interest Rate
European Swaption	IR LIBOR Market Model	Forward Monte Carlo	Interest Rate
Generic Swap	IR Deterministic Model	Backward Analytic	Interest Rate
Generic Swap	IR Deterministic Model	Forward Analytic	Interest Rate
Generic Swap	IR LIBOR Market Model	Backward Monte Carlo	Interest Rate
Generic Swap	IR LIBOR Market Model	Forward Monte Carlo	Interest Rate
Generic Swap	IR Hull White 1-Factor Model	Backward Lattice	Interest Rate
Generic Swap	IR Hull White 1-Factor Model	Backward Monte Carlo	Interest Rate
Generic Swap	IR Hull White 1-Factor Model	Backward Partial Differential Equation	Interest Rate
Generic Swap	IR Hull White 1-Factor Model	Backward Tree	Interest Rate
Generic Swap	IR Hull White 1-Factor Model	Forward Monte Carlo	Interest Rate
Generic Swap	IR Hull White 2-Factor Model	Backward Lattice	Interest Rate
Generic Swap	IR Hull White 2-Factor Model	Backward Monte Carlo	Interest Rate
Generic Swap	IR Hull White 2-Factor Model	Backward Partial Differential Equation	Interest Rate
Generic Swap	IR Hull White 2-Factor Model	Forward Monte Carlo	Interest Rate

40 Appendix F: Data Expectation

See the *OFS MRMM Download Specification and Run Chart* document in MOS for information about the stage tables in which input data of the following types is expected:

- Trade Data
- Market Data
- Reference Data

41 Appendix G: Computations

This section includes the details of the following back-end computations.

Topics:

41.1 Historical Simulation - Output Metrics

The outputs are:

- **ES and VaR**:

  This option calculates the Expected Shortfall (ES) and Value at Risk (VaR) using the current observation period.

  VaR is computed as the maximum amount of potential loss that can occur for given confidence and time horizon.

  ES is computed using the following equation:

$$ES = \sqrt{\left(ES_T(P)\right)^2 + \sum_{j \geq 2}\left(ES_T(P,j)\sqrt{\frac{\left(LH_j - LH_{j-1}\right)}{T}}\right)^2}$$

  Where,

  ES is the regulatory liquidity-adjusted expected shortfall

  T is the length of the base horizon

  $\boldsymbol{ES_T(P)}$ is the expected shortfall at horizon T of a portfolio P

  $\boldsymbol{ES_T(P,j)}$ is the expected shortfall at horizon T of a portfolio P with respect to shocks for the subset of risk factors Q (j), with all other risk factors held constant

  Q (j) is the subset of risk factors whose liquidity horizon is at least as long as LH_j

  $\boldsymbol{LH_j}$ is the liquidity horizon j as specified by in the Liquidity Horizon user interface

- **Stress Calibrated for ES**:

  This selection provides you the option to specify the stress window

  If you choose to define the observation period, toggle the Identified Period button and provide the Observation Start Date and Observation End Date.

  Stress calibrated ES is computed using the following equation:

$$\text{Stress calibrated ES} = \text{ES}_{R,S}\,\frac{\text{ES}_{F,C}}{\text{ES}_{R,C}}$$

  Where,

  $\mathbf{ES_{R,S}}$ is Expected shortfall for reduced set of risk factor and stress observation period

  $\mathbf{ES_{F,C}}$ is Expected shortfall for the full set of risk factor and current observation period

  $\mathbf{ES_{R,C}}$ is Expected shortfall for reduced set of risk factor and current observation period

For Reduced set, ES Metrix calculation (ES(R, C)), a reduced set Validation Result must have Valid status.

- **Internally Modelled Capital Charge**:

  If you select this option, specify the relative weight assigned to the firm's internal model. This output is required to compute Internally Modelled Capital Charge (IMCC).

  IMCC is computed using the following equation:

$$IMCC = \rho\left(IMCC(C)\right) + (1 - \rho)\left(\sum_{i=1}^{R} IMCC(C_i)\right)$$

  Where,

  $\boldsymbol{IMCC}(\boldsymbol{C})$ is Stress calibrated ES

  $\boldsymbol{IMCC}(\boldsymbol{C_i})$ is stress calibrated ES with respect to shocks for broad risk factors class **i** with all other risk factors held constant

  i is broad regulatory risk classes: interest rate risk, equity risk, foreign exchange risk, commodity risk, and credit spread risk

  $\boldsymbol{\rho}$ is the relative weight assigned to the firm's internal model

- **Stress Capital Add-on Charge**:

  Select this option to set the computation of stress scenario capital charge (SES) with execution.

  Stress capital add-on is computed using the following equation:

$$SES = \sqrt{\sum_{i=1}^{L} SES_{NM,i}} + \sum_{j=1}^{K} SES_{NM,j}$$

  Where,

  L is a non-modellable idiosyncratic risk factor

  K is non-modellable non idiosyncratic risk factor

  $\boldsymbol{SES_{NM,X}}$ is the stress scenario capital charge for non-modellable risk factor X, with respect to shock for X risk factor with all other risk factors held constant

- **Aggregated Charge**:

  Select this option to set the computation of Aggregated Charge with execution. Computation of aggregated charge requires a multiplier. A multiplier is the number that is associated with the number of exceptions arrived in Model Validation. Select the business definition defined in the Model Validation module from the drop-down list, to add a multiplier. If not selected, the system will take 1.5 as the default value of the multiplier.

  Aggregated Charge is computed using the following equation:

$$Aggregated\ Charge = max\left\{IMCC_{t-1} + SES_{t-1}; m_c \cdot IMCC_{avg} + SES_{avg}\right\}$$

  Where,

  IMCC and **SES** average is the average taken over 60-days

  $\boldsymbol{m_c}$ is multiplier derived from the backtesting model.

41.2 Model Validation – PLA Attribution Tests

The PLA requirements are based on two test metrics:

- The Spearman correlation metric to assess the correlation between Risk-Theoretical P&L (RTPL) and Hypothetical P&L (HPL).
- The Kolmogorov-Smirnov (KS) test metric to assess the similarity of the distributions of RTPL and HPL.

To calculate each test metric for a trading desk, the time series of the recent 250 trading days of observations of RTPL and HPL are used.

41.2.1 Determination of Spearman Correlation Metric

- For HPL, banks or financial institutions must produce a corresponding time series of ranks based on the size of the P&L (R_{HPL}). That is, the lowest value in the HPL time series receives a rank of 1, the next lowest value receives a rank of 2, and so on.
- For RTPL, banks/financial institutions must produce a corresponding time series of ranks based on size (R_{RTPL}).

Banks calculate the Spearman correlation coefficient of the two-time series of rank values of RRTPL and RHPL based on size using the following formula:

$$r_S = \frac{cov(R_{HPL}, R_{RTPL})}{\sigma_{R_{HPL}} \times \sigma_{R_{RTPL}}}$$

Where,

σRHPL and σRRTPL are the standard deviations of RRTPL and RHPL.

41.2.2 Determination of Kolmogorov-Smirnov Test Metrics

The bank must calculate the empirical cumulative distribution function of RTPL. For any value of RTPL, the empirical cumulative distribution is the product of 0.004 and the number of RTPL observations that are less than or equal to the specified RTPL.

The bank must calculate the empirical cumulative distribution function of HPL. For any value of HPL, the empirical cumulative distribution is the product of 0.004 and the number of HPL observations that are less than or equal to the specified HPL.

The KS test metric is the largest absolute difference observed between these two empirical cumulative distribution functions at any P&L value.

41.2.3 PLA Test Metrics Evaluation

Based on the outcome of the metrics, a trading desk is allocated to a PLA test red zone, an amber zone, or a green zone as mentioned in the following table.

- A trading desk is in the PLA test green zone if both
  - the correlation metric is above 0.80; and
  - the KS distributional test metric is below 0.09 (p-value = 0.264).
- A trading desk is in the PLA test red zone if the correlation metric is less than 0.7 or if the KS distributional test metric is above 0.12 (p-value = 0.055).

- A trading desk is in the PLA amber zone if it is allocated neither to the green zone nor to the red zone.

Table 122: PLA Test Thresholds

Zone	Spearman Correlation	KS Test
Amber Zone Thresholds	0.80	0.09 (p-value = 0.264)
Red Zone Thresholds	0.70	0.12 (p-value = 0.055)

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