

Market Risk Measurement and Management

User Guide

Release 8.0.8.0.0

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Financial Services

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Document Control

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1 Preface

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.

1.1 Scope of the Guide

Oracle Financial Services Market Risk Measurement and Management User Guide, Release 8.0.8.0.0, contains all the essential information required by a user to understand and make use of the functionalities in the application. It includes description of the system functions and capabilities, and details the step-by-step process for system access and use.

1.2 Intended Audience

Welcome to release 8.0.8.0.0 of the Oracle Financial Services Market Risk Measurement and Management User Guide. This manual is intended for the following audience:

- Trading Desk Manager for assessing risk of their portfolio
- Business Analysts: for generating internal risk reports
- Manager-Finance and Manager-Risk: Analyzes and evaluates output metrics, which will help to restructure the portfolio in accordance to business needs.
- Administrator: Manages system access, data load process, and setup data.

1.3 Documentation Accessibility

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at <http://www.oracle.com/pls/topic/lookup?ctx=acc&id=docacc>.

1.3.1 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.

1.4 Related Information Sources

You can access the below documents online from the Oracle Help Center (OHC) documentation Library for [OFS MRMM 8.0.8](#):

- Oracle Financial Services Market Risk Measurement and Management Release Notes. Release 8.0.8.0.0

- Oracle Financial Services Market Risk Measurement and Management Installation Guide, Release 8.0.8.0.0

You can access the OFS AAI documentation online from the documentation library for [OFS AAI 8.x](#):

- OFS Advanced Analytical Applications Infrastructure (OFS AAI) 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 8.0.6.0.0 Technology Matrix](#)

1.4.1 Conventions and Acronyms

Conventions	Description
CAS	Cross Asset Server
CVA	Credit Valuation Adjustment
DM	Data Model
DRC	Default Risk Charge
DVA	Debit 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

Conventions	Description
P&L	Profit and Loss
PFE	Positive Future Exposure
RF	Risk Factor
SES	Stressed Capital Add-on
VaR	Value at Risk

1.4.2 What's new in This Release

The Oracle Financial Services Market Risk Measurement and Management Release 8.0.8.0.0 is an enhancement of the existing Oracle Financial Services Market Risk Management Release 8.0.6.0.0 which has the following enhanced features:

- Portfolio, Pricing Policy and Stress Testing functionality has been revamped to make it more intuitive to users
- New reports have been introduced

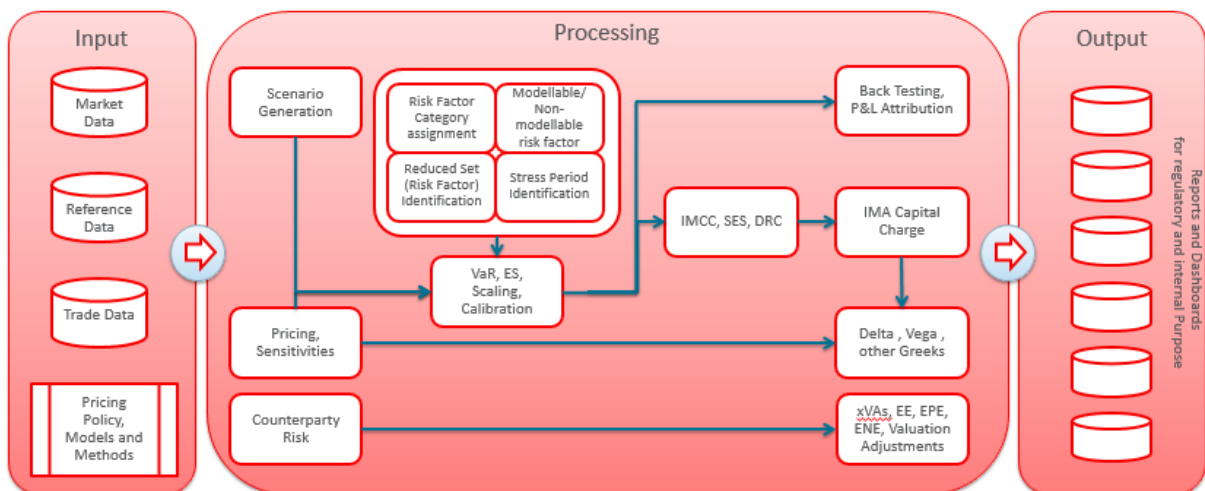
2 Introduction to Oracle Financial Services Market Risk Measurement and Management

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 Fundamental Review of Trading Book (FRTB).

2.1 Process Flow

The process flow of OFS MRMM solution is illustrated below.



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

- **Trade Data:** This is data of on and off balance sheet positions, settled and unsettled trades/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 which 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.

2. User Configurations (Processing): To process the above data and achieve desired results, such as price of a trade or capital requirement for trading book, you need to perform the system configurations, explained below:

- **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 OFS Advanced Analytics Infrastructure User Guide on [OHC Documentation Library](#) for details.
- **Default Configuration:** In this section you need to define the default values used by various components of MRMM. It includes:
 - Currency
 - Currency Pair
 - Model and Method
 - Model Parameters
 - Instrument Type Classification
 - Liquidity Horizon
- **Library:** In this section you need to define the portfolios, configure rules for identification of modellable and non-modellable risk factors, and create market scenarios and pricing policies. It includes:
 - Portfolio Definition
 - Risk Factor Identification
 - Stress Scenarios
 - Pricing policy
- **Instrument Valuation:** In this section you need to perform valuation of instruments and positions in a trading book.
- **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.

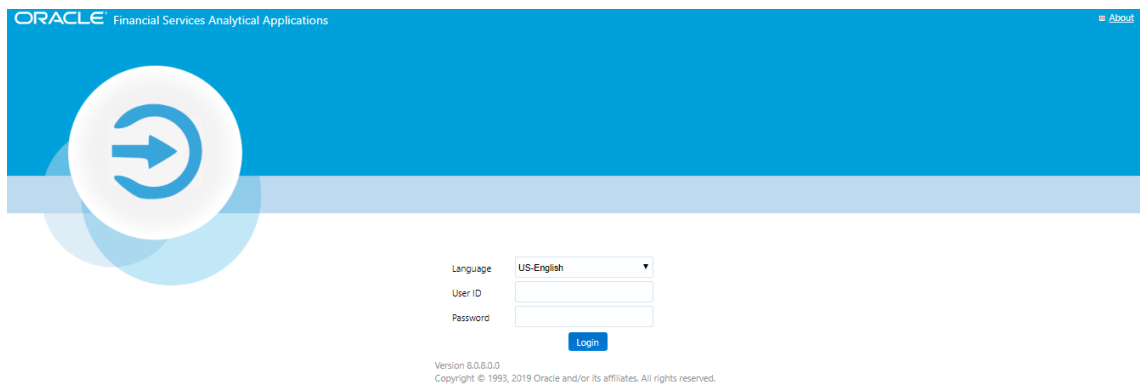
3 Getting Started with OFS MRMM

This chapter details how to get started with the OFS MRMM application, and explains the common features available across the components in the user interface. It describes the organization of the user interface, and provides step-by-step instructions for navigating through the application.

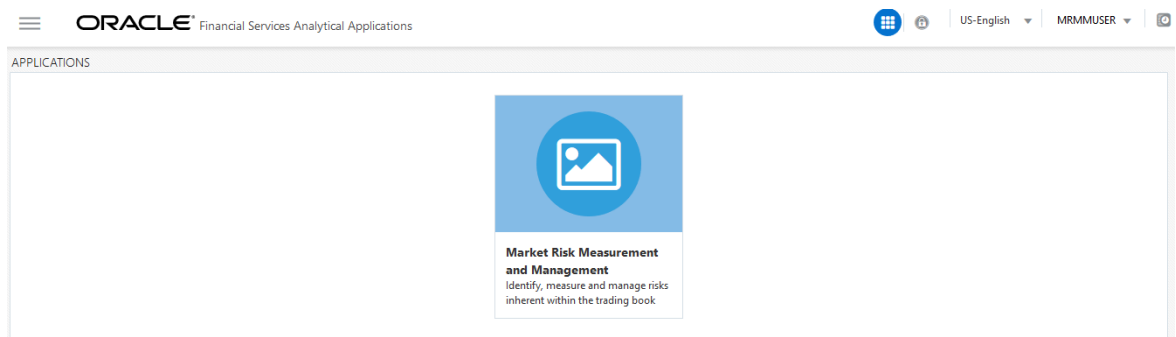
3.1.1 Log in to OFS MRMM

To login:

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 OFSAAI, this home screen is displayed.



3. The buttons in the masthead are illustrated below.

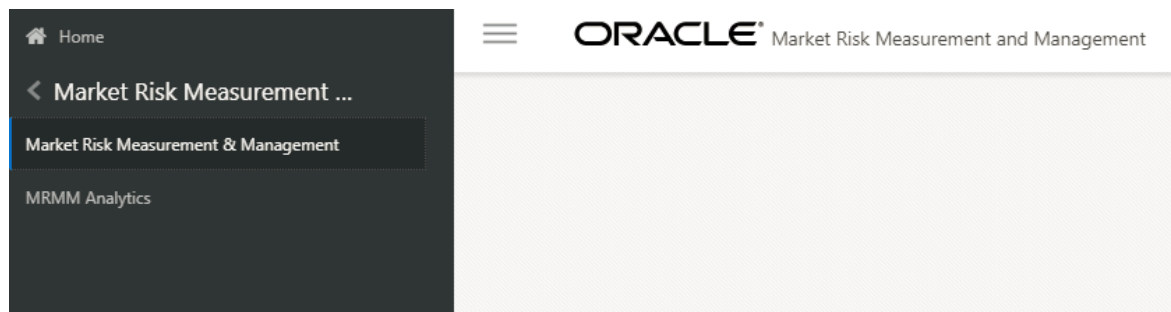


Use the information provided in the following table to set the application preferences.

Field	Description
User Menu	Click this drop-down to select the options: Preferences, About, Change Password or Logout.
Application Icon 	This icon is used to show the available Applications installed in your environment at any time. Click the icon and select Financial Services Market Risk Measurement and Management
Language Menu 	It displays the language you selected in the OFSAA Login Screen. 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 of time.
Administration Icon- 	This icon is used to go to the Administration window. The Administration window displays modules like System Configuration, Identity Management, Database Details, manage OFSAA Product Licenses, Create New Application, Information Domain, Translation Tools and process Modelling Framework as Tiles.
Last Login Details 	This displays 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 OFS Analytical Applications Infrastructure User Guide on OHC Documentation Library , 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 OFS Analytical Applications Infrastructure User Guide on OHC Documentation Library , for details.
Processing Modelling Framework	This module facilitates built-in tooling for orchestration of human and automatic workflow interfaces. See OFS Analytical Applications Infrastructure User Guide on OHC Documentation Library , for details.

- Click the Market Risk Measurement and Management icon.

5. Select **Market Risk Measurement and Management** in the Left Hand Side (LHS) pane. The Market Risk Measurement and Management landing page is displayed.



6. For ease of navigation, click the Hamburger Icon  icon to view the following options:

- Library
- Instrument Valuation
- Default Configuration
- Dimension and Hierarchy Configuration

3.1.2 Components of OFS Market Risk Measurement and Management

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/ trading desk
- Calculation of Greeks for instruments
- Computation of sensitivities (such as Delta, Vega) as per the regulatory requirements for the FRTB standardized approach

See [Instrument Valuation](#) for details.

4 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 OFS Analytical Applications Infrastructure User Guide in [OHC Documentation Library](#) 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.

5 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.

5.1 Navigate to the Currencies screen

To navigate to the currencies screen, from the MRMM home screen, click **Common Object Maintenance > Rate Management > Currencies**.

Currencies

Search

Currency Code: Currency Name:


Status: Active Reporting Currency:

Currencies 0 - 17 / 17

Code	Currency Name	Reference Interest Rate Code	Reporting Currency	Status
<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	No	Inactive
<input type="checkbox"/>	ADP Andorran Peseta		No	Active
<input type="checkbox"/>	AED United Arab Emirates Dirham		No	Active
<input type="checkbox"/>	AOX test		No	Active
<input type="checkbox"/>	AUD Australian Dollar		Yes	Active
<input type="checkbox"/>	BBD Barbados Dollar		No	Active
<input type="checkbox"/>	CAD Canadian Dollar		Yes	Active
<input type="checkbox"/>	CRC Costa Rican Colon		No	Active
<input type="checkbox"/>	EUR Euro (European EMU)		Yes	Active
<input type="checkbox"/>	GBP Pound Sterling		Yes	Active
<input type="checkbox"/>	INR Indian Rupee		Yes	Active

5.2 Search for a Currency

To search for a currency:

- On the **Currencies** screen, under **Search**, provide this search criteria and click the  icon.
The currency you were searching for, is displayed in a tabular format.
- Click the icon to clear the search criteria and refresh the page.

NOTE You can control the number of rows to display on screen by selecting the Pagination Options icon from the action bar.

5.3 Add a New Currency

To add a new currency:


1. On the **Currencies** screen, under Currencies, type the currency details in the text boxes provided using this information.
 - **Currency Code:** For seeded currencies, these are ISO Currency Codes. For user-defined currencies, these may 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, these may be any string up to a length of 40 characters.
 - **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).
2. To add multiple currencies at once, click the **+** icon to add a new row. Do this to add as many currencies as required, and then provide details for each currency.
 3. Click **Save**. The newly added currency (ies) are displayed in the table.

NOTE


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

5.4 Edit a Currency

To edit a currency:

1. Click the check box corresponding to the currency you want to edit, and click the  icon.
2. All the fields except **Currency Code** become editable.
3. Edit the currency as required and click the **Save** button.

5.5 Delete a Currency

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


6 Instrument Valuation

OFS MRMM Instrument Valuation module, enables you to create and analyze different perspectives of viewing the valuation of instruments.

In this section, we discuss the instrument granularity computations and metrics using NUMERIX including the price computation of instruments in the portfolio. The needs of both regulatory reporting and internal risk management are addressed. You can perform valuation of instruments and positions in trading book using pre-defined models and methods based on trading desk and/or portfolio. The following computations are provided:

- Present value of instrument
- Cash flow of instrument
- Greeks and sensitivity associated with instrument
- Yield Risk report of instrument

6.1 Navigate to the Instrument Valuation Summary screen

To navigate to the Instrument Valuation Summary screen, from the MRMM home screen, click **Market Risk Measurement and Management**, click the Hamburger icon , and click **Instrument Valuation**.



Name	Created By	Creation Date	Modified By	Modified Date
test1	MRMMUSER	07/01/2019	MRMMUSER	07/01/2019
test	MRMMUSER	06/28/2019	MRMMUSER	06/28/2019
smumz	MRMMUSER	06/28/2019	MRMMUSER	06/28/2019

6.2 Search for a Business Definition

To search for a business definition in the **Instrument Valuation Summary** screen:

1. 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.
2. In the **Name** column, click the name link of the Instrument Valuation Summary you want to view. If there are multiple results for your search, try refining the search string by providing exact names of the summary. Use the navigation buttons at the bottom of the table in case of multiple search results.

- From the breadcrumb on top, click the **Instrument Valuation Summary** link to return to the summary screen after viewing details of a business definition you were interested in.

6.3 Create and Execute a Business Definition

The screenshot shows the Oracle Market Risk Measurement and Management interface. At the top, there's a red header with the Oracle logo and 'Market Risk Measurement and Management'. Below that, the page title is 'Instrument Valuation' and the folder is 'OFSMRMMSEG'. The breadcrumb trail is 'Home > Instrument Valuation Summary > test'. There's a plus icon for creating a new definition. The form fields are: Name (test), Description, Portfolio (port_basisSwap1), Version (1), Access Type (Read), and Reporting Currency (Andorran Peseta). There's also a 'Stress Scenario' checkbox and a 'testfor' field. Below the form is an 'Execution Summary' table with columns: Execution Date, Execution Id, Execution Status, and Definition workflow status. The table is empty, showing 'No data to display.' and 'Page 1 (0 of 0 items)'.

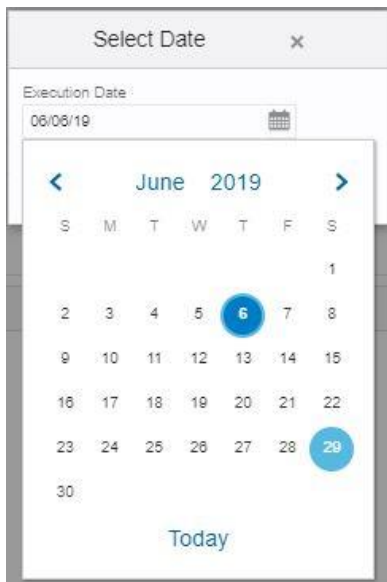
To define a new Instrument Valuation - business definition:

- In the **Instrument Valuation Summary** screen, click the **+** icon to create a new business definition.
- In the Instrument Valuation definition screen, populate the below details:

Fields	Description
Fields marked in red asterisk (*) are mandatory	
Name*	Enter the name of the business definition.
Description	Provide a description for the business definition.
Folder	Select the folder where the definition has to 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
Portfolio	Select the portfolio from the drop-down list. You can add multiple portfolios.

Fields	Description
Fields marked in red asterisk(*) are mandatory	
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 case for 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	It is the currency in which all the output for 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, 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 **Save** and **Submit**.
4. Click **Execute** to trigger an adhoc run. A pop up message with a date-time editor is displayed. Specify the date on which the execution needs to be performed and click **OK**. The execution is triggered.



5. You can view details of the execution, such as Execution Date, Execution ID, Execution Status and Definition Workflow Status in the Execution Summary table.

Execution Summary			
Execution Date	Execution Id	Execution Status	Definition workflow status
2019-08-20	1559823405684	FAILED	DR

Page 1 of 1 (1 of 1 items) | K < 1 > X | Page Size 10


6.4 Edit a Business Definition

To edit a currency:

1. In the **Name** column, click the name link of the Instrument Valuation Summary you want to edit.
All the fields become editable.
2. Edit the currency as required and click the **Save** button.

NOTE You can only edit business definitions in draft stage

6.5 Delete a Business Definition

To delete a business definition, select the definition you want to delete, and click the  icon. A confirmation message appears. On confirmation, the definition is deleted.

6.6 Export a Business Definition

Use the  icon, to export business definitions, for offline viewing.

7 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.

7.1 Search for a Holiday Calendar

To search for a holiday calendar:

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 link of the holiday calendar you want to view. If there are multiple results for your search, try refining the search string by providing 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 screen by selecting the "Pagination Options" icon from the action bar.

7.2 Create a Holiday Calendar

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

To create a Holiday Calendar:

1. Navigate to the **Holiday Calendar** summary page.
2. Click **Add** Holiday Calendar. The Holiday Calendar details page is displayed.
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 for the holiday calendar.

NOTE The name you assign to the holiday calendar must be unique. Name 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.

In the **Holiday Details** grid, define the Holiday details for the any period within the holiday range defined in step 6. 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/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.

Once the holiday calendar definition is saved, its status in the summary page is marked as defined.

6. A holiday calendar created can also be deleted. Select one or more rows of holiday calendar definitions and click Delete.

7.2.1 Excel Import / Export

Excel import/export functionality is used for adding/editing holiday calendar definitions.

7.2.2 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:

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

Holiday list for the holiday ID #1 generated successfully message appears (where #1 is the holiday calendar code).

The holiday list can be confirmed by querying the FSI_HOLIDAY_LIST table.

4. 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** icon to execute the selected holiday calendar.

5. The generated holiday list is no longer valid if
 - 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 below 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"

7.2.3 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 in 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 the below steps:

1. Click **Show Exceptions** in the Holiday Exceptions grid. The Holiday Exceptions window opens.
2. The search block in the Exceptions page has the below fields: **From (Year), To (year), Fixed Holidays, Moving Holidays, Holiday Date** and **All Exceptions**.
 - **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 checkbox when selected lists all the exceptions, if already defined, for the holidays within the From, To Date range.
3. In the Holiday Exceptions block, 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, Spring 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.

7.2.4 Excel Import/ Export

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

8 Library

This section enables you to create a library of definitions which can be used across applications. You can create a library of:

- Portfolios
- Stress Scenarios
- Pricing Policies

8.1 Portfolio Definition

Portfolio is a group of financial instruments bundled together. It gives business user a 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.

Portfolio is the base for any evaluation to be performed. For example in Instrument Valuation all the analysis that are performed are at granularity of portfolio. Portfolio definition functionality provides a flexibility to create portfolio based on business hierarchy, or by selecting individual instruments. Business hierarchy provides a 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 for 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 analysis of instrument valuations and portfolio valuations.

8.1.1 Navigate to the Portfolio Summary screen

To navigate to the Portfolio screen, from the MRMM home screen, click **Market Risk Measurement and Management**, click the Hamburger icon , click **Library > Portfolio**.

ORACLE Market Risk Measurement and Management

Portfolio Summary

Home > Portfolio Summary

View: ALL Type to filter... X Folder: OFSMRMMSEG + -

Portfolio Name	Portfolio Type	Created By	Creation Date	Modified By	Modified Date
port_basisSwap1	POSITIONS	MRMMUSER	05/28/2019	MRMMUSER	05/28/2019
Gen_Swap_InVal		MRMMUSER	10/18/2018	MRMMUSER	05/04/2019
Inflation Zero Coupon Swap		MRMMUSER	09/14/2018	MRMMUSER	05/04/2019
Forex Var Swap		MRMMUSER	11/05/2018	MRMMUSER	05/04/2019
Inflation Linked Bond		MRMMUSER	11/05/2018	MRMMUSER	05/04/2019
fr_american		MRMMUSER	05/30/2019	MRMMUSER	05/30/2019
CMDTY_SWAPPTN		MRMMUSER	05/30/2019	MRMMUSER	05/30/2019
cmdty_eur		MRMMUSER	05/30/2019	MRMMUSER	05/30/2019
cmdty_amercon		MRMMUSER	05/29/2019	MRMMUSER	05/29/2019
Abond_ALL		MRMMUSER	09/14/2018	MRMMUSER	05/28/2019

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8.1.2 Search for a Portfolio

To search for a portfolio in the Portfolio Summary screen:

1. In the **View** drop-down box, select the kind of portfolio. the available options are: **All, Positions, Dimensions, Trading Desk**.
2. In the **Search** field, type the first few letters of the portfolio 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 link of the portfolio you want to view. If there are multiple results for your search, try refining the search string by providing exact names of the summary. Use the navigation buttons at the bottom of the table in case of multiple search results.
4. From the breadcrumb on top, click the **Portfolio Summary** link to return to the summary screen after viewing details of the portfolio you were interested in.

8.1.2.1 Define a Portfolio

ORACLE Market Risk Measurement and Management

Portfolio Definition Folder: OFSMRMMSEG

Home > Portfolio Summary > port_basisSwap1

Save Share Like Dislike

Portfolio Type: Positions Dimensions Trading Desk

Name: port_basisSwap1 Version: 1

Description: Access Type: Read/Write Read

Available Positions + -

** Please apply the filter to get the position details

Selected Positions -

	Account Number	Instrument Code	Trading Desk Id	Instrument Type	Entity Name	CounterParty Name	Currency Code
<input type="checkbox"/>	A_BS_SWAP_010	BASIS_SWAP_010	BASIS_TRAD1				USD
<input type="checkbox"/>	A_BS_SWAP_009	BASIS_SWAP_009	BASIS_TRAD1				EUR
<input type="checkbox"/>	A_BS_SWAP_008	BASIS_SWAP_008	BASIS_TRAD1				GBP
<input type="checkbox"/>	A_BS_SWAP_007	BASIS_SWAP_007	BASIS_TRAD1				EUR
<input type="checkbox"/>	A_BS_SWAP_006	BASIS_SWAP_006	BASIS_TRAD1				JPY

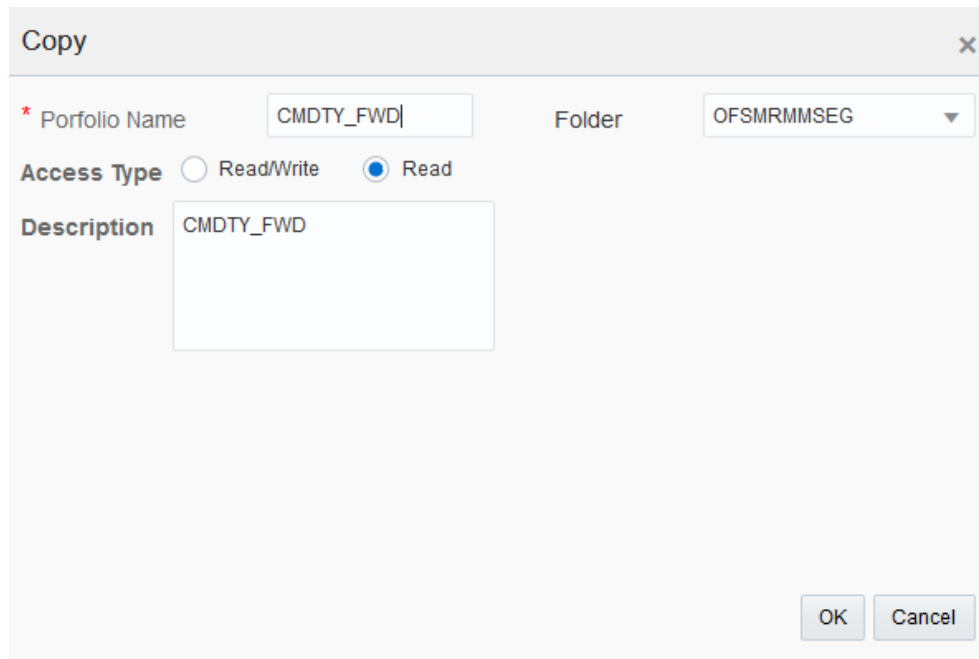
Page 1 of 2 (1-5 of 10 items) K < 1 2 > X Page Size 5

To define a new Portfolio definition:

1. In the **Portfolio Summary** screen, click the icon to create a new portfolio.
2. In the **Portfolio Definition** screen, populate the below details:

Fields	Description
Fields marked in red asterisk(*) are mandatory	
Name*	Enter the portfolio name.
Description	Enter a short description for 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	<p>Portfolios can be created based on multiple filters. These are represented as Portfolio type, and are detailed below:</p> <ul style="list-style-type: none"> • 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. • Dimensions: In this option, the portfolio can be defined based on a more aggregate level as compared to position type. You can apply filters based on dimensions such as Country, Market Risk Asset class and so on. • Trading Desk: This option allows a trading desk to be represented as a separate portfolio.
Available Positions	Displays the available positions
Selected Positions	Displays the selected positions
Filters	If you have selected Available Position option. You will be provided with filters such as, Instrument Type, Entity Name, Counterparty Name, Currency.
Available Hierarchies	Displays the available hierarchies
Selected Hierarchies	Displays the selected hierarchies
Trading Desk	Displays the trading desk information

3. In the **Portfolio Type** field, select whether the portfolio should be based on **Position, Dimensions, or Trading Desk**. For example, if you select **Instruments**, then the list of Instruments is displayed. The list displays all the available marketable instruments.
 - a. To create the Portfolio based on Positions:
 - i. Select the **Positions** radio button in **Portfolio Type**.



Copy


* Portfolio Name Folder

Access Type Read/Write Read

Description

3. Click **OK**. The copy is created and can be viewed in the Portfolio Summary screen.

8.1.3 Export a Portfolio

Use the  icon, to export portfolios.

8.2 Risk Factor

The page displays a list of pre-seeded risk factors. You can add a business name to risk factors, or delete entries.

8.2.1 Navigate to the Risk Factor Screen

To navigate to the **Risk Factor** screen, from the MRMM home screen, click **Market Risk Measurement and Management**, click the Hamburger icon  , click **Library > Risk Factor**.

Risk Factor

Home > Risk Factor

Type to filter. X

Risk Factor	Business Name	Asset Class	Add On Date
CR.EUR-BACR_SNRFOR_MM.CDS-10Y.SPREAD.MID		CR	06/27/2019
CR.EUR-BACR_SNRFOR_MM.CDS-1Y.SPREAD.MID		CR	06/27/2019
CR.EUR-BACR_SNRFOR_MM.CDS-3Y.SPREAD.MID		CR	06/27/2019
CR.EUR-BACR_SNRFOR_MM.CDS-5Y.SPREAD.MID		CR	06/27/2019
CR.EUR-BACR_SNRFOR_MM.CDS-7Y.SPREAD.MID		CR	06/27/2019
CR.EUR-BACR_SNRFOR_MM.CDS.RECOVERY		CR	06/27/2019
CR.EUR-BMW_SNRFOR_MM.CDS-10Y.SPREAD.MID		CR	06/27/2019
CR.EUR-BMW_SNRFOR_MM.CDS-1Y.SPREAD.MID		CR	06/27/2019
CR.EUR-BMW_SNRFOR_MM.CDS-3Y.SPREAD.MID		CR	06/27/2019
CR.EUR-BMW_SNRFOR_MM.CDS-5Y.SPREAD.MID		CR	06/27/2019

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8.2.2 Search for a Risk Factor


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

8.3 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 which 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 MRMM application, enables you to define market data under multiple scenarios, which can be further used to perform valuations.

8.3.1 Navigate to the Stress Scenario Summary Screen

To navigate to the **Stress Scenario** screen, from the MRMM home screen, click **Market Risk Measurement and Management**, click the Hamburger icon  , click **Library > Stress Scenario**.



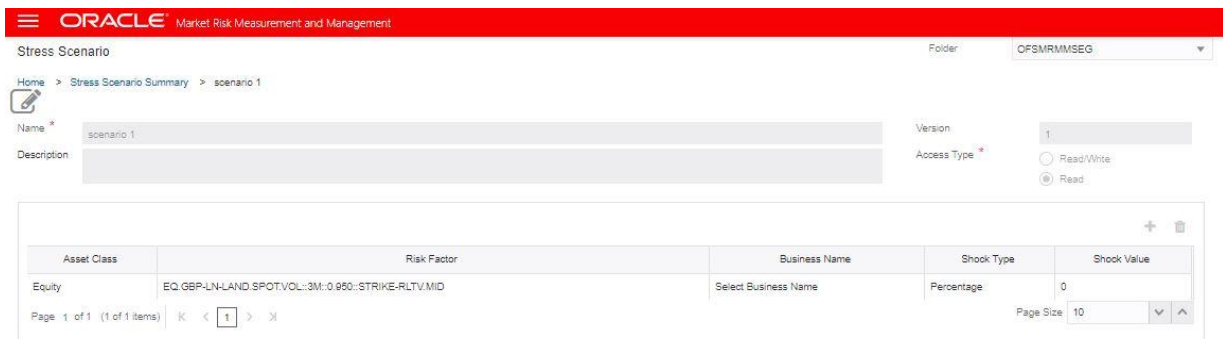
8.3.2 Search for a Stress Scenario

To search for a stress scenario, in the **Stress Scenario Summary** screen, type the first few letters of the stress scenario 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.


From the breadcrumb on top, click the **Stress Scenario Summary** link to return to the summary screen after viewing details of the stress scenario you were interested in.

8.3.3 Define a Stress Scenario

The functionality enables you to create a new scenario.





To define a new stress scenario:

1. In the **Stress Scenario Summary** screen, click the  icon to create a new scenario.
2. In the definition screen, populate the below details:

Fields	Description
Fields marked in red asterisk (*) are mandatory	
Name*	Enter the stress scenario name.
Description	Enter a short description for the stress scenario

Fields	Description
Fields marked in red asterisk(*) are mandatory	
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.

3. Click the  icon, and select the Asset Class, Risk Factor, Business Name. If the risk factor has been assigned a business name, it is displayed.
4. Select the **Shock Type** and assign a **Shock Value**. For details see [Shock Definition Parameters](#). You can create multiple shocks in a scenario.
5. Click  to delete any entry from the table.
6. Click **Save**. The Scenario is defined and displayed in the summary page.

8.3.4 Shock Definition Parameters

Shock can be defined at various levels of dimension and market data market quotes. You need to select the factors based on which the shock needs to be defined. The factors used to define a shock are dependent on the Risk Factor Type and Market Data Type. Depending on the factor the definition of a shock can be classified into the four categories. The categories are explained considering Interest Rate Shock as an example:

- **Highest Level of Risk Factor:** Any shock defined at this level will impact all the yield curves. In the example, of Interest Rate Shock, this shock will be applied is at the level of Interest Rate (IR). Any shock defined at IR level will impact all yield curves.
- **Currency Level:** Any shock defined at this level will impact all yield curves mapped to a specific currency type. In the example, of Interest Rate Shock, this shock will be applied is at the level of IR, mapped to a specific currency type such as US Dollar (USD). Any shock defined at IR-USD level will impact all yield curves where currency is USD.
- **Yield Curve Level:** Any shock defined at this level will impact the dimensions mapped to a specific to a currency type, of a specific yield curve. In the example, of Interest Rate Shock, this shock will be applied is at the level of IR, mapped to a specific currency type such as US Dollar (USD), and yield curve such as LIBOR. Any shock defined at IR-USD-LIBOR level will impact only LIBOR yield curve where currency is USD
- **Yield Curve Term Point Level:** Any shock defined at this level will impact the dimensions mapped to a specific currency type, of a specific yield curve with a defined term point. In the example, of Interest Rate Shock, this shock will be applied is at the level of IR, mapped to a specific currency type such as US Dollar (USD), and yield curve such as LIBOR with a fixed term point. Any shock defined at IR-USD-LIBOR-3M level will impact only 3 months term point of LIBOR yield curve where currency is USD.

For example if the shock value for IR-USD-LIBOR-3M is 1% and that for IR-USD-LIBOR is 2%. In this case a three month term point will be shocked by 1% whereas all other term points in yield curve will be shocked by 2%. Below table illustrates the way shock definition is expected to work in the form of a hierarchy. As a result the below percentage of shock is applied to the yield curves:

- 4% shock to 3 month term point of yield curve IR-USD-LIBOR
- 3% shock to all term points except 3 month of yield curve IR-USD-LIBOR
- 2% shock to all USD yield curves except LIBOR
- 1% shock to all yields curves where currency is not USD

Level 1	Level 2	Level 3	Level 4	Shock value
IR				1%
IR	USD			2%
IR	USD	LIBOR		3%
IR	USD	LIBOR	3M	4%

The below table lists the factors for each type of market data which can be used to define shock. Additionally, dimensions such as Cash Flow, Time Bucket, industry/sector of the Counterparty, Counterparty Type, and Rating of Instrument and so on can also be used to define shock. Generic dimensions are applicable to all the shock factors. The granularity of the shock is inversely proportional to the number of dimensions selected.

Type of Risk Factor	Type of Market Data	Available Factors/Key for Shock Definition
CMDTY	Commodity Forward	Currency, Exchange, Ticker, Maturity
CMDTY	Commodity Spot	Currency, Exchange, Ticker
CMDTY	Commodity volatility surface	Currency, Exchange, Ticker, Maturity, Strike, Strike Type
CR	Credit index swap	Currency, Index Series Version, Tenor, Indicator (Spread/Recovery)
CR	Single-name credit default swap	Currency, Reference Entity, Debt Type, Restructuring clause, Tenor
CR	Survival Probabilities	Currency, Reference Entity, Debt Type, Restructuring clause, Maturity
EQ	Equity Dividends	Currency, Exchange, Ticker, Dividend Structure
EQ	Equity Futures	Currency, Exchange, Contract code, Maturity Code
EQ	Equity Spot	Currency, Exchange, Ticker

Type of Risk Factor	Type of Market Data	Available Factors/Key for Shock Definition
EQ	Equity volatility surface	Currency, Exchange, Ticker, Maturity, Strike, Strike Type
FX	Foreign exchange forward	Base Currency, Term Currency, Market Type, Maturity
FX	Foreign exchange spot	Base Currency, Term Currency
FX	FX volatility surface	Base Currency, Term Currency, Tenor, Strike
INFL	Inflation-Indexed Options	Currency, Inflation Index, Flavour, Strike, Maturity
INFL	Inflation-Indexed Swaps	Currency, Inflation Index, Maturity
INFL	Inflation-Linked Bonds	Currency, Type of bond, Issuer, Inflation Index
INFL	Seasonality	Currency, Inflation Index, Season Month
IR	Basis Swap	Currency, IR Index, IR Index Tenor for both legs of swap, Maturity of swap
IR	Bonds/Bills	Currency, Type of bond/Bill, Issuer, Maturity
IR	Cap volatility surface	Currency, IR Index, IR Index Tenor, Cap Tenor, Cap Strike
IR	Cash	Currency, IR Index, IR Index Tenor
IR	Cross-currency basis swap	Currency, IR Index, IR Index Tenor for both legs of swap, Maturity of swap
IR	Cross-currency fixed-for-floating swap	Currency, IR Index, IR Index Tenor for both legs of swap, Maturity of swap, Market Type
IR	Forward rate agreement	Currency, IR Index, IR Index Tenor, FRA Period
IR	Represent a point on a swaption volatility cube	IR.[Underlying].SWPT.StrikeType::Strike::OptTenor::SwapTenor::DataType.QuoteType where [Underlying] = Currency-IRIndex-IRIndexTenor.VOL
IR	Swap	Currency, IR Index, IR Index Tenor, Swap Tenor
IR	Swaption volatility cube	Currency, IR Index, IR Index Tenor, Strike Type, Strike, Option Tenor, Swap Tenor
IR	Swaption volatility surface	Currency, IR Index, IR Index Tenor, Swaption Strike, Option Tenor, Swap Tenor

8.3.5 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.

8.3.5.1 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 risk factors.

Below 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 = $2 * [1 + (1\%)] = 2.02$

8.3.5.2 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. Below 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 = $2 + 0.04 = 2.04$

8.3.5.3 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. Below 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 = $112 + (- 8) = 94$

8.4 Pricing Policy

In this page, you can define the pricing policies to be used for instrument pricing. Pricing Policy enables you to select models and methods to be used for pricing the instrument. You can either download, or define the pricing policy

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.

8.4.1 Navigate to the Pricing Policy Summary Screen

To navigate to the **Pricing Policy** screen, from the MRMM home screen, click **Market Risk Measurement and Management**, click the Hamburger icon  , click **Library > Pricing Policy**.


8.4.2 Search for a Pricing Policy

To search for a stress scenario, in the **Pricing Policy Summary** screen, type the first few letters of the portfolio 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.

From the breadcrumb on top, click the **Pricing Policy Summary** link to return to the summary screen after viewing details of the policy you were interested in.


8.4.3 Define a Pricing Policy

To define a pricing policy:


1. In the **Pricing Policy Summary** screen, click the  icon to create a new pricing policy.
2. In the definition screen, populate the below details:

Fields	Description
Fields marked in red asterisk (*) are mandatory	
Name*	Enter the pricing policy name.
Description	Enter a short description for the pricing policy

Fields	Description
Fields marked in red asterisk(*) are mandatory	
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.

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

NOTE Select the source as Numerix.


4. Click  to delete any entry from the table.
5. Click **Save**. The pricing policy is defined and displayed in the summary page.

9 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. You can configure the below settings in this window:

- Currency
- Currency Pair
- Model and Method
- Model Parameters
- Instrument Type Classification
- Liquidity Horizon

9.1 Navigate to the Default Configurations Screen

To navigate to the **Default Configurations** screen, from the MRMM home screen, click **Market Risk Measurement and Management**, click the Hamburger icon  , click **Default Configurations**.

9.2 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 Rank, Interest Rate Index, Interest Rate Tenor, Discount Curve, Dual Curve, Overnight Index, Holiday Calendar, Country, Allowed Yield Curves, Bond Type and Issuer.

Discount Curve	Dual Curve	Overnight Index	Holiday Calendar	Country	Allowed Yield Curve	Bond Type	Issuer
AUD-BBSW-6M	false		SYDNEY	AUS	AUD-BBSW-6M AUD-BBSW-3M	AUTREASURY	AUGO
CAD-CORRA-ON	true	CORRA	TORONTO	CAN	CAD-CORRA-ON CAD-CDOR-6m CAD-CDOR-3m	CATREASURY	CAGO
EUR-EONIA-ON	true	EONIA	TARGET	DEU	EUR-EONIA-ON EUR-EURIBOR-1m EUR-EURIBOR-3m EUR-EURIBOR-6m EUR-EURIBOR-9m EUR-EURIBOR-12m	DEBUND	DEGO
INR-MIFOR-6m	false			IND	INR-MIFOR-6m		
GBP-SONIA-ON	true	SONIA	LONDON	GBR	GBP-SONIA-ON GBP-LIBOR-1M GBP-LIBOR-6m GBP-LIBOR-3M	GBGILT	GBGO

The following table describes the fields in the Currency window:

Fields	Description
Fields marked in red asterisk(*) are mandatory	
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, higher the rank of currency. For example: USD is the most traded currency in 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 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 pricing of a trading book instrument. For example: USD-LIBOR-3M

Fields	Description
Fields marked in red asterisk(*) are mandatory	
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 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.
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.

To define Currency:

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 'F2' key, or click on any other row to come out of the edit mode in a table, before updating or navigating to a different tab.

2. Click  .

9.3 Currency Pair

The Currency Pair window enables you to provide default values at the granularity of currency pair. This is used for 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.

Currency Pair Code	Base Currency	Term Currency	Base CC Basis Tenor	Term CC Basis Tenor	Inverse Price	CC Basis Curve	Basis Spread Leg
ADPAED	ADP	AED			false	2	
ADPASD	ADP	ASD					
ADPAUD	ADP	AUD			true		
ADPBBD	ADP	BBD					
ADPCAD	ADP	CAD			false		
ADPCRC	ADP	CRC					
ADPEUR	ADP	EUR					
ADPOBP	ADP	GBP					
ADPINR	ADP	INR					
ADPJOD	ADP	JOD					

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

Fields	Description
Fields marked in red asterisk(*) are mandatory	
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 interest rate index of base currency. This is represented as tenor and tenor unit. For example: 3M
Term CC Basis Tenor	Tenor of interest rate index of term currency. This is represented as 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 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 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:

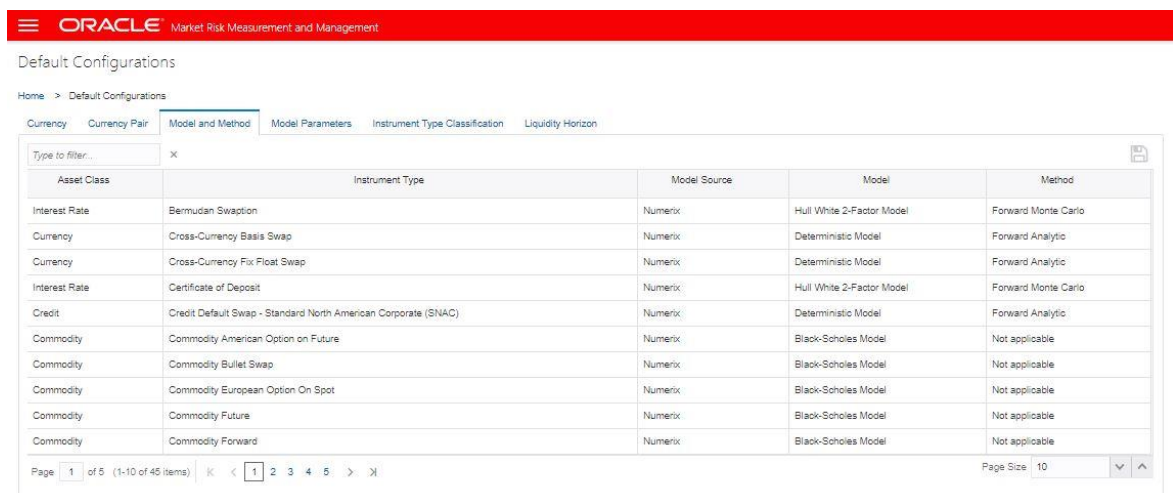
1. Select the Currency Pair Code row that needs to be updated and enter the details for **Base CC Basis Tenor, Term CC Basis Tenor, Inverse Price, CC Basis Curve, and Basis Spread Leg.**

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

2. Click  .

9.4 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 screen 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.




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

Fields	Description
Fields marked in red asterisk(*) are mandatory	
Asset Class	Displays the asset class (Interest Rate, Equity, Commodity and so on) of instrument type for which models and methods needs 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 selected model from the drop-down list.

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

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

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

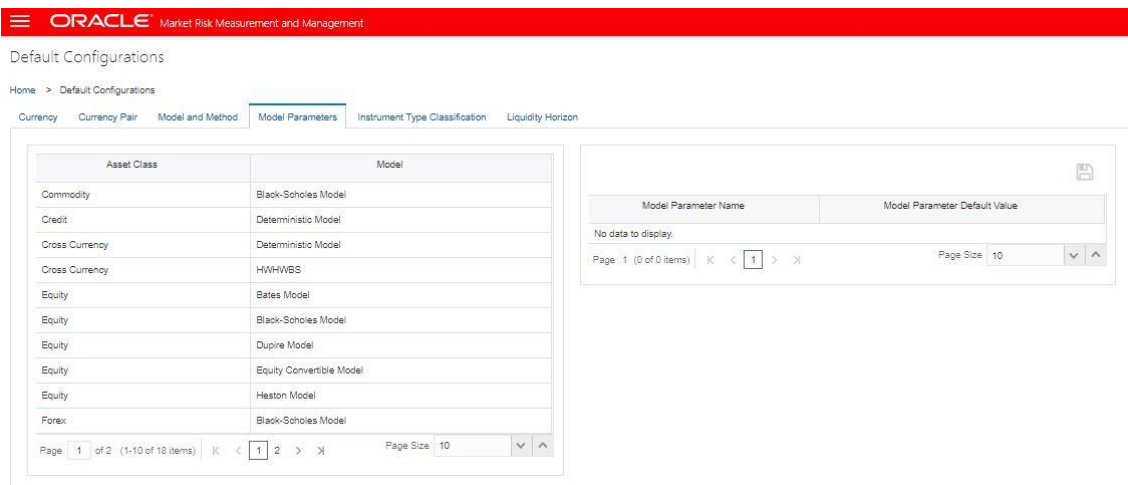
3. Click . Each instrument type is mapped to one of the asset class and its value is displayed.

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 D: List of Models and Methods](#) for details.

9.5 Model Parameters

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



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

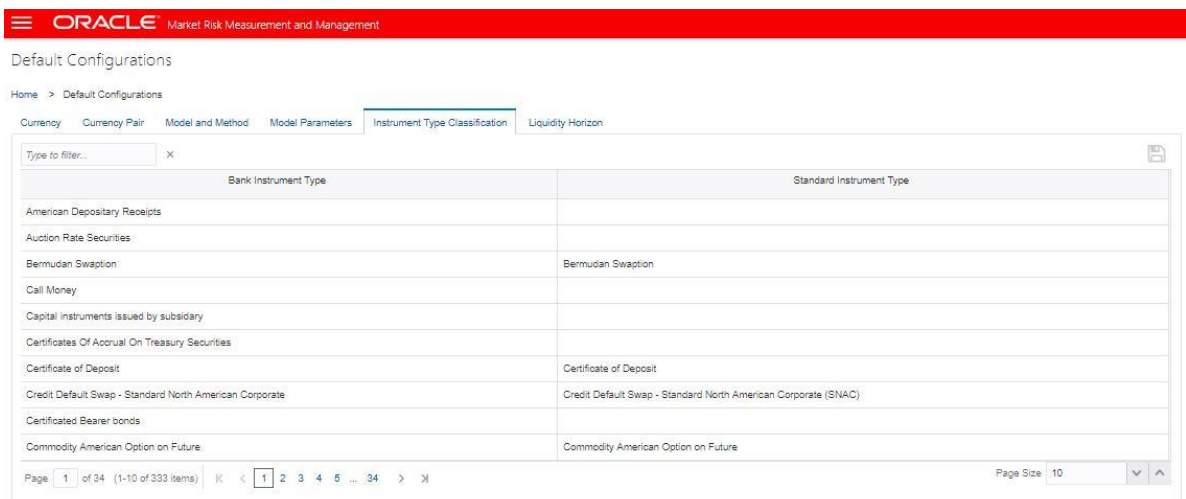
Fields	Description
Fields marked in red asterisk(*) are mandatory	
Asset Class	Displays the type of asset for which model and method needs to be defined.
Model	Displays the model name.
Model Parameter Name	Displays the model parameters associated with the selected model.
Model Parameter Default Value	Specify a value for the model parameter.

To define the default Model Parameter value:

1. Select the model for which model parameter values needs to 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 leave it blank.
2. Click  . The updated values are displayed.

9.6 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 Instrument Type Classification window allows you to map the instrument type as per the financial institution, and the standard instrument type names used in MRMM application.



The screenshot shows the Oracle Market Risk Measurement and Management interface. The 'Instrument Type Classification' tab is active, displaying a table with two columns: 'Bank Instrument Type' and 'Standard Instrument Type'. The table lists various instrument types, including American Depository Receipts, Auction Rate Securities, Bermudan Swaption, Call Money, Capital instruments issued by subsidiary, Certificates Of Accrual On Treasury Securities, Certificate of Deposit, Credit Default Swap - Standard North American Corporate, Certificated Bearer bonds, and Commodity American Option on Future. The table is currently on page 1 of 34.


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

Fields	Description
Fields marked in red asterisk(*) are mandatory	
Bank Instrument Type	It is the instrument type name as specified in instrument type dimension.
Standard Instrument Type	It is the instrument type name as used by MRMM application. Select the Standard Instrument Type from the drop-down box.

To select the standard instrument type for a specific bank instrument:

1. Click any **Bank Instrument Type**. Select the **Standard Instrument Type** from the drop-down list on the RHS column.
2. Select the **Model** and the **Method** from the drop-down box.

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

3. Click  . The mapping is saved.

9.7 Liquidity Horizon

OFS MRMM application incorporates the risk of market liquidity, by varying the liquidity horizons for calculating regulatory Expected Shortfall. This enables to mitigate the risk of a sudden, and severe impairment of market liquidity across asset markets. 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](#)).

Liquidity Horizon screen provides a mapping between the risk factor category and the values associated with each category. The table below lists the default liquidity horizon values as per Basel regulation (Reference: [BCBS document d352](#)).

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
Equity price (large cap)	10	Precious metals and non-ferrous metals price: volatility	60
Equity price (small cap)	20	Other commodities price: volatility	120
Equity price (large cap): volatility	20	Commodity: other types	120

ORACLE Market Risk Measurement and Management

Default Configurations

Home > Default Configurations

Currency Currency Pair Model and Method Model Parameters Instrument Type Classification **Liquidity Horizon**


Risk Factor Category	Liquidity Horizon
Interest rate: specified currencies - EUR, USD, GBP, AUD, JPY, SEK, CAD and domestic currency of a bank	10
Interest rate: unspecified currencies	20
Interest rate: volatility	60
Interest rate: other types	60
Credit spread: sovereign (IG)	20
Credit spread: sovereign (HY)	40
Credit spread: corporate (IG)	40
Credit spread: corporate (HY)	60
Credit spread: volatility	120
Credit spread: other types	120

Page 1 of 3 (1-10 of 26 items) Page Size 10

Liquidity horizon can be defined for each portfolio and trading desk individually. To assign a risk factor value to each risk factor category:

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


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

2. Click  . 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.

10 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 which will be used to select members to define a trading book portfolio. The dimensions are pre-seeded with the application. You must create at least one hierarchy for all the dimensions that you intend to use in portfolio definition. See OFS Analytical Applications Infrastructure User Guide on [OHC Documentation Library](#) for steps to create a hierarchy.

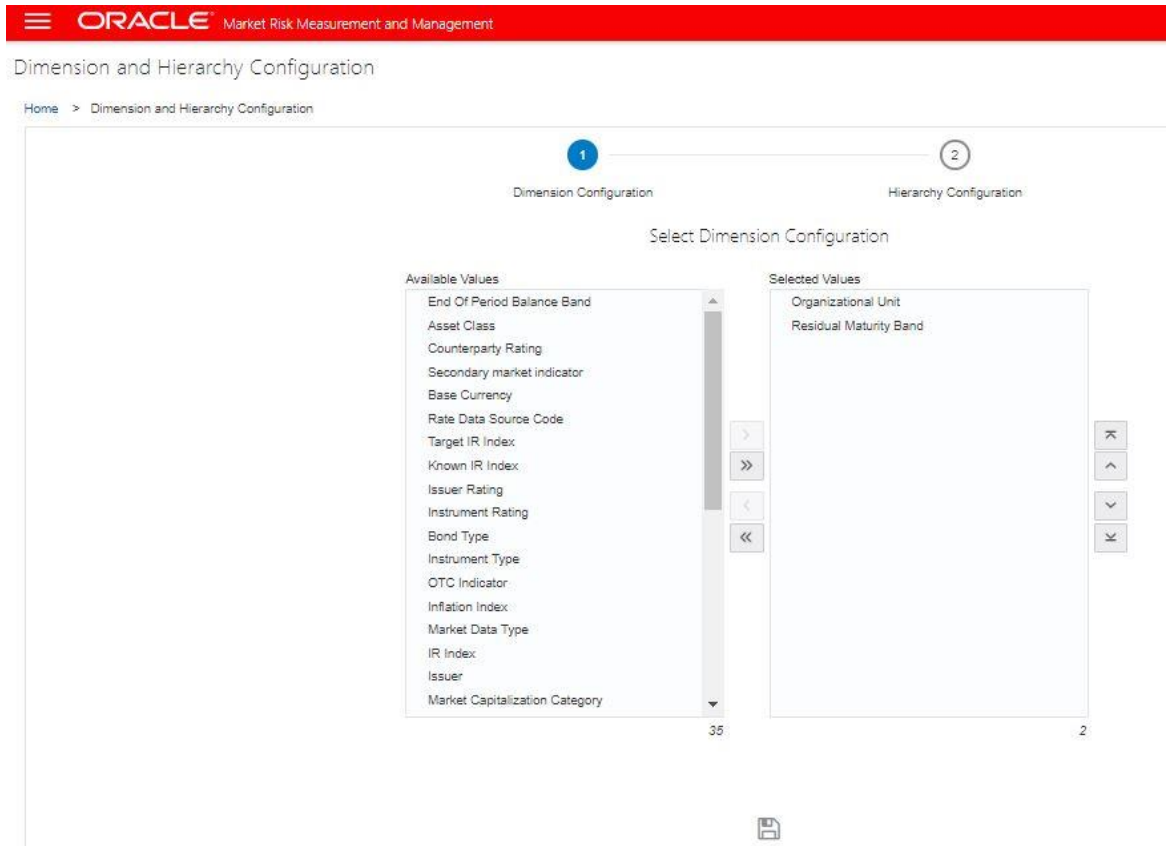
10.1 Navigate to the Dimensions and Hierarchy Screen

To navigate to the **Dimension and Hierarchy** screen, from the MRMM home screen, click **Market Risk Measurement and Management**, click the Hamburger icon  , click **Dimensions and Hierarchy**.

In this window you can perform the following actions:

- **Dimension Configuration:** This window enables you to select one or multiple dimensions from the available list of dimensions.
- **Hierarchy Configuration:** This window enables you to update one hierarchy each for the selected dimensions.





10.2 Configuring Dimensions




The following table describes the fields in the Dimensions Configuration window:

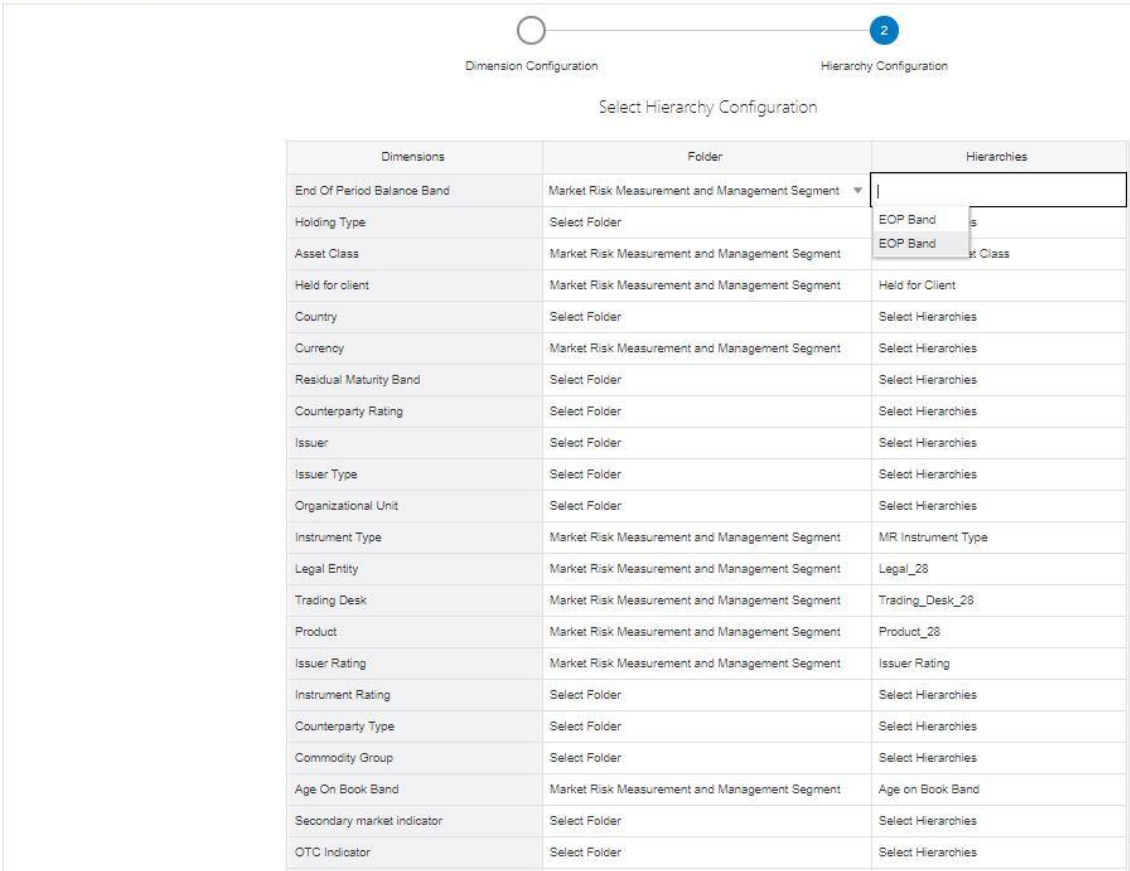
Fields	Description
Fields marked in red asterisk(*) are mandatory	
Available Values	Displays the list of available dimensions.
Selected Values	Displays the list of selected dimensions.

To select a dimension:

1. To add the dimensions, select the dimension from the **Available Values** and add them to the list of **Selected Values** by using  button. To select multiple values use Ctrl or Shift key. To select all the Available Values, use  button. To remove any selected value from the list use  button. To remove all the selected values use  button.

- Click , to update the selected dimensions list. The selected dimensions are populated in the Hierarchy Configuration window.

10.2 Configuring Hierarchies



Dimensions	Folder	Hierarchies
End Of Period Balance Band	Market Risk Measurement and Management Segment	EOP Band
Holding Type	Select Folder	EOP Band
Asset Class	Market Risk Measurement and Management Segment	Asset Class
Held for client	Market Risk Measurement and Management Segment	Held for Client
Country	Select Folder	Select Hierarchies
Currency	Market Risk Measurement and Management Segment	Select Hierarchies
Residual Maturity Band	Select Folder	Select Hierarchies
Counterparty Rating	Select Folder	Select Hierarchies
Issuer	Select Folder	Select Hierarchies
Issuer Type	Select Folder	Select Hierarchies
Organizational Unit	Select Folder	Select Hierarchies
Instrument Type	Market Risk Measurement and Management Segment	MR Instrument Type
Legal Entity	Market Risk Measurement and Management Segment	Legal_28
Trading Desk	Market Risk Measurement and Management Segment	Trading_Desk_28
Product	Market Risk Measurement and Management Segment	Product_28
Issuer Rating	Market Risk Measurement and Management Segment	Issuer Rating
Instrument Rating	Select Folder	Select Hierarchies
Counterparty Type	Select Folder	Select Hierarchies
Commodity Group	Select Folder	Select Hierarchies
Age On Book Band	Market Risk Measurement and Management Segment	Age on Book Band
Secondary market indicator	Select Folder	Select Hierarchies
OTC Indicator	Select Folder	Select Hierarchies

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

Fields	Description
Fields marked in red asterisk(*) are mandatory	
Dimensions	Displays name of the dimension selected in Dimension Configuration
Folder	Select the folder from the drop-down box where the hierarchy has been defined
Hierarchies	Select the Hierarchy

To select a hierarchy, follow the below steps:

1. In the **Hierarchy Configuration** window, update the **Folder** and **Hierarchies** fields.
2. Click **Save**. The configured hierarchies will be used to define portfolios.

11 Market Risk Measurement and Management Reports

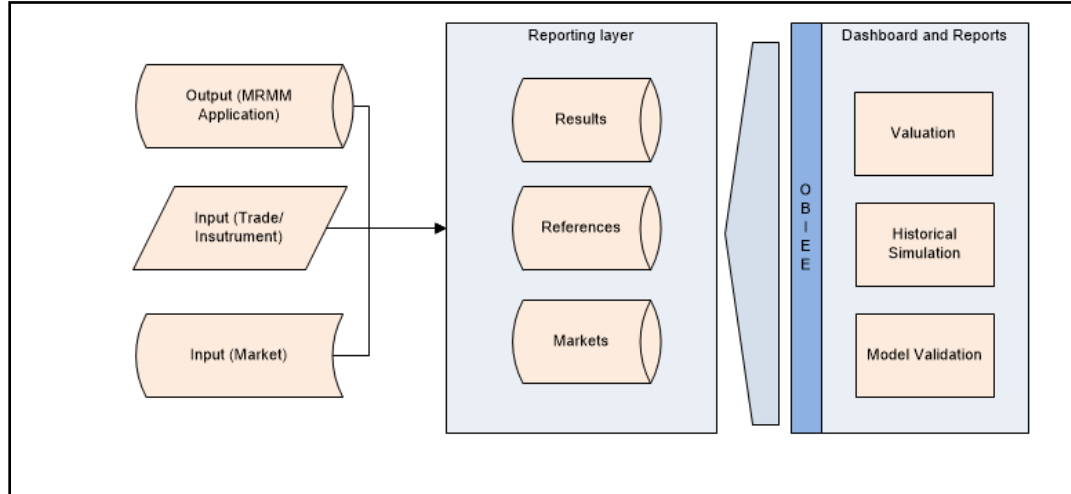
OFS MRMM solution enables banks to accurately measure, evaluate, monitor and manage market risk and to proactively comply with regulatory requirements of capital calculation as per Internal Models Approach (IMA). This solution ensures that all critical elements of a market risk program from pricing, 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, giving users the ability to perform queries on results. This ability enables the user to access seeded reports and dashboards and to quickly develop new reports on a wide variety of information. Standard reports and dashboards are part of the installation of OFS MRMM. It is expected that pre-built dashboards, and reports may not be sufficient for every user, and hence the tool gives ability to modify standard reports and also create new as per individual requirements. You can implement these reports as they are available, or modify them to the specifications of your users.

The details of the dashboard reports are provided in subsequent chapters.

11.1 Process Flow

The picture below depicts high level process flow of MRMM Analytics.



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

11.2 Data Flow

11.2.1 Dimension Population

In OFSAA, Hierarchies are defined and managed through the common infrastructure, Dimension Management User Interface. Prior to use in MRMMBI, the related parent/ child hierarchy data must first be converted to a flattened and level-based format. 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 BI applications.

The Dimension Population process has the following two components:

- [Hierarchy Flattening](#)
- [Dimension Table Population](#)

11.2.1.1 Hierarchy Flattening

The following topics are covered in this section:

- Overview of Hierarchy Flattening Process
- Prerequisites and Troubleshooting
- Tables Used by the Hierarchy Flattening Process
- Executing the Hierarchy Flattening Process
- Checking the Execution Status

11.2.1.1.1 Overview of Hierarchy Flattening Process

The Hierarchies are maintained in the Dimension Management component of OFSAA Infrastructure. (In the Financial Service Application menu, navigate to **Master Maintenance > Dimension Management > 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 hierarchy data for any hierarchies created on seeded or user defined dimensions is 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.

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. Similarly, 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** – Oracle database function

- **REV_HIER_TRANSFORMATON_BIAPPS** – Oracle database Package called by the preceding function.

Some of the features of the Hierarchy Flattening process are:

- The user has the choice to process a single hierarchy or all 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 REV_HIER_DEFINITIONS to **Pending**. This improves processing efficiency as the Flattening process will avoid hierarchies that have not been modified.

11.2.1.1.2 Prerequisites and Troubleshooting

The following are the pre-requisites and troubleshooting steps:

1. All the post install steps mentioned in the Oracle Financial Services Analytical Applications Infrastructure (OFSAAI) Installation and Configuration guide and the solution installation manuals of MRMM have to be completed successfully.

The Hierarchies are maintained in the Dimension Management component of OFSAAI Infrastructure. (In the Financial Service Application menu, navigate to Master Maintenance > Dimension Management > 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 will have the proper data in the following section Tables Used by the Hierarchy Flattening Process.

- Check in the database (atomic schema) to confirm the FLATTENED_ROWS_COMPLETION_CODE column in REV_HIER_DEFINITIONS table has 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. (Use a database SQL query to check. This is available in the section [Executing the Hierarchy Flattening Transformation](#))
 - Check if the REV_HIERARCHIES table has a row for the hierarchy ID that is being processed. (Use a database SQL query to check. This is available in the section [Executing the Hierarchy Flattening Transformation](#)).
2. Application users must be mapped to a role which has the seeded batch execution function (BATPRO)
 - By default, this SMS function is mapped to the SMS Role: Data Centre Manager (SYSOPC)
 - The MRMM Application 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.
 3. Before executing a batch, check if the following services are running on the application server:
 - lccserver

- Router
- AM
- Messageserver

For more information on how to check if the services are up and how to start the services if you find them not running, refer to the Oracle Financial Services Analytical Applications Infrastructure User Guide on [OHC Documentation Library](#).

4. Users must create Batch Processes for executing the flattening and movement procedures. This process is explained in the section [Executing the Hierarchy Flattening Transformation](#).
 - 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 execution of stored procedures

11.2.1.1.3 Tables Used by the Hierarchy Flattening Process

The following are the tables used by the hierarchy flattening process:

- 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/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

11.2.1.1.4 Executing the Hierarchy Flattening Process

You can execute the function from the Operations (formerly Information Command Center (ICC) framework) module of OFSAAI, as mentioned below.

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:

1. Select the checkbox 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 don't see this procedure in the list, contact 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:

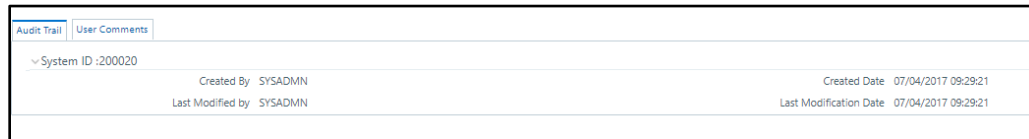
```
SELECT B.DIMENSION_ID, T.DIMENSION_NAME, T.DESCRPTION FROM
REV_DIMENSIONS_B B INNER JOIN REV_DIMENSIONS_TL T ON
B.DIMENSION_ID = T.DIMENSION_ID AND T.DIMENSION_NAME LIKE
'<DIMENSION NAME>'
```

Replace the tag <DIMENSION NAME> in this query with the Dimension Name you find in the UI (Navigate to OFSAAI Home) **Financial Services Application > Master Maintenance > 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 needs to 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.



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 need to 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 needs to 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 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.

Hierarchy transformation can also be directly executed on the database through SQLPLUS.

Details are:

- **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.

11.2.1.1.5 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 Batch Monitor provides logs for execution with the top row being the most recent. If there is any error during execution, it will get listed here.

Even if you see Successful as the status in Batch Monitor it is advisable to go through the Event Log and re-check if there are any errors.

Alternatively, the execution log can be accessed on the application server in the following directory \$FIC_DB_HOME/log/date. The file name will have the Batch Execution ID.

The database level operations log can be accessed by querying the FSI_MESSAGE_LOG table. The Batch Run ID column can be filtered for identifying the relevant log. (This is the same log you see in the Event Log window.)

Check the .profile file in the Installation Home if you are unable to navigate to these locations.

11.2.1.2 Dimension Table Population

The dimension table population process serves two purposes:

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

Dimension table population should be run after initial creation of a hierarchy and after any changes are made to a hierarchy

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

The following topics are covered in this section:

- [Overview of SCD Process](#)
- [Prerequisites](#)
- [Tables Used by the SCD Component](#)
- [Executing the SCD Component](#)
- [Checking the Execution Status](#)

11.2.1.2.1 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 into 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, refer to:

- Oracle Data Integrator Best Practices for a Data Warehouse at <http://www.oracle.com/technetwork/middleware/data-integrator/learnmore/odi-best-practice-data-warehouse-168255.pdf>
- Oracle Warehouse Builder Data Modelling, ETL, and Data Quality Guide, 11g Release 2 (11.2), Part #E10935-03 at http://docs.oracle.com/cd/E18283_01/owb.112/e10935/dim_objects.htm.

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.

Example:

Consider a Dimension Table, DIM_PRODUCT: In this example:

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

- 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 example below:

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'

11.2.1.2.2 Prerequisites

Following are the pre-requisites:

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 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 would be 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:

V_COMPONENT_DESC	Meaning
PRODUCT_HIER1	Signifies the PRODUCT dimension
ORG_UNIT_HIER11	Signifies the ORG UNIT dimension
V_COMPONENT_DESC	Meaning
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-ID's, 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 tables SYS_TBL_MASTER and SYS_STG_JOIN_MASTER 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 as well as the flattened hierarchy data. For example, DIM_PRODUCT_V in usable format. New views should be included for any new dimensions defined.

11.2.1.2.3 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 will be seeded into this table during the MRMM BI Installation.

The table structure is as follows:

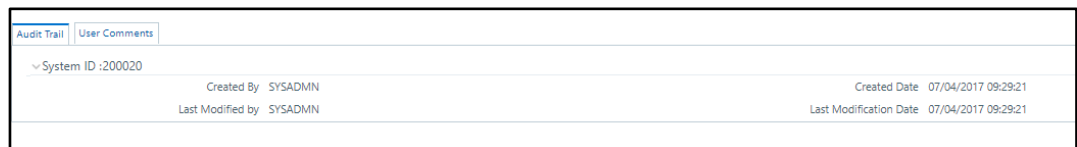
- V_COMPONENT_CODE - This column acts as a primary key.
- V_COMPONENT_DESC - This column contains a standard value used within the database view for a flattened hierarchy.
- V_COMPONENT_VALUE - This column contains the unique hierarchy identifier for the reporting hierarchies to be used in MRMMBI.

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.



Hierarchy Management Page

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.

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 MRMM BI application installer populates one row per dimension for the seeded dimensions in this 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	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 i.e., 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

Example: The following data is 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 MRMM BI application installer populates this table for the seeded dimensions.

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 given below
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 are:

- PK - Primary Dimension Value (may be multiple for a given "Mapping ReferenceNumber")
- SK - Surrogate Key
- DA - Dimensional Attribute (may be 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, scd, 125.

A third optional parameter (N/Y) passed during SCD execution (like SCD,<map_ref_no>,<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'.

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

map_ref_num	Target Table that is Updated
scd,471	DIM_SUB_NETTING_AGREEMENT
scd,70	DIM_MITIGANT_TYPE

- Wait - When the file is being executed, you can either wait till 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. 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.

11.2.1.2.5 Checking the Execution Status

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

The status messages in batch monitor are:

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

The ICC execution log can be accessed on the application server in the directory \$FIC_DB_HOME/log/ficgen.

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

The detailed SCD component log can be accessed on the application server under

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

The file name will have 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

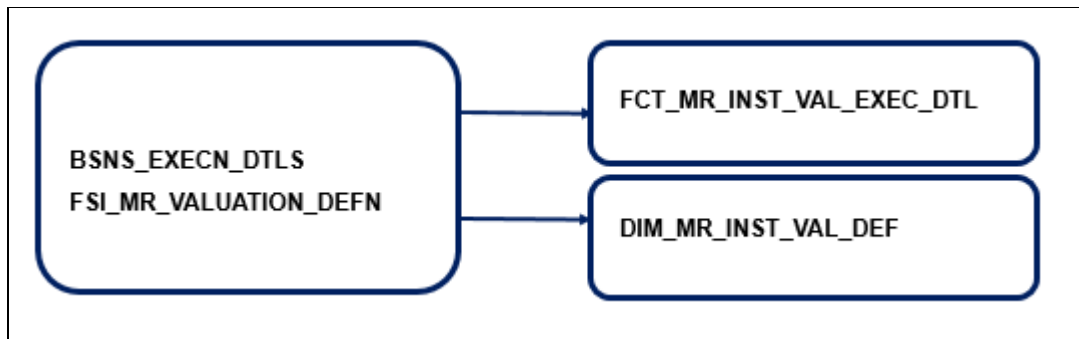
NOTE It is not necessary to run SCD for all dimensions. In certain cases, you should specify the specific dimension requiring updates.

11.3 MR Results Transformation

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

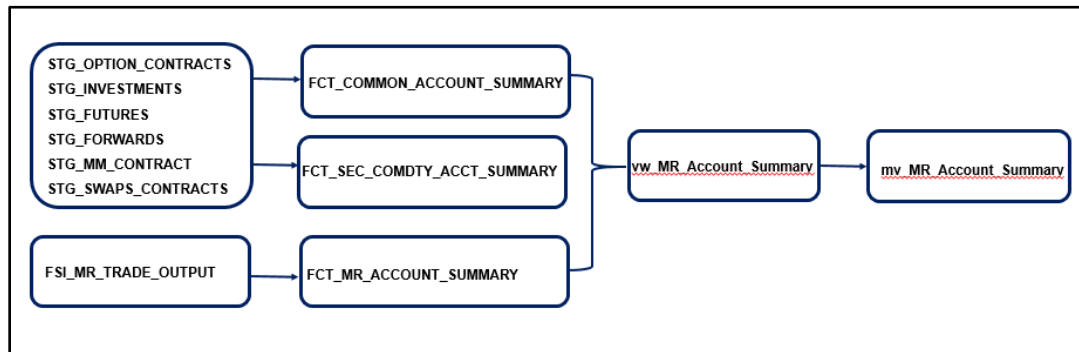
11.3.1 Data Flows Market Risk Instrument Valuation

Below are the data flows for Instrument Valuation.



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.

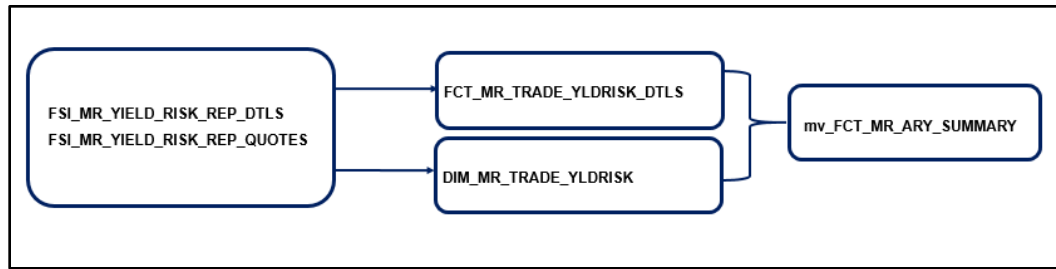


Data flow of input data and trade level results

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

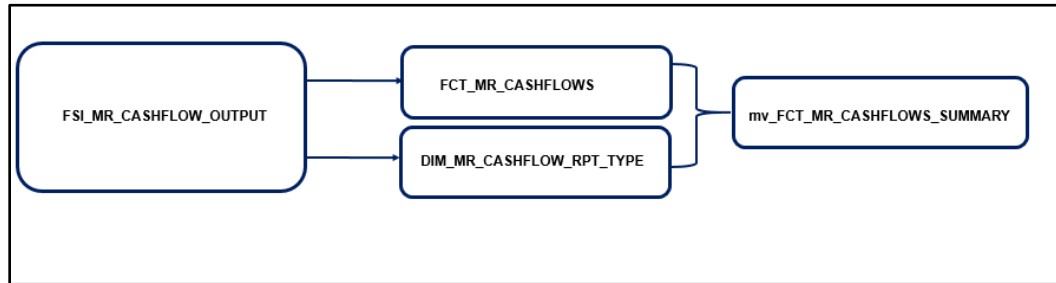
The FCT_COMMON_ACCOUNT_SUMMARY table stores common account level information that usually comes as an input through staging. This table is shared by all OFSAA BI applications and contains dimensional values, attributes, and financial measures which are generally applicable to the individual account records.

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



Data flow of Yield Risk Report

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



Data flow of trade level cash flows

The FCT_MR_CASHFLOWS table stores detail of cash flows generated during pricing / 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 will generally have multiple records in this table.

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_CASHFLOWS
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_EXC_CN_DTLS	FCT_MR_INST_VAL_EXC_DT

12 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 OFSAAI framework.

This chapter includes the following topics:

- [Overview of Account Summary Tables](#)
- [Overview of Account Summary Population](#)
- [Executing the Account Summary Population T2T](#)
- [Checking the Execution Status](#)
- [Account Summary T2Ts](#)

12.1 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 (OFSAAI) 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 which 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.

12.2 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 which apply SQL functions or do arithmetic operations on instrument columns before moving them to the Fact table.

Data base 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.

12.2.1 Prerequisites

Following are the pre-requisites for Account Summary population:

1. All the postinstall steps mentioned in the Oracle Financial Services Analytical Applications Infrastructure (OFSAAI) Installation and Configuration Guide and the solution installation manuals of MRMM BI have to be completed successfully.
2. Application users must be mapped to a role which has the seeded batch execution function (BATPRO).
3. Before executing a batch, check if the following services are running on the application server:
 - lccserver
 - Router
 - AM
 - Messageserver
4. For more information on how to check if the services are up and on, and how to start the services if you find them not running, refer to the [Oracle Financial Services Analytical Applications Infrastructure User Guide](#).
5. Batches must be created for executing the function. This is explained in section Executing the Account Summary Population T2T.
6. The Dimension Table Population step must be done before you execute the T2T batch. For more details, refer to section [Dimension Population](#).

12.2.2 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 & commodity account summary

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
		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

Table to Table Seeded Definitions

12.3 Executing the Account Summary Population T2T

12.3.1 Executing through Batch

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

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

V_COMPONENT_CODE	V_COMPONENT_DESC	V_COMPONENT_VALUE
DEFAULT_GAAP	DEFAULT_GAAP	USGAAP

Configuration

For all other GAAP codes, we need to update SETUP_MASTER manually before running each Account Summary Population T2Ts.

12.3.2 Fact Common Account Summary - Batch Execution

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

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

A seeded batch, <INFODOM>_MRMM_ACCT_SUMMARY_REP_POP has to be executed for the required MIS Date. Alternatively, following steps will help you define a new batch:

1. From the Home menu, click **Operations** and select **Batch Maintenance**.
2. Click **New Batch** ('+' symbol in Batch Name container). 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. Refer section Tables Used by the Account Summary Population T2T Process.
 - Data file name will be blank for any Table to Table Load mode.
 - Default value refers to currency calculation. If there is any need for currency conversion in T2T transactions, Default value has to be provided. For example, default value is [DRCY]='USD' Here 'USD' acts as 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.

12.4 Checking the Execution Status

The status of execution can be monitored using the Batch Monitor screen.

NOTE

For a more comprehensive coverage of configuration and execution of a batch, refer to [Oracle Financial Services Analytical Applications Infrastructure User Guide](#).

The status messages in Batch Monitor are:

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

The execution log can be accessed on the application server in the following directory \$FIC_DB_HOME/log/t2t. The file name will have the batch execution id.

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

12.5 Account Summary T2Ts

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

13 Dashboard - Home

Home consists of the following page level filters which are applicable to all the reports in this dashboard.

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 dashboards are displayed as part of Home:

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

13.1 Variance

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

13.2 Heat Map

Report Name	Heat Map
Report Level Filters	Stress Scenario Metric: MTM, Delta, Gamma, Phi, Rho, Sigma, Theta, Vanna, Vega, Volga
Report Description	This heat map compares values of key risk measures (Base Measures) across portfolios and stress scenarios. Users can identify portfolios with 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

13.3 Metric by Stress Scenario

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
Base Measures	MTM, Delta, Gamma, Phi, Rho, Sigma, Theta, Vanna, Vega, Volga

Computed Measures	Not applicable
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13.4 Metric by Portfolio

Report Name	Metric by Portfolio
Report Level Filters	Stress Scenario
Report Description	The 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

13.5 Top 10 Age On Book

Report Name	Top 10 Age On Book
Report Level Filters	Rank
Report Description	This tabular report lists positions based on ageing. The report is sorted based on age-on-book of each individual position
Report Type	Tabular report: The following are displayed as column items: <ul style="list-style-type: none"> • Account Number • Age • MTM

Dimensions	Dim Account
Base Measures	MTM
Computed Measures	Not applicable

14 Dashboard - Portfolio

Portfolio consists of the following page level filters which are applicable to all the reports in this dashboard.

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 dashboards are displayed as part of Portfolio:

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

14.1 Portfolio Variance

Report Name	Portfolio Variance
Report Level Filters	Metric, Asset Class, Reporting Currency, Stress Scenario
Report Description	This report compares portfolio value over two days . In case of 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

14.2 Heat Map

Report Name	Heat Map
Report Level Filters	Metric, Asset Class, Reporting Currency, Stress Scenario
Report Description	This heat map compares values of key risk measures (Base Measures) stress scenarios and instrument types. Users can identify portfolios with 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

14.3 Metric by Stress

Report Name	Metric by Stress
Report Level Filters	Metric1 Metric 2 Stress Scenario
Report Description	This report enables user to compare key risk metrics for a selected portfolio under baseline and stress scenarios
Report Type	Graphical report - Bar Graph representing: 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

14.4 Portfolio Trend

Report Name	Portfolio Trend
Report Level Filters	Not applicable
Report Description	Trend report key risk measures on 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

15 Dashboard - Trading Desk

Trading desk consists of the following page level filters which are applicable to all the reports in this dashboard.

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 dashboards are displayed as part of Trading Desk:

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

15.1 Trading Desk Variance

Report Name	Trading Desk Variance
Report Level Filters	Metric, Asset Class, Reporting Currency, Stress Scenario
Report Description	This report compares trading desk portfolio value over 2 days . In case of 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

Report Name	Heat Map
Report Level Filters	Metric, Asset Class, Reporting Currency, Stress Scenario
Report Description	This heat map compares values of key risk measures (Base Measures) stress scenarios and instrument types. Users can identify trading desks with 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

Report Name	Metric by Stress
Report Level Filters	Metric1 Metric 2 Stress Scenario
Report Description	This report enables user to compare key risk metrics for a selected trading desk under baseline and stress scenarios
Report Type	Graphical report - Bar Graph representing: 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
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15.4 Trading Desk Trend

Report Name	Trading Desk Trend
Report Level Filters	Not applicable
Report Description	Trend report 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

16 Dashboard - Risk Factor

Risk factor consists of the following page level filters which are applicable to all the reports in this dashboard.

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 dashboards are displayed as part of Risk Factor:

- Value By Risk Factor

16.1 Value By Risk Factor

Report Name	Value By Risk Factor
Report Level Filters	Not applicable
Report Description	The risk factor report lists all the market data that were used for risk and valuation computations .
Report Type	Tabular Report It has the following columns: <ul style="list-style-type: none"> • Risk Factor Name • Risk Factor Value
Dimensions	Risk Factor
Base Measures	Risk factor value
Computed Measures	Not applicable

17 Dashboard - Position

Position consists of the following page level filters which are applicable to all the reports in this dashboard.

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

The following dashboards are displayed as part of Position:

- Trade Output
- Cash Flow Report

17.1 Trade Output

Report Name	Trade Output
Report Level Filters	Not applicable
Report Description	This is detailed report on results of valuation process . The report provides metrics computed for each position included in the run
Report Type	<p>Tabular Report:</p> <p>It has the following columns:</p> <ul style="list-style-type: none"> • Present Value • Present Value Pay Leg • Present Value Recieve 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
- Contracturl 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

	<ul style="list-style-type: none"> • 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	Refer excel sheet
Computed Measures	Not applicable

17.2 Cash Flow Report

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	<p>Tabular Report:</p> <p>It has the following columns:</p> <ul style="list-style-type: none"> • 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
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18 Annexure A: Details of Market Data

Market Data refers to the multiple types of data required from financial market to price interest rate, equity, foreign exchange and other types of products. The following types of market data are required by 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:
 - Yield curves 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 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 may be expressed either as yield or absolute amounts.
 - Constant value: Yield represented as specific percentage of equity's market price on a specific date
 - Dividend yield: Dividend expressed as 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 comprises 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:
 - 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 over strikes
 - 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 can be shocked to created different Market Scenarios i.e. one or more shifts applied to selected market data. The above data will be sourced through stage tables. The logical quote structure in which market data is expected is given below. When data moves from stage table to processing, appropriate values are concatenated to form the required quote.

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

Type	Asset Class	Market Data Type Code	Market Data Type	Market Data Description	Logical Quote structure
Curve	INFL	INFL_SEASONALITY	Seasonality	Seasonality	INFL.Currency-InflationIndex.SEASONALITY-Month Example: INFL.USD-CPI.SEASONALITY-JAN
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: INFLJPY-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
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

Type	Asset Class	Market Data Type Code	Market Data Type	Market Data Description	Logical Quote structure
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.BaseCurrencyTermCurrency.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
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

Type	Asset Class	Market Data Type Code	Market Data Type	Market Data Description	Logical Quote structure
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
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::LIGNORMAL.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

Expected Logical Quote Structure for Market Data

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

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

Logical Quote Structure for Fixing Data

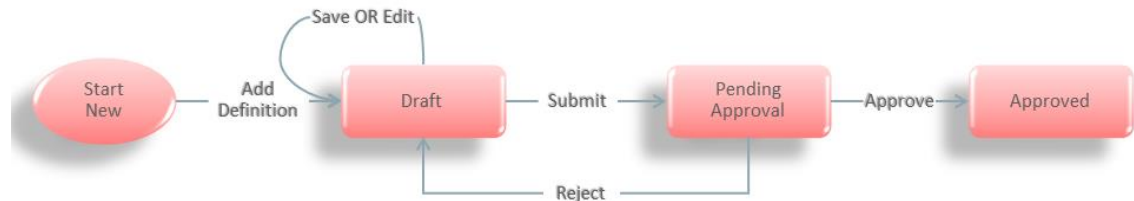
19 Annexure B: Approval Workflow

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.

19.1.1 Understanding Approval Work Flow

The approval work flow and the logical change in each status is depicted as part of the process flow below:



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.

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 result 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 steps which explain the approval work flow process and the tasks that a user can perform during each stage are as follows:

To create a new definition, click Add icon in the Business Assumptions Summary window. On creation of a new definition it is in 'Draft' status. The icons which are enabled while a definition is in Draft status are as follows: View, Edit, Copy, Delete, Send for Approval, and Approval Summary.

The actions which are permissible when a definition is in 'Draft' status are as follows:

- You can view the definition by clicking the View icon in the summary window. You cannot edit the values in View mode.
- You can edit the definition by clicking the Edit icon 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 the Copy icon 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 the Delete icon.
- Once the definition is finalized, you can initiate the approval process by opening the definition in edit mode and clicking the Send for Approval icon 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 the Approval Summary icon. 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 actions which are permissible when a definition is in 'Pending Approval' status are as follows:

- You can view the definition by clicking the View icon 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 the Copy icon 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 the Approve icon. You are allowed to 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 the Reject icon. You are allowed to 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 the Approval Summary icon. 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 actions which are permissible when a definition is in 'Approved' status are as follows:

- You can view the definition by clicking the View icon in the summary window. You cannot edit the values in View mode.
- You can edit the definition by clicking the Edit icon 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 the Copy icon 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 the Approval Summary icon. This window provides details of each change in the approval status.
- Approved definition cannot be edited.

20 Annexure C: List of Instruments Supported by OFS MRMM

The instruments supported by MRMM are listed in this section.

- List of Instruments Supported by OFS MRMM
- List of Instruments Supported for Monte Carlo Simulation

20.1.1 List of Instruments Supported by MRMM

OFS MRMM supports the following instruments.

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

Sl. No.	Asset Class	Name of the Instrument	MRMM Release Version
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
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

20.1.2 List of Instruments Supported for Monte Carlo

OFS MRMM supports the following instruments for Monte Carlo Simulation:

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	Interest Rate	Cash Deposit	8.0.5.0.0
8	Interest Rate	CapFloor	8.0.5.0.0
9	Commodity	Commodity Forward	8.0.5.0.0
10	Commodity	Commodity Future	8.0.5.0.0
11	Interest Rate	Sovereign bond	8.0.5.0.0
12	Forex	FX Forward	8.0.5.0.0
13	Interest Rate	Floating Rate Note	8.0.5.0.0
14	Interest Rate	Forward rate Agreement	8.0.5.0.0
15	Interest Rate	Treasury Bill	8.0.5.0.0
16	Interest Rate	Vanilla IR Swap	8.0.5.0.0
17	Equity	Equity Variance Swap	8.0.5.0.0
18	Interest Rate	Callable Bond	8.0.5.0.0
19	Commodity	Commodity American Option on Future	8.0.5.0.0
20	Equity	Equity American Option	8.0.5.0.0
21	Forex	FX American Option	8.0.5.0.0
22	Interest Rate	Amortizing Swap	8.0.5.0.0
23	Commodity	Commodity European Option On Spot	8.0.5.0.0
24	Forex	FX Asian Option	8.0.5.0.0
25	Equity	European Swaption	8.0.5.0.0
26	Interest Rate	Generic Swap	8.0.5.0.0
27	Forex	FX European Option	8.0.5.0.0

Sl. No.	Asset Class	Name of the Instrument	MRMM Release Version
28	Equity	Equity European Option	8.0.5.0.0
29	Equity	Equity Total Return Swap	8.0.5.0.0
30	Commodity	Commodity Swaption	8.0.5.0.0
31	Commodity	Commodity Bullet Swap	8.0.5.0.0
32	Credit	Credit Default Swap - Standard North American Corporate (SNAC)	8.0.5.0.0
33	Forex	FX Pivot	8.0.6.0.0
34	Forex	FX Dual Target Forward	8.0.6.0.0
35	Forex	FX Barrier Scripted	8.0.6.0.0

21 Annexure D: List of Models and Methods

OFS MRMM supports the following 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

Instrument Type	Model	Method	Asset Class
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

Instrument Type	Model	Method	Asset Class
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

Instrument Type	Model	Method	Asset Class
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

Instrument Type	Model	Method	Asset Class
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

Instrument Type	Model	Method	Asset Class
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

Instrument Type	Model	Method	Asset Class
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

List of Models and Methods

22 Annexure E: Data Expectation

For information about stage tables in which input data of below types is expected, see OFS MRMM Download Specification and Run chart document in [MOS](#).

- Trade Data
- Market Data
- Reference Data

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