

Oracle Financial Services Loan Loss Forecasting and Provisioning

User Guide

Release 8.1.2.0.0

February 2022

ORACLE
Financial Services

Oracle Financial Services Loan Loss Forecasting and Provisioning User Guide

Copyright © 2024 Oracle and/or its affiliates. All rights reserved.

This software and related documentation are provided under a license agreement containing restrictions on use and disclosure and are protected by intellectual property laws. Except as expressly permitted in your license agreement or allowed by law, you may not use, copy, reproduce, translate, broadcast, modify, license, transmit, distribute, exhibit, perform, publish, or display any part, in any form, or by any means. Reverse engineering, disassembly, or decompilation of this software, unless required by law for interoperability, is prohibited.

The information contained herein is subject to change without notice and is not warranted to be error-free. If you find any errors, please report them to us in writing.

If this is software or related documentation that is delivered to the U.S. Government or anyone licensing it on behalf of the U.S. Government, then the following notice is applicable.

U.S. GOVERNMENT END USERS: Oracle programs, including any operating system, integrated software, any programs installed on the hardware, and/or documentation, delivered to U.S. Government end users are “commercial computer software” pursuant to the applicable Federal Acquisition Regulation and agency-specific supplemental regulations. As such, use, duplication, disclosure, modification, and adaptation of the programs, including any operating system, integrated software, any programs installed on the hardware, and/or documentation, shall be subject to license terms and license restrictions applicable to the programs. No other rights are granted to the U.S. Government.

This software or hardware is developed for general use in a variety of information management applications. It is not developed or intended for use in any inherently dangerous applications, including applications that may create a risk of personal injury. If you use this software or hardware in dangerous applications, then you shall be responsible to take all appropriate fail-safe, backup, redundancy, and other measures to ensure its safe use. Oracle Corporation and its affiliates disclaim any liability for any damages caused by use of this software or hardware in dangerous applications.

Oracle and Java are registered trademarks of Oracle and/or its affiliates. Other names may be trademarks of their respective owners.

Intel and Intel Xeon are trademarks or registered trademarks of Intel Corporation. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. AMD, Opteron, the AMD logo, and the AMD Opteron logo are trademarks or registered trademarks of Advanced Micro Devices. UNIX is a registered trademark of The Open Group.

This software or hardware and documentation may provide access to or information about content, products, and services from third parties. Oracle Corporation and its affiliates are not responsible for and expressly disclaim all warranties of any kind with respect to third-party content, products, and services unless otherwise set forth in an applicable agreement between you and Oracle. Oracle Corporation and its affiliates will not be responsible for any loss, costs, or damages incurred due to your access to or use of third-party content, products, or services, except as set forth in an applicable agreement between you and Oracle.

For information on third party licenses, click [here](#).

Document Control

Table 1: Document Version Control

Version Number	Revision Date	Change Log
1.0	February 2022	Captured updates for Release 8.1.2.0.0.

Table of Contents

1	About the Guide	14
1.1	Scope of the Guide	14
1.2	Intended Audience	14
1.3	Access to Oracle Support	14
1.4	Related Information Sources	14
1.5	What is New in this Release	15
1.5.1	<i>Installing this Major Release</i>	15
2	Loan Loss Forecasting and Provisioning	16
3	Understanding the OFS Loan Loss Forecasting and Provisioning Application	17
3.1	LLFP	17
3.2	LLFP with the CECL Standard	17
3.3	IFRS 9 Run	17
3.3.1	<i>Overview of the IFRS 9 Guidelines</i>	19
4	Segmentation Run	21
5	Classification and Stage Determination	22
5.1	Run Management	22
5.1.1	<i>Mapping a Rule Definition Saved in a New Version</i>	22
5.1.2	<i>Classification</i>	24
5.1.3	<i>Rating Reclassification</i>	27
5.1.4	<i>BASEL Reclassification</i>	27
5.1.5	<i>Stage Determination</i>	27
5.1.6	<i>Collective Assessment Stage Determination Run</i>	29
5.1.7	<i>Manual Stage Reassignments</i>	32
6	Historical Average Transition Matrix	33
6.1	Populating the Parameter Table	33
6.2	Source Data for Historical Average Transition Matrix	33
6.3	Historical Movement Matrix Computation	34
6.4	Average Transition Matrix Computation	34

7	Historical Loss Rate	35
7.1	Populating the Parameter Table.....	35
7.2	Source Data for Historical Average Transition Matrix	35
7.3	Historical Loss Rate Computation.....	35
8	Calculation of Effective Interest Rate (EIR)	37
8.1	Overview.....	37
8.2	Computation of EIR	37
8.2.1	<i>If EIR is Provided as a Download</i>	<i>37</i>
8.2.2	<i>EIR Computed within the Application</i>	<i>38</i>
8.2.3	<i>Prerequisites for the Calculation of EIR</i>	<i>39</i>
8.2.4	<i>Calculation of the EIR Value.....</i>	<i>40</i>
8.2.5	<i>Net Present Value (NPV) of Cash Flows for Modification Gain or Loss.....</i>	<i>40</i>
8.3	EIR Preferences.....	40
8.3.1	<i>Access EIR Preferences.....</i>	<i>40</i>
8.3.2	<i>EIR Processing</i>	<i>41</i>
8.3.3	<i>Origination Date Cashflow Process</i>	<i>41</i>
8.3.4	<i>As-Of-Date Cashflow Process.....</i>	<i>42</i>
8.4	Batches to Compute EIR.....	43
8.5	Effective Interest Rate Computation for Purchased Credit Deteriorated (CECL) or Purchased or Originated Credit Impaired (IFRS 9) Instruments	43
8.5.1	<i>Calculation of the EIR Value.....</i>	<i>44</i>
8.5.2	<i>Data Requirements.....</i>	<i>44</i>
8.5.3	<i>Computation of EIR PCD or POCI Instruments.....</i>	<i>44</i>
8.5.4	<i>Expected Credit Loss for PCD or POCI Instruments</i>	<i>44</i>
8.5.5	<i>Non-Credit Discounts.....</i>	<i>45</i>
9	Probability to Default Modelling	46
9.1	PD Modelling.....	46
9.1.1	<i>Transition Matrix Definitions</i>	<i>47</i>
9.1.2	<i>Economic Scenarios</i>	<i>51</i>
9.1.3	<i>PD Model Process</i>	<i>53</i>
9.1.4	<i>Survival Model.....</i>	<i>57</i>

9.1.5	<i>User Group Mapping for Sandbox</i>	60
9.1.6	<i>PD Model Execution Parameters</i>	60
9.2	The probability to Default (PD) Term Structure	62
9.2.1	<i>PD Term Structure through Staging</i>	62
9.2.2	<i>PD Term Structure through Seeded PD Models</i>	62
9.2.3	<i>Movement of Data from Staging or PD Output Table to Processing Tables</i>	62
9.2.4	<i>Interpolation of PD Values to Buckets</i>	62
10	Expected Credit Loss (Allowance and Provision) Calculation in IFRS 9	64
10.1	Methodologies and ECL Calculation	64
10.1.1	<i>Methodology Selection</i>	65
10.1.2	<i>Cash Flow Method</i>	65
10.1.3	<i>Forward Exposure</i>	67
10.1.4	<i>Provision Matrix</i>	68
10.1.5	<i>Specific Provision</i>	70
10.1.6	<i>Roll Rate</i>	71
10.1.7	<i>Collateral Value Based Method</i>	72
10.1.8	<i>Mitigant Effect on ECL</i>	72
10.2	Calculation of 12 Month and Lifetime ECL Irrespective of the Stage	73
10.2.1	<i>Provision Matrix Assignment</i>	73
10.3	Calculation of Allowance and Provision	74
10.3.1	<i>Allowance and Provision Calculation</i>	74
10.3.2	<i>Using LGD Data for ECL Calculation</i>	76
10.4	Impairment Gain or Loss Calculation	76
10.5	Collective Assessment for ECL Run	76
10.5.1	<i>Cohort Formation for ECL Run</i>	76
10.6	Loss Given Default (LGD) Term Structure	80
10.6.1	<i>Obtaining LGD Data in Staging</i>	80
10.6.2	<i>Movement of LGD Data into Processing</i>	81
10.6.3	<i>Processing LGD Data as Required for ECL Calculation</i>	81
10.6.4	<i>Collective Assessment</i>	81
10.7	Scenario-based ECL Computation	81
10.7.1	<i>Implications of Using SBECL</i>	82

11	Credit Line	83
11.1	Specific Provision	83
11.1.1	<i>Calculation of 12 Months and Lifetime PD Values</i>	83
11.1.2	<i>Calculate the LGD Value</i>	83
11.1.3	<i>Mitigant Effect on ECL</i>	83
11.2	Loss Given Default (LGD) Term Structure.....	84
11.2.1	<i>Obtaining LGD Data in Staging</i>	84
11.2.2	<i>Movement of LGD Data into Processing</i>	84
11.3	Calculation of 12 Month and Lifetime ECL Irrespective of the Stage.....	84
11.3.1	<i>Using LGD Data for ECL Calculation</i>	85
12	Current Expected Credit Loss (CECL) Calculation for FASB's CECL Guideline	86
12.1	CECL Run Management	86
12.2	Methodologies and CECL Calculation.....	86
12.2.1	<i>Methodology Selection</i>	87
12.2.2	<i>Cash Flow Method</i>	87
12.2.3	<i>Forward Exposure</i>	88
12.2.4	<i>Provision Matrix</i>	89
12.2.5	<i>Specific Provision</i>	91
12.2.6	<i>Roll Rate</i>	91
12.3	Calculation of Allowance and Provision	92
12.3.1	<i>Allowance and Provision Calculation</i>	93
12.4	Impairment Gain or Loss Calculation	94
12.5	Loss Given Default (LGD) Term Structure.....	94
12.5.1	<i>Obtaining LGD Data in Staging</i>	94
12.5.2	<i>Movement of LGD Data into Processing</i>	94
12.5.3	<i>Processing LGD Data as Required for CECL Calculation</i>	95
12.5.4	<i>Using LGD Data for CECL Calculation</i>	95
12.6	Troubled Debt Restructured (TDR) Reserve Computation and Adjustment	95
12.7	Scenario-based CECL Computation	96
12.7.1	<i>Implications of Using Scenario-Based CECL</i>	97
12.8	Allowance Computation for Available-for-Sale Financial Asset (AFS).....	97
12.8.1	<i>Overview</i>	97

12.8.2	<i>Prerequisites for AFS Model</i>	97
12.8.3	<i>Data Capture - Asset Category and Fair Value</i>	98
12.8.4	<i>Impairment Assessment</i>	98
12.8.5	<i>Check for Credit Loss Factors</i>	98
12.8.6	<i>Allowance and Other Comprehensive Income (OCI) Computation</i>	98
13	Attribution Analysis	99
13.1	Execute Attribution Analysis	100
13.2	Process Flow.....	100
13.3	Attribution Analysis Process.....	100
13.4	Reconciliation Reports	101
13.4.1	<i>ECL Reconciliation Analysis for Accounts</i>	101
13.4.2	<i>ECL Reconciliation Analysis for Credit Line or Facilities</i>	109
14	Aggregate Reporting Tables	112
14.1	Multi Dimension Aggregate Table for Expected Credit Loss Results.....	112
14.2	Segment (Portfolio) Level Aggregate Table for Expected Credit Loss Results	112
14.3	Multi Dimension Aggregate Table for ECL Reconciliation Results	112
14.4	Multi Dimension Aggregate Table for Roll Forward Reports	113
15	Effective Interest Rate (EIR) Based Interest Adjustments	114
15.1	Overview.....	114
15.2	Process.....	114
15.2.1	<i>Movement of Data into Processing Area</i>	114
15.2.2	<i>Identify and Obtain Information from Last Accrual Date</i>	115
15.2.3	<i>Transaction Level Data Population</i>	116
15.2.4	<i>Transaction Level Processing</i>	116
15.2.5	<i>Aggregation Account Level and Adjustment Computation</i>	118
16	Computation and Amortization of Cost of Interest Subvention	120
17	Accounting Enablement	121
18	Reserve Adjustment Computation	123
18.1	Overview.....	123

18.2	Reserve Factor Definition and Reserve Adjustment Computation Process	123
18.2.1	<i>Reserve Type</i>	123
18.2.2	<i>Accessing Reserve Factor Definition Section</i>	124
18.2.3	<i>Creating Reserve Factor Definition</i>	124
18.2.4	<i>Viewing Reserve Factor Definition</i>	125
18.2.5	<i>Copying Reserve Factor Definition</i>	125
18.3	Period Specific Reserve Factor Segment Mapping Process	126
18.3.1	<i>Accessing Reserve Factor Segment Mapping Section</i>	126
18.3.2	<i>Creating Reserve Factor Segment Mapping</i>	126
18.3.3	<i>Editing Reserve Factor - Segment Mapping</i>	128
18.3.4	<i>Viewing Reserve Factor Mapping</i>	128
18.3.5	<i>Approve or Reject Reserve Factor Segment Mapping</i>	128
18.3.6	<i>Execution of Reserve Factor-Segment Definition for a Specific CECL Run</i>	129
18.3.7	<i>Deleting Reserve Factor Mapping</i>	130
18.4	Computation of Required Reserve.....	130
19	Multiple Ratings.....	131
19.1	Accessing Multiple Ratings in the Application	131
19.2	Creating Multiple Ratings.....	132
19.3	Viewing Multiple Rating Definition	133
19.4	Deleting Multiple Rating Definition	133
20	Currency	135
21	Loss Given Default Model	136
21.1	Accessing LGD Model in the Application	136
21.2	Searching for LGD Model Definitions.....	136
21.3	Creating New LGD Model Definition	136
21.4	Editing LGD Model Definition	138
21.5	Viewing LGD Model Definition.....	138
21.6	Copying LGD Model Definition	138
21.7	Deleting LGD Model Definition	139
22	Using Model Management and Governance Application	140
22.1	Signing into the Oracle Financial Services Model Management and Governance Application	140

22.2	Populate a Workspace	141
22.3	Launch a Workspace	143
22.4	Python Models Deployment Topology	143
22.5	Using Model Management	144
22.5.1	Access the Advance Model Management Window	144
22.5.2	Open the Pipeline Designer	145
22.5.3	Publish Models (Scoring)	147
22.5.4	View Model Details	148
22.5.5	Model Deployment	149
22.6	Model Execution Parameters	150
22.6.1	LGD & Vintage Model Execution Parameters	150
22.6.2	PD Model Execution Parameters	151
22.6.3	Survival Model Execution Parameters	152
22.7	Required Python Libraries	152
22.8	Execute Models by using the Scheduler Service	153
22.9	Scheduler Service Dashboard	153
22.9.1	Stages in Scheduler	154
22.9.2	Define Batch	154
22.9.3	Define Task	156
22.9.4	Schedule Batch	158
22.9.5	Monitor Batch	158
23	ECL Computation Using Hybrid Vintage Model	160
23.1	Accessing Vintage Model in the Application	160
23.2	Searching for Vintage Model Definitions	160
23.3	Creating New Vintage Model Definition	160
23.4	Editing Vintage Model Definition	162
23.5	Viewing Vintage Model Definition	162
23.6	Copying Vintage Model Definition	162
23.7	Deleting Multiple Rating Definition	163
24	Currency Conversion	164
25	Subledger Attributes	165
25.1	Access Subledger Attributes	165

25.2	Search for Subledger Accounting Attributes.....	166
25.3	Create a New Subledger Accounting Attribute	167
25.4	Edit a Subledger Attribute.....	169
25.5	View a Subledger Attribute	169
25.6	Delete a Subledger Attribute	169
26	Subledger	170
26.1	Access Subledger	170
26.2	Search for Subledger Definitions	171
26.3	Map the Subledger Roles and Groups	171
26.4	Create New Subledger Definition	173
26.5	Edit a Subledger Definition	178
26.6	View a Subledger Definition	179
26.7	Execute a Subledger Definition	179
26.8	View a Subledger Error Log	180
26.9	Finalize a Subledger Run	180
26.10	Create a New Version of the Subledger Definition	182
27	Subledger Manual Adjustment.....	183
27.1	Access Subledger Manual Adjustment	183
27.2	Search for Subledger Manual Adjustment Definitions	184
27.3	Create New Subledger Manual Adjustment Definition	184
27.4	Edit a Subledger Manual Adjustment Definition.....	186
27.5	View a Subledger Manual Adjustment Definition	186
27.6	Run Subledger Manual Adjustment Definition.....	186
28	Loss Forecasting	188
29	Reinsurance Contracts.....	189
30	General Features of LLFP	190
30.1	Elimination of Inter-Company in Accounts	190
31	Preparing for Execution	191
31.1	Important Metadata Definition	191
31.1.1	Loading Data for Execution.....	191

31.1.2	<i>Rating Reclassification</i>	191
31.1.3	<i>Market Data Population</i>	191
31.1.4	<i>Provision Matrix Mapping</i>	192
31.1.5	<i>Basel Reclassification</i>	192
31.1.6	<i>Collective Assessment</i>	192
31.1.7	<i>Gross Charge-off Threshold</i>	193
31.2	Setting Up Application Preferences Table	193
31.3	Setting Up Setup Master Table	195
32	Execution	197
32.1	Data Quality Framework.....	197
32.2	Process Modelling Framework.....	197
32.3	Manual Stage or Classification Reassignments	197
32.3.1	<i>Access the Maker or Checker Stage and Classification Reassignment Module</i>	198
32.3.2	<i>Maker - Stage and Classification Reassignment Process</i>	198
32.3.3	<i>Checker - Stage and Classification Reassignment Approval or Rejection Process</i>	200
32.4	Legal Entity based Security for Data and Metadata	202
32.5	Folder or Segment based Security	202
32.5.1	<i>Map Maintenance and Mapper Maintenance</i>	202
32.5.2	<i>Stage Reassignment Windows</i>	203
33	Load Run IDs for T2Ts	204
33.1	Existing T2Ts	204
33.2	Executing Incremental T2T	205
34	Resolution of LLFP Implementation Issues	206
34.1	Web Service Call for Provision Calculation	206
34.2	LLFP Web Service Call Functionality	206
35	Understanding Key Terms and Concepts	209
36	General Data Protection Regulation Compliance for LLFP	211
36.1	Data Redaction.....	211
37	Things to Remember	212

38 Frequently Asked Questions.....	213
39 Product Type Mapping	216
39.1 Offline Object Migration.....	216
40 Data Flow	217
41 Generating Download Specification.....	218
42 Generate Cash flows by using Specific Instrument Tables in OFS ALM.....	219
42.1 Calculate Cash Flows from the Origination Date.....	219
42.2 Calculate Cash Flows from the As-of-Date.....	220
43 Glossary	221

1 About the Guide

This section provides release information for the Oracle Financial Services Loan Loss Forecasting and Provisioning and includes the following topics:

- [Scope of This Guide](#)
- [Intended Audience](#)
- [Access to Oracle Support](#)
- [Related Information Sources](#)
- [What is New in this Release](#)

1.1 Scope of the Guide

The objective of this user guide is to provide comprehensive working knowledge on OFS Loan Loss Forecasting and Provisioning (OFS LLFP), release 8.1.2.0.0. This user guide intends to help you understand the key features and functionalities of OFS Loan Loss Forecasting and Provisioning (OFS LLFP), release 8.1.2.0.0. These user guides aid institutions in calculating the provision or allowance for exposures as per IFRS 9 proposed guidelines.

This User Guide must be used in conjunction with the documents listed in the [Related Information Sources](#) section to get a complete view of the OFS Loan Loss Forecasting and Provisioning application capabilities.

1.2 Intended Audience

This document is intended for users of OFS Loan Loss Forecasting and Provisioning.

1.3 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

We strive to keep this document and all other related documents updated regularly; visit the [OHC Documentation Library](#) to download the latest version available. The list of related documents is provided here:

- [OHC Documentation Library for OFS Loan Loss Forecasting and Provisioning](#)
 - *OFS Loan Loss Forecasting and Provisioning Release Notes*
 - *OFS Loan Loss Forecasting and Provisioning Installation Guide*
 - *OFS Loan Loss Forecasting and Provisioning User Guide*
- [OHC Documentation Library for OFS Advanced Analytical Applications Infrastructure Application Pack](#)

- *OFS Advanced Analytical Applications Infrastructure (OFS AAAI) Application Pack Installation and Configuration Guide*
- *OFS Analytical Applications Infrastructure User Guide*
- *OFS Analytical Applications Infrastructure Administration Guide*
- *OFS Analytical Applications Infrastructure Environment Check Utility Guide*

The additional documents are:

- [OFSAA Licensing User Manual Release 8.1.2.0.0](#)
- [OFS Analytical Applications 8.1.2.0.0 Technology Matrix](#)
- [OFS Analytical Applications Infrastructure Security Guide](#)
- [OFS Loan Loss Forecasting and Provisioning Security Guide Release 8.1.x](#)
- [OFS Analytical Applications Infrastructure Cloning Guide](#)
- [OFS Loan Loss Forecasting and Provisioning Cloning Guide Release 8.1.x](#)
- [OFSAAI FAQ Document](#)

1.5 What is New in this Release

OFS Loan Loss Forecasting and Provisioning bundles the following new features in version 8.1.2.0.0:

- **LGD Model**- The new LGD Model is developed to get the LGD Term Structure. The Workout LGD Methodology is used. Fractional Response Regression is used to train and test the Model. This Model is only available through OFS MMG. For more information on using OFS MMG with OFS LLFP, see the [Using Model Management and Governance Application](#) Chapter.
- **Straight Line Method Amortization**: The New Amortization Method is created in addition to the existing Effective Yield Method. The Amortization method can be selected at the segment level in the existing Interest Adjustment Run.
- **OFS MMG Migration**: The Existing models are rewritten in Python and can be used through OFS MMG. For more information on using OFS MMG with OFS LLFP, see the [Using Model Management and Governance Application](#) Chapter.
- **Incremental Load Run ID**: Supports the Incremental Loading of the Staging Product Processor Tables. For more information, see the [Load Run IDs for T2Ts](#) Section.
- **Currency Conversion**: Within the LLFP application, for a specific source and destination currencies, the Exchange Rates can be referred to from a default Exchange Rate Source or a Rate Source specific to a particular Legal Entity.
- **Subledger**: The Subledger Journal Entries finalization sequence has been streamlined, users are required to finalize for all the previous years before they can finalize for the current year. For more information, see the [Finalize a Subledger Run](#) Section.

1.5.1 Installing this Major Release

For detailed instructions to install this Major Release, see the [OFS Loan Loss Forecasting and Provisioning Installation Guide Release 8.1.2.0.0](#).

2 Loan Loss Forecasting and Provisioning

OFS Loan Loss Provisioning and Forecasting (LLFP) is designed to aid institutions in calculating the provision or allowance for exposures as per IFRS 9 proposed guidelines. Institutions must estimate future losses based on forward-looking factors and make provisions accordingly. Thus, the LLFP Application calculates the expected loss.

The International Accounting Standards Board (IASB) had published standards (IFRS 9) on the calculation of loan losses and its subsequent provisioning. IFRS 9 was published in 2014 and is effective from the year 2018. It has 3 phases:

- IFRS 9 (Phase I): Classification and Measurement
- IFRS 9 (Phase II) Impairment
- IFRS 9: Phase III: Hedge Accounting

For more information about the IFRS 9 guidelines, see the IFRS 9 Financial Instruments guidelines published by IASB in July 2014.

Similarly, Financial Accounting Standards Board (FASB) - the US-based standard-setting board, which applies to organizations within the USA, had come out with its own set of guidelines for loss reserve computation and provisioning, in 2016, termed CECL - Current Expected Credit Loss and the same is effective starting December 2019.

3 Understanding the OFS Loan Loss Forecasting and Provisioning Application

The main objective of this chapter is to get familiarized with the various functions of the OFS Loan Loss Forecasting and Provisioning application through the process flow. The logical order, in which the OFS Loan Loss Forecasting and Provisioning application functionalities are executed, helps in understanding, executing, and maintaining data in the OFS LLFP Application.

3.1 LLFP

This illustration shows the process flow of the OFS LLFP application with the first process is the loading of data, then the Segmentation Run, then the Transition Matrix Run, then the Loss Rate Computation Run, then Classification & Stage Determination Run, then the EIR Computation Run, then the ECL Computation Run, and the Interest Adjustment Run.

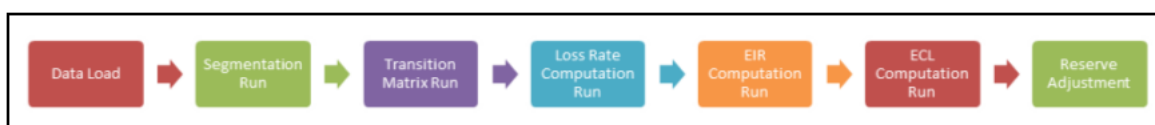
Figure 1: The Process Flow of the Key Features in the LLFP Application



3.2 LLFP with the CECL Standard

This illustration shows the process flow of the LLFP (CECL standard) application with the first process is the loading of data, then the Segmentation Run, then the Transition Matrix Run, then the Loss Rate Computation Run, then the EIR Computation Run, then the ECL Computation Run, and the Interest Adjustment Run.

Figure 2: The Process Flow of the Key Features in the LLFP (CECL Standard) Application



NOTE This process flow diagram highlights only the key features and does not depict the entire product features.

3.3 IFRS 9 Run

During the financial crisis, the delayed recognition of credit losses on loans and other financial instruments is considered a weakness because of the existing accounting standards. Specifically, the existing model in IAS 39, an *incurred loss* model delays the recognition of credit losses until there is evidence of a trigger event. Post the crisis, the International body for accounting standards (IASB) saw the need to be proactive in recognizing the losses. Hence, IASB has issued a fresh set of guidelines for Financial Instruments - IFRS 9 related to three areas. Impairment is one of the phases or areas covered by the IFRS 9 guidelines to handle expected credit losses.

The expected credit loss guidelines of IFRS 9 are more proactive and forward-looking in terms of loss recognition. To be compliant with the IFRS 9 guidelines, OFSAA has upgraded its existing Loan Loss Forecasting and Provisioning application.

The IFRS 9 Run includes the following processes:

- Stage Determination
- Manual Reassignment (Optional)
- Expected Credit Loss Calculation
- **Segmentation Run:** In LLFP, Segmentation Run refers to the process of grouping together accounts into a Portfolio for further processing. Financial institutions generally process accounts that have similar risk characteristics and profiles together as if they were a single block or record, such as many credit cards which show similar risk characteristics can be treated as a single Credit Card.
- **Transition Matrix Run:** Through a sequence of UIs, the Transition matrix user can manually feed in Probability of Default (PD) values to be later consumed in the Run apart from the application's built-in capability to compute historical PD values based on Credit Rating or DPD transitions over a period of time.
- **Loss Rate Computation Run:** This run computes the Loss rate based on Roll Rate Methodology built into the application.
- **Classification and Stage Determination Run:** The Stage Determination Run starts with the data population to obtain the data required for Classification, Stage Determination, and ECL computation. The non-standard or external data formats are now reclassified to standard or internal data formats. The final subprocess is to assign a stage at an account level granularity, either through an individual or collective basis, based on the data provided and rules configured. After this, the reclassification subprocess is executed to convert non-standard or external data formats to standard or internal data formats. The next process is to conduct the Business model and Cash Flow Characteristics (SPPI) test to identify the classification for each instrument or account. The final stage is to evaluate the change in credit risk and macroeconomic factors to determine the stage at an account level granularity with the stage determination subprocess. Upon successful execution of the stage determination run, the application provides an option for the manual reclassification of the stages assigned to accounts, based on various parameters.
- **Manual Reassignment:** This optional step enables the financial institutions to override the outcome of the Stage Determination Run and reassign the stage. This process goes through a Maker- Checker workflow with an audit trail. It caters to any judgmental or qualitative factors that need to be considered plus any reputable presumptions.
- **ECL Run:** The ECL Calculation Run begins with the Methodology Selection subprocess to assign a specific calculation methodology for each of the accounts processed by the application. The selection of methods is based on specific factors that are taken into consideration by the application. Post methodology selection, the application then calculates the Expected Credit Loss, again at an account level granularity, either through an individual or collective basis, based on the approach as per the method selected. The ECL values are also calculated for off-balance-sheet accounts, undrawn portions, POCL accounts, and so on.
- **Interest Adjustment Run:** IFRS9 requires interest income recognition at the Effective Interest Rate. Adjustment value will be posted after factoring in the contract interest amount.

3.3.1 Overview of the IFRS 9 Guidelines

The methodologies to calculate the Expected Credit Loss for different instruments under various Credit Risk scenarios are provided by the IFRS 9 guidelines. Following are those instruments that fall under the scope of IFRS 9 Impairment standards:

The methodologies to calculate the Expected Credit Loss for different instruments under various Credit Risk scenarios are provided by the IFRS 9 guidelines. Following are those instruments that fall under the scope of IFRS 9 Impairment standards:

- Lease Receivables and Trade Receivables
- Contract Assets, Loan Commitments, and Financial Guarantees

The following are the different methodologies highlighted by the standards:

- [General Approach](#)
- [Simplified Approach](#)
- [Approach for Purchased or Originated Credit Impaired \(POCI\) Accounts](#)
- [Determining the Significance of Increase in Credit Risk](#)

3.3.1.1 General Approach

The General Approach is for all instruments that are within the scope of IFRS 9 except for Lease Receivables, Trade Receivables, Loan Commitments, Contract Assets, and any other instruments that are Purchased or Originated Credit Impaired.

Under this approach, the standard requires the entity to measure the significance of an Increase in Credit Risk of the instrument, from its initial recognition. Based on the outcome, the entity provides for a 12 Month Expected Credit Loss or a Lifetime Expected Credit Loss.

- If the entity decides that there is *No Significant Increase* in Credit risk, then the Allowance is equal to the 12 Month Expected Credit Loss.
- If the entity decides that there is a *Significant increase* in Credit Risk, then the Allowance is equal to the Lifetime Expected Credit Loss.

The standard also provides detailed guidance on the factors to be considered to decide the significance of an increase in the credit risk of an Instrument. If the instrument becomes impaired, the Allowance is equal to the difference between the Gross Carrying Amount and the present value of the expected cash flows.

3.3.1.2 Simplified Approach

IFRS 9 standards state that, for certain specific instruments, it is not essential to determine the significance of an increase in Credit risk. Instead, an Allowance equal to the lifetime Expected Credit Loss can be directly provided.

The instruments in the scope of the simplified approach are the following:

- Lease Receivables
- Trade Receivables, Loan Commitments, and Contract Assets without significant financing component
- Trade Receivables, Loan Commitments, and Contract Assets with significant financing component, and the entity follow the simplified approach.

NOTE For Trade Receivables, Loan Commitments, and Contract Assets with significant financing components, the entity has the option to choose either the general approach or the simplified approach.

3.3.1.3 Approach for Purchased or Originated Credit Impaired (POCI) Accounts

The Allowance calculation of POCI accounts under this approach requires the calculation of the Lifetime Expected credit loss for each account, using the Credit Impaired EIR as the discount rate. The allowance is the cumulative change in the lifetime expected credit loss for the account from the date of initial recognition.

3.3.1.4 Determining the Significance of an Increase in Credit Risk

The standard also provides a viewpoint on the various factors that an organization must take into account to determine if a particular instrument, that is not Purchased or Originated Credit impaired has seen a significant increase in credit risk or not. Some of the factors suggested by the standard are the following:

- Internal Price indicators of Credit Risk
- Attributes of Financial Instruments such as Covenants, Collateral, and so on.
- Credit Spread, Credit Default Swaps, Fair Value less than Amortized Cost
- External Credit Rating
- Internal Credit Rating
- Forecast of Financial Conditions
- Forecast of Economic Conditions
- Forecast of Business Conditions
- Increased Credit Risk on other financial instruments of the borrower
- An adverse change in the Regulatory, Technology environment of the borrower
- Change in the value of the collateral
- Change in quality of guarantee
- Support from the Parent organization
- Expected changes in the Loan documentation
- Expected changes in the performance and behavior of the borrower
- Past due information
- Qualitative and non-Statistical Factors

4 Segmentation Run

The Segmentation Run of LLFP is one of the foremost runs that need to be executed during the process of computing various parameters required under IFRS 9. However, the use of segments, and execution of the Segmentation run, is not mandatory. If you do not want to use features that require segments, for example, Historical Transition Matrix, PD Model, and so on.

Segmentation is the process of grouping accounts into homogeneous clusters using various dimensions as parameters. Segments or Portfolios help in simplifying the process of treating or evaluating accounts by treating accounts belonging to one homogeneous group in the same manner.

The Segmentation Run of LLFP can be used to create such Segments or Portfolios, wherein every account is mapped to a specific Segment. The first step in the Segmentation process is to create a Segment Type and the master list of Segments that you want to map each of the accounts to, using the AMHM windows. The standard product has a seeded Segment Type - IFRS9 - ECL and corresponding Segments. You can choose to use the existing Segments or create a new Segment type and corresponding child Segments.

Once the master list of Segments is available, the second step is to configure Rules that assign a Segment to an account taking into consideration various dimensions, using the flexible, configurable, Run Rules Framework. The standard product considers two dimensions to assign a Segment to an account. These are Product Type and Customer Type. As required, more Dimensions can be considered by reconfiguring the dataset and the Rule, such as Industry, Region, Branch, Country, and so on.

The output of LLFP's Segmentation Run is stored in a specific table where for any given date only one set of Account-Segment mapping, the final one, is stored.

This mapping is then taken into account for further processing in both the LLFP application as well as the OFS Hedge Management and IFRS Valuations application.

Segmentation is mandatory for the functioning of the following features:

- Historical Transition Matrix
- Historical Loss Rates
- Inbuilt PD Model
- ECL Computation using Roll Rate Methodology

5 Classification and Stage Determination

This section provides information about classification and stage determination.

5.1 Run Management

OFS Loan Loss Forecasting and Provisioning application support two sequential runs, Stage Determination and Allowance Calculation, that are seeded within the application to support the Expected Credit Loss, Allowance, and Provision, calculation as per the IFRS 9 guidelines. The Stage Determination run starts with the data population subprocesses to obtain the data required for Stage Determination. After this, the reclassification subprocess is executed to convert non-standard or external data formats to standard or internal data formats. The final stage is to evaluate the change in credit risk and macroeconomic factors to determine the stage at an account level granularity with the stage determination subprocess. Upon successful execution of the stage determination run, the application provides an option for the manual reclassification of the stages assigned to accounts, based on various parameters.

Upon completion of the manual reclassification of stages, the application obtains the additional data required for ECL calculation. The Cash Flow and Forward Exposure subprocesses along with the Probability of Default calculation are performed and the ECL amount is calculated. Separate processes are applicable for the Provision Matrix and Specific provision methods. The application also displays the execution status of the Run through the UI. For more details, see the Process Modelling Framework section. Upon successful execution, the outputs include but are not limited to, Expected Credit Loss, Allowance, Provision, Effective interest rate, and so on are available for reporting. For detailed information on using the Run Management feature, see the **Run Management** Section in the [Oracle Financial Services Asset Liability Management \(OFS ALM\) User Guide](#).

5.1.1 Mapping a Rule Definition Saved in a New Version

To map a Run Definition that is saved in a new version, perform the following steps:


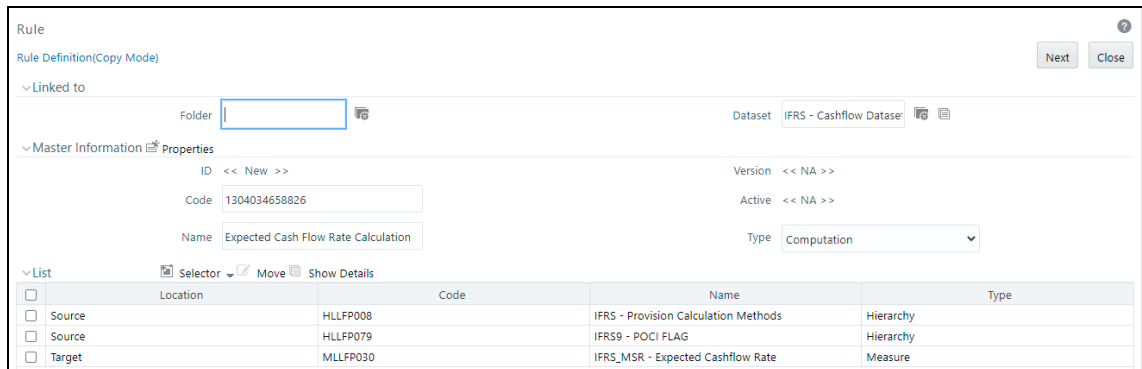
1. On the **Rule** Page, select the desired Rule and click . To open the **Rule Definition (Copy Mode)** Page.

Figure 3: The Rule Definition (Copy Mode) Window



Location	Code	Name	Type
Source	HLLFP008	IFRS - Provision Calculation Methods	Hierarchy
Source	HLLFP079	IFRS9 - POCI FLAG	Hierarchy
Target	MLLFP030	IFRS_MSR - Expected Cashflow Rate	Measure

2. Create a copy of the desired rule with a unique name. For more information on creating a copy of the Rule, see the [Oracle Financial Services Asset Liability Management \(OFS ALM\) User Guide](#).
3. Save the copy.


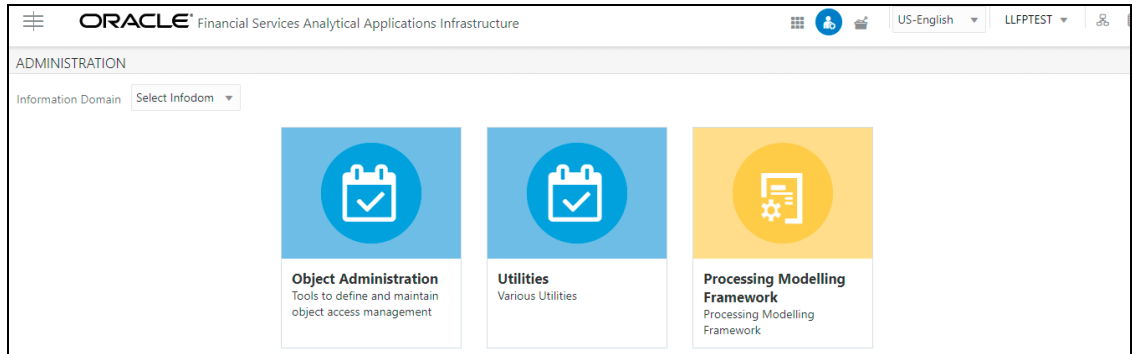
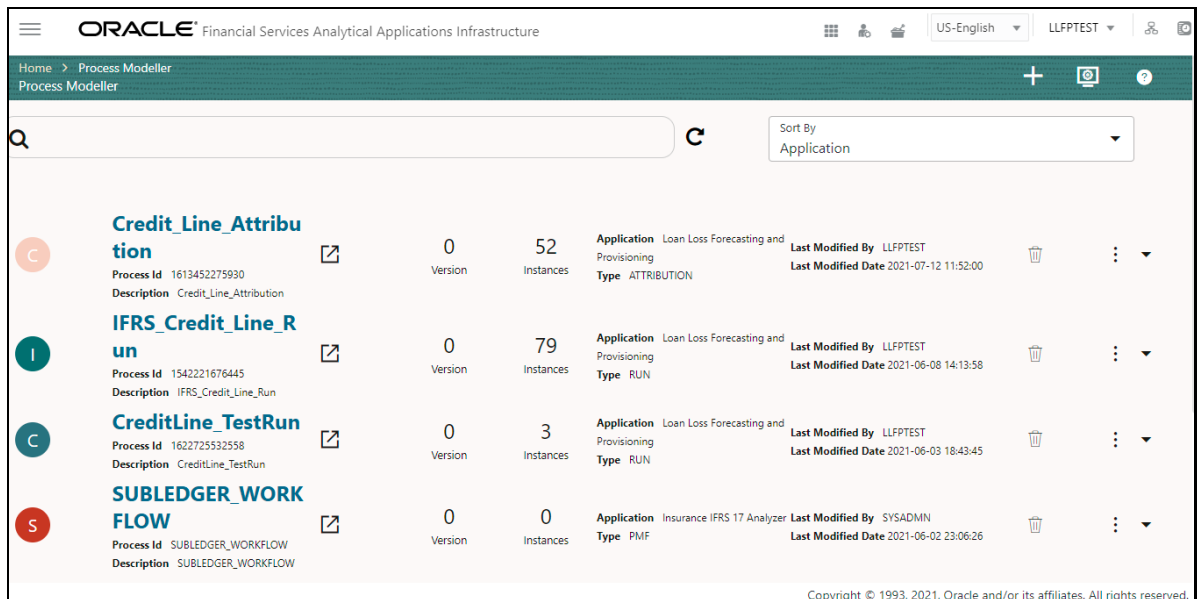
- Click  to open the **Administration** Page.

Figure 4: The Administration Page

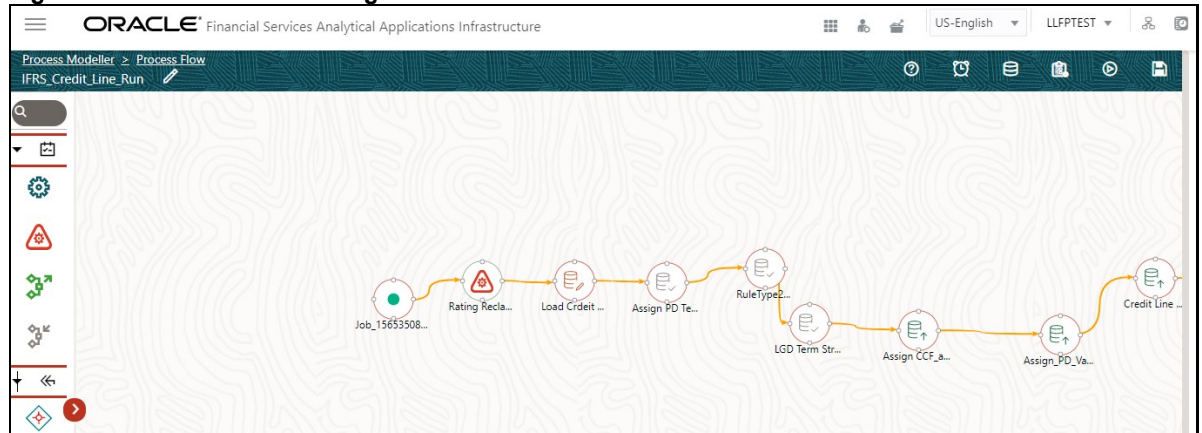


- Select the Information Domain from the **Information Domain** drop-down box and click **Process Modelling Framework**.

Figure 5: The Process Modelling Framework Summary Page



- Select the desired process.

Figure 6: The Process Modelling Framework Canvas

7. Map the newly created copy of the rule to the corresponding task in the PMF run. For more information, see the [Process Modelling Framework Orchestration Guide](#).

5.1.2 Classification

Financial instruments are required to be classified into three categories and thereby accounted for as suggested in the Phase 1 section of the IFRS 9 guidelines. The three categories are the following:

- Amortized Cost (AMRTCOST)
- Fair Value through Other Comprehensive Income (FVOCI)
- Fair Value through Profit and Loss (FVTPL)

Financial assets must undergo the Business Model test (BM) and Cash Flow Characteristics test (SPPI) and Financial Liabilities must undergo the Business Model Test for classifying into the aforementioned categories.

5.1.2.1 Business Model Test

The Business Model Test is conducted at an aggregated level. This test allows the banks to classify instruments into any of the subcategories of the business model such as Held to Collect (Assets), Held to Collect and Sell (Assets), Held to Sell (Assets and Liabilities), Held to Maturity (Liabilities), and Available for Sale (Liabilities).

To conduct the Business Model Test, various dimensions are considered to assign a business model. You can create Rules that are executed in a specific order and that helps in the categorization. The application is seeded with certain Rules which can be modified or removed.

The Rules around Business Model Test enable banks to design a hierarchy-based Holding Type assessment, that is the Rules help banks to classify their accounts into any one of the holding types, such as Held to Collect, Held to Sell, or Held to Collect and Sell.

Banks can configure Rules based on various available Hierarchies or a combination of hierarchies. For example Portfolio, Customer Type, Product, Branch, Industry, Country, Line of Business, and so on.

The standard product consists of the following rules:

Table 2: The Rules of the Standard Product

Source Dimensions	Target Dimension
Product, Customer Type	Holding Type
Product, Capital Exposure Flag	Holding Type
Product, Exposure for Sale Indicator	Holding Type

5.1.2.2 Cash Flow Characteristics (SPPI) Test

IFRS 9 requires all financial instruments to be tested for their cash flow characteristics before being classified into any of the three accounting classifications. This test is conducted at the instrument level. To pass the cash flow characteristics or the Solely Payments of Principal and Interest (SPPI) test, an entity needs to prove that the contractual cash flows received from an instrument are Solely Payments of Principal and Interest on the principal amount outstanding.

To conduct the Cash Flow Characteristics Test, various dimensions are considered. However, more importantly, the contract level characteristics are taken into consideration with the help of certain flags, parameters, values, and so on. This defines the instrument in detail.

The application picks the dimension-based Rules to assign the SPPI flag as YES. Primarily, the SPPI flag is assigned based on the broad knowledge of the Portfolio, Product, or Product type. After the SPPI flags are assigned based on a given set of dimensions, further evaluation is conducted for those accounts with the SPPI flag as YES.

The Rules related to the SPPI test enable the bank to evaluate every instrument or account to check if the contractual cash flows received from an instrument are Solely Payments of Principal and Interest on the principal amount outstanding or SPPI. The initial set of Rules allows you or the bank to define if a product or portfolio may potentially pass the SPPI test, at an aggregated level, that is, the hierarchy at which the Rule is defined. All the subsequent Rules verify the characteristics of an instrument to check if it caters to the SPPI requirements.

The standard product consists of the following Rules.

Table 3: The Rules of the Standard Product

Source Dimensions	Target Dimension
Product	SPPI
Behavior Type = 'Development and Recovery'	SPPI = N
If SPPI='Y', Fixed, Interest Rate<=0%	SPPI = N
If SPPI='Y', Floating Rate, Float Spread<=0%	SPPI = N

If SPPI='Y', Embedded Options Flag = 'Y'	SPPI = N
If SPPI='Y', Securitized Flag='Y'	SPPI = N
If SPPI='Y', Employee Account = 'Y'	SPPI = N
If SPPI='Y', Sub Prime Flag='Y'	SPPI = N
If SPPI='Y', Payment Pattern <any specific pattern>	SPPI = N
If SPPI='Y', Benchmark Currency<>Instrument currency	SPPI = N

NOTE You can configure or reconfigure the given Rules and also add or remove Rules as per the requirement.

5.1.2.3 Accounting Classification based on Business Model and SPPI

Once the Business Model test or Cash Flow Characteristics test is performed, the classification method needs to be assigned, depending on the outcome of the test. As the first step, accounts that have been assigned the classification through staging or based on election, retain that classification.

For accounts, where the classification is null, the following process assigns the classification:

Table 4: The Business Model that assigns the respective classification

Business Model	SPPI Test	Classification
Held to Collect	Y	AMRTCOST
Held to Collect and Sell	Y	FVOCI
Held to Sell	Y	FVTPL
Held to Maturity	Y	AMRTCOST
Available for Sale	Y	FVTPL
Held to Collect	N	FVTPL
Held to Collect and Sell	N	FVTPL
Held to Sell	N	FVTPL
Held to Maturity	N	AMRTCOST

Available for Sale	N	FVTPL
--------------------	---	-------

The final process is to optionally select the accounts to be classified under FVTPL or FVOCI. This is done based on the following Rules:

Fair Value option: If the fair value flag is Y, then Classification = FVTPL

8. Equity Instruments: For Instrument Type = Equities and Business Model = Held to Collect, then Classification = FVOCI.

NOTE If the Classifications for all the accounts are provided as downloads, then the application need not process the same. In such cases, all the Classification related Processes have to be removed from the Stage Determination and Classification Run.

5.1.3 Rating Reclassification

In this subprocess, the application reclassifies the external ratings into internal ratings. This is necessary because the wide variety and range of external ratings from various sources have to be mapped to the user's limited set of internal ratings, for ease of processing and comparisons.

5.1.4 BASEL Reclassification

Basel reclassification Rule is used to map the bank's customer type and product type to Basel Customer Type and Basel Product Type respectively. Product types, Customer types, and Asset classes are reclassified to standard values for further processing. This is performed with the aid of the following reclassification Rules:

- Basel Product Type Reclassification
- Basel Customer Type Reclassification
- Basel Asset Class Reclassification

5.1.4.1 Basel Product Type Reclassification

In Basel Product Type Reclassification, the bank's product type is mapped to the Basel product Type.

5.1.4.2 Basel Customer Type Reclassification

In Basel Customer Type Reclassification, the bank's customer type is mapped to the Basel Customer Type.

5.1.4.3 Basel Asset Class Reclassification

In Basel Asset Class Reclassification, the asset classes are standardized for further processing.

5.1.5 Stage Determination

Stage Determination is a subprocess in the Stage Determination run. The IFRS 9 guidelines require each account to be classified into three different stages on every reporting date, based on the significance of an increase in Credit Risk from the initial recognition. The guidelines mandate the calculation of a 12 Month

or Lifetime Expected Credit Loss for an account, depending upon the stage in which an account, or instrument, has been classified into.

The LLFP application supports the *Stage Determination* requirements of the IFRS 9 guidelines by considering the following factors to determine the Significance of Increase in Credit Risk, thereby deciding the stage into which a particular account is classified:

- Rating for all customer types other than Retail (Long term or Short term)
- Delinquency *Days-past-due* (DPD) and LTV for Retail customers
- Industry
- Country
- Devolvement status
- New account
- Restructured status
- Impaired or Default Status

The stage determination rules based on the IFRS 9 Rules are created using any one of the parameters provided in the preceding section and each of these rules is available in the ready-to-use product.

The rules are prebuilt and easily reconfigurable based on the internal risk policy of the bank or based on the regulator's directions.

The application allows you to create new rules from the data available in the model, modify the existing rules, delete specific rules, and reorder the entire set of rules.

Collective Assessment: The ECL run can also determine the stage, collectively, at an aggregated level. For more information about collective assessment, see the [Collective Assessment](#) section.

Rating: This rule applies to wholesale type of accounts. Depending upon the Rating on the Date of Initial Recognition and the Rating on the Current reporting date, the accounts are classified into one of the three stages. Rating as of Initial Recognition is obtained as a download and is reclassified to the Internal Rating. You can configure what number of notches degraded must be considered as a significant increase in Credit Risk.

Delinquency Past Due days: This rule applies to all retail types of accounts.

LTV: This rule is applicable for specific product types such as Secured Lending and Residential Mortgage Exposure. This rule requires the precalculation of the LTV Change. The exposure LTV Ratio is obtained as a download. Exposure LTV Ratio on Date of Initial Recognition is obtained as a download. If the LTV change is greater than the application, it can classify such accounts from Stage 1 to 2. This value can be customized by the customer.

New Account: This rule applies to all accounts. It ensures that the new accounts are classified as Stage 1, immaterial of its rating, or DPD or LTV values as of the current reporting date.

Devolvement Status: This rule is applicable only for Loans and Guarantees (Direct Credit Substitutes). The rule classifies all devolved accounts in stage 2.

Industry: This rule is common for both retail as well as the wholesale type of accounts. The rule can be customized for each run to reflect the economic scenarios at that instance.

Country: This rule is common for both retail as well as wholesale type of accounts. The rule can be customized for each run to reflect the economic scenarios at that instance.

Simplified: This rule is to ensure that certain product types are directly classified as Stage 2 by the application.

Restructured (Renegotiated or Modified): This rule ensures that renegotiated or modified accounts are retained in Stage 2 for a certain period, Observatory Period, beyond the date of modification. This time is calculated upfront by the precalculation process. The application checks if the time from the date of Modification, Current date - Date of Modification, is within the Observatory period. All modified accounts that are classified into stages 1 and 2 by earlier rules and within this period, will be bucketed into Stage 2. Any account classified into Stage 3 by earlier rules will be retained as Stage 3. You can configure the duration of the Observatory period either as an absolute value or a percentage value.

12 Month PD: This Rule compares the 12 month PD as of Origination Date concerning the current 12 month PD and migrates the account to Stage 2 if the difference is greater than the threshold value of 20 percentage points. However, this Rule can be configured to change the threshold value as per your requirements. This Rule can also be modified to compare the PDs on a relative basis instead of an absolute basis.

Impaired: This rule ensures that all impaired accounts are classified into Stage 3.

Default: This rule ensures that all defaulted accounts are classified into Stage 3.

Stage Migration Check: This rule is to ensure that there is no movement of accounts from Stage 3 to Stage 1 between two consecutive reporting dates.

NOTE The Rules stated here are part of the ready-to-use application. New Rules can be added to this list and the existing Rules can be modified or removed, depending on the bank's discrete Risk policy.

While classification is done for all instruments, the Stage and ECL Computation are done only for Asset classes and certain off-balance sheet instruments. This is a configurable idea wherein you may select the list of products that have to be considered for Stage Determination and ECL computation. This is achieved through a Rule.

5.1.6 Collective Assessment Stage Determination Run

The Collective Assessment feature of the IFRS 9 Run of LLFP application enables you to form Cohorts, that is, group a set of accounts, based on various parameters or dimensions such that, accounts with similar characteristics are grouped and treated uniformly as a single account while determining the stage as well as computing the Expected Credit Loss (ECL) values.

5.1.6.1 Cohort Formation for Stage Determination Run

The Collective assessment feature is part of the IFRS 9 Stage Determination Run and it addresses the following two major aspects:

- Determine the stage of accounts with similar (Risk) characteristics in a similar manner.
- Improvement in performance by reducing the total number of records to be treated.

The application uses the following steps during the Stage determination process, specifically related to collective assessment:

- A configurable rule that defines the dimensions or Parameters deciding the set of accounts that are allowed to be processed, collectively.
- Cohort formation is a grouping of accounts, based on a given set of dimensions.
- Assigning or calculating Cohort level values based on the account level values, which are part of the Cohort.
- Determine the Stage for Cohorts.
- Reassign the Cohort's stage back to individual accounts that are part of the Cohort.

Dimensions or Parameters Deciding the Type of Accounts that are allowed to be Processed Collectively

This process has been approached in the following two steps:

- Parameters or dimensions that mandatorily filter out specific accounts from the collective assessment.

Accounts matching the following parameters are eligible for collective assessment:

- The account must not have been restructured.
- The account must not be impaired or defaulted.
- The account must not be a POCI account.
- The account must not have been devolved.
- The account must not have been classified as stage three on the previous reporting date.

NOTE These are mandatory filters that cannot be changed.

- Dimensions that decide the set of accounts enabled for collective assessment.

Using the Run Rule framework, the application enables you to define the dimensions that determine which set of accounts are allowed to be treated collectively. The Rule is flexible enough to allow you to include new dimensions, remove existing ones, and so on. In the ready-to-use product, the default dimensions are:

- Basel Customer Type
- Basel Product Type

Dimensions based on which Accounts are grouped

Once the accounts that are eligible for collective assessment are decided, the next step is to decide the parameters based on which the groups are formed. LLFP forms Cohorts based on the following dimensions:

- Basel Customer Type
- Basel Product Type
- Country
- Industry

In addition to the preceding dimensions, for the non-retail customer type, the following two dimensions are also considered for cohort formation:

- Rating (counterparty or issuer) on Initial Recognition

- Rating (counterparty or issuer) as of the current date

For retail customer type, the following dimension is also considered for cohort formation:

- Delinquency past due days band

Assigning Values to Cohorts

Once the Cohorts are formed, they are treated as individual accounts. The next step is to assign representative values to the parameters of these Cohorts based on the values of accounts that are part of the Cohort. The following table highlights, how the representative values are computed for the given parameters of a Cohort:

Table 5: Computation of Values in the Parameters of a Cohort

FISD Columns	Values
Collective Individual Flag	"G"
Exposure Default Status Flag	"N"
LTV Flag	Calculated post cohorts automatically
Account Sequence Number	Cohort ID
Account SKey	-1
Basel Customer Type SKey	As per Cohort
Basel Product Type SKey	As per Cohort
Counterparty Rating DOIR SKey	As per Cohort
Counterparty Rating SKey	As per Cohort
Country SKey	As per Cohort
Delinquency Bank SKey	As per Cohort
Devolvement status CD	As per Cohort
Customer Industry SKey	As per Cohort
Issuer Rating DOIR SKey	As per Cohort
Issuer Rating SKey	As per Cohort
LTV Currency Ratio	Average

LTV DOIR Ratio	Average
MIS Date SKey	As per Run
Run SKey	As per Run

Stage Determination of Cohorts

For facilitating the Stage Determination process of the Cohorts, the application's Stage Determination Rule has been reconfigured to work either on Individual accounts not part of Cohorts or on Cohorts.

NOTE The Stage Determination Rules do not process Individual accounts that are part of Cohorts.

Reassigning the Stages Assigned to Cohorts back to Individual Accounts

Once the stage is determined for the Cohorts, the same is assigned back to individual accounts.

Audit Trail

After this, the Cohort-related records are removed from the IFRS Stage Determination fact table and moved to a new table for audit purposes.

5.1.7 Manual Stage Reassignments

The Manual Stage Reassignments or Overrides UI enables you to manually update any stage that was assigned to every account by the application using the Stage Determination rules. The stage is assigned through the Stage Determination run. For more details about Stage Determination, see the **Segmentation Run** section.

The manual reassignment of stage determination involves two steps:

- Manual reassignment step
- Approval process

The users who have the Maker, manual reassignment step, privileges can update the rating using the **Stage Reassignment** section of the Maker Stage Reassignment module.

The approval or rejection process is performed by the user who has the Checker privileges. The checker can use the **Stage Reassignment** section of the Checker Stage Reassignment module to approve or reject the reassignments done by the user who had the Maker privileges.

To know more about the Manual Reassignment Process, see the **Manual Stage or Classification Reassignments** section.

NOTE The Preferred Segment Type Code must be updated in the Preference table for the successful execution of the Run. If you do not want to use Segments as a Dimension, the related Processes must be removed.

6 Historical Average Transition Matrix

The historical Transition Matrix is generated using long-term averages and can be based on rating scales or DPD bands. The last column of this matrix is the default probability also called the long-term default frequency.

The Historical Transition Matrix Run is used to compute the average Transition Matrix for various portfolios or segments based on the historical data available within the application. The Run can be segregated into two functional steps:

1. Transpose the historical data between any two dates into a movement matrix.
2. Look up the movement matrix across multiple dates to compute the Average Transition Matrix.

6.1 Populating the Parameter Table

Generation of a Transition Matrix requires certain parameters to be defined; this is done with the help of Rules that populates the values in a specific Param table. The parameters are defined at the segment or portfolio level. The parameters that are required to be defined are the following:

- EIR Computation Flag: Identifies the portfolios or segments for which Transition matrices have to be created.
- Transition Matrix Type: Defines whether the matrix must be based on Rating (R) or Delinquency Past Due Days Band or DPD Bands (D).
- Transition Matrix Frequency: Indicates the frequency of the matrix as Annual (Y), Semi-Annual, or Half Yearly (H), Quarterly (Q), and Monthly (M).
- Transition Matrix Basis: Indicates if the computation happens based on the Number of Accounts (N) or Outstanding Amount (O).

The Rules that populate the Param table are configurable based on the requirements of the customer, preferably as a one-time activity.

NOTE Segmentation (Portfolios) is a mandatory prerequisite for the computation of the Historical Transition Matrix.

6.2 Source Data for Historical Average Transition Matrix

The source data for both the Historical Average Transition Matrix and Historical Loss Rate computation is the **Multiple Rating Preferences** table, where data across each MIS Date is available at an account-level granularity. The **Multiple Rating Preferences** table has information across multiple dimensions. This helps map each account to a Rating or Delinquency Past Due Band and the various segments under which respective accounts fall.

6.3 Historical Movement Matrix Computation

The first step in the Average Transition Matrix computation process is to compute the movement matrix between the MIS Date and the previous Date. After the two dates are arrived at, the accounts under each valid segment are grouped based on the combination of the Previous and Current Rating or DPD Band. After the accounts are grouped, the movement amounts or values are computed between any two Ratings or DPD bands as follows:

- The previous date is inferred based on the Frequency of the Matrix as per the assignment made in the *Param* table for the given Segment.
- Transition Matrices are generated only for Segments with the TM Compute flag marked as **Y** in the *Param* table.
- The Rating or DPD basis is decided per the values assigned in the *Param* table for the given segment.
- The basis of computation - Number of Accounts or the Outstanding Amount of the Account is decided per the values assigned in the *Param* table for the given segment.

6.4 Average Transition Matrix Computation

The second step in the process is to compute the Average Transition Matrix, based on the Rating or DPD band movements computed across historical dates. The number of periods to look back is decided based on the Preferences set in the LLFP Preference table, based on which the outstanding amounts or number of accounts are summed up for the computation purpose.

To compute the Transition Rates, the total migration value, the number of accounts, or outstanding amount, between any two Ratings or DPD bands is divided by the total value, several accounts, or outstanding amount, on the base Rating or DPD Band.

The results, Transition Matrices, across segments are then stored in the **Transition Matrix Master** and **Transition Matrix Details** tables.

NOTE During the initial Run, historical data will not be available for computation. You need to ensure that historical data is populated manually before executing the Historical Matrix Run. OFS Loan Loss Forecasting and Provisioning application stores all the required data from the initial Run onwards. The duration of required historical data is dependent on the value provided in the **Transition Matrix Historical Data Cap** and **Transition Matrix Historical Data Cap Unit** columns of the **Application Preferences** table. If you update the Transition Matrix frequencies that were previously set in the application, you will have to re-execute all the pre-executed Runs, for the duration mentioned in the **Application Preference** table.

The number of historical periods for which the average matrix is computed is dependent on the value provided in the LLFP app preference table. When the value of N is provided, the average transition matrix is computed using N-1 individual transitions.

Historical data needs to be populated to the columns of the **FSI_LLFP_AVG_MOVEMENT_MTX** table.

7 Historical Loss Rate

The Historical Loss Rate Run is used to compute the loss rates for various Portfolios or Segments based on the historical data available within the application.

7.1 Populating the Parameter Table

Computation of the Historical Loss Rate requires certain parameters to be defined. This is done with the help of Rules that populates the values in a specific Param table. The parameters are defined at a Segment or Portfolio level. The parameters that are required to be defined are the following:

- **EIR Computation Flag:** Identifies the Portfolios or Segments for which Transition matrices have to be created.
- **Transition Matrix Type:** Defines whether the matrix must be based on Rating (R) or Delinquency Past Due Days Band or DPD Bands (D).
- **Transition Matrix Frequency:** Indicates the frequency of the matrix as Annual (Y), Semi-Annual, or Half Yearly (H), Quarterly (Q), and Monthly (M).
- **Transition Matrix Basis:** Indicates if the computation happens based on the Number of Accounts (N) or Outstanding Amount (O).

NOTE Segmentation (Portfolios) is a mandatory prerequisite for the computation of the Historical Transition Matrix.

7.2 Source Data for Historical Average Transition Matrix

The source data for both the Historical Average Transition Matrix and Historical Loss Rate computation is the **Multiple Rating Preferences** table, where data across each MIS Date is available at an account-level granularity. The **Multiple Rating Preferences** table has information across multiple dimensions. This helps map each account to a Rating or Delinquency Past Due Band and the various Segments under which respective accounts fall.

7.3 Historical Loss Rate Computation

The first processing step in the Historical Loss Rate Computation process is to group all the accounts based on the Default Grade Rating or the Default DPD Band for the given date. After the accounts are grouped, the total outstanding, total recovery, and total write-off amounts are summed up across these accounts. This step is done only for the given MIS Date.

NOTE Only the accounts in the default grade are considered.

The second step in the process is to compute the Loss Rate for the given MIS Date using the following formula:

$$\text{Loss Rate (t)} = [\text{Write-offs (t)} - \text{Recoveries (t)}] \text{ or Outstanding (t-1)}$$

These loss rates are then used for the Average 12 month and Lifetime Gross Loss Rate computation within the Roll Rate methodology.

NOTE During the initial Run, historical data will not be available for computation. You need to ensure that historical data is populated manually before executing the Historical Loss Rate Run. OFS Loan Loss Forecasting and Provisioning application stores all the required data from the initial Run onwards. The duration of required historical data is dependent on the value provided in the **Loss Rate Historical Data Cap** and **Loss Rate Historical Data Cap Unit** columns of the **Application Preferences** table. If you update the Loss Rate frequencies that were previously set in the application, you will have to re-execute all the pre-executed Runs for the duration mentioned in the **Application Preference** table.

Historical data needs to be populated to the columns of the **FSI_LLFP_HIST_LOSS_RATE** table.

8 Calculation of Effective Interest Rate (EIR)

This section provides information about the calculation of the effective interest rate.

8.1 Overview

IFRS 9 mandates the use of an Effective Interest Rate (EIR) to discount to take into account the Time value of money. The guidelines also mandate the use of the Origination date EIR for Fixed-rate accounts and the Current date EIR for Variable rate accounts.

Additionally, the guidelines require the banks to use Credit Adjusted Effective Interest Rate (CAEIR) if any Purchase or Originated Credit Impaired (POCI) accounts. As mentioned, for fixed-rate POCI accounts, the Origination date Credit Adjusted EIR is used, and for variable rate accounts, the Current date Credit Adjusted EIR is used.

8.2 Computation of EIR

The LLFP application calculates the Effective interest Rates as applicable. The application also gives the option to provide the EIR value as a download.

NOTE EIR computation is applicable for products under ODs, Cards, Loans, Investments, Money Market instruments, Borrowing, Repo Contracts, Annuity Contracts, Term Deposits, Commitment Contracts, and Retirement Accounts. In the case of Leases, the Lease rate is used as the discount rate. And for Letter of Credits and Guarantees, the discount rate is provided as a download. These rates have to be provided as a download through the **Account Inception Rates Stage** table. The following details must be noted for EIR computation:

- Holiday Calendar is not supported for EIR Computation.
- Credit Adjusted EIR is not computed.

The computed EIR is dependent on the payment frequency, and constant value, provided as part of the account details. In the case of patterns, the payment frequency for each cash flow date is equal to the number of days between the current cash flow date and the previous cash flow date or FIC MIS date.

8.2.1 If EIR is Provided as a Download

If the value is provided as a download through the **Account Inception Rates Stage** table, then the application populates the same into the processing area.

In the case of a fixed rate account, the application checks the availability of the corresponding to the given Account ID as per the account start date (MIS Date = Account Start Date).

In the case of a variable rate account, the application checks the availability of the EIR corresponding to the given Account ID as per the given MIS Date.

NOTE If the EIR for the required date is not available in the **Account Inception Rates** table, then the EIR on the MIS Date, which is nearest to the required date is used.

8.2.2 EIR Computed within the Application

The following two approaches are used to compute the EIR within the application:

- [Cash Flows Generated by Oracle's Cash Flow Engine](#)
- [Cash Flows Provided as Download](#)
- [EIR Calculation Flag and Checking the Availability of EIR Value \(For Fixed Rate Account - Origination Date EIR\)](#)

8.2.2.1 Cash Flows Generated by Oracle's Cash Flow Engine

In this scenario, the application requires OFS Asset Liability Management (OFS ALM) as a prerequisite and you need to populate all the relevant columns mandated by the cash flow engine. For more information about the Asset Liability Management application, see the OFS Asset Liability Management User Guide in Oracle Help Center Documentation Library.

Also, there are certain columns required for computing the EIR as of the Origination date, such as original deferred balances, and so on. These columns are identified in LLFP's download specifications.

Execution: You must use the **EIR Preference** window where you can identify the process created in the OFS ALM application to generate the cash flows (As-of-Date or Origination date). After the process(es) are identified, the relevant Batches need to be executed to compute EIR.

8.2.2.2 Cash Flows Provided as Download

In this scenario, the application requires cash flows to be provided in the staging area and account-related attributes to be provided in the corresponding columns in the product processors.

Execution: The relevant Batches need to be executed to compute EIR.

NOTE When Cash Flows are provided as a download, the application computes EIR solely for assets and only cash in-flows are considered.

A given financial element must not be repeated for an account and cash flow date combination. For example, for any particular cash flow date, there can only be one Principal and Interest Cash Flow each.

NOTE If Cash Flows are provided as a download via the stage account cash flow table, a single row for principal and interest cash flow each must be provided, on any cash flow date.

8.2.2.3 EIR Calculation Flag and Checking the Availability of EIR Value For Fixed Rate Account - Origination Date EIR

The EIR EIS Calculation Flag determines the need to recalculate the Origination Date EIR.

NOTE EIR as of the current date is computed every time, irrespective of the Flag.

- If the flag is Y in the **Product Processor** table, the application computes or recomputes the Origination Date EIR value.
- If the flag is *NULL* in the **Product Processor** table and the EIR is not available for the given account, then the application computes the same.

8.2.3 Prerequisites for the Calculation of EIR

The application requires the following values for the calculation of EIR:

- If Cash Flows are given as download - Cash Flows as of Origination date for fixed-rate accounts and Cash Flows on As-of-Date for Variable rate accounts.
- If Cash Flows are to be generated by OFS ALM - Account related attributes (As required by OFS ALM's Cash Flow Engine).

Table 6: The Data Prerequisites for EIR Computation

Data Prerequisites for EIR Computation		
Key Parameters	Fixed-Rate	Floating Rate
Outstanding	Original Outstanding	Current Outstanding
Cash Flows	As of Origination Date	As of the given date
Fees (Applicable for EIR)	Original Fees (as of origination)	Deferred Fees (As of current date)
Premium or Discount	Original Premium or Discount	Deferred Premium or Discount
Cost	Original Cost	Deferred Cost
Other parameters (for example, Payment Frequency, Current Rate, and so on) -Detailed data requirements are mentioned separately.	Constant across both	

NOTE This table is only to indicate the Origination Date versus As of Date data requirements, for Origination date EIR and As of Date EIR.

8.2.4 Calculation of the EIR Value

The application first adjusts the outstanding amount with fees, specific to EIR, any premium or discount, and any cost. After this, the internal rate of return is computed using the adjusted outstanding amount and the Cash Flows.

To compute the As of Date EIR, you need the ending deferred balances which are computed in the EIR adjustment process. To enable this, after the execution of the EIR adjustment process, the end-of-period deferred balances, fees, premium or discount, and cost have to be updated back to the staging area or FSI_D tables. The As of Date EIR process needs to be executed after this.

EIR engine is enhanced to capture the effect of additional fees or new fees received. Additionally, the calculation logic is modified for Floating Rate Instruments, by considering the Repricing Date.

8.2.5 Net Present Value (NPV) of Cash Flows for Modification Gain or Loss

Net Present Value (NPV) of Current Date Cash Flows is determined for both Fixed and Floating rate accounts. Then the Cash Flows are discounted using the EIR to compute the NPV. This Net Present Value of Cash Flows is used to compute Modification Gain / Loss. For more information about Modification Gain or Loss, see the [Modification Gain or Loss](#) section.

8.3 EIR Preferences

The **EIR Preferences** section enables you to select processes for Effective interest Rate (EIR) calculation. EIR is calculated using both Origination Date Cash Flows and As of Date Cash Flows and the Cash Flows are discounted over the life-cycle of the financial asset.

For EIR computation, be it the Origination Date or As of Date, ALM is used to the extent of generating the cash flows. Subsequent calculation of EIR is only within LLFP. Therefore, it is required to set up the required Static Deterministic Processes within ALM, ideally, these can stop with cash flow generation.

After this, everything is controlled from inside LLFP. You will need to schedule or execute an LLFP-Engine - this engine will internally trigger the CFE; after the CFE completes, the cashflows are picked up and EIR is computed for each account.

NOTE There can be multiple ALM processes used for Cashflow Generation in LLFP. But for EIR calculations, there must not be any common instruments, or source hierarchies, among the selected ALM processes in the **EIR Preference** window.

8.3.1 Access EIR Preferences

Once the required number of ALM processes are set up within ALM, the **EIR Preferences** section can be used to specify which ALM processes are used for As of Date and which are used for Origination Date.

You can access the **EIR Preferences** window by clicking **Loan Loss Forecasting and Provisioning**, then **LLFP Maintenance**, **EIR Preferences** link from the LHS menu of the application.

The **EIR Preference** window is displayed as depicted in the following figure:

Figure 7: The EIR Preference Window

EIR Preference	
∨ EIR Processing	
∨ Origination Date Cash-flow Process	+
Folder	Process
∨ As-Of-Date Cash-flow Process	+
Folder	Process
alm	IFRS806SEG

8.3.2 EIR Processing

For EIR calculation, the OFS Loan Loss Forecasting and Provisioning application provide you the option to select multiple processes. Various processes can be marked for Origination Date Cash Flows and As of Date Cash Flows.

NOTE You must ensure that the same set of account(s) is not included across multiple processes.

8.3.3 Origination Date Cashflow Process

This section details the process of selecting processes from the list of available processes, in the OFS Loan Loss Forecasting and Provisioning application for the Origination Date Cash Flow process.

8.3.3.1 Process Selection

Perform the following procedure to select the required processes:

1. In the **Origination Date Cash-flow Process** table, click **Add** to open the **Process Selection** window.

Figure 8: The Process Selection Window

Process Selection

Folder Selection

Folder: IFRS806SEG Generate Cash Flow


Process Selection

alm

Apply Cancel

2. Populate the **Process Selection** form as tabulated.

Table 7: The Process Selection Form

Field	Description
Folder	Select a folder from the drop-down list.
Generate Cash Flow	For Origination Date Cash Flows, this checkbox is selected by default.
Process Selection	Click Select  adjacent to this field to select a process.

3. Click **Apply**.

The selected processes are saved and are displayed under the **Origination Date Cash-flow Process** table.

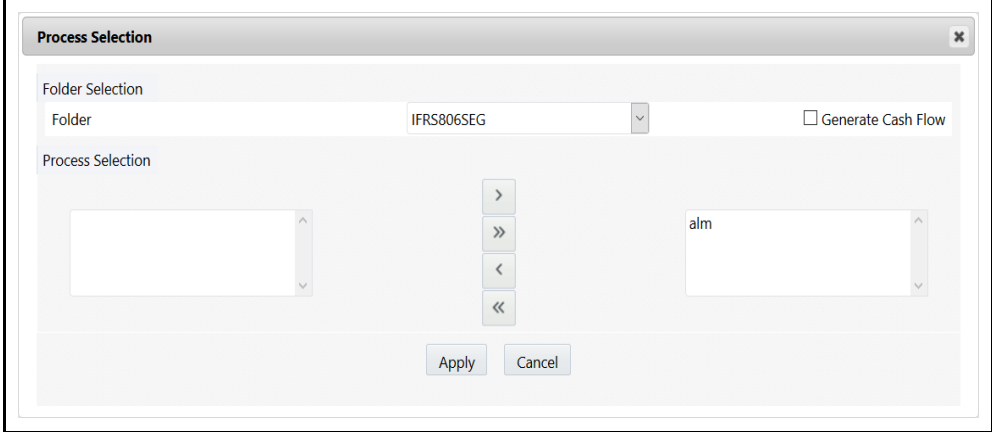
8.3.4 As-Of-Date Cashflow Process

This section details the process of selecting processes from the list of available processes, in the OFS Loan Loss Forecasting and Provisioning application for As of Date Cash Flow process.

8.3.4.1 Process Selection


Perform the following procedure to select the required processes:

1. In the **As-Of-Date Cash-flow Process** table, click **Add** to open the **Process Selection** window.

Figure 9: The Process Selection Window


2. Populate the **Process Selection** form as tabulated.

Table 8: The Process Selection Form

Field	Description
Folder	Select a folder from the drop-down list.
Generate Cash Flow	For Origination Date Cash Flows, this checkbox is selected by default.
Process Selection	Click Move  adjacent to this field to select a process.

3. Click the **Apply**.

The selected processes are saved and are displayed in the **As-Of-Date Cash-flow Process** table.

8.4 Batches to Compute EIR

There are the following batches, which are used in EIR calculation, for Origination Date and As of Date:

- **Batch Name:** <Infodom>_LLFP_EIR_INST_DATA_POP

This Batch is for Origination Date Cash Flow Generation and EIR computation.

- **Batch Name:** <Infodom>_IFRS_AOD_CF_EIR

This batch is for Current Date Cash Flow Generation and EIR computation.

NOTE	This batch expects the instrument data in all the FSI_D tables to be sliced and available in the DATA_SLICE_ID column. If the data is not sliced, then you need to update the value in the V_COMPONENT_VALUE column for the corresponding V_COMPONENT_CODE column with parameter value LLFP_SLICE_COUNT in the SETUP_MASTER table to the required number of slices.
-------------	---

- **Batch Name:** <Infodom>_LLFP_CF_EIR_INST_DATA_POP

This batch loads data from the product processor tables into the respective instrument tables (**FSI_D_***).

When Cash Flows are provided as a download, you need to modify the Batch parameters. To know more about these modifications, see OFS Loan Loss Forecasting and Provisioning Run Chart in OHC Documentation Library.

To know more about Batches and Batch Execution, see the Operations chapter in the [OFS Analytical Applications Infrastructure User Guide](#).

The behavior of the IFRS EIR engine is controlled by six execution properties present in the **FSI_LLFP_LOOKUP_PROPS_EIR** table. The parameter names are; **PARALLEL_TABLES**, **NUM_EIR_THREADS**, **NUM_ACCOUNTS**, **OFSRM_EXECUTOR**, **EIR_CALC_SCRIPT**, and **IGNORE_CFE_ERROR**.

8.5 Effective Interest Rate Computation for Purchased Credit Deteriorated (CECL) or Purchased or Originated Credit Impaired (IFRS 9) Instruments

Under CECL and IFRS 9 guidelines, Purchased Credit Deteriorated or a Purchased or Originated Credit Impaired instrument requires the computation of the EIR using a different approach. In the case of IFRS 9, this rate is called Credit Adjusted EIR.

- **CECL:** Effective Interest Rate is computed using Expected (Recovery) Cash Flows and Purchase Price adjusted for deferred balances. Additionally, the application computes a non-credit discount.
- **IFRS 9:** Credit Adjusted Effective Interest Rate is computed using Expected (Recovery) Cash Flows and Purchase Price adjusted for deferred balances. Additionally, the application computes a non-credit discount.

This EIR is used to discount the Cash Flows for the computation of ECL and interest recognition.

8.5.1 Calculation of the EIR Value

The application first adjusts the outstanding amount with fees, specific to EIR, any premium or discount, and any cost. After this, the internal rate of return is computed using the adjusted outstanding amount and the Cash Flows.

To compute the As of Date EIR, you need the ending deferred balances which are computed in the EIR adjustment process. To enable this, after the execution of the EIR adjustment process, the end-of-period deferred balances, fees, premium or discount, and cost have to be updated back to the staging area or **FSI_D** tables. The As of Date EIR process needs to be executed after this.

8.5.2 Data Requirements

EIR for PCD or POCI instruments has the following data requirements:

- Expected or Recovery Cash Flows
- Purchase Price
- Deferred Balances except for Discount (Fees and Cost)
- Instrument details such as Outstanding, Current Net Rate, and so on

8.5.3 Computation of EIR PCD or POCI Instruments

The first step involved in the computation of EIR for PCD or POCI instruments is to determine the Adjusted Purchase price which is computed as the difference between the actual Purchase Price and the given Deferred Balance.

Subsequently, the recovery cash flows are discounted at a rate such that its net present value is equal to the adjusted purchase price. This rate is considered the EIR for the given PCD or POCI Instrument.

NOTE EIR for PCD or POCI instruments is computed only once, that is on the origination date.

8.5.4 Expected Credit Loss for PCD or POCI Instruments

Once the EIR for PCD or POCI instruments is computed the Expected Credit Loss will be computed using any one of the available methodologies including the Cash Flow approach, where the expected Cash Flows are the same as the recovery Cash Flows provided as a download.

If other methodologies are followed, then the corresponding data requirements are applicable. For more details about Expected Credit Loss, see Expected Credit Loss (Allowance and Provision) Calculation in IFRS 9 section.

NOTE While the computation of EIR requires Recovery Cash Flows as a mandatory input, ECL computation does not require the same.

8.5.5 Non-Credit Discounts

The application also computes the Non-Credit discount. In general, discounts are of two types: Credit and Non-Credit. While the Credit-related discount can be assumed to be equal to the ECL, the Non-Credit value needs to be determined using the Deferred Balance approach.

The first step for Non-Credit discounts is to determine the amortized cost as the sum of the Adjusted Purchased Price and the ECL. The difference between the amortized cost and the outstanding or carrying amount is the Total Deferred Balance.

Total Deferred Balance is comprised of Fee, Cost, and Non-Credit Discount. This Non-Credit Discount is computed as the residual of the Deferred Balance deducted for Fee and Cost.

9 Probability to Default Modelling

This section provides information about the PD modeling feature.

9.1 PD Modelling

OFS Loan Loss Forecasting and Provisioning PD Modelling accurately predict the number of defaults by omitting optimism or conservatism. Adjustments are made on regulatory capital models to remove inherent conservatism. Estimated PDs are point-in-time. These are adjusted, where necessary, to reflect the effects of the current economic conditions. The PD estimates are recalibrated based on the current representative sample regularly. PD is calculated using sufficient sample size and historical loss data covers at least one full credit cycle.

PD model segments consider drivers in respect of borrower risk, transaction risk, and delinquency status. The PD models are representative of the portfolio segments. The data used for calibration is consistent with the IFRS 9 default definition throughout. Techniques used to determine lifetime PD measures do not introduce bias into the calculation. Future projected macroeconomic factors are used in the computation of lifetime PDs. The risk of default is higher when the expected life of the instrument considering cumulative probability is longer.

The LLFP application calculates Cumulative PD and Final Marginal PD using conditional probability logic. The PD calculation can be performed as mentioned in the following processes:

- Calculation of Marginal PD whenever Cumulative PD is provided as a download using a Conditional Probability Logic.
- Computation of the Factor - Lambda, Geometric factor, or Arithmetic factor, depending on the Interpolation technique, using the given formula.
- Computation of Intermediate Cumulative PD using the given formula.
- Computation of Intermediate Marginal PD using the conditional probability approach, for each block of time.
- Computation of Final Cumulative PD by using the conditional probability approach, cumulating across periods till the max maturity bucket. This value is used for the Cash Flow approach.
- Computation of Final Intermediate PD by subtracting each cumulative PD with the preceding Cumulative PD. This value is used for the Forward Exposure approach.

The whole PD modeling process consists of the following processes:

- [Transition Matrix Definitions](#)
- [Economic Scenarios](#)
- [PD Model Process](#)
- [Survival Model](#)
- [User Group Mapping for Sandbox](#)
- [PD Model Execution Parameters](#)

NOTE Segmentation (Portfolios) is a mandatory prerequisite for these six processes.

The Transition Matrix definition is an optional process. You can also use the transition Matrices generated through the Historical Transition Matrix Run.

9.1.1 Transition Matrix Definitions

This section provides information about the Transition Matrix Definitions.

9.1.1.1 Access Transition Matrix Definitions

You can access the Transition Matrix Definitions module by clicking the **Transition Matrix Definitions** link in the LHS menu of the OFS Loan Loss Forecasting and Provisioning application. Upon clicking this link, the **Transition Matrix Definitions** window is displayed with the **Search** table and the **Transition Matrix Definitions** table.

Figure 10: The Transition Matrix Definitions Page

The screenshot shows the 'Transition Matrix Definition Summary' window. At the top right, it says 'As of Date: 06/11/2013'. Below this is a search form with fields for 'Definition Name', 'Segment', and 'Matrix Type', and a 'Created Date' dropdown. Below the search form is a table titled 'Transition Matrix Definition Summary' with the following data:

Definition Name	Transition Matrix Id	Segment	Matrix Type	Frequency	Computed Matrix	Roll Rate	Modified Date
102-D-M-O	202	Corporate-Loans	Days Past Due	Monthly	Yes		04/14/2018 11:01:22
101-R-M-N	201	Retail-Loans	Credit Rating	Monthly	Yes		04/14/2018 11:01:21


The **Transition Matrix Definitions** window displays all the existing Transition Matrix definitions under the **Transition Matrix Definitions** table. The definitions are displayed with details such as Definition Name, Transition Matrix ID, Portfolio, Matrix Type, Frequency, Computed Matrix, Roll Rate, and Modified Date.

9.1.1.2 Definition Search

The **Search** table enables you to perform a search for existing Transition Matrix definitions. Perform the following steps to search for an existing Transition Matrix definition from the **Search** table:

1. Enter the value for one or many of the following search parameters, in the respective fields:

Table 9: The Transition Matrix Definition Search Form

Field Name	Description
Definition Name	Enter the full or partial name of the definition that you want to search for.
Created Date	Select less than or greater than , or = from the drop-down list and click the Calendar  to specify the date, to search for definitions that are created before, after, or on the specified date.
Portfolio	Select the Portfolio from the drop-down list.

Field Name	Description
Frequency	Select the required value for frequency from the drop-down list. Available options are: <ul style="list-style-type: none"> • Annually • Half Yearly • Quarterly • Monthly
Matrix Type	Select the required matrix type from the drop-down list. Available options are: <ul style="list-style-type: none"> • Credit Rating • Dates Past Due

2. Click **Search**.

The search operation is performed with the entered parameter values and the results are displayed in the **Transition Matrix Definitions** table.

You can make use of the pagination options to decide the number of definitions per page or to navigate between pages.

9.1.1.3 Creating a Transition Matrix Definition

Perform the following steps to create a Transition Matrix definition:

1. In the **Transition Matrix Definitions** table, click **Add** to open the **Transition Matrix** window.

Figure 11: The Transition Matrix Window


The screenshot shows a web form for creating a Transition Matrix definition. It includes the following fields and controls:

- Name**: Text input field.
- Description**: Text input field.
- Matrix Type**: Drop-down menu.
- Frequency**: Drop-down menu.
- Portfolio**: Drop-down menu.
- Applicable for Roll Rate**: Drop-down menu.
- Computation Basis**: Drop-down menu.
- MIS Date**: Date input field with a calendar icon.
- Save** and **Cancel**: Action buttons.
- Audit Trail** and **User Comments**: Tabs for tracking changes.
- System ID**: Read-only field.
- Created By**, **Creation Date**, **Last Modified By**, and **Last Modification Date**: Read-only audit fields.

2. Populate the **Transition Matrix** form as tabulated.

Table 10: The Transition Matrix Form

Field	Description
Name	Enter a name for the Transition Matrix definition.
Description	Enter a short description of the Transition Matrix definition.

Field	Description
Matrix Type	Select the matrix from the drop-down list. Available options are: <ul style="list-style-type: none"> • Credit Rating • Days Past Due
Frequency	Select the frequency from the drop-down list. Available options are: <ul style="list-style-type: none"> • Annually • Half Yearly • Quarterly • Monthly
Portfolio	Select the portfolio from the drop-down list. Available options are: <ul style="list-style-type: none"> • Corporate - Overdraft • Corporate - Guarantee • Retail - Lease • Corporate - Others • Corporate - Loans • Retail - Guarantee • Retail - Others • Corporate - Lease • Retail - Loans • Retail - Overdraft
Applicable for Roll Rate	Select either Yes or No from the drop-down list.
Computation Basis	Select the computation basis from the drop-down list. Available options are: <ul style="list-style-type: none"> • Count Movement • Value Movement
MIS Date	Select the MIS date by clicking the Calendar  adjacent to the MIS Date field and by picking the required date.

3. Enter the values in the matrix. As you enter the values, the **Row Totals** and **Column Totals** fields in the matrix are auto-updated.
4. Click **Add Matrix**. The entered transition matrix is saved for the selected MIS date.
You can also click **View Matrix** to view the added transition matrices and **Delete** to remove unwanted transition matrices of a selected MIS date.
5. Click **Save** to save the definition details.

The saved definition is displayed under the **Transition Matrix Definitions** table in the **Transition Matrix Definitions** window.


The **Audit Trail** section at the bottom of the **Multiple Rating** window displays the metadata related to the definition and contains the fields **Created By**, **Creation Date**, **Last Modified By**, and **Last Modification**

Date with a System ID. The **User Comments** section facilitates you to add or update additional information as comments.

9.1.1.4 Viewing a Transition Matrix Definition


The View feature enables you to view the details of an existing Transition Matrix definition. Perform the following steps to view the definition details:

Select the checkbox adjacent to the Transition Matrix definition name, which you want to view, in the **Transition Matrix Definitions** table.

1. Click **View**  to open the **Transition Matrix Definition** window.
In **View** mode, you cannot add or edit any of the fields.
2. Click **Cancel** to return to the **Transition Matrix Definitions** page.

9.1.1.5 Editing a Transition Matrix Definition

The edit feature enables you to update the details of an existing Transition Matrix definition. Perform the following steps to edit an existing Transition Matrix definition:

1. In the **Transition Matrix Definitions** table, select the checkbox adjacent to the Transition Matrix definition name that you want to edit.
2. Click **Edit**  to open the **Transition Matrix Definition** window.
You can only update the **Description** and **Applicable for Roll Rate** fields in **Edit** mode. Additionally, you can click **View Matrix** and view transition matrices for different dates.
3. Update the required fields of the definition.
4. Click **Save** to save the definition details.

The saved definition is displayed under the **Transition Matrix Definitions** table in the **Transition Matrix Definitions** window.

9.1.1.6 Checking Dependencies of a Transition Matrix Definition

You can check the dependency information of individual Transition Matrix definitions from the **Transition Matrix Definitions** window.

Perform the following steps to check the dependency information of an existing Transition Matrix definition:

1. In the **Transition Matrix Definitions** window, select the checkbox adjacent to the Transition Matrix definition for which you want to check the dependency information.
2. In the **Transition Matrix Definitions** table, click **Check Dependency**.
The dependency information of the selected definition is displayed in the **Dependency Information** window with the details such as Child Object Name, Child Object Type, Folder, Parent Object Name, Parent Object Type, and Folder.

9.1.1.7 Deleting a Transition Matrix Definition

You can delete an existing Transition Matrix definition from the **Transition Matrix Definitions** window.

Perform the following steps to delete one or more existing Transition Matrix definitions:

1. In the **Transition Matrix Definitions** window, select the checkbox(s) adjacent to the Transition Matrix definitions that you want to delete.

2. Click **Delete** .

A warning dialog is displayed.

3. Click **Yes**.

The selected definitions are removed from the **Transition Matrix Definitions** window.

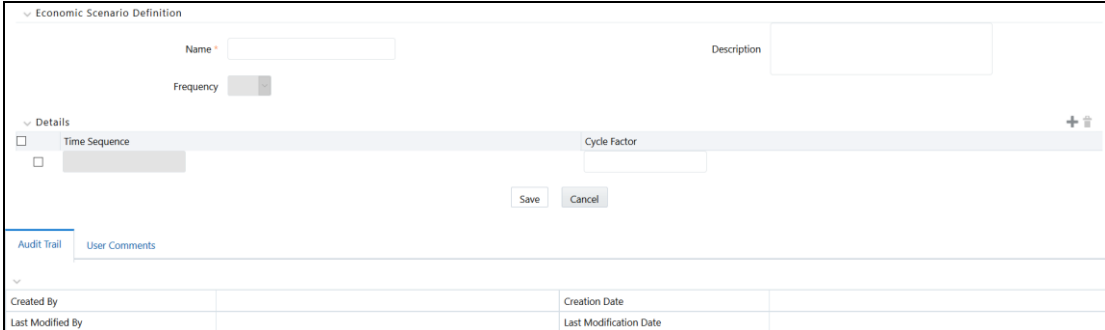
9.1.2 Economic Scenarios

This section provides information about economic scenarios.

9.1.2.1 Access Economic Scenarios

You can access the Economic Scenarios module by clicking the **Economic Scenarios** link in the LHS menu of the OFS Loan Loss Forecasting and Provisioning application. Upon clicking this link, the **Economic Scenario Definitions** window is displayed with the **Search** table and the **Economic Scenario Definitions** window.

Figure 12: The Economic Scenario Definitions Window



The **Economic Scenario Definitions** window displays all the existing Economic Scenario definitions under **Economic Scenario Definitions** table. The definitions are displayed with details such as Name, Description, Frequency, Created By, and Created Date.

9.1.2.2 Definition Search

The **Search** table enables you to perform a search for existing Economic Scenario definitions. To search for an existing Economic Scenario definition from the **Search** table, enter the name of the definition you want to search and click **Search**. The search operation is performed with the entered keyword and the results are displayed in the **Economic Scenario Definitions** table.

You can make use of the pagination options to decide the number of definitions per page or to navigate between pages.

9.1.2.3 Creating an Economic Scenario Definition

Perform the following steps to create an Economic Scenario definition:

1. In the **Economic Scenario Definitions** table, click **Add** to open the **Economic Scenario Definition** window.

Figure 13: The Economic Scenario Definition window

2. Populated the **Economic Scenario Definition** form as tabulated.

Table 11: The Economic Scenario Definition Form

Field	Description
Name	Enter a name for the Economic Scenario definition.
Description	Enter a description for the Economic Scenario definition.
Frequency	The value in this field is set to Annually and is non-editable.
Add	Add a new Time Sequence and Cycle Factor.

3. Enter the required time sequence values in the **From** field.
4. Enter the required cycle factor values in the **Cycle Factor** field.

As you enter values in **From** and **Cycle Factor** fields, the **To** field of the Time Sequence is auto-generated.

You can also select the checkbox adjacent to a Time Sequence and click **Delete** to remove a Time Sequence.

5. Click **Save**.

The saved definition is displayed in the **Economic Scenario Definitions** table.

The **Audit Trail** section at the bottom of the **Multiple Rating** window displays the metadata related to the definition and contains the fields **Created By**, **Creation Date**, **Last Modified By**, and **Last Modification Date** with a System ID. The **User Comments** section facilitates you to add or update additional information as comments.

9.1.2.4 Editing an Economic Scenario Definition

The edit feature enables you to update the details of an existing Economic Scenario definition. Perform the following steps to edit an existing Economic Scenario definition:

1. In the **Economic Scenario Definitions** table, select the checkbox adjacent to the Economic Scenario definition name that you want to edit.
2. Click **Edit** to open the **Economic Scenario Definition** window.
3. Update the available fields of the definition.
4. Click **Save**.

The saved definition is displayed under the **Economic Scenario Definitions** table in the **Economic Scenario Definitions** window.

9.1.2.5 Viewing an Economic Scenario Definition

The View feature enables you to view the details of an existing Economic Scenario definition. Perform the following steps to view the definition details:

1. In the **Economic Scenario Definitions** table, select the checkbox adjacent to the Economic Scenario definition name that you want to view.
2. Click **View** to open the **Economic Scenario Definition** window.

In **View** mode, you cannot add or edit any of the fields.

9.1.2.6 Checking Dependencies of an Economic Scenario Definition

You can check the dependency information of the individual Economic Scenario definition from the **Economic Scenario Summary** window.

Perform the following steps to check the dependency information of an existing Economic Scenario definition:

1. In the **Economic Scenario Summary** window, select the checkbox adjacent to the Economic Scenario definition for which you want to check the dependency information.
2. Click **Check Dependency**.

The dependency information of the selected definition is displayed in the **Dependency Information** window with the details such as Child Object Name, Child Object Type, Folder, Parent Object Name, Parent Object Type, and Folder.

9.1.2.7 Deleting an Economic Scenario Definition

You can delete an existing Economic Scenario definition from the **Economic Scenario Definitions** window.

Perform the following steps to delete one or more existing Economic Scenario definitions:

1. In the **Economic Scenario Definitions** window, select the checkbox(s) adjacent to the Economic Scenario definitions that you want to delete.
2. Click **Delete**.

A warning dialog is displayed.

3. Click **Yes**.

The selected definitions are removed from the **Economic Scenario Definitions** window.

9.1.3 PD Model Process

This section provides information about the PD Model Process.

9.1.3.1 Functional Overview

From the average transition matrix, the transition (migration) from a given Rating or Delinquency band to the Default band represents the Probability of Default for that Rating or Delinquency band, for the

corresponding period. On projecting this transition matrix year on year, an asset may transition from one grade to another. The probability of transition to default at the end of each year is the Through the Cycle (TTC) Probability of Default (cumulative). When such Probability of default is adjusted for changes in macroeconomic variables, the Probability of Default is Point in Time (PIT).

9.1.3.2 Access the PD Model Process

You can access the PD Model Process module by clicking the **PD Model Process** link in the LHS menu of the OFS Loan Loss Forecasting and Provisioning application. Upon clicking this link, the **PD Model Process** window is displayed with the **Search** table and the **PD Model Process** table.

Figure 14: The PD Model Process Window



The **PD Model Process** window displays all the existing PD Model Process definitions under the **PD Model Process** table. The definitions are displayed with details such as Name, Created By, Created Date, and Portfolio.

9.1.3.3 Definition Search

The **Search** table enables you to perform a search for existing PD Model Process definitions. To search for an existing PD Model Process definition from the **Search** table, enter the name of the definition you want to search and or select a required Portfolio from the drop-down list before clicking **Search**. The search operation is performed with the entered parameters and the results are displayed in the **PD Model Process** table.

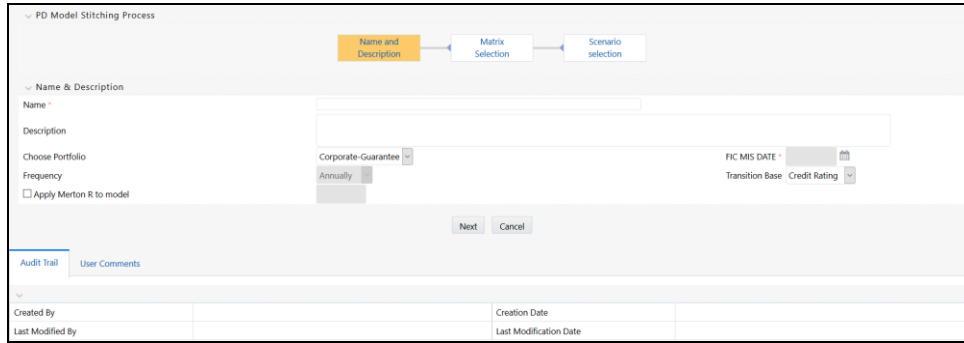
You can make use of the pagination options to decide the number of definitions per page or to navigate between pages.

9.1.3.4 Creating a PD Model Process Definition

Perform the following steps to create a PD Model Process definition:

1. In the **PD Model Process** table, click **Add** to open the **PD Model Stitching Process** window.


Figure 15: The PD Model Stitching Process Window



The **PD Stitching** window displays the **PD Model Stitching Process** and **Name & Description** tables. The **PD Model Stitching Process** table displays processes such as **Name and Description**, **Matrix Selection**, and **Scenario Selection**. By default, the **Name** and **Description** process is selected.

2. Populate the **PD Model Stitching Process** form as tabulated.

Table 12: The PD Model Stitching Process form

Field	Description
Name	Enter a name for the PD Model Process definition.
Description	Enter a description for the PD Model Process definition.
Choose Portfolio	Select the portfolio from the drop-down list.
FIC MIS Date	Select the MIS Date by clicking the Calendar  .
Frequency	The Frequency is set to Annually, by default.
Transition Base	Select the transition base from the drop-down list. Available options are: <ul style="list-style-type: none"> • Credit Rating • Days Past Due
Merton R-Value	Select this checkbox if you want to enter the Merton R-Value. If you select this checkbox, then the Metron R-Value field is enabled.

3. Select the checkbox adjacent to the **Apply Model Flag** field if you want to apply the model flag.
4. Click **Next**.

OR


5. Click the **Matrix Selection** process from the **PD Model Stitching Process** table to open the **Matrix Selection** table.

6. Click **Add** from the **Matrix Selection** table.
7. Enter the values in **From** and **To** fields of the **Computation Sequence** pane.
If you have created multiple Computation Sequences, the **To** field of all the sequences except the final sequence is auto-populated with the previous number to what is entered in the **From** field of the next sequence.
8. Click the drop-down list in the **Assign Matrix** field and select the required value.
You can also select the checkbox adjacent to a Computation Sequence and click **Delete** to remove a matrix.
9. Click **Save** to save the changes.
10. Click the **Scenario Selection** process from the **PD Model Stitching Process** table.
The **Scenario Selection** table is displayed.
11. Click **Add** to add a new Scenario Selection row.
12. Click the drop-down list under the **Select Scenarios** column and select the required scenario from the list of available scenarios.
13. Enter the weight values corresponding to the selected Scenarios in the text fields in the **Weights** column.
The cumulative number of weights is displayed under the **Weights** column against the **Total** field.
You can also select the checkbox adjacent to a Scenario and click **Delete** to remove the same.
14. Click **Save** to save the definition details.

The saved definition is displayed under the **PD Model Process** table in the **PD Model Process** window.

9.1.3.5 Editing a PD Model Process Definition


The edit feature enables you to update the details of an existing PD Model Process definition. Perform the following steps to edit an existing PD Model Process definition:

1. In the **PD Model Process** table, select the checkbox adjacent to the PD Model Process definition name that you want to edit.
2. Click **Edit**  to open the **PD Stitching** window.
3. Update the required fields of the definition.
4. Click **Save**.

The saved definition is displayed under the **PD Model Process** table.

9.1.3.6 Viewing a PD Model Process Definition

The View feature enables you to view the details of an existing PD Model Process definition. Perform the following steps to view the definition details:

1. In the **PD Model Process** table, select the checkbox adjacent to the PD Model Process definition name that you want to view.
2. Click **View**  to open the **PD Model Process** window.

3. Click **Cancel** to return to the **PD Model Process** page.

9.1.3.7 Deleting a PD Model Process Definition

You can delete an existing PD Model Process definition from the **PD Model Process** window.

Perform the following steps, to delete one or more existing PD Model Process definitions:

1. In the **PD Model Process** window, select the checkbox(s) adjacent to the PD Model Process definitions that you want to delete.

2. Click **Delete** .

A warning dialog is displayed.

3. Click **Yes**.

The selected definitions are removed from the **PD Model Process** window.

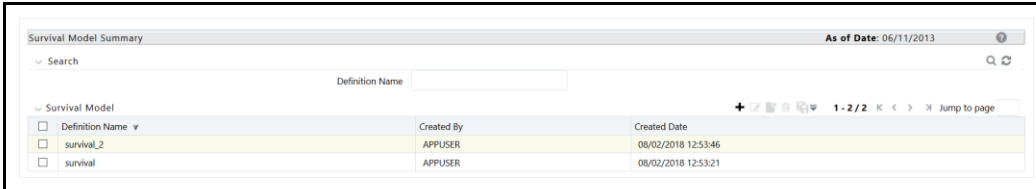
9.1.4 Survival Model

The survival model is used to compute the probability of default. Lifetime Probability of Default is then used as an input to compute the Expected Credit Loss. The survival Model enables financial institutions to understand, how long will customers take before they default. The survival time describes the amount of time that a customer takes before they default.

9.1.4.1 Access Survival Model

You can access the Survival Model module by clicking the **Survival Model** link in the LHS menu of the OFS Loan Loss Forecasting and Provisioning application. Upon clicking this link, the **Survival Model Summary** window is displayed with the **Search** section and the **Survival Model** pane.

Figure 16: The Survival Model Pane



Survival Model Summary			As of Date: 06/11/2013
Search			
Definition Name			
Survival Model			
<input type="checkbox"/>	Definition Name	Created By	Created Date
<input type="checkbox"/>	survival_2	APPUSER	08/02/2018 12:53:46
<input type="checkbox"/>	survival	APPUSER	08/02/2018 12:53:21

The **Survival Model Summary** window displays all the existing Survival Model definitions under the **Survival Model** table. The definitions are displayed with details such as Definition Name, Created By, and Created Date.

9.1.4.2 Definition Search

The **Search** table enables you to perform a search for existing Survival Model definitions. To search for an existing Survival Model definition from the **Search** table, enter the name of the definition you want to search and click **Search**. The search operation is performed with the entered keyword and the results are displayed in the **Survival Model** table.

You can make use of the pagination options to decide the number of definitions per page or to navigate between pages.

9.1.4.3 Creating a Survival Model Definition

Perform the following steps to create a Survival Model definition:

1. In the **Survival Model** table, click **Add** to open the **Survival Model Definition** window.

Figure 17: The Survival Model Definition Window

2. Populate the **Survival Model Definition** form as tabulated.

Table 13: The Survival Model Definition Form

Field	Description
Name	Enter a name for the Survival Model definition.
Description	Enter a description for the Survival Model definition.
Product Code	Select the required product code from the drop-down.
Region	Select the required region from the drop-down list.
Term	Enter the required terms for the definition. Note: Ensure that the Product Code and Region that you selected in the Survival Model Definition window is entered in the Value field of the product.id and country.id parameters in the Input Parameters window, before the model execution. Users must add the respective Product ID and Country ID that they have used when defining the Survival Model.
Customer Type	Select either Retail or Corporate .


3. In the **Available Attributes** pane of the **Account Attributes** table, click the required attributes to select or deselect them to the **Selected Attributes** pane.
4. In the **Available Variables** pane of the **Economic Variables** table, click the required variables to select or deselect them to the **Selected Variables** pane.
5. Click **Save**.

The saved definition is displayed in the **Survival Model** table.

The **Audit Trail** section at the bottom of the **Multiple Rating** window displays the metadata related to the definition and contains the fields **Created By**, **Creation Date**, **Last Modified By**, and **Last Modification Date** with a System ID. The **User Comments** section facilitates you to add or update additional information as comments.

9.1.4.4 Editing a Survival Model Definition


The edit feature enables you to update the details of an existing Survival Model definition. Perform the following steps to edit an existing Survival Model definition:

1. In the **Survival Model** table, select the checkbox adjacent to the Survival Model definition name that you want to edit.
2. Click **Edit**  to open the **Survival Model** window.
3. Update the required fields of the definition.
4. Click **Save**.

The saved definition is displayed in the **Survival Model** table.

9.1.4.5 Viewing a Survival Model Definition

The View feature enables you to view the details of an existing Survival Model definition. Perform the following steps to view the definition details:

1. In the **Survival Model** table, select the checkbox adjacent to the Survival Model definition name that you want to view.
2. Click **View**  to open the **Survival Model** window.
3. Click **Cancel** to return to the **Survival Model Summary** window.

9.1.4.6 Copying a Survival Model Definition

The Copy feature enables you to use an existing Survival Model definition to create a new one. Perform the following steps to copy an existing definition and create a new one:

1. In the **Survival Model** table, select the checkbox adjacent to the Survival Model definition name that you want to copy.
2. Click **Copy** to open the **Survival Model** window.
3. Update the required fields of the definition.
4. Click **Save**.

The saved definition is displayed under the **Survival Model** table in the **Survival Model Summary** window.

9.1.4.7 Deleting a Survival Model Definition

You can delete an existing Survival Model definition from the **Survival Model** window.

Perform the following steps to delete one or more existing Survival Model definitions:

1. In the **Survival Model** window, select the checkbox(s) adjacent to the Survival Model definitions that you want to delete.

2. Click **Delete** .

A warning dialog is displayed.

3. Click **Yes**.

The selected definitions are removed from the **Survival Model** window.

9.1.5 User Group Mapping for Sandbox

Only those users who are mapped to the Modeler and Modelling Administrator Groups can execute models under the sandbox.

9.1.6 PD Model Execution Parameters

The following are the PD Model execution parameters:

Table 14: The PD Model Execution Parameters

Sl. No.	Parameter	Details	Values to be provided in Sandbox	Values to be provided While Deploying to Atomic Schema
1	FIC MIS DATE	Refers to the execution Date of the Sandbox Population.	Provide the Date for which the data is available in the Sandbox Schema.	Before deploying the PD Model definition to the atomic schema, the FIC_MIS_DATE needs to be updated as -1 in the PD Model Creation Window Definition. The model can be authorized and requested for deployment after this change.
2	SEGMENT ID	This refers to the segments or portfolios that need to be considered for PD model executions.	the SEGMENT ID (It can be referred to from the FSI_PERIOD_TM_MAP_MST Table). It also supports the value -1.	The value must be the SEGMENT ID (It can be referred to from the FSI_PERIOD_TM_MAP_MST Table). It also supports the value -1.
3	Apply Merton	Allows the PD model to know if the Merton R-value needs to be considered to adjust TTC to PIT PD.	The value can be either Y or N depending on whether you want the Merton R-value to be considered by the PD Model. If made N, the Model shall not consider the Merton R provided, irrespective of the APPLY MERTON R flag selection in the UI. If made Y, the model	The value can be either Y or N depending on whether you want the Merton R-value to be considered by the PD Model. If made N, the Model shall not consider the Merton R provided, irrespective of the APPLY MERTON R flag selection in the UI. If made Y, the model will take the input from APPLY MERTON R flag selection in the UI (either Yes or No).

			will take the input from <i>APPLY MERTON R</i> flag selection in the UI (either Yes or No).	
4	Years to TTC	<p>Number of Years for Smoothing the PD Values - Used to define the number of years over which the PD values have to be smoothed from the PIT values to TTC values post the application of Economic Scenarios.</p> <p>For example: If the total PD term structure is for 10 years and the Economic scenarios have been provided for 3 years, with Years to TTC as 4. The model output will have PIT PDs for 3 years, smoothed PD values for years 4 to 7, and TTC PDs for years 8 to 10.</p>	Any number based on the bank's requirement.	Any number based on the bank's requirement.
5	Overwrite.DefaultRow	The value must be 'Y' If the user wants to make the default state an absorption state. Else 'N'	The value must be 'Y' If the user wants to make the default state an absorption state. Else 'N'	The value must be 'Y' If the user wants to make the default state an absorption state. Else 'N'

9.2 The probability to Default (PD) Term Structure

Oracle's LLFP application enables you or the customer to provide a series of Probability of Default (PD) values across multiple periods - a PD Term Structure either as a download or compute the same through the seeded model. This PD term structure is used in computations of Expected Cash flows and Expected Credit Loss. The PD values are generally outputs of models that are specific to a set of product portfolios wherein they generate a series of PD values for different Ratings or DPD bands.

9.2.1 PD Term Structure through Staging

The LLFP application provides a staging area to obtain the PD term structures, which are expected as a download from the bank. These values can either be Marginal PD or Cumulative PD. If the bank is providing Cumulative PD, the application calculates the Marginal PD value, at the given frequency.

A series of PD values, across multiple periods, and for different Ratings or DPD bands can be loaded into the staging tables under a given PD Term Structure ID. Multiple such PD Term structures can be provided by you to be consumed by the application, maybe across different portfolios - for example, different PD Term Structures for different Portfolios. Additionally, the staging tables can also accept different PD Term structures at different frequencies.

The staging tables are required to be updated only when there is a change in the parameter values, such as Frequency, new Term structures, and so on, or when the PD values change. The PD-related Staging tables need not be updated for every MIS Date.

9.2.2 PD Term Structure through Seeded PD Models

If you prefer to generate PD values using the seeded PD model, the application stores the results, and PD term structures - one for each defined segment, in a specific output table, called **FSI IFRS9 PD Term Structure Model Output**.

9.2.3 Movement of Data from Staging or PD Output Table to Processing Tables

The data movement from the Stage or the PD Model output tables to the Processing tables happens through an SCD batch, which needs to be executed only when fresh data is loaded into the Stage tables. PD data moving into the Processing table are generally stored over time, thus it contains historic data.

During the execution of the Interpolation batch, the application considers only the new PD term structures that have been loaded into the Processing area.

NOTE The number of periods for which the Probability of Default values are provided must be constant across dates, forgiven term structure ID.

9.2.4 Interpolation of PD Values to Buckets

The interpolation logic is part of a Batch. The first step in the process is to identify if any new PD term structures have been loaded as part of the SCD, this includes new PD Term Structure IDs or existing IDs but new dates. The interpolation logic kicks in only if there are new term structures. The next step in the process is the determination of the maximum number of buckets for which the PD values have to be

interpolated and calculated for a given *ID - Rating* or *ID-DPD band* combination. The application looks up the Application Preferences table to determine the maximum period to which the PD values need to be extrapolated and the Setup Parameter table to determine the frequency, and bucket frequency, to which the values are to be interpolated.

NOTE If the bucket frequency is greater than the PD Term structure frequency, the PD values are not calculated or interpolated.

Once the total buckets are determined, the PD values are then calculated against each of the bucket IDs.

NOTE If the bucket frequency as part of the setup parameter is changed, then all historical data is removed and all the term structures, historical, current, and new, are interpolated to the new bucket frequency.

9.2.4.1 Interpolation Logic

The next step is the population of Marginal PD from the given term structure data to the max bucket for each period. This is populated as follows:

- Considering bucket frequency is monthly - If the input data is yearly, the marginal PD of every year is populated to the 12th monthly bucket of every period. That is Buckets 12, 24 36, and so on.
- Considering bucket frequency is Quarterly - If the input data is half-yearly, the marginal PD of every half-year is populated to the 2nd Quarterly bucket of every period - 2, 4, 6, and so on.

NOTE If the PD term structure is of a lesser period than the total number of buckets applicable, then the Marginal PD of the last period is repeated for all further buckets.

For example: If the total number of buckets is 36 (monthly) but the PD term structure was given for only 2 years, the second-year value is populated for the third year as well, that is PD of Year 2 PD from the term structure is populated for 24th bucket and 36th bucket.

The next step is to interpolate the PD values for the intermediate buckets in each period. One of the following interpolation techniques is used to interpolate the PD values from the given frequency to the bucket frequency:

- Poisson process
- Arithmetic process
- Geometric process.

The interpolation technique gives the intermediate cumulative PD values for every bucket within the given period, which is the Cumulative PD for buckets 1 to 12, 13 to 24, 25 to 36, and so on, assuming input PD is yearly and bucket frequency is monthly.

The intermediate Marginal PD is calculated from the Intermediate Cumulative PD values.

The final step is the calculation of the final cumulative PD against every bucket ID, for every given combination of ID and Rating or DPD.

The interpolation batch ends here.

10 Expected Credit Loss (Allowance and Provision) Calculation in IFRS 9

The Manual Reassignment step in the Stage Determination run has to undergo approval processes before the values can be used in ECL Run. Only those Manual Reassignment changes that are approved by the Checker will be used in ECL Run. Any overridden values in the Draft, Pending approval, or the Rejected status will not be considered. The ECL Run uses the results from the Manual Reassignment process with any Approved changes.

The ECL process computes the Expected Credit Loss, including the Allowance and Provision values. Generally, the Allowance is calculated for the drawn amount and the Provision is calculated for the Undrawn amount.

10.1 Methodologies and ECL Calculation

There are five major ready-to-use Methodologies available in the product. You can choose the methodology that is applicable for every set of accounts or instruments based on the Customer Type, Product Type, and Default status (the rule can be modified to include any combination of dimensions). The five ready-to-use methodologies are:

- Cash Flow
- Forward Exposure
- Provision Matrix
- Specific Provision
- Roll Rate

Similarly, there are four submethods applicable for accounts in each of the stages (Stage 1, Stage 2, and Stage 3 plus POCI) within these methodologies. Stage one calculates the ECL for 12 months whereas all the other three stages, stage two, stage three, and stage four, calculate the ECL for a lifetime, but use different calculation approaches.

Collective Assessment: The ECL run can also determine the stage, collectively, at an aggregated level. For more information about collective assessment, see the [Collective Assessment](#) section.

For ECL calculation:

- Segments, via the Segmentation Run and applicable only for the Roll Rate methodology.
- Account Classification and Stage, via the Classification & Stage Determination Run.
- EIR, depending on the methodology.
- Transition matrices, either via the Historical Transition matrix run or UI, and applicable only for Roll Rate methodology.
- Loss rates (via the Historical Loss rate run, and applicable only for Roll Rate methodology), PD term structure (either as download or through execution of PD Model), and LGD Values, as a download, are required.

10.1.1 Methodology Selection

The methodology selection is dependent on three factors, which are, Customer Type, Product Type, and Defaulted Flag. The bank can modify the methodology selection process by either adding more parameters or modifying the existing ones. Based on these parameters, a different methodology can be assigned to different accounts, products, and so on.

10.1.2 Cash Flow Method

The Cash Flow method makes use of the Contractual Cash Flow, taking into consideration any prepayments, behavior patterns, and so on. The Contractual cash flow is adjusted for the Probability of Default (PD) and Loss Given Default (LGD) to compute the Expected Cash Flow (ECF).

The first step in the cash flow methodology is to validate if the contractual cash flows are available for the specific account. The Contractual cash flows can either be generated by the engine or obtained as a download.

NOTE If the Cash Flow is not available, the account is processed through the Provision Matrix methodology.

10.1.2.1 Prerequisites

Before following the Contractual Cash Flow method, ensure that the following prerequisites are met:

- Contractual Cash Flows are expected to be available before the ECL computation process is executed. It can be either generated by Oracle's Cash Flow engine or by an external engine or provided as a download. While providing cash flow as a download in Stage Account Cash Flows, a given financial element must not be repeated for an account and cash flow date combination. For example, for any particular cash flow date, there can only be one Principal and Interest Cash Flow each.

The internal cash flow engine used is common across other OFSAA applications. For more details about Oracle's Cash Flow engine, see the [OFS Asset Liability Management User Guide](#).

- PD and LGD values are expected either as a model output from the models hosted in the Enterprise Modeling Framework or directly as an input.
- PD Interpolation Batch.

10.1.2.2 Cash Flow Calculations

There are two distinct ways of calculating the ECL under the Cash Flow method depending on how the undrawn portion of a financial instrument is treated. They are:

- Calculation of ECL with Undrawn amount modeled within the Contractual Cash Flows
- Calculation of ECL with Undrawn amount treated separately and outside the Cash flow approach

The following sections detail the ECL calculation for accounts in any of the 4 types, that is the 3 stages and POCI accounts, both with and without an undrawn amount.

Stage One Accounts

For accounts in Stage 1, the ECL is computed by considering the cash flows for the entire life of the instrument but only considering the 12-month Probability to default. The Contractual cash flows are

adjusted for PD and LGD to compute the Expected Cash Flow (ECF). The values of Contractual Cash flow and Expected Cash flow are used to calculate the Cash Short Fall.

The ECL is calculated as the Net Present Value of Cash Short Fall.

The Effective Interest rate (EIR) is used for discounting while calculating the ECL.

NOTE The PD for 12 months or 1 year is considered for accounts in Stage one.

Stage Two Accounts

For accounts in Stage 2, the ECL is computed by considering the cash flows and the Probability to default for the entire life of the instrument. The Contractual cash flows are adjusted for PD and LGD to compute the Expected Cash Flow (ECF). The values of Contractual Cash flow and Expected Cash flow are used to calculate the Cash Short Fall.

The ECL is calculated as the Net Present Value of Cash Short Fall.

The Effective Interest Rate (EIR) is used for discounting while calculating the ECL.

NOTE The PD for the lifetime or until the maturity of the account is considered for accounts in Stage two.

Stage Three Accounts

For accounts in Stage 3, the ECL is computed by considering the cash flows and the PD for the entire life of the instrument. Here the calculation slightly differs from that of Stage 2 accounts. The Contractual cash flows are adjusted for PD and LGD to compute the Expected Cash Flow (ECF). The Net present value (NPV) of Expected Cash flows is computed.

The ECL is calculated using the Carrying Amount and Net Present Value (NPV) of ECF.

The Effective Interest Rate (EIR) is used for discounting while calculating the ECL.

NOTE The PD for the lifetime or until the maturity of the account is considered for accounts in Stage Three.

For POCI Accounts

For POCI Accounts, the ECL is computed by considering the cash flows and the PD for the entire life of the instrument. The contractual cash flows are adjusted for PD and LGD to compute the Expected Cash flows. The values of Contractual Cash flow and Expected Cash flow are used to calculate the Cash Short Fall.

NOTE The PD for the lifetime or until the maturity of the account is considered for POCI accounts.

After calculating the Contractual Cash Flow, the ECL is calculated as the Present value of Cash Shortfall adjusted for the ECL on Date of Initial Recognition.

For POCI Accounts, instead of EIR, the credit adjusted EIR is used for discounting, while calculating the ECL.

NOTE The PD values used in the Cash flow methodology are Cumulative values.

Assigning the PD Values for Each Cash Flow Date or Bucket

The PD assignment happens within the ECL run as part of the Cashflow or forward exposure methodology. The cumulative PD matches the account's Term structure ID, Account's Rating, or DPD, and the bucket number is populated against the account's cash flow - based on the cash flow's bucket.

NOTE If Cash Flows are provided as a download, via the stage account cash flow table, a single row for principal and interest cash flow each must be provided, on any cash flow date.

10.1.3 Forward Exposure

The forward exposure methodology involves the computation of the Forward Exposures, that is, forward-looking Exposure at Defaults or Forward EADs, at a different point in time in the future till the maturity of the instrument and then compute the Expected Credit Loss from them. The Forward Exposure values are calculated by the application using the Contractual cash flows, which can either be generated by Oracle's CFE or by an external engine.

The application also has a feature to obtain Forward Exposure values and the corresponding forward dates directly as a download. If both Cash Flows and Forward Exposure values are not available, then the account is processed through the Provision Matrix methodology.

This section details the steps involved in forwarding Exposure calculation for various stages.

Forward Exposure on each cash flow date is calculated from the cash flows generated or obtained as a download. The LLFP application calculates the Forward Exposure on each cash flow date as the Net present value of all future and current cash flows, discounted using the Effective Interest Rate (EIR) of the account or Cohort. Forward exposures are calculated till the last cash flow of the account.

10.1.3.1 Forward Exposure Calculations

Stage One Accounts

For Stage 1 accounts, the forward exposures up to the maturity or life term of the account are considered but only the 12 month PD is taken into account. The Per Period Loss is calculated from the Forward exposure, PD, and LGD values.

NOTE The Marginal PD for 12 months or 1 year is considered for Stage one accounts.

After calculating the Per Period Loss, the ECL is calculated as the present value of Per Period losses.

The Effective Interest Rate (EIR) is used for discounting while calculating the ECL.

Stage Two accounts

For Stage 2 accounts, the forward exposures and the PD up to the maturity of the account are considered. The Per Period Loss is calculated using Forward Exposure, Marginal PD, and LGD.

NOTE The Marginal PD for an entire lifetime of the account is considered for Stage Two accounts.

After calculating the Per Period Loss, the ECL is calculated as the Present value of Per period losses.

The Effective Interest rate (EIR) is used for discounting while calculating the ECL.

Stage Three accounts

The Forward Exposure approach for accounts in Stage 3 is similar to that of Stage 2.

POCI accounts

For POCI accounts, the forward exposures and the PD up to the maturity of the account are considered. Per Period Loss is calculated using the Forward Exposure, Marginal PD, and LGD.

NOTE The Marginal PD for the entire lifetime of the account is considered for POCI accounts.

After calculating the Per Period Loss, the ECL can be calculated as the Net Present Value of Per Period Losses adjusted for the Expected Credit loss as of Initial recognition.

The Credit adjusted EIR is used for discounting while calculating the ECL.

Assigning the PD Values for Each Cash Flow Date or Bucket

The PD assignment happens within the ECL run as part of the Cashflow or forward exposure methodology. First, the cumulative PD matches the account's Term structure ID, Account's Rating, or DPD, and the bucket number is populated against the account's cash flow - based on the cash flow's bucket. Next, based on the current and previous bucket numbers, the difference in the period, and the marginal PD values are computed.

10.1.3.2 Calculation of Forwarding Exposures as the Sum of Present Value of Cash flows using EIR

The LLFP application calculates the Forward Exposure on each cash flow date as the Net present value of all future and current cash flows, discounted using the Effective Interest Rate (EIR) of the account or cohort. The discounting period is as per the Cash flow dates and not as per the buckets.

That is, Forward Exposure on each cash flow date is calculated as the Sum of Present Value of all the Future Cash Flows and the Current date Cash Flow, that is, the Cash flow corresponding to that date.

The forward exposures are then adjusted for PD and LGD to calculate the Per Period losses and the Expected Credit Loss of the account.

Present Value of Cash Flows in the **FSI_ACCOUNT_INCEPTION_RATES** table is computed during EIR computation. If the EIR is obtained as a download, the PV of cash flows is also expected as a download. These values need to be updated in the **FSI_ACCOUNT_INCEPTION_RATES** table, for all features dependent on this value.

10.1.4 Provision Matrix

The Provision Matrix subprocess is separated into two tasks:

- Allowance Calculation
- Provision Calculation

In the Allowance Calculation task, the application uses the Provision Matrix method to calculate the Allowance for all accounts classified under the provision matrix methodology and accounts for which Allowance calculation was skipped by previous methods. This calculation is done on the Carrying Amount or the drawn amount. That is, the Allowance calculation is formulated using the Carrying Amount and Provision Rate.

In the Provision Calculation task, the application uses the Provision Matrix method to calculate the Provision for all accounts that have an undrawn portion. This calculation is done on the undrawn amount. The Provision is calculated using Undrawn Amount, Credit Conversion Factor (CCF), and Provision Rate.

10.1.4.1 Provision Rate

The provision matrices are provided by the banks as input into the staging tables. These provision matrices provide the provision rate that is applicable for a particular group of accounts based on the input factors associated with that account.

In the ready-to-use product, different Provision matrices are assigned to different groups of accounts based on the following factors:

- Customer Type
- Product Type

Financial institutions must provide both Twelve-month and Lifetime provision rates.

For Corporates and Retail, there are different ways of assigning the Provision Rates.

The provision rates can be computed for different instrument groups based on historical data and adjusted for forward-looking factors using the Enterprise modeling framework.

Assigning Provision Rates for Corporate accounts

The Provision Rates for Corporate accounts may be assigned using the ratings provided and the corresponding rates assigned are in percentage terms.

For example:

Table 15: The Provision Rates for Corporate Accounts

Rating	12-month Provision Rate (in %)	Lifetime Provision Rate (in %)
AAA	0.2%	1%
AA	1%	3%
A	1.1%	5%
BBB	3%	10%
BB	5%	20%
B	9%	30%
CCC	14%	40%
CC	28%	50%
C	35%	60%

D	97%	100%
---	-----	------

Assigning Provision Rate for Retail accounts

The Provision Rates for Retail accounts are assigned using Delinquency Past Due (DPD) bands and the rates are in percentage terms.

Table 16: The Provision Rates for Retail Accounts

Dates (DPD)	12-month Provision Rate (in %)	Lifetime Provision Rate (in %)
0-30 Days	0.2%	1%
31-60 Days	1.1%	5%
91-120 Days	9%	30 %

The application uses Rules to determine the rates applicable for an account, based on the Stage, Product Type, and Customer Type. Rates are picked from matrices as in the examples provided.

10.1.5 Specific Provision

The LLFP application calculates stage-specific ECL values for all accounts, as per the IFRS 9 guidelines. According to the guidelines, it is required to calculate the 12 months ECL for accounts in Stage 1 and Lifetime ECL for accounts in Stage 2, Stage 3, and for POCI accounts. Within the specific provision method, to distinguish between these stages, the application calculates the 12 month PD and Lifetime PD, from the given PD term structures.

For accounts in Stage 1, Allowance is calculated as the product of Carrying Amount, 12 Month PD, and LGD. Also, Provision is calculated as the product of Undrawn Amount, CCF, 12 Month PD, and LGD.

For accounts in Stage 2, Stage 3, or POCI accounts, Allowance is calculated as the product of Carrying Amount, Lifetime PD, and LGD. Also, Provision is calculated as the product of the Undrawn Amount, CCF, Lifetime PD, and LGD.

The ECL is derived as the sum of Allowance and Provision.

10.1.5.1 Calculation of 12 Month and Lifetime PD Values

The PD values are calculated from the interpolated PD term structures.

For accounts with Maturity greater than 12 months, four quarters, two half years, one year, and so on, the 12 Month PD corresponds to the Cumulative PD at the end of the 12th Month and the Lifetime PD corresponds to the Cumulative PD of the period corresponding to the account's maturity date.

For accounts with a Maturity less than 12 Months, the 12 Month PD and the Lifetime PD both correspond to the Cumulative PD of the period corresponding to the account's maturity date.

NOTE Both the 12 Month PD and the Lifetime PD are calculated for all accounts irrespective of the stage. This is required to compute both the 12 Month and Lifetime Expected Credit Losses, however, only one among those is used for reporting, depending on the Stage.

10.1.5.2 Calculate the LGD Value

The LGD value that is used in the Specific Provision method is obtained from the interpolated LGD term structure. The input LGD term structures are processed to calculate the LGD values at the bucket frequency. This processing is applied for accounts under the Specific Provision methodology as well. After the LGD term structures are processed, each account is associated with an LGD value against the current period. As mentioned in the section on LGD processing, the current period value corresponds to the 0th period or the 0th bucket.

This value, corresponding to the zeroth period or bucket, is assigned as the LGD value that is used in the Specific Provision method.

The 12 Month PD, Lifetime PD, and LGD values are stored for reporting.

10.1.6 Roll Rate

The roll rate methodology involves the computation of the Default Roll Rate and the Gross loss rate for an account based on the given Rating or Delinquent days band and its maturity.

NOTE To compute the ECL through the roll rate methodology, it is required to execute the Segmentation, Historical Transition Matrix, and Historical Loss Rate runs. If the Transition Matrices are provided as a download, the Historical Transition Matrix Run can be ignored.

The Expected Credit Loss of an account is computed as follows:

- 12 Month Allowance = Outstanding Amount * 12-month DRR * Gross Loss Rate
- Lifetime Allowance = Outstanding Amount * Lifetime DRR * Gross Loss Rate
- 12 Month Provision = Undrawn Amount * CCF * 12-month DRR * Gross Loss Rate
- Lifetime Provision = Undrawn Amount * CCF * Lifetime DRR * Gross Loss Rate

10.1.6.1 Delinquent Roll Rate Computation

During the Expected Credit Loss Run, the system computes the Roll Rate of an account by projecting the given transition matrices, computed or created through UI - as selected by you, into the future until the maturity of an account using the matrix multiplication process.

The probability of an account moving into the default rating on maturity from the current rating as of the given MIS Date is considered as the Default Roll Rate.

In the case of a 12-month computation, the matrix is projected only for a 12 month (or 1 year) period, depending upon the matrix frequency.

You can either execute the Historical Transition Matrix Run or use the Transition Matrix UI to generate a Transition Matrix. For more information about generating Transition Matrix through UI, see the [Transition Matrix Definitions](#) section.

10.1.6.2 Gross Loss Rate Computation

During the Expected Credit Loss run, the gross loss rate is computed as the average of the historical loss rates over a given period. The period over which the average is taken is based on the preferences set in the **Application Preference** table.

The Historical Loss Rate run needs to be executed for the calculation of the Gross Loss Rate.

10.1.7 Collateral Value Based Method

The Collateral Value Based (CVB) method enables allowance computation for collateral-dependent assets as per CECL requirements. Computation of allowance for credit loss for collateral dependent assets is performed using the following steps:

Identification of collateral dependent financial assets: Following conditions must be met to set the collateral dependent loan flag to Yes:

Threshold, the value of collateral post adjustment for Haircut and Recovery Cost, must be more than 70% of the book value, this is required to meet the Substantial criteria. Also, DPD for Retail Portfolio must be greater than 90 days, for DPD for Wholesale Internal Rating Rank must be less than 20, or Credit Score for Retail Portfolio (Fico Score) must be less than 575, this is required to meet the financial difficulty criteria.

1. Computation of collateral value, adjusted for the cost to sell, if applicable: LLFP computes the adjusted value of the collateral based on the following formula - Adjusted Collateral Value = $\{(1 - \text{Haircut}) * \text{Collateral Value} - \text{Recovery Cost}\}$.
2. Computation of amortized cost of the financial asset: Amortized cost is calculated based on the following formula - Amortized Cost = $(N_CARRYING_AMOUNT_RCY - ((N_FEES_EIR + N_DEFERRED_CUR_BAL) * N_RCY_CONVERSION_FACTOR))$.
3. Computation of allowance for credit loss: The allowance is computed based on the following formula - If the Adjusted Collateral Value is greater than or equal to the Amortized Cost of the financial asset, then the Allowance is calculated as zero. Otherwise, Allowance is calculated as the difference between the Amortized Cost of the financial Asset and Adjusted Collateral Value.

10.1.8 Mitigant Effect on ECL

Mitigant Effect on Expected Credit Loss enables you to calculate the Effective Loss Given Default (ELGD). The ELGD is calculated as the product of LGD and the Mitigant Effect. Mitigant Effect is calculated using the following formula:

Mitigant Effect = $\{(Exposure - ((1 - \text{HairCut for Collateral}) * \text{Collateral Value}) + \text{Recovery Cost}) \text{ or } Exposure\}$

Specific Provision and Forward Exposure methods used for Expected Credit Loss (ECL) calculation in OFS Loan Loss Forecasting and Provisioning application are in the scope of the Mitigant Effect.

Specific Provision uses Effective LGD at the bucket frequency to obtain the reduced ECL due to Mitigant Effect. For this, the application expects the LGD value as a download.

In Forward Exposure Method, the Mitigant term structure is expected as download and the Haircut value is assumed to be constant.

10.2 Calculation of 12 Month and Lifetime ECL Irrespective of the Stage

To enable the calculation of both 12 months and Lifetime ECL, with the primary difference being the Probability of default values computed against each of these, the LLFP application now computes two different calculations starting from the PD computation step.

The Data Model has also been enhanced to capture all intermediate computations which enable this feature.

The following processes are involved in this calculation:

- **PD Interpolation:** The PD interpolation process computes both 12 Month Cumulative PD and Lifetime Cumulative PD before populating the same against corresponding Cash flow or Forward Exposure.
- **Marginal PD computation:** In the case of Forwarding Exposure methodology, both 12 Month and Lifetime Marginal PDs are computed against each cash flow or forward exposure date.
- **Expected Cash Flow Rate and Expected Cash Flow Calculation:** The Expected Cash Flow rate and the Expected Cash flows are computed for both the 12 Month and the Lifetime PD values against each cash flow date.
- **Cash Shortfall Calculation:** The Cash Shortfall is computed for both the 12 months and Lifetime Expected Cash Flows against each cash flow date.
- **Per Period Loss Computation:** The Per Period Loss is computed for both the 12 month and Lifetime values against each Forward Exposure date.
- **Present Value of Expected Cash Flow and Cash Shortfall calculation:** The present values of Cash Shortfall and Expected Cash flow parameters are computed for both the 12 Month and Lifetime components.
- **Present Value of Per Period Loss:** The present value of Per Period Loss is computed for both the 12 Month and Lifetime components.
- **Provision Matrix Assignment:** Every account is assigned with a Provision Matrix, based on the Provision Matrix assignment rule. To enable the assignment of a 12-month Lifetime Provision rate, the rule needs to change as highlighted in the subsequent section of this requirement.
- **Provision Rate Assignment:** The provision Rate Assignment is enhanced to populate both 12 months and Lifetime Provision rate against each account based on the Rating or DPD band of the account and the Matrix assigned to it.
- **12 Month and Lifetime PD computation - Specific Provision**
- **Expected Credit Loss calculation - Cash Flow and Forward Exposure:** This step entails the calculation of both the 12 Month and Lifetime Expected Credit loss from the 12 month and Lifetime Cash Shortfalls or Per Period losses respectively.

10.2.1 Provision Matrix Assignment

The Provision matrix data model holds both Twelve-month as well as lifetime provision rates against each Rating or DPD band, within a matrix. To compute the 12 month and Lifetime losses through a Provision matrix approach, it is required to provide both the 12-month provision rate as well as the Lifetime rate, for each combination, that is, each Rating or DPD band.

The ready-to-use Provision Matrix assignment Rule considers Product Type and Customer Type but may be reconfigured to consider other requisite account dimensions, Stage as a source dimension is not required, to assign a Provision Matrix.

10.3 Calculation of Allowance and Provision

After the consolidated ECL is calculated through any one of the multiple methodologies available, the Allowance and Provision values are determined. The Allowance and Provision values are calculated based on the Drawn and Undrawn portions of the accounts. For every Product type and Customer type, the application checks whether the Undrawn flag is Y or N. A Rule namely, the Undrawn Flag Assignment Rule handles the flag set for the Undrawn portion.

Under Cash Flow or forward Exposure methodology, depending on the inclusion of the undrawn portion in either the Cash flow or Forward exposure, the Expected Credit Loss value is apportioned as Allowance and Provision values, considering the carrying amount.

The Undrawn Flag Assignment Rule performs the check for the Undrawn flag across all the methodologies. After the check, depending on the value of the Undrawn flag, the following calculations are made:

- If the Undrawn flag is Y and the ECL > Carrying Amount, then:
 - Allowance = Carrying Amount
 - Provision = ECL - Carrying Amount
- If the Undrawn flag is Y and the ECL < Carrying Amount, then:
 - Allowance = ECL
 - Provision = 0
- If the Undrawn flag is N and the ECL > Carrying Amount, then:
 - Allowance = Carrying Amount
- If the Undrawn flag is N and the ECL < Carrying Amount, then:
 - Allowance = ECL

If the Undrawn flag is N, the Provision is calculated using the Provision Matrix method.

10.3.1 Allowance and Provision Calculation

- Cash Flow and Forward Exposure - when Undrawn Flag is Y or N the 12 Month and Lifetime Allowance is computed as follows:
 - 12 Month Allowance = IF (12 Month ECL > Carrying Amount, Carrying Amount, 12 Month ECL)
 - Lifetime Allowance = IF (Lifetime ECL > Carrying Amount, Carrying Amount, Lifetime ECL)
- Cash Flow and Forward Exposure - when Undrawn Flag is Y the 12 Month and Lifetime Provision is computed as follows:
 - 12 Month Provision = IF (12 Month ECL > Carrying Amount, 12 Month ECL - Carrying Amount, 0)

- Lifetime Allowance = IF (Lifetime ECL > Carrying Amount, Lifetime ECL - Carrying Amount, 0)
- Cash Flow and Forward Exposure - when Undrawn Flag is N the 12 Month and Lifetime Provision is computed as follows:
 - 12 Month Provision = Undrawn * CCF * 12 Month Provision Rate
 - Lifetime Provision = Undrawn * CCF * Lifetime Provision Rate
- Provision Matrix Approach - when Undrawn flag Y or N the 12 Month and Lifetime Allowance and Provision are computed as follows:
 - 12 Month Allowance = Carrying Amount * 12 Month Provision Rate
 - Lifetime Allowance = Carrying Amount * Lifetime Provision Rate
 - 12 Month Provision = Undrawn * CCF * 12 Month Provision Rate
 - Lifetime Provision = Undrawn * CCF * Lifetime Provision Rate
- Specific Provision - when Undrawn flag Y or N the 12 Month and Lifetime Allowance and Provision are computed as follows:
 - 12 Month Allowance = Carrying Amount * LGD * 12 Month PD
 - Lifetime Allowance = Carrying Amount * LGD * Lifetime PD
 - 12 Month Provision = Undrawn * CCF * LGD * 12 Month PD
 - Lifetime Provision = Undrawn * CCF * LGD * Lifetime PD
- Expected Credit Loss Calculation

For all accounts, the 12 Month and Expected Credit Loss is calculated as follows:

 - 12 Month ECL = 12 Month Allowance + 12 Month Provision
 - Lifetime ECL = Lifetime Allowance + Lifetime Provision
- Apportioning ECL, Allowance, and Provision values from Cohorts to Individual accounts

The apportioning of all following the six parameters are performed:

 - 12 Month values of ECL, Allowance, and Provision
 - Lifetime values of ECL, Allowance, and Provision
- Computation of final Reporting Values

The Reporting ECL, Reporting Allowance, and Reporting Provision values are computed as follows:

IF STAGE = 1

 - Reporting ECL = 12 Month ECL
 - Reporting Allowance = 12 Month Allowance
 - Reporting Provision = 12 Month Provision

IF STAGE = 2 or 3

 - Reporting ECL = Lifetime ECL
 - Reporting Allowance = Lifetime Allowance
 - Reporting Provision = Lifetime Provision

10.3.2 Using LGD Data for ECL Calculation

The bucket-wise LGD values are assigned to the corresponding cash flows using the bucket ID stamped against those cash flows.

10.4 Impairment Gain or Loss Calculation

The final ECL is computed from Allowance and Provision values as mentioned in the previous section. The Impairment Gain or Loss for the current period is computed by comparing the current reporting date's Allowance and Provision values with the previous reporting dates' Allowance and Provision values.

Impairment Gain or Loss = (Current Allowance + Current Provision) - (Previous Allowance + Previous Provision) + Current Write-off - Current Recovery

Dedicated transaction-based tables are introduced for Write-offs and Recovery. As a result, the incremental values between individual periods are calculated, instead of calculating the cumulative values from the start date to the end date.

10.5 Collective Assessment for ECL Run

The Collective Assessment feature of the IFRS 9 Run of LLFP application enables you to form Cohorts (that is, group a set of accounts) based on various parameters or dimensions such that, accounts with similar characteristics are grouped and treated uniformly as a single account while determining the stage as well as computing the Expected Credit Loss (ECL) values.

10.5.1 Cohort Formation for ECL Run

The Cohort Formation or Collective assessment feature as part of the ECL run of the LLFP application addresses the following two aspects:

- Treat accounts with similar (Risk) characteristics in a similar manner
- Improvement in Performance by reducing the total number of records to be treated

The application enables Collective Assessment by following the subsequent processes:

- Dimensions and filters that define the eligibility of accounts to form Cohorts - Records satisfying these dimensions are eligible to form Cohorts (groups).
- Dimensions that define the Formation of Cohorts - These dimensions decide which set of records form a group and also in that sense decide the total number of groups as well.
- Cohort level Parameters for ECL calculation - Arrive at values for Parameters, associated with the Cohort, that is required for ECL calculation. This includes grouping cash flows or forward exposures, PD, and LGD.
- ECL Calculation for Cohorts - using any of the methodologies
- Apportion calculated metrics - Redistribute the metrics or values calculated at the cohort level to individual accounts.
- Maintain Audit trail - Store the cohorts formed during the run for future reference.

The system stores the Minimum number of accounts that are required for a cohort to be formed as a setup parameter - **MIN_ECL_COHORT_SIZE**. This is to prevent the formation of groups with fewer accounts, thereby creating a large number of small-sized cohorts, which eventually leads to an increase in

processing time and a decrease in accuracy. In the ready-to-use product, the **MIN_ECL_COHORT_SIZE** parameter is set to 50.

One preprocessing step required is to arrive at the Remaining Time to Maturity band for each account, with each band having a six-month gap. The remaining time to maturity band for the accounts is calculated as the difference between MIS Date and the Original or Revised maturity date.

If the Revised Maturity date is available, Time to Maturity = Revised Maturity Date -MIS Date else Time to maturity = Original Maturity Date -MIS Date.

The calculated Time to Maturity is then converted to a specific band.

10.5.1.1 Dimensions and Filters that Define the Eligibility of Cohorts

The next step in the process decides the set of accounts that are eligible to form Cohorts. The following are the two eligibility types:

- Filters

The filters decide the set of accounts that are eligible to form groups or Cohorts and are mandatory. Accounts are filtered based on the following factors:

- Stage: 1 and 2
- Default Flag: N
- Impaired Flag: N

- Eligibility Dimensions

The following filters are based on an extendable rule with a default set of dimensions that allow you to decide which set of accounts are eligible to form cohorts. By default the following dimensions are considered:

- Basel Customer Type
- Basel Product Type
- Methodologies

You can add or modify the list of dimensions.

10.5.1.2 Dimensions that Define the Formation of Cohorts

The application creates Cohorts, based on homogeneous values across the following dimensions. The total number of Cohorts formed is equal to the total number of such unique combinations across these dimensions. However, if the number of accounts in any Cohort is less than the minimum size set in the parameter **ECL_MIN_COHORT_SIZE**, the Cohort is disbanded and all related accounts are treated individually.

The dimensions considered to group Cohorts are the following:

- Basel Customer Type
- Basel Product Type
- IFRS Stage
- Methodology
- Cash Flow Undrawn Flag

- Current Internal Rating for non-Retail accounts or DPD Band for Retail accounts
- Time to Maturity band
- Currency

10.5.1.3 Cohort Level Parameters for ECL Calculation

The Cohort-level parameters, required for ECL calculation, are determined using the parameters of the accounts belonging to that Cohort. This is determined in two steps:

The first step includes identifying the parameters or values for dimensions that define the formation of a Cohort; these values are unique across all the accounts of a Cohort.

The second step includes identifying the parameters or values for dimensions that are derived from the account level values these values differ across the accounts of a Cohort and logic is used to arrive at Cohort level values, for example, Sum, weighted average, and so on.

- Step 1: Dimensions used for Cohort Formation are the following:
 - Basel Customer Type
 - Basel Product Type
 - IFRS Stage
 - Methodology
 - Cash Flow Undrawn Flag
 - Current Internal Rating for non-Retail accounts or DPD Band for Retail accounts
 - Time to Maturity band
 - Currency

For these dimensions or parameters, the unique values of each Cohort formed are populated as the value against this Cohort.

- Step 2: Other parameters required for ECL Calculation are the following:

The other set of parameters that are specific to ECL calculation and the values are arrived at a group level using the logic, as provided in the following table:

Table 17: Parameters Specific to ECL Calculation

Columns	For Cohort	Formula
Account Start Date	Y	MIN
Original Maturity Date	Y	MAX
Revised Maturity Date	Y	MAX
Cash Flow Undrawn Flag	Y	As per Cohort
Collective Individual Flag	Y	G

Basel Asset Class	Y	As per Cohort
Basel Customer Type	Y	As per Cohort
Basel Product Type	Y	As per Cohort
Carrying Amount in Natural Currency	Y	Sum
CCF Percent	Y	Average
Counterparty Rating	Y	As per Cohort
Delinquency Band	Y	As per Cohort
IFRS Stage	Y	As per Cohort
Issuer Rating	Y	As per Cohort
LGD Percent	Y	Weighted Average
ECL Computation Methodology	Y	As per Cohort
MIS Date	Y	As per Run
Run	Y	As per Run
Undrawn Amount in Local Currency	Y	Sum
Currency	Y	As per Cohort
Remaining Maturity Band	Y	As per Cohort

Grouping Contractual Cash Flows: In the case of a Cohort with Cash Flow methodology, the cash flows related to all accounts within the given Cohort are grouped based on the Bucket IDs assigned. All the cash flows of all related accounts are considered in this. At a bucket level, the Principal and Interest values of all related cash flows are summed up. After being grouped, the bucket start date, bucket end date, or data corresponding to the middle of the bucket is assigned as the cash flow date for that specific bucket.

Weighted average Loss Given Default: The Loss Given Default of the Cohort is calculated as the weighted average of LGD values of individual accounts which are part of the Cohort.

NOTE The weighted average of Cohorts is done at a term structure level.

Weighted average Effective Interest Rate: The Effective Interest rate of the Cohort is calculated as the weighted average of EIR values of individual accounts which are part of the Cohort.

Grouping Forward Exposures: If a Cohort has been assigned with a Forward Exposure methodology, the forward exposure values related to all accounts within the given Cohort are grouped based on the Bucket IDs assigned earlier. All the Forward Exposures of all related accounts are considered for this. At a bucket level, the forward exposures are summed up. After being grouped, the bucket start date, bucket end date, or the data corresponding to the middle of the bucket is assigned as the cash flow date for that specific bucket. For more information about the Forward Exposure method, see the [Forward Exposure](#) section.

Once the preceding steps are performed, the Cohorts are treated as individual accounts and the ECL values are computed based on the methodology that has been assigned to each Cohort.

10.5.1.4 Apportion Calculated Metrics

Once the Expected Credit Loss, Allowance, and Provision values for the Cohorts and individual accounts are computed, the Cohort level values are apportioned back to each account that is part of every Cohort. While apportioning the values, the carrying amount of each account is considered as the weighing factor.

10.5.1.5 Maintain Audit Trail

To ensure that the reporting layer does not treat the Cohorts as separate accounts and to maintain data for audit purposes the Cohorts and the corresponding values are copied into another table, Collective Assessment, and then are removed from the Account Details fact table.

10.6 Loss Given Default (LGD) Term Structure

The LGD Term Structure feature in the LLFP application allows you to change the LGD values over different periods by reflecting the changes in Loan value, collateral value, lien, and so on at an account level granularity. This also helps in obtaining more accurate ECL numbers while calculating the lifetime losses.

The processing of LGD Term Structures has the following four phases:

- [Obtaining LGD Data in Staging](#)
- [Movement of LGD Data into Processing](#)
- [Processing LGD Data as Required for ECL Calculation](#)
- [Collective Assessment](#)

10.6.1 Obtaining LGD Data in Staging

LLFP application consists of a staging table to obtain the LGD term structures at an account level granularity, that is, every account is provided with a series of LGD values over a period of time at a specific frequency. However, within a series, the values must be of constant frequency. In certain cases, there could be accounts with only a single LGD value which assumes LGD is constant. The single LGD is considered as the current period LGD.

Because the LGD values are bound to change over every period, the term structure is expected to be given at every MIS Date.

10.6.2 Movement of LGD Data into Processing

The LGD Term Structures are transferred to the processing area and adjusted as required for ECL computations, simultaneously. While the LGD series, term structure, in the staging table could be at any given frequency, the same is converted to the bucket frequency and during this process, the number of periods for which the LGD values have to be calculated or interpolated and extrapolated is dependent on the time to maturity of the account.

10.6.3 Processing LGD Data as Required for ECL Calculation

The processing table contains the number of buckets as per the cash flow buckets in the Cash flow table, rounded to the nearest multiple of the LGD term structure frequency. For example, if the account has cash flows till the 45th Monthly bucket and the LGD term structure has four yearly periods, the number of periods in the LGD processing table is rounded off to 48.

NOTE Unlike PD; LGD does not start from Zero percentage from the initial period.

10.6.3.1 Interpolation

Interpolation of LGD for intermediate periods follows a linear interpolation method. Initially, the LGD of the current date, provided as the 0th period LGD, is considered. If there is no LGD against the 0th period, then the 1st-period LGD is made applicable to the 0th period. Then the LGD for the first period is taken into consideration and then the values are interpolated for the intermediate periods. The LGD for the first period applies to the last bucket of the first period and the LGD value for the second period applies to the last bucket of the second period. By using the linear interpolation technique, the LGD values are increased linearly from the 0th bucket to the last bucket of the first period and then further to the last bucket of the second period, and so on.

10.6.4 Collective Assessment

In the case of any Cohorts being formed, a set of processed LGD term structures are created in the processing table corresponding to each of the Cohort. The number of periods or buckets for a given Cohort is the maximum value of those individual accounts which are part of that Cohort. For the Cohort related series, the LGD against each period (Bucket ID) is calculated as the weighted average of the individual LGD values against the corresponding bucket ID with the carrying amount of the account being used as the weight.

NOTE You need to load data to the LLFP LGD Term Structure Staging table.

10.7 Scenario-based ECL Computation

In Scenario-based ECL Computation, Probability of Default, Loss Given Default, and Forward Exposures, through stage management forecasts, are provided for multiple scenarios. As the first step, you need to add the required additional scenarios in the **Expected Credit Loss Scenarios** table and modify the Probability Weights in such a way that the cumulative of all the weights is 100.

Subsequently, the PD Codes in the **PD**, **LGD**, and **Forward Exposures** tables must match with the values that you have defined in the **Expected Credit Loss Scenarios** table.

The number of different PD, LGD, and Forward Exposure sets must be equal to the number of Scenarios defined. While executing the ECL Run, OFS Loan Loss Forecasting and Provisioning application replicate the account information for the given number of Scenarios. For each set, the corresponding PD, LGD, and Forward Exposure values are used.

NOTE Scenario-based Forward Exposure is used only in the case of forwarding Exposure methodology, where Forward Exposure is obtained as a download. In the case of the Forwarding Exposure method where Forward Exposures are computed using Cash Flows, within the application, or Cash Flow methodology, the same set of Cash Flows are used, thereby making ECL across all Scenarios equal. Also, Roll Rate and Provision Matrix Methodologies yield the same ECL across all Scenarios.

Using the aforementioned different Scenarios, different ECLs are computed within the processing area. While moving data into the reporting structure, the weighted average of ECLs and other related values are computed based on the weights defined in the **Expected Credit Loss Scenarios** table.

NOTE For multiple scenarios, the existing data for an MIS Date from the **PD Term Structure Detail**, **Periodic PD Rates**, and **Interpolated PD** term tables must be removed. After this, the SCDs and Batches must be re-executed.

10.7.1 Implications of Using SBECL

The following are the implications of using a Scenario-based ECL Computation method:

- Scenario-based ECL Computation is applicable only for Forward Exposure and Specific Provision methodologies.
- For Cash Flow, Roll Rate, and Provision Matrix methodologies, ECL for different Scenarios are the same.
- PD Model only generates a weighted average PDs. This may not be used for Scenario-based ECL Computations.
- ECL Reconciliation cannot be performed on ECL runs, which are Scenario-based.
- Performance for ECL is impacted.

11 Credit Line

This section contains information about the Credit Line feature and includes sections on Specific Provision, Calculation of 12 Month and Lifetime ECL Irrespective of the Stage, Provision Matrix Assignment, Calculation of Allowance and Provision, and Loss Given Default (LGD) Term Structure.

11.1 Specific Provision

The application calculates both the 12 month and lifetime ECL values for credit lines.

For Credit Line, the provision is calculated as the product of Undrawn Amount, CCF, PD, and LGD. For the Credit line, both the 12 month and lifetime provisions are calculated by taking the respective PD, CCF, and LGD.

11.1.1 Calculation of 12 Months and Lifetime PD Values

The PD values are calculated from the interpolated PD term structures.

For accounts with Maturity greater than 12 months, four quarters, two half years, one year, and so on, the 12 Month PD corresponds to the Cumulative PD at the end of the 12th Month and the Lifetime PD corresponds to the Cumulative PD of the period corresponding to the account's maturity date.

For accounts with a Maturity less than 12 Months, the 12 Month PD and the Lifetime PD both correspond to the Cumulative PD of the period corresponding to the account's maturity date.

NOTE Both the 12 Month PD and the Lifetime PD are calculated for all accounts irrespective of the stage. This is required to compute both the 12 Month and Lifetime Expected Credit Losses, however, only one among those is used for reporting. The out-of-box reports report on the lifetime values.

11.1.2 Calculate the LGD Value

The LGD value that is used in the Specific Provision method is obtained from the interpolated LGD term structure. The input LGD term structures are processed to calculate the LGD values at the bucket frequency. This processing is applied for accounts under the Specific Provision methodology as well. After the LGD term structures are processed, each account is associated with an LGD value against the current period. As mentioned in the section on LGD processing, the current period value corresponds to the 1st period or the 1st bucket.

This value, corresponding to the zeroth period or bucket, is assigned as the LGD value that is used in the Specific Provision method.

The 12 Month PD, Lifetime PD, and LGD values are stored for reporting.

11.1.3 Mitigant Effect on ECL

Mitigant Effect on Expected Credit Loss enables you to calculate the Effective Loss Given Default (ELGD). The ELGD is calculated as the product of LGD and the Mitigant Effect. The Mitigant Effect is calculated using the following formula:

Mitigant Effect = {(Exposure - ((1- HairCut for Collateral)*Collateral Value) + Recovery Cost) or Exposure}

11.2 Loss Given Default (LGD) Term Structure

The LGD Term Structure feature in the LLFP application allows you to change the LGD values over different periods by reflecting the changes in Loan value, collateral value, lien, and so on at an account level granularity. This also helps in obtaining more accurate ECL numbers while calculating the lifetime losses.

The processing of LGD Term Structures has the following four phases:

- [Obtaining LGD Data in Staging](#)
- [Movement of LGD Data into Processing](#)
- [Collective Assessment](#)

11.2.1 Obtaining LGD Data in Staging

LLFP application consists of a staging table to obtain the LGD term structures at an account level granularity, that is, every account is provided with a series of LGD values over a period at a specific frequency. However, within a series, the values must be of constant frequency. In certain cases, there could be accounts with only a single LGD value that assumes LGD is constant. The single LGD is considered as the current period LGD.

Because the LGD values are bound to change over every period, the term structure is given at every MIS Date.

11.2.2 Movement of LGD Data into Processing

The LGD Term Structures are transferred to the processing area and adjusted as required for ECL computations, simultaneously. While the LGD series, term structure, in the staging table could be at any given frequency, the same is converted to the bucket frequency and during this process, the number of periods for which the LGD values have to be calculated or interpolated and extrapolated is dependent on the time to maturity of the account.

11.3 Calculation of 12 Month and Lifetime ECL Irrespective of the Stage

To enable the calculation of both 12 months and Lifetime ECL, with the primary difference being the Probability of default values computed against each of these, the run-in LLFP application now computes two different calculations starting from the PD computation step.

The Data Model has also been enhanced to capture all intermediate computations that enable this feature.

The following processes are involved in this calculation:

- 12 Month and Lifetime PD computation - Specific Provision
- Specific Provision - when Undrawn flag Y or N the 12 Month and Lifetime Allowance and Provision are computed as follows:

- 12 Month Provision = Undrawn * CCF * LGD * 12 Month PDLifetime Provision = Undrawn * CCF * LGD * Lifetime PD

11.3.1 Using LGD Data for ECL Calculation

The bucket-wise LGD values are assigned to the corresponding cash flows using the bucket ID stamped against those cash flows.

12 Current Expected Credit Loss (CECL) Calculation for FASB's CECL Guideline

This section contains information about the Current Expected Credit Loss (CECL) Calculation for FASB's CECL guidelines.

12.1 CECL Run Management

OFS Loan Loss Forecasting and Provisioning application come with a seeded Run to support the computation of Current Expected Credit Loss (CECL) through any of the multiple methodologies available, as required by the Financial Institution. The CECL Run begins with subprocesses that help in data load, obtaining data from the multiple product processor tables. Post data load, certain key dimensions which are non-standard or external data formats are converted to standard or internal data formats, to improve ease of handling the accounts through common rules or metadata. The run then consists of processes that compute the Lifetime Expected Credit Loss values of both the drawn and undrawn portions of each account, using an approach based on the methodology assigned. Upon successful execution, the results are stored in multiple reporting tables - at both accounts and aggregate levels.

The aggregate tables then allow further computations to be performed to adjust the reserve required values based on a separate feature - Reserve Adjustment Computation.

The application also displays the execution status of the Run through the UI. For more details, see the **Process Modelling Framework** section.

NOTE The Preferred Segment Type Code must be updated in the Preference table for the successful execution of the Run. If you do not want to use Segments as a Dimension, the related Processes must be removed.

12.2 Methodologies and CECL Calculation

There are five major ready-to-use Methodologies available in the product. You can choose the methodology that is applicable for every set of accounts or instruments based on any combination of dimensions through a Rule, with the standard product feature of using Customer Type, Product Type, and Default status. The five ready-to-use methodologies are the following:

- Cash Flow
- Forward Exposure
- Provision Matrix
- Specific Provision
- Roll Rate

Collective Assessment: The CECL run can also determine the stage, collectively, at an aggregated level. For more information about collective assessment, see the [Collective Assessment](#) section.

For CECL calculation:

- Segments via the Segmentation Run and applicable only for Roll Rate methodology
- EIR, depending on the methodology

- Transition matrices, either via the Historical Transition matrix run or UI, and applicable only for Roll Rate methodology
- Loss rates via the Historical Loss rate run, and applicable only for Roll Rate methodology
- PD term structure, either as download or through execution of PD Model
- LGD Values, as a download, are required.

12.2.1 Methodology Selection

The methodology selection is dependent on three factors, which are, Customer Type, Product Type, and Defaulted Flag. The bank can modify the methodology selection process by either adding more parameters or modifying the existing ones. Based on these parameters, a different methodology can be assigned to different accounts, products, and so on.

12.2.2 Cash Flow Method

The Cash Flow method makes use of the Contractual Cash Flow, taking into consideration any prepayments, behavior patterns, and so on. The Contractual cash flow is adjusted for the Probability of Default (PD) and Loss Given Default (LGD) to compute the Expected Cash Flow (ECF).

The first step in the cash flow methodology is to validate if the contractual cash flows are available for the specific account. The Contractual cash flows can either be generated by the engine or obtained as a download.

NOTE If the Cash Flow is not available, the account is processed through the Provision Matrix methodology.

12.2.2.1 Prerequisites

Before following the Contractual Cash Flow method, ensure that the following prerequisites are met.

- Contractual Cash Flows are expected to be available before the CECL computation process is executed. It can be either generated by Oracle's Cash Flow engine or by an external engine or provided as a download. While providing cash flow as a download in Stage Account Cash Flows, a given financial element must not be repeated for an account and cash flow date combination. For example, for any particular cash flow date, there can only be one Principal and Interest Cash Flow each.

The internal cash flow engine used is common across other OFSAA applications. For more details about Oracle's Cash Flow engine, see the [OFS Asset Liability Management User Guide](#).

- PD and LGD values are expected either as a model output from the models hosted in the Enterprise Modeling Framework or directly as an input.
- PD Interpolation Batch

12.2.2.2 Cash Flow Calculations

There are two distinct ways of calculating the CECL under the Cash Flow method depending on how the undrawn portion of a financial instrument is treated. They are:

- Calculation of CECL with Undrawn amount modeled within the Contractual Cash Flows
- Calculation of CECL with Undrawn amount treated separately and outside the Cash flow approach

The following sections detail the CECL calculation for accounts, both with and without undrawn amounts, as mentioned in the preceding sections.

CECL is computed by considering the cash flows and the Probability to default for the entire life of the instrument. The Contractual cash flows are adjusted for PD and LGD to compute the Expected Cash Flow (ECF). The values of Contractual Cash flow and Expected Cash flow are then used to calculate the Cash Short Fall.

CECL is computed as the Net Present Value of Cash Short Fall.

The Effective Interest Rate (EIR) is used for discounting while calculating the CECL.

NOTE The PD for the lifetime or until the maturity of the account is considered.

Assigning the PD Values for Each Cash Flow Date or Bucket

The PD assignment happens within the CECL run as part of the Cashflow or forward exposure methodology. The cumulative PD matching the account's Term structure ID, Account's Rating, or DPD, and the bucket number (period) is populated against the account's cash flow - based on the cash flow bucket.

NOTE If Cash Flows are provided as a download, via the stage account cash flow table, a single row for principal and interest cash flow each must be provided, on any cash flow date.

12.2.3 Forward Exposure

The forward exposure methodology involves the computation of the Forward Exposures, that is, forward-looking Exposure at Defaults or Forward EADs, at a different point in time in the future till the maturity of the instrument and then compute the Current Expected Credit Loss from them. The Forward Exposure values are calculated by the application using the Contractual cash flows which can either be generated by Oracle's CFE or by an external engine.

The application also has a feature to obtain Forward Exposure values and the corresponding forward dates directly as a download. If both Cash Flows and Forward Exposure values are not available, then the account is processed through the Provision Matrix methodology.

This section details the steps involved in forwarding the Exposure calculation.

Forward Exposure on each cash flow date is calculated from the cash flows generated or obtained as a download. The LLFP application calculates the Forward Exposure on each cash flow date as the Net present value of all future and current cash flows, discounted using the Effective Interest Rate (EIR) of the account or Cohort. Forward exposures are calculated till the last cash flow of the account.

12.2.3.1 Forward Exposure Calculations

The forward exposures and the PD up to the maturity of the account are considered and the Per Period Loss is calculated using Forward Exposure, Marginal PD, and LGD.

NOTE The Marginal PD for the entire lifetime of the account is considered.

After calculating the Per Period Loss, the CECL is calculated as the Present value of Per period losses.

The Effective Interest rate (EIR) is used for discounting while calculating the CECL.

Assigning the PD Values for Each Cash Flow Date or Bucket

The PD assignment happens within the CECL run as part of the Cashflow or forward exposure methodology. First, the cumulative PD matches the account's Term structure ID, Account's Rating, or DPD, and the bucket number is populated against the account's cash flow - based on the cash flow bucket. Next, based on the current and previous bucket numbers, the difference in the period, and the marginal PD values are computed.

12.2.3.2 Calculation of Forwarding Exposures as the Sum of Present Value of Cash flows using EIR

The LLFP application calculates the Forward Exposure on each cash flow date as the Net present value of all future and current cash flows, discounted using the Effective Interest Rate (EIR) of the account or cohort. The discounting period is as per the Cash flow dates and not as per the buckets.

That is, Forward Exposure on each cash flow date is calculated as the Sum of Present Value of all the Future Cash Flows and the Current date Cash Flow, that is, the Cash flow corresponding to that date.

The forward exposures are then adjusted for PD and LGD to calculate the Per Period losses and the Current Expected Credit Loss of the account.

Present Value of Cash Flows in the **FSI_ACCOUNT_INCEPTION_RATES** table is computed during EIR computation. If the EIR is obtained as a download, the PV of cash flows is also expected as a download. These values need to be updated in the **FSI_ACCOUNT_INCEPTION_RATES** table, for all features dependent on this value.

12.2.4 Provision Matrix

The Provision Matrix subprocess is separated into two tasks:

- Allowance Calculation
- Provision Calculation

In the Allowance Calculation task, the application uses the Provision Matrix method to calculate the Allowance for all accounts classified under the provision matrix methodology and accounts for which Allowance calculation was skipped by previous methods. This calculation is done on the Carrying Amount or the drawn amount. That is, the Allowance calculation is formulated using the Carrying Amount and Provision Rate.

In the Provision Calculation task, the application uses the Provision Matrix method to calculate the Provision for all accounts that have an undrawn portion. This calculation is done on the undrawn amount. The Provision is calculated using Undrawn Amount, Credit Conversion Factor (CCF), and Provision Rate.

12.2.4.1 Provision Rate

The provision matrices are provided by the banks as input into the staging tables. These provision matrices provide the provision rate that is applicable for a particular group of accounts based on the input factors associated with that account.

In the ready-to-use product, different Provision matrices are assigned to different groups of accounts based on the following factors:

Customer Type

- Product type

The provision rates can be computed for different instrument groups based on historical data and adjusted for forward-looking factors using the Enterprise modeling framework.

Assigning Provision Rates for Corporate Accounts

The Provision Rates for Corporate accounts may be assigned using the ratings provided and the corresponding rates assigned are in percentage terms.

For example:

Table 18: The Provision Rates for Corporate Accounts

Rating	Rates in %
AAA	1%
AA	3%
A	5%
BBB	10%
BB	20%
B	30%
CCC	40%
CC	50%
C	60%
D	100%

Assigning Provision Rate for Retail Accounts

The Provision Rates for Retail accounts are assigned using Delinquency Past Due (DPD) bands and the rates are in percentage terms.

Table 19: The Provision Rates for Retail Accounts

Rating	Rate
0-30 Days	1%
31-40 Days	5%

41-100 Days	30 %
-------------	------

The application uses Rules to determine the rates applicable for an account, based on the Stage, Product Type, and Customer Type. Rates are picked from matrices as in the examples provided.

12.2.5 Specific Provision

Under this method, the LLFP application calculates the CECL using the values of EAD (current), PD, and LGD. The application calculates the Lifetime PD from the given PD term structures.

Allowance is calculated as the product of the Carrying Amount, Lifetime PD, and LGD. Also, Provision is calculated as the product of the Undrawn Amount, CCF, Lifetime PD, and LGD.

The total Expected Credit Loss is derived as the sum of Allowance and Provision.

12.2.5.1 Calculation of Lifetime PD

The PD values are calculated from the interpolated PD term structures. The Lifetime PD corresponds to the Cumulative PD of the period corresponding to the account's maturity date.

12.2.5.2 Calculate the LGD Value

The LGD value that is used in the Specific Provision method is obtained from the interpolated LGD term structure. The input LGD term structures are processed to calculate the LGD values at the bucket frequency. This processing is applied for accounts under the Specific Provision methodology also. After the LGD term structures are processed, each account is associated with an LGD value against the current period. As mentioned in the section on LGD processing, the current period value corresponds to the 0th period or the 0th bucket. This value, corresponding to the 0th period or bucket, is assigned as the LGD value that is used in the Specific Provision method.

Lifetime PD and LGD values are stored for reporting.

12.2.6 Roll Rate

The roll rate methodology involves the computation of the Default Roll Rate and the Gross loss rate for an account based on the given Rating or Delinquent days band and its maturity.

NOTE To compute the CECL through the roll rate methodology, it is required to execute the Segmentation, Historical Transition Matrix, and Historical Loss Rate runs. If the Transition Matrices are provided as a download, the Historical Transition Matrix Run can be ignored.

The Current Expected Credit Loss of an account is computed as follows:

- Lifetime Allowance = Outstanding Amount * Lifetime DRR * Gross Loss Rate
- Lifetime Provision = Undrawn Amount * CCF * Lifetime DRR * Gross Loss Rate

12.2.6.1 Delinquent Roll Rate Computation

During the Current Expected Credit Loss Run, the system computes the Roll Rate of an account by projecting the given transition matrices, computed or created through UI - as selected by you, into the future until the maturity of an account using the matrix multiplication process.

The probability of an account moving into the default rating on maturity from the current rating as of the given MIS Date is considered as the Default Roll Rate.

You can either execute the Historical Transition Matrix Run or use the Transition Matrix UI to generate a Transition Matrix. For more information about generating Transition Matrix through UI, see the [Transition Matrix Definitions](#) section.

12.2.6.2 Gross Loss Rate Computation

During the Current Expected Credit Loss Run, the gross loss rate is computed as the average of the historical loss rates over a given period. The period over which the average is taken is based on the preferences set in the **Application Preference** table.

The Historical Loss Rate Run needs to be executed for the calculation of the Gross Loss Rate. For more information about the historical loss rate, see the [Historical Loss Rate](#) section.

12.2.6.3 Provision Matrix Assignment

The Provision matrix data model holds the lifetime provision rates against each Rating or DPD band, within a matrix. The ready-to-use Provision Matrix assignment rule considers Product Type and Customer Type but may be reconfigured to consider other requisite account dimensions, Stage as a source dimension is not required, to assign a Provision Matrix.

12.3 Calculation of Allowance and Provision

After the consolidated CECL is calculated through any one of the multiple methodologies available, the Allowance and Provision values are determined. The Allowance and Provision values are calculated based on the Drawn and Undrawn portions of the accounts. For every Product type and Customer type, the application checks whether the Undrawn flag is Y or N. A Rule namely, the Undrawn Flag Assignment Rule handles the flag set for the Undrawn portion.

Under Cash Flow or forward Exposure methodology, depending on the inclusion of the undrawn portion in either the Cash flow or Forward exposure, the Current Expected Credit Loss value is apportioned as Allowance and Provision values, considering the carrying amount.

The Undrawn Flag Assignment Rule performs the check for the Undrawn flag across all the methodologies. After the check, depending on the value of the Undrawn flag, the following calculations are made:

- If the Undrawn flag is Y and the CECL > Carrying Amount, then:
 - Allowance = Carrying Amount
 - Provision = CECL - Carrying Amount
- If the Undrawn flag is Y and the CECL < Carrying Amount, then:
 - Allowance = CECL
 - Provision = 0

- If the Undrawn flag is N and the CECL > Carrying Amount, then:
 - Allowance = Carrying Amount
- If the Undrawn flag is N and the CECL < Carrying Amount, then:
 - Allowance = CECL

If the Undrawn flag is N, the Provision is calculated using the Provision Matrix method. For more details, see the [Provision Matrix](#) section.

12.3.1 Allowance and Provision Calculation

The following is the allowance and provision calculations:

- Cash Flow and Forward Exposure - when Undrawn Flag is Y or N the Lifetime Allowance is computed as follows:
 - Lifetime Allowance = IF (Lifetime CECL > Carrying Amount, Carrying Amount, Lifetime CECL)
- Cash Flow and Forward Exposure - when Undrawn Flag is Y the Lifetime Provision is computed as follows:
 - Lifetime Allowance = IF (Lifetime CECL > Carrying Amount, Lifetime CECL - Carrying Amount, 0)
- Cash Flow and Forward Exposure - when Undrawn Flag is N the Lifetime Provision is computed as follows:
 - Lifetime Provision = Undrawn * CCF * Lifetime Provision Rate
- Provision Matrix Approach - when Undrawn flag Y or N the Lifetime Allowance and Provision are computed as follows:
 - Lifetime Allowance = Carrying Amount * Lifetime Provision Rate
 - Lifetime Provision = Undrawn * CCF * Lifetime Provision Rate
- Specific Provision - when Undrawn flag Y or N the Lifetime Allowance and Provision are computed as follows:
 - Lifetime Allowance = Carrying Amount * LGD * Lifetime PD
 - Lifetime Provision = Undrawn * CCF * LGD * Lifetime PD
- Current Expected Credit Loss Calculation
 - For all accounts, the Current Expected Credit Loss is calculated as follows:
Lifetime CECL = Lifetime Allowance + Lifetime Provision
- Apportioning CECL, Allowance, and Provision values from Cohorts to Individual accounts
 - The apportioning of all following three parameters is performed:
Lifetime values of CECL, Allowance, and Provision
- Computation of final Reporting Values
 - The Reporting CECL, Reporting Allowance, and Reporting Provision values are computed as follows:
Reporting CECL = Lifetime CECL

Reporting Allowance = Lifetime Allowance

Reporting Provision = Lifetime Provision

12.4 Impairment Gain or Loss Calculation

The final CECL is computed from Allowance and Provision values as mentioned in the previous section. The Impairment Gain or Loss for the current period is computed by comparing the current reporting date's Allowance and Provision values with the previous reporting dates' Allowance and Provision values.

Impairment Gain or Loss = (Current Allowance + Current Provision) - (Previous Allowance + Previous Provision) + Current Write-off - Current Recovery

NOTE The Previous Allowance and Previous Provision values are expected as a download. If the Financial Institution computes Reserve Adjustments, the same must reflect in the *Previous Allowance* and *Previous Provision* amounts that are provided in the next FIC MIS DATE or period. This is necessary to arrive at the correct value of the Required Reserve.

To know more about Required Reserve computation, see the **Computation of Required Reserve** section.

12.5 Loss Given Default (LGD) Term Structure

The LGD Term Structure feature in the LLFP application allows you to change the LGD values over different periods by reflecting the changes in Loan value, collateral value, lien, and so on at an account level granularity. This also helps in obtaining more accurate CECL numbers while calculating the lifetime losses.

The processing of LGD Term Structures has the following four phases:

- [Obtaining LGD Data in Staging](#)
- [Movement of LGD Data into Processing](#)
- [Processing LGD Data as Required for CECL Calculation](#)
- [Using LGD Data for CECL Calculation](#)

12.5.1 Obtaining LGD Data in Staging

LLFP application consists of a staging table to obtain the LGD term structures at an account level granularity, that is, every account is provided with a series of LGD values over a period of time at a specific frequency. However, within a series, the values must be of constant frequency. In certain cases, there could be accounts with only a single LGD value which assumes LGD is constant. The single LGD is considered as the current period LGD.

Because the LGD values are bound to change over every period, the term structure is expected to be given at every MIS Date.

12.5.2 Movement of LGD Data into Processing

The LGD Term Structures are transferred to the processing area and adjusted as required for CECL computations, simultaneously. While the LGD series (term structure) in the staging table could be at any

given frequency, the same is converted to the bucket frequency and during this process, the number of periods for which the LGD values have to be calculated or interpolated and extrapolated is dependent on the time to maturity of the account.

12.5.3 Processing LGD Data as Required for CECL Calculation

The processing table contains the number of buckets as per the cash flow buckets in the Cash flow table, rounded to the nearest multiple of the LGD term structure frequency. For example, if the account has cash flows till the 45th Monthly bucket and the LGD term structure has four yearly periods, the number of periods in the LGD processing table is rounded off to 48.

NOTE Unlike PD; LGD does not start from Zero percentage from the initial period.

12.5.3.1 Interpolation

Interpolation of LGD for intermediate periods follows a linear interpolation method. Initially, the LGD of the current date, provided as the 0th period LGD, is considered. If there is no LGD against the 0th period, then the 1st-period LGD is made applicable to the 0th period. Then the LGD for the first period is taken into consideration and then the values are interpolated for the intermediate periods. The LGD for the first period applies to the last bucket of the first period and the LGD value for the second period applies to the last bucket of the second period. By using the linear interpolation technique, the LGD values are increased linearly from the 0th bucket to the last bucket of the first period and then further to the last bucket of the second period, and so on.

12.5.4 Using LGD Data for CECL Calculation

The bucket-wise LGD values are assigned to the corresponding cash flows using the bucket ID stamped against those cash flows.

NOTE You need to load data to the **LLFP LGD Term Structure Staging** table.

12.6 Troubled Debt Restructured (TDR) Reserve Computation and Adjustment

For TDR Accounts, Reserves are calculated using a distinct approach. For this, the OFS Loan Loss Forecasting and Provisioning Application make use of the TDR flag. Whenever the flag is Y, the account is in the TDR category, the application calculates a separate reserve for TDR accounts.

For the calculation of this reserve, Expected Cash Flows are expected as a download in Staging. Using these Cash Flows, which are present in the stage account Cash Flows table, the application computes the present value of these expected Cash Flows. The discount rate is calculated as EIR for Fixed-Rate Instruments and the Current Net Rate for Floating Rate Accounts.

Then the application computes the TDR reserve as the difference between the carrying amount and the present value of these expected Cash Flows.

TDR accounts undergo the first level of aggregation but do not flow into the segment-level aggregate table.

Cash Flows provided in the staging area against a TDR account are assumed to be Expected Cash Flows and not Contractual Cash Flows. As a result of this, you must neither use Cash Flow-based nor Forward Exposure based methods for ECL computation.

TDR Reserve= Carrying Amount – PV of Expected Cash Flow

1. The carrying amount is the outstanding amount when the account gets flagged as “TDR”.
2. As of Date (AOD), Contractual Cash Flow is discounted with the EIR. The following functional Use Cases are referred to for use of EIR.
 - a. When TDR Event and Repriced Event are different: For a Fixed Rate or Floating Rate Instrument, if the latest repriced EIR is available then the application uses it, otherwise it uses the origination EIR to discount the Expected Cash Flow.

Note: The latest Repriced Event should be earlier than the TDR Event.

- b. When the TDR Event and the Repriced Event are the same: For a Fixed Rate or Floating Rate Instrument, the latest EIR which is available just before these (TDR/Repriced) gets used to discount the Expected Cash Flow.

12.7 Scenario-based CECL Computation

In Scenario-based CECL Computation, Probability of Default, Loss Given Default, and Forward Exposures, through stage management forecasts, are provided for multiple scenarios. As the first step, you need to add the required additional scenarios in the **Current Expected Credit Loss Scenarios** table and modify the Probability Weights in such a way that the cumulative of all the weights is 100.

Subsequently, the PD Codes in the **PD**, **LGD**, and **Forward Exposures** tables must match with the values that you have defined in the Current Expected Credit Loss Scenarios table.

The number of different PD, LGD, and Forward Exposure sets must be equal to the number of Scenarios defined. While executing the ECL Run, OFS Loan Loss Forecasting and Provisioning application replicates the account information for the given number of Scenarios. For each set, the corresponding PD, LGD, and Forward Exposure values are used.

NOTE	Scenario-based Forward Exposure is used only in the case of forwarding Exposure methodology, where Forward Exposure is obtained as a download. In the case of the Forwarding Exposure method where Forward Exposures are computed using Cash Flows, within the application, or Cash Flow methodology, the same set of Cash Flows are used, thereby making CECL across all Scenarios equal. Also, Roll Rate and Provision Matrix Methodologies yield the same CECL across all Scenarios.
-------------	---

Using the aforementioned different Scenarios, different CECLs are computed within the processing area. While moving data into the reporting structure, the weighted average of CECLs and other related values are computed based on the weights defined in the Current Expected Credit Loss Scenarios table.

NOTE For multiple scenarios, the existing data for an MIS Date from the **PD Term Structure Detail, Periodic PD Rates, and Interpolated PD** term tables must be removed. After this, the SCDs and Batches must be re-executed.

12.7.1 Implications of Using Scenario-Based CECL

The following are the implications of using a Scenario-based CECL Computation method:

- Scenario-based CECL Computation is applicable only for Forward Exposure and Specific Provision methodologies.
- For Cash Flow, Roll Rate, and Provision Matrix methodologies, CECL for different Scenarios are the same.
- PD Model only generates a weighted average PDs. This may not be used for Scenario-based CECL computations.
- CECL Reconciliation cannot be performed on CECL runs, which are Scenario-based.
- The performance of CECL is impacted.

12.8 Allowance Computation for Available-for-Sale Financial Asset (AFS)

According to the CECL standards, financial institutions are now required to use an allowance approach when recognizing credit loss for AFS debt securities. Allowance is measured as the difference between the Security's amortized cost and the amount expected to be collected over the entire life of the security.

12.8.1 Overview

OFS Loan Loss Forecasting and Provisioning application compute the Expected Credit Loss of individual instruments or accounts using multiple models such as AFS Model, Survival Model, Roll Rate Model, Vintage Model, and Collateral Based Method. The application provides you the flexibility to compute the credit loss allowance for a different set of accounts or portfolios using different methodologies. Available-for-Sale Financial Asset Model is used to compute allowance for AFS Debt securities as per the CECL standards.

12.8.2 Prerequisites for AFS Model

The following are the prerequisites for computing allowance for AFS debt securities:

- Fair Value: The fair value can be computed using the OFSAA applications or can be provided as a download by the financial institution.
- Intent to Sell: The intent to sell must be provided by the financial institution as a flag Yes or No in the OFSAA staging table.
- Cash Flow: Expected Cash Flows can be generated using the OFSAA application or provided as a download by the financial institution.

12.8.3 Data Capture - Asset Category and Fair Value

The first step in the AFS Model is to populate the staging tables with the aforementioned prerequisites. Asset Classification Type AFS or HTM, Intent to sell are mandatory inputs. Fair value and cash flows can be provided as a download or can be generated using OFSAA applications.

12.8.4 Impairment Assessment

The second step in the process is to compute the overall impairment. This is done using a computation rule in LLFP. Overall impairment is calculated as the difference between the Amortized Cost and Fair Value.

12.8.5 Check for Credit Loss Factors

As per CECL, institutions must recognize an allowance for credit losses by a charge to earnings for the credit-related computed of the decline in Fair Value. This allowance is subject to a fair value floor. OFS Loan Loss Forecasting and Provisioning have rules configured to check if the decline in fair value is due to credit-related factors. For example, the application has rules to analyze the rating notch movement. A rating downgrade by more than three notches will set the credit loss flag to Yes.

12.8.6 Allowance and Other Comprehensive Income (OCI) Computation

The final step of the process is to compute the Credit Loss Allowance. The present value of expected cash flows is computed in the application. The Effective Interest Rate (EIR) engine provides the capability to discount cash flows using the EIR of the asset.

Allowance for credit loss is computed as the difference between Amortized Cost and the present value of expected cash flows, subject to fair value floor. If the Allowance for credit loss is less than the overall impairment, then the decline in fair value due to non-credit factors is recognized in the Other Comprehensive Income (OCI).

NOTE If the ECL of an account is calculated using the AFS method, that account will not be considered to calculate the change during Reconciliation.

13 Attribution Analysis

Attribution Analysis enables institutions and regulators to monitor the quality and health of financial institutions through identifying reasons for higher provisions, which result from a varied range of factors including but not limited to strategic decisions, quality of customers, and economic circumstances.

The Attribution Analysis feature offered in the OFS Loan Loss Forecasting and Provisioning application enables you to compare the results of two Runs (Processes) and understand the contribution of each factor that is involved in the computation process to the change in the result value.

The attribution analysis component is integrated into the OFS AAI application's Process Modelling Framework (PMF). PMF is a design and execution framework that enables Process Pipeline developers to implement various pipelines modeled by business analysts. PMF consists of process modeling components for modeling pipelines and process monitor components to monitor instantiated pipelines of OFSAA applications. For detailed information about the usage of PMF, see the [OFS Analytical Applications Infrastructure Process Modeling Framework Orchestration Guide](#).

Attribution analysis requires access to OFSAA and defining the attribution pipeline in PMF. Preparation of an attribution analysis definition and execution of the attribution pipeline are the final steps in attribution analysis. For detailed information about the usage of Attribution Analysis, see the [OFS Attribution Analysis User Guide](#).

Specific to the Expected Credit Loss (ECL) computation, the Attribution Analysis process compares the account level ECL of two dates or Runs and computes the contribution of any or all factors to the actual change in ECL either in the same date or different dates. Later the reasons for the change in ECL are also calculated. The sum of all such contributions by each factor sums up the actual change in the ECL.

You can derive insights about changes in ECL potentially caused by any or all the following causes:

- Change in IFRS 9 Stage
- Change due to Carrying Amount
- Change due to Undrawn Amount
- Change in Credit Conversion Factor
- Change in the Probability of Default (Marginal or Cumulative)
- Change in the Loss Given Default
- Change in the Exchange Rate
- Change in the Provision Rate
- Change due to Cash Flows or Forward Exposures
- Change due to Effective Interest Rate
- Change in the Time Factor (Bucket)
- Historical Cash Flows changes (Cash Flows paid off)
- Other changes are not covered in the preceding causes.

If an account is moved from one Classification category to another (reclassified), the account is treated as derecognized under the first category and newly recognized under the second category.

Detailed Attribution Analysis is performed for CVB and Collateral dependent methods, based on Mitigant Effect on Specific Provision, Forward Exposure, and CVB. Specific Provision and Forward Exposure methods use collateral. New factors such as Mitigant Value, Amortized Cost, and Deferred Balance are introduced and are used for Attribution Analysis performed on Specific Provision, Forward Exposure, and CVB.

The variable to the column mapping must be additionally configured in the **FSI_LLFP_ATTR_COMP_VAR_MAPPING** table that allows multiple columns to a single variable. This configuration is required if you are adding additional variables apart from the out-of-the-box provided variables.

13.1 Execute Attribution Analysis

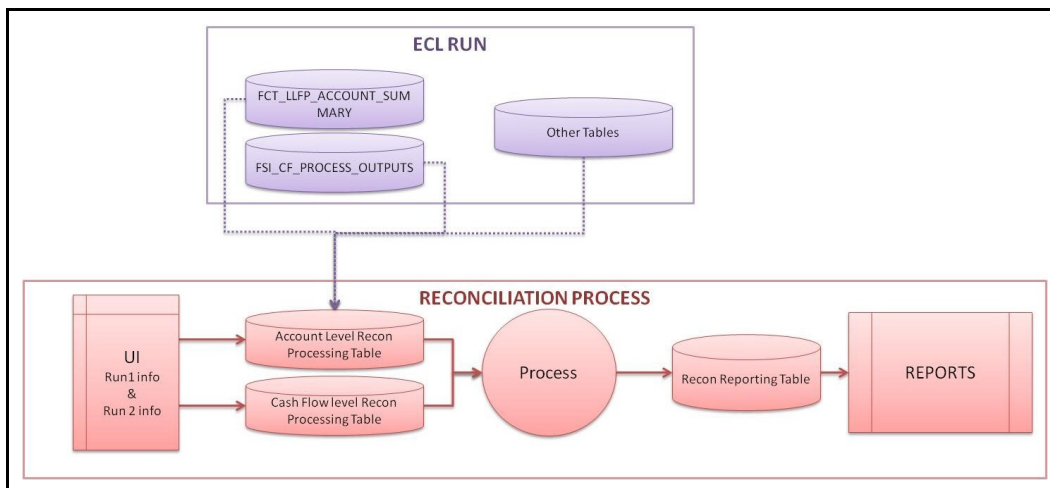
Execution of attribution analysis is a UI-driven approach. Oracle Financial Services Attribution Analysis is a feature that is integrated into the OFS AAI application's PMF. This component specifically addresses the requirement of financial institutions to compare the execution runs in models by varying one factor and studying the impact on other factors that are linked to it.

The comparison of the two executions, a base run instance and an inspect run instance provides an insight into the impact of the outcome of the run when the variables are altered for every attribution run anchoring all but one variable, keeping all variables constant except one. You can create a group of tasks, runs, and models, and execute the processes configured in a parallel or a serial sequence as required. The results can be explored for analysis and reporting. For detailed information about the usage of Attribution Analysis, see the [OFS Attribution Analysis User Guide](#).

13.2 Process Flow

The following figure depicts the process flow of the Attribution Analysis process.

Figure 18: The Reconciliation Process Flow



13.3 Attribution Analysis Process

The following is the attribution analysis process on execution:

1. The Application obtains the values of all the relevant factors to compute the ECL from both dates.

2. For each factor, at an account or cash flow granularity, the application compares the values on either date or runs and computes the change in ECL due to the change in the value of that specific factor.
3. This is repeated for all factors that were selected by you in the application.
4. After all the selected factors are attributed, the remaining difference in ECL values is attributed to *Other Changes and Multiplier Effect*.

Primarily, the factors are grouped under the following headers:

- New Assets
- Derecognized Assets
- Remeasurement
- Model or Risk Parameters
- Stage Changes
- Foreign Exchange and
- Change in Exposure
- Other Changes and Multiplier Effect

13.4 Reconciliation Reports

Reconciliation disclosures are intended to explain factors that are attributable to the change in asset values over a period for attribution analysis. Because the ECL directly impacts profitability and therefore the financial health of a bank, management and regulators alike are interested in understanding what important factors caused a change in the ECL amount from one period to the next.

OFS LLFP application has a dedicated UI-driven run with a range of factors for you to choose and determine important factors to help explain or attribute changes in ECL.

13.4.1 ECL Reconciliation Analysis for Accounts

This report is a waterfall chart providing a visual description of the movements between two reporting dates. The tabular report is located following the waterfall chart that details various contents of the chart. Drills are accessible also on the tabular report apart from on the waterfall chart, see the following explanation:

- The first and the last columns represent the run1 and run2 ECLs respectively.
- Across the x-axis, factors are grouped based on similarity and provide a high view of reasons for changes between the runs. A group can further have individual contributing factors, the summation of their combined net effect per group is shown as a column on the waterfall chart.
- A red column indicates the ECL increased between the two runs and green indicates a reduction in ECL.
- If there are no columns visible for a group, say in as Derecognized Assets in the sample image as follows, it means that either constituent factors movements have canceled each other out or as a group, they did not impact in increase or decrease in ECL.

Figure 19: The ECL Reconciliation Analysis Report

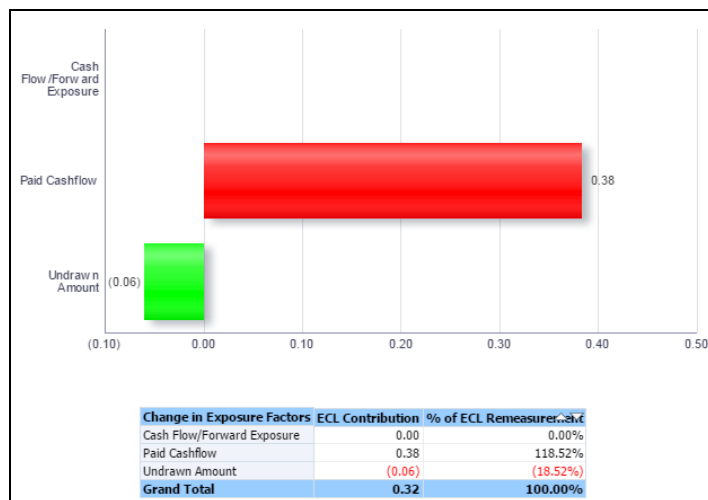


This report can be drilled down from the column that opens up a separate report:

- Remeasurement
- Change in Exposure
- Stage Changes
- Model or Risk Parameters

Each drill-down opens a combination of a horizontal bar chart and a tabular report depicting ECL contribution per factor and its percentage contribution to the factor group.

Figure 20: The ECL Reconciliation Analysis Report



13.4.1.1 35 H and 35 I

In addition to the preceding report, the reconciliation feature also caters to the quantitative disclosure requirements of the 35 H and 35 I report as per IFRS 7, but with more details or granularity.

The report shows the roll forward of Expected Credit Loss and Carrying amount values, from the beginning period balance, through the various parameters or values affecting the ECL and carrying amounts to the ending balances of the current period. The report is designed in a manner that allows you

to view it in either a simple format or a detailed one. The reporting lines are created with hierarchies that allow you to expand a reporting line to view the subsections, in a rolldown or rollup format. The rolldown format shows the roll forwards for every factor affecting the ECL or carrying amount, while the rollup view clubs many of these factors under major headers such as Model or Risk Parameters, Remeasurement, and so on.

The following table explains the list of reporting lines that are part of this report and the corresponding factors associated with it.

Table 20: The List of Reporting Lines

List of Major Factors	Description
Beginning Balance	Displays the balance of ECL and Carrying amount, stage-wise, based on Date 1 Run (Run 1).
To 12 Month ECL (Stage 1)	Displays the ECL and Carrying amount of accounts migrating from Stages 2 or 3 to Stage 1.
To Lifetime ECL - Not Credit Impaired (Stage 2)	Displays the ECL and Carrying amount of accounts migrating from Stages 1 or 3 to Stage 2.
To Lifetime ECL - Credit Impaired or Defaulted (Stage 3)	Displays the ECL and Carrying amount of accounts migrating from Stages 1 or 2 to Stage 3.
Accounts that have been Derecognized	Displays the ECL and Carries amount of accounts that are closed or derecognized.
Accounts that have been Originated or Purchased	Displays the ECL and Carrying amount of accounts that are newly recognized.
Change in allowance due to change in stage assignment	Displays the change in ECL due to change in Stage. This will not result in a change in the carrying amount.
Change in Carrying Amount	Displays the change in ECL due to changes in the carrying amount (not including write-off), undrawn line, and change in cash flows.
Write-offs	Reduction in ECL and Carrying amount due to write-offs faced in the current period.
Recovery	Increase in ECL due to recoveries made in the current period (Carrying amount does not get affected).
Changes in Exchange Rate	Displays the change in ECL and outstanding due to changes in the Exchange rate.
Remeasurement of Loss Allowance	Displays the change in ECL due to a change in methodology or changes in approach in the collective assessment. This will not result in a change in the carrying amount.
Changes in Model or Risk Parameters	Displays the change in ECL due to CCF, PD, LGD, Provision Rate, Loss Rate, Roll Rate, EIR, and time factors (depending on the method used). This will not result in a change in the carrying amount.
Other Changes or Multiplier Effect	Displays the changes in ECL due to the multiplier effect and due to additional impairment losses faced due to write-offs. No changes in the carrying amount.
Ending Balance post Cumulative changes (as in the preceding row)	Displays the balance of ECL and Carrying amount, stage-wise, based on Date 2 Run (Run 2).

The following is a screenshot of the 35 H and 35 I report with sample data (for representational purposes only).

Figure 21: The detailed view of the 35 H and I Reports

	12 Month ECL (Stage 1)		Lifetime ECL - Not Credit Impaired (Stage 2)		Lifetime ECL - Credit Impaired or Defaulted (Stage 3)	
	Expected Credit Loss	Carrying Amount	Expected Credit Loss	Carrying Amount	Expected Credit Loss	Carrying Amount
Beginning Balance	0.22	2.50	1.20	1.00	0.00	0.00
To 12 Month ECL (Stage 1)	1.20	1.00	-1.20	-1.00	0.00	0.00
To Lifetime ECL - Not Credit Impaired (Stage 2)	-0.15	-1.00	0.15	1.00	0.00	0.00
To Lifetime ECL - Credit Impaired or Defaulted (Stage 3)	0.00	0.00	0.00	0.00	0.00	0.00
Change due to Stage Assignment	0.00	0.00	0.11	0.00	0.00	0.00
Accounts that have been Derecognized	-0.07	-1.50	0.00	0.00	0.00	0.00
Accounts that have been Originated or Purchased	0.71	2.25	0.04	0.36	0.00	0.00
Change in Carrying Amount	0.00	-0.09	-0.02	-0.03	0.00	0.00
Writeoff	0.00	0.00	-0.06	-0.06	0.00	0.00
Change in Undrawn Amount	0.00	0.00	-0.01	0.00	0.00	0.00
Change in Cashflow Values	0.00	0.00	0.00	0.00	0.00	0.00
Change in Credit Conversion Factor	0.00	0.00	0.04	0.00	0.00	0.00
Change in Probability for Default	0.00	0.00	-0.11	0.00	0.00	0.00
Change in Loss Given Default	0.00	0.00	0.00	0.00	0.00	0.00
Change in Provision Rate	0.00	0.00	0.00	0.00	0.00	0.00
Change in Roll Rate	0.00	0.00	0.00	0.00	0.00	0.00
Change in Gross Loss Rate	0.00	0.00	0.00	0.00	0.00	0.00
Changes in Discount Rate	0.00	0.00	0.00	0.00	0.00	0.00
Change in Time Period to discount	0.00	0.00	0.00	0.00	0.00	0.00
Change in Exchange Rate	0.00	0.00	-0.10	-0.03	0.00	0.00
Change in Methodology / Approach to compute ECL	-0.94	0.00	0.00	0.00	0.00	0.00
Change in Approach in Collective Assessment	0.00	0.00	0.00	0.00	0.00	0.00
Other Changes / Multiplier Effect	0.00	0.00	0.07	0.00	0.00	0.00
Ending Balance post Cumulative changes as above	0.97	3.06	0.18	1.17	0.00	0.00

Figure 22: The simple view of the 35 H and I Reports

	12 Month ECL (Stage 1)		Lifetime ECL - Not Credit Impaired (Stage 2)		Lifetime ECL - Credit Impaired or Defaulted (Stage 3)	
	Expected Credit Loss	Carrying Amount	Expected Credit Loss	Carrying Amount	Expected Credit Loss	Carrying Amount
Beginning Balance	0.22	2.50	1.20	1.00	0.00	0.00
To 12 Month ECL (Stage 1)	1.20	1.00	-1.20	-1.00	0.00	0.00
To Lifetime ECL - Not Credit Impaired (Stage 2)	-0.15	-1.00	0.15	1.00	0.00	0.00
To Lifetime ECL - Credit Impaired or Defaulted (Stage 3)	0.00	0.00	0.00	0.00	0.00	0.00
Change due to Stage Assignment	0.00	0.00	0.11	0.00	0.00	0.00
Accounts that have been Derecognized	-0.07	-1.50	0.00	0.00	0.00	0.00
Accounts that have been Originated or Purchased	0.71	2.25	0.04	0.36	0.00	0.00
Changes in Carrying Amount	0.00	-0.09	-0.03	-0.03	0.00	0.00
Writeoff	0.00	0.00	-0.06	-0.06	0.00	0.00
Changes in Exchange Rate	0.00	-0.10	-0.03	-0.10	0.00	0.00
Changes in Model / Risk Parameters	0.00	0.00	-0.08	0.00	0.00	0.00
Remeasurement of Loss Allowance	-0.94	0.00	0.00	0.00	0.00	0.00
Other Changes / Multiplier Effect	0.00	0.00	0.07	0.00	0.00	0.00
Ending Balance post Cumulative changes as above	0.97	3.06	0.18	1.17	0.00	0.00

[Edit](#) - [Refresh](#) - [Print](#) - [Export](#) - [Copy](#)

	12 Month ECL (Stage 1)		Lifetime ECL - Not Credit Impaired (Stage 2)		Lifetime ECL - Credit Impaired or Defaulted (Stage 3)	
	Expected Credit Loss	Carrying Amount	Expected Credit Loss	Carrying Amount	Expected Credit Loss	Carrying Amount
Ending Balance	0.97	3.06	0.18	1.17	0.00	0.00

[Edit](#) - [Refresh](#) - [Export](#) - [Copy](#)

13.4.1.1.1 Sample Computation Logic

The following is an example of a Loan account spread over two time periods with changes in various parameters. Assuming a PD or LGD approach for ECL computation, the following table shows various parameters related to the said account, including the ECL, computed against both dates.

Table 21: The Parameters related to the Loan account, including the ECL computed against both dates

Date	31-Dec-15	31-Dec-16
Account ID	HOMELoAN123	HOMELoAN123
Balance Outstanding	\$ 1,000.00	\$ 700.00
IFRS Stage Identified	1	3

12 Month PD	5%	20%
Lifetime PD	10%	45%
LGD	70%	70%
Write-off	\$ -	\$ 200.00
12 Month ECL	\$ 35.00	\$ 98.00
Lifetime ECL	\$ 70.00	\$ 220.50
Reporting ECL	\$ 35.00	\$ 220.50

Note that in the second period, the account faced a \$200 Write-off in addition to a repayment of \$100.

Based on the computations, the Expected Credit Loss (which needs to be provisioned for, in the Balance sheet) in period 1 is \$35.00 which increases to \$220.50 in period 2.

The reconciliation process parses through the given information for both dates and identifies the change in ECL due to each parameter.

In this case, the actual change in ECL between the two dates is \$185.50

The changes due to the various parameters are arrived at by computing the ECL with the date 1 values except for the given parameter, which is replaced with the Date 2 value.

Taking PD as an example:

With an account in Stage 2, ECL computed on Date 1 would have been \$70.00

Now, replacing only the PD with Date 2 value, compute the ECL as follows:

- Outstanding of Date 1 = \$1000.00
- LGD of Date 1 = 70%
- PD of Date 2 = 45%
- ECL computed = \$315.00
- Change in ECL due to PD = \$315 - \$70 = \$245.00

The same process is repeated for other parameters.

Table 22: The Parameters related to the Loan account, including the ECL Computed against both dates

	Date 1 ECL at Stage 2	Change due to PD	Change due to LGD	Change due to Outstanding
Balance Outstanding	\$ 1,000.00	\$ 1,000.00	\$ 1,000.00	\$ 700.00
PD	10%	45%	10%	10%
LGD	70%	70%	70%	70%

ECL	\$ 70.00	\$ 315.00	\$ 70.00	\$ 49.00
Change in ECL due to given parameter	NA	\$ 245.00	\$ -	\$ (21.00)

Summing up the changes in ECL attributed to each of these factors, you can notice that the cumulative change is different from that of the actual change. This difference is due to the multiplier effect of individual changes and is thereby posted under the header *Cumulative or Multiplier Effect*.

Table 23: The Difference due to the Multiplier Effect of Individual Changes

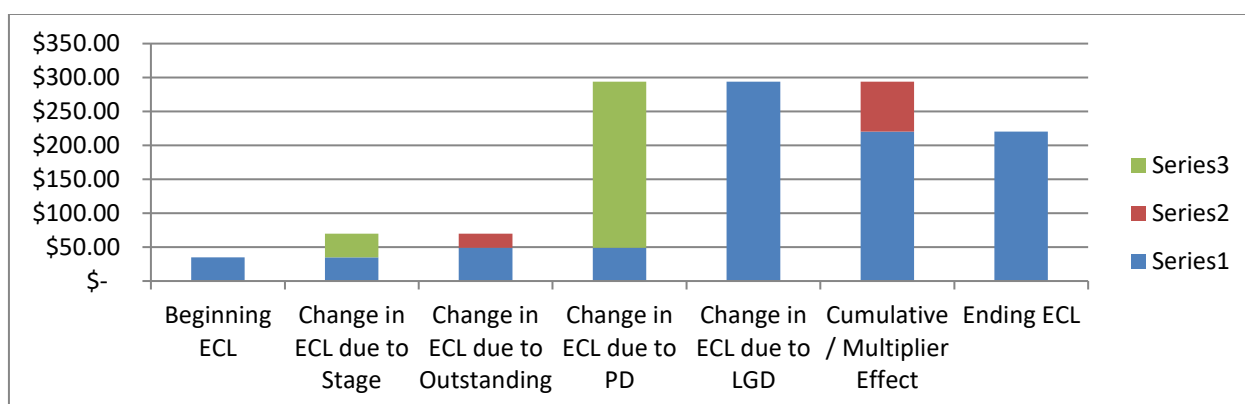
Cumulative Attributed Change by each parameter	\$ 224.00
Actual Change	\$ 150.50
Multiplier Effect	\$ (73.50)

The waterfall report based on the given example is as follows.

Table 24: The values in the Waterfall Report based on the Example

Beginning ECL	\$ 35.00
Change in ECL due to Stage	\$ 35.00
Change in ECL due to Outstanding	\$ (21.00)
Change in ECL due to PD	\$ 245.00
Change in ECL due to LGD	\$ -
Cumulative or Multiplier Effect	\$ (73.50)
Ending ECL	\$ 220.50

Figure 23: The values in the Waterfall Report based on the Example



From the disclosure's perspective, the 35 H and 35 I report values are as follows.:

Table 25: The values in the 35 H and 35 I Report based on the Example

	Expected Credit Loss			Carrying Amount		
	12 Month ECL (Stage 1)	Lifetime ECL - Not Credit Impaired (Stage 2)	Lifetime ECL - Credit Impaired or Defaulted (Stage 3)	12 Month ECL (Stage 1)	Lifetime ECL - Not Credit Impaired (Stage 2)	Lifetime ECL - Credit Impaired or Defaulted (Stage 3)
Beginning Balance	\$35.00	\$0.00	\$0.00	\$1,000.00	\$0.00	\$0.00
To 12 Month ECL (Stage 1)	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
To Lifetime ECL - Not Credit Impaired (Stage 2)	-\$35.00	\$35.00	\$0.00	\$1,000.00	\$1,000.00	\$0.00
To Lifetime ECL - Credit Impaired or Defaulted (Stage 3)	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Change due to Stage Assignment	\$0.00	\$35.00	\$0.00	\$0.00	\$0.00	\$0.00
Accounts that have been Derecognized	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Accounts that have been Originated or Purchased	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00

Change in Carrying Amount	\$0.00	-\$21.00	\$0.00	\$0.00	-\$100.00	\$0.00
Write-off	\$0.00	-\$200.00	\$0.00	\$0.00	-\$200.00	\$0.00
Change in Undrawn Amount	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Change in Cash flow Values	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Change in Credit Conversion Factor	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Change in Probability for Default	\$0.00	\$245.00	\$0.00	\$0.00	\$0.00	\$0.00
Change in Loss Given Default	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Change in Provision Rate	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Change in Roll Rate	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Change in Gross Loss Rate	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Changes in Discount Rate	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Change in Time Period to Discount	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Changes in Exchange Rate	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Change in Methodology or Approach to compute ECL	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00

Change in Approach in Collective Assessment	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Other Changes or Multiplier Effect	\$0.00	\$126.50	\$0.00	\$0.00	\$0.00	\$0.00
Ending Balance	\$0.00	\$220.50	\$0.00	\$0.00	\$700.00	\$0.00

Note that *Other Changes* include changes due to factors not selected in the reconciliation run and the multiplier effect. In this example, *Other Changes* includes the *Multiplier Effect* of - \$73.50 and an additional impairment loss of \$200 that equals the write-off amount.

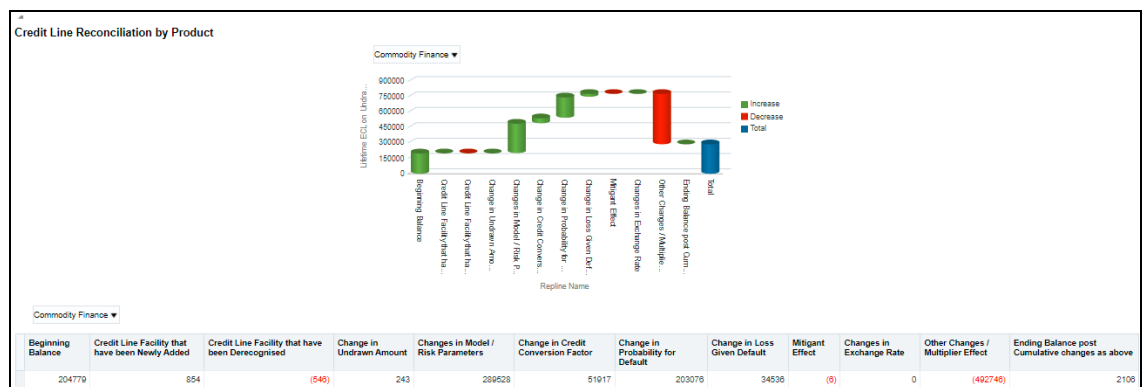
13.4.2 ECL Reconciliation Analysis for Credit Line or Facilities

This report is a waterfall chart providing a visual description of the movements between two reporting dates. The tabular report is located following the waterfall chart that details various contents of the chart.

- The first and the last columns represent the run1 and run2 ECLs respectively.
- Across the x-axis, factors are grouped based on similarity and provide a high view of reasons for changes between the runs. A group can further have individual contributing factors, the summation of their combined net effect per group is shown as a column on the waterfall chart.
- A red column indicates the ECL increased between the two runs and green indicates a reduction in ECL.
- If there are no columns visible for a group, say in as Derecognized Assets in the sample image as follows, it means that either constituent factors movements have canceled each other out or as a group, they did not impact in increase or decrease in ECL.

The below report displays only the lifetime ECL on Undrawn Amount data.

Figure 24: The ECL Reconciliation Analysis Report



13.4.2.1 Credit Line Reconciliation Report

In addition to the preceding report, the reconciliation feature also caters to the quantitative disclosure requirements of the undrawn amount but with more details or granularity.

The report shows the roll forward of Expected Credit Loss and Undrawn amount values, from the beginning period balance, through the various parameters or values affecting the ECL and Undrawn amounts to the ending balances of the current period. The report is designed in a manner that allows you to view it in a detailed format.

The following table explains the list of reporting lines that are part of this report and the corresponding factors associated with it.

Table 26: The list of reporting lines

List of Major Factors	Description
Beginning Balance	Displays the balance of ECL and Undrawn amount, based on Date 1 Run (Run 1).
Credit Line Facility that has been Newly Added	Displays the ECL and Undrawn amount of accounts that have been newly recognized.
Accounts that have been Derecognized	Displays the ECL and Undrawn amount of accounts that have been closed or derecognized.
Change in Undrawn Amount	Displays the change in ECL due to changes in the Undrawn amount and change in the Undrawn amount
Changes in Credit Conversion factors	Displays the change in ECL due to CCF, This will not result in a change in the Undrawn amount.
Changes in Probability of default	Displays the change in ECL due to PD, This will not result in a change in the Undrawn amount.
Changes in Loss given default	Displays the change in ECL due to LGD, This will not result in a change in the Undrawn amount.
Mitigant Effect	Displays the change in ECL due to the Mitigant effect, This will not result in a change in the Undrawn amount.
Changes in Exchange Rate	Displays the change in ECL and Undrawn amount due to changes in the Exchange rate.
Other Changes or Multiplier Effect	Displays the changes in ECL due to the multiplier effect. No changes in the Undrawn amount.
Ending Balance post Cumulative changes (as above)	Displays the balance of ECL and Undrawn amount, based on Date 2 Run (Run 2).

Use the **Reconciliation ID** drop-down list filter and select a value.

For every Credit Line Reconciliation report, a unique **Reconciliation ID** is generated for the selected *Base Run* or *Run1 Date* and *run_skey* and *Inspect Run* or *Run2 Date* and *run_skey*.

To know the *Run 1* and *Run 2* details for a **Reconciliation ID**, execute the following script in the atomic schema:

```
Select distinct N_RECONCILIATION_ID, BR.FIC_MIS_DATE BASE_RUN_MIS_DATE,
N_BASE_RUN_SKEY, IR.FIC_MIS_DATE INSPECT_RUN_MIS_DATE, N_INSPECT_RUN_SKEY from
FCT_LLFP_CREDIT_LINE_RECON CLR INNER JOIN DIM_RUN BR ON BR.N_RUN_SKEY =
CLR.N_BASE_RUN_SKEY INNER JOIN DIM_RUN IR ON IR.N_RUN_SKEY =
CLR.N_INSPECT_RUN_SKEY;
```

Figure 25: The Reconciliation ID Filter

* Denomination for amounts : As Is In Thousand In Million

* Reconciliation ID --Select Value--

The following is a screenshot of the Credit Line Reconciliation Report:

Figure 26: The Credit Line Reconciliation Report

Credit Line Reconciliation			
	12 Month ECL on Undrawn Amount	Lifetime ECL on Undrawn Amount	Undrawn Amount
Beginning Balance	704340	324264	99000000
Credit Line Facility that have been Newly Added	798	854	5000000
Credit Line Facility that have been Derecognised	(420009)	(120031)	(81000000)
Change in Undrawn Amount	126272	243	(4000000)
▸ Changes in Model / Risk Parameters	(97012)	289528	0
Mitigant Effect	(8)	(6)	0
Changes in Exchange Rate	0	0	0
Other Changes / Multiplier Effect	(2607)	(492746)	0
Ending Balance post Cumulative changes as above	311774	2106	19000000

Analyze - Edit - Refresh - Export

14 Aggregate Reporting Tables

The LLFP application comes with a set of Aggregate Reporting Tables that contain data in an aggregated manner and at different levels. There are Four different aggregate tables:

- **Multi dimension aggregate** table for Expected Credit Loss results
- **Segment (Portfolio) level aggregate** table for Expected Credit Loss results
- **Multi dimension aggregate** table for ECL Reconciliation results
- **Multi dimension aggregate** table for Roll Forward reports

The OBIEE reports and the Reserve Adjustment computations are based on these aggregate tables.

The following section provides details of these aggregate tables present in the OFS Loan Loss Forecasting and Provisioning application.

14.1 Multi Dimension Aggregate Table for Expected Credit Loss Results

Towards the end of the IFRS 9 specific ECL Run or the CECL Run, the account-specific source and results in data are aggregated from an account level to a multi-dimension level. Multi dimension level indicates a combination of various dimensions that are used within the LLFP application for various computations. Accounts are grouped based on the values in these dimensions and the computational values, such as amounts, rates, and so on, are aggregated using various arithmetic means, for example, Sum, Average, Weighted average, and so on. If any of the dimensions, used in aggregation, are not used or populated by an institution, the application populates a default value and the same does not hinder the aggregation process.

14.2 Segment (Portfolio) Level Aggregate Table for Expected Credit Loss Results

Post the multi-dimension level aggregation, data is further aggregated to a segment (portfolio) level, and the same kind of aggregation, sum, weighted average, and so on, as mentioned in the preceding section is used here. This is performed primarily to cater to any adjustments that may be done over the Expected Credit Loss computed in the CECL run. Reserve Adjustments are a feature of the LLFP application and the same works on the Segment level aggregated data. For more details, see Reserve Adjustment Computation Chapter.

14.3 Multi Dimension Aggregate Table for ECL Reconciliation Results

Towards the end of the ECL reconciliation process, results are aggregated from the account level to the multi-dimension level. Multi dimension level indicates a combination of various dimensions that are used within the LLFP application for various computations. Accounts are grouped based on the values in these dimensions and the computational values, ECL amounts, are aggregated using various arithmetic means,

for example, Sum, Average, Weighted average, and so on. If any of the dimensions, used in aggregation, are not used or populated by an institution, the application populates a default value and the same does not hinder the aggregation process.

14.4 Multi Dimension Aggregate Table for Roll Forward Reports

In the ECL reconciliation process, post the multi-dimension aggregation, the data is now transformed into a format as required for the roll forward reports. While the same set of dimensions, as used in the preceding table, is continued with, the difference lies in how the underlying results data is transformed or more specifically transposed to meet the requirements of the Roll Forward reports.

15 Effective Interest Rate (EIR) Based Interest Adjustments

As per IFRS 9 guidelines, financial institutions are required to recognize interest income using the Effective Interest Rate computed for the given instrument, instead of the Contractual Rate. Due to this change in the interest recognition process, in addition to the current practice of recognizing the interest using a contractual rate, financial institutions are required to pass an additional adjustment entry - Interest Adjustment Entry to be compliant with the IFRS 9 guidelines.

OFS Loan Loss Forecasting and Provisioning application compute the interest adjustment entry based on the Effective Interest Rate, Instrument Details, and all transactions against the given instrument.

This also allows the financial institutions to amortize the fees, premiums or discounts, and costs associated with the given instrument over the expected life.

15.1 Overview

The EIR-based interest adjustment, Deferred Balance Amortization, the process is executed post the computation of the Expected Credit Losses (ECL Run). Only those accounts that are classified as Amortized Cost and the ones identified for Fee Amortization are considered for this process:

- Amortized Cost Classification - This happens as part of the Classification Process or Run.
- Identifying Accounts for EIR Adjustment - This selection is enabled using a Rule within the Expected Credit Loss Run of the application.

These two filters help in identifying the accounts for which EIR-based interest adjustments have to be computed. Transactions related to Loans, Money Markets, and Investments are considered for EIR Based Interest Adjustments.

NOTE For initial execution, the **IFRS Reporting Run Info** table needs to be populated with the following default values:

V_BATCH_RUN_ID: -1

N_RUN_SKEY: -1

FIC_MIS_DATE: The current execution date for EIR Adjustment Run

LAST_ACCRUAL_DATE: The last accrual/execution date for EIR Adjustment Run

15.2 Process

This section contains detailed information about the Effective Interest Rate (EIR) Based Interest Adjustments process.

15.2.1 Movement of Data into Processing Area

There are two processing areas, one for processing account-level information and the other for processing transaction-level information. Upon triggering the process, the given set of accounts along with the corresponding instrument information is moved from the results area of the ECL computation process into the account level processing area.

The various instrument parameters that are migrated from the fact tables:

- Account Number, Classification
- Stage
- Carrying Amount (As of Previous MIS Date)
- Deferred Fees (As of Previous MIS Date)
- Deferred Premium or Discount (Def Bal) (As of Previous MIS Date)
- Prepayment Indicator, Restructured Indicator, Accrual Basis Code
- Compounding Frequency
- MIS Date, Actual Interest Accrued Till Date (Core Banking Interest)
- PV of Future Cash Flow Discounted at EIR
- Account Start Date, Financial Year Start Date
- EIR (%), Allowance
- ECL DOIR, and New Account from the Account Summary Fact tables.

15.2.2 Identify and Obtain Information from Last Accrual Date

For the given Run ID, the Previous Execution Date is considered as the Last Accrual Date. Based on the Last accrual date, the following account level information is obtained:

- Ending Net Book Value or the Modified Net Book Value, based on the Modified Flag as of the Last Accrual Date.
- Compounded Interest
- Ending Deferred Balances
- Cumulative EIR Interest recognized till date (till Last Accrual Date)
- Cumulative Interest Adjustment recognized till date (Last Accrual Date)

If the account is new (originated between the Last Accrual Date and Current MIS Date), then these values are computed as follows:

- Book Value = First Transaction Amount + Deferred Balance (Fees + Premium or Discount - Cost of Interest Subvention)
- Compounded Interest = 0
- Ending Deferred Balances = Deferred Balance (Fees + Premium or Discount - Cost of Interest Subvention)
- Cumulative EIR Interest recognized till date (till Last Accrual Date) = 0
- Cumulative Interest Adjustment recognized till date (Last Accrual Date) = 0

NOTE During the initial Run, historical data for the last accrual date will not be available for computation. You need to ensure that historical data is manually populated for the last accrual date for each EIR-based adjustment Run that is available. The **FSI EIR-based Income Adjustment Accounts (FSI_ACCT_EIR_ADJUSTMENT)** table needs to be populated with this date. The last accrual date is the date from which interest adjustments have to be made for the initial Run.

Historical data needs to be populated to the columns of the **FSI_ACCT_EIR_ADJUSTMENT** table.

15.2.3 Transaction Level Data Population

For the given accounts, the Transaction data is populated from the following Stage Transaction tables to the **Transaction Level Processing** table and from there to the **Transaction EIR Adjustment** table. The following conditions are applied to filter and move the transactions:

- The transaction value date must fall between the Last Accrual Date and the MIS Date.
- All transactions with Canceling Indicator = Y and with Reversal Date not null are ignored.
- Transactions with Debit Credit indicator = C are made Negative while transactions with D are made positive.

15.2.4 Transaction Level Processing

For each account in Account Level, based on the compounding frequency, the Compounding Dates between the Last Accrual Date and Current MIS Dates are identified. For these compounding dates, additional transactions are included in the table with TXN Amount equal to ZERO. Compounding dates arrive from the Financial Year Start date. For example, if an instrument is compounding Monthly and the Financial Year start is 15-MMM-YYYY, the process will create a transaction on the 15th of every month. If the account has originated post the Last accrual date, then the compounding dates are considered between the Account Start date and the current MIS Date.

NOTE All financial transactions outflow or inflow are required; those that affect the outstanding and computation of interest.

Outflow > Loan Disbursement, Withdrawal, and so on.

Inflow > EMI, Prepayment, and so on.

If transactions are marked as reversed or canceled.

The first transaction of a new account is assumed to be a Disbursement.

These Compounding Dates are marked with Compounding Flag = Y.

Once the transactions for the compounding dates are inserted, for every account, a transaction is included for a given MIS Date, the TXN amount is ZERO.

NOTE If a transaction already exists for a Compounding date, that is, Source TXN Date = Compounding Date, the same transaction is used with only the compounding flag made Y. If the transaction already exists for an MIS Date, that is, Source TXN Date = MIS Date, then no new transaction is included. If there are multiple transactions for a given date, then the values are added up to form a single transaction.

The transactions are then sorted in ascending order of Transaction Dates.

The transactions are now ready for Interest computation. Subsequently, the process parses through each of the transactions, one by one, to compute the Interest amounts for every transaction. To enable this, the process requires the following data:

- Accrual Basis Code
- Number of days

For the first transaction; Txn Date - Last Accrual date

For all subsequent transactions: Current Txn date - Previous Txn Date

- Starting Net Book value (for the first transaction):

If the Modification flag (on Last accrual date) = N; Ending Net Book Value (on Last Accrual date)

If the Modification flag (on Last accrual date) = Y; Modified Net Book Value (on Last Accrual Date)

After these steps, the Effective Interest Amount, Compounded Effective Interest Amount, and the Ending NetBook values are computed for each transaction, by taking EIR, Number of Days for Interest accrual, Accrual basis code (for Number of days in a year), Compounding Flag, Starting Book value, and Transaction amount into consideration.

Once the Ending Book value is computed for a given transaction, the same is used as the Beginning Net Book Value for the next transaction.

The Effective Interest Amount for different stages is calculated as follows:

- If Stage 1 or 2: EIR Interest Amount = $NBV * Days * (EIR \% \text{ or } Days \text{ in } Year)$
- If Stage 3: EIR Interest Amount = $(NBV - Allowance) * Days * (EIR \% \text{ or } Days \text{ in } Year)$
- If Stage 4: EIR Interest Amount = $(NBV - Allowance - ECL \text{ DOIR}) * Days * (EIR \% \text{ or } Days \text{ in } Year)$

The Compounded Effective Interest Amount is computed by compounding the interest computed for each transaction to the previous compounded amount. If the transaction is marked as a compounding one, that is, the Compounding Flag = Y, then the Compounded interest is made as ZERO. The total compounded interest to date will be added back to the Net Book Value.

The Ending Net Book value for each transaction is computed as:

If Compounding Flag = N, Ending Net Book Value = Starting Net Book Value + Transaction Amount

If Compounding Flag = Y, Ending Net Book Value = Starting Net Book Value + Transaction Amount + Effective Interest amount + Compounded Effective Interest Amount to date.

NOTE The transaction amount must be adjusted for signage depending upon Db Cr Indicator.

15.2.5 Aggregation Account Level and Adjustment Computation

Once the transaction level computations are over, the final computed values are aggregated back to the account level for the final computations. The following values are considered:

- Ending Net Book Value: Value from the last transaction
- Effective Interest Amount: Sum of all Effective Interest Amounts across all transactions
- Compounded Effective Interest Amount: Value from the last transaction

Once the values are aggregated, the final computations to arrive at the Interest Adjustment are done.

- Step 1: The Cumulative Effective Interest Amount is calculated as the sum of the Current Effective Interest Amount and Cumulative Effective Interest Amount of the previous MIS Date.
- Step 2: The Cumulative Interest Adjustment is calculated by subtracting the Actual Interest Accrued to date, Core Banking Interest, from Cumulative Effective interest accrued to date.
- Step 3: The Current Interest Adjustment is calculated by subtracting the Cumulative Interest Adjustment of Previous MIS Date from the Cumulative Interest Adjustment of Current MIS Date.

This value, Current Interest Adjustment, is the adjustment entry that needs to be passed to the accounting systems and reflects the amount of deferred balance that needs to be amortized for the given period.

15.2.5.1 Modification Gain or Loss

In addition to the preceding steps, if an account undergoes a Prepayment or restructuring, the application computes the Modification Gain Loss, as specified by the IFRS 9 guidelines. The Modification Gain Loss is calculated as the difference between the Modified Net Book Value and the Ending Net Book Value. Modified Net Book Value is equal to the Net Present Value of all future Cash Flows discounted at the given Effective Interest Rate.

Prepayments and Restructuring are identified based on the Prepayment Date or Restructured Date. OFS Loan Loss Forecasting and Provisioning Application checks if these dates fall between the Last Accrual Date and Current Date, FIC MIS DATE.

Modification Gain/Loss= Modified Net Book value – Ending NBV

1. Ending NBV is the outstanding amount when the account gets flagged as “Restructured” or there is a prepayment”.
2. For the computation of Modified Net Book Value (Net Present Value of all Future Cash Flows), As of Date (AOD), Future Cash Flow is required. Future Cash Flow is discounted with the EIR. The following are functional use cases to get this EIR.
 - a. When Restructured/Prepayment Event and Repriced Event are different: For a Fixed Rate or Floating Rate Instrument, if the latest repriced EIR is available then the application uses it else it uses origination EIR to discount the Future Cash Flow.
 - b. Note: The latest repriced event should be earlier than Restructured/Prepayment Event.
 - c. When Restructured/Prepayment Event and Repriced Event are the same: For a Fixed Rate or Floating Rate Instrument, the latest EIR is available just before the (Restructured/Prepayment/Repriced) Events get used to discount the Future Cash Flow.

15.2.5.2 Ending Deferred Balance

The Ending Deferred Balance for the current MIS Date is calculated by subtracting the Modification Gain Loss and Current Interest Adjustment from the Ending Deferred Balance of the Previous MIS Date.

15.2.5.3 Amortization of Individual Components of Deferred Balance - Fee, Premium or Discount, and Cost

As a continuation of Aggregation Account Level and Adjustment Computation and Ending Deferred Balance, the Interest Adjustment and the Ending Deferred balances are split up to compute the ending balances of the individual components. These components are, considered for the computation of Effective Interest Rate as well:

- Fee
- Premium or Discount
- Cost

The LLFP application first computes the ratio of Fee, Premium or Discount, and Cost based on their values as on the date of initial recognition of the given account. Using this ratio, the application then splits the Interest Adjustment into individual components. The result of this split is the individual adjustment values:

- Fee Adjustment
- Premium or Discount Adjustment
- Cost Adjustment

Post the computation of the individual adjustment values, the individual componentized ending deferred balances are computed by subtracting the individual beginning balances from their corresponding adjustment amounts.

NOTE Whenever the ending deferred balance becomes zero, the computation of interest adjustments is stopped forthwith.

16 Computation and Amortization of Cost of Interest Subvention

OFS Loan Loss Forecasting and Provisioning application are enabled to compute and amortize the Cost of Interest Subvention. To calculate this, as the first step, the cost involved is identified by subtracting Original Fair Value from Original Outstanding Amount.

There are two different ways through which the Original Fair Value can be obtained. The first option is to fetch this value from OFS HM output tables if the OFS HM application is installed. Otherwise, the cost must be provided in the **FSI Account Inception Details** table.

NOTE You need to execute the Fair Value Run for the Account Start Date.

The computation and amortization of the Cost of Interest Subvention consist of the following three steps:

- Step 1: Computation of Current Period Amortization Amount
- Step 2: Computation of Ending Balance of Interest Subvention Cost
- Step 3: Computation of Interest Subvention Amortization Rate

The process also involves equating the Carrying Amount as End of Period Carrying Amount of Outstanding Amount as of Last Accrual Date. Interest Subvention Amortization Rate as of Last Accrual Date is identified as Amortization Rate and Interest Subvention Cost at End of Period as of Last Accrual Date is identified as Interest Subvention Cost at End of Period.

For the calculation, for every subsequent period, the Interest Subvention Amortization Rate is obtained from the immediate predecessor period. The Interest Subvention Amortization Rate on the final period will be zero.

NOTE The downloaded Cost of Interest Subvention must be a positive value.

17 Accounting Enablement

The Accounting Enablement feature of the OFS Loan Loss Forecasting and Provisioning application consolidates all the parameters or values that are required to be accounted for, from the perspective of IFRS 9, across the three phases. It enables you or the institution to push the data from OFS Loan Loss Forecasting and Provisioning and OFS HM to any Downstream Accounting Systems, Oracle's FAH, or other, at an account level or any aggregated level. The level of aggregation can be defined by the bank in the integration process based on a varied set of dimensions.

As mentioned, the process consolidates data from the LLFP application for the given MIS Date, into an Output Table.

The following information is stored:

- Expected Credit Loss
- Allowance and Provision Amount (separately)
- Impairment Gain or Loss
- Fair Value Gain or Loss

Depending upon the Hedge Effectiveness ratio and the type of Hedge (Cash Flow or Fair Value), the Fair Value Gain or Loss is split into the effective and in-effective portions. If any options are being used in the hedge, wherever necessary, the changes in time value and the intrinsic value are also posted separately.

A flag identifying if the specified account is part of an effective hedge is also populated to enable more detailed downstream accounting.

- Deferred Balance Amortization amount (EIR based Income Adjustment)

Deferred Balance is comprised of components such as fees, costs, and premiums or discounts. While the EIR adjustment process computes the Amortization amount for the deferred balances and the split amongst these three components, in the current process, the data is then migrated to the output tables to enable accounting entries, even on a separate basis, that is, individually for these three components.

- Ending Deferred Balances

Ending Deferred Balances, individually for fees, costs, and premiums or discounts is also migrated to the output table.

- Modification Gain or Loss
- Reclassification Gain or Loss

NOTE ECL, EIR Adjustment, and HM Valuations are prerequisites for the Accounting Enablement process.

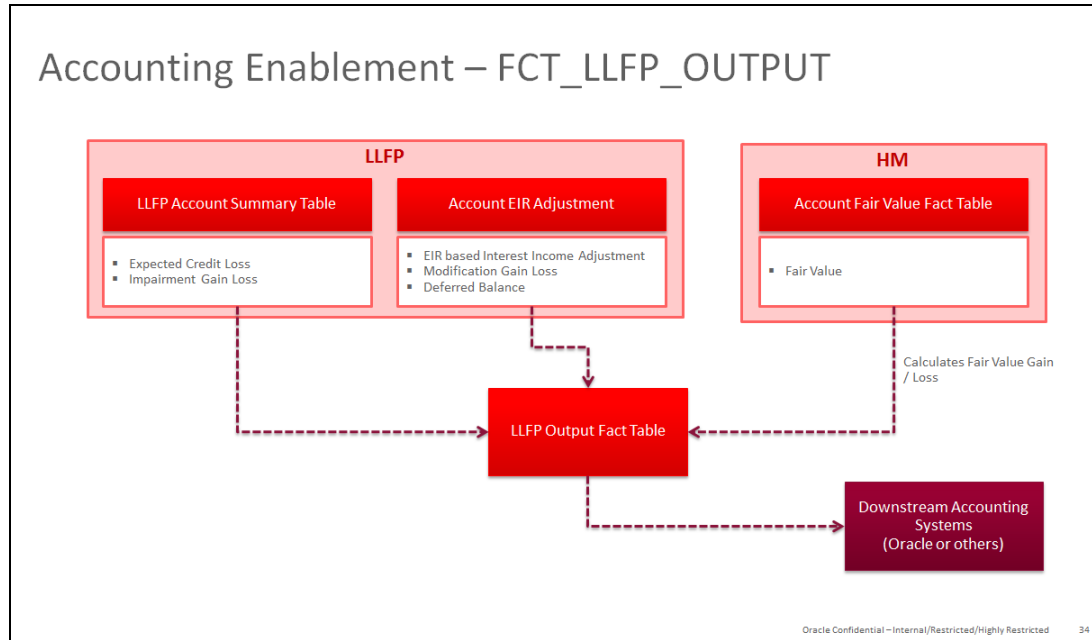
To enable banks to aggregate the information into their ledger systems or accounting systems, LLFP provides the preceding information at an account level granularity but accompanied by various corresponding dimensions, this is intended to help the bank configure the aggregation process to suit its requirements.

The dimensions are the following:

- Customer Type

- Product
- Product Type
- Legal Entity
- IFRS 9 Classification
- Currency and
- Segment or Portfolio

Figure 27: The Accounting Enablement - FCT_LLFP_OUTPUT Process Flow



18 Reserve Adjustment Computation

As part of Expected Credit Loss Computations, financial institutions in certain geographies are required or permitted to adjust the ECL values with additional reserves as per the guidelines applicable to their jurisdiction. OFS Loan Loss Forecasting and Provisioning application allow financial institutions to compute the additional reserve values corresponding to one or more factors specific to a portfolio. The factors could be Qualitative, Environmental, or any other type as required. The Qualitative and Environmental (Q&E) Reserve allocation is assigned at an account level. The factor-level values are then rolled up to a portfolio level and used in adjusting the aggregated ECL amount.

18.1 Overview

OFS Loan Loss Forecasting and Provisioning application feature a set of work-flow based User Interfaces that enable financial institutions to compute various additional reserves and then adjust the computed ECL values, ECL computed using various methodologies for each account.

The steps in this process are the following:

- Create Factors under different reserve types and define the purpose of these factors.
- For any given period, create a list of applicable factors.
- Select the segments or portfolios for which each of these factors is applicable and assign the values, either as a percentage or an absolute value, for each Factor-Segment combination and perform what-if analysis by doing a test compute of the reserve value based on the assigned values.
- Send the period-specific factor-segment definitions (individually) for approval.
- Go through the Workflow process to approve or reject these factor-segment definitions.
- Once approved, execute the adjustment process to compute the additional reserves for each factor-segment combination and adjust the expected credit loss values at the segment (aggregated) level.

18.2 Reserve Factor Definition and Reserve Adjustment Computation Process

This section details the process of creating Reserve Factor definitions, mapping Reserve Factor-Segment definitions, and the approval process for these definitions. Only those users who are mapped to the LLFP Admin User Group can create Reserve Factor definitions.

18.2.1 Reserve Type

All Reserve Factors are linked to a Reserve Type. Therefore, you must provide the necessary Reserve Types in the Staging Area and move data to the Dimension table by executing the required SCD. Only upon the availability of data in the Dimension table, the Reserve Factor UIs display the required data which is used to create new Factors.

NOTE The Reserve Type Population SCD does not support newline characters, blank space, and any other special characters in the Staging Data.

18.2.2 Accessing Reserve Factor Definition Section

You can access the **Reserve Factor Definition** section by clicking the **Reserve Factor Definition** link, present in the LHS menu of the OFS Loan Loss Forecasting and Provisioning application.

Upon clicking this link, the **Reserve Factor Definition** window is displayed:

Figure 28: The Reserve Factor Definition Window

Valid From	Valid To	Created By	Created Date	Modified By	Modified Date
04/04/2008	04/16/2018	APPUSER	04/16/2018 14:46:25	APPUSER	04/16/2018 14:46:42
04/03/2002	04/16/2018	APPUSER	04/16/2018 12:53:46	APPUSER	04/16/2018 12:54:07

The definitions are displayed with details such as Name, Description, Factor type, Basis, Currency, and Measure. You can search for existing definitions by entering a keyword in the **Name** field and by clicking **Search** from the **Search** table.

18.2.3 Creating Reserve Factor Definition

Perform the following steps to create a Reserve Factor Definition:

1. In the **Reserve Factor Definition** window, click **Add** to open the **Reserve Factor Definition** window.

Figure 29: The Reserve Factor Definition Window

2. Populate the **Reserve Factor Definition** form as tabulated.

Table 27: The Reserve Factor Definition form

Field	Description
Name	Enter a name for the Reserve Factor definition.
Description	Enter a description of the Reserve Factor definition.

Field	Description
Folder	Select a folder from the drop-down list.
Reserve Type	Select a reserve type from the drop-down list.
Basis	Select either Amount or Percentage . Note: If you select Amount , then the Currency field is enabled. If you select Percentage , then the Base Measure field is enabled.
Currency	Select the currency from the drop-down list. Note: This field is enabled only if you selected the Amount in the Basis field.
Base Measure	Select a Base Measure from the drop-down list. Available options are: <ul style="list-style-type: none"> • Expected Credit Loss • Allowance Amount • Carrying Amount • Undrawn Amount • Exposure Limit Note: This field is enabled only if you selected Percentage in the Basis field.

3. Click **Save**.

The **Audit Trail** section at the bottom of the **Multiple Rating** window displays the metadata related to the definition and contains the fields **Created By**, **Creation Date**, **Last Modified By**, and **Last Modification Date** with a System ID. The **User Comments** section facilitates you to add or update additional information as comments.

18.2.4 Viewing Reserve Factor Definition

The View feature enables you to view the definition details. To view the definition details, select the checkbox adjacent to the definition you want to view and click **View**. Upon clicking this button, the details of the definition are displayed in the **Reserve Factor Definition** window.

NOTE You cannot edit or update the details in this window.

18.2.5 Copying Reserve Factor Definition

The copy feature enables you to copy the details of an existing Reserve factor definition and create a new definition.

Perform the following steps to copy an existing definition and create a new definition:

1. In the **Reserve Factor Definition** section, select the checkbox adjacent to the definition that you want to copy.
2. Click **Copy** to open the **Save As** window displayed.
3. In the **Name** field, enter the name of the definition.
4. In the **Description** field, enter a description of the definition.

5. Click **Save**.

Once the definitions are created, you can perform mapping using the Reserve factor Mapping UI of the OFS Loan Loss Forecasting and Provisioning application.

18.3 Period Specific Reserve Factor Segment Mapping Process

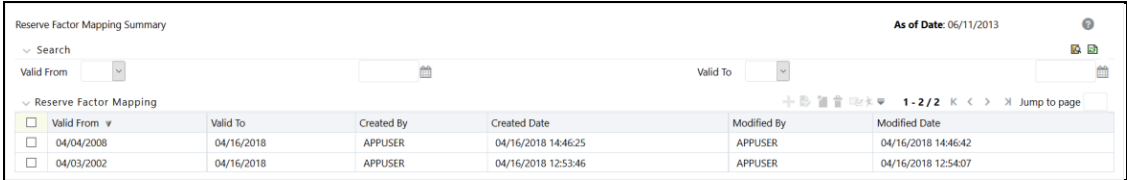
Reserve Factor Segment Mapping Process section enables you to create a definition against a specific period for reserve adjustments and in each definition, map the Reserve factor definitions to segments for which they are applicable, and post the approval workflow, execute the Reserve Adjustment process. Only those users who are mapped to the **LLFP Analyst User Group** can **Create Reserve Mappings** and submit them for approval.

18.3.1 Accessing Reserve Factor Segment Mapping Section

You can access the **Reserve Factor Segment Mapping** section by clicking the **Reserve Factor Segment Mapping** link, present in the LHS menu of the OFS Loan Loss Forecasting and Provisioning application.

When you click this link, the **Reserve Factor Mapping Summary** window is displayed:

Figure 30: The Reserve Factor Mapping Summary Window



The screenshot shows the 'Reserve Factor Mapping Summary' window. At the top right, it says 'As of Date: 06/11/2013'. Below that is a search section with 'Valid From' and 'Valid To' dropdown menus and a 'Search' button. The main content is a table with the following data:

Valid From	Valid To	Created By	Created Date	Modified By	Modified Date
<input type="checkbox"/> 04/04/2008	04/16/2018	APPUSER	04/16/2018 14:46:25	APPUSER	04/16/2018 14:46:42
<input type="checkbox"/> 04/03/2002	04/16/2018	APPUSER	04/16/2018 12:53:46	APPUSER	04/16/2018 12:54:07

The definitions are displayed with details such as Valid From, Valid To, Created By, Created Date, Modified By, and Modified Date. You can search for existing definitions by entering Valid From and or Valid To in respective fields and by clicking **Search** from the **Search** table.

18.3.2 Creating Reserve Factor Segment Mapping



Perform the following procedure to create a Reserve Factor Segment Mapping:

1. In the **Reserve Factor Mapping Summary** window, click **Add** to open the **Reserve Factor Mapping** window.

Figure 31: The Reserve Factor Mapping Window

2. Populate the **Reserve Factor Mapping** form as tabulated:

Table 28: The Reserve Factor Mapping form

Field	Description
Date Selection pane	
Valid From	Click Calendar  in this field and select the Valid From date from the calendar.
Valid To	Click Calendar  in this field and select the Valid To date from the calendar.
Factor Selection	
<ol style="list-style-type: none"> In the Reserve Factor Definition Summary window, click Add to select the required Reserve Factor definitions. Click OK. In the Factor Selection table, the Reserve Factor definitions are displayed with the details such as Name, Basis, Currency, Measure, Segments Assigned, Current Status, Remarks Initial ECL, Reserve, Final ECL, and Percentage Change. In the Remarks column, you can provide remarks for the selected factors. The View button enables you to view the remarks details such as Remarks, Current Status, Created By, and Created Date. Click Apply. 	
Run Selection and Trial Adjustments	
This allows you to perform a what-if analysis that helps you understand the change in ECL, based on the adjustment values that have been given for a factor before you send it for approval.	
Select a CECL Run	Select the active and executed CECL runs from the drop-down list.
FIC MIS Date	Select the MIS date from the drop-down list. This list displays only those dates which on which the CECL Run is available.
Select a Run	Select a Run from the drop-down list.

3. Click **Map**.

The mapping is executed and the Initial ECL for the given Run, Reserve for the given Run, Final ECL for the given Run, and Percentage change in ECL for given Run values are generated.

4. Click **Submit**.

The mapping is saved and is displayed under the **Reserve Factor Mapping** table of the **Reserve Factor Mapping Summary** window.

The **Audit Trail** section at the bottom of the **Multiple Rating** window displays the metadata related to the definition and contains the fields **Created By**, **Creation Date**, **Last Modified By**, and **Last Modification Date** with a System ID. The **User Comments** section facilitates you to add or update additional information as comments.

18.3.3 Editing Reserve Factor - Segment Mapping

Perform the following steps to edit and update the Reserve Factor - Segment Mapping:

1. In the **Reserve Factor Segment Mapping** table, select the checkbox adjacent to the mapping that you want to edit.
2. Click **Edit** to open the **Reserve Factor Mapping** window.
3. Update the values in the required fields.

NOTE You cannot edit or update the values under the **Date Selection** table.

4. Click **Submit**.

The updated definition is displayed under the **Reserve Factor Mapping** table.

18.3.4 Viewing Reserve Factor Mapping

The View feature enables you to view the definition details. To view the mapping details, select the checkbox adjacent to the mapping you want to view and click **View**. Upon clicking this button, the details of the mapping are displayed in the **Reserve Factor Definition** window.

NOTE You cannot edit or update the details in this window.

18.3.5 Approve or Reject Reserve Factor Segment Mapping

You can approve or reject an existing Reserve Factor Segment Mapping, which is pending approval. Only a user with *Approver* privileges can approve or reject a mapping. Only those users who are mapped to the LLFP Admin User Group can *Approve* or *Reject* a Reserve Factor Segment Mapping. A mapping that is created by a user cannot be approved by the same user even if the user has approver privileges.

Perform the following steps to approve or reject a Reserve Factor Segment Mapping:

1. In the **Reserve Factor Segment Mapping** table, select the checkbox adjacent to the Reserve Factor Segment Mapping that you want to approve or reject.
2. Click **Approve** or **Reject** to open the **Reserve Factor Mapping** window.
3. Populate the **Reserve Factor Mapping** form as tabulated.

Table 29: The Reserve Factor Mapping form

Field	Description
Run Selection and Trial Adjustments	
This allows you to perform a what-if analysis that helps you understand the change in ECL, based on the adjustment values that have been given for a factor before you send it for approval.	
Select a CECL Run	Select the active and executed CECL runs from the drop-down list.
FIC MIS Date	Select the MIS date from the drop-down list. This list displays only those dates which on which the CECL Run is available.
Select a Run	Select a Run from the drop-down list.

4. Select the checkboxes adjacent to the Factors that you want to **Approve** or **Reject**.

NOTE Remarks are mandatory for factors that are being approved or rejected.

5. Click **Approve** or **Reject**.

If you clicked **Approve**, then the selected Factors are finalized.

If you select **Reject**, then you can redo the mapping process and send it for approval again.

18.3.6 Execution of Reserve Factor-Segment Definition for a Specific CECL Run

Performing the following steps to execute the approved factors within a Period Specific Factor-Segment mapping definition:

1. In the **Reserve Factor Segment Mapping** table, select the checkbox adjacent to the definition that you want to execute.
2. Click **Execute** to open the **Execute Reserve Computation Process** window.
3. Populate the **Execute Reserve Computation Process** form as tabulated.

Table 30: The Execute Reserve Computation Process form

Field	Description
Select a CECL Run	Select the active and executed CECL runs from the drop-down list.
FIC MIS Date	Select the MIS date from the drop-down list. This list displays only those dates which on which the CECL Run is available.
Select a Run	Select a Run from the drop-down list.

4. Click **Execute**.

Upon execution, the underlying process parses through all the approved factors and computes the reserve adjustments for every Factor-Segment combination. These intermediate values are stored for every Run. Post this, the reserve adjustments are aggregated to the segment level and posted in the **Segment Level Aggregate** table. This enables the computation of the final required reserve value.

18.3.7 Deleting Reserve Factor Mapping

You can delete an existing Reserve Factor Mapping definition from the **Reserve Factor Mapping Summary** window.

Perform the following steps to delete one or more existing Reserve Factor Mapping definitions:

1. In the **Reserve Factor Mapping** table, select the checkbox(s) adjacent to the Reserve Factor Mapping definitions you want to delete.
2. Click **Delete**.
A warning dialog is displayed.
3. Click **Yes**.

The selected definitions are removed from the **Reserve Factor Mapping Summary** window.

18.4 Computation of Required Reserve

The application computes the Impairment Gain or Loss Calculation using the CECL, computed within the Run. This Impairment Gain or Loss value does not include the Reserve adjustments made using the Reserve factor Adjustment feature. If you have made additional adjustments, the same must be included in the final Required Reserve computation.

19 Multiple Ratings

Rating is a key dimension that is required for OFS Loan Loss Forecasting and Provisioning application to compute various outputs and for other specific processing, such as Expected Credit Loss, Stage Determination, HTM, and so on. All the processing within LLFP is performed at Account Level granularity and hence it is required for each account to be mapped to a specific Rating. Currently, every account is mapped with the Counterparty's Rating as of the given date. At the same time, the Counterparty's Rating valid as of the Account Start Date is mapped as the inception rating for a given account.

In many instances, it is noticeable that the account's repayment capability is strongly influenced by account-specific aspects such as covenants, seniority, collateral or mitigants, and so on. In addition to the characteristics of the counterparty. The same is the case with the influence of sovereign-related aspects.

Therefore, the effects of the Account's Ratings and the Sovereign's Ratings on an Instrument are now considered by OFS Loan Loss Forecasting and Provisioning application, in addition to the Counterparty Rating. As part of this, the application look-up for the following Ratings for every account from various external and internal rating providers:

- Account Rating
- Party Rating
- Sovereign Rating
- Instrument Rating

For Stage Determination, which determines the significance of the increase in credit risk, the ratings as of the Account Start Date, inception, or origination, are also determined. However, the same is determined for every date for a given account. Instead, it is sourced as a one-time process and then reused for all subsequent execution dates.

Once the ratings are sourced, the number of notches that a given Account, or Party, or Sovereign has been upgraded or downgraded is determined, based on the provider-specific rating rank list.

For Stage Determination, multiple ratings, only from a single source provider can be used. Stage Determination Run in the application now offers three new Rules for determining the stage, based on notch movement in Account Rating, Counterparty Rating, and Sovereign Rating.

The purchase of Instruments during various periods is rated separately. OFS Loan Loss Forecasting and Provisioning application looks for the ratings of Instruments, on or before the MIS Date, and is picked. The instrument Rating feature enables you to set up a preference for Instruments as well. The UI also enables you to select various rating providers and select the preferences for these rating providers. Depending on these preferences you set through the UI, the Rating Types and corresponding rating providers are selected.

19.1 Accessing Multiple Ratings in the Application

You can access Multiple ratings in the application by clicking the **Multiple Rating Preferences** link from the LHS menu of the application. Upon clicking this link, the **Multiple Rating** window is displayed as depicted in the following figure:

Figure 32: The Multiple Rating Window

Name	Description	Legal Entity	Product	Rating Type	Rating Provider
Rating_UCITS / Mutual Funds	UCITS / Mutual Funds	Bank New York	Equity Funds	Party	Moodys Corporation
Rating_UCITS / Mutual Funds	UCITS / Mutual Funds	Bank New York	Debt Funds	Party	Moodys Corporation
Rating_UCITS / Mutual Funds	UCITS / Mutual Funds	Bank New York	Derivatives Fund	Party	Moodys Corporation
RATING_SD_Loans	Loans	Bank New York	Loans and Advances to Staff	Party	Moodys Corporation
RATING_SD9	First to default credit swaps	Bank New York	Credit Link Note	Party	Moodys Corporation

Existing Multiple Rating definitions are displayed with details such as Name, Description, Legal Entity, Product, Rating Type, and Rating Provider.

You can search for an existing definition by entering the Multiple Rating definition names in the **Name** field and by clicking **Search**. The list is filtered to display only those definitions that match the keyword.

19.2 Creating Multiple Ratings

Performing the following steps to create new Multiple Rating definitions:

1. In the **Multiple Rating** window, click **Add** to open the **Multiple Rating Add** window.


Figure 33: The Multiple Rating Add Window

The screenshot shows the 'Multiple Rating Add' window with the following fields and sections:

- Select Rating Provider:** Name (text input), Description (text input), Effective From Date (calendar icon), Rating Category (drop-down list).
- Details:** Legal Entity (text input with map icon), Product (text input), Inherit Flag (checkbox).
- Preference Selection:** Rating Type (drop-down list), Select Rating Provider (text input), Current Selection (text input), Save (button), Cancel (button).
- Audit Trail / User Comments:** System ID (text input), Created By (text input), Last Modified By (text input), Creation Date (text input), Last Modification Date (text input).

2. Populate the **Multiple Rating Add** form as tabulated.

Table 31: The Multiple Rating Add form

Field	Description
Name	Enter a name for the Multiple Rating.
Description	Enter a short description of the Multiple Rating.
Effective From Date	Click the Calendar  to select the effective date.
Rating Category	Select either Account or Facility from the drop-down list.
Legal Entity	Click Map adjacent to this field. Select the required Legal Entities from the Hierarchy Browser window.
Inherit Flag	Select this checkbox if you want to set this flag to Yes .
Product	Select the Product from the drop-down list.

The Rating Types such as Party, Accounting, Sovereign, and Instrument are displayed under the **Preference Selection** table with the details such as Rating Type name, Select Rating Provider, and Current Selection.

3. You can select the Rating Preferences as detailed:
 - d. Select the checkbox adjacent to a Rating Type and click **Up** or **Down** to move the Rating Type up or down.
 - e. Click the **Details** link adjacent to the **Rating Type** and select the required **Rating Providers** from the **Rating Selection** window.
 - f. In the **Rating Selection** window, click the required Rating Providers under the **Rating Provider** pane and select or deselect those to the **Order Of Preference** pane. Click **Apply** to confirm the selection.
 - g. The selected providers are listed in the **Current Selection** column.
 - h. Click **Save**.
 - i. The Rating details are saved, and the definition is displayed in the Multiple Rating Summary pages with details such as Name, Description, Legal Entity, Product, Rating, Type, and Rating Provider.
4. Click **Save**.

The **Audit Trail** section at the bottom of the **Multiple Rating** window displays the metadata related to the definition and contains the fields **Created By**, **Creation Date**, **Last Modified By**, and **Last Modification Date** with a System ID. The **User Comments** section facilitates you to add or update additional information as comments.

19.3 Viewing Multiple Rating Definition

You can view the Multiple Rating definitions from the Multiple Rating page. Perform the following steps to view an existing Multiple Rating definition:

1. In the **Multiple Rating** table, select the checkbox adjacent to the Multiple Rating definition that you want to view.
2. Click **View** to open the **Multiple Rating - View** window.

NOTE You cannot edit any of the fields in **View** mode.

19.4 Deleting Multiple Rating Definition

You can delete an existing Multiple Rating definition from the **Multiple Rating** window.

Perform the following steps to delete one or more existing Multiple Rating definitions:

1. In the **Multiple Rating** table, select the checkbox(s) adjacent to the Multiple Rating definitions that you want to delete.
2. Click **Delete**.
A warning dialog is displayed.

3. Click Yes.

The selected definitions are removed from the **Multiple Rating** window.

20 Currency

Financial institutions transact business in more than one currency. Transacting business in multiple currencies demands functional capabilities for multi-currency accounting and currency rate management

You can access the **Currency** feature in the application by clicking the **Currency** link from the LHS menu of the application. Upon clicking this link, the **Currencies** window is displayed as depicted in the following figure:

Figure 34: The Currencies Window

The screenshot shows the Oracle Financial Services Loan Loss Forecasting and Provisioning application interface. The main window is titled "Currencies" and contains a search bar and several input fields. The "Currency Code" field is empty, "Currency Name" is empty, "Status" is set to "Active", and "Reporting Currency" is set to "No". Below these fields is a table with the following data:

Code	Currency Name	Reference Interest Rate Code	Reporting Currency	Status
<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	No	Inactive
<input type="checkbox"/>	Euro (European EMU)		Yes	Active
<input type="checkbox"/>	Indian Rupee		Yes	Active
<input type="checkbox"/>	US Dollar		Yes	Active

At the bottom of the window, there are "Save" and "Cancel" buttons.

Existing currencies are displayed with details such as Code, Currency Name, Reference Interest Rate Code, Reporting Currency, and Status.

You can search for an existing currency by entering the Currency Code, and Currency Name, and selecting the Status and Reporting Currency from the respective fields. For more information on using the Currency feature, see the Currency section in the [Oracle Financial Services Asset Liability Management \(OFS ALM\) User Guide](#).

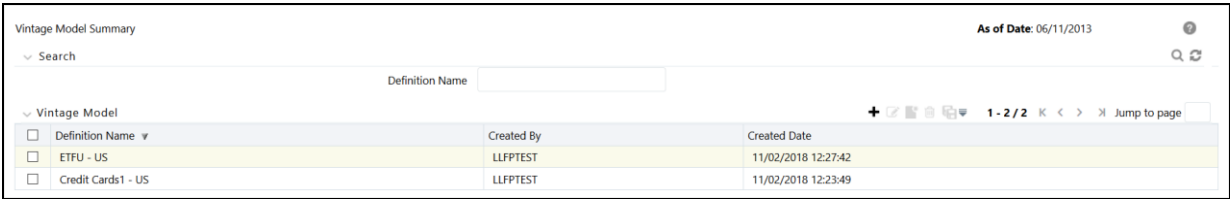
21 Loss Given Default Model

Loss-given default (LGD) represents the portion of the non-recovered exposure in the case of the default. LGD is censored with two values, 0%, and 100%. Full recovery is associated with 0% LGD and zero recoveries are associated with 100% LGD. In most cases partial recovery takes place, hence LGD lies between 0% and 100%.

21.1 Accessing LGD Model in the Application

You can access the LGD Model section by clicking the LGD Model element from the LHS navigation menu of the application. Upon clicking this element, the LGD Model section is displayed as depicted in the following figure:

Figure 35: The LGD Model section



This page displays the existing LGD Model definitions in the **LGD Model** pane. This page also enables you to define a new LGD Model, edit the existing definitions, view the details of the existing definition, and copy existing definitions to create new ones. You can search for an existing definition by entering the LGD Model definition names in the **Name** field and by clicking the **Search** button. The list is filtered to display only those definitions that match the keyword.

21.2 Searching for LGD Model Definitions

The Search feature enables you to filter the list of existing definitions and find the definitions that you look for. To search for definitions, enter the keyword in the Definition Name field and click the **Search** button.

The list of LGD Model definitions in the **LGD Model** pane is refreshed and the definitions that match your search criteria are displayed.

21.3 Creating New LGD Model Definition

The **LGD Model** page enables you to create new definitions. Perform the following procedure to create a new LGD Model definition:

1. Click the **Add** button, from the **LGD Model** pane.
The **LGD Model Definition** window is displayed.
2. Populated the fields as tabulated

Table 32: The LGD Model Grid

Field	Description
	<i>LGD Model Definition Pane</i>

Field	Description
Name	Enter a name for the definition.
Description	Enter a description for the definition
Product Code	Select a value from the drop-down list. The data for this drop-down is provided by the location dimension.
Region	Select a region code from the available list of regions.
Term	Enter the number of terms. Select either Months, Quarters, or Years.
Historic Term	Enter a value and select a value from the drop-down list.
Customer Type	Select either <i>Retail</i> or <i>Corporate</i> .
Economic Variable	Use the Move and Move All buttons to select the variables from the Available Variables field to the Selected Variables Pane. Use the Remove and Remove All buttons to deselect a variable and move it from the Selected Variables field to the Available Variables field.
<i>Feature Engineering Pane</i>	
Predicted Term	Enter a value and select a value from the drop-down list.
Discount Rate Spread	Enter a value in the percentage format. Decimal values are also supported in this field.
Direct Expense for Recovery	Select the slider to enable this feature. The following fields appear: <ul style="list-style-type: none"> • Number in Percentage - Enter a value in the percentage format. • Base – Select either <i>Outstanding balance at default</i> or <i>Collateral value (As of date)</i> • Spread –Select either <i>At the end of the period</i> or <i>Spread evenly throughout the period</i>.
Data Manipulation to reduce noise in the data	Select the Unstable Default Period and Minimum Period of recovery sliders to enable these features. When this feature is enabled a text box and a drop-down list appears. Enter a value and select a value from the drop-down list.
To calculate assumption based LGD	When this feature is enabled a text box and a drop-down list appears. Enter a value and select a value from the drop-down list. Additionally, the following fields appear: <ul style="list-style-type: none"> • Number in Percentage - Enter a value in the percentage format. • Base – Select either <i>Outstanding balance at default</i> or <i>Collateral value (As of date)</i> • Spread –Select either <i>At the end of the period</i> or <i>Spread evenly throughout the period</i>.
Economic Variables - Tuning	Select the required Economic Variable.

3. Click **Save**.

The saved definition is displayed in the **LGD Model** pane of the **LGD Model** page.

21.4 Editing LGD Model Definition

You can edit the LGD Model definitions from the **LGD Model** page. Perform the following procedure to edit an existing LGD Model definition:

1. Select the checkbox adjacent to the LGD Model definition you want to edit, from the LGD Model grid.
2. Click **Edit**.

The **LGD Model Edit** window is displayed.

3. Update the required fields.

NOTE You cannot modify the Name, Product Code, and Region of the definition.

4. Click **Save** to save the definition details.

The saved definition is displayed in the **LGD Model** pane of the **LGD Model** page.

The **Audit Trail** section at the bottom of the definition page displays the **Created By**, **Creation Date**, **Last Modified By**, and **Last Modification Date** details. The **User Comments** section enables you to add additional information as comments.

21.5 Viewing LGD Model Definition

You can view the LGD Model definitions from the **LGD Model** page. Perform the following procedure to view an existing LGD Model definition:

1. Select the checkbox adjacent to the LGD Model definition you want to view, from the LGD Model grid.
2. Click **View**.

The **LGD Model - View** window is displayed with the definition details.

NOTE You cannot edit any of the fields in View mode

21.6 Copying LGD Model Definition

The copy feature enables you to use an existing definition to create a new definition. To copy an existing definition, perform the following procedure:

1. Select the checkbox adjacent to the LGD Model definition you want to copy, from the LGD Model pane.
2. Click **Copy**.

The **LGD Model Definition** window is displayed.

3. Update the required fields.
4. Click **Save** to save the definition details.

The saved definition is displayed in the **LGD Model** pane of the **LGD Model** page.

21.7 Deleting LGD Model Definition

You can delete an existing LGD definition from the **LGD Model Summary** window.

To delete one or more existing LGD Model definitions, perform the following procedure:

1. Select the checkbox(s) adjacent to the LGD Model definitions you want to delete.
2. Click the **Delete** button from the LGD Model grid.

A warning dialog is displayed.

3. Click **Yes**.

The selected definitions are removed from the LGD Model Summary window.

22 Using Model Management and Governance Application

This section provides information about OFS Model Management and Governance (OFS MMG) by using the OFS LLFP Models.

Topics:

- [Signing into the Oracle Financial Services Model Management and Governance Application](#)
- [Populate a Workspace](#)
- [Launch a Workspace](#)
- [Python Models Deployment Topology](#)
- [Using Model Management](#)
- [Model Execution Parameters](#)
- [Required Python Libraries](#)
- [Execute Models using Scheduler Service](#)

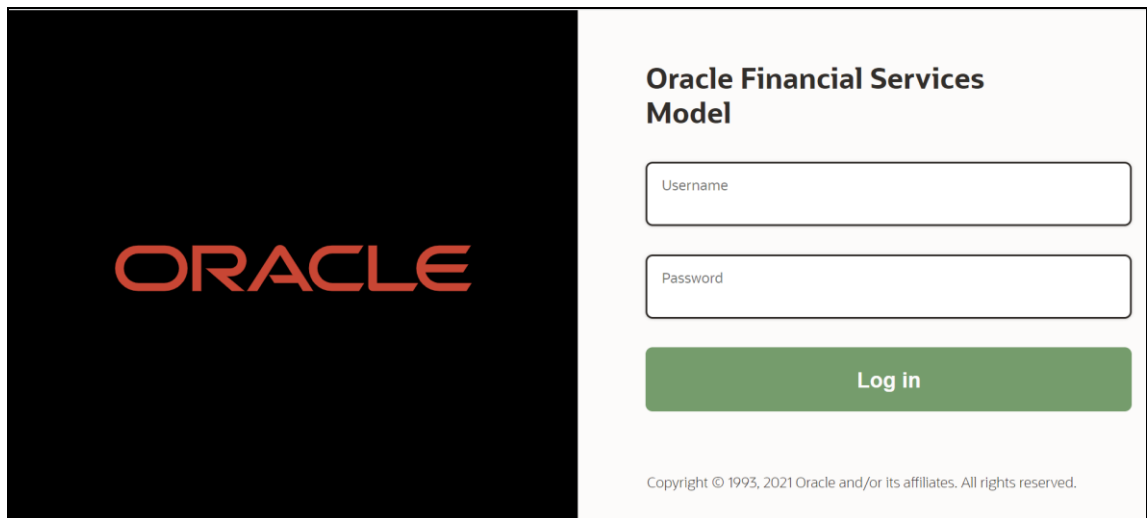
22.1 Signing into the Oracle Financial Services Model Management and Governance Application

After the application is installed and configured, access the Oracle Financial Services Model Management and Governance application.

To access the Oracle Financial Services Model Management and Governance Application, follow these steps:

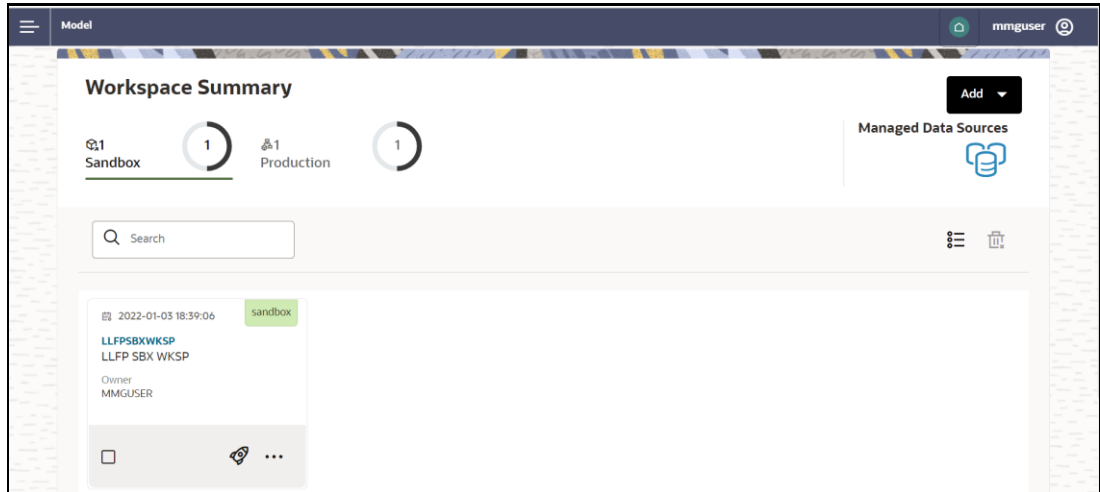
1. Enter the application URL in your browser. The Login page is displayed.

Figure: OFS Model Management and Governance Application Login Page



2. Enter your User ID and Password.
3. Click **Log in**. The **Workspace Summary** Page is displayed.

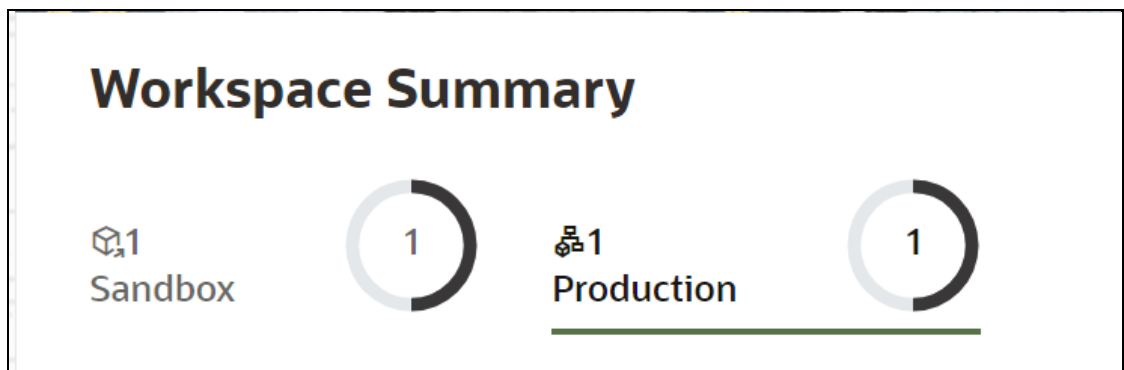
Figure: The Workspace Summary Page



NOTE For more information about the Application UI Features and Workspace Management, see the **Using the Application UI Features** and **Using Workspace Management** Sections in the [Oracle Financial Services Model Management and Governance User Guide](#).

NOTE As part of the OFS LLFP Python Models, two workspaces are provided, one for Sandbox and one for Production.

Figure: Workspace Summary



22.2 Populate a Workspace

The workspace is populated with data from the datasets in the External Sources or from the OFS LLFP Atomic Schema.

To populate the Workspace, perform the following steps:


1. Navigate to the **Workspace Summary** Page. The page displays the Workspace records in a table format.
2. Click **...** next to the corresponding Workspace and then select **Populate Workspace**  to populate the Workspace with data from a dataset data in the **Populate Workspace** Window.

Figure 4: Populate Workspace Window

3. Click **Populate Workspace** to start the process. Here, you can create the batch by using **Create Batch** option or create and execute by using the **Create and Execute Batch** option. On selecting either of these options, a workspace population task gets added to the batch.

NOTE

For more information on the operations that can be performed in the Workspace, see the **Using Workspace Management** Section in the [Oracle Financial Services Model Management and Governance User Guide](#).

22.3 Launch a Workspace

Use the **Workspace** Window to launch a Workspace. The **Workspace** Window displays a menu for Models and an Application Configuration and Model creation submenu.


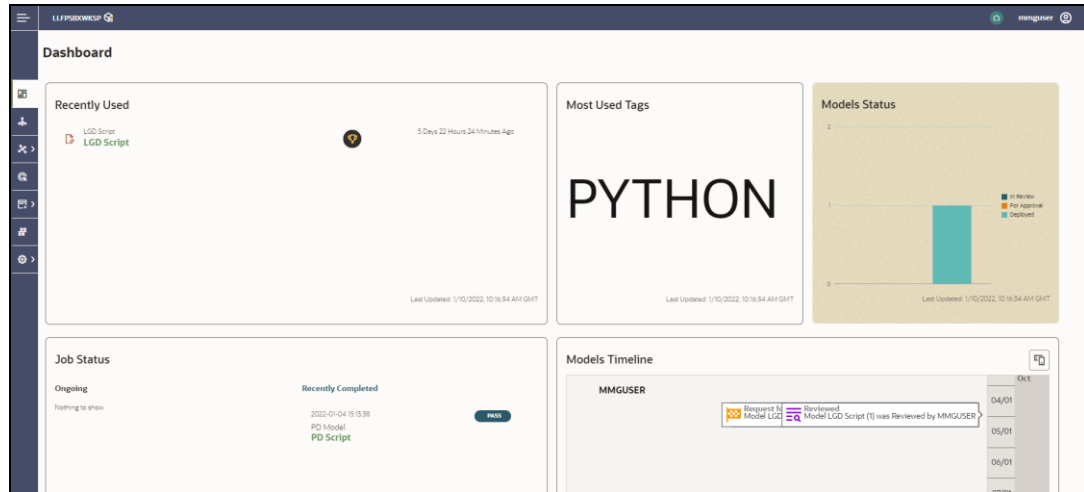
Navigate to **Click Launch**  next to the corresponding Workspace. The Workspace Dashboard is displayed. The OFS MMG Dashboard window is displayed with the application configuration and model creation menu.

Figure: The Workspace Dashboard



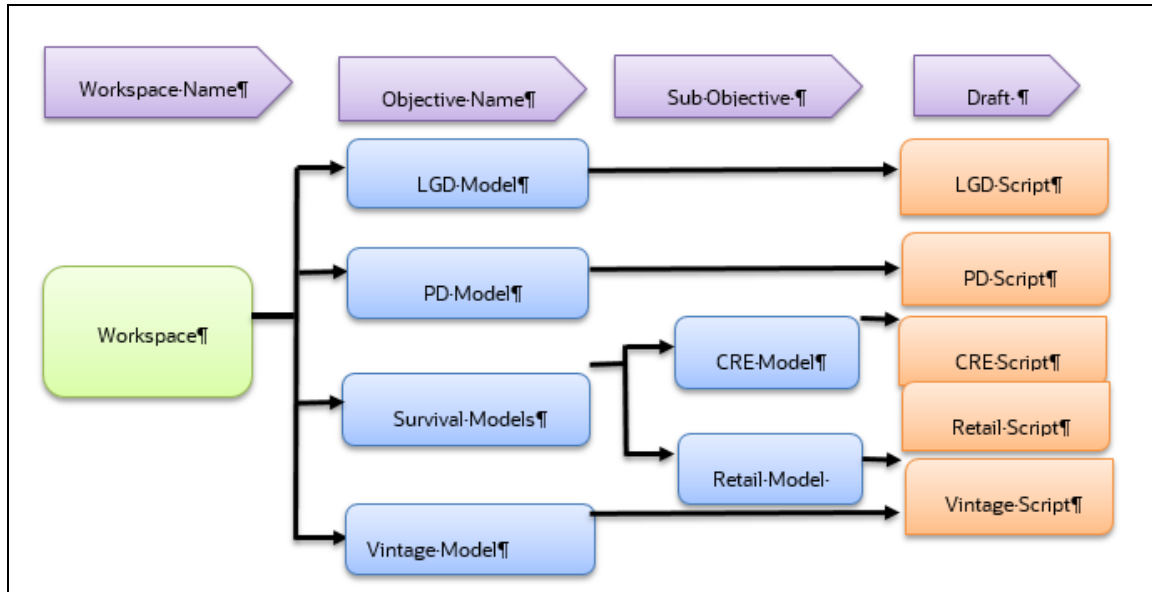
NOTE

For more information about the workspace **Dashboard** window, see the **Access the Workspace Dashboard** Window Section in the [Oracle Financial Services Model Management and Governance User Guide](#).

22.4 Python Models Deployment Topology

The following image illustrates the deployment topology of the Python Models.

Figure: The Logical Architecture implemented for the OFS LLFP Python Models



22.5 Using Model Management

This section provides detailed information on using Model Management.

22.5.1 Access the Advance Model Management Window

The **Advance Model Management** Window allows you to create and publish models.


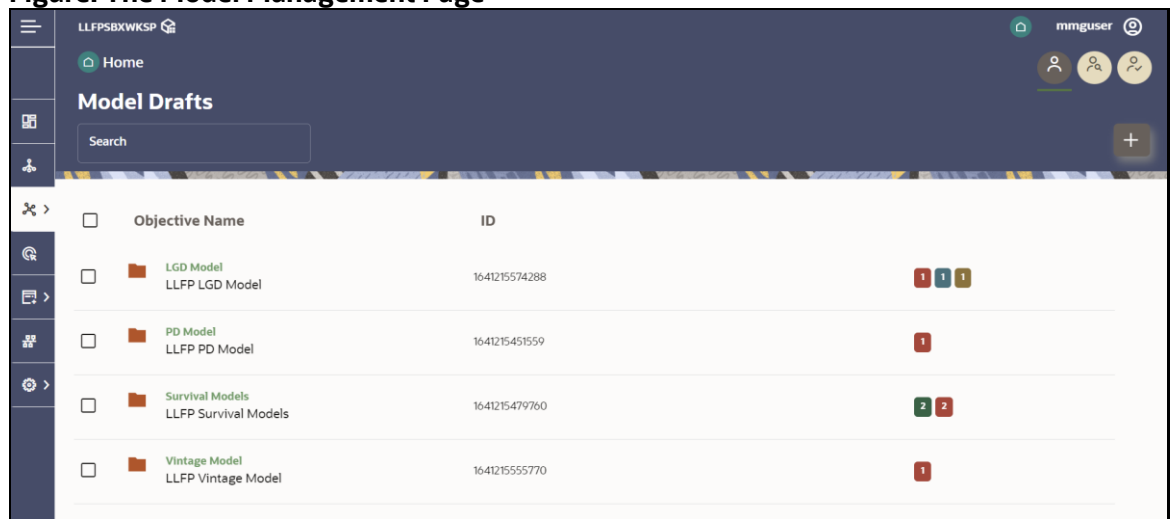
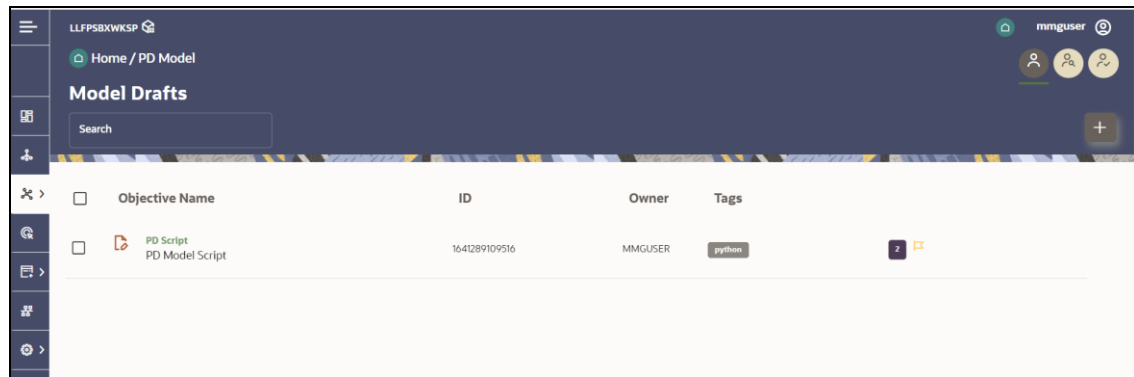
1. Click **Advanced Model Management**  to display the **Model Management** Window. This window displays the folders that contain models and their records in a table format.

Figure: The Model Management Page



2. Navigate to **Models**.

Figure: The Draft Model**NOTE**

To know more about the **Access the Advance Model Management Window**, refer to the **Access the Advance Model Management Window** Section in the [Oracle Financial Services Model Management and Governance User Guide](#).

22.5.2 Open the Pipeline Designer

Pipeline Designer enables you to design the paragraph by using widgets instead of using Python codes. In addition, if you add new paragraphs in Data Studio, the added paragraphs are displayed in a widget format. Similarly, if you create a Notebook by using Pipeline Designer, it can be opened for editing in Data Studio by using the Studio Notebook option.

22.5.2.1 Model Execution using Pipeline Canvas


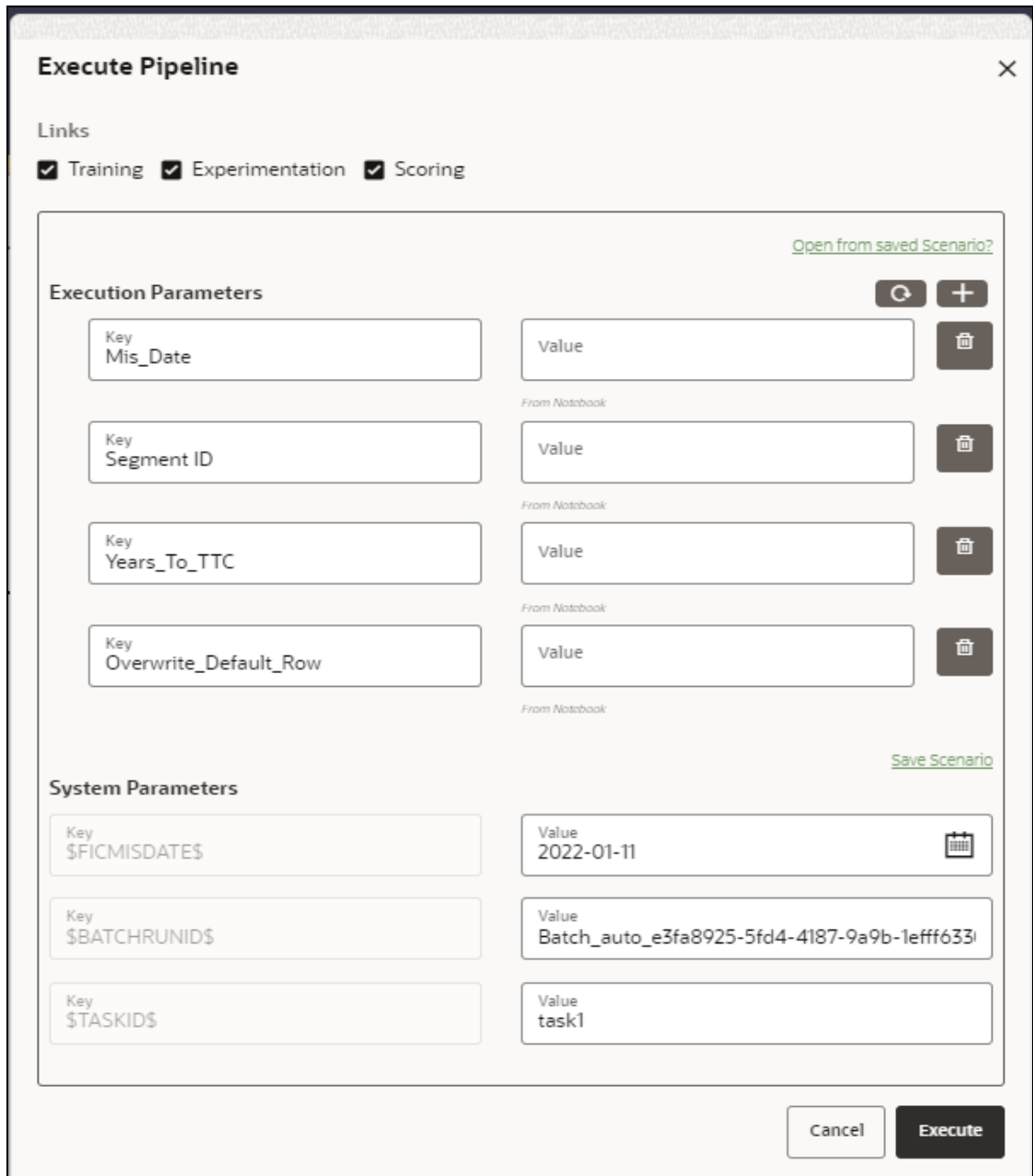
1. Click **Execute**  to view the **Execute Pipeline** Window.

Figure: A Sample of the Execute Pipeline Window

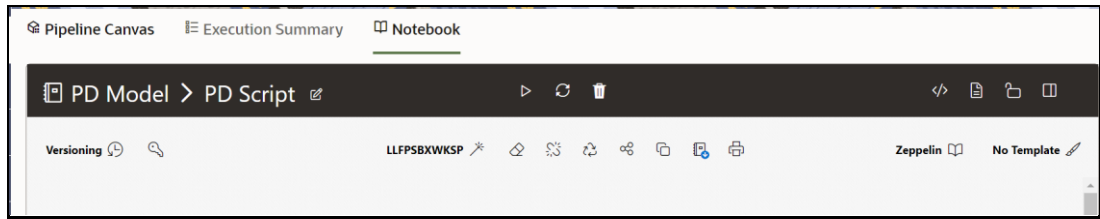


22.5.2.2 Model Execution using Notebook

Perform the following steps to use Notebook for executing the model:

1. Click Run Paragraphs  to Execute all paragraphs. For more information, see the [Oracle Financial Services Model Management and Governance User Guide](#).

Figure: The Notebook Tab



22.5.2.3 Execution Summary

This section of Pipeline Designer displays the summary of the executed pipelines.

Figure: The Execution Summary Tab



NOTE

For more information about the model execution parameters, see the Model Actions Section in the [Oracle Financial Services Model Management and Governance User Guide](#).

22.5.3 Publish Models (Scoring)

After creating or modifying the existing draft models, you can publish the Notebooks that contain the Model script.



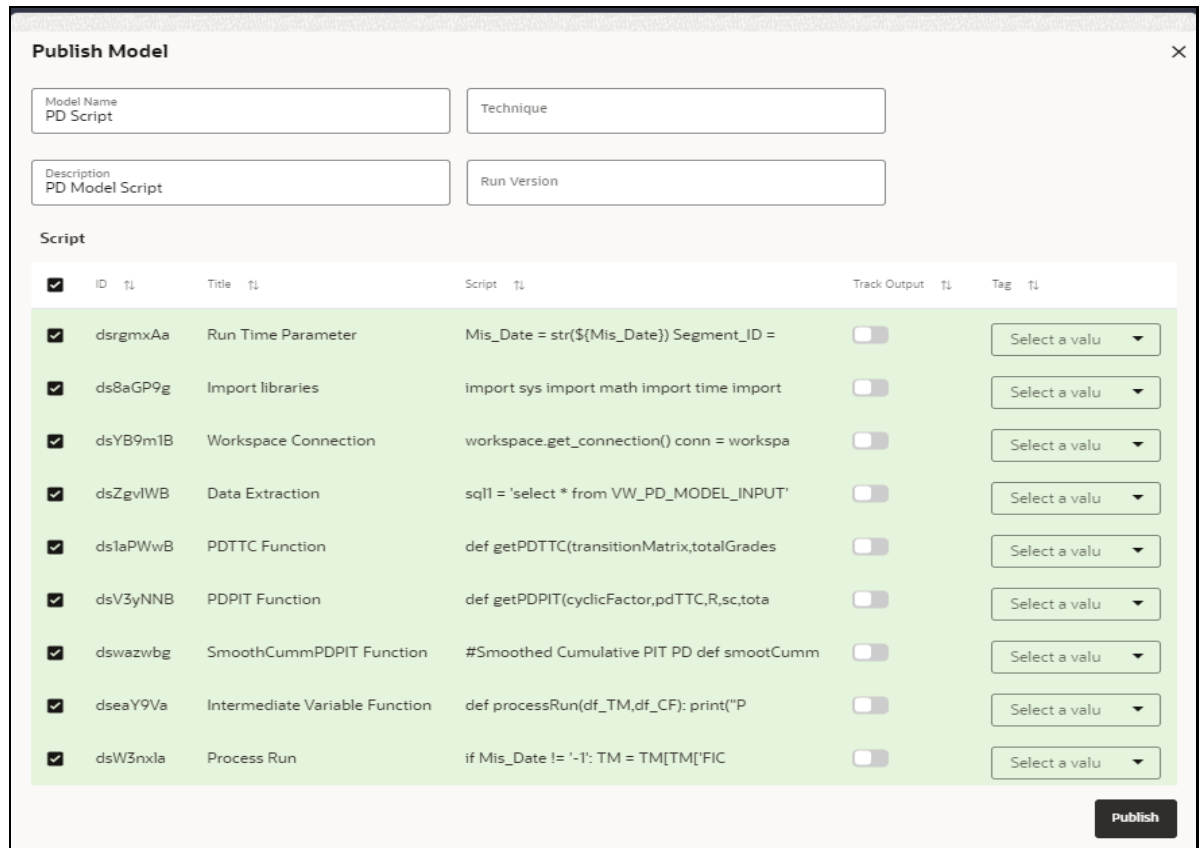
1. Click  next to the corresponding Draft Model and select **Publish Data Studio**  to open the **Publish Model** Window.

Figure: The Publish Model Window



2. Enter the details as tabulated.

Table: The Publish Model Details Form

Field or Icon	Description
Model Name	The field displays the name of the Model. Modify the name if required.
Model Description	The field displays the description for the Model. Enter or modify the description if required.
Technique	Enter the registered technique to use.
Run Version	Select a run version.
Script	The table displays the Paragraphs that were created in the Training Model. Select the Paragraphs that you want to use to create the Scoring Model. Track Output - Select this to track the output of the Paragraph.

3. Click **Publish**.

22.5.4 View Model Details

You can view model information for Champion Models that require approval and so on.

1. Click on the **Model** or **Draft** name to open the Model details.



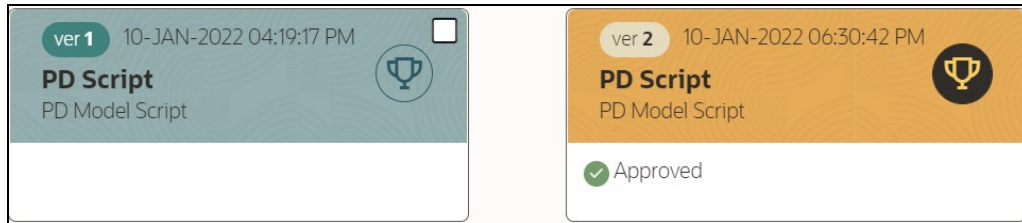
- The icon  indicates that the Model is the challenger.
- The icon  indicates that the Model is the champion.

Figure 13: Hover the Mouse over the Model Details



22.5.5 Model Deployment


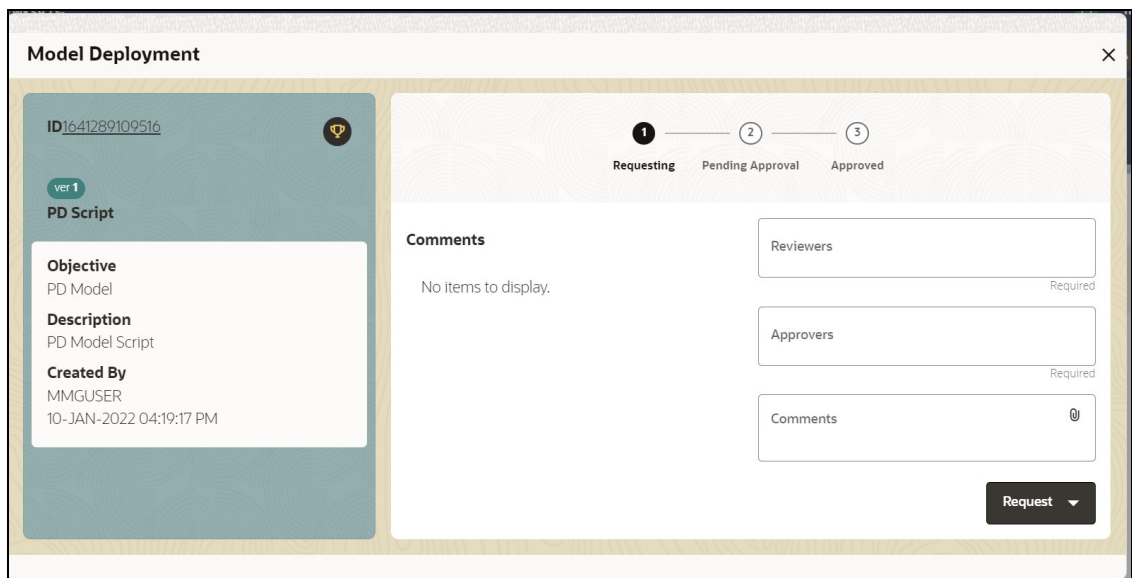
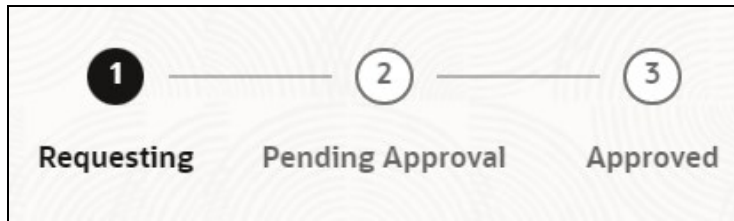
To make a model a champion from this window, hover the mouse in the selected model columns. and click  to display the **Model Deployment** Window.

Figure 14: The Model Deployment Details Window



1. Select the reviewer group from the **Reviewers** drop-down list.
2. Select the Approver group from the **Approvers** drop-down list.
3. Enter comments in the **Comments** Field and click to attach files to support the comments.
4. Use the following features on the window to perform additional actions.
 - View the model status in the progress indicator. The progress Indicator displays the various stages of progress that the model has been through. Accordingly, you must request, review, or approve Models.

Figure 15: The Model Approval Progress Indicator



5. Click the type of request from the drop-down list:
- **Model Acceptance:** To review and accept the model creation.
 - **Model Acceptance + Promote to Production:** To review and promote the model to production.
 - **Make Champion - Local:** If the model is not the champion model, select to make it the local champion.
 - **Promote to Production:** To promote a model to production
 - **Make Champion - Global:** If the model is not the champion model, select to make it the Global champion.
 - **Retire Champion:** To retire a Champion model
 - **Comment History:** A record of comments entered in the cycle of model creation and approval with the feature to download attachments.

The model sent for acceptance or promotion to production is now displayed to a Reviewer when signed in, who must either accept the request or reject it.

NOTE For more information on the actions that can be performed on Models, see the **Create, Review, Approve, and Deploy a Model** Section in the [Oracle Financial Services Model Management and Governance User Guide](#).

NOTE After using the **Promote to Production** feature on a Model, a Model can be accessed from the production environment.
A Sandbox must have the Production Workspace attached for this option to be enabled.

22.6 Model Execution Parameters

This section provides detailed information on the Model execution parameters.

22.6.1 LGD & Vintage Model Execution Parameters

Table33: The LGD & Vintage Model Execution Parameters

Sl. No.	Parameter	Details
---------	-----------	---------

1	Product Code	Provide the Product Code for which the data is available in the Sandbox Schema that you want to execute.
2	Region/ Country ID	Provide the Country or Region Code for which the data is available in the Sandbox Schema that you want to execute.
3	Mis Date	Provide the Date for which the data is available in the Sandbox Schema.

NOTE **Global Variable (output_save_batch_size):** For the performance improvement, as part of the OOB Model, 3000 output rows can be inserted at once. Users can modify the Global Variable *output save batch size* based on data and traffic between servers.

22.6.2 PD Model Execution Parameters

This table provides detailed information on the PD Model execution Parameters.

Table34: PD Model Execution Parameters

Sl. No.	Parameter	Details
1	Mis Date	Provide the Date for which the data is available in the Sandbox Schema.
2	Segment ID	This refers to the segments or portfolios that need to be considered for the PD Model executions. For Example: <ul style="list-style-type: none"> • Each Segment can pass as a number (101) • Execute all Segments by using the pass as number (-1) • Multiple Segment can pass as list e.g. [101,102]
3	Year To TTC	Number of Years for Smoothing the PD Values. This is used to define the number of years over which the PD values have to be smoothed from the PIT values to the TTC values post the application of Economic Scenarios. For example, the total PD Term Structure is for 10 years and the Economic Scenarios have been provided for 3 years with the Years to TTC as 4. The model output will have PIT PDs for 3 years, smoothed PD values for years 4 to 7, and TTC PDs for years 8 to 10.
4	Overwrite	The value must be Y if the user wants to make the default state as absorption state, else use the value N.

NOTE **Global Variable (output_save_batch_size):** For performance improvement, as a part of the OOB Model, 3000 output rows can be inserted at once. Users can modify the Global Variable *output save batch size* based on data and traffic between servers.

22.6.3 Survival Model Execution Parameters

This table provides information on the Survival Model execution parameters.

Table: The Survival Model Execution Parameters

Sl. No.	Parameter	Details
1	Product ID	Provide the Product Code for which the data is available in the Sandbox Schema that you want to execute.
2	Country ID	Provide the Country or Region Code for which the data is available in the Sandbox Schema that you want to execute.
3	Mis Date	Provide the Country or Region Code for which the data is available in the Sandbox Schema that you want to execute.
4	Plot Account	Provide the Account Name for Plot the Graph.

NOTE

Global Variable `output_save_batch_size`: For performance improvement, as part of the OOB Model, 3000 output rows can be inserted at once. Users can modify the Global Variable `output save batch size` based on data and traffic between servers.

`max_dummies`: Customization is provided for the characteristic independent variables. If many values are available in any characteristic variable, then that will suppress the effect of other variables and the model will not get trained properly. Hence, to avoid this, additional customization is provided in terms of limiting the number of values in a given characteristic variable by considering their frequency. For example, let us assume that the Collateral Type contains many unique values. Hence, the model will select the highest top 2 frequency of unique values and keep the remaining values as others. If a user needs to change this as per their requirement then they can do the same by doing trivial changes in the Python code.

Code: `Global Variable "max_dummies = 3"`

22.7 Required Python Libraries

This table lists the required Python libraries.

Table: Required Python Libraries

Sl. No	3rd party Library Name	LGD Model	PD Model	Survival Models	Vintage Model
1	cx-oracle	✓	✓	✓	✓
2	Numpy	✓	✓	✓	✓
3	Pandas	✓	✓	✓	✓
4	Matplotlib	✓		✓	✓

5	Sklearn	✓		✓	
6	Lifelines			✓	
7	Scipy		✓		
8	Seaborn				✓
9	statsmodels	✓			

22.8 Execute Models by using the Scheduler Service

The scheduler is a service in the Infrastructure System that automates behind-the-scenes tasks that are necessary to sustain various enterprise applications and functionalities. This automation enables the applications to control unattended background jobs program execution. The functionalities in a Scheduler provide a graphical user interface and a single point of control for the definition and monitoring of the background executions.

NOTE

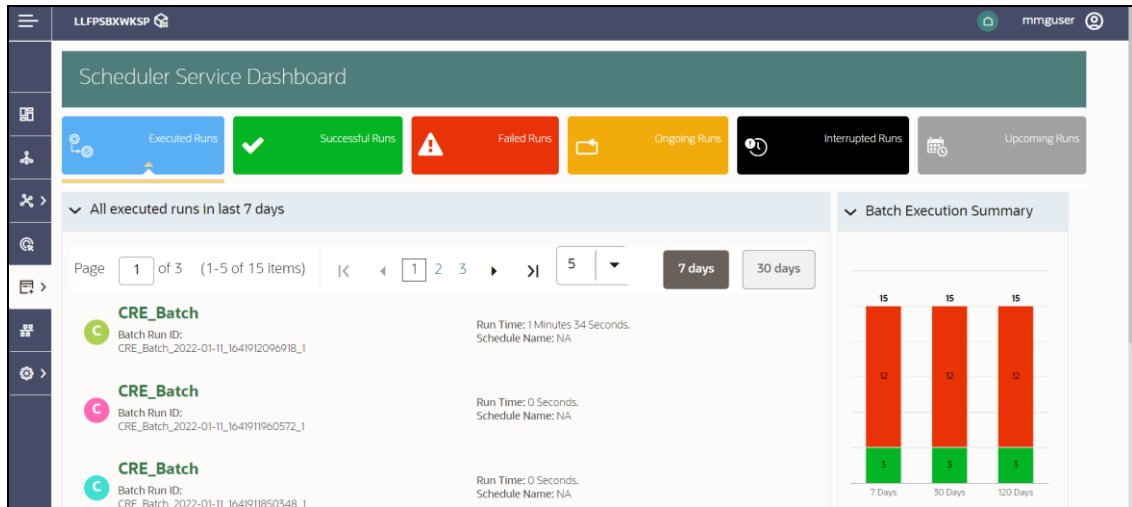
The Scheduler Service can be configured in both the Sandbox and Production Workspace. But for Production Execution, configure it in the Production Workspace and utilize the output for future ECL Calculations.

22.9 Scheduler Service Dashboard

This dashboard is the landing page of the Scheduler. On this page, you can view the following details:

- Tabs such as **Executed Runs**, **Successful Runs**, **Failed Runs**, **Ongoing Runs**, **Interrupted Runs**, and **Upcoming Runs**. You can click the tabs to view the details of the Batches based on their status. For example, click **Ongoing Runs** to view the details of the batches that are currently running.
- The Batches that were executed in the last 7 days with details such as **Batch Name**, **Batch Run ID**, and **Run-Time**. Click 30 days to view the batches executed over the last 30 days. You can click the icon corresponding to a Batch to monitor it.
- The **Batch Execution Summary** Pane displays the count of total batches executed for the last 7 days, 30 days, and 120 days. Additionally, you can view the separate count of successful batches, failed batches, interrupted batches, ongoing batches, and the batches that are yet to begin, by placing your cursor over the color given for each batch status.

Figure: The Scheduler Service Dashboard



22.9.1 Stages in Scheduler

Following are the stages in the Scheduler:

- Define Batch is used for creating a new batch, modifying Batch details, and deleting unwanted Batches.
- Define Task is used for creating tasks for the Batches,
- Schedule Batch is used for executing a Batch instantaneously and scheduling batches.
- Monitor Batch is used to track the execution of the Batches to view the real-time status.

22.9.2 Define Batch

The **Define Batch** Window displays the details of all existing Batches such as **Batch ID**, **Batch Name**, **Batch Description**, **Last Modified By**, and **Last Modified Date**. This window allows you to create a new Batch, edit, copy and delete Batches.

22.9.2.1 Creating a New Batch

You can create a new Batch in the **Define Batch** Window and schedule and monitor the batch that you created.

To create a new Batch, perform the following steps:


1. In the **Define Batch** window, click . The **Create a New Batch** Window is displayed.
2. Specify the details as tabulated.

Table: Fields in the Create a New Batch window and their Description

Field	Description
Batch Details	

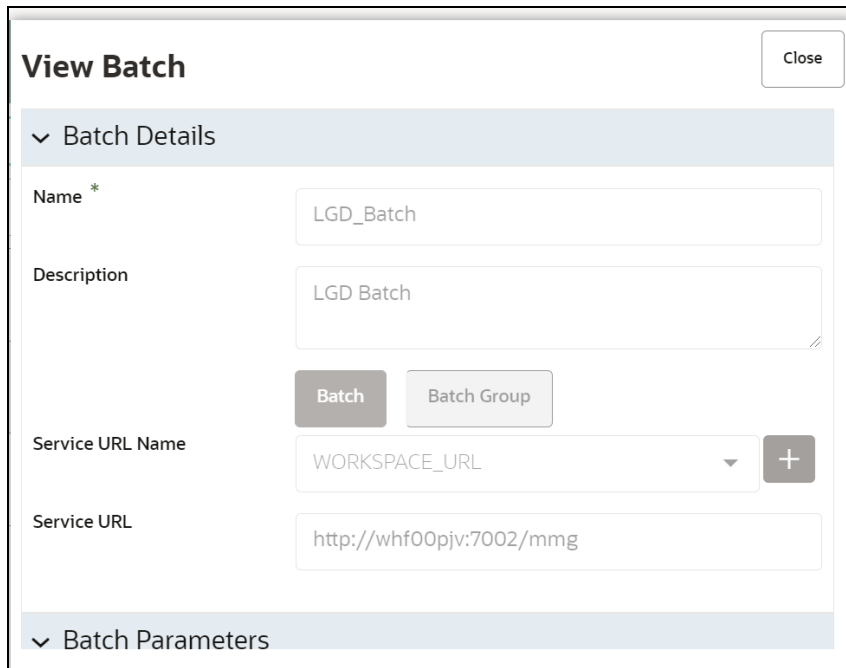
Batch Name	<p>The Batch Name is auto-generated by the system or you can give a custom name. You can specify a Batch name based on the following conditions:</p> <p>Note:</p> <ul style="list-style-type: none"> • The Batch Name should be unique across the Information Domain. • The Batch Name must be alphanumeric and should not start with a number. • The Batch Name should not exceed 60 characters in length. • The Batch Name should not contain any special characters except “_”.
Batch Description	<p>Enter a description for the Batch based on the Batch name.</p> <p>Note: The Batch description should be alphanumeric. It should not exceed 200 characters in length.</p>
Service URL Name/ Service URL	<p>Select the Service URL name from the drop-down list, if it is available. The Service URL is displayed in the Service URL field.</p> <p>Note: For Modeling WORKSPACE_URL must be selected.</p> <p>To add a new Service URL, enter a name to identify it in the Service URL Name Field and enter the correct URL in the Service URL Field. You can enter a partial URL here and the remaining URL in the Task Service URL.</p>

- From the **Batch Parameters** pane, click  to add a new Batch Parameter. By default, **\$FICMISDATES** and **\$BATCHRUNID** are added as Batch parameters.

You can delete a parameter by clicking  corresponding to the parameter.

- Click **Save**. The new Batch is created and displayed in the **Define Batch** Window

Figure 17: The View Batch Window



The screenshot shows a window titled "View Batch" with a "Close" button in the top right corner. The window is divided into two main sections: "Batch Details" and "Batch Parameters".

Batch Details:

- Name ***: A text input field containing "LGD_Batch".
- Description**: A text area containing "LGD Batch".
- Service URL Name**: A dropdown menu with "WORKSPACE_URL" selected and a "+" button to the right.
- Service URL**: A text input field containing "http://whf00piv:7002/mmg".

Below the "Batch Details" section, there are two buttons: "Batch" and "Batch Group".

Batch Parameters: This section is currently collapsed.

22.9.3 Define Task

The **Define Tasks** Window displays the list of tasks associated with a specific Batch definition. You can create new tasks, edit the existing tasks or delete unwanted tasks.

22.9.3.1 Create New Task

To add a new task, perform the following steps:


1. Click **Define Tasks** from **Scheduler Service**.
2. Select the Batch for which you want to add a new task from the **Batch Name** drop-down list.
3. Click . The **Create a New Task** Window is displayed.
4. Specify the details as tabulated.

Table: Fields in the Create a New Task Window

Field	Description
Task Details	
Task Name	Enter the task name. Note: <ul style="list-style-type: none"> • The Task Name must be alphanumeric and must not begin with a number. • The Task Name must not exceed 60 characters in length. • The Task Name must not contain any special characters except underscore (_).
Task Description	Enter the task description. No special characters are allowed in Task Description. Words like Select from or Delete From (identified as potential SQL injection vulnerable strings) must not be entered in the Description.
Components	For modeling perspective select <i>Model</i> .
Task Type	Select the task type from the drop-down list. The options are REST , EXTERNAL API , and SCRIPT . Currently, only REST is supported.
Batch Service URL	Select the required Batch Service URL from the drop-down list. This field can be blank and you can provide the full URL in the Task Service URL Field. Note: From a modeling perspective, WORKSPACE_URL must be selected.
Task Service URL	Enter the task service URL if it is different from the Batch Service URL.
Task Parameters	
\$BATCHDATE\$	By default, values are added.
\$BATCHRUNID\$	By default, values are added.
Objective	Select the Objective name from the drop-down list. For example, PD Model, LGD Model, Survival Models/CRE Model, etc.
Model	Select the Model type from the drop-down list. For example, Champion, etc.
Link Types	Select the link type from the drop-down list. The options are Training , Scoring , or Training+Scoring .

Synchronous Execution	Select Yes or No from the drop-down list.
Optional Parameters	Pass the run-time parameter. Syntax: a1='100',a2='xyz' For example. Product Code='HPR',Region='NJ',FIC Mis Date='20100401'

5. Click **Save**.

Figure: The Task Details Window

▼ Task Details

Task Name *

Task Description

Task Type

* Components

Batch Service URL

Task Service URL

Figure: The Task Parameters Window

▼ Task Parameters

Parameter	\$BATCHDATE\$	Value	Batch Date	<input checked="" type="checkbox"/>
Parameter	\$BATCHRUNID\$	Value	BATCHRUNID	<input checked="" type="checkbox"/>
Parameter	Objective	Value*	<input type="text" value="LGD Model"/>	<input checked="" type="checkbox"/>
Parameter	Model	Value*	<input type="text" value="CHAMPION"/>	<input checked="" type="checkbox"/>
Parameter	Link types	Value	<input type="text" value="Training+Scoring"/>	<input checked="" type="checkbox"/>
Parameter	Synchronous Execution	Value	<input type="text" value="YES"/>	<input checked="" type="checkbox"/>
Parameter	Optional Parameters	Value	<input type="text" value="Product Code ='HPR', Regi"/>	<input checked="" type="checkbox"/>

22.9.4 Schedule Batch

The Schedule Batch window facilitates you to run, schedule, re-start, and re-run the batches in the Scheduler Service. After you upload the data in the required format into the Object Storage, you must load the data into the system using the Scheduler Service. You can schedule them to run in a required pattern and view the run time status of the scheduled services using the Monitor Batch feature.

The Schedule Batch window allows you to perform the following operation to a batch:

- Execute a Batch
- Schedule a Batch
- Re-start a Batch
- Re-run a Batch

NOTE

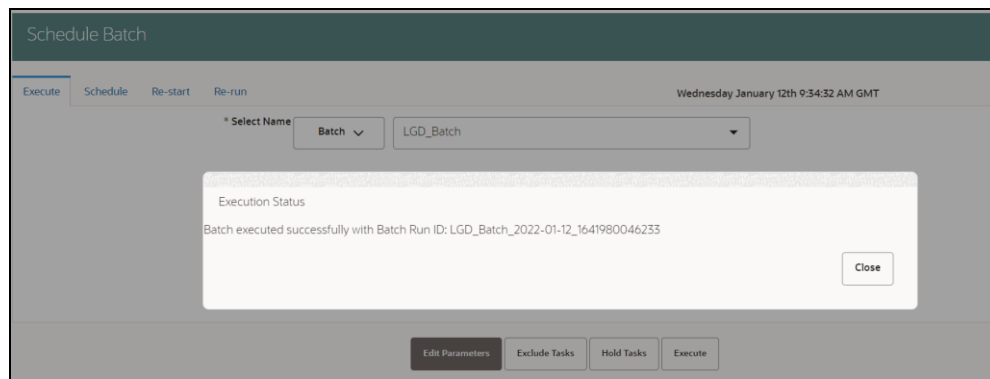
For more information on the Schedule Batch, see the **Schedule Batch** Section in the [OFS Scheduler Service User Guide](#).

22.9.4.1 Execute a Batch

The Execute Batch option allows you to run a batch instantaneously. To execute a Batch, perform the following steps:

1. Click **Schedule Batch** from the Scheduler Service. The **Schedule Batch** Window is displayed.
2. Select the Batch Name from the Batch Name drop-down menu. For example, **LGD_BATCH**.
3. Click **Execute**. The **Execution Status Dialog Box** is displayed with the Batch successfully executed message. This indicates the unique identification reference number for the batch and the date of the batch execution.

Figure 20: The Schedule Batch & Execution Status



22.9.5 Monitor Batch

The Monitor Batch feature enables you to view the status of executed Batch along with the task's details. You can track the issues if any, at regular intervals and ensure smoother Batch execution. A visual representation, as well as a tabular view of the status of each task in the Batch, is available.

NOTE

Logs are saved in **LOG_HOME** path
/scratch/users/logs/home_logs/execution

To know more about Monitor Batch, refer to the Monitor Batch Section in the [OFS Scheduler Service User Guide](#).

23 ECL Computation Using Hybrid Vintage Model

The vintage analysis accounts for expected losses by allowing an institution to calculate the cumulative loss rates of a given loan pool and in so doing, to determine that loan pool's lifetime expected loss experience. This includes a reasonable approximation of probable and estimable future losses gleaned by applying historical gross charge-off information to forward-looking qualitative and environmental factors.

The vintage analysis is a method of evaluating the credit quality of a loan portfolio by analyzing net charge-offs in a homogeneous loan pool where the loans share the same origination period. The method is widely used in the analysis of retail credit card and mortgage portfolios. The application uses historical charge-off rates and macro-economic variables to compute the Expected Credit Loss amount.

23.1 Accessing Vintage Model in the Application

You can access the Vintage Model section by clicking the Vintage Model element from the LHS navigation menu of the application. Upon clicking this element, the Vintage Model section is displayed as depicted in the following figure:

Figure 36: The Vintage Model section

Definition Name	Created By	Created Date
ETFU - US	LLFPTEST	11/02/2018 12:27:42
Credit Cards1 - US	LLFPTEST	11/02/2018 12:23:49

This page displays the existing Vintage Model definitions in the **Vintage Model** pane. This page also enables you to define a new Vintage Model, edit the existing definitions, view the details of the existing definition, and copy existing definitions to create new ones. You can search for an existing definition by entering the Vintage Model definition names in the **Name** field and by clicking the **Search** button. The list is filtered to display only those definitions that match the keyword.

23.2 Searching for Vintage Model Definitions

The Search feature enables you to filter the list of existing definitions and find the definitions that you look for. To search for definitions, enter the keyword in the Definition Name field and click the **Search** button.

The list of Vintage Model definitions in the **Vintage Model** pane is refreshed and the definitions that match your search criteria are displayed.

23.3 Creating New Vintage Model Definition

The **Vintage Model** page enables you to create new definitions. Perform the following procedure to create a new Vintage Model definition:





1. Click the **Add** button, from the **Vintage Model** pane.
The **Vintage Model Definition** window is displayed.

Figure 37: The Vintage Model Definition window

2. Enter a name for the definition in the **Name** field.
3. Enter a description of the definition in the **Description** field.
4. Click the drop-down list adjacent to the **Product Code** field and select a product code from the available list of codes.

NOTE The data for this drop-down is provided by the location dimension.

5. Click the drop-down list adjacent to the **Region** field and select a region code from the available list of regions.
6. Enter the number of terms in the text field adjacent to the **Term** field.
7. Select the required Economic Variables. You can use the following buttons to select/deselect the variables between **Available Variables** and **Selected Variables** panes:

- Use the **Select One**  icon to move the selected variables to the **Selected Variables** pane.
- Use the **Select All**  icon to move all the variables to the **Selected Variables** pane.
- Use the **Deselect One**  icon to move the selected variables back to the **Available Variables** pane.
- Use the **Deselect All**  icon to move all the variables back to the **Available Variables** pane.

8. Click **Save**.

The saved definition is displayed in the **Vintage Model** pane of the **Vintage Model** page.

23.4 Editing Vintage Model Definition

You can edit the Vintage Model definitions from the **Vintage Model** page. Perform the following procedure to edit an existing Vintage Model definition:

1. Select the checkbox adjacent to the Vintage Model definition you want to edit, from the Vintage Model grid.

2. Click **Edit**.

The **Vintage Model Edit** window is displayed.

3. Update the required fields.

NOTE You cannot modify the Name, Product Code, and Region of the definition.

4. Click **Save** to save the definition details.

The saved definition is displayed in the **Vintage Model** pane of the **Vintage Model** page.

The **Audit Trail** section at the bottom of the definition page displays the **Created By**, **Creation Date**, **Last Modified By**, and **Last Modification Date** details. The **User Comments** section enables you to add additional information as comments.

23.5 Viewing Vintage Model Definition

You can view the Vintage Model definitions from the **Vintage Model** page. Perform the following procedure to view an existing Vintage Model definition:

1. Select the checkbox adjacent to the Vintage Model definition you want to view, from the Vintage Model grid.

2. Click **View**.

The **Vintage Model - View** window is displayed with the definition details.

NOTE You cannot edit any of the fields in View mode

23.6 Copying Vintage Model Definition

The copy feature enables you to use an existing definition to create a new definition. To copy an existing definition, perform the following procedure:

1. Select the checkbox adjacent to the Vintage Model definition you want to copy, from the Vintage Model pane.

2. Click **Copy**.

The **Vintage Model Definition** window is displayed.

3. Update the required fields.

4. Click **Save** to save the definition details.

The saved definition is displayed in the **Vintage Model** pane of the **Vintage Model** page.

23.7 Deleting Vintage Model Definition

You can delete an existing Multiple Rating definition from the **Vintage Model Summary** window.

To delete one or more existing Vintage Model definitions, perform the following procedure:

1. Select the checkbox(s) adjacent to the Vintage Model definitions you want to delete.
2. Click the **Delete** button from the Vintage Model grid.

A warning dialog is displayed.

3. Click **Yes**.

The selected definitions are removed from the Vintage Model Summary window.

24 Currency Conversion

Previously, the *Exchange Rate Source* could be set by updating the **V_COMPONENT_VALUE** Column for the **DEFAULT_FX_RATE_SRC** Component Code.

Now, within the OFS LLFP application, for a specific source and destination currencies, Exchange Rates can be referred to from a default *Exchange Rate Source* or a *Rate Source* specific to a particular Legal Entity.

For the *Rate Source* specific to a particular Legal Entity, in the **stg_entity_org_exchg_map** Table, for each **FIC_MIS_DATE**, you must map the **V_LV_CODE** Column with the **V_RATE_DATA_SOURCE_CD** Column. For the OFS LLFP application, the value in the **V_ORG_UNIT_CODE** Column must be **OTH**.

25 Subledger Attributes

The feature has an interface that provides the users with an exhaustive list of input variables to choose from and create formulae in the expression box. Once the accounting mappings are created, the users can use those in creating accounting attributes in the subledger definitions.

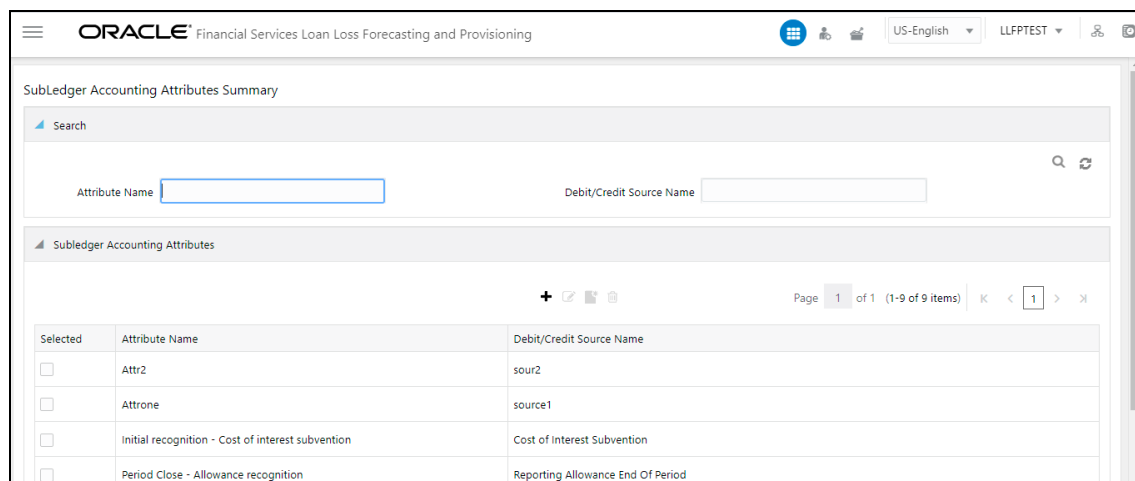
Topics:

- [Access Subledger Attributes](#)
- [Search for Subledger Accounting Attributes](#)
- [Create a New Subledger Accounting Attribute](#)
- [Edit a Subledger Attribute](#)
- [View a Subledger Attribute](#)
- [Delete a Subledger Attribute](#)

25.1 Access Subledger Attributes

You can access the **Subledger Attributes** window by clicking the **Subledger Attributes** element from the left-hand side menu. When you click this element, the **Subledger Accounting Attributes Summary** window is displayed:

Figure 38: The Subledger Accounting Attributes Summary Window



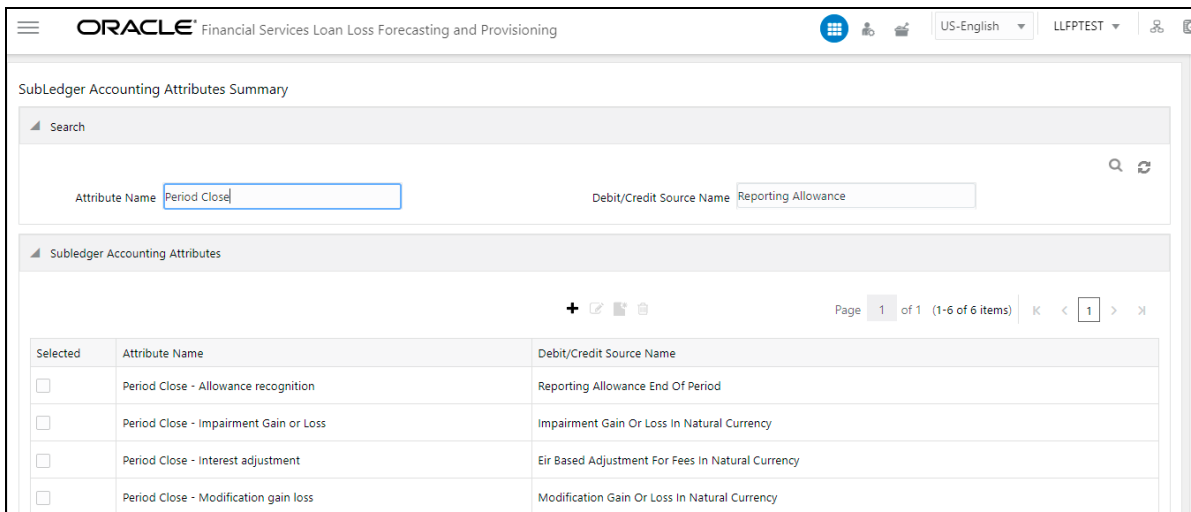
This window displays the existing sub-ledger attributes in the **Subledger Accounting Attributes** pane. This window also enables you to define new sub-ledger accounting attributes, edit the existing attributes, and view the details of existing attributes.

25.2 Search for Subledger Accounting Attributes

The **Search** feature enables you to filter the list of existing definitions and find the definitions that you require.

To search for an attribute name, enter an attribute and debit or credit source name in the **Attribute Name** and **Debit/Credit Source Name** fields respectively, and click **Search**.

Figure 39: The Subledger Accounting Attributes Summary Window



The list of sub-ledger accounting attributes in the **Subledger Accounting Attributes** pane is refreshed and the attributes that match your search criteria are displayed.

25.3 Create a New Subledger Accounting Attribute

The Subledger Attributes Feature enables you to create new Subledger Accounting Attributes. Ensure that the same source name is not used for two source mappings. Additionally, when creating a new attribute, use a unique name. If the name of an existing attribute is used, then you might encounter upgrade issues.

Perform the following steps to create New Subledger definitions:


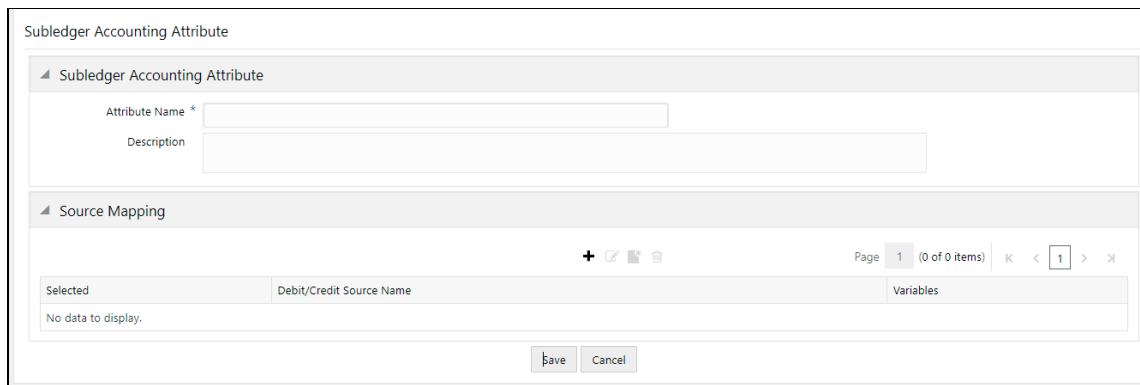
1. In the **Subledger Accounting Attributes** pane, click **Add**  to open the **Subledger Accounting Attribute** Window.

Figure 40: The Subledger Accounting Attributes Window



The screenshot shows the 'Subledger Accounting Attribute' window. It features a header section with a collapse icon and the title 'Subledger Accounting Attribute'. Below this are two text input fields: 'Attribute Name *' and 'Description'. The second section is titled 'Source Mapping' and contains a table with three columns: 'Selected', 'Debit/Credit Source Name', and 'Variables'. The table is currently empty, displaying 'No data to display.' Above the table are icons for adding, editing, and deleting items, along with a pagination control showing 'Page 1 (0 of 0 items)'. At the bottom of the window are 'Save' and 'Cancel' buttons.

2. In the Subledger Accounting Attribute pane, enter a name and a description for the attribute in the **Attribute Name** and **Description** fields, respectively.


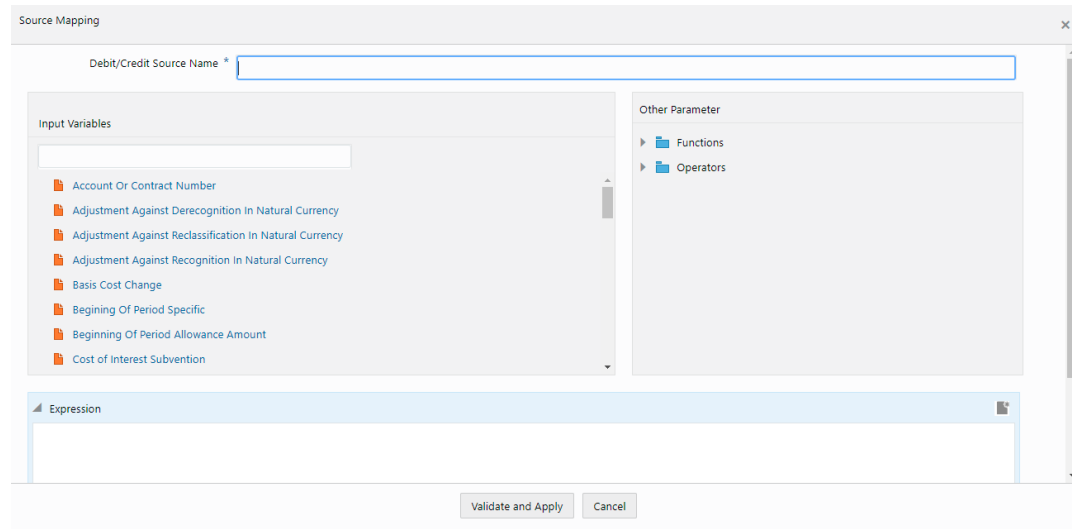
3. In the **Source Mapping** pane, click **Add**  to open the **Source Mapping** Window.

Figure 41: The Source Mapping Window



4. Populate the **Source Mapping** form as tabulated.

Table 35: The Source Mapping Pane

Field	Description
Debit/Credit Source Name*	Enter a name for the Debit or Credit Source. This is a mandatory field.
Input Variables	Select the required Input Variables from the list to populate the Expression Pane.
Functions	Select the required Functions from the drop-down list. The available Functions are: <ul style="list-style-type: none"> • AND • ABS • Case • Floor • Greatest • Least • MOD • OR
Operators	Select the required Operators from the drop-down list. The available Operators are: <ul style="list-style-type: none"> • Equal • Greater Than • Minus • Less Than • Plus

5. Click **Validate and Apply**.
 If you have not entered a value in the Debit/Credit Source Name field or added values in the **Expression** field, then an error message appears.
6. Click **Save** in the **Accounting Attribute Definition** Window.


25.4 Edit a Subledger Attribute

Perform the following steps to edit a subledger attribute:

1. In the **Subledger Accounting Attributes** table, select the checkbox adjacent to the subledger attribute that you want to edit.
2. Click **Edit**, to open the **Subledger Accounting Attributes** window.
3. Update the required fields. For more information, see [Create a New Subledger Accounting Attribute](#).
4. Click **Save**.
5. The saved attribute is displayed in the **Subledger Accounting Attributes** pane on the **Subledger Accounting Attributes Summary** window.

25.5 View a Subledger Attribute

Perform the following steps to view a subledger attribute:

1. In the **Subledger Accounting Attributes** table, select the checkbox adjacent to the Subledger attribute that you want to view.
2. Click **View**  to open the **Subledger Accounting Attributes** window.
3. Click **Cancel** to go back to the **Subledger Accounting Attributes Summary** window.

25.6 Delete a Subledger Attribute

Only Subledger attributes that are not used by a subledger definition are available for deletion. If you try to delete a subledger attribute that is used by a subledger definition, then an error message appears indicating the same. Perform the following steps to delete a subledger attribute:

1. In the **Subledger Accounting Attributes** table, select the checkbox adjacent to the Subledger attribute that you want to delete.
2. Click **Delete**.
3. Click **Yes**.

The selected Subledger Attributes are deleted.

26 Subledger

The granular level of data stored in the sub-ledger can be used to generate the accounting entries. It uses data along with implied allocations from allowance, provision, impairment gain or loss, and so on. The sub-ledger generates bookings and reports to feed out to general ledgers, management reporting, and analysis tools. By maintaining detailed data and handling complex calculations and reconciliations, it takes stress off general ledgers. Note that the application only picks up data from the latest ECL and CECL Run. This allows for GL consolidation, and cloud migration, and provides the accuracy and suitability of ledger data.

Subledger supports currency conversion. To enable or use this feature, the user must select the currency as reporting currency while creating the Subledger definition. Please note that the system should also have the currency rate for the currency conversion as per the **fic_mis_date** before calling the sub-ledger run to add the journal balances as per the selected reporting currency.

A new component GL_ACCOUNT_HIER, which is a General Ledger Hierarchy applicable for Subledger, has been added in the SETUP_MASTER Table. See the [Setting Up Setup Master Table section](#).

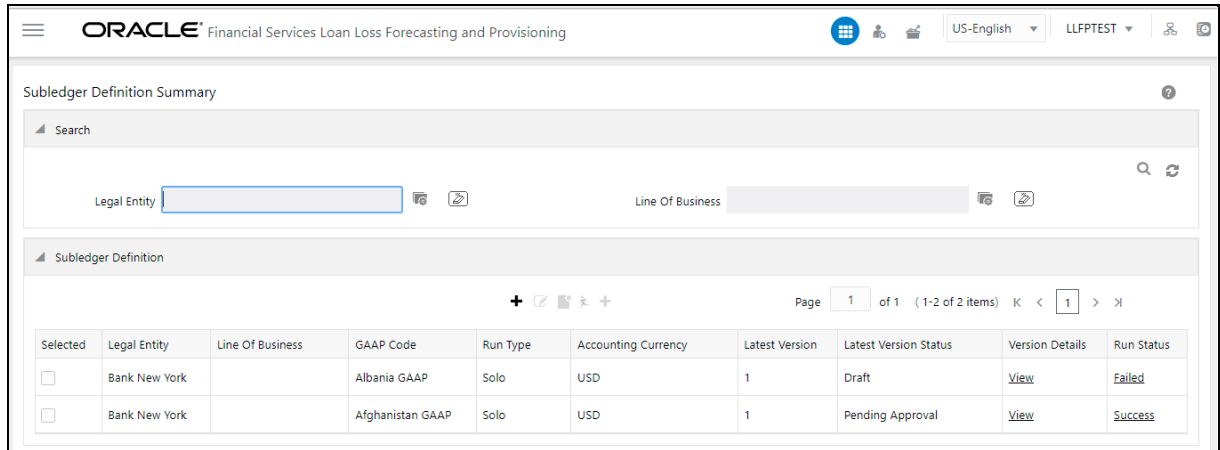
Topics:

- [Access Subledger](#)
- [Search for Subledger Definitions](#)
- [Map the Subledger Roles and Groups](#)
- [Create New Subledger Definition](#)
- [Edit a Subledger Definition](#)
- [View a Subledger Definition](#)
- [Execute a Subledger Definition](#)
- [View a Subledger Error Log](#)
- [Finalize a Subledger Run](#)
- [Create a New Version of the Subledger Definition](#)

26.1 Access Subledger

You can access the **Subledger** window by clicking the **Subledger** element from the left-hand side menu. When you click this element, the **Subledger** window is displayed:

Figure 42: The Subledger Definition Summary Window

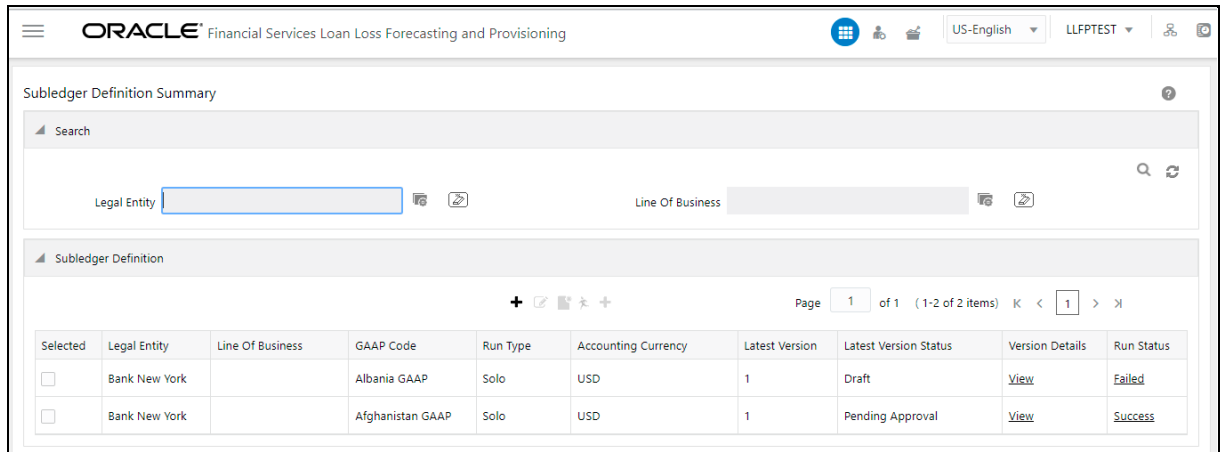


This window displays the existing sub-ledger definitions in the **Subledger Definition** pane. This window also enables you to define a new sub-ledger, edit the existing definitions, view the details of the existing definition, run the definitions, and create new versions of the existing definitions.

26.2 Search for Subledger Definitions

The **Search** feature enables you to filter the list of existing definitions and find the definitions that you require.

Figure 43: The Subledger Definition Summary Window



To search for definitions, select the required items from the **Legal Entity** and **Line Of Business** fields, and click **Search**.

The list of sub-ledger definitions in the **Subledger Definition** table is refreshed and the definitions that match your search criteria are displayed.

26.3 Map the Subledger Roles and Groups

Before you create Subledger definitions, perform the following User Role and Group Mappings and Approvals:

1. Log in as a System Administrator.
2. Navigate to **Identity Management**, followed by **Security Management, User Administrator, and User Maintenance**.
3. Add a new user definition.
For more information, see the **User Maintenance** section in the [OFS Analytical Applications Infrastructure User Guide](#).
4. Log in as a System Authorizer.
5. Navigate to **Identity Management**, followed by **Security Management, User Administrator, and User Authorization**.
6. Authorize the user that you created in step 3.
For more information about authorizing a user, see the User Authorization section in the [OFS Analytical Applications Infrastructure User Guide](#).
7. Log in as a System Administrator.
8. Navigate to **Identity Management**, followed by **Security Management, User Administrator, and User Group Map**.
9. Map the user to the *LLFP Application Approver Group* and *LLFP Application Analyst Group*.
For more information about mapping a user to a User Group, see the **User Group Map** section in the [OFS Analytical Applications Infrastructure User Guide](#).
10. Navigate to **Identity Management**, followed by **Security Management, User Administrator, and User Group Role Map**.
11. Map the User Group *UGLLFPANALYST* to *Sub Ledger Maker*, and then map the User Group *UGLLFPAPPROVER* to *Sub Ledger Checker*.
For more information about mapping a User Group, see the **User Group Role Map** section in the [OFS Analytical Applications Infrastructure User Guide](#).
12. Log in as a System Authorizer.
13. Authorize the mappings that you performed in step 11.
For more information about authorizing a user, see the **User Authorization** Section in the [OFS Analytical Applications Infrastructure User Guide](#).

NOTE

You can use the same user that you created in the preceding steps for performing actions in the Subledger Manual Adjustment feature.

26.4 Create New Subledger Definition

Perform the following steps to create new Subledger definitions:



NOTE If you want to import definitions created by you, then see the Object Migration Section in the [OFS Analytical Applications Infrastructure User Guide](#).

1. In the **Subledger Definition** Pane, click **Add**  to open the **Subledger Process** Window.

Figure 44: The Subledger Process Window

2. Populate the **Subledger Definition** Pane in the **Definition Details** tab.

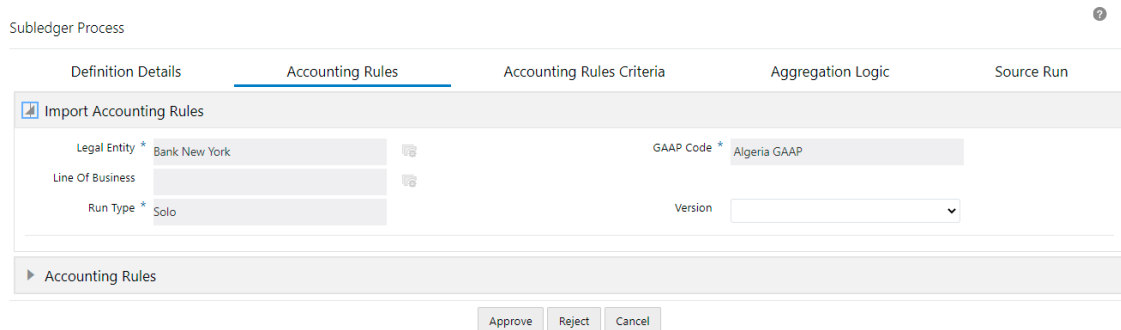
Table 36: The Subledger Definition Pane

Field	Description
Fields marked with asterisks (*) in the window are mandatory.	
Legal Entity*	Click Hierarchy Selection  adjacent to this field. Select the required Legal Entity from the Hierarchy Selection Window. For more information, see Hierarchy Selection .
GAAP Code*	Select a GAAP Code from the drop-down list.
Line of Business	Click Hierarchy Selection  adjacent to this field. Select the required Legal Entity from the Hierarchy Selection window. For more information, see Hierarchy Selection .
Status	This field is not editable and is in the <i>Draft</i> status.
Run Type	Select either Solo or Consolidated from the drop-down list.
Reporting Currency	Select a currency from the drop-down list.
Version	When creating a definition, the version is set to 0. You cannot change this value.
Effective From Date	Select an Effective Date from the calendar icon.

Field	Description
Select General Ledger Accounts	<p>Click Hierarchy Selection to select a value from the following fields:</p> <p>Note: You must create the members and hierarchies in the Member and Hierarchy Maintenance Window to populate data in this field. For more information about creating members and hierarchies, see the OFS Analytical Applications Infrastructure User Guide.</p> <ul style="list-style-type: none"> • Hierarchy Folder: Select a Hierarchy folder from the drop-down. • Hierarchy: Select a Hierarchy from the drop-down. • Members: Add or remove members from the Selected Members Pane. By default, all accounts will appear in this list.



3. Click **Save**.
4. Select the **Accounting Rules** Tab.

Figure 45: The Accounting Rules Tab



5. Populate the **Import Accounting Rules** pane in the **Accounting Rules** Tab.

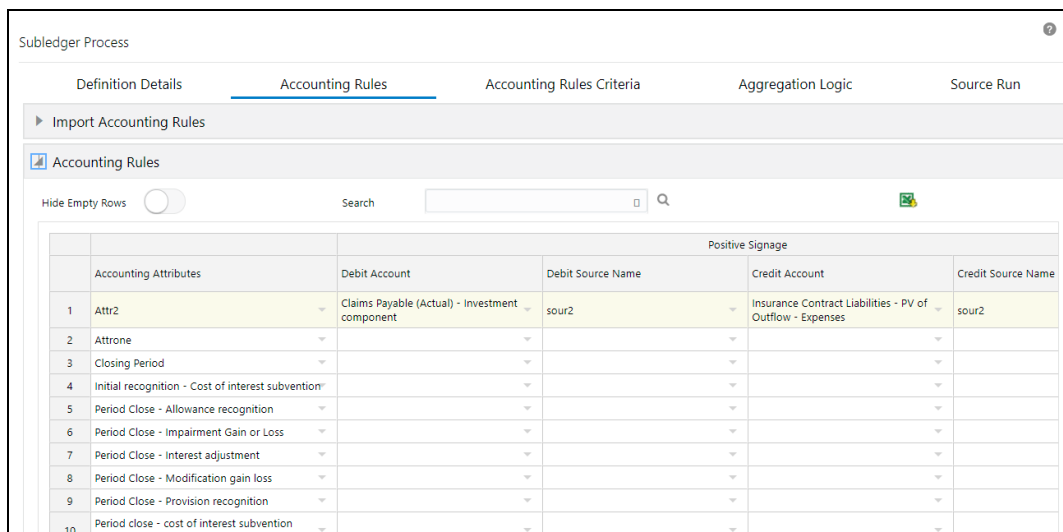
Table 37: The Import Accounting Rules Pane

Field	Description
Fields marked with asterisks (*) in the window are mandatory.	
Legal Entity	Click the Hierarchy Selection  adjacent to this field. Select the required Legal Entity from the Hierarchy Selection Window. For more information, see Hierarchy Selection .
GAAP Code	Select a GAAP Code from the drop-down list.
Line of Business	Click Hierarchy Selection  adjacent to this field. Select the required Legal Entity from the Hierarchy Selection Window. For more information, see Hierarchy Selection .
Run Type	Select either Solo or Consolidated from the drop-down list.

Field	Description
Version	When creating a definition, the version is set to 0. You cannot change this value.


- On the **Accounting Rules** Page, select the drop-down arrow to expand the table.

Figure 46: The Accounting Rules Tab with the Expanded Accounting Rules Pane




- Populate the **Accounting Rules** Pane.

Table 38: The Accounting Rules Pane

Field	Description
Hide Empty Rows	Click Enable  if you want to hide empty rows. When enabled, the empty rows in the Accounting Rules table are hidden.
Accounting Attributes	Select an attribute from the drop-down list.
Debit Account	Select a debit account from the drop-down list.
Debit Source Account	Select a debit source account from the drop-down list.
Credit Account	Select a credit account from the drop-down list.
Credit Source Account	Select a credit source account from the drop-down list.
Modify Accounts for Opposite Signage	Select this checkbox if you want to modify accounts for opposite signage.
Journal Comments	Enter the required journal comments for the Subledger.
Workflow Comments	Enter the required workflow comments for the Subledger.

The pane allows you to perform the following actions:

- Insert a new row before
- Insert a new row after
- Delete selected rows
- Copy

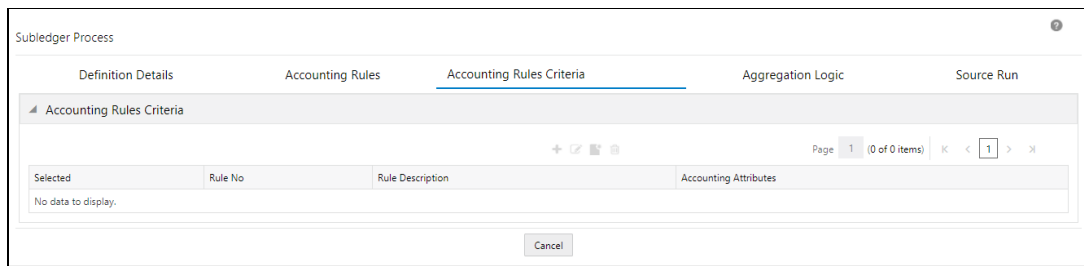
8. Additionally, click **Export Accounting Rules**  to download the Excel file on your system.
 - a. Fill the Excel file with the required data.
 - b. Copy the data from Excel and paste it into the respective columns in the **Copy Accounting Rules** Pane.


NOTE You must ensure the following:

- The data in the columns in the application must exactly match the data as per the columns in the **Accounting Rules** Excel. If the rules data was not added correctly, then the system will give you a validation error and you must add the rules data correctly in the corresponding columns in the application.
- Your system must contain the same GL entries as per the entries in the **Debit Account** column in the **Accounting Rules** Excel. If you copy and paste a GL entry that your system does not contain from Excel into the **Debit Account** column in the application, then the system will not validate it.

9. Click **Save**.
10. Click the **Accounting Rules Criteria** Tab.

Figure 47: The Accounting Rules Criteria Tab



11. Click **Add**  to open the **Accounting Rules Criteria** Window.
 - a. In the **Input Variables** Pane, select the required input variables from the list to populate the **Expression** Pane.
 - b. In the **Accounting Attributes** Pane, select the required accounting attribute from the list to populate the **Expression** Pane.

- c. In the **Other Parameters** Pane, select the required functions and operators. The following are the available functions and operators:
- Functions
 - AND
 - ABS
 - Case
 - Floor
 - Greatest
 - Least
 - MOD
 - OR
 - Operators
 - Greater than
 - Plus
 - Minus
 - Less Than
 - Equal
- d. After you have built your Expression, click **Validate and Apply**.

12. Click **OK**.

The condition is added to the Accounting Attribute.

NOTE A condition can be mapped to multiple attributes but an accounting attribute can be mapped only to a single condition. For example, you have created Condition A and Condition B. You have mapped Condition A to Accounting Attributes A1, A2, and A3. But the same Accounting Attributes cannot be mapped to Condition B.

13. Click the **Aggregation Logic** tab.

The **Aggregation Attributes** tab is displayed and contains the **Account Classification, Customer Type, IFRS Stage, Line of Business, POCI Flag, Products, Product Type, Segment, and TDR Flag**.

This tab allows you to aggregate the results and pass journal entries at a chosen consolidated level. Consolidated entries might give added insights into the impact of changes on the chosen grouping.

NOTE Only those Credit and Debit General Ledgers total balances that are associated with an Accounting Attribute are checked and added to the journal entry. This ensures that only balanced journal entries are passed. If there is an imbalance between the Accounting Attributes, then the Accounting Attributes General Ledger Balances will not be passed to the journal entries.

Figure 48: The Aggregation Logic Tab

Subledger Process

Definition Details Accounting Rules Accounting Rules Criteria **Aggregation Logic** Source Run

Aggregation Attributes

<input checked="" type="checkbox"/> Account Classification	<input type="checkbox"/> Customer Type	<input type="checkbox"/> Ifrs Stage	<input type="checkbox"/> Line of business
<input type="checkbox"/> POCI Flag	<input type="checkbox"/> Product type	<input type="checkbox"/> Products	<input type="checkbox"/> Segment
<input type="checkbox"/> TDR Flag			

Save Submit Cancel

14. Select the checkbox(s) adjacent to the required attributes.

15. Click **Save**.

16. Click the **Source Run** Tab.

Figure 49: The Source Run Tab

Subledger Process

Definition Details Accounting Rules Accounting Rules Criteria Aggregation Logic **Source Run**

Source Run

<input type="checkbox"/> CECL Run	<input checked="" type="checkbox"/> Expected_Credit_Loss_Run
-----------------------------------	--

Save Submit Cancel

17. Select the required Source Runs. This is the list of ECL and CECL Runs that have been executed. The Source Runs that appear in this tab, depending on the values that you selected in the **Legal Entity**, **Line of Business**, **Calculation Method**, **Run Type**, fields in the **Definition Details** tab

18. Click **Save**.

19. If you want to send it to the approver then click **Submit**.

The approval request can be done from the Inbox screen. Log in as a Checker, access the required definition, and then either Approve or Reject the definition after reviewing it. For more information refer to the [OFS AAI Administration Guide](#).

After a Subledger definition has been submitted for approval, you cannot modify any fields. You can modify the fields only if the Approver has rejected the Subledger definition.

The **Audit Trail** Pane at the bottom of the definition window displays the **Created By**, **Creation Date**, **Last Modified By**, and **Last Modification Date** details. The **User Comments** field enables you to add additional information as a comment.

26.5 Edit a Subledger Definition

Perform the following steps to edit subledger definitions:

1. In the **Subledger Definition** table, select the checkbox adjacent to the subledger definition that you want to edit.
2. Click **Edit**, to open the **Subledger Process** window.


3. Update the required fields. For more information, see [Create a New Subledger Definition](#).
4. Click **Save**.

The saved definition is displayed in the **Subledger Definition** table on the **Subledger Definition Summary** window.

The **Audit Trail** pane at the bottom of the definition window displays the **Created By**, **Creation Date**, **last modified by**, and **Last modification date** details. The **User Comments** field enables you to add additional information as a comment.

26.6 View a Subledger Definition

Perform the following steps to view subledger definitions:

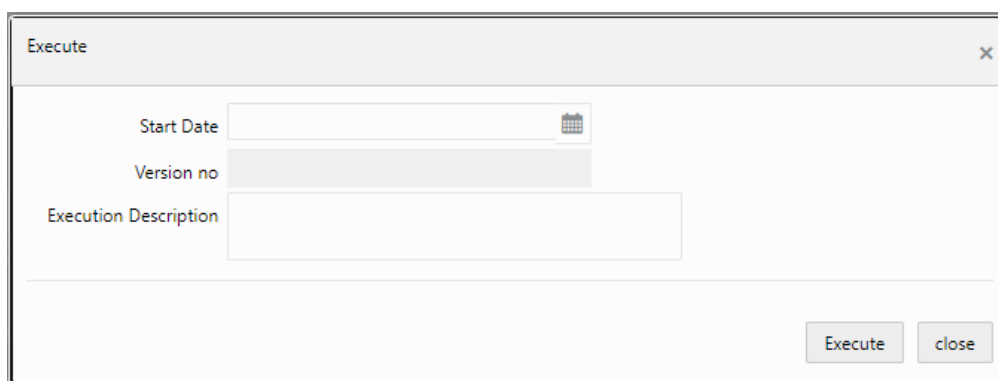
1. In the **Subledger Definition** window, select the checkbox adjacent to the **Subledger** definition that you want to view.
2. Click **View** , to open the **Subledger Process** window.
3. Click **Cancel** to go back to the **Subledger Definition** window.

26.7 Execute a Subledger Definition

Perform the following steps to execute subledger definitions:

1. In the **Subledger Definition** table, select the checkbox adjacent to the subledger definition that you want to run.
2. Click **Run**, to open the **Execute** window.

Figure 50: The Execute window



3. In the **Date Selection** window, click the **Calendar** icon and select a date.
4. In the **Version no** field, enter a version of the definition that you want to execute.
5. In the **Execution Description** field, enter a description.
6. Click **Execute**.

The selected **Subledger** definition is marked for execution.

26.8 View a Subledger Error Log

The subledger error logs can be viewed from the **Batch Monitor** screen from **Common Object Maintenance** and the **Subledger Definition Summary** page. To view the subledger error log from the **Batch Monitor** screen, see the [OFS AAI User Guide](#). Perform the following steps to view subledger error logs from the **Subledger Definition Summary** page:

1. On the **Subledger Definition Summary** page, in the **Run Status** column, select the status link corresponding to the sub-ledger definition that you want to view the error log for. The View Logger window appears.

Figure 51: The View Logger Window

2. Click the **Log File** drop-down list to select a log file.
3. Click **View Log** to populate the **Log File Components** pane.
4. Additionally, you can click **Download** if you want to download the selected log file.
5. Click **Close** to go back to the **Subledger Definition** window.

26.9 Finalize a Subledger Run

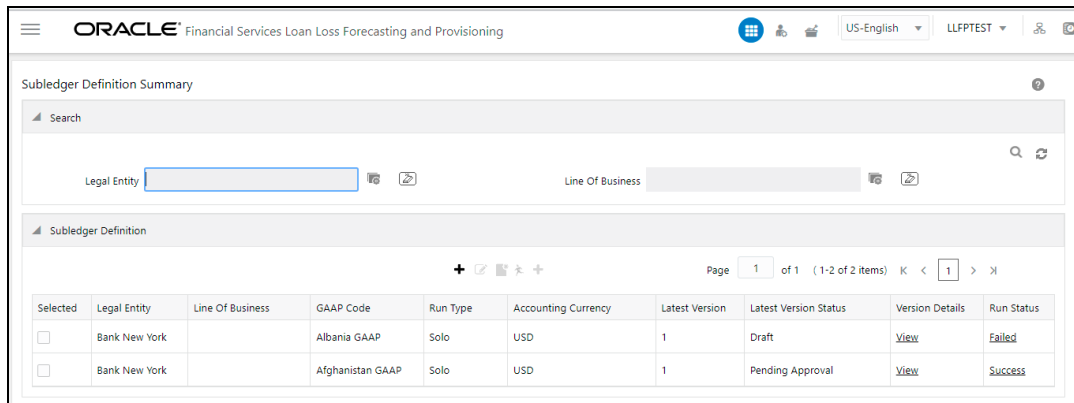
Finalizing a Subledger Run enables you to conclude the journal entries of the associated Base Run and Manual Adjustment Run. You cannot finalize a Run more than once. Finalization of a Subledger Run is done sequentially in the application, that is, only when the prior date's run is finalized, then only can the current year's Subledger Run be finalized. Before finalizing a Subledger Run, run the Base Subledger and approve it, then approve and run the Subledger Manual Adjustment (if any), then finalize the approval through the maker and checker process. Note that a Subledger Manual Adjustment definition can only be modified before the Run is finalized.

To finalize a **Subledger** Run from the **Subledger Definition Summary** Window, perform the following steps:

NOTE You cannot finalize a Subledger Run that contains imbalanced journals.

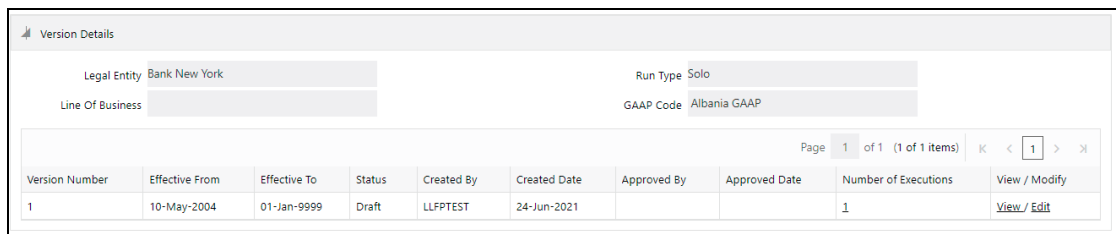
1. Log in as a Maker.
2. In the **Subledger Definition** Table, select the Subledger Definition that you want to send for approval to finalize.

Figure 52: The Subledger Definition Pane



3. In the **Version Details** column, click **View** to open the **Version Details** Pane.

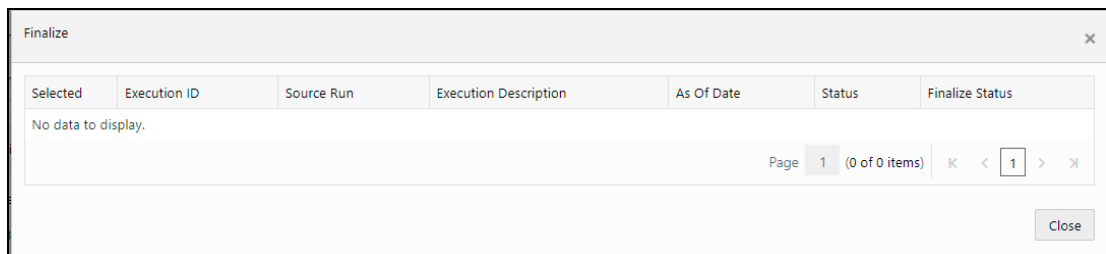
Figure 53: The Version Details Pane



4. In the **Number of Executions** column, click the link to open the **Finalize** Pane.

The number in the **Number of Executions** Column corresponds to the number of Source Runs that you selected in the [Source Run Tab of the Subledger Process Page](#). The Run is picked from the most recent FIC MIS Date.

Figure 54: The Finalize Pane



5. In the **Selected** column, select the check box adjacent to the Subledger Run that you want to send for approval, and then click **Submit**.

The selected Subledger Run is sent for approval.

6. After the Subledger Approver has approved the Subledger Run for finalization, repeat steps **2**, **3**, and **4**.
7. In the **Selected** column, select the check box adjacent to the Subledger Run that you want to finalize, and then click **Finalize**.

A message appears, confirming that the version was successfully finalized. You can also download the .txt file containing the imbalanced journals for a selected date.

26.10 Create a New Version of the Subledger Definition

Perform the following steps to create a new version of an existing subledger definition:

1. In the **Subledger Definition** table, select the checkbox adjacent to the subledger definition that you want to edit.
2. Click **New Version**, to open the **Subledger Process** window.

NOTE You can create new versions only for the Approved definitions.

3. Update the required fields. For more information, see [Create New Subledger Definition](#).
4. Click **Save**.

The saved definition is displayed in the **Subledger Definition** table of the **Subledger Definition Summary** window.

27 Subledger Manual Adjustment

The **Subledger Manual Adjustment** enables you to update the batch details of approved **Subledger** definitions. Complete all the Manual Adjustment tasks before finalizing a subledger definition as a Subledger Manual Adjustment definition can only be modified before the run is finalized.

NOTE For a Subledger Manual Adjustment Definition, that contains the base Subledger run with the aggregation logic as **Product** or **Product Type**, the user should define the hierarchy in the **Dimension Management** section of the application for the **Product/Product Type** or load the same through the **DRM Loader Batch**. This enables the user to access it in the **Subledger Manual Adjustment** screen.

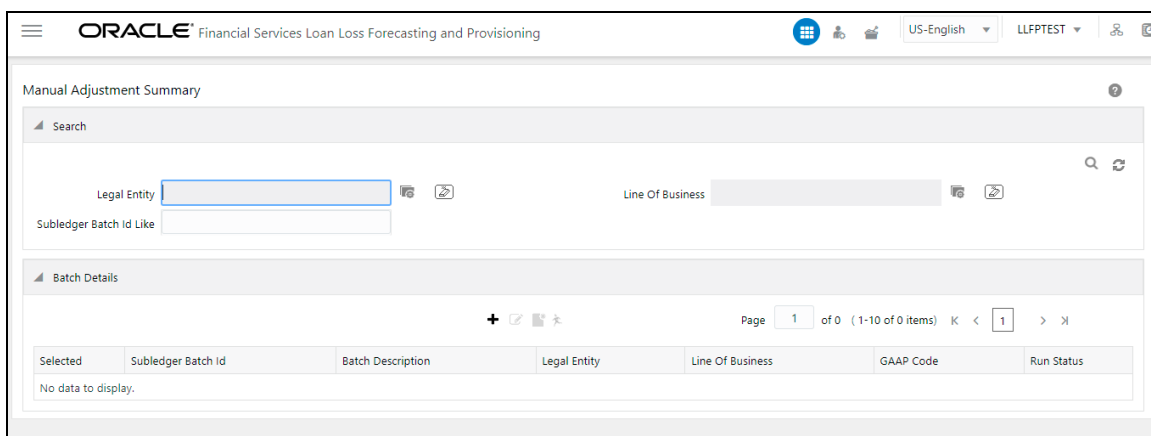
Topics:

- [Access Subledger Manual Adjustment](#)
- [Search for Subledger Manual Adjustment Definitions](#)
- [Create New Subledger Manual Adjustment Definition](#)
- [Edit a Subledger Manual Adjustment Definition](#)
- [View a Subledger Manual Adjustment Definition](#)
- [Run Subledger Manual Adjustment Definition](#)

27.1 Access Subledger Manual Adjustment

You can access the **Subledger Manual Adjustment** window by clicking the **Subledger Manual Adjustment** element from the left-hand side menu. When you click this element, the **Manual Adjustment Summary** window is displayed:

Figure 55: The Manual Adjustment Summary Window



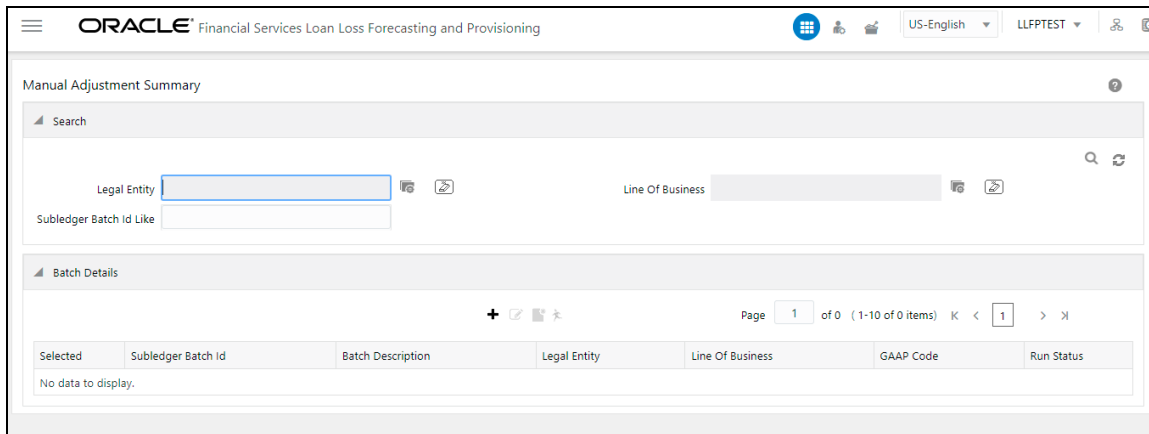
The screenshot shows the Oracle Financial Services Loan Loss Forecasting and Provisioning interface. The main window is titled "Manual Adjustment Summary". It features a search bar with filters for "Legal Entity", "Subledger Batch Id Like", and "Line Of Business". Below the search filters is a "Batch Details" section containing a table. The table has columns for "Selected", "Subledger Batch Id", "Batch Description", "Legal Entity", "Line Of Business", "GAAP Code", and "Run Status". The table currently displays "No data to display." The page navigation shows "Page 1 of 0 (1-10 of 0 items)".

This window displays the existing **Subledger Manual Adjustment** definitions in the **Batch Details** table. This window also enables you to define the new **Subledger Manual Adjustment Definition**, edit the existing definitions, view the details of the existing definition, and run the definitions.

27.2 Search for Subledger Manual Adjustment Definitions

The **Search** feature enables you to filter the list of existing definitions and find the definitions that you require. To search for definitions, enter the required keywords in the **Legal Entity**, **Line Of Business**, and **Batch ID Like** fields, and click **Search**.

Figure 56: The Manual Adjustment Summary Window



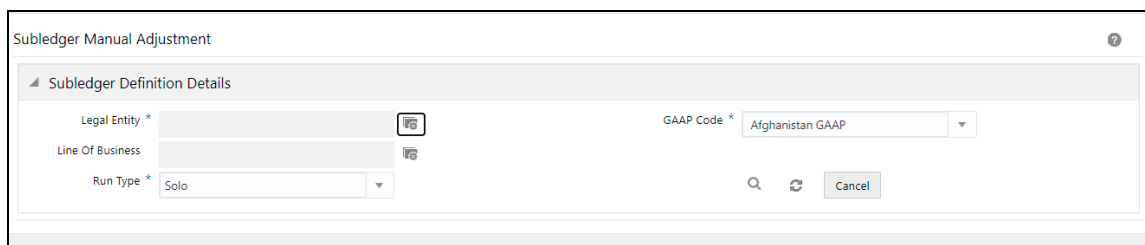
The list of subledger manual adjustment definitions in the **Batch Details** table is refreshed and the definitions that match your search criteria are displayed.

27.3 Create New Subledger Manual Adjustment Definition

Perform the following steps to create new subledger manual adjustment definitions:



1. In the **Subledger Manual Adjustment** table, click **Add**, to open the **Subledger Manual Adjustment** window.


Figure 57: The Subledger Manual Adjustment Window

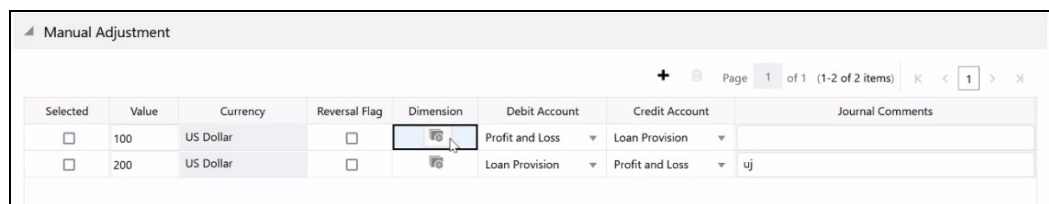


2. Populate the **Subledger Definition Details** pane.

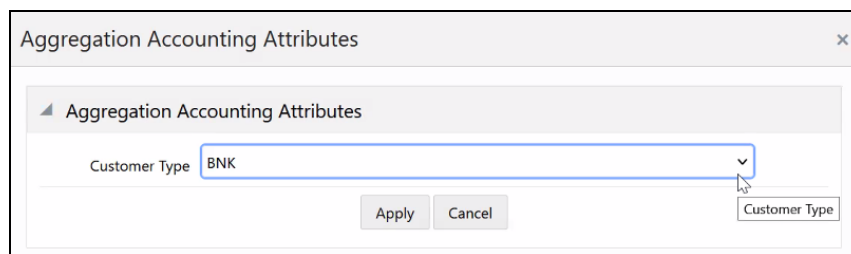
Table 39: The Subledger Definition Details pane

Field	Description
Fields marked with asterisks (*) in the window are mandatory.	
Hierarchy Folder	Select a folder from the drop-down list.
Legal Entity	Click Hierarchy Selection  adjacent to this field. Select the required Legal Entity from the Hierarchy Selection window. For more information, see Hierarchy Selection .
Line of Business	Click Hierarchy Selection  adjacent to this field. Select the required Legal Entity from the Hierarchy Selection window. For more information, see Hierarchy Selection .
GAAP Code	Click the drop-down list adjacent to this field and select a GAAP Code .
Run Type	Click the drop-down list adjacent to this field and select the option either Solo or Consolidated .

3. Click the **Search**  icon.
4. Click the drop-down list adjacent to the **Reporting Currency** field and select a currency.
5. Click the drop-down list adjacent to the **Status** field and select a status.
6. Click the calendar icon adjacent to the **FIC MIS Date** field and select a date from the calendar.
All the executions performed on the selected date are displayed in the **Execution ID** dropdown.
7. Click the drop-down list adjacent to the **Execution ID** field and select an execution ID.
8. In the Manual Adjustment Pane, click the Dimension Icon.



9. In the Aggregation Accounting Attributes Window, select the required Dimension and then click **Apply**.



10. Click **Submit**.

11. Click **Save**.

27.4 Edit a Subledger Manual Adjustment Definition

Perform the following steps to edit subledger manual adjustment definitions:

1. From the **Batch Details** table, select the checkbox adjacent to the **Subledger Manual Adjustment** definition you want to edit.
2. Click **Edit**. To open the **Subledger Manual Adjustment** window.
3. Update the required fields. For more information, see [Create a New Subledger Manual Adjustment Definition](#).
4. Click **Save**.

The saved definition is displayed in the **Batch Details** table on the **Manual Adjustment Summary** window.

27.5 View a Subledger Manual Adjustment Definition

Perform the following steps to view subledger manual adjustment definitions:

1. In the **Batch Details** window, select the checkbox adjacent to the subLedger manual adjustment definition that you want to view.

2. Click **View**  to open the **Subledger Manual Adjustment** window.

This window displays the aggregation attributes and accounting rules details as well.

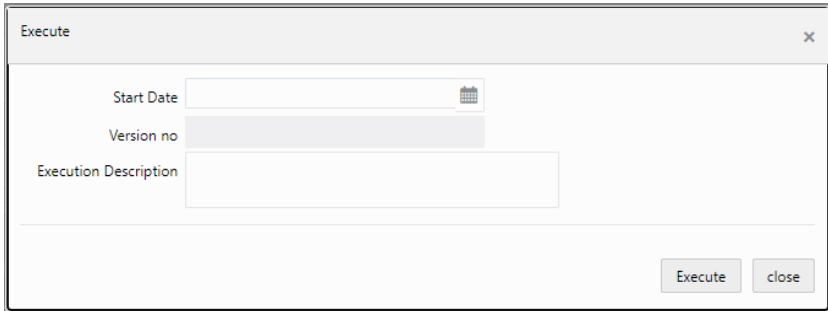
3. Click **Cancel** to go back to the **Batch Details** window.

27.6 Run Subledger Manual Adjustment Definition

Perform the following steps to run subledger manual adjustment definitions:

1. In the **Batch Details** table, select the checkbox adjacent to the **Subledger Manual Adjustment**.
2. Click **Run**.

Figure 58: The Execute window



3. In the **Execution** window, enter the start date in the **Start Date** field.

4. In the **Execution Description** field, enter a description.
5. Click **Execute**.

The selected subledger manual adjustment definition is marked for execution.

28 Loss Forecasting

Apart from calculating the provision, by EL and IL approach, OFS Loan Loss Forecasting and Provisioning forecasts the losses by using ratings or days-past-due matrices based on the number of customers or the total amount of exposures across product types. The loss forecast component doesn't report the losses for the future period; instead, it predicts the status of the exposure count or exposure amount.

For example: For the current period if the total exposure count at a given product type is 3000 and the forecasted PD for period 1 is 10%, then the loss forecasted value would be 300, then 2700.

The user input matrices would differ in their frequency ranging from a month to one year. The forecasted period is based on the least available frequency to five (5) periods for rating based and twenty-four (24) periods for days-past-due (DPD) based. The loss forecasting procedure is computed as follows:

- **Determination of Min Frequency:** Minimum frequency period of the matrices for both rating-based and days-past-due-based is used as an input for the Poisson process, to bring down all the other matrices to the common platform of frequency.

For example: For a given set of exposures if the matrix frequency period ranges from Monthly, Quarterly, Half-yearly to Yearly, the minimum frequency period of all the matrices available (monthly) will be used as a base frequency for the other matrices to undergo the Poisson process. The forecasting is done for five (5) months for rating based and twenty-four (24) months for DPD based, excluding the current period.

- **Loss forecast for Current Period:** For current period values, the LLFP application will just populate the summation of the values on the given dimension. This will not need any matrix intervention. Normally, the loss forecast is done on predetermined dimensions like product type, product, asset class, and so on. Hence, while reporting the current period; LLFP will sum up the values across the selected dimensions for both exposure count and exposure amount level.
- **Poisson Parameter:** The Poisson process is initiated after the successful assignment of Individual exposures undergoing the Expected Loss or Incurred Loss approach to the transition matrix. The matrix is assigned based on predetermined dimensions, Customer type, product type, and currency. All the matrices irrespective of the frequency applicability will undergo the Poisson parameter.

Poisson Parameter = $1 - \exp(-?) = ?$; where ? = the probability of default values for a given period.

- **Calculation of Probability of Defaults:** The default values for the forecasted period, 5 periods or 24 periods, are loaded by using time-homogeneous and time-non-homogeneous matrices. For those matrices with variant frequency, the Poisson process of decomposition is used to trickle down the matrices to a common platform of frequency and then loaded for the respective periods.
- **Customer count & Exposure amount:** The LLFP application supports the forecast based on the customer count and exposure amount. Under the given dimensions, Product Type, Geography, and so on, the sum of exposures or amount of exposures is multiplied with the corresponding default values. For the second consecutive period, the output of the first period is multiplied by the corresponding default values, and so on.

29 Reinsurance Contracts

Reinsurance is a transaction where the insurance company, the reinsurer, agrees to indemnify another insurance company, the reinsured or cedent or primary company, against all or part of the loss that the latter sustains under a policy or policies that it has issued. For this service, the ceding company pays the reinsurer a premium. The purpose of reinsurance is the same as that of insurance: to spread risk. The reinsurance receivables are receivable recognized by an insurer or a captive insurance entity for amounts recoverable under a reinsurance agreement.

As per the FASB guidelines, the allowance for credit loss must be computed for the reinsurance contracts held by the insurance company. The following formula is used in the computation of allowance for credit loss for reinsurance contracts held:

$$ECL = \text{Reinsurance Claim Outstanding Amount} * PD * \text{Loss Given Default}$$

30 General Features of LLFP

This section contains information about the general features of the OFS Loan Loss Forecasting and Provisioning application.

30.1 Elimination of Inter-Company in Accounts

While moving data into Processing Area, the OFS Loan Loss Forecasting and Provisioning application remove all accounts for which the counterparty is a legal entity under its organizational structure. This is only applicable for executing Runs on a consolidated basis.

31 Preparing for Execution

The main objective of this chapter is for you to get familiarized with the various requirements of LLFP before data execution.

This chapter is classified into the following:

- [Important Metadata Definition](#)
- [Setting up Application Preferences Table](#)
- [Setting Up Setup Master Table](#)

To know about Stage tables, Batches, and underlying Tasks, see OFS Loan Loss Forecasting and Provisioning Run Chart and Download Specification documents in MOS.

31.1 Important Metadata Definition

This section provides information about the important metadata definitions.

31.1.1 Loading Data for Execution

Perform the following steps to load data in OFS Loan Loss Forecasting and Provisioning, before execution:

1. Load Data to all the Stage tables.
2. Run the seeded batches to populate corresponding DIM or FSI tables.
3. Save the Hierarchies using one of the following options:
 - One at a time by resaving from the **Hierarchy** window.
 - From the **Save Metadata** window, by selecting all the required hierarchies simultaneously.
4. Navigate to the **Rule** window and select the relevant nodes and configure the mapping.

31.1.2 Rating Reclassification

It populates rating data and reclassifies external ratings to internal ratings. Data population is done using T2T and reclassification is done using a Type 2 rule External Rating to Internal Rating Reclassification. The current Application supports only 1-1 mapping of External Rating to Internal Rating. This rule is expected to be reviewed and customized based on the internal rating and mapping strategy of the bank.

NOTE As each rating has its unique characteristics, it is required to map each external rating to a unique internal rating.

31.1.3 Market Data Population

It populates Interest Rate data and Exchange Rate data using T2T IRC_DATA_POPULATION and EXCHANGE_RATE_DATA_POPULATION respectively. Runkey marked as -1 will be the actual historical data. For each run, data from -1 will be populated with the execution Runkey in the same table.

Provision Matrix method assigns a provision rate to an account based on rating or delinquency band as per mapping. To select the treatment, each account is mapped to an approach based on the following criteria:

- Impairment Status
- Customer Type
- Product

This rule is expected to be reviewed and customized based on the data and mapping strategy of the bank.

31.1.4 Provision Matrix Mapping

The Rules associated with this task are the following:

- Provision Matrix Assignment

Accounts for which cash flow cannot be predicted, or is not available, can be treated with the provision matrix method wherein the provision rate is assigned to an account based on its rating or delinquency days, or both. If Provision Matrix is only rating-based then the delinquency band given at the account level, if any, is ignored, and vice-versa for the delinquency-based matrix.

The provision rate for the accounts having the same rating or delinquency band may vary across products, customer types, or impairment status. Hence, Provision Matrix is mapped based on the following criteria:

- Impairment Status
- Customer Type
- Product

This rule is expected to be reviewed and customized based on the data and mapping strategy of the bank.

31.1.5 Basel Reclassification

The Rules associated with this task are the following:

- Basel Customer Type Reclassification
- Basel Product Type Reclassification
- Basel Asset Class Reclassification

For regulatory reporting and consolidation purposes, bank products and customers need to be reclassified to Basel product type and Basel customer type respectively. Also, Basel customer type and Basel Product Type are reclassified to Basel Asset class for the future purpose of regulatory capital calculation and reporting.

This rule is expected to be reviewed and customized based on the data and mapping strategy of the bank.

31.1.6 Collective Assessment

The Rules associated with this task are the following:

- Collective Assessment Assignment Rule

- Cohort_Identification DT

To improve overall process efficiency to generate cash flow accounts having similar characteristics - typically small in value and large in volume accounts like retail accounts - are grouped to form a cohort. Cash flow and allowance are then, calculated at the cohort level. Amortized cost and allowance calculated at the cohort level are allocated back to the account level based on the allocation factor of an account. The allocation factor is typically carrying the amount of an account in the cohort.

31.1.7 Gross Charge-off Threshold

The Rules associated with this task are the following:

Charge-off Materiality Assignment

This rule sets the materiality flag based on for gross charge-off amount to be considered for Provision calculation.

31.2 Setting Up Application Preferences Table

The following table provides details about how to set up the application preferences table.

Table 40: The Application Preference Table

Name	Table or Column Name	Description
TABLE NAME	FSI_LLFP_APP_PREFERENCES	This table allows you to set certain one-time preferences. These preferences guide the application while performing various functionalities.
COLUMN NAMES	N_TM_HIST_DATA_CAP	The value in this column indicates the number of historical periods the application parses through, to generate an average Historical Transition Matrix. Accepted Values: Positive Integers
	V_TM_HIST_DATA_CAP_UNIT	The value in this column indicates the unit of frequency of historical periods the application needs to parse through, to generate an average Historical Transition Matrix. Accepted Values: Y, H, Q, and M
	N_TM_PROJ_CAP	The value in this column indicates the number of periods the transition matrices are projected into the future for various computations. Accepted Values: Positive Integers
	V_TM_PROJ_CAP_UNIT	The value in this column indicates the unit of the period the transition matrices are projected into the future for various computations. Accepted Values: Y, H, Q, and M

Name	Table or Column Name	Description
	SEGMENT_TYPE_CD	The value in this column indicates the Segment Type that is considered by the LLFP application. Accepted Values: Any value from the SEGMENT_TYPE_CD column of the FSI_SEGMENT_TYPE_CD table.
	N_PD_MODEL_PROJ_CAP	The value in this column indicates the number of ANNUAL periods over which the PD term structure is arrived at. Accepted Values: Positive Integers
	V_LOSS_RATE_HIST_DATA_CAP_UNIT	The value in this column indicates the unit of frequency of historical periods for which the application generates Historical Loss Rates. Accepted Values: Y, H, Q, and M
	N_LOSS_RATE_HIST_DATA_CAP	The value in this column indicates the number of historical periods for which the application generates Historical Loss Rates. Accepted Values: Positive Integers
	V_PD_INTERPOLATION_METHOD	The value in this column indicates the technique that will be used for PD interpolation or extrapolation. Accepted Values: List of values from the V_PARAM_VALUE_CODE column of RUN_PARAMETERS_LOV table, where the value of the V_PARAM_ID column is PD_INTERPOLATION_MTHD .

NOTE Any changes in values to the **N_TM_HIST_DATA_CAP**, **V_TM_HIST_DATA_CAP_UNIT**, **V_LOSS_RATE_HIST_DATA_CAP_UNIT**, and **N_LOSS_RATE_HIST_DATA_CAP** columns will require re-execution of all the pre-executed Runs such as Historical Transition Matrix and Historical Loss Rate.

Any changes in values to the **N_TM_PROJ_CAP**, **V_TM_PROJ_CAP_UNIT**, and **N_PD_MODEL_PROJ_CAP** columns will require redefinitions for the PD model and economic scenario, as this will change the number of periods for which the definition is made.

NOTE N_TM_HIST_DATA_CAP is converted into several periods, based on the transition frequency set by Transition Matrix Frequency Assignment Rule, starting from the current FIC MIS DATE.

For example, if the historical cap is set as 1 Y in the Application Preference Table and the transition frequency is set as Quarterly, the Historical Transition Matrix Run will look for historical data from three previous quarters.

31.3 Setting Up Setup Master Table

The following table provides details about setting up the setup master table.

Table 41: The Setup Master Table

Name	Table or Column Name	Description
Table Name	SETUP_MASTER	This table allows you to set certain one-time preferences. These preferences guide the application while performing various functionalities.
Component Codes	BASE_LOAD_RUN_ID	This value in this column indicates the preferred Load Run ID (n_load_run_id) selection. LLFP application will load and process the complete dataset for the selected Load Run ID. Accepted values are 0, 1, etc. The default value is set to 0.
	DEFAULT_GAAP	Enter the default GAAP code to be used to filter the accounts for processing. Accepted Values: Any GAAP Code from DIM_GAAP
	LLFP_ACCOUNTS_TO_PROC	The value in this column indicates the number of accounts to be processed in a batch. Accepted Values: Any number starting from 1, depending on the hardware size. Default Seeded Value: 200000
	LLFP_SLICE_COUNT	The value in this column indicates the number of slices of instrument data that must be chunked. Default Value: -1 Accepted Values: Any number starting from 1, depending on the hardware size.
	DEFAULT_FX_RATE_SRC	Default FX Rate Source Example of Accepted Values: BLOOMBERG

Name	Table or Column Name	Description
	LLFP_PARALLEL_DOP	The value in this column indicates the Degree of Parallelism for the execution of DT. Accepted Values: Any numeric value based on the hardware size.
	MIN_ECL_COHORT_SIZE	A minimum number of accounts will form part of the ECL cohort. Example of Accepted Values: 50
	LLFP_PREFERRED_RATING_ST_LT_IND	The value in this column indicates the LLFP Default Rating Type Indicator, S, or L. Accepted Values: S or L
	DT_LOG_LEVEL	The value in this column indicates the log level as Debug or Error. Accepted values: 0 for Debug or 1 for Errors
	GL_ACCOUNT_HIER	General Ledger Hierarchy applicable for Subledger. The value should correspond to the applicable HIERARCHY_ID in the table DIM_GENERAL_LEDGER_HIER.

32 Execution

The main objective of this chapter is for you to get familiarized with the data execution process.

32.1 Data Quality Framework

Data from the staging table is checked for quality of data. Any erroneous data that is not processed and is reported in the log file.

SCD is executed in the following order:

1. Dimension Data Population
2. Account Data Population
3. Account Inception Rates
4. Market Data Population
5. Semi Static Data Population
6. PD Term Structure Population

There is one base run each for the EL and IL approach of LLFP. The provision Matrix method and Recovery Rate method are part of both Runs. In the EL run, an account can be mapped to either of the EL, Provision Matrix, or Recovery Rate methods. Similarly, in the IL run, an account can be mapped to either IL, Provision Matrix, or Recovery Rate method.

Output Table Population batch is used to populate the provision amount to the **FCT_LLFP_OUTPUT** table for the OBP-CSA interface to fetch the output data.

32.2 Process Modelling Framework

Process Modeling Framework (PMF) is a design and execution framework that enables Process Pipeline developers to implement various Pipelines modeled by business analysts. Process Pipeline developers use the framework to orchestrate the Business Pipelines and Run Pipelines within OFSAA, and also to design the artifacts that participate in the Pipelines, to complete their implementation.

The Process Modeling Framework consists of Process Modeling components for modeling Pipelines and Process Monitor components for monitoring instantiated Pipelines of OFSAA applications.

For more information about PMF, see [OFSAAI Process Modelling Framework Orchestration Guide](#).

32.3 Manual Stage or Classification Reassignments

The Manual Stage Reassignments or Overrides UI enables you to manually update any stage that was assigned to every account by the application using the Stage Determination rules. The stage is assigned through the Stage Determination run.

The manual reclassification of stage determination involves two steps:

- Manual reclassification step
- Approval process

The users who have the Maker, manual reclassification step, and privileges can update the rating using the **Stage Reassignment** section of the Maker Stage and Classification Reassignment module.

The approval or rejection process is performed by the user who has the Checker privileges. The checker can use the **Stage Reassignment** section of the Checker Stage and Classification Reassignment module to approve or reject the reassignments done by the user who had the Maker privileges.

32.3.1 Access the Maker or Checker Stage and Classification Reassignment Module

You can access the Maker or Checker Stage and Classification Reassignment Module by clicking the **Maker Stage and Classification Reassignment** or **Checker Stage and Classification Reassignment** link from the LHS menu of the application home page. You will be able to see the Maker Stage Reassignment or **Checker Stage Reassignment** link depending on the user privileges assigned to you.

32.3.2 Maker - Stage and Classification Reassignment Process

Performing the following steps to retrieve the list of accounts, which have undergone Stage Determination Run by:

1. Select a value from the **Stage Determination Run** drop-down list.
2. Select a value from the **Execution Date** drop-down list.
3. Select a value from the **Run Execution Name** and **Run Skey** in the drop-down lists.
4. Enter any or all of the following details to filter your search:

Table 42: The Stage Determination form

Field	Description
Customer ID	Enter the Customer ID of the account, on which you want to perform manual reassignment.
Account ID or No	Enter the Account ID or No of the account, on which you want to perform manual reassignment.
Customer Name	Enter the Customer Name of the account, on which you want to perform manual reassignment.
Customer Type	Select the Customer Type from the drop-down list.
Product Type	Select the Product Type from the drop-down list.
Line of Business	Select the Line of Business from the drop-down list.
Country	Select the Country from the drop-down list.

Industry	Select the Industry from the drop-down list.
Previous Reported Stage	Select the Previous Reported Stage from the drop-down list.
Impaired	Select the Impaired from the drop-down list.
Restructured	Select the Restructured from the drop-down list.
Application Assigned Stage	Select the Application Assigned Stage from the drop-down list.
Workflow Status	Select the Workflow Status from the drop-down list. Available values are the following: <ul style="list-style-type: none"> • Approved • Pending for Approval • Rejected • Saved
Show Non - Overridden Accounts	Select the radio button adjacent to the Show Non - Overridden Accounts if you retrieve the rating information related to the non-overridden accounts. If this option is selected, the Workflow Status is disabled.
Defaulted	Select Defaulted from the drop-down list. Available values are the following: <ul style="list-style-type: none"> • Yes • No
Classification	Select the required Classification from the drop-down list.
POCI	The default status of POCI is set to N.

5. Click Search.

The account details with the selected search criteria are displayed under the Selective Reassignment list table. The accounts are listed with the Customer ID, Customer Name, Account ID or No, Customer Type, Product Type, Previous Reported Stage, Application Assigned Stage, Stage Reassigned, Classification, Reassign Classification, and Justification details. Here, the UI mandates the use of at least one filter before clicking **Search**.

6. Select the checkboxes adjacent to the Customer IDs of the accounts you wish to reassign stages.
7. Reassign stages from the drop-down under the **Stage Reassigned** column for the selected accounts.
8. Reassign classification from the drop-down under the **Classification Reassigned** column for the selected accounts.
9. Enter the justification for reassigning stages in the **Justification** column.

If you want to reassign the stages of all the accounts in the **Selective Reassignment** list, perform the following:

10. In the **Group Reassignment** table, select the checkbox adjacent to the **Apply to all accounts** field.
11. Select the required stage from the **Stage Reassigned** drop-down list.
12. Select the required stage from the **Classification Reassigned** drop-down list.
13. Enter the justification for reassigning stages in the **Justification** column.
14. Click **Apply** and then click **Save**.
15. Click **Submit**.

You have the option to execute the stage determination to run multiple times on any FIC_MIS_DATE. By default, the ECL computation process will take the latest stage determination to run data for processing.

However, the user has the option to determine which stage determination run must be processed for ECL calculation purposes. When you click **Finalize Run**, a pop-up is displayed with the number of accounts in each workflow status and asks for a confirmation to mark a run as final. After a Run is marked as final, no more changes are allowed on that Run.

It is possible to mark another Run as final, even after a specific Run is already finalized. The pop-up additionally highlights that another Run is marked as final if the user confirms to override the same.

32.3.3 Checker - Stage and Classification Reassignment Approval or Rejection Process

Performing the following steps to retrieve the list of accounts, which have undergone Stage Determination Run by:

1. Select a value from the **Stage Determination Run** drop-down list.
2. Select a value from the **Execution Date** drop-down list.
3. Select a value from the **Run Execution Name** and **Run Skey** drop-down lists.
4. Enter any or all of the following details to filter your search:

Table 43: The Stage Determination Run form

Field	Description
Customer ID	Enter the Customer ID of the account, on which you want to perform manual reassignment.
Account ID or No	Enter the Account ID or No of the account, on which you want to perform manual reassignment.
Customer Name	Enter the Customer Name of the account, on which you want to perform manual reassignment.
Customer Type	Select the Customer Type from the drop-down list.

Product Type	Select the Product Type from the drop-down list.
Line of Business	Select the Line of Business from the drop-down list.
Country	Select the Country from the drop-down list.
Industry	Select the Industry from the drop-down list.
Previous Reported Stage	Select the Previous Reported Stage from the drop-down list.
Impaired	Select the Impaired from the drop-down list.
Restructured	Select the Restructured from the drop-down list.
Application Assigned Stage	Select the Application Assigned Stage from the drop-down list.
Workflow Status	The Workflow Status is set to Pending Approval for the user with checker privileges. This is to list all the reassignment approval requests only.
Defaulted	Select Defaulted from the drop-down list. The available values are: <ul style="list-style-type: none"> • Yes • No
Stage Reassigned	Select the reassigned stage from the drop-down list.
Classification	Select the required Classification from the drop-down list.
POCI	The default status of POCI is set to N.

5. Click Search.

The account details with the selected search criteria are displayed under the Selective Reassignment list table. The accounts are listed with the Customer ID, Customer Name, Account ID or No, Customer Type, Product Type, Previous Reported Stage, Application Assigned Stage, Stage Reassigned, App Assigned Classification, Reassigned Classification, and Justification details. Here, the mandatory use of the filter is NOT applicable.

- 6.** Select the checkboxes adjacent to the Customer IDs of the accounts you want to approve or reject the reassignment.
- 7.** Select **Approve or Reject** from the drop-down under the **Decision, Approve, or Reject**, column for the selected accounts.
- 8.** Enter the comments for approving or rejecting the stage reassignment in the **Approver Comments** column.

9. If you want to approve or reject the reassignment of all the accounts in the Selective Reassignment list, perform the following:
 - e. Select the checkbox adjacent to the **Apply to all accounts** field under the **Group Reassignment** table.
 - f. Enter the approver comments for approving or rejecting the reassignment in the **Approver Comments** column.
 - g. Select the required decision as **Approve** or **Reject** from the **Decision** drop-down list.
10. Click **Apply**.
11. Click **Submit**.

32.4 Legal Entity based Security for Data and Metadata

This feature enhances the security of the LLFP application if multiple legal entities are using the same application instance. The feature facilitates the restriction of user access within the scope of a particular legal entity. The access is restricted in such a way that the user can view or execute the DATA and the METADATA of the legal entity to which the user is mapped one or many. The user is also restricted from viewing the data and metadata of other entities to which the user is not mapped to.

This has coverage in the following areas of the application:

- [Folder or Segment based Security](#)
- [Stage Reassignment Windows](#)

32.5 Folder or Segment based Security

In OFSAA, the metadata is specific to a folder or segment. That is, the Metadata within one folder is not available under other folders. Also, the application is enabled with folder-mapper security using which, user groups are mapped to specific folders or segments. Using these features, user access is restricted to specific metadata based on the legal entity to which the user or user group is mapped.

This is achieved using the following enhancements:

- Creating Legal Entity specific Folders
- Mapping User Groups to specific Folders, based on the Legal Entity they belong to.
- Mapping User Groups to specific Legal Entities, using the Mapper feature, which is available as part of AAI.

Because a folder is specific to a legal entity and user groups are mapped to both Legal entities and folders, implicitly, each User Group, thereby a user under that User Group, can access only those Folders which are specific to the legal entity to which they have been assigned.

32.5.1 Map Maintenance and Mapper Maintenance

The **Map Maintenance** section of the OFSAAI enables you to map Legal Entities with User Groups. The application expects you to create the Legal Entities and User Groups from the respective OFSAAI modules.

Once the required number of Legal Entities and User Groups are created, you can create Mapper Definitions from the **Map Maintenance** section of OFSAAI. For more details, see the **Map Maintenance** section in the [OFS Advanced Analytics Infrastructure User Guide](#).

Once the Mapper definitions are created, you can define the mappings among the participating hierarchies, from the **Mapper Maintenance** section. For more details, see the **Mapper Maintenance** section in the [OFS Advanced Analytics Infrastructure User Guide](#).

32.5.2 Stage Reassignment Windows

The Stage Reassignment UI allows you to reassign the stages or approve or reject the changes. Through the windows, maker, or checker windows, you can select a Run and view the corresponding data, both the input as well as the results. Currently, the windows allow you to select any of the Runs and thereby enabling the view of the data of all legal entities leading to data leakage between legal entities.

With the introduction of the Legal Entity-based Security feature, the application restricts access to data belonging to a specific legal entity from users who are not mapped to that legal entity. To enable this, the folder security feature has been incorporated in the Stage reassignment UI, where the Folders are mapped to Legal entities and are accessible only to those users who are mapped to that legal entity.

The also introduces a drop-down list with the Folders specific to the legal entity to which the User (User Group) is mapped. After the user selects a specific folder, only those Runs under the selected folder are listed for the user. Thus, the user is restricted to access only those Runs and data specific to the legal entity that the user is mapped to.

33 Load Run IDs for T2Ts

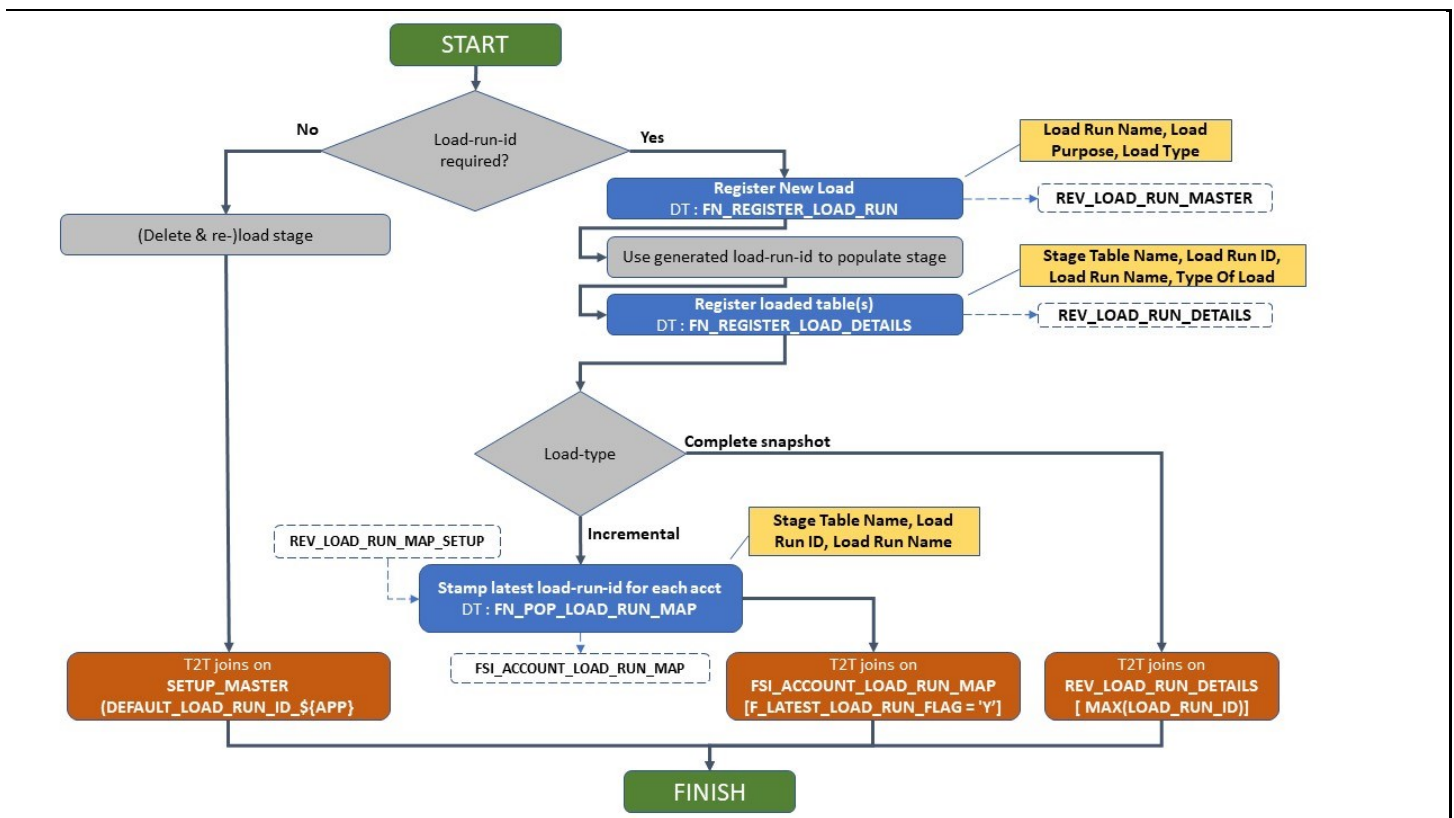
You can load the data into OFSAA processing or reporting tables using the OFSAA T2Ts.

OFSAA Data Model includes Load Run Identifier as part of the primary key for a set of staging tables. This enables data to be stored for multiple Load Runs for any date. Hence it helps the customer to apply the adjustments to the existing data incrementally. OFSAA Data Model also has a table to maintain master information about Load Run and can be used for identifying or filtering Load Run during Run execution within OFSAA.

Before loading data into the staging table, generate a Load Run Identifier to stamp the records from the source. These records can be a complete snapshot or can be partial or Incremental Data, too. This Load Run Identifier can be generated by calling the Load Run ID Registration Process.

The following process flow diagram illustrates the Load Run ID for the T2T process.

Figure 59: Load Run ID for T2T Process Flow



33.1 Existing T2Ts

Existing T2Ts are modified to join the stage table and **SETUP_MASTER** table, where the **V_COMPONENT_VALUE = 'B'** for Base Load and **V_COMPONENT_VALUE = 'I'** for Incremental Load for **V_COMPONENT_CODE = 'LLFP_LOAD_TYPE'**.

In the case of Base Load, even though changes are made to the existing T2Ts, seeded entries in the **SETUP_MASTER** table works if the Load Run ID column value in the stage table contains the default

value of 0. If the Load Run ID value in the stage table is a value other than 0, then update the **BASE_LOAD_RUN_ID** and **EPM_LOAD_RUN_ID** parameter value in the **SETUP_MASTER** table with the used Load Run ID value for the load. While using modified existing T2Ts, insert a complete snapshot of the data for a given MIS date. Merging of data is not supported with existing T2Ts. Re-execution for a given MIS date needs the deletion of data from instrument tables and execution of existing T2Ts. Deletion of data is not required for OFS LLFP processing tables. Seeded master batches are provided to execute the T2Ts in a single execution.

In the case of Incremental Load, registration of the "load run id" in the required tables are required which is explained in the below section.

1. Generate the Load Run ID.
 - Execute the **fn_register_load_run** function
 - **Input:** Load Run Name, Load Purpose, Load Type
 - **Output:** generates Load Run ID in **REV_LOAD_RUN_MASTER** table
2. Register the Load.
 - Execute the **fn_register_load_details** function
 - **Input:** Stage Table Name, Load Run ID, Load Run Name, Type Of Load
 - **Output:** **REV_LOAD_RUN_DETAILS**
3. Load Data to stage table with generated Load Run ID.
4. Execute the batch to load the data to the **FSI_ACCOUNT_LOAD_RUN_MAP** table:
 - Execute the **fn_pop_load_run_map** function
 - **Input:** **STAGE_TABLE_NAME, LOAD_RUN_ID, LOAD_RUN_NAME**
 - **Output:** **FSI_ACCOUNT_LOAD_RUN_MAP**
5. Execute the incremental T2T to load the data into the processing table.
 - **Input:** **FSI_ACCOUNT_LOAD_RUN_MAP**, Stage Table
 - **Output:** Processing Table
6. Mark the load manually as completed by updating the **REV_LOAD_RUN_MASTER** table.

For more information, refer to the section Loading Multiple Load Runs in OFSAA in the [Oracle Financial Services Data Foundation Application Pack](#).

33.2 Executing Incremental T2T

While populating instrument data for the EIR population with an incremental load process, the following batch must be executed:

<INFODOM>_LLFP_CF_EIR_INST_DATA_POP_INCR batch

All other batch names will remain the same and cater to both the base load and incremental load.

34 Resolution of LLFP Implementation Issues

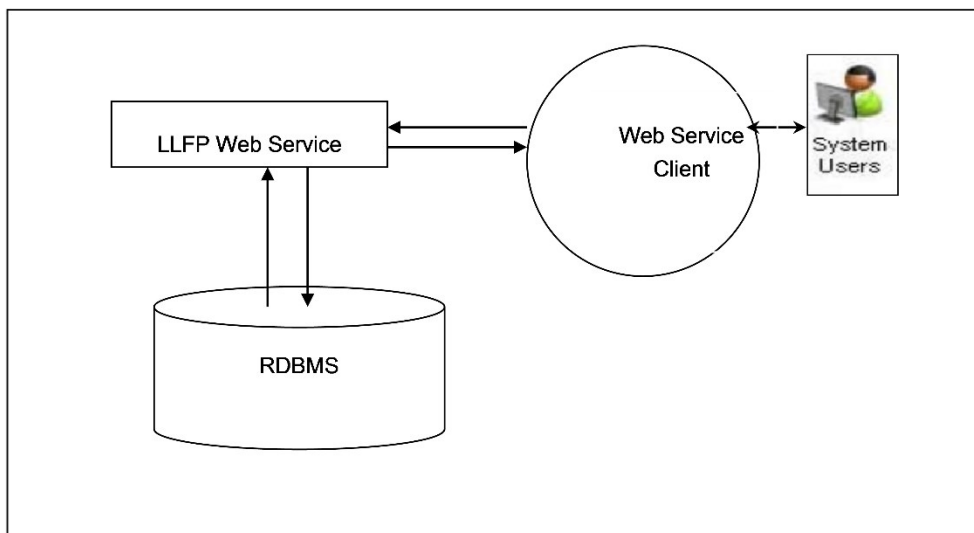
This section provides information about the web service call and LLFP web service call features.

34.1 Web Service Call for Provision Calculation

The Web Service call option is used to calculate the provision amount for impaired accounts. Specific Allowance, NPV Allowance, and Recoupment schedule are calculated based on the expected Cashflow, its present value, and potential NPV allowance, at each recoupment using the Expected Cash Flow Method.

The following illustration depicts the architecture of the OFS Loan Loss Forecasting and Provisioning application web service call.

Figure 60: The LLFP Web Service Architecture



In this approach, a new run, comprising only the expected cashflow method for provision calculation is created. This is triggered through a web-based online call by the OBP collection module. In a day, multiple calls are made to the provision calculation run by managers handling different sets of accounts. At times, multiple calls are also made for the same account.

34.2 LLFP Web Service Call Functionality

The LLFP web service calls the LLFP method for the Expected Cash Flow Method Run calculation. A new run, comprising of only the expected cashflow method for provision calculation is created. This is triggered through a web-based online call by the OBP collection module.

Follow the following steps to obtain the web service call functionality:

1. The LLFP web service is accessible using the service endpoint or WSDL URL. The request must be sent as a string in a specific format. For example:

```
<?xml version="1.0" encoding="UTF-8"?>
<LLFP TYPE="REQUEST">
```

```

<ACCOUNT_ID>V1</ACCOUNT_ID>
<FIC_MIS_DATE>20140623</FIC_MIS_DATE>
<CASH_FLOWS>
  <CASH_FLOW id="1">
    <DATE>20140723</DATE>
    <VALUE>30</VALUE>
  </CASH_FLOW>
  <CASH_FLOW id="2">
    <DATE>20140822</DATE>
    <VALUE>25</VALUE>
  </CASH_FLOW>
</CASH_FLOWS>
<DISCOUNT_RATE>5</DISCOUNT_RATE>
<CARRYING_AMOUNT>1000</CARRYING_AMOUNT>
<NPV_THRESHOLD>100</NPV_THRESHOLD>
<RECOVERABLE_PERIOD>2</RECOVERABLE_PERIOD>
<PRODUCT_CODE>p10001</PRODUCT_CODE>
<CURRENCY>USD</CURRENCY>
<LEGAL_ENTITY>E500002</LEGAL_ENTITY>
<RECOVERY_COST>50</RECOVERY_COST>
</LLFP>

```

The string is taken as the input for calculation. The response to the string must be a text in the XML style.

Example of the text in XML style:

```

<?xml version="1.0" encoding="UTF-8"?>
<LLFP TYPE="RESPONSE">
  <REQUEST_ID>0</REQUEST_ID>
  <FIC_MIS_DATE>2014-06-23 00:00:00</FIC_MIS_DATE>
  <ACCOUNT_ID>V1</ACCOUNT_ID>
  <CURRENCY>USD</CURRENCY>
  <PRODUCT_CODE>p10001</PRODUCT_CODE>
  <LEGAL_ENTITY>E500002</LEGAL_ENTITY>
  <DISCOUNT_RATE>5</DISCOUNT_RATE>
  <CARRYING_AMOUNT>1000</CARRYING_AMOUNT>
  <NPV_THRESHOLD>100</NPV_THRESHOLD>
  <RECOVERABLE_PERIOD>2</RECOVERABLE_PERIOD>
  <RECOVERY_COST>50</RECOVERY_COST>
  <SPECIFIC_ALLOWANCE>995</SPECIFIC_ALLOWANCE>

```

```
<NPV_ALLOWANCE>52.25</NPV_ALLOWANCE>
<TOTAL_ALLOWANCE>1047.25</TOTAL_ALLOWANCE>
<RECOUPMENTS>
  <RECOUPMENT ID=1>
    <RECOUPMENT_PERIOD>1</RECOUPMENT_PERIOD>
    <RECOUPMENT_AMOUNT>0</RECOUPMENT_AMOUNT>
  </RECOUPMENT>
  <RECOUPMENT ID=2>
    <RECOUPMENT_PERIOD>2</RECOUPMENT_PERIOD>
    <RECOUPMENT_AMOUNT>4.75</RECOUPMENT_AMOUNT>
  </RECOUPMENT>
  <RECOUPMENT ID=3>
    <RECOUPMENT_PERIOD>3</RECOUPMENT_PERIOD>
    <RECOUPMENT_AMOUNT>23.75</RECOUPMENT_AMOUNT>
  </RECOUPMENT>
</RECOUPMENTS>
</LLFP>
```

This completes the web service call procedure. The output is sent as an XML.

35 Understanding Key Terms and Concepts

The following are the key terms and concepts used in the OFS Loan Loss Forecasting and Provisioning application.

- **Poisson Process and Exponential Distribution**

The Poisson process is a counting process for the number of events that occurred up to a particular time. It is at times called a jump process, as it jumps up to a higher state each time an event occurs. It is also a special case of a continuous Markov process.

It has potential applications in the Financial Industry. For example, Total Credit default amounts consist usually of a sum of individual default amounts. The number of defaults is usually assumed to occur according to a Poisson process.

The exponential distribution plays a very important role in the Poisson process partly because the time between events or jumps follows an exponential distribution.

Random variable X is said to be an exponential distribution if density has the form:

$$f_X(x) = e^{-\lambda x}, \text{ for } x \geq 0.$$

- **Splitting of Poisson Processes**

For example, Times between births (in a family) follows an exponential distribution. The births are categorized by gender.

For example, Times between back pains follow an exponential distribution. However, the degree of pain may be categorized as per the required medication, which depends on the degree of pain.

Consider a Poisson Process $f_N(t)$; where in addition to observing an event, the event can be classified as belonging to one of r possible categories.

Define $N_i(t)$ = no. of events of type i during $(0; t]$ for $i = 1; 2; \dots; r$

$$N(t) = N_1(t) + N_2(t) + \dots + N_r(t)$$

This process is referred to as splitting the process.

The LLFP Application makes use of the Poisson process as one of the techniques to interpolate the PD term structures, PD curves, from a lower frequency to a higher frequency, for example, from an annual frequency to a monthly frequency.

NOTE	For PD interpolation, the input frequency must be lower, the period must be higher, than the output frequency. For example, the PD term structure cannot be monthly while the bucket frequency is annual).
-------------	--

- **Marginal Transition Matrix versus Cumulative Transition Matrix**

Cumulative Transition Matrix refers to a matrix, which includes transitions from previous years as well. Marginal Matrix refers to transitions that are incremental or for only one unit of time.

In the LLFP Application, for computing Point in Time Probability of Default through the inbuilt PD Model, it is required to provide Marginal Transition Matrix on an annual basis for multiple periods as required by you.

For example, Marginal Transition Matrix - M1 can be used for Years 1, 2, and 3 while Marginal Transition Matrix M2 can be used for years 4 and 5.

Examples of Marginal Transition Matrices:

Figure 61: The Marginal Transition Matrix (Year 1)

Year 1 - Transition Matrix							
From or To	AAA	AA	A	BBB	BB	B	D
AAA	88.53%	7.75%	0.47%	0.00%	0.00%	0.00%	3.25%
AA	0.60%	87.50%	7.33%	0.54%	0.06%	0.50%	3.47%
A	0.40%	2.07%	87.21%	5.36%	0.39%	0.16%	4.41%
BBB	0.01%	0.17%	3.96%	84.13%	4.03%	0.72%	6.98%
BB	0.02%	0.05%	0.21%	5.32%	75.62%	7.15%	11.63%
B	0.00%	0.05%	0.16%	0.28%	5.92%	73.00%	20.59%
CCC or C	0.00%	0.00%	0.24%	0.36%	1.02%	11.74%	86.64%

36 General Data Protection Regulation Compliance for LLFP

General Data Protection Regulation (GDPR) compliance requires Personal Identification Information (PII) data to be protected from unscrupulous access. OFS Loan Loss Forecasting and Provisioning application are enabled to protect PII data using the following approaches.

36.1 Data Redaction

Using this approach, you are provided access rights at the database level. Users with access rights will be able to view the PII data while the same will be redacted for users without access rights.

There must be a one-to-one mapping between the Account Number and the Original Account Number. The account number must be anonymized.

NOTE The **V_ACCOUNT_NUMBER**, **V_CONTRACT_CODE**, and **V_ORIGINAL_ACCOUNT_NUMBER** columns of the Stage tables allow only -, a hyphen, and _, underscore special characters.

The Data Redaction feature is not supported for Oracle DB version 12.2.0.xx or above.

37 Things to Remember

This section contains additional information.

- The Base Run ID selection has been added from OFS LLFP Release 8.1.1.1.0 version onwards. This enables a complete data load for a preferred Load Run ID selection. For more information, see the [Setting Up Setup Master Table](#).
- The Basel Reclassification rule is for reporting purposes only and does not have any effect on method selection or calculation.
- LLFP application expects only one internal rating for one external rating. Many External ratings can be mapped to one internal rating.
- The provision matrix method is assigned for a specific condition and as the default method for all unless otherwise specified.
- If the cash flow is given as a download, then all accounts are treated individually.
- The overnight rate, 1 Day, is mandatory for Interest Rate Curve.
- The provision Matrix method can be assigned directly through the Methodology Assignment Rule in addition to accounts assigned for Cash Flows or Forward exposure. But without cash flows, the application will overwrite the methodology to the provision matrix.
- Method override also checks for accounts having different product types but sharing the same collateral. Such accounts are not assigned any provision calculation method and, hence, the Provision amount is not calculated for it.
- For the Poisson process, the desired frequency period must be less than the input matrix frequency period.
- To calculate the proper coefficient, no consecutive interest rates in the historical interest rate curve table must be precisely the same.
- A maximum of 100 data points, interest rate points, can be given for interpolation coefficient calculation.
- LLFP does not handle the partial allocation of mitigant value to an account, that is 100% of the mitigant value is considered to be associated with the account.
- A threshold can only be applied at product-type, Legal Entity, and Currency levels.

38 Frequently Asked Questions

You can see the Frequently Asked Questions which is developed with the interest to help understand OFS Loan Loss Forecasting and Provisioning.

1. Can LLFP be used with other cash flow engines instead of Oracle CFE? If yes, then what is required to be done?

Oracle LLFP can be used with other cash flow engines. LLFP uses the Oracle cash flow engine to generate contractual cash flow at the account level and cash flow as of the account start date to calculate EIR. If any external engine is used then cash flow generated by other engines needs to be given as download in the **STG_ACCOUNT_CASH_FLOWS** table in the format as specified in download specifications.

2. Effective Initial Rates calculated by Oracle LLFP are calculated as of which date?

The following is the EIR computation of Oracle's LLFP application:

- Origination Date EIR: Computed only for Fixed-rate accounts and ideally only in the lifetime of the account, unless the application is explicitly made to recompute the same.
- Current Date EIR: Computed for both Fixed-rate and Floating rate accounts.

For more details, see the **EIR Preferences** section.

3. How can the Origination Date EIR be made to compute again for a Fixed-rate account?

The origination date EIR will be computed for accounts:

Where the value is not available

With `EIR EIS COMPUTATION FLAG = "Y"`

4. How is collective assessment handled in Oracle LLFP?

Collective assessment of accounts is handled using the Cohorts feature of the application. As a first step, a configurable rule is used to identify the set of accounts that can potentially be treated collectively. Based on the configured criteria, this Rule marks the corresponding accounts to be treated collectively.

The cohort process considers this input along with various parameters such as Rating or Delinquency date band, Product Type, Customer Type, Methodology assigned, Maturity band, and so on. groups account based on their common values, across all these parameters.

All the necessary values corresponding to these accounts are also aggregated to the cohort's level, for example, Carrying Amount, Undrawn amount, CCF Percent, Cash Flows, and so on are aggregated.

Next, based on the methodology corresponding to each cohort, the Expected Credit loss values, Allowance, and Provision are computed.

Finally, the computed values are then apportioned back to the individual accounts for final account-level reporting.

NOTE To retain efficiency, accounts under Cash flow or Forward Exposure methodology are grouped only if the minimum cohort size meets the set value in the preference table.

5. Does the user need to give a cash flow download every time for same-day execution?

Yes. Cash flow needs to be in the staging table for each run.

6. Is it feasible to compare individually calculated allowances and those which are allocated back to the account level from the collective assessment?

While performing collective assessment all the parameters required to compute Expected Credit Loss are aggregated using various logics. Once, the aggregated ECL is computed, the same is apportioned back to individual accounts. While doing this there is bound to be a difference between the ECL computed using the Collective Assessment approach or the Individual Approach. Accounts having similar behavior and potential cash flow are combined to generate cash flow more efficiently. These are typically large-in-volume accounts like retail exposures. Considering carrying amount as a weight for individual allocation, the allowance may be compared with individual treatment. If the allocation factor is other than the Carrying amount then there will be some difference.

7. Is EIR calculated collectively or individually?

EIR is calculated only at the account level.

8. Can a Run be without collective assessment?

The option to perform computations at a cohort level is controlled by a configurable Rule. This Rule will determine which set of accounts can be processed collectively by flagging them. In addition to the rule, the LLFP application also looks at specific parameters to be common across the accounts that are marked to be processed collectively. If and only if both the flag and the parameters are common, for accounts, the corresponding accounts are treated collectively.

9. Can Provision Matrix and PD Term Structures be based on External Ratings?

No. Both the Provision matrix and PD Term Structures must be based on internal ratings.

10. Can an account be collectively assessed under Cash Flows or Forward Exposure methodologies?

Yes

11. Can the application calculate EIR if cash flow is provided as a download?

Yes

12. How do I enable the Subledger feature on the LHS menu for a user group, for example, an analyst?

Before you create SubLedger definitions, performed the following user role and group mappings and approvals:

- i. Log in as a System Administrator.
- ii. Navigate to **Identity Management**, then **Security Management**, then **User Administrator**, and then **User Maintenance**.
- iii. Add a new user definition. For more information, see the **User Maintenance** section in the [OFS Analytical Applications Infrastructure User Guide](#).
- iv. Log in as a System Authorizer.

- v. Navigate to **Identity Management**, then **Security Management**, then **User Administrator**, and then **User Authorization**.
- vi. Authorize the user that you created in step 3. For more information about authorizing a user, see the User Authorization section in the [OFS Analytical Applications Infrastructure User Guide](#).
- vii. Log in as a System Administrator.
- viii. Navigate to **Identity Management**, then **Security Management**, then **User Administrator**, and then **User User Group Map**.
- ix. Map the user to the *IIA Application Approver Group* and *IIA Application Analyst Group*. For more information about mapping a user to a user group, see the **User User Group Map** section in the [OFS Analytical Applications Infrastructure User Guide](#).
- x. Navigate to **Identity Management**, then **Security Management**, then **User Administrator**, and then **User Group Role Map**.
- xi. Map the User Group *UGIIAANALYST* to *Sub Ledger Maker*, and then map the User Group *UGIIAAPPROVER* to *Sub Ledger Checker*. For more information about mapping a user group, see the **User Group Role Map** section in the [OFS Analytical Applications Infrastructure User Guide](#).
- xii. Log in as a System Authorizer.
- xiii. Authorize the mappings that you performed in step 11. For more information about authorizing a user, see the **User Authorization** section in the [OFS Analytical Applications Infrastructure User Guide](#).

NOTE You can use the same user that you created in the preceding steps for performing actions in the Subledger Manual Adjustment feature.

13. How are Cohorts different from Segments?

Cohorts have very specific utility within OFS Loan Loss Forecasting and Provisioning. Cohorts, Collective Assessment, are run specific grouping of records that contain similar risk characteristics such as Ratings or DPDs, Regions, Products, and so on. Moreover, Cohorts created for Stage determination are not reused for ECL computation - in other words, constituent records will be different as parameters for ECL cohorts are different. Segments can be any composition of records that a business deems fit to track per its risk policy. Unlike Cohorts, constituent records of a Segment remain intact across the applications.

14. If segments are already created, should Cohorts be created for Collective Assessment?

If Segments are created, then the same can be used as one of the dimensions for Cohort formation in all the Runs.

39 Product Type Mapping

This section details the offline object migration that is used in product type mapping.

39.1 Offline Object Migration

Each product in STG_PRODUCT_MASTER must be mapped to one of the Product Type as mentioned in the Product Type Mapping document, available on [MOS](#). Also, each product type must be mapped to the product subcategory, product category, and product group as mentioned therein.

41 **Generating Download Specification**

Data Model for OFS Loan Loss Forecasting and Provisioning is available upon customer request, as an ERwin file. Download Specifications can be extracted from this model.

42 Generate Cash flows by using Specific Instrument Tables in OFS ALM

This chapter provides information about using specific instrument tables, **FSI_D_LLFP_INSTRUMENTS_EIR**, **FSI_D_LOAN_CONTRACTS**, and **FSI_D_INVESTMENTS**, to create process rules in the OFS Asset Liability Management application and then use these process rules to generate cash flows in the OFS Loan Loss Forecasting and Provisioning application.

The following are the two ways you can use the process rules you created in the OFS Asset Liability Management application to generate cash flows for OFS LLFP:

- [Calculate Cash Flows from the Origination Date](#)
- [Calculate Cash Flows from the As-of-Date](#)

42.1 Calculate Cash Flows from the Origination Date

To create a process rule with the instrument table **FSI_D_LLFP_INSTRUMENTS_EIR** in the OFS Asset Liability Management application and calculate cash flows from the origination date in the OFS LLFP application, follow these steps:

1. Log in to the OFS Asset Liability Management application.
2. Create an ALM Process Rule by using the instrument table **FSI_D_LLFP_INSTRUMENTS_EIR** as the source table. For more information on creating an ALM Process Rule, see the *Creating an ALM Process Rule* section in the [OFS Asset Liability Management User Guide](#).

NOTE

Although there can be multiple ALM processes, ensure that there is no overlapping of data between the processes.

3. Log in to the OFS Loan Loss Forecasting and Provisioning application.
4. From the LHS menu, navigate to **Loan Loss Forecasting and Provisioning**, select **LLFP Maintenance**, and then select **EIR Preferences**.
5. In the **EIR Preference** window, in the **Origination Date Cash-flow Process** pane, select the ALM Process Rule that you created in Step 2. For more information about selecting the origination date cash flow process, see the [Origination Date Cash Flow Process](#) section.
6. In the **EIR Preference** window, in the **Origination Date Cash-flow Process** pane, select the ALM Process Rule that you created in Step 2. For more information about selecting the origination date cash flow process, see the [Origination Date Cash Flow Process](#) section.
7. Run the batch **<Infodom>_LLFP_EIR_INST_DATA_POP**.

This batch loads data in the instrument table **FSI_D_LLFP_INSTRUMENTS_EIR** and executes the ALM Process Rule to generate cash flows followed by the EIR computation.

42.2 Calculate Cash Flows from the As-of-Date

To create a process rule with the instrument tables **FSI_D_LOAN_CONTRACTS** and **FSI_D_INVESTMENTS** in the OFS Asset Liability Management application and calculate cash flows from the as-of-date in the OFS LLFP application, follow these steps:

1. Log in to the OFS Asset Liability Management application.
2. Create an ALM Process Rule by using the instrument tables **FSI_D_LOAN_CONTRACTS** and **FSI_D_INVESTMENTS**, normal instrument tables, as the source table. For more information on creating an ALM Process Rule, see the **Creating an ALM Process Rule** section in the [OFS Asset Liability Management User Guide](#).

NOTE Although there can be multiple ALM processes, ensure that there is no overlapping of data between the processes.

3. Log in to the OFS Loan Loss Forecasting and Provisioning application.
4. From the LHS menu, navigate to **Loan Loss Forecasting and Provisioning**, select **LLFP Maintenance**, and then select **EIR Preferences**.
5. In the **EIR Preference** window, in the **As-Of-Date Cash-flow Process** pane, select the ALM Process Rule that you created in Step 2. For more information about selecting the as-of-date cash flow process, see the [As-Of-Date Cash Flow Process](#) section.
6. From the LHS menu, navigate to **Common Object Maintenance**, select **Operations**, and then select **Batch Execution**.
7. Run the batch **<Infodom>_LLFP_CF_EIR_INST_DATA_POP** to load data from the product processor tables into the respective instrument tables, **FSI_D_***.
8. Run the batch **<Infodom>_IFRS_AOD_CF_EIR**.

This batch executes the ALM Process Rule to generate cash flows followed by the EIR computation.

43 Glossary

Aggregation

To summarize detailed instruments to a table in the database that are used for faster processing in ALM.

Answers

Answers are the OBIEE (Oracle Business Intelligence Enterprise Edition), an ad-hoc reporting tool.

As of Date

The date at which the data is current.

Asset or Liability Management Committee

The Asset or Liability Management Committee (or ALCO) is an organization within a financial institution whose charter is to manage interest rate and liquidity risk.

At-Risk Period

The time horizon for Value-at-Risk, such as the difference between the time in the future when we evaluate a portfolio loss and the As of Date.

Base Rates

The section in Oracle Asset Liability Management stores the interest rates associated with the data As-of-Date.

Basis Points

1/100th of a percent (abbreviated as bps)

Cash Flow Instrument Table

An instrument table that contains all of the OFSAA cash flow columns required by the cash flow engine.

Cash Flow Column

The OFSAA cash flow engine uses this column to perform cash flow analysis on a record.

CPR

Constant Prepayment Rate (CPR) is a measure of an annualized prepayment rate.

Credit Risk

The risk is that a loan holder will be unable to repay any portion of the loan.

Current Rate Risk Profit

A component of the funding center rate risk results that are attributed to the current mismatches of assets and liabilities.

Data Filter Rule

Data Filters are used to define which data must go into a processing run.

Data Input Helper

A pop-up dialogue facilitates the definition of a series of input values, dates, or numbers, by allowing several methods for defining structured patterns in the data.

DDA

Demand Deposit Account. An example of a DDA is a checking account.

De-annualize

To compute the monthly equivalent rate of an annual rate.

Duration

Duration is the rate of market value change concerning discount rate changes. It is a measure of market value sensitivity: the lower the value, the less sensitive the market value is to changes in interest rates.

Embedded Rate Risk Profit

A portion of the funding center rate risk results is attributed to prior rate bets.

Funding Center

The area is a financial institution that receives the transfer pricing charge and credit for funds.

Funds Transfer Pricing

A method for valuing all sources and uses of funds for a balance sheet.

General Ledger

The main data source that defines an institution's financial reality. General Ledger reflects all accounting entries.

Table

A logical grouping of cells is often surrounded by scroll bars.

Hierarchy

The hierarchical structure for dimension members in OFS applications, examples include organizational and product type

Historical Rates Table

OFSAA repository for all historical actual interest rates.

Instrument

Synonymous with an account record or an individual contract.

See also: Instrument Table

Instrument Table

A type of table contained in the OFSAA database is used to store account-level information.

Instrument Records

Rows in the OFSAA database that carry transaction account level information, examples include deposit account by deposit account

Interest Rate Code

User-defined code to reference a yield curve or single rate index for historical analysis, transfer pricing, and interest rate forecasting purposes.

Last Repricing Date

The date the rate last changed for an adjustable-rate instrument and the origination date for a fixed-rate instrument.

Leaf Fields

OFSAA database fields are used to define the hierarchical segmentation of data. They also draw a relationship between the instrument data and the General Ledger data in Ledger or Stat. Also known as key dimensions.

Leaf Values

Specific numeric values that make up the Leaf Fields. These are dimension members that can never be used as parent nodes on a hierarchy. The fact data must always be populated with dimension member-leaf values only.

Ledger Stat

The table in the OFSAA database stores all General Ledger as well as statistical information for current and historical periods.

Liquidity Premiums

A charge levied on a long-term instrument to compensate for the illiquidity of the funds.

Log in

To access the programs and database of any OFSAA application by providing a valid username and password.

Long Run Rate

One of the user-input parameters of the Vasicek, discrete-time, term structure model; represents the equilibrium value of the one-month annually compounded rate.

Market Price of Risk

In financial economics theory, the market price of risk is a measure of the inter-temporal risk-aversion of the aggregate investor. For example, a high market price of risk during some future period means that investors will be more risk-averse and that rates for that term must be higher to compensate for this risk. In practical terms, the market price of risk is the plug that makes the risk-neutral rates price risk-free bonds correctly.

Market Value

In Monte Carlo, the average of the scenario-specific present values. In deterministic processing, it is the present value of the cash flows of the specific scenario.

Matched Rate Transfer Pricing

Method of Transfer Pricing where all accounts contain transfer rates that reflect their specific maturity and repricing characteristics.

Matched Spread

The interest profit margin for any account is measured as the Note Rate minus the Transfer Rate for asset accounts and the Transfer Rate minus the Note Rate for Liability and Equity accounts.

Monthly Rate

The yield on a loan contracted at the beginning of a month for one month assumes a continuous compounding basis; the monthly rate is a function of time and scenario; the Rate Generator also computes rates for a different term than a month.

Next Repricing Term

Repricing frequency for an adjustable-rate instrument and the original term to maturity for a fixed-rate instrument.

Oracle Business Intelligence Enterprise Edition

OBIEE is Oracle's market-leading business intelligence product. OFSAA applications are fully integrated with OBIEE through the OFSAA BI applications, including OFS Asset Liability Management Analytics and OFS Profitability Analytics.

OFS Analytical Applications Infrastructure

OFS Analytical Applications Infrastructure is a set of powerful administrative tools that provide management of the OFSAA environment and access to the database by OFS application users. Infrastructure is a required component for all OFSAA applications except Balance Sheet Planning.

OFS Advanced Analytical Applications Infrastructure

The advanced infrastructure provides the modeling framework and stress testing framework as additional complementary components to supplement core analytic applications.

Operating Cost

The non-interest-related cost of running a business.

Option Costs

Costs are assigned to measure the value of any customer option on an instrument. Examples include prepayments on mortgage loans. These costs are typically added to the base transfer rate to compute an all-in funding rate.

Portfolio Fields

Fields in the OFSAA database that are common to multiple instrument tables. The OFSAA Administrator determines the portfolio fields.

Prepayment

A reduction in the principal balance of a transaction record before the contracted schedule date.

Present Value

In Monte Carlo, the sum of cash flows paid by security along with a particular rate scenario is discounted by the stochastic discount factor. In deterministic processing, the sum of the cash flows is discounted by the deterministic discount factor.

PSA

A prepayment specification method was established by the Public Securities Association, which relates the CPR to the age of that instrument.

Reconciliation

The process of comparing information from one data source to another.

Record

Usually, a single account or transaction, or aggregation of accounts, is stored in the database, also called a row.

Reporting Currency

An active currency which balances in other currencies are consolidated, is often used for reporting.

Single Rate

An interest rate code with only one point is defined. For example, the prime rate and the 11th District Cost of Funds Index.

Speed of Mean Reversion

One of the user-input parameters of Vasicek and Extended Vasicek, discrete-time, term structure models; represents the long-run drift factor.

SQL

Structured Query Language. A direct method of accessing the raw OFSAA database.

Stochastic Discount Factor

Present value, along with a rate scenario, of one dollar received at some future time; it is a function of future time, OAS, and scenario.

Transfer Pricing Rule

An OFSAA Rule is used to specify the method for transfer pricing for each balance sheet account.

Volatility

One of the user-input term parameters of all, discrete-time, term structure models; represents a standard deviation of the one-month annually compounded rate.

Yield Curve

The term structure of annually compounded zero-coupon bond yield, as recorded in Rate Management > Historical Rates.

OFSAA Support

Raise a Service Request (SR) in [My Oracle Support \(MOS\)](#) for queries related to the OFSAA applications.

Send Us Your Comments

Oracle welcomes your comments and suggestions on the quality and usefulness of this publication. Your input is an important part of the information used for revision.

- Did you find any errors?
- Is the information clearly presented?
- Do you need more information? If so, where?
- Are the examples correct? Do you need more examples?
- What features did you like most about this manual?

If you find any errors or have any other suggestions for improvement, indicate the title and part number of the documentation along with the chapter/section/page number (if available) and contact the Oracle Support.

Before sending us your comments, you might like to ensure that you have the latest version of the document wherein any of your concerns have already been addressed. You can access My Oracle Support site that has all the revised/recently released documents.

