SAS® Offer Optimization for Communications 5.4

Administrator's Guide

SAS® Documentation

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Contents

About This Book

Audience

document is primarily intended for administrators who will perform the initial installation and configuration of SAS Offer Optimization for Communications and also perform the administrative tasks on a regular basis. The document gives an overview of the SAS Offer Optimization for Communications architecture. It also explains various architecture components and the interactions between them. In addition, this document provides the data flow diagram. This diagram explains the data-processing infrastructure of SAS Offer Optimization for Communications. The solution-specific administrative tasks are detailed in the respective chapters.

Prerequisites

Before you administer SAS Offer Optimization for Communications, make sure that you are familiar with the following concepts:

basic concepts and components of the SAS Intelligence Platform
: For details, see *SAS Intelligence Platform: Overview*, which is located at **http://support.sas.com/documentation/cdl/en/biov/63145/PDF/default/biov.pdf**.

the SAS environment
: For details, see *SAS Intelligence Platform: System Administration Guide*, which is located at **http://support.sas.com/documentation/cdl/en/bisag/60945/PDF/default/bisag.pdf**.

the SAS applications servers that are required for particular content
: For details, see *SAS Intelligence Platform: Application Server Administrative Guide*, which is located at **http://support.sas.com/documentation/cdl/en/biasag/61237/PDF/default/biasag.pdf**.

security concepts
: You should be familiar with the authentication and authorization concepts. You should also know how to manage access in the metadata layer. In addition, you should know how to create and manage user and group definitions in metadata. For details, see *SAS Intelligence Platform: Security Administration Guide*, which is located at **http://support.sas.com/documentation/cdl/en/bisecag/61133/PDF/default/bisecag.pdf**.

the middle-tier environment
: You should know how to configure the Application server.

SAS products
: You should know the basic procedures for using the applications that you plan to administer. For example, if you are responsible for administering SAS Web Report Studio, then you should know how to log on, navigate, and create reports in SAS Web Report Studio.

server context
: You should have complete information about the SAS Application Server context. A SAS Application Server knows its server context (the context in which it is being used) and makes decisions based on that knowledge. For example, a client such as SAS Data Integration Studio is assigned a default SAS Application Server. When the client generates code, it submits the code to that application server. The application server determines what type of code is being submitted and directs it to the correct server. That is, if the code is a typical SAS code that can be run in SAS Display Manager, the code is executed by the application server's workspace server. In addition, data-related objects such as SAS libraries, database libraries, and OLAP schemas can be assigned to a SAS Application Server. After this assignment, a client might need to access data in a particular library or OLAP schema. The client then uses a server component that belongs to the application server to which the library or schema is assigned.

Document Conventions

The following table lists the conventions that are used in this document:

Document Conventions

Convention	Description
<SAS Home>	Represents the path to the folder where SAS is installed. For example, on a Windows computer, this can be **C:/Program Files/SASHome**.
<SAS configuration directory>	Represents the path to the folder where SAS configuration data is stored. For example, on a Windows computer, this can be **C:/SAS/Config**.

Recommended Reading

When you refer this guide, make sure that you read the following documents in the sequence mentioned below:

- *SAS Communications Analytics Architecture: Data Reference Guide*
- *SAS Communications Analytics Architecture: Administrator's Guide*
- *SAS Communications Analytics Architecture: User's Guide*
- *SAS Customer Analytics for Communications: Data Reference Guide*
- *SAS Customer Analytics for Communications: Administrator's Guide*
- *SAS Customer Analytics for Communications: User's Guide*
- *SAS Offer Optimization for Communications: Data Reference Guide*
- *SAS Offer Optimization for Communications: Administrator's Guide*

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Part 1

Installing and Configuring SAS Offer Optimization for Communications

Chapter 1

Architecture Overview

SAS Offer Optimization for Communications Architecture

Overview

The SAS Offer Optimization for Communications architecture is designed to efficiently process a large volume of data. At the same time, the architecture enables the solution to use this data to support user-driven workflow through the application user interface. SAS Offer Optimization for Communications has an n-tier architecture that separates the workflow-related activities from data-intensive process routines and distributes functionality across computer resources that are most suitable for these tasks.

You can scale the architecture to meet the demands of your workload. For a large organization, the tiers can be installed across a multitude of machines with different operating systems. For tasks such as developing prototypes and presenting demonstrations, all the tiers can be installed on a single machine. Similarly, if you are implementing SAS Offer Optimization for Communications for small enterprises, then you can install all the tiers on a single machine.

The SAS Offer Optimization for Communications architecture consists of the following four tiers:

Data Tier
: The data tier stores your enterprise data. This data is stored in SAS data sets in appropriate libraries and is used in various analysis-through-client programs.

Server Tier
: The server tier of SAS Offer Optimization for Communications consists of data routines and SAS servers that process your enterprise data based on requests from client programs (through middle-tier services) and other programs.

Middle Tier

The middle-tier of SAS Offer Optimization for Communications provides an environment in which the SAS Offer Optimization for Communications client, along with other business intelligence web applications, such as SAS Customer Analytics for Communications, SAS Web Report Studio, and SAS Information Delivery Portal, can execute in an integrated environment. These applications run in a web application server and communicate with the user by sending and receiving data from the user's web browser. The middle-tier applications depend on the servers that are deployed on the server tier to process, query on, and analyze data.

Client Tier

Clients in SAS Offer Optimization for Communications include web-based and desktop user interface content and applications. These clients provide access to content, appropriate query and reporting interfaces, and business intelligence functionality, including advanced design and analysis tasks for all information consumers in your enterprise.

Application Architecture

The following diagram describes the components in the SAS Offer Optimization for Communications architecture.

Figure 1.1 *SAS Offer Optimization for Communications Architecture*

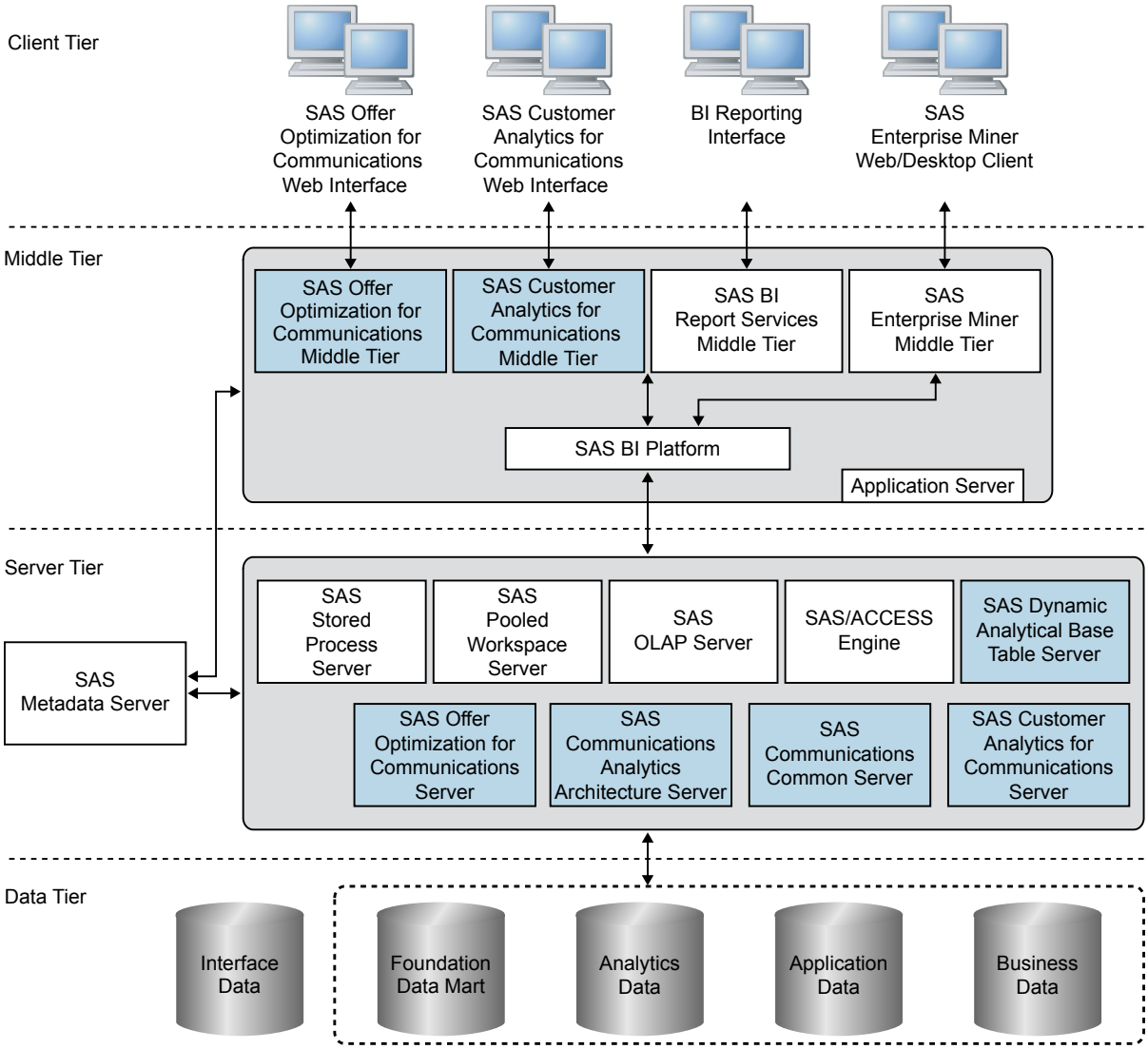


Table 1.1 *Data Tier Components*

Component	Function
Foundation Data Mart	stores your enterprise data (and history) that is classified into reference data, dimensions, and transaction summary facts. This data is used by the business solutions to support analysis at customer, product, and offer level. This data is also used to generate business intelligence reports and analyze the best offer recommendations.

Component	Function
Analytics Data	consists of base data structures that are used to build analytical models. These models are used for scoring or segmenting customers. The solution has a defined set of derived, behavior, and descriptive variables. These variables are initially used to configure the model and later as an input to the scoring code that is provided by the model.
Application Data	stores data for projects that are defined through the application interface to derive best offer recommendations for user-defined customer target population.
Business Data	stores customer-specific and offer-specific data that SAS Offer Optimization for Communications uses to recommend best offers to a customer.
Interface Data	contains application data structures that are exposed as a part of the interface to the third-party engines to support the offer evaluation and bill recalculation functionality.

For information about the entities and attributes of each data mart, see *SAS Offer Optimization for Communications: Data Dictionary*.

Table 1.2 *Server Tier Components*

Component	Function
SAS Metadata Server	is a multi-user-centralized resource for storing, managing, and delivering metadata for all SAS applications across your enterprise.
SAS Stored Process Server	responds to client requests to execute solution-specific stored processes.
SAS Pooled Workspace Server	provides access to SAS software features such as SAS language, SAS libraries, the server file system, results content, and formatting services–execution environments for solution data routines.
SAS OLAP Server	provides access to solution-specific cubes.

Component	Function
SAS/ACCESS Engine	provides interfaces to a wide range of relational, hierarchical, and network model databases. With this product, SAS Offer Optimization for Communications can read, write, and update data regardless of which database and platform the data is stored on. SAS/ACCESS interfaces provide fast, efficient data loading and enable SAS applications to work directly from your data sources without making a copy.
SAS Communications Common Server	represent the data processing SAS routines that are packaged as a part of the solution. These routines perform distinct data operations based on client requests and other SAS routines (in batch mode).
SAS Communications Analytics Architecture Server	
SAS Dynamic Analytical Base Table Server	
SAS Customer Analytics for Communications Server	
SAS Offer Optimization for Communications Server	

Table 1.3 *Middle-Tier Components*

Component	Function
SAS BI Platform	consists of SAS Shared Services, SAS Remote Services, Java Platform Services, and SAS Web Infrastructure Platform. For details, see *SAS Intelligence Platform: Overview*, which is located at **http://support.sas.com/documentation/cdl/en/biov/63145/PDF/default/biov.pdf**.
SAS BI Report Services Middle Tier	provides an execution environment for the following business intelligence applications: • SAS Web Report Studio • SAS Information Delivery Portal • SAS BI Dashboard • SAS BI Portlets
SAS Enterprise Miner Middle Tier	provides an application framework for SAS Enterprise Miner. For details, see *Administrator's Guide for SAS Analytics Platform*, which is located at **http://support.sas.com/documentation/onlinedoc/apcore/admin15.pdf**.

Component	Function
SAS Offer Optimization for Communications Middle Tier	consists of solution-specific services that interact with the client interface to accept user requests (query analysis or data processing) and respond to them with the help of the server tier.
SAS Customer Analytics for Communications Middle Tier	consists of solution-specific services that interact with the client interface to accept user requests (query analysis or data processing) and respond to them with the help of the server tier.

Table 1.4 *Client-Tier Components*

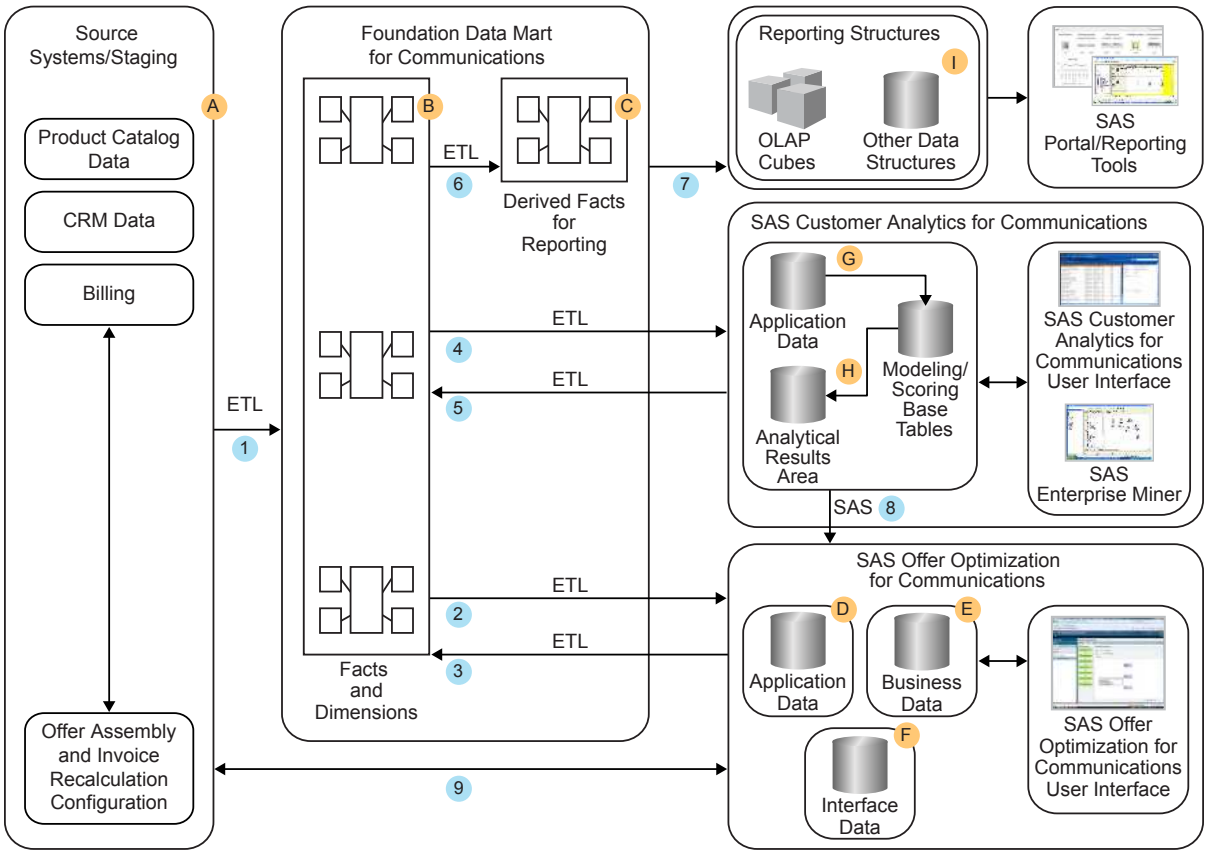
Component	Function
BI Reporting Interface	The BI Reporting Interface mainly consists of the following client interfaces: • SAS OLAP Cube Studio • SAS Information Map Studio • SAS Web Report Studio • SAS Information Delivery Portal • SAS BI Dashboard • SAS BI Portlets For information and usage of these clients, see *SAS Intelligence Platform: Overview*, which is located at **http://support.sas.com/documentation/cdl/en/biov/63145/PDF/default/biov.pdf**.
SAS Enterprise Miner Web or Desktop Client	For information and usage of these clients, see *SAS Intelligence Platform: Overview*, which is located at **http://support.sas.com/documentation/cdl/en/biov/63145/PDF/default/biov.pdf**.
SAS Offer Optimization for Communications Web User Interface	is the web-based user interface to support configuration and execution of user-driven workflow for recommending best offers. For details, see *SAS Offer Optimization for Communications: User's Guide*.
SAS Customer Analytics for Communications Web User Interface	is the web-based user interface to support the end-to-end analytical workflow from building modeling ABT to scoring. For details, see *SAS Customer Analytics for Communications: User's Guide*.

Data Flows in SAS Offer Optimization for Communications

The following diagram represents the data stores that form the solution information model and the data flow through this information model. As depicted in the diagram data flows through the following data stores:

- A: Source Systems
- B: Foundation Data Mart
- C: Derived Facts for Reporting
- D: Application Data
- E: Business Data
- F: Interface Data
- G: Analytical Application Data
- H: Analytical Results Data
- I: Reporting Structures

Figure 1.2 *Data Flow Diagram*



The data flows in SAS Offer Optimization for Communications are handled through the following ETL jobs:

1. ETL jobs that populate the Foundation data mart from the source systems structures. These ETLs are typically developed during implementation with additional information such as inputs on data availability, reference patterns, information validations, refresh frequency, and so on.
2. ETL jobs that populate customer, offer, usage, and revenue information into the Business Data.
3. ETL jobs that write back the business group and customer association data into the Foundation data mart. This association information is further used in all aspects of the solution such as UI-based analysis, analytics, and business reporting.
4. ETL jobs that populate the base tables for supporting solution analytics. The base tables and information maps are used to build analytical base tables for modeling and scoring.
5. ETL jobs that write back the results of analytical or scoring processes into the Foundation data mart.
6. ETL jobs that extract and aggregate transaction data according to the reporting grain of the solution and populate into reporting facts.
7. ETL jobs that populate data from the derived facts and dimensions (Foundation data mart) into the solution cubes.
8. SAS data routines extract analytical base tables information that is required by the SAS Offer Optimization for Communications application workflow.
9. Denotes the database access process, which is used by the SAS Offer Optimization for Communications interface engine to process data from and into the Application Interface data mart.

Note: If the Foundation data mart is in Teradata, then all the numbered processes can be completed in the database itself.

SAS Offer Optimization for Communications contains three data flows:

BI Reporting data flow
For details, see *SAS Communications Analytics Architecture: Administrator's Guide*.

Analytics data flow
For details, see *SAS Customer Analytics for Communications: Administrator's Guide*

Application data flow
For details, see "ETL Jobs for Populating Application Data Tables" on page 29.

The SAS Offer Optimization for Communications Workflow

The SAS Offer Optimization for Communications workflow explains the interactions among various components. To summarize, the solution workflow contains the following steps:

1. Populate data into the common data layer from the external source systems through the staging area.
2. Populate data into the solution-specific data layer:

- reporting data. For details, see *SAS Communications Analytics Architecture: Administrator's Guide.*
- analytical data. For details, see *SAS Customer Analytics for Communications: Administrator's Guide.*
- application-specific data. For details, see Chapter 3, "Solution-Specific ETL Jobs," on page 29.

3. Log on to SAS Offer Optimization for Communications with the profile of an administrator.
   a. Define business groups.
   b. Run process to add customers to business groups.

   Note: For tasks that are detailed in step 3, see *SAS Offer Optimization for Communications: User's Guide.*

4. Log on to SAS Customer Analytics for Communications to complete analytical tasks that pertain to the following business problems of prepaid, postpaid, and TV lines of business:
   - customer segmentation
   - customer acquisition
   - customer churn
   - cross-sell or up-sell
   - customer lifetime value

   For details, see the *SAS Customer Analytics for Communications: User's Guide*.

5. View business reports in SAS Web Report Studio. For details, see *SAS Communications Analytics Architecture: User's Guide*.
   a. Analyze BI reports for customer analytics.
   b. Analyze business groups reports.
   c. Identify business problems associated with each business group.

6. Log on to SAS Offer Optimization for Communications with a certain profile and perform the following tasks. For details, see *SAS Offer Optimization for Communications: User's Guide*.
   a. Define projects with specific objectives for different business groups.
   b. Configure and run project workflow to derive representative customers.
   c. Export information about representative customers to external source systems.
   d. Import billing details of representative customers and recalculate invoices. This step is applicable only for a postpaid project.
   e. Produce best offers for customers in the target segment.
   f. Promote the project to batch mode.

7. Run the project in batch mode and produce best offers for each customer in the customer base.
8. Export information about best offers to external source systems.

   Note: For tasks that are detailed in step 6 and 7, see the relevant chapter of this guide.

9. Log on to SAS Web Report Studio with a certain profile and view reports to evaluate the performance of SAS Offer Optimization for Communications.

   Note: For details, see *SAS Offer Optimization for Communications: User's Guide*.

Chapter 2

Installation and Configuration

Pre-Installation Instructions

Verify System Requirements

Review the system requirements documentation to ensure that your system meets the appropriate requirements. For more information, see *System Requirements for SAS Offer*

Optimization for Communications. You can access this from **http://support.sas.com/resources/sysreq/**.

Complete the Pre-Installation Tasks for SAS Intelligence Platform

Before you begin to install SAS Intelligence Platform and SAS Offer Optimization for Communications, read the *SAS Intelligence Platform: Installation and Configuration Guide*, which is located at **http://support.sas.com/documentation/cdl/en/biig/62611/PDF/default/biig.pdf**. SAS Offer Optimization for Communications is designed to work with SAS Intelligence Platform. Reading this documentation helps you understand the pre-installation tasks and guide you through a typical installation of SAS Intelligence Platform.

Complete the Pre-Installation Tasks for SAS Communications Analytics Architecture

Before you install SAS Offer Optimization for Communications, make sure that you complete the pre-installation instructions that are detailed in the *SAS Communications Analytics Architecture: Administrator's Guide*. For information about how to access SAS Communications Analytics Architecture documentation, see **http://support.sas.com/documentation/onlinedoc/securedoc/index_caa.html**.

Complete the Pre-Installation Tasks for SAS Customer Analytics for Communications

Before you install SAS Offer Optimization for Communications, make sure that you complete the pre-installation instructions that are detailed in the *SAS Customer Analytics for Communications: Administrator's Guide*. For information about how to access SAS Customer Analytics for Communications documentation, see **http://support.sas.com/documentation/onlinedoc/securedoc/index_cac.html**.

Obtain a Deployment Plan

Before you can install SAS Offer Optimization for Communications, you must obtain a deployment plan. The deployment plan is a summary of the software that is installed and configured during your installation. A deployment plan file, named plan.xml, contains information about what software should be installed and configured on each machine in your environment. This plan serves as input to the SAS installation and configuration tools. SAS includes a standard deployment plan. You can use this standard plan or create your own plan. For more information, see "About Deployment Plans" in the *SAS Intelligence Platform: Installation and Configuration Guide*, which is located at **http://support.sas.com/documentation/cdl/en/biig/62611/PDF/default/biig.pdf**.

Create a SAS Software Depot

Download the software that is listed in your SAS Software Order with the SAS Download Manager. This creates a SAS Software Depot, which includes the SAS installation data (SID) file. The SID file (a control file) is required by the SAS system to install and license SAS software. After you have downloaded the SAS Software Depot, you can then use the SAS Deployment Wizard to install your software. For more

information, see "Creating a SAS Software Depot" in the *SAS Intelligence Platform: Installation and Configuration Guide*, which is located at **http://support.sas.com/documentation/cdl/en/biig/62611/PDF/default/biig.pdf**.

Determine the Location of the SAS Environment URL

During deployment, you are prompted by the SAS Deployment Wizard to specify a URL for the SAS environment file, named sas-environment.xml (for example, **http://<your HTTP server>/sas-environment.xml**). This file defines a set of SAS deployments at your site for client applications to use. The sas-environment.xml file does not need to physically exist at the URL location that you specify in the SAS Deployment Wizard before beginning the SAS installation.

However, knowing the intended value of this URL is important because every client installation is prompted for this value. If you do not specify the URL when SAS Offer Optimization for Communications is installed, then as a post-installation task, you must manually edit a file on every client machine to specify this URL. Therefore, it is beneficial to decide on a value for this URL during your planning process so that it can be provided to administrators who might be performing an installation.

For more information about the structure of this file, see "Configuring the SAS Environment File" in the *SAS Intelligence Platform: Middle-Tier Administration Guide*, which is located at **http://support.sas.com/documentation/cdl/en/bimtag/64207/PDF/default/bimtag.pdf**.

Setting Up the MySQL Database

Installing the MySQL Server

SAS Offer Optimization for Communications requires a MySQL instance for the Application Data tables and Interface Data tables. These instances should run successfully before you start the SAS Deployment Wizard.

If you are installing a fresh MySQL Server, make sure that you have selected the **Include Bin Directory in Windows Path** option. If you do not select this option, you have to manually add the MySQL bin path as mentioned below.

In a Windows environment, add the following path for the Windows PATH variable: **<MySQL Installation Dir>/MySQL Server 5.1/bin;**.

In a UNIX environment, perform the following steps:

1. Add the following lines in the .profile file:

   ```
   export PATH=$PATH:<MySQL_Install_Dir>/bin;

   export LIBPATH=$LIBPATH:<MySQL_Install_Dir>/lib

   LD_LIBRARY_PATH=<MySQL_Install_Dir>/lib:$LD_LIBRARY_PATH

   export LD_LIBRARY_PATH

   export MYSQL_LIBPATH=<MySQL_Install_Dir>/lib
   ```

   Note:

   - If you are installing MySQL on H6i/UNIX platform, add the following line in the .profile file:

     ```
     export SHLIB_PATH=<MySQL_Install_Dir>/lib
     ```

- In order to confirm that the paths are updated in the session, you must log on to a UNIX shell before restarting the SAS Deployment Wizard.

2. Make sure that you are installing 64–bit MySQL if you are installing MySQL on a 64–bit machine.
3. Add the path for **basedir=** and **datadir= in** the **<MySQL_Install_Dir>/support-files/mysql.server** file as mentioned below:

   ```
   basedir=<MySQL_Install_Dir>

   datadir=<MySQL_Install_Dir>/data
   ```

   Note: If a MySQL server is not installed on the same machine on which the Offer Optimization for Communications Server is to be configured, then make sure that you install and configure the MySQL client software.

Create Database Instance and Users for Application Data and Application Interfaces

To create a MySQL database instance and user ID for the Application Data and Interface Data tables:

1. Log on to the MySQL database with the default user.
2. Create a database for the application data. For example, to create a database instance named BPPAPTBL, you can enter the following command:

   ```
   CREATE DATABASE BPPAPTBL
   ```

   The subsequent sections refer to this database instance as BPPAPTBL.
3. Create a new user. For example, you can enter the following command:

   ```
   CREATE USER <User name>'@'<Machine name>' IDENTIFIED BY '<Password>'
   ```

4. Grant permission to this user on the database that you created in step 2. For example, if you have created a user named OOCuser, you can enter the following command:

   ```
   GRANT ALL PRIVILEGES ON apdm.* TO 'OOCuser'@'<machine Name>'
   ```

   The subsequent sections refer to this user as OOCuser.
5. Repeat steps from 2 to 4 to create a database for the Interface Data tables. You can name the instance BPPINF.
6. Perform the following steps if you are creating the database instance on a UNIX machine:
   a. Stop MySQL server.
   b. Open the my.cnf file that is available in the root MySQL installation folder and add the following line after the line **myisam_sort_buffer_size**:

      ```
      lower_case_table_names=1
      ```

   c. Start the MySQL server.
7. Create a sample table in the BPPAPTBL database by using the credentials that you created in step 3. This step ensures that the OOC user has the CREATE TABLE privileges. As a result, the OOC APDM DDL that will be run by the SAS Deployment Wizard will run without errors.

Prerequisite Steps for Teradata

Overview

If the Foundation data mart is in Teradata, make sure that you install and configure the Teradata client on a machine on which the Offer Optimization for Communications Server Tier is to be installed and configured. Contact your Database Administrator to set up the client software. Also, make sure that the required databases are created on the Teradata Server

Create a Super User

Create a user on the Teradata server. This user will be a super user who will perform all the operations that are relevant for SAS Offer Optimization for Communications. In addition, this user will own all the databases that you will create.

Create a Database for Business Data

Create an appropriate database on the Teradata server for the following database details:

- Library Name and Library Path: Business data
- Libref: OOCBDM
- Schema name: OOCBDM

Grant Privileges to the Super User

By using the Teradata client, you grant the following permissions to the super user. Contact your Database Administrator for assistance.

```
GRANT ALL ON <Database name> to <Super user name>
```

Replace <Database name> with the appropriate schema name.

Replace <Super user name> with the appropriate user name that you created earlier.

For example, for the OOCBDM schema and the bppexec super user, enter the following command:

```
GRANT all on OOCBDM to bppexec;
```

Note: Make sure that you grant all permissions to the super user for each database that is listed in the above table.

Export Environment Variables

Export environment variables for the Teradata client according to your platform.

Table 2.1 *Environment Variables*

Platform	Environment Variables
AIX	LIBPATH=TPT-API-LIBRARY-LOCATION NLSPATH=TPT-API-MESSAGE-CATALOG-LOCATION LC__FASTMSG=false *Note:* LC__FASTMSG contains two underscores.

Platform	Environment Variables
HP-UX and HP-UX for the Itanium Processor Family	SHLIB_PATH=TPT-API-LIBRARY-LOCATION NLSPATH=TPT-API-MESSAGE-CATALOG-LOCATION
Linux for Intel Architecture, Linux for x64, and Solaris for x64	LD_LIBRARY_PATH=TPT-API-LIBRARY-LOCATION NLSPATH=TPT-API-MESSAGE-CATALOG-LOCATION

Specifying Library Names

Various Teradata libraries are created during SAS Deployment Wizard installation. You are prompted to specify a database name for each of these libraries. Default values are provided for these prompts as mentioned in the above table. However, you can change these values according to your planned database setup.

Note: It is not mandatory that these databases be available during SAS Deployment Wizard installation. However, make sure that you create them before you execute the post-installation instructions. This is because during post-installation, you have to execute certain DDLs in order to create tables in these databases.

Providing 64–bit Libraries Path

You need to provide the 64-bit libraries path if you want to install SAS in 64-bit native mode. To confirm whether you are using 64–bit libraries for 64–bit SAS, execute the **`env`** command on the UNIX platform or the **`set`** command on other platforms.

For example, the output of **`env`** execution on an AIX platform that lists variables specific to Teradata environment variables is as follows: **`LIBPATH=/install/mysql/5.1.47/lib:/opt/teradata/client/13.10/lib64:/opt/teradata/client/13.10/tdicu/lib64:/opt/teradata/client/ODBC_64/lib`**.

Default File Locations

The SAS Deployment Wizard installs and configures your SAS software. The application installation files are installed in a default location referred to as **`<SAS Home>`**. For example, on a Windows machine, <SAS Home> is **`C:/Program Files/SASHome`**.

The configuration files are stored in a default location referred to as **`<SAS configuration directory>`**. For example, on a Windows machine, **`<SAS configuration directory>`** is **`C:/SAS/Config`**.

Note: You can deploy up to 10 configurations of the SAS products. The SAS Deployment Wizard specifies each configuration under a <Level> folder. For example, if you deploy a level 2 configuration, the default configuration directory is **`C:/SAS/Config/Lev2`**.

The following table lists the default locations of the installation and configuration files for SAS Offer Optimization for Communications.

Table 2.2 Default Locations

Location Name	Windows Path	UNIX Path
<SAS Home>	`C:/Program Files/SASHome`	`../SASHome`
<SAS configuration directory>	`C:/SAS/Config`	`../SAS/Config`

Installation Instructions

SAS Offer Optimization for Communications works with SAS Intelligence Platform, which is also installed and configured when you deploy SAS Offer Optimization for Communications. You use the SAS Deployment Wizard to install and configure your software. For more information, see the *SAS Deployment Wizard: User's Guide*, which is located at **http://support.sas.com/documentation/installcenter/en/ikdeploywizug/62130/PDF/default/user.pdf**

This section explains installation instructions that are specific to SAS Offer Optimization for Communications. For complete installation and configuration instructions, see the *SAS Intelligence Platform: Installation and Configuration Guide*, which is located at **http://support.sas.com/documentation/cdl/en/biig/62611/PDF/default/biig.pdf**.

If you are installing SAS Offer Optimization for Communications along with SAS Communications Analytics Architecture and SAS Customer Analytics for Communications, then make sure that you refer to the *SAS Communications Analytics Architecture: Administrator's Guide* and the *SAS Customer Analytics for Communications: Administrator's Guide* for solution-specific instructions.

To install SAS Offer Optimization for Communications and other relevant SAS products by using the SAS Deployment Wizard:

1. Log on to the machine on which you want to install SAS Offer Optimization for Communications.

   On a Windows machine, log on as a user who is a member of the Administrators group. On a UNIX machine, log on as a SAS user (for example, sas) that you defined when performing the SAS Intelligence Platform pre-installation tasks.

   Note: It is recommended that you do not log on as root to perform an installation on a UNIX machine.

2. Start the SAS Deployment Wizard from your SAS Software Depot. For example, on a Windows machine, double-click the setup.exe file, which is located in your SAS Software Depot folder.

3. Open the *SAS Intelligence Platform: Installation and Configuration Guide*, which is located at **http://support.sas.com/documentation/cdl/en/biig/62611/PDF/default/biig.pdf**.

   TIP On the Select Deployment Step and Products to Install page of the wizard, make sure that you select **SAS Offer Optimization for Communications Server** from the **Product** list.

4. (Optional) If you are installing SAS Offer Optimization for Communications along with SAS Communications Analytics Architecture and SAS Customer Analytics for Communications, see the *SAS Communications Analytics Architecture: Administrator's Guide* and the *SAS Customer Analytics for Communications: Administrator's Guide* for the solution-specific installation instructions.
5. Perform step-by-step installation and configuration as explained in the respective guides.
6. On the SAS Communications Analytics Architecture Server Configuration page, specify the database configuration information. For details, see *SAS Communications Analytics Architecture: Administrator's Guide*.
7. On the SAS Communications Common Server Configuration page, specify the database configuration information. For details, see *SAS Customer Analytics for Communications: Administrator's Guide*.
8. On the SAS Customer Analytics for Communications Server Configuration page, specify the database configuration information. For details, see *SAS Customer Analytics for Communications: Administrator's Guide*.
9. On the SAS Offer Optimization for Communications Server page, specify the following database connection details, and then click **Next**.

Table 2.3 *MySQL Database Connection Information Details*

Field Label	Value
Database host	Enter the name of the MySQL server that you installed when you were performing the pre-installation tasks.
Port number	Enter the port on which the MySQL server is running.
Application Mart Schema Name	Enter the value for the schema name of the database in which Application Data tables are stored. The value that you enter must be the same that you specified during the pre-installation task. The default value is BPPAPTBL.
Interface Mart Schema Name	Enter the value for the schema name of the database in which application Interface Data tables are stored. The value that you enter must be the same that you specified during the pre-installation task. The default value is BPPINF.

10. On the SAS Offer Optimization for Communications Server page, specify the following details for the Database User Information, and then click **Next**.

Table 2.4 MySQL Database User Details

Field Label	Value
Database Administrative User ID	Enter the user ID of the user who has the administrative privileges. This use ID must be the same that you created during pre-installation.
Password	Enter the password for the **Database Administrative User ID**
Confirm Password	Enter the same password again. Click **Next** to specify the schema names.

11. On the SAS Offer Optimization for Communications Database page, provide the location of the JDBC Driver for the MySQL database, and then click **Next**. Make sure that the MySQL connector JAR is the only JAR in the folder.
12. On the Deployment Summary page, review the list of products that you are about to install, and then click **Start**.
13. On the Deployment Complete page, the SAS Deployment Wizard indicates that the installation and configuration of your SAS software is complete. Each software component should have a check mark beside it in the list. Click **Next**.
14. On the Additional Resources page, review the manual configuration instructions in the instructions.html file. This file is saved to your SAS configuration directory during the deployment (for example, **`C:/SAS/Config/Lev1/Documents/instructions.html`**). You can also view the list of the links for additional resources about your deployment. You can print the list for future reference.
15. Click **Finish** to close the SAS Deployment Wizard.

    Note: On a UNIX platform, certain files require setuid permissions. To set the setuid permissions, run the setuid.sh script, which is located in the **`/usr/local/SASHome/SASFoundation/9.3/utilities/bin`** directory.

Post-Installation Instructions

Overview of Post-Installation Tasks

If the installation is successful, the SAS Deployment Wizard produces an HTML file named instructions.html. Follow the post-installation tasks in this file to complete the configuration of the server tier and the middle tier. The instructions.html file also describes when to perform the tasks that are outlined in this chapter.

Additional information about the instructions.html file and supplemental instructions are available in the SAS Intelligence Platform documentation.

Verify Operating System Users and Grant Permissions

Verify that a user group named SAS Server Users exists at the operating system level. This user group is created as a part of the SAS installation. Make sure that this group includes the sassrv user (a SAS Server user).

Grant the SAS Server Users group Full Control permission (on Windows) or 775 permission (on UNIX) for the following folders and their subfolders:

- **<SAS configuration directory>/Lev1/AppData/SASOfferOptforCommServer**
- **<SAS configuration directory>/Lev1/Applications/SASOfferOptforCommServer5.4**

Define Users and Assign Roles

You need to define users who can log on to SAS Offer Optimization for Communications and perform tasks based on their assigned roles. SAS Offer Optimization for Communications is shipped with three predefined roles for administration, analysis, and viewing. A predefined set of capabilities is available for each role. For details, see "Verify Roles and Capabilities" on page 24.

You can define users and assign roles in SAS Management Console. For more information, see the *SAS 9.3 Management Console: Guide to Users and Permissions*. This document is available at **http://support.sas.com/documentation/cdl/en/mcsecug/63190/PDF/default/mcsecug.pdf**.

Grant Random Access for Data in OOCBDM Library

Some ETL jobs might require random access to the data and therefore might not run successfully. Therefore, in order to ensure that these ETLs run successfully, you have to grant random access for data in the OOCBDM library.

Note: You need to perform the following steps if your Business Data is in a database other than SAS, such as Teradata.

To grant random access to data:

1. Log on to SAS Data Integration Studio and connect to a profile.
2. Select the **Inventory** tab and expand the **Library** folder.
3. Right-click the **OOCBDM** library and select **Properties**.
   a. On the **Options** tab, click **Advanced Options**.
   b. On the **Input/Output** tab, select **Yes** for **Allow random access to a table when rereading a row**.
   c. Click **OK**.
4. Close SAS Data Integration Studio.

Validation Instructions

Verify the Installation of SAS Offer Optimization for Communications

To verify whether SAS Offer Optimization for Communications has been installed properly:

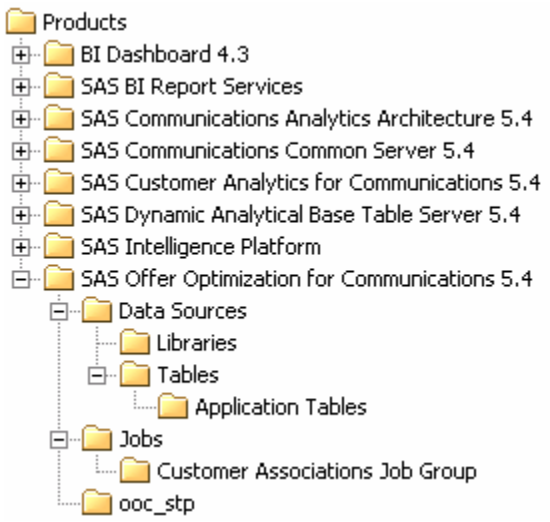
1. Enter the application URL in the address field of your web browser, and then press ENTER. For example, you might enter **`http://server01.abc.com:8080/SASOfferOptForComm`**.
2. Log on to SAS Offer Optimization for Communications as a user who has all the capabilities of the Administration role.
3. You should see the following workspaces:
   - Business Groups
   - Projects
4. In the Business Groups workspace, check that you can create a business group. After you create a business group, you can define its selection criteria. For instructions on how to create a business group and define its selection criteria, see the *SAS Offer Optimization for Communications: User's Guide*.
5. On the Application bar, click **Log Off**

Verify the Metadata Layout

To verify that all the required metadata components are created successfully:

1. Log on to SAS Management Console with the profile of an administrator.
2. On the **Folders** tab, expand **Products** ⇨ **SAS Offer Optimization for Communications**.
3. Confirm that the following subfolders are created in each of these folders.

Figure 2.1 *Metadata Layout*



Verify Roles and Capabilities

To verify that appropriate roles and capabilities are created:

1. Open SAS Management Console with the profile of an administrator.
2. On the **Plug-ins** tab, expand **Environment Management** and select **User Manager**.
3. In the right pane, make sure that the following roles or groups are available:

Table 2.5 *Predefined Roles*

Group Name or Role Name	Group or Role
Offer Opt for Comm DBMS User Group	Group
Offer Opt for Comm: Administration	Role
Offer Opt for Comm: Analysis	Role
Offer Opt for Comm: Viewing	Role

4. Right-click any of the roles and select **Properties**.
5. On the **Capabilities** tab, make sure that the role-specific capabilities are selected for the role. For details, see "Roles and Capabilities" on page 31.

Verify the Stored Processes

To verify that the stored procedures are registered appropriately, complete these steps:

1. Open SAS Management Console with the profile of an administrator.
2. On the **Folders** tab, expand **System** ⇨ **Applications** ⇨ **SAS Offer Optimization for Communications** ⇨ **Offer Opt for Comm Server 5.4**.
3. Select **ooc_stp** and in the right pane verify that 29 stored processes are registered.

Verify the Predefined Libraries

To confirm that the predefined libraries are created appropriately:

1. Open SAS Management Console with the profile of an administrator.
2. On the **Plug-ins** tab, expand **Environment Management** ⇨ **Data Library Manager** ⇨ **Libraries**.
3. Make sure that the following libraries are created
   - Application Mart
   - Business Data
   - Interface Mart
4. Close SAS Management Console.
5. Go to the **`<SAS configuration directory>/Lev1/<SAS Application Server context name>`** folder.
6. Depending on whether the operating system is Windows or UNIX, run the sas.bat or the sas.sh file respectively. For example, on the Windows machine, run the **`C:/SAS/Config93/Lev1/SASApp/sas.bat`** file.
7. In the SAS Explorer, double-click **Libraries** and verify that the following library names are displayed:
   - BPPAPTBL
   - BPPINF
   - OOCBDM
8. Close Base SAS.

Unconfiguring SAS Offer Optimization for Communications

Prerequisite Tasks

Before you unconfigure SAS Offer Optimization for Communications, complete the following tasks:

1. Create a backup of the **`<SAS configuration directory>/Lev1/AppData/SASOfferOptforCommServer`** folder:
2. Create a backup of the application metadata if you have made any customizations that you want to save for later use. To do so, Start SAS Management Console, and then open the appropriate connection profile to connect to the desired metadata server.
3. On the **Folders** tab, expand **SAS Folders** ⇨ **Products**.
4. Create a backup of the **SAS Offer Optimization for Communications 5.4** folder.
5. Close SAS Management Console.
6. Stop the web application server (JBoss, WebSphere, or WebLogic, as applicable).

Remove SAS Offer Optimization for Communications

Use the SAS Deployment Manager to remove the following software components of SAS Offer Optimization for Communications:

- SAS Offer Optimization for Communications Server
- SAS Offer Optimization for Communications Mid-tier

Post-Unconfiguration Tasks

After you have removed the software components of SAS Offer Optimization for Communications, delete the application metadata.

To delete the application metadata, complete the following tasks:

1. Start SAS Management Console, and then open the appropriate connection profile to connect to the desired metadata server.
2. On the **Folders** tab, expand **SAS Folders** ⇨ **Products**.
3. Delete the **SAS Offer Optimization for Communications 5.4** folder.
4. Close SAS Management Console.
5. Delete the following folder: **`<SAS configuration directory>/Lev1/AppData/SASOfferOptforCommServer`**.

Part 2

Application Management

Chapter 3

Solution-Specific ETL Jobs

Prerequisite ETL Jobs

Before you run the solution-specific ETL jobs that populate the Application Data tables, make sure that you have run the ETL jobs of SAS Communications Analytics Architecture. For details, see *SAS Communications Analytics Architecture: Administrator's Guide*.

ETL Jobs for Populating Application Data Tables

SAS Offer Optimization for Communications requires certain data for generating workflow reports and running application processes. This activity is completed by running a set of jobs. These jobs populate data from the Foundation data mart into the Application Data. In addition, these jobs write back the data that describes business groups and the association between business groups and customers to the Foundation data mart tables.

Table 3.1 *ETL Jobs for Application Data Tables*

Job Name	Purpose	Primary Source Table	Target Table
bpp_cust_dtl_job	gets the required customer-related information in the application area so that further application process can access all the data from this location instead of the Foundation data mart. This job should be synchronized with the loading frequency of the Foundation data mart.	CUST_D	CUST_DTL

Job Name	Purpose	Primary Source Table	Target Table
bpp_bg_write_back_job	writes back the metadata of the business group that is created in the application. You must run this job when a new business group is created or an existing business group is modified.	BSNSGRP_SUMMARY	BUSINESS_GROUP_D
bpp_cust_bg_association_job	writes back the association of the business group with the customer in the Foundation data mart tables.	• BSNSGRP_FLTR_SUMMARY • CUST_D	CUST_X_BUSINESS_GROUP_BRIDGE

Chapter 4

Performing Middle-Tier Administrative Tasks

Middle-Tier Administration Overview

The middle-tier component synchronizes all components of SAS Offer Optimization for Communications and enables them to function together as an integrated system. It interacts with the web-based user interface of SAS Offer Optimization for Communications and the SAS library. Also, it connects to the SAS run-time environment in order to run analytical processes.

You have to perform certain administrative activities in order to set up and configure the middle-tier component on various servers such as the metadata server, the application server, and the SAS library. In addition, you have to maintain error logs that are generated by SAS Offer Optimization for Communications.

Middle-Tier on Metadata Server

Roles and Capabilities

SAS Offer Optimization for Communications has three predefined roles that can be assigned to users. Each role is assigned a set of predefined capabilities. One or more roles can be assigned to a user who can access SAS Offer Optimization for Communications. If multiple roles are assigned to a user, then the least restrictive capability of each role is granted to the user.

SAS Offer Optimization has the following predefined roles.

Offer Opt for Comm: Administration
: Users who are assigned this role can access and perform all functions that are performed by using the SAS Offer Optimization for Communications interface. They can view, create, edit, and delete business groups and projects and assign users to business groups. In addition, they can also view, create, edit, and delete workflow reports.

Offer Opt for Comm: Analysis
: Users who are assigned this role can access the projects that are assigned to them and perform workflow steps. They can view details of business groups that are assigned to them and projects that are shared by other users. In addition, they can also create, modify, and delete the workflow reports for the projects that are assigned to them.

Offer Opt for Comm: Viewing
: Users who are assigned this role can perform basic tasks such as view business groups, projects, and reports. Therefore, they cannot change the state of SAS Offer Optimization for Communications.

Creating Users and Granting Roles and Capabilities

You have to define users who can log on to SAS Offer Optimization for Communications and perform tasks based on the role that is assigned to them. For details about defining users and granting roles and capabilities, see *SAS 9.2 Management Console Guide to Users and Permissions*. This document is available at the following location: **http://support.sas.com/documentation/cdl/en/mcsecug/61708/PDF/default/mcsecug.pdf**.

Middle-Tier and Database Connectivity

SAS Offer Optimization for Communications will be deployed on the application server. SAS Offer Optimization for Communications uses JNDI lookup to connect to the database. The application searches for the JNDI name BPPDS to identify the datasource that it needs to connect to.

The middle-tier of SAS Offer Optimization for Communications is connected to the database using the application-server-managed datasource. For this purpose, you have to create the datasource of the SAS Offer Optimization for Communications database in the application server and configure its JNDI lookup as BPPDS. Therefore, set the JNDI name of the datasource as *BPPDS*.

Here are the application-server-specific details of managing the datasource:

JBoss
: On a Windows machine, locate the BPPDataSource-ds.xml file in the **<JBOSS_HOME>/server/SASServer11/deploy** folder. For example, this location can be **C:/jboss-4.2.0.GA/server/SASServer11/deploy**.

WebLogic and WebSphere
: Go to the application server administration console. Complete the required configuration for the JNDI resources.

Configuring External Properties

The external properties of SAS Offer Optimization for Communications are predefined. Also, each property is populated with a default value. For certain properties, you can change the default value according to your requirements. To change the default value of these properties, log on to SAS Management Console and change the properties of the software component that is installed on the metadata server.

The following table lists the external properties that are defined in the software component.

Table 4.1 *External Properties*

Property Name	Configure (Yes/No)	Purpose
BPP_CACHE_INTERVAL	Yes	indicates the cache interval. This interval is configured in milliseconds. Some master tables that are frequently used are cached by the middle-tier. The default cache interval is one day. After that, the cache is refreshed. You can increase or decrease the value for the cache interval.
flex.BPP_TIMEOUT_WARNING_DURATION	Yes	the duration of time in seconds for displaying the warning dialog box before the time-out.
flex.BPP_TIMEOUT_PINGWINDOW_INTERVAL	Yes	the time in milliseconds for keeping the Flex session and server session alive for any user action that is taken on the Flex side.
flex.BPP_LOCALE	Yes	specifies the fallback locale, which is used if no locale is defined in the request or the locale that is defined in the request is not supported.
flex.BPP_ADMIN_EMAIL_ID	Yes	specifies the e-mail ID that is used for the send e-mail notification feature that is available in the SAS Offer Optimization for Communications interface.

To configure the external properties:

1. Log on to SAS Management Console and connect to the role of an Administrator.
2. On the **Plug-ins** tab, select **Application Management** ⇨ **Configuration Manager** ⇨ **SAS Application Infrastructure**.
3. Right-click **Offer Opt for Comm Mid-Tier 5.4** and select **Properties**.
4. On the **Advanced** tab, specify the appropriate value for each property that you want to configure.

5. Click **OK**.

Logging Configuration Administration

The logs of the middle-tier component are maintained in the **<SAS configuration directory>/Lev1/Web/Logs** folder. For example, on a Windows machine, this location can be **C:/SAS/EBIEDIEG/Lev1/Web/Logs**.

The logs of the middle-tier component use log4j and therefore support the following features:

- Increase or decrease the level of detail that is generated in the logs.
- Define the location where the logs can be generated.
- Select the preferred format for the log files.

The log configuration file is maintained in the **<SAS configuration directory>/Web/Common/LogConfig** folder. For example, this location can be **C:/SAS/EBIEDIEG/Lev1/Web/Common/LogConfig**. You can change the logging configuration for the middle-tier component. However, before you do so, refer to the log4j documentation. For details, see **http://logging.apache.org/log4j/**.

Middle-Tier Error Messages

The following table lists the codes and the descriptions of errors that can occur when the SAS Offer Optimization for Communications interface interacts with the middle-tier component. When an error occurs, the respective error code is present in the application-specific middle tier log. You can refer to the error descriptions that are listed below when you debug the error.

Table 4.2 *Error Messages*

Error Code	Description
ER0000	An error has occurred. Please contact the system administrator.
ER0001	Error while inserting data
ER0002	Error while inserting or updating data
ER0003	Error while generating ID
ER0004	Error while deleting data
ER0005	Error querying data
ER0006	Error loading data
ER0007	Error while updating data
ER0008	Error retrieving session from Flex Context

Error Code	Description
ER0009	Could not resolve user
ER0010	Error while initializing
ER0011	Configuration not found
ER0012	Error Reading Config file
ER0013	Not able to verify product license
ER0014	Stored process does not exist.
ER0015	Stored Process Name search yielded null
ER0016	Stored Process Name search yielded zero results
ER0017	Error Executing Stored procedure
ER0018	Error Destroying Execution2Interface
ER0019	Project Name already exists. Please select a different project name
ER0020	Project is currently in execution.
ER0021	Error retrieving user capabilities
ER0022	Error retrieving user roles
ER0023	No property found
ER0024	Business Group Already exists. please change the name to create a new one
ER0025	Not able to clone Expression object
ER0026	Product is not valid.
ER0027	Product is not licensed.
ER0028	Product license has expired.
ER0029	Display themes cannot be found. Please verify that the installation included Flex Application Themes.
ER0030	This business group has one or more projects in the batch mode. Please pull these projects back to the design mode before you delete this business group
ER0031	You are not authorized to create a project in this business group
ER0032	Unable to retrieve users.

Error Code	Description
ER0033	An internal error has occurred when you were trying to execute. Please contact the system administrator.

Chapter 5

Business Groups Administration

Configuration for Business Groups

Business groups are defined and maintained by using the SAS Offer Optimization for Communications interface. However, in order to define business groups, you have to complete certain prerequisite activities.

In order to enable users to define business groups, you have to complete the following tasks:

- Register the stored procedures.
- Configure variables.
- Configure values for variables.

- Define filter combinations.

Note: You might have to consult your business analyst when you perform these tasks. Also, it is recommended that you be familiar with the structures of the main and reference tables of the Foundation data mart and the Application Data tables.

Registering the Stored Procedure for Business Groups

Overview

SAS Offer Optimization for Communications requires the bpp_spexecutecreatebsnsgrpfltr.sas stored procedure for creating business groups. This stored procedure is available in the following folder:

Windows path
`<SAS Home>/SASFoundation/9.3/bppsrv/sasstp`

UNIX path
`<SAS Home>/SASFoundation/9.3/sasstp/bppsrv`

Before you use this stored procedure, you have to register it in SAS Management Console.

Register the Stored Procedure

To register the stored procedure:

1. Log on to SAS Management Console and connect to a profile.
2. If you are registering the stored procedure for the first time, then create a new folder in **Products ⇨ Offer Optimization for Communications**.
3. Right-click the folder that you have created. On the menu, select **Actions ⇨ New Stored Process**.
4. Specify the name and description of the stored procedure and click **Next**.
5. Select **`SAS server as SASApp – Logical Stored Process Server`**.
6. Select **Source code repository path** in order to point to the following location.

   Windows path
   `<SAS Home>/SASFoundation/9.3/bppsrv/sasstp`

   UNIX path
   `<SAS Home>/SASFoundation/9.3/sasstp/bppsrv`
7. Specify the name of the source file of the stored procedure that you want to register.
8. Click **Next**.
9. Click **New Prompt** if the stored procedure requires some initial parameters.
10. Click **Finish**.

Execute the Stored Procedure

You can execute the stored procedure that you have registered only after you configure variables and values for business groups. For details, see "Configuring Variables and Variable Values for Business Groups" on page 39.

To execute the stored procedure:

1. Open SAS Enterprise Guide.
2. Go to the folder in which you have registered the stored procedure. This folder is available in **Products ⇨ SAS Offer Optimization for Communications**.
3. Drag and drop the stored procedure into the Process flow diagram.
4. Right-click the stored procedure and select **Run** to execute it.
5. Specify appropriate values if you are prompted for certain parameters.

Configuring Variables and Variable Values for Business Groups

Overview

Each business group that is defined using the SAS Offer Optimization for Communications interface is associated with certain selection criteria. Based on these selection criteria, customers are added to the business group. For details, see *SAS Offer Optimization for Communications User's Guide*. In order to enable users to define the selection criteria, you have to configure certain variables and define their values.

Here is the list of Application Data tables that you have to configure in order to define variables and values for business groups.

Table 5.1 *Tables for Business Groups Variables*

Table Name	Description
BPP_VRBL_MASTER	contains the master list of variables that are required for SAS Offer Optimization for Communications configuration. This table is populated with default data. Make sure that you do not delete the default data.
BPP_VRBL_MASTER_NLS	contains the localized names for variables that are defined in the BPP_VRBL_MASTER table.
BSNSGRP_VRBL_MASTER	contains the variables that you want to consider for defining business groups. This table is populated with default data. Make sure that you do not delete the default data.

Table Name	Description
BPP_REF_VRBL_VAL_MASTER	contains values of variables that you define in the BPP_VRBL_MASTER table. This table is populated with default data. Make sure that you do not delete the default data.
BPP_REF_VRBL_VAL_MASTER_NLS	contains the localized value names for values that are defined in the BPP_REF_VRBL_VAL_MASTER table.
BSNSGRP_REF_VRBL_VAL_MASTER	contains values of variables that you define in the BSNSGRP_VRBL_MASTER table. This table is populated with default data. Make sure that you do not delete the default data.

Assumptions

When you define a variable for business groups, make sure that a customer has only one value of this variable. For example, a customer can have multiple account types. Therefore, you must not select the account type variable for defining business groups.

In addition, for defining business groups, you must consider only those variables that are defined in the corresponding reference tables and main dimensions of the Foundation data mart.

For example, here is the list of variables that you can define for business groups based on these assumptions:

- Customer type
- Payment mode
- Customer geography
- Offer segment

Configure Variables

A default set of variables is defined in the BPP_VRBL_MASTER Application Data table. However, you can also decide on the variables that you want to consider for business groups. Define these variables in the BPP_VRBL_MASTER table. Make sure that you specify values for the following columns of the BPP_VRBL_MASTER table.

Table 5.2 *Required Columns of BPP_VRBL_MASTER Table*

Column	Description
VARIABLE_ID	the sequence number that uniquely identifies the variable.

Column	Description
VARIABLE_NM	the name of the variable. Make sure that you refer to the corresponding reference table of the Foundation data mart when you define this column value. The value in this column must be the same as the name of the column that contains the reference code of the reference table.
SRC_TABLE_NM	the name of the table that sources the association of the variable.
SRC_COLUMN_NAME	the name of the column of the source table.
SRC_LIBRARY_NM	the name of the source library that associates the variable with the application.
REF_SRC_TABLE_NM	the name of the reference table of the Foundation data mart from which the values for this variable are populated.
REF_SRC_TABLE_COLUMN	the name of the column of the reference table from which values for this variable are populated.
REF_LIBRARY_NAME	the name of the source library from which values for this variable are populated.

The following table lists the columns of the BPP_VRBL_MASTER table that you have to configure in order to define payment mode as one of the variables for business groups.

Table 5.3 *Sample Data in BPP_VRBL_MASTER Table*

Column	Value
VARIABLE_ID	1
VARIABLE_NM	PYMNT_MODE_CD
SRC_TABLE_NM	OFFER_BUNDLE_D
SRC_COLUMN_NAME	BASE_OFFER_PYMNT_MODE_CD
SRC_LIBRARY_NM	CFDDIM
REF_SRC_TABLE_NM	PAYMENT_MODE
REF_SRC_TABLE_COLUMN	PYMNT_MODE_CD
REF_LIBRARY_NAME	CFDREF

After you configure values in the BPP_VRBL_MASTER table, make sure that you enter correct values for these variables in the BPP_VRBL_MASTER_NLS table. To do so, in the BPP_VRBL_MASTER_NLS table, enter appropriate values for the following columns.

Table 5.4 BPP_VRBL_MASTER_NLS Table

Column	Description
VARIABLE_ID	the sequence number that uniquely identifies the variable.
LOCALE	a specific language code that is associated with a geographical region.
VRBL_DSPLY_NM	the localized display name that is associated with the variable.
VRBL_DSPLY_DESC	the localized display description that is associated with the variable.

Example: Configure BPP_VRBL_MASTER_NLS Table

To configure the payment mode variable, you can enter the following data in the BPP_VRBL_MASTER_NLS table.

Table 5.5 Sample Data in BPP_VRBL_MASTER_NLS Table

Column	Value
VARIABLE_ID	1
LOCALE	en_US
VRBL_DSPLY_NM	Payment mode
VRBL_DSPLY_DESC	Payment mode

After you configure variables in the BPP_VRBL_MASTER table, identify the variables that you want to consider for defining selection criteria for business groups. In the BSNSGRP_VRBL_MASTER table, enter the IDs of these variables. For example, for the payment mode variable, enter the VARIABLE_ID that you have entered in the BPP_VRBL_MASTER table into the VARIABLE_ID column of the BSNSGRP_VRBL_MASTER table.

Configure Values for Variables

After you define variables for business groups, configure values for these variables in the BPP_REF_VRBL_VAL_MASTER table. Make sure that you specify values for the following columns of the BPP_REF_VRBL_VAL_MASTER table.

Table 5.6 Required Columns of BPP_REF_VRBL_VAL_MASTER Table

Column	Description
VARIABLE_ID	the unique sequence number of the variable as defined in the BPP_VRBL_MASTER table.
BPP_REF_VARIABLE_VALUE_ID	the sequence number that uniquely identifies the value of a certain variable.

Column	Description
BPP_REF_VARIABLE_VALUE	the value of the variable. Make sure that you refer to the corresponding reference table of the Foundation data mart when you define this column value. The value in this column must be same as the column value of the corresponding reference table of the Foundation data mart.

Example: Configure BPP_REF_VRBL_VAL_MASTER Table

To configure values for the payment mode variable, you can enter the following data in the BPP_REF_VRBL_VAL_MASTER table.

Table 5.7 *Sample Data in BPP_REF_VRBL_VAL_MASTER Table*

Column	VARIABLE_ID	BPP_REF_VARIABLE_VALUE_ID	BPP_REF_VARIABLE_VALUE
Record 1	1	1	PREPAID
Record 2	1	2	POSTPAID

After you configure values in the BPP_REF_VRBL_VAL_MASTER table, make sure that you enter correct values for the configured values in BPP_REF_VRBL_VAL_MASTER_NLS table. To do so, in the BPP_REF_VRBL_VAL_MASTER_NLS table, enter appropriate values for the following columns.

Table 5.8 *Sample Data BPP_REF_VRBL_VAL_MASTER_NLS in Table*

Column	Description
BPP_REF_VARIABLE_VALUE_ID	the unique sequence number of the variable value as defined in the BPP_REF_VRBL_VAL_MASTER table.
LOCALE	a specific language code that is associated with a geographical region.
BPP_REF_VRBL_VAL_DSPLY_NM	the localized display name that is associated with the variable value.
BPP_REF_VRBL_VAL_DSPLY_DESC	the localized display description that is associated with the variable value.

Example: Configure BPP_REF_VRBL_VAL_MASTER_NLS Table

After configuring values for the payment mode variable, you can enter the following data in the BPP_REF_VRBL_VAL_MASTER_NLS table.

Table 5.9 Sample Data in BPP_REF_VRBL_VAL_MASTER_NLS Table

Column	BPP_REF_VARIABLE_VALUE_ID	LOCALE	BPP_REF_VRBL_VAL_DSPLY_NM	BPP_REF_VRBL_VAL_DSPLY_DESC
Record 1	1	en_US	Prepaid	Prepaid
Record 2	2	en_US	Postpaid	Postpaid

After you configure values in the BPP_REF_VRBL_VAL_MASTER table, identify the values that you want to consider for defining selection criteria for business groups. To do so, in the BSNSGRP_REF_VRBL_VAL_MASTER table, enter appropriate values for the following columns.

Table 5.10 Columns of BSNSGRP_REF_VRBL_VAL_MASTER Table

Column	Description
BPP_REF_VARIABLE_VALUE_ID	the sequence number that uniquely identifies the value of the variable as defined in the BPP_REF_VRBL_VAL_MASTER table.
VARIABLE_ID	the unique sequence number of the variable as defined in the BPP_REF_VRBL_VAL_MASTER table.
VARIABLE_VALUE_DLTD_IND	indicates whether the variable value is to be considered for defining selection criteria of business groups. If you want to consider this value for defining the selection criteria, set the value for this column to NULL.

Example: Configure BSNSGRP_REF_VRBL_VAL_MASTER Table

After configuring values for the payment mode variable, you can enter the following values in the BSNSGRP_REF_VRBL_VAL_MASTER table.

Table 5.11 Sample Data in BSNSGRP_REF_VRBL_VAL_MASTER Table

Column	Value
VARIABLE_ID	1
BPP_REF_VARIABLE_VALUE_ID	1
VARIABLE_ID	1
BPP_REF_VARIABLE_VALUE_ID	2

Constraints

You have to decide on the maximum number of variables and values that you can configure in the BSNSGRP_VRBL_MASTER and

BSNSGRP_REF_VRBL_VAL_MASTER tables respectively. This consideration has an impact on the exploration of the hierarchical list. Therefore, it is recommended that you restrict the number of variables and values to four or five.

Defining Filter Combinations for a Business Group

After you define variables and their values in the BSNSGRP_VRBL_MASTER and BSNSGRP_REF_VRBL_VAL_MASTER Application Data tables, you have to run the bpp_spexecutecreatebsnsgrpfltr.sas stored procedure to set up all possible filter combinations. These filter combinations are then stored in BSNSGRP_FLTR_SUMMARY and BSNSGRP_FLTR_X_VRBL_VAL Application Data tables.

To define filter combinations for a business group:

1. Make sure that you have populated the following Application Data tables with correct data:
   - BSNSGRP_VRBL_MASTER
   - BSNSGRP_REF_VRBL_VAL_MASTER
2. Run the bpp_spexecutecreatebsnsgrpfltr.sas stored procedure, which is available in the following location:

   Windows path
   `<SAS Home>/SASFoundation/9.3/bppsrv/sasstp`

   UNIX path
   `<SAS Home>/SASFoundation/9.3/sasstp/bppsrv`

   This step populates BSNSGRP_FLTR_SUMMARY and BSNSGRP_FLTR_X_VRBL_VAL Application Data tables with all combinations of variables and values that can be used as filter combinations.
3. In the BSNSGRP_FLTR_SUMMARY Application Data table, identify the filter combinations that you do not want to add as selection criteria for creating business groups. These combinations might not be significant for defining a business group. For example, a certain offer segment might not be applicable in certain geographical areas.
4. For each combination that you have identified in the above step, set the value of the BSNSGRP_FLTR_VALID_IND column to N.

   Note: If you set up this value after you define one or more business groups, then this change will not be applicable to the business groups that you have already defined. Therefore, make sure that you set up the value for the BSNSGRP_FLTR_VALID_IND column before you define business groups.

Defining Business Groups

After you complete the prerequisite configuration tasks, you can define business groups by using the SAS Offer Optimization for Communications interface. The variables and values that you have configured in the BSNSGRP_VRBL_MASTER and

BSNSGRP_REF_VRBL_VAL_MASTER Application Data tables will be available in the hierarchical list that you use to define the selection criteria. For details, see *SAS Offer Optimization for Communications: User's Guide*.

After you complete defining the business groups, you have to run the bpp_bg_write_back_job job. This job writes the information about business groups from the Application Data to the Foundation data mart.

Editing a Business Group Scheme

Overview

The following tasks can necessitate changing a business group scheme:

- Add a variable to the BSNSGRP_VRBL_MASTER Application Data table.
- Delete a variable from the BSNSGRP_VRBL_MASTER Application Data table.
- Add a value to the BSNSGRP_REF_VRBL_VAL_MASTER Application Data table.
- Delete a value from the BSNSGRP_REF_VRBL_VAL_MASTER Application Data table.

These tasks impact the underlying business group scheme. Therefore, you must be very cautious when you perform these tasks. Also, before you perform these tasks, make sure that you archive all your project data.

Note: You have to define the filter combinations again after you perform any of these tasks. For details, see "Defining Filter Combinations for a Business Group" on page 45.

Adding or Deleting a Variable

A business requirement can necessitate adding or deleting variables that are defined for business groups. For example, in addition to the variables, payment mode, customer type, and geography, your business might want to consider a new variable such as an offer segment. In this case, you have to add a new variable to the BSNSGRP_VRBL_MASTER Application Data table. If you add or delete a variable, then you have to define all the business groups and projects again. Therefore, before you add a new variable to the BSNSGRP_VRBL_MASTER Application Data table or delete a variable from this table, make sure that you archive all your project data.

Adding a New Value for a Variable

A business requirement can necessitate adding one or more new values for a variable. For example, new states or regions can be added for the geography variable. For such business requirements, you have to add the new values in the BSNSGRP_REF_VRBL_VAL_MASTER Application Data table. When you add a new value for a variable, it is indicated in the hierarchical list of selection criteria that are defined by using theSAS Offer Optimization for Communications interface. You have to perform certain tasks such as run the business groups and the associated projects again. For details, see *SAS Offer Optimization for Communications: User's Guide*.

Deleting a Value for a Variable

A business requirement can necessitate removing one or more values for a variable. For example, certain states or regions might not be needed for the geography variable. For such business requirements, you have to update the BSNSGRP_REF_VRBL_VAL_MASTER Application Data table. To do so, set the VARIABLE_VALUE_DLTD_IND column to Y for the value that you do not want to consider for the selection criteria of business groups. As a result, the selection criteria that are defined for this value are deleted from the BSNSGRP_FLTR_X_VRBL_VAL and BSNSGRP_FLTR_SUMMARY Application Data tables and the BSNSGRP_X_BPP_FLTR_X_CUST Business Data table. Therefore, you have to run the business groups and the associated projects again. For details, see *SAS Offer Optimization for Communications: User's Guide*.

Performing Tasks for a Deleted Business Group

Users can delete a business group using the SAS Offer Optimization for Communications interface. However, you have to perform certain administrative tasks before and after a business group is deleted.

If a business group is deleted, then the business group and also its projects are deleted. Therefore, before a business group is deleted, make sure that you archive the project data associated with the business group. After a business group is deleted, the selection criteria that are defined for the business group are assigned to the default business group. Therefore, the variable values that were selected for this business group are available for selection when the selection criteria for other business groups is defined.

Note: If you want to retrieve a business group that is deleted, in the BSNSGRP_SUMMARY Application Data table, change the value of the BSNSGRP_ACTIVE_IND column from *N* to *Y*. You have to retrieve the data of the projects that are associated with this business group. For details, see "Defining Filter Combinations for a Business Group" on page 45.

Viewing Log Files for Business Groups

When you run the stored procedure to define filter combinations or when you perform any task for a business group through the SAS Offer Optimization for Communications interface, a log file is created in the **<SAS configuration directory>/Lev1/AppData/SASOfferOptforCommServer/5.4/logs/ooc_logs/bsnsgrplogs** folder. This log file contains information about all the tasks and the errors that might occur when you perform these tasks. For example, if you run the stored procedure to define the filter combinations, the bpp_spexecutecreatebsnsgrpfltr.log file is generated. Also, if you run a business group (with ID as 2) through the SAS Offer Optimization for Communications interface, the bpp_spexecutebsnsgrp2.log file is generated. Similarly, log files are generated when you perform other tasks through the SAS Offer Optimization for Communications interface.

Updating the Business Groups Data

Every time data is loaded into the Foundation data mart, you have to synchronize the business group tables with the latest data. This data synchronization is required to get the latest information about the customer base and offers.

To synchronize the business group tables with the Foundation mart tables:

1. Run the bpp_cust_dtl_job job. You can schedule this job to run after every load of the Foundation data mart.
2. Go to the **<SAS configuration directory>/Lev1/<SAS Application Server context name>** folder.
3. Depending on whether the operating system is Windows or UNIX, run the sas.bat or the sas.sh file respectively. For example, on the Windows machine, run the **C:/SAS/Config/Lev1/SASApp/sas.bat** file.
4. In the editor, run the following command:

   ```
   %OOCINIT; %bpp_executeooc_bg_batch();
   ```

5. Run the bpp_cust_bg_association_job job. You can schedule this job to run after the BPP_EXECUTEOOC_BG_BATCH macro is run successfully.

Chapter 6

Configuration for Application Workflow

Configuration for Workflow Steps

You have to perform certain configuration tasks before users create projects and work with the project workflow by using the SAS Offer Optimization for Communications interface. These configuration tasks are required for the Target Segment Selection, Microsegmentation, and Offer Ranking workflow steps.

Note: Users must not create projects and work with project workflow before the configuration tasks that are detailed in this chapter are complete. Otherwise, the workflow steps will not run successfully.

Configuration for Target Segment Selection Workflow Step

Variables Selection

Target segments are defined based on certain filter criteria. In order to define the filter criteria, you have to configure certain variables and define values for these variables. These variables are either categorical or numeric. The variables that you define must be columns of the CUST_DTL Business Data table.

Here is the list of columns of the CUST_DTL table from which you can select the variables for the target segment selection workflow step:

- CUST_STATUS_CD
- TENURE_ON_NETWORK_BAND
- GROSS_USG_ARPU_BAND
- CHURN_BAND_CD
- BILL_ARPU_BAND
- IND_CUST_GENDER_CD
- STATE_CD
- AGE_BAND_CD
- IND_CUST_MARITAL_STATUS_CD
- CITY_CD
- CUST_CREDIT_CLASS_CD
- IND_CUST_SEGMENT_TYPE_CD
- IND_CUST_STD_OCCUPATION_CD
- IND_OCCUPATION_INDUSTRY_GRP_CD
- IND_CUST_ETHINICITY_CD
- IND_CUST_EDUCATION_LEVEL_CD
- IND_CUST_INCOME_RANGE_CD

- ORG_CUST_ORG_TYPE_CD
- ORG_CUST_SEGMENT_TYPE_CD
- IND_CUST_CSP_EMPLOYEE_IND
- ACQUIRING_CAMPAIGN_CD
- BASE_OFFER_TYPE_CD
- BASE_OFFER_CUST_TYPE_CD
- BASE_OFFER_PYMNT_MODE_CD
- BASE_OFFER_SEGMENT_CD
- BPP_AVAILED_IND
- CUST_ADDRESS_POSTAL_CD
- COUNTY_CD
- REGION_CD
- COUNTRY_CD
- ANALYTICAL_MODEL_SEGMENT_CNCT
- CAMPAIGN_CD
- PROFITABILITY_BAND_CD
- DATA_USG_ARPU_BAND
- VOICE_USG_ARPU_BAND
- MESSAGE_USG_ARPU_BAND
- EXPECTED_TENURE_IN_DAYS
- CLTV
- CHV

Configure Variables

To configure variables for the target segment selection workflow step, complete the following steps:

1. Identify the columns of the CUST_DTL Business Data table that you want to consider as variables for the target segment selection workflow step. You might have to consult your business analyst to confirm the selection of variables.
2. In the BPP_VRBL_MASTER Application Data table, enter the details about the variables that you want to consider for the target segment selection workflow step.

   You have to enter correct values for the following columns of the BPP_VRBL_MASTER Application Data table.

   Table 6.1 *Columns of BPP_VRBL_MASTER*

Column	Description
VARIABLE_ID	the sequence number that uniquely identifies the variable.

Column	Description
VARIABLE_CD	the code that is assigned to the variable. This column is not used currently.
VARIABLE_NM	the name of the variable. Make sure that the value of this column is the same as the column name of the CUST_DTL Business Data table. Moreover, this has to be a categorical variable.
VARIABLE_PRFLNG_TYPE_CD	the profiling type code. Specify the value **CAT** for a categorical variable and **NUM** for a numeric value.
ANALYTICAL_VARIABLE_IND	indicates whether the variable is an analytical variable. Type **N** for a categorical variable and **Y** for a numeric variable.
PREPAID_IND	indicates whether the variable can be used for target segments that contain prepaid customers. Type **Y** to indicate that the variable can be used for prepaid customers.
POSTPAID_IND	indicates whether the variable can be used for target segments that contain postpaid customers. Type **Y** to indicate that the variable can be used for postpaid customers.

In addition, the BPP_VRBL_MASTER Application Data table, contains the following columns:

- VARIABLE_DISPLAY_IND
- VARIABLE_DISPLAY_FORMAT
- VARIABLE_DATA_TYPE
- SRC_TABLE_NM
- SRC_COLUMN_NAME
- SRC_LIBRARY_NM
- REF_SRC_TABLE_NM
- REF_SRC_TABLE_COLUMN
- REF_LIBRARY_NAME
- RPT_SRC_TABLE_NM
- RPT_SRC_COLUMN_NM
- RPT_SRC_LEVEL
- VARIABLE_SUB_CTGRY_CD
- RPT_VRBL_IND
- CREATED_DTTM
- UPDATED_DTTM

However, you do not have to configure these columns.

Example: Configure BPP_VRBL_MASTER Table

You can configure the churn band variable by specifying the following values in the BPP_VRBL_MASTER Application Data table:

Table 6.2 *Configuration of Churn Band Variable*

Column	Value
VARIABLE_ID	15
VARIABLE_CD	NA
VARIABLE_NM	CHURN_BAND_CD
VARIABLE_PRFLNG_TYPE_CD	CAT
ANALYTICAL_VARIABLE_IND	N
PREPAID_IND	Y
POSTPAID_IND	Y

Note: You must also configure the localized values in the BPP_VRBL_MASTER_NLS Application Data table. For details, see "Configure Variables" on page 40.

Configure Values

After you configure the variables, you have to specify the values for each variable. To do so, enter appropriate details in the BPP_REF_VRBL_VAL_MASTER Application Data table.

Note: You have to configure the values only if the variable is of categorical type.

Table 6.3 *Columns of BPP_REF_VRBL_VAL_MASTER Table*

Column	Description
VARIABLE_ID	the unique sequence number of the variable as specified in the BPP_VRBL_MASTER Application Data table.
VARIABLE_CD	the code that is assigned to the variable. This column is not used currently.
BPP_REF_VARIABLE_VALUE_ID	the sequence number that uniquely identifies the value.
BPP_REF_VARIABLE_VALUE	the reference value of the variable.

In addition, the BPP_REF_VRBL_VAL_MASTER Application Data table contains the following columns:

- BPP_REF_VARIABLE_VALUE_NM
- BPP_REF_VARIABLE_VALUE_DESC
- BPP_REF_VARIABLE_DISPLAY_IND

However, you do not have to configure these columns.

Example: Configure BPP_REF_VRBL_VAL_MASTER Table

You can configure the following reference values for the CHURN_BAND_CD variable.

Table 6.4 *Sample Data in BPP_REF_VRBL_VAL_MASTER Table*

Column	VARIABLE_ID	BPP_REF_VARIABLE_VALUE_ID	BPP_REF_VARIABLE_VALUE
Record 1	14	31	HIGH
Record 2	14	32	MED
Record 3	14	33	LOW

Note: You must also configure the localized values in the BPP_REF_VRBL_VAL_MASTER_NLS Application Data table. For details, see "Configure Values for Variables" on page 42.

Configuration for Microsegmentation and Offer Ranking Workflow Steps

Prerequisites

Before you configure the Microsegmentation and Offer Ranking workflow steps, make sure that you are familiar with the tasks that you can perform in the SAS Customer Analytics for Communications interface. For details, see the *SAS Customer Analytics for Communications: User's Guide*.

Overview of the Configuration Tasks

Microsegmentation and Offer Ranking are the analytical components of SAS Offer Optimization for Communications that are integrated in the workflow. For details, see the *SAS Offer Optimization for Communications: User's Guide*.

In order to enable you to work with these workflow steps, some default configuration is provided. However, you have to perform certain additional tasks that are relevant to building and registering ABT variables.

Default Configuration

After you install and configure SAS Offer Optimization for Communications, certain projects are automatically created. These projects are displayed in the Projects workspace of the SAS Customer Analytics for Communications interface. Also, for each

of these projects, an ABT is predefined. You can view the details of each ABT in the **ABT** page of the respective project.

Note: By default, the owner of these predefined projects is sasadm@saspw. However, you can change the project owner according to your requirements. For details, see the *SAS Customer Analytics for Communications: Administrator's Guide*.

Table 6.5 *Predefined Projects and ABTs*

Project Name	Purpose	ABT Name
Microsegmentation Prepaid	Microsegmentation Prepaid	MSPRE ABT
Microsegmentation Postpaid	Microsegmentation Postpaid	MSPOST ABT
Offer Ranking Postpaid	Offer Ranking Postpaid	ORPOST ABT

Note: The project (Offer Ranking Prepaid) and the ABT (ORPRE ABT) are automatically created for the Offer Ranking Prepaid purpose. However, you must not use this predefined project and ABT. You have to write code to create ABTs for the Offer Ranking Prepaid purpose. For details, see "Developing User-Written Code for Offer Ranking Prepaid ABTs" on page 60.

Define Dimensional Attribute Values for Offer Ranking ABT Variables

Before you define ABT variables for the Offer Ranking projects, you must define the dimensional attribute values by using the Add Dimensional Attribute Value window of SAS Customer Analytics for Communications. For details about dimensional attribute values, see the *SAS Customer Analytics for Communications: User's Guide*.

Note: Make sure that you do not use the import dimensional attribute values feature that is described in the *SAS Customer Analytics for Communications: User's Guide* to define the dimensional attribute values.

Define ABT Variables

For each predefined ABT, you have to define relevant ABT variables. Later, you can modify or delete these variables according to your requirements. For details about ABT variables, see the *SAS Customer Analytics for Communications: User's Guide*.

Consider the following recommendations when you define variables:

Microsegmentation Postpaid ABT
: You can define behavioral variables based on the usage and revenue information that is available for 6 months to 12 months of historical data.

Microsegmentation Prepaid ABT
: You can create behavioral variables based on usage and revenue information that is available for 6 weeks to 12 weeks of historical data. These variables are also used in the Offer Assembly workflow step to calculate the daily average for services that you want to configure. Therefore, you must create a variable that represents usage and revenue information for the services that you want to configure. Assume that you want to configure Local SMS and International calls as services in the Offer Assembly step. Then, you must create one variable for each service so that the

average usage for that service is computed for a certain period say 6 weeks in the past.

Offer Ranking Postpaid ABT
You can define behavioral variables for the billed amount and the discounted amount for various selection criteria.

Note: BILL_AMT is a mandatory variable for the Microsegment Offer Ranking workflow step. Therefore, make sure that you define this ABT variable for ORPOST ABT, which is created for the Offer Ranking Postpaid project. In this case, the BILL_AMT variable would contain the total billing amount for the past 12 months.

Deploy ABT

After you define the ABT variables, you have to deploy the ABTs. For details about how to deploy the ABTs, see *SAS Customer Analytics for Communications 5.4: User's Guide*. Make sure that you deploy the ABT every time you make any changes to the ABT variables.

Register ABT Variables

After you define the ABT variables for all the predefined ABTs, you have to register these variables in the Application Data. To do so, you have to run the bpp_ooc_apdm_var_sync.sas file. This file is available at the following location:

Windows path
<SAS Home>/SASFoundation/9.3/bppsrv/sasmisc/Controlscripts/insertscripts

UNIX path
<SAS Home>/SASFoundation/9.3/misc/bppsrv/Controlscripts/insertscripts

After you register the variables, they are ready for use in the respective workflow steps.

Note: Make sure that you register the ABT variables again if you add new variables or modify existing variables.

Precautions

While working on any of the predefined projects, make sure that you consider the following important instructions. Otherwise, the execution of the workflow will be held up.

- Do not delete a predefined project.
- Do not create or modify the subset criterion of a predefined project.
- Do not delete a predefined ABT.

Configuration for Offer Assembly Workflow Step

Overview of the Configuration Tasks

In the Offer Assembly workflow step, information about representative customers is sent to the external source system. Based on this information, SAS Offer Optimization for Communications receives information about eligible offers for these customers. Before you can begin the Offer Assembly workflow step, you must perform certain configuration tasks.

The configuration that is required for the Offer Assembly workflow step differs depending on the payment mode of the project. For a postpaid payment mode, the default configuration is automatically completed. Therefore, no manual configuration is required. However, for prepaid payment mode, you must complete certain configuration tasks. These tasks involve populating the OA_SERVICE_MASTER, OA_SERVICE_MASTER_NLS, and OA_SERVICE_X_PROMO_TYPE Application Data tables with appropriate data. The subsequent topics explain the configuration tasks that you must perform for Prepaid Offer Assembly.

Configure Services for Prepaid Offer Assembly

Make sure that you have information about the services that need to be considered for Prepaid Offer Assembly. For example, you would want to assemble offers for prepaid customers based on their usage values for services such as SMS, International Calls, Local Calls, Data Upload, and Data Download. You have to define these services in the OA_SERVICE_MASTER Application Data table. In order to do so, specify values for the following columns of the OA_SERVICE_MASTER Application Data table. For more details about the OA_SERVICE_MASTER Application Data table, see *SAS Offer Optimization for Communications: Data Reference Guide*.

Table 6.6 *OA_SERVICE_MASTER Table*

Column	Description
SERVICE_ID	the sequence number that uniquely identifies the service. The value that you enter in this column must be the same as the SERVICE_ID of the corresponding service. That SERVICE_ID is defined in the SERVICE_D table of the Foundation data mart.
SERVICE_NM	the name of the service that you want to consider for Prepaid Offer Assembly.
MCSGMT_ABT_VAR_NM	the name of the variable that is defined in the Microsegment Prepaid ABT for that service. You must define only one variable for each service.For details, see "Define ABT Variables" on page 55.

Column	Description
CONVERSION_MULTIPLIER	the multiplier that is used to convert variable values of the Microsegment Prepaid ABT to a daily grain. You must enter a valid value in this column. Also, you cannot keep this column empty. Assume that the variables in the Microsegment Prepaid ABT contain average values at a weekly grain. In this case, you must enter 0.1428 as the CONVERSION_MULTIPLIER to convert the weekly average value to daily average value. If the average values are already at a daily grain, enter the CONVERSION_MULTIPLIER as 1. *Note:* Make sure that you include only numeric values in this column. You must not enter equations such as (* 2/ 7) in this column.
SERVICE_DISPLAY_IND	indicates whether the service would be considered for assembling offers for prepaid customers. If the value of this column is Y, then the service would be available for selection as offer components in the Offer Assembly workflow step.

Table 6.7 *Sample Records in OA_SERVICE_MASTER Table*

SERVICE_ID	SERVICE_NM	MCSGMT_ABT_VAR_NM	CONVERSION_MULTIPLIER	SERVICE_DISPLAY_IND
1	SMS	A_AVG_SMS_CNT_L6W	0.1428	Y
2	Local Calls	A_AVG_LOC_CNT_L6W	0.1428	Y

The next table that you should configure is the OA_SERVICE_MASTER_NLS Application Data table. This table contains the localized values for the services that you have configured in the OA_SERVICE_MASTER Application Data table. Enter the appropriate values for the following columns of the OA_SERVICE_MASTER_NLS Application Data table. For more details about the OA_SERVICE_MASTER_NLS Application Data table, see *SAS Offer Optimization for Communications: Data Reference Guide*.

Table 6.8 *OA_SERVICE_MASTER_NLS Table*

Column	Description
SERVICE_ID	the sequence number that uniquely identifies the service.
LOCALE	a specific language code that is associated with a geographical region.

Column	Description
SERVICE_DSPLY_NM	the localized display name that is associated with the service.
SERVICE_DSPLY_DESC	the localized display description that is associated with the service.

Table 6.9 *Sample Records in SERVICE_MASTER_NLS Table*

SERVICE_ID	LOCALE	SERVICE_DSPLY_NM	SERVICE_DSPLY_DESC
1	en_US	Short Messaging Service	Short Messaging Service
2	en_US	Local Voice Calls	Local Voice Calls

Associate Services with Promotion Types

The Prepaid Offer Assembly workflow step is defined for promotion types(also called offer types). For example, the promotion types can be defined as Accumulation and Registration. For details about these offer types, see *SAS Offer Optimization for Communications: User's Guide*. The services that you have configured in the OA_SERVICE_MASTER and OA_SERVICE_MASTER_NLS Application Data tables need to be associated with a promotion type. This association indicates whether a service is available for selection in the SAS Offer Optimization for Communications interface for Accumulation or Registration offer type.

The OA_PROMO_TYPE_MASTER Application Data table contains the default values that are defined for promotion types. You need to configure the OA_SERVICE_X_PROMO_TYPE Application Data table to associate the services with the promotion type. One service can be associated with one or more promotion types.

Table 6.10 *OA_PROMO_TYPE_MASTER Table*

Column	Description
PROMOTION_TYPE_ID	a unique identifier that is assigned to a promotion type.
PROMOTION_TYPE_NM	name of the promotion type.

Table 6.11 *Sample Records in OA_PROMO_TYPE_MASTER Table*

PROMOTION_TYPE_ID	PROMOTION_TYPE_NM
PROMO_1	ACCUMULATION
PROMO_2	REGISTRATION

In order to configure the OA_SERVICE_X_PROMO_TYPE Application Data table, enter appropriate values for the following columns. For more details about the OA_SERVICE_X_PROMO_TYPE Application Data table, see *SAS Offer Optimization for Communications: Data Reference Guide*.

Table 6.12 *OA_SERVICE_X_PROMO_TYPE Table*

Column	Description
SERVICE_ID	the sequence number of the service as specified in the OA_SERVICE_MASTER Application Data table.
PROMOTION_TYPE_ID	the PROMOTION_TYPE_ID as specified in the OA_PROMO_TYPE_MASTER Application Data table. This service will be associated with the specified promotion type. A service can be associated with one or more promotion types.
USED_FOR_FAVORITE_IND	indicates whether the service will be configured as a favorite offer. This field is applicable for services that are configured for the Registration promotion type.
USED_FOR_CONFIG_IND	indicates whether the service can be configured as an offer component in the SAS Offer Optimization for Communications interface. This field is applicable for services that are configured for both promotion types, namely Accumulation and Registration. For the Registration promotion type, make sure that you set this field to Y for the recharge-related service.

Table 6.13 *Sample Records in OA_PROMO_TYPE_MASTER Table*

SERVICE_ID	PROMOTION_TYPE_ID	USED_FOR_FAVORITE_IND	USED_FOR_CONFIG_IND
1	PROMO_1	N	Y
1	PROMO_2	Y	N
2	PROMO_2	N	Y

Developing User-Written Code for Offer Ranking Prepaid ABTs

When the Offer Assembly workflow step is run in the SAS Offer Optimization for Communications interface, eligible offers are assembled from the external interface for the representative customers. For a postpaid project, the Offer Ranking ABT is

automatically built based on the information that is available from the Invoice Recalculation step. However, for a prepaid project, the structure in which the offers are assembled is not predefined. Therefore, for a prepaid project, the Offer Ranking ABTs (one each for Microsegment Offer Ranking and Customer Offer Ranking) cannot be defined by using the SAS Customer Analytics for Communications interface. This is because the data sources from which offers are assembled are not predefined.

Because the Offer Ranking ABTs cannot be built by using the SAS Customer Analytics for Communications interface, a user-written code needs to be called when the Offer Ranking workflow steps are run for a prepaid project. This code builds the required Offer Ranking ABTs. The code specifies that offers are stored in a certain table, say offer_catalog.

The Offer Ranking ABTs can then be built for a prepaid project based on the following information:

offer_catalog table
: contains information about offer characteristics. These offers are retrieved from the external interface as the eligible offers for representative customers.

Microsegmentation ABT
: contains usage information about the representative customers.

You can write the code to build the Offer Ranking ABTs in the following wrappers. The call for this code is included in the back-end macros.

Table 6.14 *Wrapper Names*

Workflow Step	Wrapper name
Microsegment Offer Ranking	bpp_build_prepaid_abt_wrapper.sas
Customer Offer Ranking	bpp_bld_prepd_precise_abt_wrap.sas

The Offer Ranking ABTs need to be built at Customer X Offer level. Therefore, the CUST_ID and OFFER_BUNDLE_ID columns should be available in the ABT.

Sample wrapper macros are prepackaged with the solution. You can use them as a reference when you write your code.

The names of sample wrappers are as follows:

Table 6.15 *Sample Macros*

Wrapper name	Sample macro name
bpp_build_prepaid_abt_wrapper.sas	sample_wrapper_ms_offr_rank.sas
bpp_bld_prepd_precise_abt_wrap.sas	sample_wrapper_cust_offr_rank.sas

These macros are available in the following location:

Windows path
: **<SAS Home>/bppsrv/ucmacros**

UNIX path
: **<SAS Home>/ucmacros/bppsrv**

Configuring Parameters for Workflow Steps

The BPP_PARAMETERS_MASTER Application Data table contains parameters that you have to configure for SAS Offer Optimization for Communications. The values of these parameters are stored in the BPP_PARAMETERS_VAL_MASTER Application Data table. Each parameter has a default value. Default values are populated for all parameters. For some parameters, you must not change the default values. For these parameters, the value in the **Is Editable** column in the table below is *No*. In addition, certain parameters can have multiple values. For these parameters, the value in the **Multiple Values** column in the table below contains *Yes*.

Table 6.16 *Parameters for Workflow Steps*

Parameter Name	Description	Is Editable	Multiple Values	Possible Values	Default Value
BPP_ABTSCORE_FLG	used in ABT creation to compare the scoring flag.	No	No	S	S
BPP_AGRMNT_LVL_NUM	contains the agreement level number.	No	No	1	1
BPP_CATEGORICAL_VARIABLE_TYPE	identifies whether a variable is of the categorical type.	No	No	CAT	CAT
BPP_CENTROID	determines whether the sampling method is centroid.	No	No	CENTROID	CENTROID
BPP_CUST_BILL_AMT_VAR	indicates that the net bill amount variable is defined in the variable master table.	No	No	BILL_AMT	BILL_AMT
BPP_CONVERGENCE_CRIT	determines the default value for the convergence criterion in the clustering procedure.	Yes	No	any nonnegative value.	0.01
BPP_DATEFUNC	calculates the datepart from the datetime format.	No	No	datepart	datepart

Parameter Name	Description	Is Editable	Multiple Values	Possible Values	Default Value
BPP_DB_NM	checks the current database name.	No	No	ORACLE	ORACLE
BPP_DISPERSION_NAME	compares dispersion in the BPP_statistics table. This parameter is not used currently.	No	No	DISPERSION	DISPERSION
BPP_ELBOW_CRIT	determines the default value for the elbow criterion in the clustering procedure.	Yes	No	any numeric value between 0 and 1.	0.01
BPP_ELIGIBILITY_SUPPORT_FLG	handles eligibility criteria.	No	Yes	Y or N.	N
BPP_ERR_THRESHOLD	the threshold for critical error.	No	No	4	4
BPP_EXECUTION_MODE	indicates whether a project is in batch or design mode. This parameter is not used currently.	No	Yes	Y or N	N
BPP_FLAG_ON	indicates that the flag value for a certain variable is true.	No	No	Y	Y
BPP_FLAG_OFF	indicates that the flag value for a certain variable is false.	No	No	N	N
BPP_FLT_ASSIGNED_PROD_IND	indicates whether the offer evaluation should check for bundles that include only the existing representative customer-assigned product or also for bundles that contain additional assigned products	Yes	No	Y or N	Y

Parameter Name	Description	Is Editable	Multiple Values	Possible Values	Default Value
BPP_FLT_ACC_TO_USG_IND	sets the default value for the indicator that determines whether bundles that include rating schema for the existing representative customer usage should be considered.	Yes	No	Y or N	Y
BPP_FREQUENCY_NAME	compares frequency in the BPP_STATISTICS table. This parameter is not used currently.	No	No	FREQ	FREQ
BPP_IMPUTE_METHOD	replaces missing values of an ABT	Yes	Yes	MIN, MAX, MEAN, and NONE	MIN
BPP_INC_NEW_OFRBNDL_IND	contains the default value for the indicator of new offer bundles that is included in offer assembly.	Yes	No	Y or N	Y
BPP_INTERFACE_PURGE_IND	sets the default value of the indicator that decides whether the interface-related table should be purged after execution.	Yes	No	Y or N	N
BPP_LANGUAGE_CD	the language code that is used in the Foundation data mart.	Yes	No	Standard codes for various languages (for example, en_US for US English).	en_US
BPP_LOYALTY_LEVEL_CD	defines the loyalty level code.	No	No	CUST	CUST
BPP_MAXCLUSTER	determines the default value for the maximum number of clusters.	Yes	No	any numeric value between 2 and 999.	5

Parameter Name	Description	Is Editable	Multiple Values	Possible Values	Default Value
BPP_MS_MAXITER	determines the default value for the maximum number of iterations in the clustering procedure.	Yes	No	an integer that is greater than 1.	500
BPP_MS_RSQUARE	filters data from the proc fastclus output data set based on the `WHERE _type_ is to 'RSQ'` condition.	No	No	RSQ	RSQ
BPP_MSPRE	used in the ABT creation step of the microsegment and the offer payment code of prepaid.	No	No	Microsegmentation Prepaid	Microsegmentation Prepaid
BPP_MSPOST	used in the ABT creation step of microsegment and the offer payment code of postpaid.	No	No	Microsegmentation Postpaid	Microsegmentation Postpaid
BPP_MMS	filters data based on multimedia message service.	Yes	No	should be equal to the service name associated with the multimedia message service.	21_SERVICE_NM
BPP_NORM_MEAN	contains the default mean value for the normalization procedure.	Yes	No	any value	0
BPP_NORM_STD	contains the default value for the standard deviation for the normalization procedure.	Yes	No	any value greater than 0	1

Parameter Name	Description	Is Editable	Multiple Values	Possible Values	Default Value
BPP_NUM_PROFILE	determines the default number of profiling variables that are selected from each variable cluster group.	Yes	No	an integer that is greater than or equal to the value of the BPP_NUM_RECOMMENDED parameter. However, it is recommended that you set a value that is less than 5.	2
BPP_NUM_OF_CYCLES	contains the default value for the number of cycles that are to be considered in invoice recalculation.	Yes	No	an integer that is greater than or equal to 1	3
BPP_NUM_RECOMMENDED	determines the default number of analytically recommended variables that are selected from each variable cluster group.	Yes	No	an integer that is greater than or equal to 1. However, it is recommended that you set a value that is less than 4.	2
BPP_NUMERICAL_VARIABLE_TYPE	identifies whether a variable is of the numerical type.	No	No	NUM	NUM
BPP_OFFERS_PER_CUSTOMER	contains the default value for the top number of offers for the offer ranking at the customer level workflow step.	Yes	No	an integer that is greater than or equal to 1.	5
BPP_OFFERS_PER_MICROSEGMENT	contains the default value for the top number of offers for the offer ranking at the microsegment level workflow step.	Yes	No	an integer that is greater than or equal to 1.	10

Parameter Name	Description	Is Editable	Multiple Values	Possible Values	Default Value
BPP_OPT_CRIT	determines the list of values for optimization criteria in offer ranking.	No	Yes	MIN and MAX	MIN
BPP_OPT_DEVIATION	contains the default value for the optimization deviation in offer ranking.	Yes	No	an integer that is greater than or equal to 1.	3
BPP_OPT_MSNGVAL	defines the list of values for the missing value replacement methods in offer ranking.	No	Yes	MIN, MAX, and AVERAGE	MIN
BPP_OPT_WT	contains the default value for the optimization weight in offer ranking.	Yes	No	any integer that is greater than or equal to 1	10
BPP_OPEN_CYCLE_IND	calculates invoice recalculation with an open cycle end.	No	No	Y	Y
BPP_ORPRE	used in the ABT creation step of offer ranking and in the offer payment code of postpaid.	No	No	Offer Ranking Prepaid	Offer Ranking Prepaid
BPP_ORPOST	used in the ABT creation step of offer ranking and in the offer payment code of postpaid.	No	No	Offer Ranking Postpaid	Offer Ranking Postpaid
BPP_OUTLIER_HANDLE_CENTER_NAME	filters data in the outlier handling process.	No	No	CENTER	CENTER
BPP_OUTLIER_HANDLE_MEAN_NAME	filters data from the proc means output data set based on the `WHERE _type_ is to 'MEAN'` condition.	No	No	MEAN	MEAN

Parameter Name	Description	Is Editable	Multiple Values	Possible Values	Default Value
BPP_OUTLIER_FLG_NAME	compares the outlier flag in the BPP_STATISTICS table. This parameter is not used currently.	No	No	OUTLIER_FLG	OUTLIER_FLG
BPP_PAYMENT_MODE	handles payment-mode-specific execution.	No	Yes	PREPAID and POSTPAID	POSTPAID
BPP_PREPAID_MODE_CD	determines whether the payment mode is prepaid.	No	No	PREPAID	PREPAID
BPP_PROMOTION_TYPE	handles promotion type in Offer Assembly workflow step for Prepaid projects	No	Yes	ACCUMULATION or REGISTRATION	ACCUMULATION
BPP_POSTPAID_MODE_CD	determines whether the payment mode is postpaid.	No	No	POSTPAID	POSTPAID
BPP_P_VAL_CUT_OFF	compares the calculated confidence value with the theoretical confidence value in all analytical processes. Confidence value = 1 - P value.	Yes	No	0.95	0.95
BPP_PERMITTED_VARIATION_PER_DIST	determines the deviation in distribution between microsegments for the model monitoring process.	Yes	No	any value that is greater than 0.	5
BPP_PERMITTED_VARIATION_STD_DEV	determines the deviation in dispersion between microsegments for the model monitoring process.	Yes	No	any value that is greater than 0.	0.5

Parameter Name	Description	Is Editable	Multiple Values	Possible Values	Default Value
BPP_PCT_PERMTD_CENTROID_SHIFT	checks the deviation in the shifted centroid and the original centroid in the outlier handling process.	Yes	No	any value greater than 0.	0.001
BPP_PERCENT_OUTLIER	selects the outermost population from centers in the outlier handling process for calculation.	Yes	No	any value between 0 and 100.	1
BPP_PREPAID_OFFR_PYMNT_MODE_CD	the offer payment code for prepaid as defined in the Foundation data mart.	Yes	No	should be the same as the offer payment code for prepaid that is defined in the Foundation data mart.	PREPAID
BPP_POSTPAID_OFFR_PYMNT_MODE_CD	the offer payment code for postpaid as defined in the Foundation data mart.	Yes	No	should be the same as the offer payment code for postpaid that is defined in the Foundation data mart.	POSTPAID
BPP_PRJ_SCHLD_FRQNCY	shows possible schedule frequencies for batch execution.	Yes	Yes	MONTHLY, WEEKLY, and DAILY	MONTHLY
BPP_PRECISE_IND	sets the value of the indicator that decides whether precise rating should be performed.	No	Yes	Y or N	N
BPP_PROFILE_ASSIST_ANOVA_NAME	filters data from the proc anova output data set based on the `WHERE _type_ is to 'ANOVA'` condition.	No	No	ANOVA	ANOVA

Parameter Name	Description	Is Editable	Multiple Values	Possible Values	Default Value
BPP_RECALIBRATION_BOTH_REASON	indicates that a model is to be recalibrated. The reasons are significant change in the dispersion and distribution of customers in the microsegment as compared to the previous dispersion and distribution.	No	No	B	B
BPP_RECALIBRATION_DIST_REASON	indicates that a model is to be recalibrated. The reason for recalibration is the significant change in the distribution of customers in a microsegment as compared to the previous distribution.	No	No	D	D
BPP_RECALIBRATION_STD_REASON	indicates that a model is to be recalibrated. The reason for recalibration is significant change in the dispersion of customers in the microsegment as compared to the previous dispersion.	No	No	S	S
BPP_RECALIBRATION_NO_REASON	used if no reason is available for recalibration.	No	No	N	N

Parameter Name	Description	Is Editable	Multiple Values	Possible Values	Default Value
BPP_SAMPLE_SIZE	indicates the sample size that has to be considered for building a clustering model in design mode. From the population that is filtered in the target segment, a sample of the size mentioned here is chosen. However, the size of the population that is filtered in the target segment can be less than the sample size that is configured here. In this case, the whole population is considered for model building.	Yes	No	an integer value between 40000 and 60000.	50000
BPP_SAMPLING_METHOD	defines a list of values for the sampling method.	No	Yes	CENTROID and SPREADBASED	CENTROID
BPP_SEGMENT_SCORE_CENTER_NAME	filters data in the segmentation scoring method.	No	No	CENTER	CENTER
BPP_SHIFTED_CENTER_NAME	filters data in the outlier handling process.	No	No	SHIFTED_CENTER	SHIFTED_CENTER
BPP_SEED_DELETE_VAL	used in the clustering procedure to restrict the minimum cluster size.	Yes	No	an integer that is greater than 1	4
BPP_SESSION_ID	distinguishes between different interface sessions.	No	No	0	0

Parameter Name	Description	Is Editable	Multiple Values	Possible Values	Default Value
BPP_SLEEP_DURATION	halts the processes for a given time while polling for responses in interface sessions. It is in seconds.	Yes	No	an integer greater than or equal to 1	30
BPP_SPREADBASED	determines whether the sampling method is spread-based.	No	No	SPREADBASED	SPREADBASED
BPP_SMS	filters data based on short message service.	Yes	No	should be equal to the service name associated with the short message service.	1_SERVICE_NM
BPP_TIMEOUT	terminates the processes after the given time while polling for responses in interface sessions. It is in seconds.	Yes	No	any integer greater than or equal to 1	180
BPP_VARCLUS_GROUP_NAME	filters data from the proc varclus output data set based on the `WHERE _type_ is to 'GROUP'` condition.	No	No	GROUP	GROUP
BPP_VARCLUS_RSQUARED_NAME	filters data from the proc varclus output data set based on the `WHERE _type_ is equal to 'RSQUAR` condition.	No	No	RSQUARED	RSQUARED

Prerequisite Tasks for Creating Projects

Overview

After you configure variables and values that are required for various workflow steps and define business groups, you have to populate the BPP_VRBL_X_WKFLWSTP and WKFLWSTP_AVBL_VRBL_VAL_MASTER Application Data tables. You must populate these tables in order to ensure smooth functioning of the workflow steps.

Note: You have to populate both the tables before you define projects and configure the workflow. Otherwise, the workflow steps will not execute successfully.

Populate the BPP_VRBL_X_WKFLWSTP Table

The BPP_VRBL_X_WKFLWSTP Application Data table contains information about variables that are required for processing workflow steps such as target segment selection, microsegmentation, and offer ranking. For each combination of a business group and a workflow step, you can define a set of variables. Therefore, all projects that are associated with a particular business group will have the same set of variables.

Note: The analytical variables that are part of microsegmentation and offer ranking ABT must also be configured when you perform this step.

To populate the BPP_VRBL_X_WKFLWSTP Application Data table, specify the following information:

Table 6.17 *Columns of BPP_VRBL_X_WKFLWSTP Table*

Column	Description
VARIABLE_ID	the sequence number of the variable as specified in the BPP_VRBL_MASTER Application Data table.
WORKFLOW_STEP_ID	the sequence number of the workflow step as specified in the BPP_WKFLWSTP_MASTER Application Data table.
BSNSGRP_ID	the unique identifier of the business group for whose projects you want to configure the variables. This business group ID is as generated in the BSNSGRP_SUMMARY Application Data table.

Populate the WKFLWSTP_AVBL_VRBL_VAL_MASTER Table

You have to populate the WKFLWSTP_AVBL_VRBL_VAL_MASTER Application Data table to identify the list of values that you want to provide to users. Users will use these values to define filter criteria for the target segment selection workflow step. For each combination of a business group and a workflow step, you can define the values that you want to consider for defining target segments that are associated with a

particular business group. To populate the WKFLWSTP_AVBL_VRBL_VAL_MASTER Application Data table, specify the following information.

Table 6.18 *Columns of WKFLWSTP_AVBL_VRBL_VAL_MASTER Table*

Column	Description
BPP_REF_VARIABLE_VALUE_ID	the sequence number of the reference value that is specified in the BPP_REF_VRBL_VAL_MASTER Application Data table.
WORKFLOW_STEP_ID	the sequence number of the workflow step as specified in the BPP_WKFLWSTP_MASTER Application Data table.
BSNSGRP_ID	the unique identifier of the business group for whose projects you want to configure the variables. This business group ID is as generated in the BSNSGRP_SUMMARY Application Data table.

External Interfaces

Overview

SAS Offer Optimization for Communications interfaces with external source systems in order to exchange data for Offer Assembly and Invoice Recalculation workflow steps.

In the Microsegment Representation workflow step, representative customers are drawn. In the Offer Assembly workflow step, the information about representative customers is sent to the external source system. As a result, SAS Offer Optimization for Communications receives information about eligible offers for these customers from the external source system .

In the Invoice Recalculation step, information about each combination of the representative customer and the eligible offer is sent to the external source system. As a result, SAS Offer Optimization for Communications receives billing information for each combination from the external source system.

For details about the workflow steps, see *SAS Offer Optimization for Communications: User's Guide*.

Configuring the Setup for External Interfaces

Populating Interface Tables

Before users run Offer Assembly and Invoice Recalculation workflow steps, you have to configure certain Interface Data and Business Data tables. For details about these tables, see *SAS Offer Optimization for Communications: Data Dictionary*.

For the following Interface Data tables, data is populated when you perform the post-installation tasks:

- BPP_INF_PRM
- BPP_INF_STATUS
- BPP_INF_STATUS_NLS

Therefore, make sure that you do not change data in these tables.

Configure Error Codes

In order to track the errors that occur during data processing and data exchange between SAS Offer Optimization for Communications and the external source system, you have to define certain error codes.

To support error tracking:

1. Define error codes in the BPP_INF_ERROR Interface Data table.
2. Define localized display names and descriptions along with locale and error codes in the BPP_INF_ERROR_NLS Interface Data table.
3. Define error codes in the bpp_smd_error.smd file.

Configure Parameters

When SAS Offer Optimization for Communications interfaces with an external source system, some data is populated into the Interface Data tables. Data is populated into these tables based on which workflow step (Offer Assembly or Invoice Recalculation) is being processed by the SAS code. After data is populated into the Interface Data tables, the back-end processes go into a sleep mode until they receive a response from the external source system.

To ensure successful execution of Offer Assembly and Invoice Recalculation workflow steps, you have to set correct values for the following parameters.

BPP_TIMEOUT
: the total duration for which back-end processes wait to receive response from the external interface. If there is no response in this time span, the back-end processes stop their execution. For example, you set the BPP_TIMEOUT duration as 1 hour. If the back-end processes do not receive any response from the external interface within an hour after data is populated into the Interface Data tables, the processes will stop their execution.

BPP_SLEEP_DURATION
: the duration, which is used to set the polling frequency. After data is loaded into the Interface Data tables, back-end processes start polling to check the response from the external interface at regular time intervals. For example, if you set the BPP_SLEEP_DURATION as two minutes, then the back-end processes check the response after every two minutes in the BPP_TIMEOUT period.

Data Processing Steps

Overview

The following steps explain how data is exchanged between SAS Offer Optimization for Communications and the external interface when users run the Offer Assembly and Invoice Recalculation workflow steps. At various steps, the audit table (available in the

Interface Data) BPP_INF_AUDIT is updated. For details, see "Audit Table" on page 77.

Offer Assembly Workflow Step

When users run the Offer Assembly workflow step, the following back-end processes are run.

1. A unique session ID is created for the current session.
2. The details about parameters that are related to the Offer Assembly workflow step are inserted into the BPP_INF_PRM_DTL Interface Data table with the current session ID.
3. The OAREPCUST<session ID> Business Data table is created for an individual session. This table contains details of representative customers that are drawn in the Microsegment Representation workflow step.
4. An entry is added in the BPP_INF_AUDIT Interface Data table with the current session ID and the response from the external interface are polled.
5. The external source system updates the data for the current session ID in the BPP_INF_AUDIT Interface Data table.
6. The details about eligible offers for all representative customers from the external source system are populated in the OAOUTDTL<Session ID> Business Data table with the current session ID.
7. If the external source system sends a Successful status in the BPP_INF_AUDIT Interface Data table, then the back-end process copies data from the OAOUTDTL<Session ID> Interface Data table into the OFFER_ASSMBLY_DTL Business Data table based on the current session ID.
8. If the external source system sends a Failed status in the BPP_INF_AUDIT Interface Data table, then the back-end process does not copy any data from the Interface Data table to the Application Data table and marks the status of Offer Assembly workflow step as Failed.
9. If no response is received from the external interface within the configured time, then the back-end process stops processing and marks the status of the Offer Assembly workflow step as Failed.

Invoice Recalculation Workflow Step

When users run the Invoice Recalculation workflow step, the following back-end processes are run.

1. A unique session ID is created for the current session.
2. The details about parameters that are related to the Invoice Recalculation workflow step are inserted into the BPP_INF_PRM_DTL Interface Data table with the current session ID.
3. The BRINPUT<Session ID> Business Data table is created for the current session ID. This table contains details about eligible offers for all representative customers with the current session ID.
4. An entry is added into the BPP_INF_AUDIT Interface Data table with the current session ID and the response from the external source system is polled.
5. The external source system updates an entry in the BPP_INF_AUDIT Interface Data table for the current session ID.

6. The output data is populated in the BRSUMDTL<Session ID>, BRUSGDTL<Session ID>, and BRNUSGDTL<Session ID> Business Data tables.
7. The following details are populated in the interface tables:

   BRUSGDTL<Session ID>
   billing details about usage at product-event type grain on each eligible offer for all representative customers are populated with current session ID. The time grain of the table is same as the billing cycle.

   BRNUSGDTL<Session ID>
   billing details of non-usage at product-charge type grain on each eligible offer for all representative customers are populated with current session ID. The time grain of the table is same as the billing cycle.

   BRSUMDTL<Session ID>
   the summarized bill details about each eligible offer for all representative customers are populated with the current session ID. The time grain of the table is same as the billing cycle.
8. If the external source system sends a Successful status in the BPP_INF_AUDIT Interface Data table, then the back-end process copies data from the BRUSGDTL<Session ID, BRNUSGDTL<Session ID> and BRSUMDTL<Session ID> Business Data tables to the BILLRECALC_USG_DTL, BILLRECALC_NONUSG_DTL, and BILLRECALC_DTL Business Data tables, respectively, based on the current session ID.
9. If the external source system sends a Failed status into the BPP_INF_AUDIT Interface Data table, then the back-end process does not copy any data from Interface Data tables to Application Data tables. The status of the Invoice Recalculation workflow step is marked as Failed.
10. If no response is received from the external source system within the configured time, then the back-end process stops processing. The status of the Invoice Recalculation step is marked as Failed.

Audit Table

All activities in Offer Assembly and Invoice Recalculation are tracked in the Audit table. The status of each activity is tracked through unique codes.

Table 6.19 *Status Codes for Offer Assembly*

Sequence	Interaction Code	External Source System Code	Status Code	Populated by	Action
1	RQ	BI	ENBOF	SAS Offer Optimization for Communications	When SAS Offer Optimization for Communications populates data for offer assembly, it inserts data for interaction code RQ.

Sequence	Interaction Code	External Source System Code	Status Code	Populated by	Action
2	RQ	OF	OFPRS	External source system	When the external source system starts processing for offer assembly, it updates the source system code and status code for the interaction code RQ.
3	RQ	OF	OFEXS or OFEWE	External source system	When the external source system interface completes processing successfully or with errors for offer assembly, it updates the source system code and status code for the interaction code RQ.
4	RS	OF	ENBBIOF	External source system	When the external source system completes processing successfully or with errors for offer assembly, it inserts data for the interaction code RS.

Table 6.20 *Status Codes for Invoice Recalculation*

Sequence	Interaction Code	External Source System Code	Status Code	Populated by	Action
1	RQ	BI	ENBBC	SAS Offer Optimization for Communications	When SAS Offer Optimization for Communications populates data for Invoice Recalculation process, it inserts data for the Interaction code RQ.

2	RQ	BC	BCPRS	External source system	When external interface starts processing for Invoice Recalculation, it updates the Source System code and the Status code for the Interaction code RQ.
3	RQ	BC	BCSU1/BCEWE	External source system	When external source system completes processing successfully or ended with error for Invoice Recalculation, it updates the Source System code and the status code for the interaction code RQ.
4	RS	BC	ENBBIBC	External source system	When the external source system completes processing successfully or with errors for Invoice Recalculation, it inserts data for the interaction code RS.

Configuring Error Tables for Workflow Steps

Overview

Errors can occur when you run workflow steps from the SAS Offer Optimization for Communications interface. In order to enable users to resolve the errors, an appropriate error message needs to be displayed. In addition, these error messages should be included in the SAS log. To complete these tasks, you have to configure the error tables.

Create an SMD Data Set

To create an SMD data set from an smd file:

1. Update the textual content for all error codes in an smd file.

2. Rename the smd file to its original name with a suffix according to the language code.
3. Run the BPP_CREATE_SMD_TO_DS macro. You can run this macro from SAS Enterprise Guide. This macro requires the following inputs:

   Dir
   the name of the directory in which the smd file exists.

   Smdfilename
   the original smd filename.

   Localelist
   the locale for which you want to add error codes.

   Outputlib
   the directory in which you want to create the smd data set.

   TIP Repeat these steps for all the smd files.

Configure Error Codes

In order to display appropriate messages in the SAS Offer Optimization for Communication interface, add localized descriptions for all error codes in the BPP_ERR_NLS Application Data table.

Table 6.21 *BPP_ERR_NLS Table*

Column	Description
ERR_CD	the error code that is used in the SAS code to identify the reason of failure.
LOCALE	a specific language code that is associated with a geographical region.
ERR_DSPLY_DESC	the localized display description that is associated with the error code.

Creating Projects

After you complete the configuration setup for the projects, workflow steps, and external interfaces, users can define projects and configure workflow steps using the SAS Offer Optimization for Communications interface. For details, see *SAS Offer Optimization for Communications: User's Guide*.

Note: Before you create projects, make sure that the OFFR_DTL Application Data table is populated with data. If there is no data in this table, run the following code in Base SAS:

```
%OOCINIT; %bpp_executeooc_bg_batch();
```

Logs for Workflow Steps

When you run or reset a workflow step through the SAS Offer Optimization for Communications interface, a log file is created in the **<SAS configuration directory>/Lev1/AppData/SASOfferOptforCommServer/5.4/logs/ooc_logs/oocprojectlogs** folder. This log file contains information about all the tasks and the errors that might occur when you perform these tasks. For example, if you run the Target Segment Selection workflow step for a project with ID 3, then the bpp_spexecutetargetsegment_3.log file is generated. Also, when you reset the Target Segment Selection workflow step for a project with ID 3, then the bpp_spresettargetsegment_3.log file is generated. Similarly, log files are generated when you run and reset other workflow steps through the SAS Offer Optimization for Communications interface.

Chapter 7

Configuration for Workflow Reports

Configuring Setup for Workflow Reports

Overview

SAS Offer Optimization for Communications enables users to define dynamic reports at workflow step level. Based on these reports, users can evaluate the results that are derived at various workflow steps and can decide whether they need to configure a workflow step again. These reports are called workflow reports.

Here is the list of the major features of workflow reports:

- You can define dimensions, measures, and derived measures dynamically.
- You can use various types of aggregations such as SUM, COUNT, MIN, and MAX to create measures.
- You can create workflow reports in graphical formats such as pie charts and bar charts. You can also generate these reports as data tables.

In order to enable users to define workflow reports, you have to complete the following configuration tasks:

1. Configure report categories.
   a. Associate a report category with one or more source report tables.
   b. Associate a report category with one or more workflow steps.
2. Configure reporting variables.
   a. Categorize reporting variables as dimensions, measures, and derived measures.

b. Configure a simple measure.
c. Associate measures with reporting variables.
d. Configure a derived measure.
e. Associate derived variables with simple measures.

3. Associate reporting categories with reporting variables.

Configuring Report Categories

Define a Report Category

A report category enables users to logically group reporting variables based on which they can further define reports. Therefore, a report category helps you ensure that a correct set of variables is grouped together. You have to provide a set of predefined report categories to users. To do so, you have to populate appropriate data in the BPP_RPT_CTGRY Application Data table.

Table 7.1 *BPP_RPT_CTGRY Table*

Column	Description
RPT_CTGRY_ID	the unique sequential number that is assigned to a report category.
RPT_CTGRY_NM	the name of the report category.
RPT_CTGRY_LEVEL_CD	the code for the level that is associated with the grain of report category. For example, the grain of report category can be at offer or product level.
RPT_CTGRY_DISPLAY_IND	indicates whether the report category is to be displayed in the SAS Offer Optimization for Communications interface. This column can have a value Y or N.
RPT_CTGRY_VALID_IND	indicates whether the report category is valid. This column can have a value Y or N.
AVLB_DYNMC_RPT_IND	indicates whether the report category is available for dynamic reporting. This column can have a value Y or N.

Example: Configure BPP_RPT_CTGRY Table

In order to define a report category that consists of usage revenue contribution across microsegments, insert the following values into BPP_RPT_CTGRY Application Data table.

Table 7.2 *Sample Data in the BPP_RPT_CTGRY Table*

Column	Value
RPT_CTGRY_ID	2

Column	Value
RPT_CTGRY_NM	USG_RVN_CNTRBTN_ACRSS_SGMNT_OFFR_LEVEL
RPT_CTGRY_LEVEL_CD	Y
RPT_CTGRY_DISPLAY_IND	Y
RPT_CTGRY_VALID_IND	OFFER
AVLB_DYNMC_RPT_IND	Y

After you configure categories in the BPP_RPT_CTGRY Application Data table, make sure that you enter correct values for these categories in the BPP_RPT_CTGRY_NLS Application Data table. To do so, you have to populate appropriate data in the BPP_RPT_CTGRY_NLS Application Data table.

Table 7.3 *BPP_RPT_CTGRY_NLS Table*

Column	Description
RPT_CTGRY_ID	the unique sequential number that is assigned to a report category.
LOCALE	identifies a specific language code that is associated with a geographical region.
RPT_CTGRY_DSPLY_NM	the localized display name that is associated with the category.
RPT_CTGRY_DSPLY_DESC	the localized display description that is associated with the category.

Example: Configure BPP_RPT_CTGRY_NLS Table

After you configure values for the USG_RVN_CNTRBTN_ACRSS_SGMNT_OFFR_LEVEL category into the BPP_RPT_CTGRY Application Data table, insert the following data into the BPP_RPT_CTGRY_NLS Application Data table to complete its localized configuration.

Table 7.4 *Sample Data in BPP_RPT_CTGRY_NLS Table*

Column	Description
RPT_CTGRY_ID	2
LOCALE	en_US
RPT_CTGRY_DSPLY_NM	USAGE REVENUE CONTRIBUTION ACROSS SEGMENT OFFER LEVEL
RPT_CTGRY_DSPLY_DESC	USAGE REVENUE CONTRIBUTION ACROSS SEGMENT OFFER LEVEL

Associate a Report Category with a Report Source View

The values for reporting variables are retrieved from the report source view. Data is populated in these source views through predefined ETL processes. The following report source views are available:

- CUST_MONTHLY_SUMMARY_RF
- CUST_SERVICE_MONTHLY_RF

A report category can use different report source views in order to retrieve values for the reporting variables. However, for a combination of report category and payment mode, there can be only a single source view. Therefore, values for reporting variables are retrieved from the corresponding view based on the payment mode of the project and the report category that the user is defining in the workflow report. In order to associate a report category with a report source view, you have to populate appropriate data in the BPP_RPT_CTGRY_SRCTBL Application Data table.

Table 7.5 *BPP_RPT_CTGRY_SRCTBL Table*

Column	Description
RPT_CTGRY_ID	the unique identifier for a report category that is defined in the BPP_RPT_CTGRY Application Data table.
RPT_SRC_TABLE_NM	the name of the view that sources the population of reporting variables. For example, for postpaid the CUST_MONTHLY_SUMMARY_RF source view populates the reporting variables. However, for prepaid the CUST_WEEKLY_SUMMARY_RF source view populates the reporting variables.
BPP_PRJ_PYMNT_MODE_CD	the code for the payment mode that is associated with the target population for a project. The value that you configure for this column must be the same as the value that you have configured for the BPP_PAYMENT_MODE parameter in the BPP_PARAMETERS_VALUE_MASTER Application Data table. For example, the values that can be configured can be prepaid and postpaid.

Example: Configure BPP_RPT_CTGRY_SRCTBL Table

In order to map source tables with the USG_RVN_CNTRBTN_ACRSS_SGMNT_OFFR_LEVEL category, insert the following data into the BPP_RPT_CTGRY_SRCTBL Application Data table.

Table 7.6 *Sample Data in BPP_RPT_CTGRY_SRCTBL Table*

Column	RPT_CTGRY_ID	BPP_PRJ_PYMNT_MODE_CD	RPT_SRC_TABLE_NM
Record 1	2	POSTPAID	CUST_MONTHLY_SUMMARY_RF

Column	RPT_CTGRY_ID	BPP_PRJ_PYMNT_MODE_CD	RPT_SRC_TABLE_NM
Record 2	2	PREPAID	CUST_WEEKLY_SUMMARY_RF

Associate a Report Category with a Workflow Step

You have to configure the BPP_RPT_CTGRY_X_WKFLWSTP Application Data table in order to define valid combinations of report categories and workflow steps. Based on the combinations that you define, users can define workflow reports for various workflow steps.

Table 7.7 BPP_RPT_CTGRY_X_WKFLWSTP Table

Column	Description
RPT_CTGRY_ID	the unique identifier for a report category.
WORKFLOW_STEP_ID	the unique identifier that is assigned to a workflow step.

Example: Configure BPP_RPT_CTGRY_X_WKFLWSTP Table

To define the scope for the USG_RVN_CNTRBTN_ACRSS_SGMNT_OFFR_LEVEL category within workflow steps, insert the following data into the BPP_RPT_CTGRY_X_WKFLWSTP Application Data table.

Table 7.8 Sample Data in BPP_RPT_CTGRY_X_WKFLWSTP Table

Column	Value
RPT_CTGRY_ID	2
WORKFLOW_STEP_ID	3

Configure Reporting Variables

Categorize a Reporting Variable

In order to enable users to generate workflow reports based on a set of predefined reporting variables, you have to configure the BPP_RPT_VRBL_MASTER Application Data table. Users can define workflow reports based on the reporting variables that you configure in this table. A variable can be identified based on the following categories:

Dimensions
: A categorical variable can be categorized as a dimension. A churn band variable can be an example of a dimension.

Measures
: A numerical variable that is based on simple aggregation.

Derived Measure
: A numerical variable that is based on the calculation of two or more measures.

Table 7.9 BPP_RPT_VRBL_MASTER Table

Column	Description
VARIABLE_ID	the unique identifier for the reporting variable.
VARIABLE_NM	the name of the variable.
VARIABLE_TYPE_CD	the code that is assigned for the category of the variable. For example, the supplied values can be DIM, MSR, or DRVDMSR.
VARIABLE_DATA_TYPE	the data type of the variable. Based on the value that you specify for this column, the variable is displayed in appropriate format in the workflow reports.
VARIABLE_DISPLAY_FORMAT	the format in which a variable can be displayed in the SAS Offer Optimization for Communications interface. The supplied values can be currency, amount, data, and so on.
VARIABLE_DISPLAY_IND	indicates whether the variable will be displayed in the SAS Offer Optimization for Communications interface.
RPT_SRC_COLUMN_NM	the name of the column that sources the reporting variable.
RPT_SRC_LBRY_NM	the name of the library that sources the population of reporting variables
RPT_SRC_TABLE_NM	the name of the table that sources the population of reporting variables.
UPDATED_DTTM	the date and time that a record was updated.
CREATED_DTTM	the date and time that a record was created.

Example: Configure Derived Measure

You have configured dimensions, measures, and derived measures in the BPP_RPT_VRBL_MASTER Application Data table. To configure AVG_MOU_PER_CALL as a derived measure, define TOT_CALLS and TOT_MOU as measures in the BPP_RPT_VRBL_MASTER Application Data table. Also, define NUM_OF_CALLS and DURATION_OF_CALLS as sources of measures in the BPP_RPT_VRBL_MASTER Application Data table. To configure all these variables, insert the following data into the BPP_RPT_VRBL_MASTER Application Data table.

Table 7.10 *Sample Data in BPP_RPT_VRBL_MASTER Table*

Column	VARIABLE_ID	VARIABLE_NM	VARIABLE_DISPLAY_IND	RPT_SRC_TABLE_NM	VARIABLE_DISPLAY_FORMAT	VARIABLE_DATA_TYPE	VARIABLE_TYPE_CD	RPT_SRC_COLUMN_NM	RPT_SRC_LBRY_NM
Record 1	22	NUM_OF_CALLS	N	Null	NUMBER	NUMERIC(10,0)	MSRSRC	NUM_OF_CALLS	BPPAPCFG
Record 2	23	DURATION_OF_CALLS	N	Null	NUMBER	NUMERIC(10,0)	MSRSRC	DURATION_OF_CALLS	BPPAPCFG
Record 3	44	TOT_CALLS	Y	Null	NUMBER	NUMERIC(10,0)	MSR	Null	BPPAPCFG
Record 4	45	TOT_MOU	Y	Null	NUMBER	NUMERIC(10,0)	MSR	Null	BPPAPCFG
Record 5	64	AVG_MOU_PER_CALL	Y	Null	NUMBER	NUMERIC(15,3)	DRVDMSR	Null	BPPAPCFG

The CREATED_DTTM and UPDATED_DTTM columns hold values of the current timestamp.

To ensure that the correct display name of dimensions, measures and derived measures in the SAS Offer Optimization for Communication interface, configure the BPP_RPT_VRBL_MASTER_NLS Application Data table.

Table 7.11 *BPP_RPT_VRBL_MASTER_NLS Table*

Column	Description
VARIABLE_ID	the unique identifier for the reporting variable.
LOCALE	identifies a specific language code that is associated with a geographical region.
VARIABLE_DSPLY_NM	the localized display name that is associated with the variable.
VARIABLE_DSPLY_DESC	the localized display description that is associated with the variable.

Example: Configure BPP_RPT_VRBL_MASTER_NLS Table

To complete the configuration of variables, add the following data into the BPP_RPT_VRBL_MASTER_NLS Application Data table.

Table 7.12 Sample Data in BPP_RPT_VRBL_MASTER_NLS Table

Column	VARIABLE_ID	LOCALE	VARIABLE_DSPLY_NM	VARIABLE_DSPLY_DESC
Record 1	23	en_US	DURATION OF CALLS	DURATION OF CALLS
Record 2	24	en_US	NUMBER OF MESSAGES	NUMBER OF MESSAGE
Record 3	44	en_US	TOTAL CALLS	TOTAL CALLS
Record 4	45	en_US	TOTAL MOU	TOTAL MOU
Record 5	64	en_US	AVERAGE MOU PER CALL	AVERAGE MOU PER CALL

Configure a Simple Measure

You have to configure the measures that you want to include in the workflow reports in the BPP_RPT_MEASURE_MASTER Application Data table. These measures can be further used to define derived measures. In order to define a simple measure, specify appropriate values for the following columns of the BPP_RPT_MEASURE_MASTER Application Data table.

Table 7.13 BPP_RPT_MEASURE_MASTER Table

Column	Description
MEASURE_ID	the unique identifier for a variable that is defined as a measure for workflow reports. The value for this column must be numeric.
MEASURE_NM	the name of the variable that is defined as a measure in workflow reports.
PRMRY_AGGR_TYPE_ID	the unique identifier for primary type of aggregation that is performed on a measure. The BPP_RPT_AGGR_MASTER Application Data table contains the list of aggregations.
SCNDRY_AGGR_TYPE_ID	the unique identifier for any secondary type of aggregation that is performed on a measure. The BPP_RPT_AGGR_MASTER Application Data table contains the list of aggregations.
MEASURE_CALC_CNDTN_EXPR	This column is not used currently.

Example: Configure BPP_RPT_MEASURE_MASTER Table

You have defined measures in the BPP_RPT_VRBL_MASTER Application Data table in the previous step. Now, you have to define their properties into the

BPP_RPT_MEASURE_MASTER Application Data table. Add the following data into BPP_RPT_MEASURE_MASTER Application Data table.

Table 7.14 *Sample Data in BPP_RPT_MEASURE_MASTER Table*

Column	MEASURE_ID	MEASURE_NM	PRMRY_AGGR_TYPE_ID	SCNDRY_AGGR_TYPE_ID	MEASURE_CALC_CNDTN_EXPR
Record 1	3	TOT_CALLS	1	Null	Null
Record 2	4	TOT_MOU	1	Null	Null

Associate a Measure with a Reporting Variable

Measure is a type of numeric variable that has some aggregation defined on it. This aggregation is defined in the BPP_RPT_MEASURE_MASTER Application Data table. However, you have to define the association of a measure with a variable in the BPP_RPT_MSR_X_VRBL Application Data table.

Table 7.15 *BPP_RPT_MSR_X_VRBL Table*

Column	Description
MEASURE_ID	the unique identifier for a measure that is used in workflow reports.
VARIABLE_ID	the unique identifier for a variable that is used in the workflow reports.

Example: Configure BPP_RPT_MSR_X_VRBL Table

You have defined the measures and their properties. To define a measure's association with a variable, add the following data into theBPP_RPT_MSR_X_VRBL Application Data table.

Table 7.16 *Sample Data in BPP_RPT_MSR_X_VRBL Table*

Column	MEASURE_ID	VARIABLE_ID
Record 1	23	22
Record 2	4	3

Configure a Derived Measure

Derived measures are calculated based on the simple measures. In the BPP_RPT_DRVD_MEASURE_MASTER Application Data table, you have to define the derived measures that you want to use for workflow reports.

Table 7.17 BPP_RPT_DRVD_MEASURE_MASTER Table

Column	Description
DRVD_MEASURE_ID	the unique identifier that is assigned to a variable that is used as a derived measure for workflow reports. The value for this column must be numeric.
DRVD_MEASURE_NM	the name of the derived measure.
AGGR_TYPE_ID	the unique identifier for type of aggregation that is performed on a measure. The list of aggregations is defined in the BPP_RPT_AGGR_MASTER Application Data table.
DRVD_MEASURE_MUL_FCT	is the multiplication factor for calculating the true value of a derived measure. This value is used in case of percentage or value conversion. The default value for this column is 1.
DRVD_MEASURE_OPRTR	the operator that is used in the definition of a derived measure. Currently, only the division operator is supported. Therefore, use the front slash (/) symbol to define the division operator.

Example: Configure BPP_RPT_DRVD_MEASURE_MASTER Table

You have defined the derived measures in the BPP_RPT_VRBL_MASTER Application Data table. Now, you have to define their properties in the BPP_RPT_DRVD_MEASURE_MASTER Application Data table. Add the following data into the BPP_RPT_DRVD_MEASURE_MASTER Application Data table.

Table 7.18 Sample Data in BPP_RPT_DRVD_MEASURE_MASTER Table

Column	Value
DRVD_MEASURE_ID	8
DRVD_MEASURE_NM	AVG_MOU_PER_CALL
AGGR_TYPE_ID	5
DRVD_MEASURE_OPRTR	/
DRVD_MEASURE_MUL_FCTR	1

There are certain limitations for configuring a derived measure:

- You have to define a derived measure based on two simple measures.
- You can configure a derived measure by using the division operation. You have to define the measures that will be used as the numerator and the denominator in the BPP_RPT_MSR_X_DRVD_MSR Application Data table.

- You cannot define a derived measure by using another derived measure.

Associate a Derived Variable with a Simple Measure

In order to define an association between a derived variable and a simple variable, enter appropriate values in the BPP_RPT_MSR_X_DRVD_MSR Application Data table.

***Table 7.19** BPP_RPT_MSR_X_DRVD_MSR Table*

Column	Description
DRVD_MEASURE_ID	the unique identifier that is assigned to a derived measure.
MEASURE_ID	the unique identifier for a variable that is defined as a measure for workflow reports.
MEASURE_NMRTR_IND	indicates whether the measure is used in the numerator part of the derived measure definition.
VARIABLE_ID	the unique identifier for a variable that is used in the workflow reports.

Example: Configure BPP_RPT_MSR_X_DRVD_MSR Table

You can define the derived measure, AVG_MOU_PER_CALL, which will be created by using the measures TOT_CALLS and TOT_MOU. To do so, add the following data into the BPP_RPT_MSR_X_DRVD_MSR Application Data table.

***Table 7.20** Sample Data in BPP_RPT_MSR_X_DRVD_MSR Table*

Column	DRVD_MEASURE_ID	MEASURE_ID	VARIABLE_ID	MEASURE_NMRTR_IND
Record 1	8	4	23	Y
Record 2	8	3	22	N

Associate a Report Category with a Reporting Variable

You have to associate the report category with the report variable. This association is a many-to-many relationship. In other words, a reporting variable can be available for multiple categories and vice versa. This association is defined in the BPP_RPT_CTGRY_X_VRBL Application Data table.

***Table 7.21** BPP_RPT_CTGRY_X_VRBL Table*

Column	Description
RPT_CTGRY_ID	the unique identifier of a report category.
VARIABLE_ID	the unique identifier for a variable that is used in the application.

Column	Description
VRBL_MNDTRY_IND	indicates whether it is mandatory to include the variable in workflow reports that are defined for the report category.
WORKFLOW_STEP_ID	the unique identifier of a workflow step.

Example: Configure BPP_RPT_CTGRY_X_VRBL Table

In order to ensure that all the measures and the derived measures that you have defined earlier are displayed in the SAS Offer Optimization for Communication interface, add the following data into the BPP_RPT_CTGRY_X_VRBL Application Data table.

Table 7.22 *Sample Data in BPP_RPT_CTGRY_X_VRBL Table*

Column	RPT_CTGRY_ID	VARIABLE_ID	WORKFLOW_STEP_ID	VRBL_MNDTRY_IND
Record 1	2	44	3	N
Record 2	2	45	3	N
Record 3	2	64	3	N

Prepackaged Data for Workflow Reports

Overview

SAS Offer Optimization for Communications provides prepopulated data for workflow reports. This data includes information about dimensions, measures, sources of measures, and derived measures.

Dimensions

The following table lists the prepopulated dimensions that users can use for defining workflow reports.

Table 7.23 *Prepopulated Dimensions*

Dimension Name	Description
BUSINESS_GROUP_NM	Business group name
TARGET_SEGMENT_NM	Target segment name
MCSGMT_BUSS_NM	Microsegment name
BASE_OFFER_PYMNT_MODE_NM	Payment mode name of base offer

Dimension Name	Description
CITY_NM	City name
STATE_NM	State name
COUNTY_NM	County name
REGION_NM	Region name
COUNTRY_NM	Country name
CHURN_BAND_NM	Churn band name
CAL_MONTH_NM	Calendar month name
PROFITABILITY_BAND_NM	Profitability band name
AGE_BAND_NM	Age band name
CAL_QUARTER_NM	Calendar quarter name
BASE_OFFER_NM	Base offer name
TENURE_ON_NETWORK_IN_DAYS	Tenure on network in days
TENURE_ON_BASE_OFFER_IN_DAYS	Tenure on base offer in days
TENURE_ON_OFFER_BUNDLE_IN_DAYS	Tenure on offer bundle in days

Measures

The following table lists the prepopulated measures that users can use for defining workflow reports. Measures are further categorized based on their purpose.

Table 7.24 *Prepopulated Measures*

Measure Name	Description
Group name: Customer Counts	
TOT_CUST_CNT_IN_TS_FLTR	Total customer count in the target segment
TOT_CUST_CNT_IN_MS_FLTR	Total customer count in the microsegment
Group name: Usage	
TOT_CALLS	Total number of calls
TOT_MOU	Total minutes of usage
Data	
TOT_DATA_CALLS	Total data of event calls

Measure Name	Description
TOT_DATA_VOLUME	Total data of event volume
Group name: Message	
TOT_MESSAGE	Total number of messages
TOT_MESSAGE_VOLUME	Total volume of all messages
Group name: Revenue	
TOT_GROSS_REVENUE	Total gross revenue
TOT_ARPU	Total ARPU
TOT_DATA_USG_ARPU	Total ARPU for data usage
TOT_MESSAGE_USG_ARPU	Total ARPU for message usage
TOT_VOICE_USG_ARPU	Total ARPU for voice usage
TOT_VOICE_CALL_REVENUE	Total revenue of voice calls
TOT_DATA_CALL_REVENUE	Total revenue of data calls
TOT_MESSAGE_CALL_REVENUE	Total revenue of messages
TOT_NUM_OF_RECHARGES	Total number of recharges
TOT_AMT_OF_RECHARGES	Total amount of recharges

Derived Measures

The following table lists the prepopulated derived measures that users can use for defining workflow reports. Derived measures are further categorized based on their purpose.

Table 7.25 *Prepopulated Derived Measures*

Derived Measure Name	Description
Group name: Customer Counts	
PCT_CUST_IN_MS	Percentage of customers in microsegments
Group name: Usage	
PCT_VOICE_CALL_REV_TO_TOT_REV	Percentage of voice call revenue to total revenue
AVG_MOU_PER_CUST_IN_TS	Average minutes of usage per customer in the target segment

Derived Measure Name	Description
AVG_MOU_PER_CUST_IN_MS	Average minutes of usage per customer in microsegments
AVG_MOU_PER_CALL	Average minutes of usage per call
Group name: Data	
PCT_DATA_CALL_REV_TO_TOT_REV	Percentage of data call revenue to total revenue
AVG_MEGABYTE_PER_CUST_IN_TS	Average data volume per customer in the target segment
AVG_MEGABYTE_PER_CUST_IN_MS	Average data volume per customer in microsegments
AVG_MEGABYTE_PER_SESSION	Average data volume per session
Group name: Message	
PCT_MSG_CALL_REV_TO_TOT_REV	Percentage of message call revenue to total revenue
AVG_MESSAGES_PER_CUST_IN_TS	Average number of messages per customer in the target segment
AVG_MESSAGES_PER_CUST_IN_MS	Average number of messages per customer in the micro segment

Chapter 8

Batch Processing

Processing a Project in Batch Mode

When you run all the workflow steps of a project in design mode, the project is ready to be promoted to batch mode. Using the **Push a project to batch mode** feature of SAS Offer Optimization for Communications, users promote the project from design mode to batch mode. The project IDs of projects, which are promoted to batch mode are stored in the BPP_PROJECT_SCHEDULE Application Data table along with the schedule frequencies.

To run a project in batch mode:

1. From the BPP_PROJECT_SCHEDULE Application Data table, identify the project whose schedule is due for the batch run.
2. Go to the **<SAS configuration directory>/Lev1/<SAS Application Server context name>** folder.
3. Depending on whether the operating system is Windows or UNIX, run the sas.bat or the sas.sh file respectively. For example, on the Windows machine, run the **C:/SAS/Config93/Lev1/SASApp/sas.bat** file.
4. In the editor, run the following command:

   ```
   %OOCINIT; %bpp_executeoocbatch(bpp_project_id= <Project ID>);
   ```

   In the above code, replace Project ID with the ID that you have identified in step 1.
5. View the log file that is created in the **<SAS configuration directory>/Lev1/AppData/SASOfferOptforCommServer/5.4/logs/ooc_logs/oocprojectlogs** folder. In this folder, a separate log file is created for each project. For example, for a project whose ID is 20, the log will be stored in the bpp_executeoocbatch_20.log file.

Note: There can be multiple projects that are due for the batch run at the same time. In this case, you can run all these projects in parallel. To do so, repeat steps from 2 to 4.

Purging Batch Run Data

You might want to configure a workflow step of a project that is in batch mode. However, in order to do so, you have to first pull the project into design mode. You can pull a project into design mode by using the **Pull project to design mode** feature of the SAS Offer Optimization for Communications interface. Before you use this feature, make sure that you purge all batch run data for that project.

To purge the batch run data for a project:

1. Go to the **<SAS configuration directory>/Lev1/<SAS Application Server context name>** folder.
2. Depending on whether the operating system is Windows or UNIX, run the sas.bat or the sas.sh file respectively. For example, on the Windows machine, run the **C:/SAS/Config/Lev1/SASApp/sas.bat** file.
3. In the editor, run the following command:

   ```
   %OOCINIT; %bpp_projectrun_purge_script(bpp_project_run_id= <Project run ID>);
   ```

   In the above code, replace Project run ID with the appropriate project's batch run ID.

Part 3

Appendixes

Appendix 1

Troubleshooting

Troubleshooting Related to Middle-Tier

Problem

I am able to see the application. However, when I log on, I see some pop up-error messages, and then the application window appears. Also, I cannot see any business groups or projects in the respective sections of the navigation pane.

Solution

1. Make sure that the SAS library is assigned properly.
2. Make sure that all the required SAS services are running.
3. Make sure that the SAS Share server is running.
4. Enable ROOT logging to DEBUG in the middle-tier log configuration file that is maintained at the **`<SAS configuration directory>/Web/Common/LogConfig`** location.
5. View the details of the errors that are generated in the log file.

Troubleshooting Project Creation

Problem

I am unable to create a new project in the SAS Offer Optimization for Communications interface.

Solution

Add a LIBNAME statement in the bpp_post_init.sas file.

To add the LIBNAME statement:

1. Open SAS Management Console and connect to a suitable profile.
2. On the **Plug-ins** tab, expand **Environment Management** ⇨ **Data Library Manager** ⇨ **Libraries**.
3. Right-click the **Application Mart** library, and then select **Properties**.
4. On the **Options** tab, click **Advanced Options**.
5. Deselect the **Library is Pre-assigned** check box.
6. Click **OK** to close the Advanced Options window.
7. Click **OK** to close the Properties window.

8. Right-click the **Application Mart** library and select **Display LIBNAME statement**.
9. Copy the LIBNAME statement and add this statement in the bpp_post_init.sas file, which is available in the following location:

   Note: Make sure that you add the LIBNAME statement before the **`%mend bpp_post_init;`** statement.

   Windows path
   `<SAS Home>/bppsrv/ucmacros`

   UNIX path
   `<SAS Home>/ucmacros/bppsrv`
10. Save the file.

Glossary

ABT variable
See analytical base table variable

analytical base table
a highly denormalized data structure that is designed to build an analytical model or to generate scores based on an analytical model. Short form: ABT.

analytical base table variable
a column in an analytical base table that is used to build a statistical model to predict defaults. Short form: ABT variable.

business group
a subset of the customer base that is derived as a result of high-level business segmentation based on relatively static business attributes such as offer segment (wireless, land-line), offer payment mode (prepaid, postpaid), customer type, and customer's geographical area.

campaign
a planned set of one or more communications that are directed at a selected group of customers or potential customers for a commercial goal.

churn
the process of losing active customers and their related revenue. Churn can be classified as either voluntary or involuntary, depending on the reason for discontinuing the subscription or service.

churn score
a process that uses analytical data and process models to predict the likelihood of customer churn. The churn models are developed based on data from account, client, household, subscription, and equipment information. The

churner
a subscriber that involuntarily or voluntarily disconnects a subscription.

communications service provider
a company that operates networks, or integrates the communications services of other providers, to deliver end-to-end service to customers. Telecom service providers (TSPs), Internet service providers (ISPs), and application service aroviders (ASPs) are examples.

dimension
a data element that categorizes values in a data set into non-overlapping categories that can be used to group, filter, and label the data in meaningful ways. Hierarchies within a dimension typically represent different groupings of information that pertains to a single concept. For example, a Time dimension might consist of two hierarchies: (1) Year, Month, and Date, and (2) Year, Week, and Day.

ETL
See extract, transform, load

ETL job
a set of instructions that is used to specify ETL processes that are needed to create output.

extract, transform, load
a data warehousing process in which data is extracted from outside sources, transformed according to operational and quality needs, and loaded into a target database.

fact
a single piece of factual information in a data table. For example, a fact can be an employee name, a customer's phone number, or a sales amount. It can also be a derived value such as the percentage by which total revenues increased or decreased from one year to the next.

hierarchical list
a user interface element that helps select values by organizing variables into parent-child relationships, typically where a parent member represents the consolidation of its children. A hierarchical list progresses from top to bottom.

information map
a collection of data items and filters that provides a user-friendly view of a data source. When you use an information map to query data for business needs, you do not have to understand the structure of the underlying data source or know how to program in a query language.

SAS Display Manager
an interactive, windowing interface to SAS System software. SAS Display Manager commands can be typed on the command line, entered by pressing function keys, and selected from the PMENU facility.

SAS Enterprise Guide
a software application with a point-and-click interface that gives users access to the functionality of many components of SAS software. Interactive dialog boxes guide users through data analysis tasks and reporting tasks, and users can easily export the results of those tasks to other Windows applications or servers. SAS Enterprise Guide provides access not only to SAS data files, but also to data that is in a wide variety of other software vendors' formats and in other operating system formats.

SAS Metadata Server
a multi-user server that enables users to read metadata from or write metadata to one or more SAS Metadata Repositories.

workflow
a sequence of processes, together with the people, the tools, and the information necessary to accomplish a specific business objective or goal.

workflow report
a report that you can define for each step of the project workflow.

workflow step
each individual activity of a project that is depicted in a workflow diagram.

Index