SAS® Cost and Profitability Management 8.4

Installation, Migration, and Configuration Guide

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Chapter 1 – Using These Instructions

Audience

This document is intended for users who are installing or migrating to SAS Cost and Profitability Management 8.4. This document has been updated for the first maintenance release, SAS Cost and Profitability Management 8.4M1.

Overview

This document contains the following major sections:

Chapter 2, "Deployment Options," explains the common configurations that are supported.

Chapter 3, "Migrating from Previous Versions," contains steps for migrating from SAS Activity-Based Management 7.x or SAS Cost and Profitability Management 8.1 or 8.3 to 8.4. These steps must be performed before you install the new version.

Chapter 4, "Migrating Model Data," describes steps for migrating model data from SAS Cost and Profitability Management 8.3 and earlier to version 8.4. These tasks must be performed before and after you install the new version.

Chapter 5, "Setting Up Users, Groups, and Ports," provides an overview of the users and groups that are necessary to install and run SAS Cost and Profitability Management.

Chapter 6, "Installing Third-Party Prerequisites," contains steps for installing prerequisite software that is not supplied by SAS.

Chapter 7, "Installing SAS Prerequisites," contains information for installing other SAS components on machines in your SAS Cost and Profitability Management deployment.

Chapter 8, "Installing SAS Cost and Profitability Management," walks you through an installation of SAS Cost and Profitability Management.

Chapter 9, "Post-Installation," describes steps to create the data sources, perform any desired data migration, and test the installation.

Multiple appendices have also been included to help you with third-party database configuration and selecting tuning options for improved performance.

Technical Support

Visit the SAS Technical Support website at `http://support.sas.com` for installation updates.

For product documentation, visit the SAS Cost and Profitability Management Support page.

Conventions Used in this Guide

Words in examples that are italicized are meant to be replaced by information specific to your system.

For instance, on Windows, replace *SASHOME* with the path where you installed SAS. If you installed SAS in `Program Files` on your D: drive, replace *SASHOME* with `d:\Program Files\SASHOME`.

On UNIX, replace *SASHOME* with the path where you installed SAS. If you installed SAS on the `/opt` path, replace *SASHOME* with `/opt/SASHOME/`.

Likewise, *CONFIGHOME* is the directory that you selected to store your configuration data during SAS installation, appended with the configuration level that you are currently using. By default, SAS uses the directory `C:\SAS\Config\` for Windows. Most users will use `Lev1` for the configuration level. Thus a typical value for *CONFIGHOME* is `C:\SAS\Config\Lev1`.

Thus, on Windows the text *CONFIGHOME*`\Applications` typically equates to `C:\SAS\Config\Lev1\Applications`.

On UNIX, *CONFIGHOME* equates to the path where your configuration is installed. If you installed on the `/opt` path and used a configuration name of `Config` and `Level 1`, replace *CONFIGHOME* with `/opt/SAS/Config/Lev1`.

Reference Documents

This installation document is not intended to provide sufficient knowledge of the SAS software installation process to begin installing SAS Cost and Profitability Management. The *SAS Deployment Wizard and SAS Deployment Manager 9.4: User's Guide* is required reading before you begin. It is available at http://support.sas.com/documentation/installcenter/en/ikdeploywizug/66034/PDF/default/user.pdf

You also need a document that lists the minimum supported software versions for SAS Cost and Profitability Management 8.4 to ensure that any prerequisites that you install are compatible with SAS Cost and Profitability Management. The *SAS Cost and Profitability Management 8.4 System Requirements* document is available at http://support.sas.com/documentation/onlinedoc/abm/index.html.

Keep this document handy, as it will be referenced repeatedly during the installation process. We recommend printing a copy for easy access.

SAS Cost and Profitability Management might be the first product at your site that requires SAS 9.4. You might be using a 9.2/9.3-based Metadata Server and Web Report Studio as part of your existing SAS Activity-Based Management 7.x installation. If so, you must migrate all SAS 9.3 (or earlier) components to be used by SAS Cost and Profitability Management 8.4 to version 9.4. Refer to the *SAS 9.4 Intelligence Platform Migration Guide* at https://documentation.sas.com/?docsetId=bimig&docsetTarget=bimig.pdf&docsetVersion=9.4&locale=en for more information.

The *SAS 9.4 Intelligence Platform Installation and Configuration Guide* contains a wealth of information about SAS software installation. It is available at http://documentation.sas.com/?docsetId=biig&docsetTarget=biigwhatsnew94.htm&docsetVersion=9.4&locale=en

The *SAS 9.4 Intelligence Platform: System Administration Guide* provides detailed information about managing users and groups. It is available at http://documentation.sas.com/?docsetId=bisag&docsetTarget=bisagwhatsnew94.htm&docsetVersion=9.4&locale=en.The *SAS 9.4 Intelligence Platform: Security Administration Guide* provides detailed information about security in the SAS 9.4 Intelligence Platform. It is available at http://documentation.sas.com/?docsetId=bisecag&docsetTarget=bisecagwhatsnew94.htm&docsetVersion=9.4&locale=en

The SAS Visual Analytics documentation is available at the following website: http://support.sas.com/documentation/onlinedoc/va/index.html.

Finally, an alphabetical listing of all available SAS product documentation is available at https://support.sas.com/en/documentation/all-products-documentation.html.

Release Notes

Be sure to check http://support.sas.com/documentation/onlinedoc/abm/index.html for updated documentation in the form of Release Notes. This document contains late-breaking information related to installation, configuration, and defects.

Chapter 2 – Deployment Options

SAS Cost and Profitability Management supports many server configurations. Deployment architecture is typically selected based on the expected workload. If you are migrating from SAS Activity-Based Management 7.x and want to change the deployment architecture, contact SAS Technical Support.

An Integrated Windows Authentication-enabled (IWA) deployment is now an option. For more information about IWA deployments, refer to the IWA sections of the following documents:

SAS Security Administration Guide

Middle-Tier Administration Guide

First, we define a few terms:

Middle-Tier Server – Hosts the SAS Cost and Profitability Management middle-tier software. This includes the SAS Cost and Profitability Management web services, database access logic, and some of the business rules that provide SAS Cost and Profitability Management functionality. This server accesses the *Database Server* and *OLAP Server*. In addition, it calls the *Model Server* to perform calculation tasks and creates cubes using the *OLAP Server*.

Database Server – Hosts the SAS Cost and Profitability Management database. SAS Cost and Profitability Management 8.4 supports Microsoft SQL Server, PostgreSQL, and Oracle databases.

OLAP Server – An OLAP server responding to multidimensional query requests from an OLAP viewer such as the one built into SAS Cost and Profitability Management and SAS Enterprise Guide. SAS Cost and Profitability Management supports both the SAS OLAP Server and Microsoft SQL Server Analysis Services.

For installation and configuration purposes, we refer to the SAS Cost and Profitability Management *OLAP Server* as the machine where the SAS PROC OLAP runs **or** the machine where Microsoft SQL Server Analysis Services runs -- **not** as the machine that responds to requests from an OLAP viewer. This slight distinction signifies that SAS cubes can be built on one machine while multidimensional query requests are handled by a separate machine where SAS OLAP Server is installed.

This server is typically called a SAS Server. The SAS installation process installs the entire Base SAS system on this server, along with specific components required by SAS Cost and Profitability Management, such as the SAS OLAP Server. However, if you instead use Microsoft SQL Server Analysis Services (SSAS) for OLAP processing, the *OLAP Server* may not need any SAS software. For brevity, we refer to this logical server as the *OLAP Server*, but a more appropriate name might be the *OLAP Cube Creation Server*.

Model Server – Hosts the SAS Cost and Profitability Management models and most of the business logic. This is the server that performs the actual calculation logic for SAS Cost and Profitability Management.

Metadata Server – Hosts the SAS Metadata Server, and may host other SAS applications as well, such as SAS Web Infrastructure Platform and SAS Foundation Services. These products are part of the SAS Business Intelligence architecture. SAS Cost and Profitability Management uses the *Metadata Server* to store information about users, perform user authentication, and to share data with other applications, such as SAS Visual Analytics. It is also used by SAS OLAP Server to store cube and security information. Finally, it centralizes access to SAS Workspace Servers, so they can be shared among SAS Business Intelligence applications.

For clarity, this document refers to the five logical servers in italics with their name capitalized to distinguish their usage. For example, this document will use *Model Server* when referring to your logical deployment; but will use "model server" when referring to a specific machine (computer) or server.

Next, we discuss how these *logical* servers can be installed onto *physical* machines. The SAS Cost and Profitability Management architecture does not specify how the five servers listed above map to one or more distinct machines. Select a deployment topology that best suits your requirements. The topologies discussed below are the most common, but they do not enumerate all possibilities. Discuss the suitability of any of these topologies with SAS consultants. In order of smallest expected workload to largest, they are:

Two-Machine Deployment

This deployment is suitable for small installations where:

- The number of SAS Cost and Profitability Management users with **Create Models** and **View Models** roles is relatively small.
- Both the SAS Cost and Profitability Management models and their cubes are small.
- Integration with other applications, such as SAS Web Report Studio, is not required.
- Microsoft SQL Server Analysis Services are used for OLAP processing.

All server machines are running on Microsoft Windows.

In this deployment, the two computers host the SAS servers in the following manner:

- Server 1: *Middle-Tier Server*, *Metadata Server*, and *Model Server*. If your site already has a SAS Metadata server installed, SAS Cost and Profitability Management should share your existing server.
- Server 2: *Database Server* and *OLAP Server*.

Three-Machine Deployment

This deployment is suitable for mid-size installations. It meets requirements similar to the Two Computer Deployment discussed previously, except that the models are now large enough or the number of users is large enough that sharing one computer between the *Middle-Tier Server* and the *Model Server* is no longer practical. This deployment is feasible only if the *Workspace Server* is not heavily used by other SAS applications.

In this deployment, the three server machines host the servers in the following manner:

- Server 1: *Middle-Tier Server* and *Metadata Server*. If your site already has a metadata server installed, SAS Cost and Profitability Management should share the existing server.
- Server 2: *Database Server* and *OLAP Server*

- Server 3: *Model Server*

Four-Machine Deployment

This deployment is suited to high-usage installations. It moves the database, OLAP processing, and calculation onto computers that are separate from the web application server.

- Server 1: *Middle-Tier Server*
- Server 2: *Database Server* and *OLAP Server*
- Server 3: *Model Server*
- Server 4: *Metadata Server*. If your site already has a Metadata Server installed, SAS Cost and Profitability Management should share your existing server.

A SAS workspace server should also be installed on the OLAP server if SAS OLAP Server is used to process cubes. This allows the cube creation, cube storage, and cube delivery to be hosted on a single machine.

Five-Machine Deployment

This deployment is suited to very high-usage installations. It moves the database, OLAP processing and calculation processing onto computers separate from the Middle-Tier Server.

- Server 1: *Middle-Tier Server*
- Server 2: *Database Server*
- Server 3: *OLAP Server*
- Server 4: *Model Server*
- Server 5: *Metadata Server*. If your site already has a SAS Metadata Server installed, SAS Cost and Profitability Management should share your existing server.

Other Deployment Options

The previously described deployment scenarios represent a few of the possible options. Depending on the number of SAS Cost and Profitability Management users at your site, the size of your models, and the size of the cubes they generate, other topologies are feasible. The key to setting up an appropriate topology is understanding the usage patterns and task loading of the machines in your deployment.

Important: *For specific recommendations on hardware sizing based on your deployment, modeling, and performance needs, a formal analysis is required. SAS strongly recommends consulting with a sizing expert to obtain an official hardware recommendation that is based on your deployment type, the estimated SAS workload, and the number of users. The SAS World-Wide Sizing Team can help you plan for adequate hardware resources, based on your deployment size and usage patterns. To request sizing expertise, contact your SAS account representative. If you need assistance in determining your SAS account representative, send an email to contactcenter@sas.com.*

Note: *HTTP by default is not secure, and user credentials are sent in clear text. Configure TLS to secure the connections (HTTPS). Make sure that you are validating the server certificates (MS CHANNEL). Verify that HTTPS conforms to data-in-motion standards.*

Server Prerequisites

Each of the four logical servers, plus the *Metadata Server,* in a SAS Cost and Profitability Management deployment has its own specific software prerequisites. Some of these are third-party requirements, such as a relational database, and others are SAS requirements, such as a SAS/ACCESS engine for data access. These prerequisites are documented in the *SAS Cost and Profitability Management 8.4 System Requirements*. When *logical* servers are installed on a single *physical* computer, do not duplicate the prerequisites, except where explicitly noted.

Deployment Information

Use the following table to record information about the machines in your deployment.

Type of Server	Machine Name	Operating System	Machine Description
Middle-Tier Server			
Model Server			
Database Server			
OLAP Server			
Metadata Server			

Before You Begin

SAS recommends that you disable any antivirus software that is running on your server while you are performing the SAS installation. SAS has observed that antivirus software can prevent some required files and settings from installing successfully.

Chapter 3 – Migrating from Previous Versions

This chapter is intended for existing SAS Activity-Based Management 7.x customers, SAS Cost and Profitability Management 8.1 and 8.3 customers who want to install the most recent version, or for SAS 9.2 or 9.3 users who are new to SAS Cost and Profitability Management. If none of these criteria describes your site, you can skip this chapter.

If you presently use SAS 9.3 or earlier software, you must first update it to SAS 9.4.

If you have SAS Activity-Based Management 7.x or SAS Cost and Profitability Management 8.1 or 8.3 software, follow the steps in this document to migrate to SAS Cost and Profitability Management 8.4.

In addition, if you do not currently have any version of SAS Activity-Based Management installed, you cannot migrate your existing SAS 9.3 system to 9.4 *and* add SAS Cost and Profitability Management 8.4 at the same time. To add SAS Cost and Profitability Management to your installation, first migrate your existing SAS installation to SAS 9.4, and then run the SAS Deployment Wizard a second time to add SAS Cost and Profitability Management 8.4.

Important Changes from Previous Versions of SAS Activity-Based Management

A few important changes in SAS Cost and Profitability Management 8.4 will affect users of previous versions of SAS Activity-Based Management:

- SAS Cost and Profitability Management 8.4 requires SAS 9.4. Older versions of SAS components that support SAS Cost and Profitability Management, such as a Metadata Server, must also be migrated to SAS 9.4.
- SAS Cost and Profitability Management 8.4 no longer supports Microsoft SQL Server 2000 or 2005 databases. It no longer supports Microsoft Analysis Services 2000 or 2005 for OLAP.
- SAS Cost and Profitability Management 8.4 no longer supports Oracle 10g database.
- Cubes that were built with SAS OLAP Server 9.2/9.3 **are** compatible with SAS OLAP Server 9.4. However, the cube names that are created by SAS Cost and Profitability Management 8.4 have changed from previous versions. This change makes the cubes easy to recognize if you access them from outside of SAS Cost and Profitability Management, but it also requires you to delete any cubes from an older version of SAS Activity-Based Management and recreate them in SAS Cost and Profitability Management 8.4.
- Even if you are migrating from SAS Cost and Profitability Management 8.x, you need to recreate your cubes in SAS Cost and Profitability Management 8.4.

For detailed version information regarding supported third-party tools, refer to the *SAS Cost and Profitability Management 8.4 System Requirements*.

Backing up the System

Before you start the upgrade, you must back up your database. If you are using Microsoft SQL Server, back up the OEModels databases (or the name that you selected for this database when you installed your back-level version of SAS Activity-Based Management or SAS Cost and Profitability Management). If you are using Oracle, you must back up the schema that you created for SAS Activity-Based Management 7.x or SAS Cost and Profitability Management 8.x during the installation.

Before you back up the databases, verify that no one is using SAS Activity-Based Management or SAS Cost and Profitability Management on the target servers.

Warning: *Database backups are specific to a version of SAS Cost and Profitability Management. Do not restore the current SAS Cost and Profitability Management databases from a backup created from a previous version. Include the version number in the backup filename.*

In addition to the SAS Activity-Based Management databases, create a backup of the directory that contains the Published Reports that were created by SAS Activity-Based Management users. It is a best practice to retain a copy of all published reports. This folder is located at: *SASHOME*`\Activity-Based Management Solution\Enterprise Server\SasSolutions\ABM\Reports\Published`.

Note: *The Published Report feature is not supported in SAS Cost and Profitability Management 8.4.*

You should also back up all your current-version SAS data prior to migrating any of the SAS components to 9.4. For more information, refer to the *SAS 9.4 Intelligence Platform Migration Guide.*

Upgrading from SAS OLAP 9.2 or 9.3

Cubes that were built with SAS OLAP Server 9.2/9.3 **are** compatible with SAS OLAP Server 9.4. However, the cube names that are created by SAS Cost and Profitability Management 8.4 have changed from previous versions. This change makes the cubes easy to recognize if you access them from outside of SAS Cost and Profitability Management, but it also requires you to delete any cubes from an older version of SAS Activity-Based Management and recreate them in SAS Cost and Profitability Management 8.4. For more information, refer to the *SAS 9.4 Intelligence Platform Migration Guide*.

Upgrading from Microsoft Analysis Services 2005

For more information, see Appendix C - Third-Party Migration.

Upgrading from Microsoft SQL Server 2005

Data from Microsoft SQL Server 2005 can be moved to later versions of Microsoft SQL Server. See "Migrating from SQL Server 2005" in Appendix C - Third-Party Migration for more information.

Migrating SAS Activity-Based Management Models

See Chapter 4 for the steps to migrate models to the current version.

Running the SAS Migration Utility

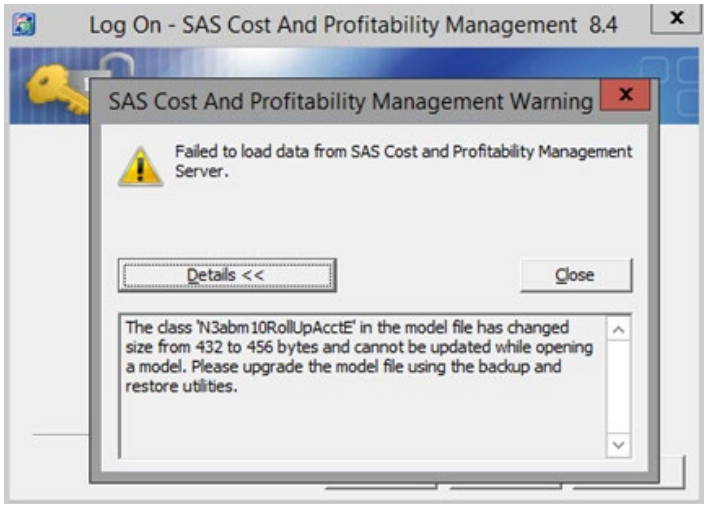
Follow the instructions in the *SAS 9.4 Intelligence Platform Migration Guide* for migrating your existing SAS 9.2 or 9.3 Intelligence Platform.

Once you have migrated your SAS Business Intelligence Platform to version 9.4, continue with these instructions to complete your installation. When the software installation has completed, the final step of the installation process migrates your existing SAS Activity-Based Management data to the new 8.4 format.

Migrating from Releases of 8.x to 8.4

If you are migrating from any SAS Cost and Profitability Management 8.x release to SAS Cost and Profitability Management 8.4, you must export the current models using the Export Model functionality of SAS Cost and Profitability Management before starting the migration. The migration process will not migrate the model data. After the migration process is complete, you must use Import Model functionality of SAS Cost and Profitability Management to access your models. The migration process migrates the model metadata, but it does not migrate actual models. If a model has been published, then unpublish the model before exporting it.

After you migrate or perform an upgrade in place to SAS Cost and Profitability Management 8.4, when you try to log in to the client, you might receive the following error:



If this occurs, take the following steps:

1. Stop the SAS Object Spawner.
2. Navigate to the Models directory path, which is typically `SASConfig/Lev1/SASApp/ABMServer/Models` on the compute tier.
3. Rename the `M0` folder to `M0_rename`.
4. Start SAS Object Spawner.
5. Log back in to the client.

After migration when a user logs in to SAS Cost and Profitability Management, the models are displayed, but they lack the actual model data. Each displayed model shows only the model metadata that was migrated. If the user tries to open these models, an error is displayed that states, "`Failed to load data from SAS Cost and Profitability Management Server`."

If this occurs, the user should import the already exported model. An important first step is to rename the `model.abm` file for each model. These model Memory Mapped Files (MMF) are located under the Models folder mentioned above in step 2. While importing the model, the user should select the option **Existing model** (for an XML import) or **Existing model** along with the option to **Replace all data in the model, then import new data** (for a Database Import). The selection of these options ensures that the model metadata is connected to the actual model data that is being imported. After the import has completed successfully, the user can open the model.

Before starting the migration, the user should also export the cube configurations. These configurations need to be imported using the Import Cube Configuration functionality in SAS Cost and Profitability Management.

For more information about these import features, refer to the *User's Guide*.

Chapter 4 – Migrating Model Data

This chapter is intended for SAS Activity-Based Management 7.x users *or* SAS Cost and Profitability Management 8.x users. If you are new to SAS Cost and Profitability Management, you can skip this chapter.

If you are migrating from SAS Activity-Based Management 7.x, at this point in the installation process, you should already have one of the supported database versions installed. This database should also contain your SAS Cost and Profitability Management model data from a previous version of SAS Activity-Based Management. This process is described in Appendix C - Third-Party Migration on page 80.

Important: *Make sure that you have backed up your data before proceeding! In addition to performing a database backup, SAS also recommends exporting the models to a safe place.*

Migrating from Version 8.x

On Linux systems, if you are not doing an in-place migration--that is, if you want to keep the existing 8.x version of the software running--you must change directory permissions on `CONFIGHOME/SASApp/ABMServer/Models` and `CONFIGHOME/SASApp/ABMServer/Logs` after the migration. This step is required to enable the Model Server external user to read and write to the contents of the two directories.

If the external Model Server user is part of the same group, you can run the following command:

```
chmod –R 775 Models folder Logs folder
```

No special steps are required on Windows systems.

You have two options to migrate SAS Cost and Profitability Management data from an earlier version of the software:

- **Export data from the previous version and import it into SAS Cost and Profitability Management 8.4:** This is the simplest and most common approach. You export the required models and related data from the previous version and import them into SAS Cost and Profitability Management 8.4. You must specify a fresh database schema during the migration. No special post-installation steps are required.
- **In-place database migration:** You can also update the data in your existing database to the format used by SAS Cost and Profitability Management 8.4. This method requires you to point to your old database during the migration and select the "Upgrade" option. After the in-place migration, refer to Chapter 3 – Migrating from Previous Versions for information about migrating the model data.

Migrating from Version 7.x

You have two options to migrate SAS Cost and Profitability Management data from an earlier version of the software:

- **Export data from the previous version and import it into SAS Cost and Profitability Management 8.4:** This is the simplest and most common approach. You export the required models and related data from the previous version and import them into SAS Cost and Profitability Management 8.4. You must specify a fresh database schema during the migration. No special post-installation steps are required.

Note: *If you were using a MySQL database with your previous version of SAS Activity-Based Management, exporting is the only supported way to migrate your data to SAS Cost and Profitability Management 8.4.*

- **In-place database migration:** You can also update the data in your existing database to the format used by SAS Cost and Profitability Management 8.4. This method requires you to specify your old database during the migration and select the **Upgrade** option.

Migrating in place from version 7.x to 8.4 is mostly handled by the SAS Migration Utility. After the installation, you must run the Model Migration Utility, which is discussed in Chapter 9 – Post-Installation.

If you are not migrating data, some post-installation steps are required. These steps are described in Chapter 9.

Chapter 5 – Setting Up Users, Groups, and Ports

Before you begin the installation, you must have a user account available to install the SAS software. In addition to user accounts, SAS Cost and Profitability Management has a few third-party prerequisites and requires specific port settings. The following sections explain how to create the necessary user accounts and groups on the operating system and describe how to set their permissions.

Warning: *While reading this chapter, be aware that using "local" users for tasks other than software installation can cause authentication problems when software is deployed on multiple machines. (In Windows terminology, "local" users are defined on a local machine and lack network or domain authentication.) These problems arise because a local user on one machine is invisible to software on another machine – even if the same user accounts are created with identical passwords on each machine. If resources and access privileges on one computer require authentication on another machine, that user must have network authentication.*

The following sections describe the user accounts that SAS and third-party software require, and they answer the following questions:

- What are internal and external user accounts?
- What user rights are required, or to what groups must each account be assigned?
- Should I create local or network directory service accounts?

Types of User Accounts

Two types of user accounts are required when deploying SAS:

- *Internal user accounts* are accounts known only to SAS and are created and authenticated internally in metadata rather than externally via an operating system.
- *External user accounts* are user accounts defined outside of SAS metadata. These accounts are local to a machine or are defined in a network directory service of which the machine is a member, such as LDAP.

Internal Accounts

Internal user accounts are known only to SAS and are created and authenticated internally in metadata rather than externally. SAS identifies internal accounts by appending a special string to the user ID. This string begins with an "at" sign (@) and contains the characters *saspw*. For example: **@saspw**. For two of the required user accounts, the SAS Administrator and the SAS Trusted User, the SAS Deployment Wizard prompts you by default to create *internal* user accounts.

Access to these two internal accounts is not required for day-to-day usage of SAS Cost and Profitability Management. However, you will need them to administer your SAS Cost and Profitability Management installation.

For more information about internal accounts, see "Understanding the State of Your System" in the *SAS Intelligence Platform: System Administration Guide*.

External Accounts

External user accounts are defined outside of SAS metadata. These user accounts are local to a machine or are defined in a network directory service of which the machine is a member, such as LDAP or a Windows domain.

SAS requires *external* user accounts for two purposes: installation, and running some SAS server processes. During installation and configuration, the SAS Deployment Wizard must run under an external account with the necessary privileges on the target *machine* to write SAS program and log files. To run servers such as the stored process server and the pooled workspace server, SAS requires an external user account to be the server process owner. For more information about external user accounts, see the *SAS Intelligence Platform: Security Administration Guide*.

As you create these external user accounts, record information about them in the table provided. You will need this information when you run the SAS Deployment Wizard to install SAS Cost and Profitability Management and other SAS software.

Key Points

Some discussions of user accounts that follow in this document refer to internal accounts, and others refer to external accounts. References to internal accounts or groups implicitly mean items that are stored in a SAS metadata server. References to external accounts or groups implicitly mean items stored within an operating system.

Model Server and OLAP Server Accounts

The external accounts and external groups discussed in this chapter must be accessible to the SAS Cost and Profitability Management *Model Server* and, if you are using SAS OLAP Server, on your *OLAP Server* as well.

They are also required on other SAS servers in your deployment, but they are not required on your database server, nor are they required on your OLAP Server if you are using Microsoft SQL Server Analysis Services.

In addition to any external accounts that SAS requires, an external account is required for the model server. A network account is required, unless the Metadata Server and the Model Server are installed on the same machine and require administrator privileges on the *Model Server*.

Creating External User Accounts

SAS Cost and Profitability Management requires an external user account for:

- the software installer
- each SAS Cost and Profitability Management user, or at least one for a First User

Other SAS software also needs an external account to run the SAS Spawned Servers. However, SAS Cost and Profitability Management does not use SAS Spawned Servers, so that account can be ignored for the purposes of installing SAS Cost and Profitability Management.

Note: *Do not confuse the SAS Spawned Server with the SAS Object Spawner.*

You can install your SAS software using any operating system account that has sufficient privileges. However, SAS recommends using the same user account to install all SAS software, to install all third-party prerequisites, to uninstall software, and to apply any required updates.

We recommend recording the account IDs that you use in the following table:

Account [1]	Recommended User ID	Actual User ID
SAS Installer	Windows: *my-domain**installer-ID*[2]	
	UNIX: sas [3]	

1 For information about these user accounts, see "Rights Required by External User Accounts for SAS" in *SAS 9.4 Intelligence Platform: Installation and Configuration Guide*.

2 On Windows, the user ID should be available in the future to facilitate SAS maintenance.

3 On UNIX, do not use root.

Operating systems require you to assign certain rights to the external user accounts that are used to deploy and to run SAS. The following table describes the user rights that are required by the external user accounts to deploy and run SAS:

Account	Operating System	User Rights Needed
SAS Installer	Windows	Administrator rights
	UNIX	Member of a group that is the *primary* group for the SAS Spawned Servers account[1]

1 SAS Cost and Profitability Management does not use any SAS Spawned Servers accounts. However, other SAS products may use them. If you do create a spawned servers account, it must also be a member of a group that is the *primary* group for the SAS Installer account.

On Windows, if you select to run your SAS servers using management scripts—instead of running them as Windows services—the user account that runs the SAS Spawned Server must meet the following requirements on the Spawned Server machine:

- be the administrator or a member of the Windows Administrators group
- have the following Windows local user rights:
  - Adjust memory quotas for a process
  - **Replace a process level token**

When you set up passwords for your SAS system users, SAS recommends configuring passwords that do not have to be reset at the first login. It is also preferable to configure the passwords for these accounts not to expire.

Windows

On a Windows server, follow these steps if you need to create a local SAS Installer User. If you already have a local account for this purpose, or if you plan to use a network account, skip these steps. Otherwise, you need to create this local user on each machine where SAS software will be installed:

1. **Start → Control Panel → Administrative Tools → Computer Management**.
2. Expand the **System Tools**.
3. Expand **Local Users and Groups** and right-click **Users**. Select **New User…**
4. Supply a username for the installation user that you selected.
5. Supply descriptions (**SAS Installer User**) and a password.
6. Clear the option **User must change password at next logon.**

7. Select the option **User cannot change password.**
8. Select the option **Password never expires.**
9. Click **Create**, and then click **Close**.

UNIX

Use the appropriate system utilities to add a user account with the following characteristics:

- Add a user
- Set a password for the user (`passwd NewUser`)
- Set the expiration date to 99999

SAS First User Account (Optional)

To validate your SAS deployment, you need an external user account that represents a SAS Cost and Profitability Management user. This account must be the temporary process owner when its jobs are run on a standard workspace server.

This "SAS First User" is typically a SAS Cost and Profitability Management user whose account will be used to validate the installation. However, you have the option to create a temporary external account whose sole purpose is validation. You can enable the SAS Deployment Wizard to create an internal SAS First User account for you and prompt for the First User's external account credentials.

Creating External Groups

Certain operating-system privileges must be granted to users who will run SAS processes. They must be granted on each machine where these processes will run. All SAS Cost and Profitability Management modeler users must be able to launch batch processes on the *Model Server.* In addition, if you are using SAS OLAP Server, users who create cubes must be able to launch batch processes on the *Model Server* and the *OLAP Server*.

On UNIX and Windows, adding users to a group and then granting that group the proper permissions simplifies the management of multiple users.

Full Name	Recommended Group ID	Actual Group ID
SAS Server Users	Windows: SAS Server Users	
	UNIX: sas	

Windows

Create a new external group (not a Metadata Server group), and add each SAS Cost and Profitability Management user to the group of SAS server users. If you are creating a SAS First User account, add it to this group as well.

Warning: *Failure to add each SAS Cost and Profitability Management user to the group of SAS server users on the required computers causes calculation and cube-generation tasks to fail.*

Perform these steps on each machine in your deployment where you will install SAS software. For a typical SAS Cost and Profitability Management installation, this means the *Model Server* and the *OLAP Server*, if SAS OLAP is used:

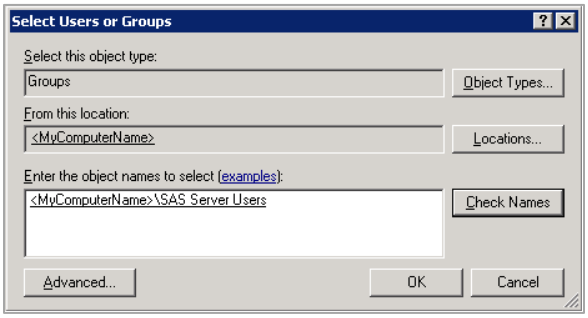
1. Click **Start→Control Panel→Administrative Tools→Computer Management**.
2. Expand **Systems Tools**. Expand **Local Users and Groups**. Right-click **Groups**, and select **New Group** to create a new group using the SAS Server Users name you selected.

   Note: *Networked user accounts are required if the metadata server is on a separate machine from the other SAS Servers.*
3. Close **Computer Management**.

Finally, grant **Log on as a batch job** to this group. Take the following steps:

1. Access **Administrative Tools → Local Security Policy** in the Windows Control Panel.
2. In the Local Security Settings dialog box, select **Local Policies → User Rights Assignment**.
3. Right-click **Log on as a batch job** and select **Properties**.

4. In the Log on as batch Properties dialog box, click **Add User or Group**.
5. In the Select Users or Groups dialog box, click the **Object Types** button to search for groups on the local machine.



6. In the Object Types dialog box, verify that the **Groups** check box is selected, and click **OK**.
7. Click **Locations**.
8. In the Locations dialog box, verify that your local computer name is selected. The local computer name usually appears at the top of the list. Click **OK**.
9. Type a name for the SAS Server Users in the **Enter the object names to select** field. Select **Check Names**. Click **OK**.
10. Click **OK** to close the **Log on as batch Properties** dialog box.

UNIX

If you are installing any SAS software on a UNIX system, create a UNIX group to store the ID of the SAS Server User. SAS recommends that you name this group **sas**. The system command to add members is `useradd -G GroupName UserName`.

Designating Ports

Review the set of ports that the SAS servers and third-party servers in your system will use by default. If any of these ports are unavailable in your environment, possibly because of conflicts with other software, select alternate ports and record them in the following table.

Only the ports that are used by SAS Cost and Profitability Management are included in this list. For more information about SAS software ports, refer to "Designating Ports and Multicast Addresses" in the *SAS 9.4 Intelligence Platform: Installation and Configuration Guide*.

Server	Default Port	Actual Port	Machine Name
Middle-Tier SAS Web Server	8080		
Database Port (select one): • Microsoft SQL Server • Oracle • PostgreSQL	 1433[3] 1521[3] 10332[3]		
OLAP Server Port (select one): • Microsoft SQL Server Analysis Services • SAS OLAP Server[1]	 N/A [4] 5451		
SAS Metadata Server	8561		
SAS Workspace Server[2]	8591		
SAS Deployment Tester Server	10021		
SAS Cost and Profitability Management "Operations"	5081		
SAS Cost and Profitability Management "Windows Service Port"	9050		
SAS Foundation Services[5]	5091		

1 This port is for the Workspace server on the *OLAP Server* (if SAS OLAP Server is in use).
2 This port is for the Workspace server on the *Model Server*.
3 The default port for the default instance. If you create a named instance, the port may differ.
4 Microsoft SQL Server Analysis Services does not use a port for creating connections. Specify an instance name if it is not running on the default instance.
5 This is usually located on the *Metadata Server*

The default port assignment is based on a clean installation of the product on a machine where:

- no other instances of that product are installed
- no other versions of that product are running
- no similar products are running (for example, web servers)

Observe these restrictions because the default ports may have been reassigned during the installation. Verify the port assignment before continuing with the SAS Cost and Profitability Management installation.

Warning: *The port assignments on any single machine cannot conflict. SAS port assignments might be duplicated across machines because the connection between components or services on different machines consists of the computer name and port number.*

Chapter 6 – Installing Third-Party Prerequisites

This chapter provides an overview for the installation of the third-party software prerequisites that will be needed by the SAS Cost and Profitability Management installation. These instructions are not intended to replace the OEM instructions for the software, but are instead intended to provide an overview for important options and installation choices that SAS Cost and Profitability Management relies on for proper operation.

***Important**: Not all of these prerequisites are required on all servers. Follow the instructions carefully to avoid installing unnecessary software.*

Before installing the SAS Cost and Profitability Management software on the *Middle-Tier Server*, verify that the other servers in your deployment have the third-party software prerequisites and SAS software prerequisites installed. Record the following information during the installation process for reference purposes:

- machine names
- newly created user accounts and passwords
- installation directories
- a check-mark to indicate that the software has been installed

Verify that you are installing these prerequisites using the proper SAS Installer user account that was identified in the previous chapter.

This information is required to configure the SAS Cost and Profitability Management server so that it can communicate with the other servers. Use the tables below to record the information as your installation proceeds:

Middle-Tier Server – **Machine Name:**

Prerequisite Software	**Installed?**	**Installation Directory**
SAS Cost and Profitability Management Middle-Tier[1]		
Database access software[2]		
JUnit Software		
Microsoft .NET[3]		

1 To be installed in Chapter 8.
2 JDBC driver for SQL Server, Oracle or PostgreSQL.
3 .NET is only required if you are using SQL Server Analysis Services for OLAP.

Database Server – **Machine Name:**

Prerequisite Software	**Installed?**	**Instance/GDB Name**
Relational Database		

OLAP Server (if using SAS OLAP Server [1]) – **Machine Name:**

Prerequisite Software	Installed?
SAS Cost and Profitability Server Tier[3]	
Database access software[2]	

1 Includes Base SAS with PROC OLAP, SAS OLAP Server, and Workspace Server.
2 An ODBC driver for a SQL Server, Oracle, or PostgreSQL database.
3 The full name is SAS Cost and Profitability Management Data Integration and Enterprise BI Server. This will be installed in Chapter 8. This can also be any existing SAS OLAP Server.

OLAP Server (if using SQL Server Analysis Services [1]) – **Machine Name:**

Prerequisite Software	Installed?
SQL Server Analysis Services	
Database Connectivity Tools[1]	

1 Either Microsoft Client Connectivity Tools or Oracle Administrative Client Tools.

Model Server – **Machine Name:**

Prerequisite Software	Installed?
SAS Cost and Profitability Management Server[1]	
Database access software[2]	
SAS/ACCESS to ODBC	
SAS/ACCESS to Oracle (if using an Oracle database)	
SAS/ACCESS to PostgreSQL (if using a PostgreSQL database)	

1 Includes Base SAS with SAS/GRAPH, and Workspace Server as key components
2 The Microsoft Client Connectivity Tools for SQL Server; Oracle Administrative Client Tools; or an ODBC driver for PostgreSQL.

Metadata Server – **Machine Name:**

Prerequisite Software	Installed?	Internal Account	Password
SAS Metadata Server			
SAS Foundation Services			

Verify that these prerequisites have been met before you install SAS Cost and Profitability Management. Or, if they are to be installed on the same machine as SAS Cost and Profitability Management, install them simultaneously.

User ID for Installations

Verify that you are logged in as the SAS Installer User before proceeding.

Relational Database

A relational database is a required prerequisite for the *Database Server* in your deployment.

The SAS Cost and Profitability Management 8.4 Solution needs a relational database to store its data. Select one of the following databases and install it:

- Microsoft SQL Server database (for Windows)
- PostgreSQL database (for Windows and UNIX)
- Oracle database (for Windows and UNIX)

If you have already installed a database, verify the port number for the database and record it in the table provided in "Designating Ports" in the previous chapter.

Use the following table to record the installation details for the database:

Database user name	Password	Database/Schema name

Installing Microsoft SQL Server Database

Skip this section if you are upgrading from a previous version of SAS Activity-Based Management ***and*** if you are using a version of SQL Server that is supported by SAS Cost and Profitability Management 8.4. However, you will need the SQL Server user's name and password, and the database name that contains your existing data. Record this information in the table above. You will need it later when you install SAS Cost and Profitability Management 8.4 and when you update your database to the 8.4 schema format.

Background Information

Microsoft has changed terminology over the last several releases of SQL Server. In SQL Server 2000, the OLAP server was named Microsoft Analysis Services (MSAS), but starting with SQL Server 2005, it is called SQL Server Analysis Services (SSAS). This should not be confused with SAS OLAP Server.

In addition, in SQL Server 2000 the connectivity drivers (ODBC, OLEDB, etc.) and management console were combined into the Client Tools installation. In recent versions of SQL Server, Microsoft bundles them differently. Refer to your Microsoft SQL Server documentation and be sure to select appropriate options during SQL Server installation to include connectively tools.

***Important**: If you are using Microsoft SQL Server for your database or Microsoft SQL Server Analysis Services for your OLAP processing, your Middle-Tier Server **must** be running on Windows. This is a configuration limitation caused by user authentication limitations between UNIX and Windows.*

Install Microsoft SQL Server

Complete the installation steps in "Installing Microsoft SQL Server" in Appendix A.

Configure Microsoft SQL Server

Complete the configurations steps in "Configuring Microsoft SQL Server " in Appendix A.

Install Oracle Database

Warning: *The Oracle installer performs a few prerequisite tests. Make sure all tests successfully complete. If any tests fail, refer to the Oracle installation guide for help. This is especially important because, depending on your hardware configuration, the Oracle database may require the presence of a Loopback Adapter for proper operation. If the Loopback Adapter is not installed but its presence is required by Oracle, the Oracle database will appear to operate properly most of the time. However, SAS has determined that random failures, typically involving "concurrency" (to quote the Oracle error messages), will occur. The Oracle documentation has instructions for installing the Loopback Adapter on your operating system.*

Complete the installation and configuration steps in "Installing Oracle on Windows" in Appendix B.

Install PostgreSQL Database

If your software order indicates that you are planning to use PostgreSQL with SAS Cost and Profitability Management, the database will be included with the SAS software and installed by the SAS Deployment Wizard.

If you are using the PostgreSQL database on a non-English environment, you must add the parameter "`PGCLIENTENCODING=UTF8`" to your environment variables. If it is not added, then generate cubes can fail with a transcoding error.

OLAP Server

If you are using SAS OLAP Server, you may skip this section. You will install it in Chapter 7.

If you are using Microsoft SQL Server Analysis Services, install it on the machine that you have identified as the *OLAP Server* in your SAS Cost and Profitability Management deployment. If you are using Microsoft SQL Server Analysis Services and your *OLAP Server* and *Database Server* are deployed on one machine, you may have already installed the OLAP software. If so, you can skip this section.

Microsoft SQL Server Analysis Services

See "Installing Microsoft SQL Server Analysis Services " in Appendix A for more information.

ODBC Drivers

The *Model Server* uses ODBC drivers to access the database. Likewise, if you are using the SAS OLAP Server to create SAS Cost and Profitability Management cubes, the *OLAP Server* deployment also uses the ODBC drivers to access the database. Keep the following points in mind:

- If your *OLAP Server* is running on a 32-bit operating system, a 32-bit ODBC driver is required on the OLAP Server.
- Likewise, you need a 64-bit ODBC driver for an *OLAP Server* running on a 64-bit operating system.

- In contrast, the *Model Server* requires 64-bit ODBC driver. This is true regardless of the operating system or the "bit-ness" of the operating system on your *Database Server*.

If you are using Microsoft SQL Server Analysis Services to create SAS Cost and Profitability Management cubes, the *OLAP Server* does not require ODBC drivers, but it does need the Client Connectivity tools for your database.

Important: *SAS recommends installing the ODBC drivers using the Client Connectivity Tools options that are available on your database installation media for Microsoft SQL Server and Oracle databases. Using these options guarantees that the Model Server, as well as the ODBC drivers, will receive any updates as part of a database update provided by your vendor.*

Important: *Windows distinguishes between 32-bit and 64-bit ODBC drivers. Windows also distinguishes between 32-bit DSNs and 64-bit DSNs. The 32-bit DSNs can only use 32- bit ODBC drivers, and 64-bit DSNs can only use 64-bit ODBC drivers.*

Microsoft SQL Server Database

To download the drivers directly, search for the "Microsoft SQL Server Feature Pack" at the following website: `http://www.microsoft.com/en-us/download/`. Download the drivers for the version of SQL Server that you are using with SAS Cost and Profitability Management.

Oracle Database

If you need to download the ODBC drivers directly, the "Oracle Data Access Components" for Oracle can be found at `http://www.oracle.com/technology/software/tech/windows/odpnet/index.html`.

Important: *If the Model Server is installed on a UNIX machine, SAS Cost and Profitability Management includes the required ODBC drivers for Oracle database. For more information, see* *Appendix F – ODBC Data Sources on Linux**.*

PostgreSQL Database

The ODBC drivers for PostgreSQL are automatically included when SAS Cost and Profitability Management is installed with the PostgreSQL option. If you need to download the ODBC drivers directly, they can be found at the following website: `http://www.postgresql.org/ftp/odbc/versions/msi/`.

Important: *If the Model Server is installed on a UNIX machine, SAS Cost and Profitability Management includes the required ODBC drivers for PostgreSQL database. For more information, see* *Appendix F – ODBC Data Sources on Linux**.*

JUnit for SAS Cost and Profitability Management Server Diagnostic

JUnit must be installed on the *Middle-Tier Server*. SAS Cost and Profitability Management Server Diagnostic requires access to JUnit 4.8.1 software to run. You can download and install it from the SAS Support website: `https://support.sas.com/en/documentation/third-party-software-reference/9-4/support-for-other-products.html`. Click the **JUnit** link, and then click the **Download** link.

Required Software for SAS Cost and Profitability Management Client

The following software is required for each SAS Cost and Profitability Management client:

Microsoft .NET Framework

The Microsoft .NET 4.8 Framework is required by the SAS Cost and Profitability Management client. The .NET Framework is installed by SAS installer. A separate installation is not required.

You can download the .NET Framework from http://www.microsoft.com/downloads.

Microsoft XML Core Services

Microsoft XML 6.0 Parser is installed as part of Microsoft Internet Explorer and does not typically require a separate installation.

If necessary, it can be downloaded from http://www.microsoft.com/downloads/details.aspx?FamilyId=59914795-60c7-4ebe-828d-f28cb457e6e3&displaylang=en.

OLEDB for OLAP Drivers

Client machines require a driver to access OLAP data sources and to display OLAP cubes.

If you are using SAS OLAP Server to create cubes, you need the SAS OLEDB for OLAP 9.4 driver. This driver is included as part of the SAS Cost and Profitability Management Client installation.

Otherwise, download the Microsoft SQL Server Feature pack to get the Microsoft OLEDB for OLAP driver. You can go to http://www.microsoft.com/en-us/download/ and search for "Microsoft SQL Server Feature pack" to download the version you require.

WSE 3.0

The Client machine requires Web Services Enhancements (WSE) 3.0. If you are installing the client software on Windows 8 or a later version, you must install WSE 3.0. You can install it from the SAS Software Depot.

Special Combinations

Microsoft SQL Server Database and Microsoft Analysis Services

If you are using Microsoft SQL Server, you may experience unresolved table locking problems in your SQL Server database that prevent SAS Cost and Profitability Management batch processes from completing. The error states:

```
Transaction (Process ID 58) was deadlocked on lock resources with
another process and has been chosen as the deadlock victim. Rerun
the transaction.
```

This problem most commonly appears when SQL Server is heavily loaded and SAS Cost and Profitability Management is generating cubes.

To resolve this problem, modify your database transaction isolation level.

1. Launch the **SQL Server Management Studio** from the **Start** menu.

2. Make sure you have selected Database Engine and the machine where your database engine is running. Log into **SQL Server Management Studio** using an appropriate administrative account.
3. Open a query window: click the **New Query** button on the toolbar.
4. Paste the following query into the query window and change the text *MyCPMDatabaseName* to be the name of your SAS Cost and Profitability Management database:

   ```
   ALTER DATABASE MyCPMDatabaseName SET READ_COMMITTED_SNAPSHOT ON
   ```

5. Select **Execute**.

Chapter 7 – Installing SAS Prerequisites

After completing the steps in Chapter 6 – Installing Third-Party Prerequisites, you now have all of the third-party software prerequisites installed and configured properly on the machines in your deployment. The next step is to install your SAS software.

If you are new to installing SAS software, the process involves two components:

- The software to be installed – a SAS Software Depot
- A "Plan file" that describes the SAS software to be installed on each computer. This file helps to simplify complex installations.

Your SAS software order was delivered with a sample Plan file that is suitable for the deployment information you provided when you ordered your software. If you want to change that deployment, contact a SAS representative.

Verify that you are installing the software discussed in this chapter using the SAS Installer User.

SAS Software

As part of your SAS software purchase, you receive a *Software Order Email* message that describes the specific software included in your order, download instructions (or DVDs if requested), and a *SAS Installation Data file* (SID file) attachment that is required to activate your software. You will need this email to continue with the installation. The Software Order Email is sent to the SAS Installation Representative at your site. If you cannot locate your Software Order Email, visit the SAS Support website at `http://support.sas.com/techsup/license` to have the email re-sent to the SAS Installation Representative.

During the installation, you must have access to the SAS Software Depot and Plan file. Keep these in a location that is accessible to all the machines.

Download your software into the SAS Software Depot using either the SAS Download Manager or the DVDs that you received from SAS.

For information about the SAS Software Depot, refer to the Quick Start documents at:

- `http://support.sas.com/documentation/installcenter/en/ikqsgbasicesd/66208/PDF/default/quickstart.pdf` ("basic" deployments) or
- `http://support.sas.com/documentation/installcenter/en/ikqsgplanesd/66210/PDF/default/quickstart.pdf` (deployments using a SAS "Plan" file).

Use the SAS Deployment Wizard to install the software from the SAS Software Depot. The Install Center website provides more information about all aspects of SAS software installation: `https://support.sas.com/en/documentation/install-center/94.html`

SAS Software Installation

Follow the SAS Deployment Wizard instructions carefully and type your responses accurately. Correctly specifying port numbers, user names, and machine names is critical.

Using the SAS Deployment Wizard, install the required SAS software that you identified in Chapters 3 and 4 on the appropriate OLAP Server and, if required, on the *Metadata Server*. These two servers may not require software installations. For example, if you are using Microsoft SQL Server Analysis Services, the *OLAP Server* installation is already complete.

Similarly, if your site already has a SAS 9.4 Metadata server installed, it is possible that the only SAS software packages that you must install are the *Model Server* and the *Middle-Tier Server*, both of which are discussed in the next chapter. But it is also possible that only the *Database Server* installation is complete.

Your Plan file will help you efficiently install the SAS software where it is required. If your *Model Server* will run on the same machine as the *Middle-Tier Server*, an accurate Plan file allows for this configuration and installs the software together. Your Plan file can also enable you to install the *OLAP Server* and *Metadata Server* simultaneously.

Warning: *If you have a SAS Plan file specifying that SAS software should be deployed on two separate computers, you may be tempted to run the SAS Deployment Wizard to install "Software 1" on Computer A and then run it a second time to install "Software 2" on the same computer. If you install your software this way, make sure you specify different configuration directories for each run of the Deployment Wizard. If you try to co-locate multiple sets of configuration files in a single directory, the configuration data from a subsequent installation can overwrite the previous configuration data, resulting in a non-functioning system.*

During the installation, update the configuration tables in Chapter 5 with port information, user names, and other data to identify your deployment.

Important: *If you are installing in a locale other than English, follow the instructions that are available at the following websites for locale-specific settings:*

- *SAS 9.4 Intelligence Platform: Installation and Configuration Guide*
- *Multilingual Computing with SAS 9.4*

If these settings are not correct, SAS Cost and Profitability Management might not work properly.

Important Deployment Questions

Several options in the SAS Deployment Wizard impact your entire installation. This section reviews those options and provides guidance to make informed decisions. You might see all of these choices when installing your software or you might see none of them. The options depend on the software that you are installing and the target machines.

Run as Windows Services (Windows Only)

If you are installing on a Windows operating system, you have the option to run selected software as a Windows service or by manually executing "management scripts."

No performance penalty is associated with either choice. The decision instead affects how you manage your deployment. The advantage of Windows services is that the operating system can automatically stop and restart them when Windows is shut down or restarted.

The advantage of executing management scripts is that you decide when to start them, and you have direct access to any startup parameters provided by these scripts. However, if you decide to use management scripts, be aware that you must manually stop and start these tasks yourself when Windows is shut down or restarted. If these tasks are not running, the SAS applications do not run properly.

SAS recommends that these tasks be run as Windows Services so they will automatically start when the machine is restarted. Otherwise, they must be manually started by an administrator or by means of a script that runs after a restart of the machine.

Allow Anonymous Web Access

The option to Allow Anonymous Web Access is often dependent on the site-wide security policy at an enterprise. Check with your IT department about its web access policies. If you do not have a specific need to allow anonymous access, SAS recommends that you leave this option disabled.

Automatically Configure Your Web Application Server

SAS Cost and Profitability Management and other SAS applications use a web application server to host portions of their application. You have the option to let the SAS configuration process automatically configure the application servers, or you can perform those steps manually after the SAS configuration has completed. The steps that you must manually perform are written to the *instructions.html* file that is generated for each machine in your deployment. For typical installations, SAS recommends letting the web application servers be automatically configured.

Configure Multiple Managed Servers

SAS Cost and Profitability Management 8.4 requires multiple-managed servers. SAS Cost and Profitability Management 8.4 typically goes under SASServer9, and the server should not be shared with any other SAS solutions.

SAS Software to Install

The installation instructions for the SAS Metadata Server and the SAS OLAP Server are not included in this guide. Refer to the *SAS 9.4 Intelligence Platform Installation and Configuration Guide* for more information.

The SAS Deployment Wizard asks for a machine name multiple times. Unless you are specifically prompted for an abbreviated name, provide a fully-qualified name. Fully qualified names are usually of the form: ***<MyMachineName>.<MyCompanyName>*.com** or perhaps ***<MyMachineName>.<MyRegion>.<MyCompanyName>*.org**. Here is an example: **sasserver.eur.webcomputers.com**. Abbreviated names are usually a simple name, such as ***<MyMachineName>*** or simply **sasserver**. Do not add forward or backward slashes as prefixes to these names. Consult with your IT support staff if you are uncertain about the proper format for your installation.

Warning: *SAS Cost and Profitability Management 8.4 does not support pooled workspace servers. When configuring a SAS OLAP Server for SAS Cost and Profitability Management, select a non-pooled workspace server.*

Metadata Server

The *Metadata Server* is the first machine to install, configure, and have running. It is used to store and share information about all the other machines where you install SAS software.

Typical SAS installations share a Metadata Server. If you already have a functioning SAS 9.4 Metadata Server for another SAS deployment, do not install another unless you are creating multiple, independent environments—as, for example, when isolated Test and Production environments are created to partition work streams.

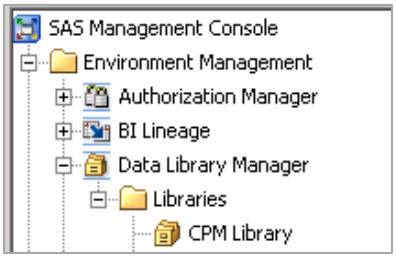
Record the options that you selected while installing the SAS Metadata Server. Information about the **Host Name** and **Port** is required to install SAS Cost and Profitability Management.

OLAP Server

Important: *If you already have a SAS OLAP Server installed, you can share it with SAS Cost and Profitability Management. You can also decide to install a dedicated instance for SAS Cost and Profitability Management. Unless prohibited by your product license, select the deployment that best suits your requirements.*

You can skip this installation if you are using Microsoft SQL Server Analysis Services for cube processing. For more information about the SAS OLAP Server, refer to its documentation at `http://support.sas.com/documentation/onlinedoc/olap/index.html`.

The SAS Cost and Profitability Management configuration creates the **CPM Library** in the SAS Metadata Server. This library uses the DSN definition on the *OLAP Server* to connect to the SAS Cost and Profitability Management database. If the *OLAP Server* and *Calculate Server* are hosted on the same machine, they share the DSN. If they are hosted on separate machines, each machine requires an identical DSN definition. For more information about DSNs, see "Creating Data Source Names (DSNs)" in Chapter 9.



SAS Visual Analytics Server

If your deployment includes a SAS Visual Analytics server, refer to the relevant documentation at `http://support.sas.com/software/products/va/index.html`.

Important: *If you are planning to use SAS LASR Analytic Server on a separate machine, take the following steps to set up a database connection:*

6. Configure a workspace server on the SAS Visual Analytics Server machine to push data from SAS Cost and Profitability Management to SAS LASR Analytic Server. You can find more information about SAS Visual Analytics server configuration at `http://support.sas.com/software/products/va/index.html`.
7. On the SAS Visual Analytics Server machine, create a system DSN that points to the database server. If the SAS Visual Analytics Server is running on Linux, use the required ODBC drivers provided by SAS to create the DSN. You can copy these drivers from other machines (such as the Mid-Tier machine or IOM tier) onto this machine. For more information about DSN configuration, see "Creating Data Source Names (DSNs)" in Chapter 9 and "Appendix F – ODBC Data Sources on Linux."
8. Configure the user who will push the data to the SAS LASR Analytic Server. This user requires the 'Log on as batch job' property on the SAS Visual Analytics server. For more information about this property, see "Creating External Groups" in Chapter 5.

Chapter 8 – Installing SAS Cost and Profitability Management

This chapter guides you through the installation of SAS Cost and Profitability Management 8.4 on the machine that you identified as the *Application Server* in your deployment. The SAS Cost and Profitability Management installation assumes that one of the following situations applies:

- You have all the other servers in your SAS Cost and Profitability Management deployment installed and properly running, or
- The other servers in your deployment will be installed on the same machine as your SAS Cost and Profitability Management *Middle-Tier Server*. In other words, you are going to install them now.

The following sections describe the important steps in the SAS Deployment Wizard. Some wizard dialog boxes seem to ask for redundant information. If your Plan file installs several components on a single machine, all the configuration steps for each component are displayed – even if some of the information is redundant.

Installing on UNIX

The SAS Deployment Wizard that is used to install SAS Cost and Profitability Management is an X window application. If you are installing from a personal computer, set up the display to that machine. For example:

```
DISPLAY=yourcomputer_absolute_address:0.0
export DISPLAY
```

Interactive Prompting Levels

After you start the SAS Deployment Wizard, you are asked to select a wizard prompting level:

- **Express -** displays the minimum number of dialog boxes to complete the configuration
- **Typical -** displays the basic set of dialog boxes to complete the configuration
- **Custom -** displays all the dialog boxes to complete the configuration

The following table lists the configuration options and the prompt level at which they display for SAS Cost and Profitability Management.

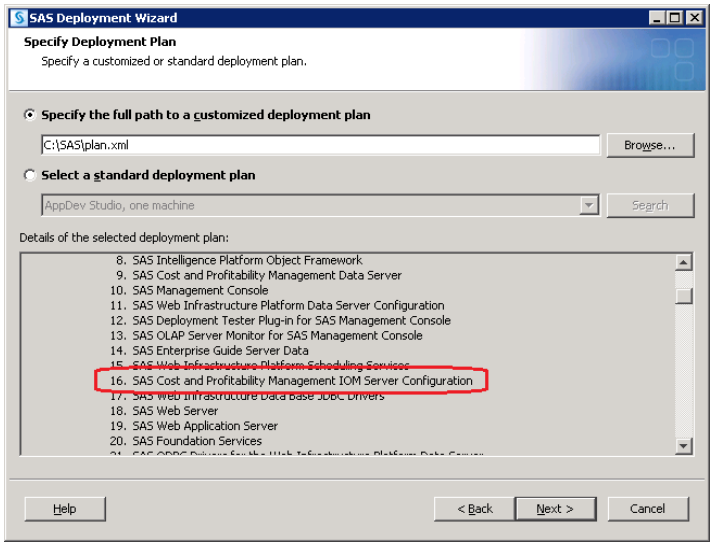
***Note**: Your deployment will include additional configuration options. The configuration options you see depend on the SAS products that are identified in your deployment plan, and on the target machine where you are installing software.*

SAS Deployment Wizard Option	Express	Typical	Custom
OLAP Server Options	X	X	X
Workspace Server for Cube and Model Server	X	X	X
Operations Port	X	X	X
Database Options	X	X	X
Database Connectivity and Upgrade Options	X	X	X
JUnit and SAS Environments Options	X	X	X
ODBC and Database Server Options	X	X	X

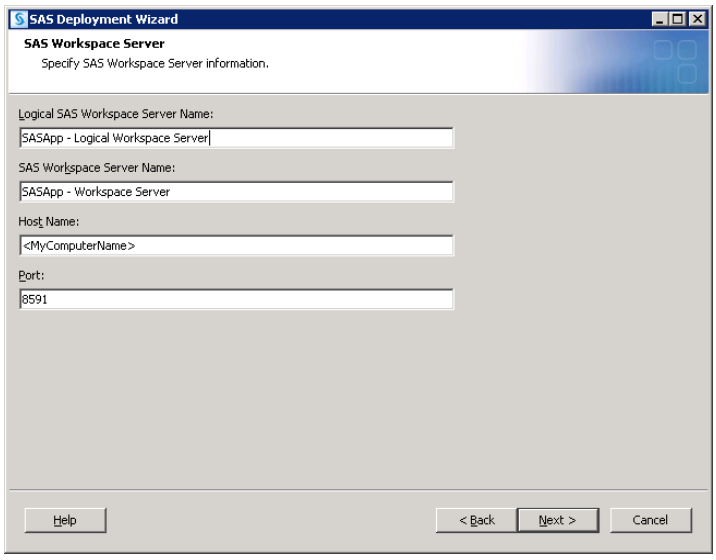
Installing the SAS Cost and Profitability Management Model Server

When you are ready to install the software, take the following steps:

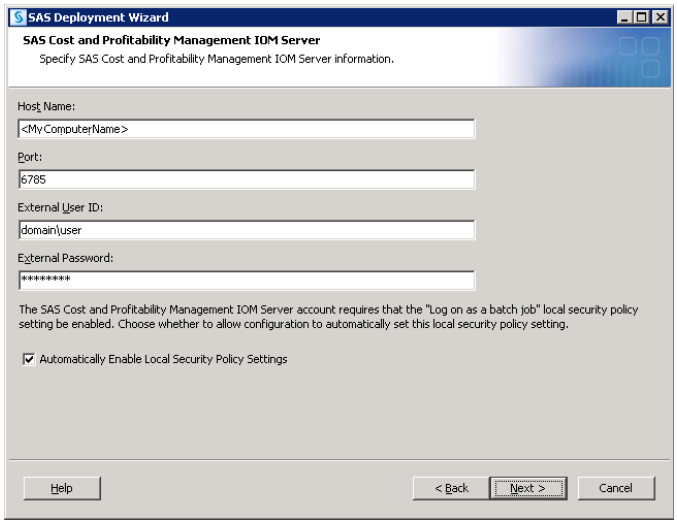
1. Launch the SAS Deployment Wizard and browse to select your Plan file.
2. Verify the presence of "SAS Cost and Profitability Management IOM Server Configuration" in the Deployment Wizard dialog box to ensure that the SAS Cost and Profitability Management Server is configured on the machine that will host the *Model Server*.



3. Before you configure the *Model Server*, configure the Logical Workspace Server, which is used by SAS Cost and Profitability Management Server.
4. When you configure the *Middle-Tier Server*, you are prompted for the name of the Logical SAS Workspace Server.



5. The wizard also prompts you for information about the SAS Cost and Profitability *Model Server*.



The following information is required:

Host Name: The machine where the Model Server will be installed.

Port: The port that is used by the Model Server.

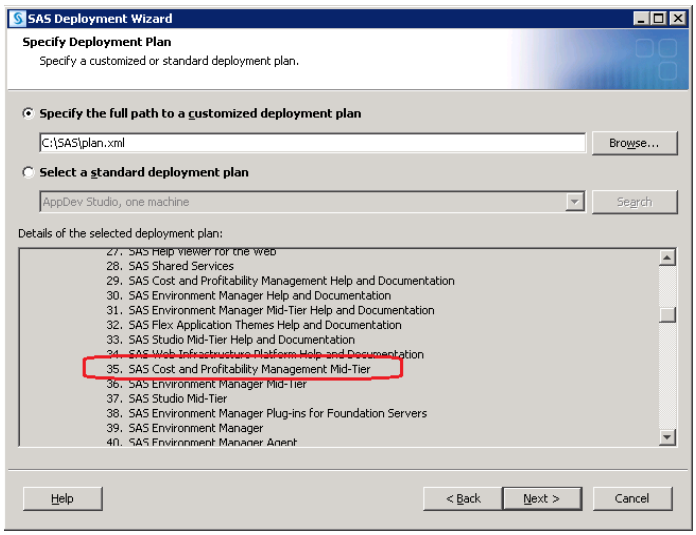
External User ID: The external user ID that is used to launch Model Server. For more information, see "Model Server and OLAP Server Accounts" in Chapter 5.

Password: The password of the user account that is used to launch the Model Server.

Note: *If you are deploying SAS Cost and Profitability Management on top of an existing SAS installation (an add-on installation) and your deployment includes SAS Visual Analytics, you must select additional components during configuration. The Adding SAS Visual Analytics Components section of the SAS Visual Analytics: Installation and Configuration Guide describes these components. They must be included and selected for configuration with the SAS Cost and Profitability Solutions Mid-Tier LASR Configuration component so that it can receive the data that it requires from SAS Visual Analytics High-Performance Configuration.*

Installing the SAS Cost and Profitability Management Middle Tier

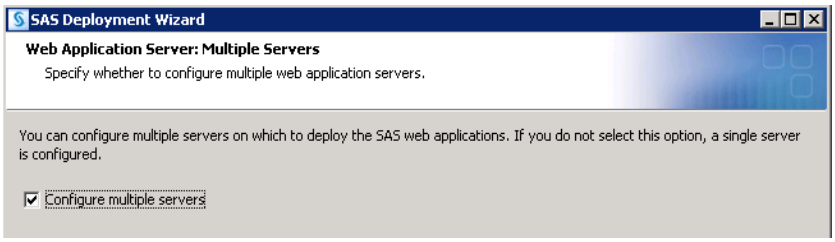
The SAS Deployment Wizard prompts you to select the machine from your Plan file that will host the *Middle-Tier Server*.



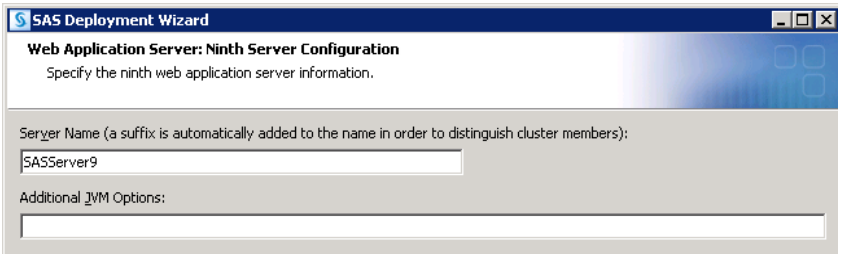
Verify that "SAS Cost and Profitability Management Middle-Tier" is in the list.

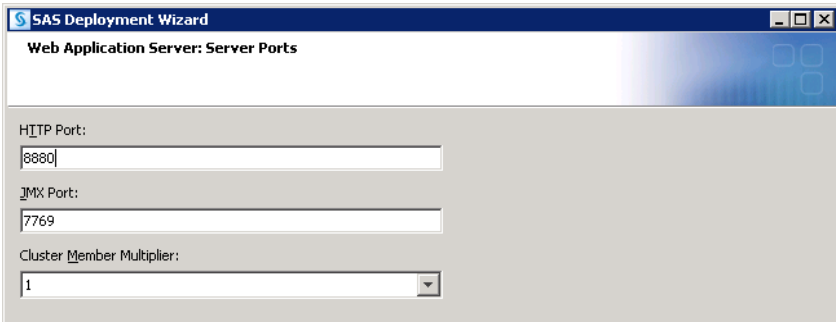
The SAS Deployment Wizard walks you through the installation. When you begin to configure the web application server, you will have 0 - 7 web application servers to configure before the **Web Application Server: Managed Server** dialog box opens. The actual number depends on your Plan file.

Select the option to **Configure multiple servers** on the Web Application Server: Multiple Servers dialog box.

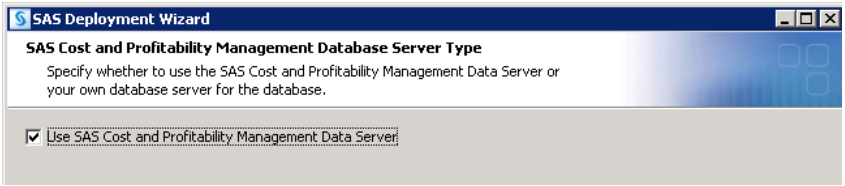


The Ninth Server Configuration dialog box (shown below) corresponds to the web application server for SAS Cost and Profitability Management.



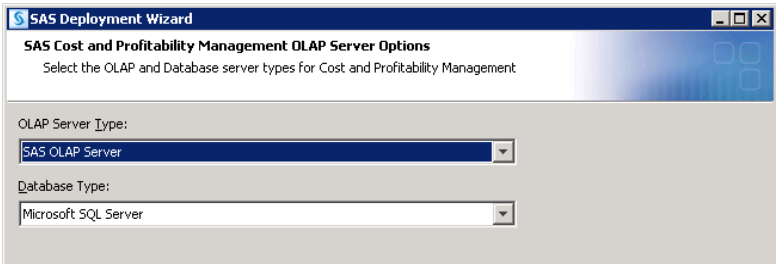


The wizard then prompts you to configure the SAS Cost and Profitability Management Data Server.



This server corresponds to the PostgreSQL database. Select this option if you plan to use PostgreSQL. SAS OLAP Server is then configured automatically.

Otherwise, the wizard prompts you for OLAP server information.



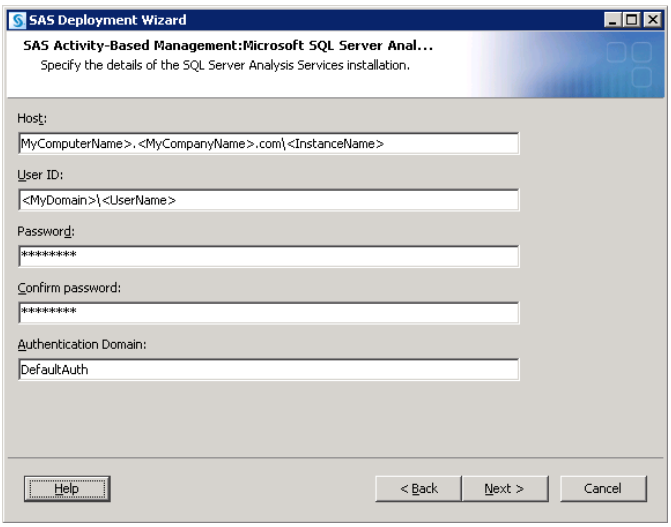
The following information is required if you configure an OLAP server:

OLAP Server Type: The type of OLAP server to use. This parameter is specific to your operating system. Select either **SAS OLAP Server** or **Microsoft SQL Server Analysis Services**. Refer to the SAS Cost and Profitability Management System Requirements for specific limitations and version requirements.

Note: *Microsoft SQL Server Analysis Services is supported only for Microsoft SQL Server and Oracle databases. PostgreSQL is not supported.*

Database Type: The relational database to use. Select either Microsoft SQL Server or Oracle. The available options are not filtered for the operating system. Refer to the *SAS Cost and Profitability Management System Requirements* for supported deployment options and specific version requirements.

If you selected Microsoft SQL Server Analysis Services as an OLAP Server option, you are prompted to configure it.



The following information is required:

Host: The fully qualified name of the machine that hosts SQL Server Analysis Services. If you defined a Default Instance, omit the `\<InstanceName>` qualifier. Otherwise, specify the instance name.

User ID: A domain account ID that has sufficient privileges to create, delete, and change permissions on cubes. If your deployment has the Microsoft SQL Server Analysis Services installed on the same machine as the SAS Cost and Profitability Management *Middle-Tier Server*, this can be a local user. If you specify a local user, `<MyDomain>` is replaced by the short machine name. The cube creation process on Microsoft SQL Server Analysis Services runs as this user.

Note: *Provide limited privileges to this user on the underlying operating system and file system.*

Password: The password for the Analysis Services user.

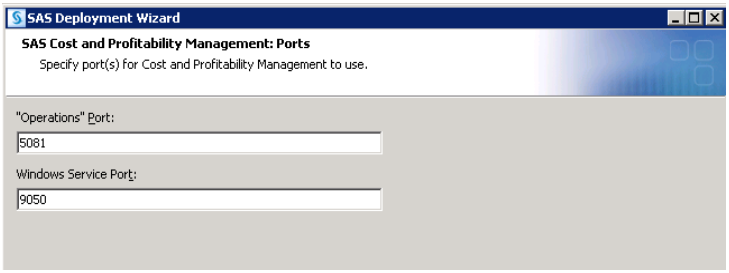
Important: *The password length limit is 64 characters. The following symbols do not work when used in passwords. Note that this is not a complete list; there may be additional symbols that do not work:*

For Oracle: **~, !, @, $, %, ^, &, *, +, <, >, ', "**

For PostgreSQL and Microsoft SQL Server: **%, &, +, <, >, ', "**

Authentication Domain: The authentication account to use for SAS Cost and Profitability Management users when creating and updating permissions on cubes that are created by SAS Cost and Profitability Management.

The next configuration step prompts you for port information**:**

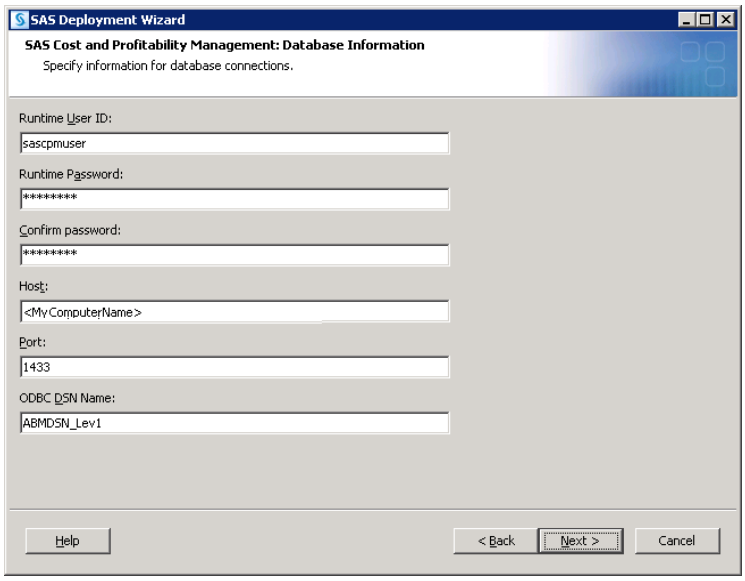


The following information is required:

"Operations" Port: The port that is used by the Middle-Tier Server to communicate with all SAS Cost and Profitability Management "operations". These are long-running processes that perform tasks such as importing and exporting model data or performing model calculations.

Windows Service Port: For Microsoft SQL Server Analysis Services, the port that is used by the Middle-Tier Server to communicate with the OLAP cube creation processes. It is *not* used to communicate with Microsoft SQL Server Analysis Services directly.

Next, specify database connection parameters.



The following information is required:

Runtime User ID: The database login account for the SAS Cost and Profitability Management software to use when accessing the database. This is the database login name from your existing SAS Cost and Profitability Management database, or the database login from your new database installation.

Runtime Password: The database user's password.

Important: *The databases were installed and configured in Chapter 6. The database and user information are required. This information is used to attach to the database and create initial tables or to update the existing tables to the latest schema. If this information is incorrect, this process does not complete successfully.*

Important: *The password length limit is 64 characters. The following symbols do not work when used in passwords. Note that this is not a complete list; there may be additional symbols that do not work:*

For Oracle: **~, !, @, $, %, ^, &, *, +, <, >, ', "**

For PostgreSQL and Microsoft SQL Server: **%, &, +, <, >, ', "**

Host: The fully-qualified name of the machine that hosts your database.

Port: The port that your database is configured to use. See "Designating Ports" in Chapter 5 for more information.

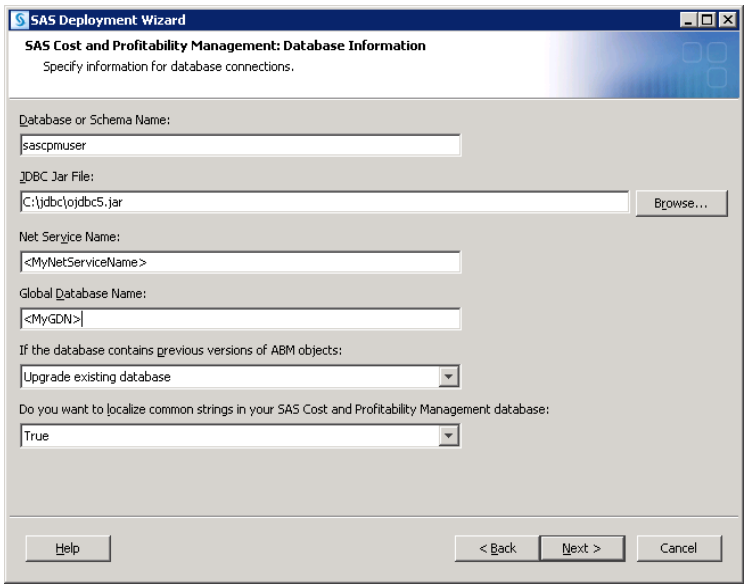
ODBC DSN Name: The Data Source Name (DSN) that the *Model Server* and *SAS OLAP Server* use to connect to the relational database that you select. By default, the Deployment Wizard suggests a default name that includes your configuration level name. Change it if desired.

Important: *The Model Server and OLAP Server require an appropriate ODBC driver to communicate with the relational database that you selected. This driver is operating-system specific.*

Important: *If you are performing a clustered deployment for the Middle-Tier Server, the ODBC DSN must be configured on each cluster node. In addition, all of the Database Client Connectivity Tools must be installed on each node to enable database communications.*

For more information on DSNs, see "Creating Data Source Names (DSNs)" on page 45.

The next configuration step prompts for database information:



The following information is required:

Database or Schema Name: The database or the schema name used for the SAS Cost and Profitability Management relational database.

JDBC Jar File: The location of the JDBC driver's jar file for the selected database. This JDBC driver is used by the Middle-Tier Server to communicate with the database. For Microsoft SQL Server and Oracle databases, this is the jar file that you installed in Appendix A or Appendix B.

Net Service Name: Applies to an Oracle database if you have selected Microsoft SQL Server Analysis Services for OLAP. Specify the Net Service Name you have designated in your Oracle database for SAS Cost and Profitability Management. See "Appendix B – Installing Oracle" for more information.

Global Database Name: For an Oracle database, specifies the Global Database Name that you have designated in your Oracle database for SAS Cost and Profitability Management.

Be careful to specify the Global Database Name correctly. Conventions have changed slightly in recent versions of Oracle. The name typically contains the Service Name (alias) or SID (unique name of the database instance), followed by the domain suffix. For example, if the Service Name is "orcl" and the domain suffix is "na.test.com", the correct Global Database Name would be: `orcl.na.test.com`

However, it is possible to configure the Oracle Global Database Name to be the same as the Service Name or the SID. Many default setups for database instances prior to Oracle 11g R2 have this configuration.

If you specify an incorrect Global Database Name, you might see an error similar to the following in the SAS Cost and Profitability Management installation log during your SAS Cost and Profitability Management installation:

```
[echo] java.sql.SQLException: Listener refused the connection with the
       following error:
```

```
[echo] ORA-12514, TNS:listener does not currently know of service
       requested in connect descriptor
```

If the database contains previous…: The action to perform if the database already contains SAS Cost and Profitability Management models. The two options are as follows:

- Upgrade existing database
  Examines the version number of SAS Cost and Profitability Management schema in your database and updates it to SAS Cost and Profitability Management 8.4. This option is valid for any SAS Activity-Based Management version 7.x and SAS Cost and Profitability Management 8.x. If the existing schema is up-to-date, no action is taken.
- Reinstall database
  Erases the contents of the existing database and recreates a new, empty database. This selection resets the database to a new state and deletes all previous SAS Cost and Profitability Management data. No additional warnings are given once the wizard proceeds.

See "Migrating from Version 7.x" in Chapter 4 for more information.

Do you want to localize…: Whether to localize the names of objects in the SAS Cost and Profitability Management database. If you select "True," the object names in the database are localized using the locale setting of your SAS Metadata server. If you select "False," the database object names remain in English.

Warning: *If you are upgrading from a previous version of SAS Activity-Based Management and you selected the option to "Upgrade existing database", make the same choice here that you made when installing the previous version. Otherwise, Saved OLAP Views may not operate properly in SAS Cost and Profitability Management 8.4. This happens because the saved OLAP Views included localized names in portions of their content.*

The next wizard dialog box, **SAS Cost and Profitability Management Middle-Tier Dependencies**, only displays if you have already installed and configured an operational SAS Metadata Server. It queries the Metadata Server to discover other logical workspace servers that have been deployed. SAS Cost and Profitability Management can then launch a cube generation process on another machine, for example. If you do not have an operational SAS Metadata Server, these processes run on the local machine.

SAS Web Infrastructure Platform: The SAS Web Infrastructure Platform to use for the SAS Cost and Profitability Management Middle-Tier Server.

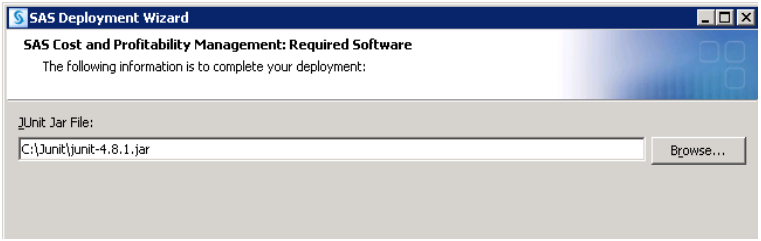
SAS OLAP Server: For the SAS OLAP Server option, the Logical Workspace Server to use for running the SAS Cost and Profitability Management SAS OLAP cube building processes.

SAS Workspace Server: The Logical Workspace Server to use for SAS Cost and Profitability Management Model Server.

SAS Cost and Profitability IOM Server Configuration: The *Model Server* to use for SAS Cost and Profitability Management Middle-Tier Server, if you have multiple Model Servers defined.

SAS Cost and Profitability Database Server Configuration: The database configuration to use for all SAS Cost and Profitability Management Servers, if you have more than one.

The next configuration step is the Required Software dialog box:



JUnit Jar File: The JAR file that is used by the SAS Cost and Profitability Management Diagnostics application.

Deployment Errors

If any errors are found during configuration, you can fix them and **Retry** the operation before continuing.

The Deployment in Progress status box provides information about errors. Each successfully installed or configured item has a green check mark. If any errors are displayed during the installation or configuration process, click the link in the dialog to view the log file. Search the log file for errors by using the key word "error". The most recent errors or warnings appear at the end of the log file.

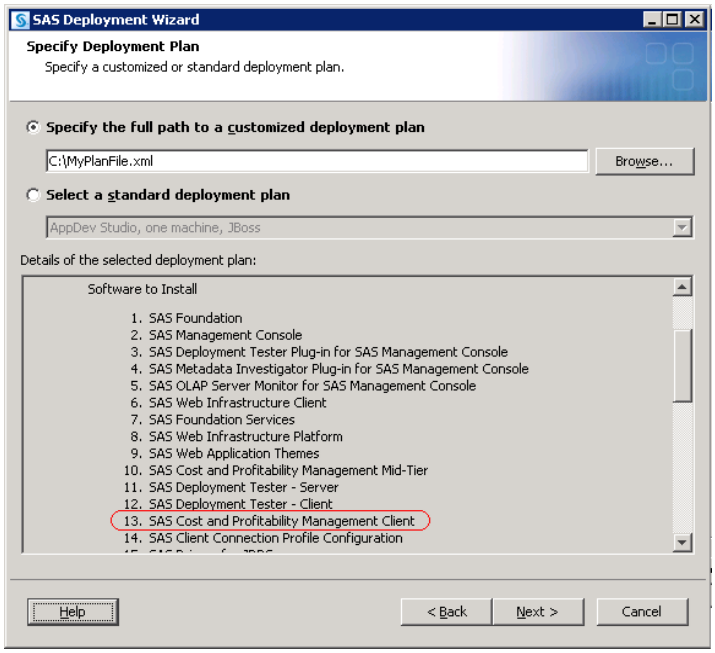
The most common error during SAS Cost and Profitability Management configuration is a failure to attach to your database or to the **sascpmmodels** database/schema. If this problem occurs, log in to your database management console and verify the database user, the **sascpmmodels** database/schema, and its permissions. Then click **Retry** on the error dialog box.

You must resolve any errors before continuing.

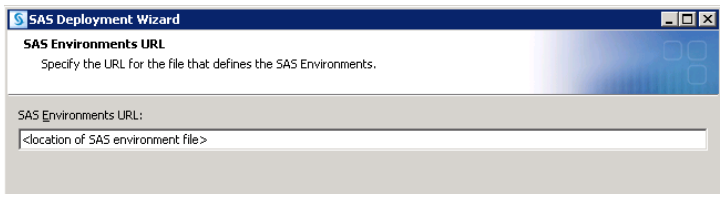
Installing the SAS Cost and Profitability Management Client

***Note**: As with all SAS client products, the SAS Cost and Profitability Management client is automatically installed with SAS/SECURE. However, because the client uses HTTP or HTTPS communication with the server, SAS/SECURE is optional. Install it if you are using other SAS client products, such as the SAS Management Console.*

To install the client, launch the SAS Deployment Wizard and select your Plan file. Verify the presence of "SAS Cost and Profitability Management Client" in the list. Then select the machine from your Plan file that will host your client applications.



Depending on the other software that you are installing on your client computers, multiple wizard dialog boxes might open. For the SAS Cost and Profitability Management client, only one configuration step is important, in the Specify URL for Available Servers File dialog box:



SAS Environments URL: The SAS environments file that is used by the SAS Cost and Profitability Management client application (and any other SAS clients that you install on this machine). The client application uses the environments file to locate other machines in your SAS deployment. Refer to *SAS 9.4 Intelligence Platform: Middle-Tier Administration Guide* for information about the SAS environments file.

Note: *The SAS Cost and Profitability Management client installs EASY API. This API enables the user to execute the operations in batch. The passwords that are used in the batch file for EASY API are encoded; therefore, this folder must be protected by file system permissions to prevent unauthorized access to the credentials.*

After you have installed the Cost and Profitability Management 8.4 client, the old (8.x) client will not be deleted. It is retained so that you can preserve any customizations from it.

Chapter 9 – Post-Installation

After installation and configuration, these post-installation steps verify the folder permissions, add SAS Cost and Profitability Management users, and test the installation. Make sure you have restarted all the server machines before you begin.

Validating the Installation

After completing your installation, review and follow the steps in the `instructions.html` file that was automatically generated as part of your installation. A link to this file is provided in the final dialog box in the SAS Deployment Wizard.

Several of the steps in the `instructions.html` file refer to the detailed instructions provided in this chapter. You can skip ahead to the relevant sections in this chapter to complete those steps, if necessary.

Chinese Localization (Windows Client Only)

The "Chinese (Traditional, Taiwan)" locale is not properly recognized by the SAS Cost and Profitability Management client on a Chinese Taiwanese (ZH_TW) Windows operating system. A Microsoft bug causes the .NET locale detection mechanism to incorrectly identify this locale as "Chinese (Traditional, Hong Kong S.A.R)" (ZH_HK). The Chinese Taiwanese resources are not located by the SAS Cost and Profitability Management client program because Windows provides an incorrect directory.

To resolve this problem, after the SAS Cost and Profitability Management client is installed, locate the directory where the client is installed, typically "`C:\Program Files\SAS\Cost and Profitability Management Solution\Cost and Profitability Management Solution\Client`". Locate the ZH_TW directory under the client installation folder where the resources are installed, and copy that directory, and any subdirectories, to a new directory named ZH_HK. Then restart the client program. Your Chinese Traditional localizations should appear as expected.

Important: *Unlike the other post-installation changes outlined in this chapter, perform this modification on the Client machines, not on the Server machines.*

Registry Access (Windows Client Only)

The SAS Cost and Profitability Management client stores settings, such as SAS LASR Analytic server configuration, in the Windows Registry on the client machine. If these settings are not retained across client sessions, the user might not have the required permissions to update the Registry. This issue can occur on Windows 10. To resolve this problem, use one of the following options:

1. Run SAS Cost and Profitability Management client in administrator mode. Right-click on the icon and select "Run as Administrator." If this is not possible, try Option 2:
2. Give SAS Cost and Profitability Management users access rights to the Windows Registry.

Settings are stored in the following Registry paths (users require access to the `Current_user` Registry key and access to the LOCAL_MACHINE section):

- `HKEY_CURRENT_USER\Software\SAS Institute Inc.\SASCostandProfitabilityManagement`
- `HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\SAS Institute Inc.\SASCostandProfitabilityManagement`

Right-click the key and use the Permissions dialog box to grant permissions to each user.

Important: *Unlike the other post-installation changes outlined in this chapter, perform this modification on the Client machines, not on the Server machines.*

Configuring Integrated Windows Authentication (for Thin Clients)

If your deployment is IWA-enabled, perform the steps that are described in the following link to configure web browsers to use IWA:

`http://go.documentation.sas.com/?docsetId=bimtag&docsetTarget=p1871e69gmwdr0n1o182krslc10p.htm&docsetVersion=9.4&locale=en`

Allocating Memory for the Java Virtual Machine

When SAS Cost and Profitability Management is configured, a default amount of memory is reserved for the Java Virtual Machine (JVM) for use by SAS Cost and Profitability Management "operations." If this setting is too high, the JVM might consume more RAM than necessary (and thus reduce the amount of memory available for other tasks on that machine); if it is too low, some SAS Cost and Profitability Management tasks can fail due to lack of memory.

Many SAS Cost and Profitability Management installations will not need to change `Xmx`. Users of small- and medium-sized models (fewer than 25,000 accounts and 100,000 assignments) should find the default value sufficient. For more information, see "Adjusting Memory Settings on Servers" in Appendix H.

Managing External Users

Depending on your deployment, you may have two, and perhaps three, places to manage SAS Cost and Profitability Management users and their permissions:

- The internal users in the SAS Cost and Profitability Management User's group in the SAS Metadata Server
- The "SAS OLAP server" cube directory (if you are using SAS OLAP Server)

You can manage access in two ways. You can simply add and remove individual users from these locations. Or you can create operating system groups, provide those groups with the required privileges to the correct locations, and add users to those groups. If you create domain, or network groups, you can manage users from a single location. If you have many SAS Cost and Profitability Management users, managing them individually can be error-prone.

This document provides instructions for managing users individually. If you want to manage users by means of groups, the process is similar, except that you first create a group for each unique access criterion and then perform the same steps with the group.

Creating Data Source Names (DSNs)

SAS Cost and Profitability Management uses a DSN on the *Model Server* and *OLAP Server* to locate your SAS Cost and Profitability Management database.

Microsoft SQL Server

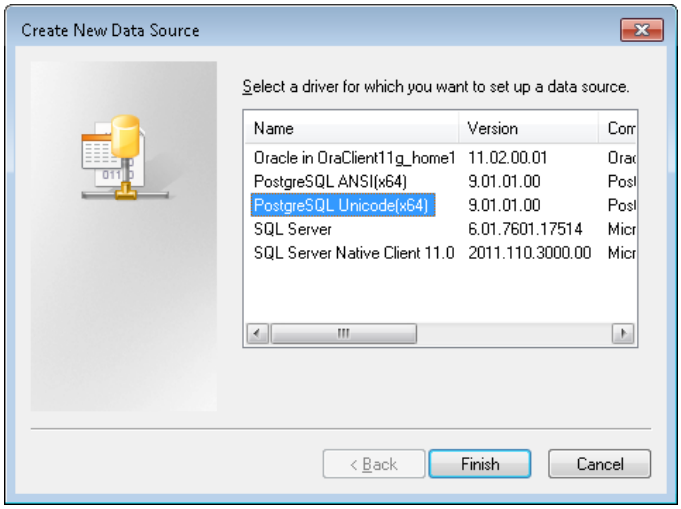
Take the following steps to create DSNs in a Microsoft SQL Server deployment:

1. Open **Administrative Tools → Data Sources** in the Control Panel.
2. Click the **System DSN** tab. If a DSN exists with the data source name you provided in the SAS Deployment Wizard, delete it: select the DSN name in the list and click **Remove**.
3. Create a new DSN by clicking the **Add** button.
4. Select the driver name that is appropriate for your database from the list. For Microsoft SQL Server 2012, select **SQL Server Native Client 11.0**.
5. Click **Finish** to create the connection.
6. Enter the data source name that you supplied to the SAS Deployment Wizard. Enter a description of this data source in the **Description** field. SAS recommends using "Connection to the SAS CPM database" for the description.
7. Select the machine, instance name, and port hosting your database from the list labeled **Which SQL Server do you want.** The name is typically specified as `MachineName,Port`. If you are attaching to a Named Instance of SQL Server, the instance name is not required. Because each instance of SQL Server must be mapped to a unique port, the machine name and port number are sufficient to specify the instance of SQL Server to which to connect. Click **Next**.
8. Select **SQL Server Authentication** and enter the database username and password that you provided to the SAS Deployment Wizard for accessing the SAS Cost and Profitability Management database. Click **Next**.
9. Select the SAS Cost and Profitability Management database as the default database in the **Change the default database to** field, and click **Next**.
10. Click **Finish**.
11. Select **Test Data Source** to verify connectivity. Click **OK** when the connection is verified. Click **OK** to complete DSN creation.

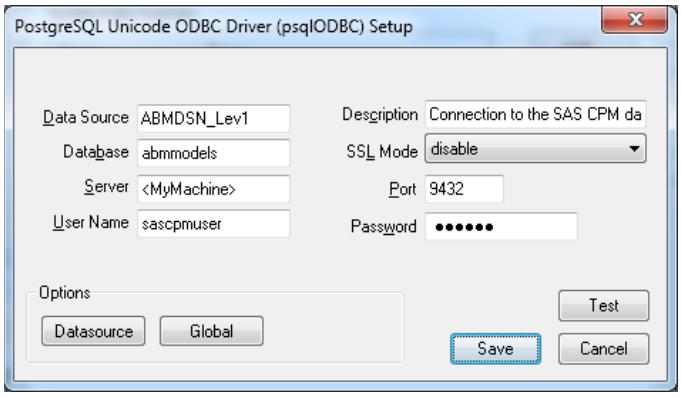
PostgreSQL

Take the following steps to create DSNs in a PostgreSQL deployment:

1. From the Control Panel, open **Administrative Tools → Data Sources**.
2. Click the **System DSN** tab. If a DSN exists with the data source name that you supplied in the SAS Deployment Wizard, edit it by selecting the DSN name in the list and clicking **Configure**. If an appropriately named DSN does not already exist, click **Add** to create a new one.
3. Select the driver name that is appropriate for your database from the list. For PostgreSQL, select **PostgreSQL Unicode (x64)**.



4. Click **Finish** to create the connection.
5. The **PostgreSQL** dialog box opens.

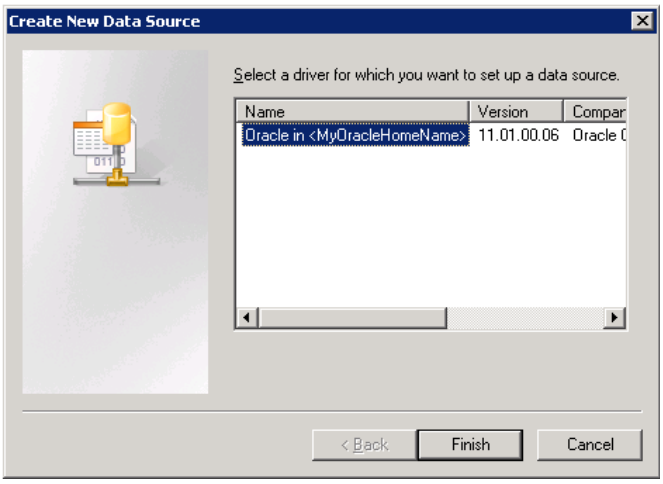


6. Type the DSN name that you provided in the SAS Deployment Wizard for SAS Cost and Profitability Management.
7. Type a description of this data source in the **Description** field. SAS suggests using "Connection to the SAS CPM database" as the description. Specify **abmmodels** as the database name.
8. Type the **Server**, **Port**, **User** and **Password** for the SAS Cost and Profitability Management Models Database. Refer to the table that you completed in Chapter 5 for port information.
9. Click **Test** to verify the information that you supplied. The connection to the SAS Cost and Profitability Management database is tested.
10. Click **OK** to complete DSN creation.

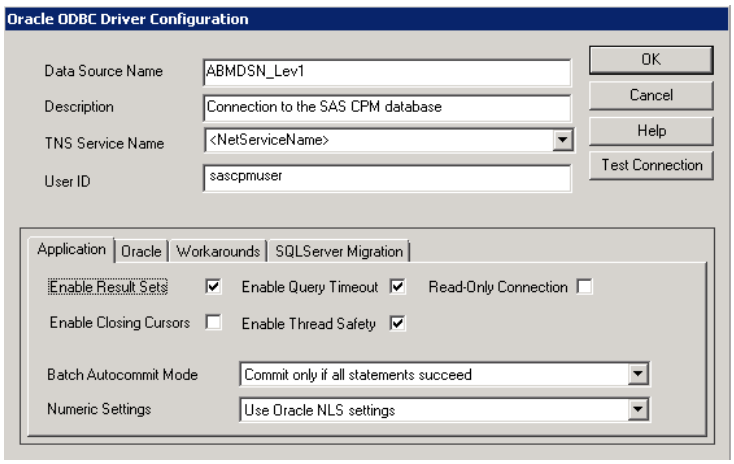
Oracle

Take the following steps to create DSNs in an Oracle deployment:

1. From the Control Panel, open **Administrative Tools→Data Sources.**
2. Click the **System DSN** tab. If a DSN exists with the data source name that you entered in the SAS Deployment Wizard, edit it by selecting the DSN name in the list and clicking **Configure**. If an appropriately named DSN does not already exist, click **Add** to create a new one.
3. Select the driver name that is appropriate for your database from the list. For Oracle, select **Oracle in <MyOracleHomeName>,** where *MyOracleHomeName* is the home name that you provided when you installed the Oracle database.
4. Click **Finish** to create the connection.



5. The Oracle ODBC Driver Connection dialog box opens. Type the **Data Source Name** that you supplied to the SAS Deployment Wizard. Enter a description of this data source into the **Description** field. SAS suggests using "Connection to the SAS CPM database" as the description.
6. In the **TNS Service Name** field, type the Net Service Name that you created, as described in the section titled "Oracle Net Configuration" in Appendix B.



7. In the **User ID** field, type the SAS Cost and Profitability Management user/schema that you created as part of your Oracle database installation**.** Refer to the table that you completed in Chapter 5 for more information.
8. Click **Test Connection** to verify the configuration.
9. Click **OK** when complete.

Configuring ODBC Data Sources on UNIX

For more information about ODBC data sources, see "Appendix F – ODBC Data Sources on Linux." Also see the instructions for your operating system for the exact steps.

Configuring Integrated Windows Authentication (IWA)

If your deployment is IWA-enabled, perform following steps. If you are not doing an IWA deployment, you can skip these steps.

1. On the Windows machine where you are performing the deployment, edit the file wrapper.conf in the following directory:

   SASCONFIG\Lev1\Web\WebAppServer\SASServer9_1\conf.

6. Add the following Java argument:

   ```
   java.security.krb5.conf
   ```

7. Set it to point to the correct krb5 file. For example:

   ```
   wrapper.java.additional.51 = -Djava.security.krb5.conf =
   "C:/SAS/Config/Lev1/Web/WebAppServer/SASServer1_1/conf/krb5.ini"
   ```

Make sure you are specifying forward slashes in the path.

SAS OLAP Setup

8. Open SAS Management Console using an account with administrator privileges. Open the User Manager.
9. Open the Properties dialog box for the Cost and Profitability Management Server Users group.
10. Click the Accounts tab. You should see a user for the C&PM IOM server (for example, iomuser).
11. Select the row and click Edit.
12. Change the Authentication Domain for the user to any other name (for example, CPMIOM).
13. Save changes.
14. Restart the ObjectSpawner and SASServer9_1 services.

SSAS Setup

1. Repeat all the steps listed above for SAS OLAP Setup until you reach Step 7. Do not restart the Object Spawner or SASServer9_1 services yet.
2. Open the Properties dialog box for the Cost and Profitability Management Users group.
3. Click the **Accounts** tab.

You will see two users. One is defined in the ABMDB domain, and the other in the DefaultAuth domain. (The second user is the network user, for connecting to Microsoft Analysis Services.)

4. Change the domain of the DefaultAuth user to any other name (for example, CPMSSAS).
5. Open the SAS CPM Software Component Properties dialog box by clicking Configuration Manager -→ SAS Application Infrastructure → Cost and Profitability Mgmt 8.4.
6. Click the **Advanced** tab.
7. Change the value of the "data.abmserver.ssas.authdomain.name" property to the name that you used in Step 4 (for example, CPMSSAS).
8. Save your changes.
9. Restart the ObjectSpawner and SASServer9_1 services.

Oracle Bulk Data Loader

If you are using an Oracle database, the *Model Server* uses the Oracle bulk data loader to improve performance when loading and saving data. Verify that the Oracle bulk data loader, named `sqlldr.exe` on Windows systems and `sqlldr` on UNIX systems, is included in the `PATH` environment variable so that the SAS Cost and Profitability Management Model Server can invoke it.

Note: *If Oracle12c client is used, place the* `oraodm12.dll` *at the following location:*

`ORACLE_HOME/client/bin`

This location enables `sqlldr` *to run properly.*

Importing and Exporting Model Data

SAS Cost and Profitability Management can import and export model data from or to any data source.

For Microsoft SQL Server, Oracle, and PostgreSQL databases, SAS Cost and Profitability Management requires the database connection details to connect to the database.

For any other database, SAS Cost and Profitability Management can make a connection through ODBC. To enable this configuration, appropriate DSNs must first be created on the Model Server.

If your setup is SSL-enabled, and if the C&PM client machine has Internet Explorer 10, you might need to explicitly enable the **TLS 1.2** option in the Internet Explorer Advanced settings. If this setting is not enabled, the Import operation might fail.

Importing and Exporting Data from Microsoft Office Applications

SAS Cost and Profitability Management supports importing data from and exporting data to Microsoft Office applications. As noted above, to perform these tasks, data access drivers are required. For Microsoft Office, install the Office ODBC drivers that are compatible with your version of Microsoft Office. Although 32-bit and 64-bit versions of these drivers are available, you must install the 32-bit versions; the SAS Cost and Profitability Management client application can only access 32-bit drivers.

Note: *In previous versions of SAS Activity-Based Management, Microsoft Office files were imported from the Server, and therefore the Office ODBC drivers had to be installed there. Microsoft no longer supports Office drivers on a server operating system or on a machine that is used as a server in a deployment architecture, regardless of its operating system. Therefore, SAS has changed the SAS Cost and Profitability Management Office Import feature to work from the Client machine, not from the Server machine.*

Whether you use 32-bit drivers or 64-bit drivers to access your Office files, the same size limitations apply. With a 64-bit version of Office (either 2013 or 2016) on your client, you may not be able to install a 32-bit driver for Microsoft Office. But you can install the 32-bit drivers for another version of Office. For example, if you have a 64-bit version of Office 2016 and cannot install the 32-bit version of the Office 2016 drivers, you can install the 32-bit versions of the Office 2013 drivers, and all will function correctly.

Note: *Be sure to install the 32 bit versions of the Microsoft Office drivers.*

The drivers for Office 2007 products are available from Microsoft here:
`http://www.microsoft.com/downloads/details.aspx?familyid=7554f536-8c28-4598-9b72-ef94e038c891&displaylang=en`

The drivers for Office 2010 products are available here:
`http://www.microsoft.com/downloads/details.aspx?FamilyID=C06B8369-60DD-4B64-A44B-84B371EDE16D&displaylang=en`

Configuring OLAP Permissions

SAS OLAP Server uses operating system authentication to manage access to cubes. Thus, SAS requires each user of SAS Cost and Profitability Management to have access to the directory where SAS OLAP cubes are created. Any user who wants to create or delete OLAP cubes must have sufficient privileges on that folder and cube file. Any user who wants to view cubes requires **read** privileges on that cube. These privileges are granted by the host operating system and are not managed by the SAS Metadata Server.

Tip *Using operating system groups can simplify user management.*

Windows

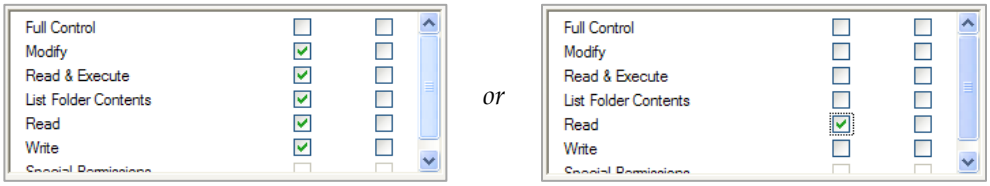
Take the following steps to configure OLAP permissions in a Windows environment:

1. Open **Windows Explorer** on the SAS Cost and Profitability Management *OLAP Server* and browse to the directory where SAS OLAP cubes are created:

   `CONFIGHOME\AppData\SASCostAndProfitabilityManagement\cubes`

   Create this directory if it does not already exist.

2. Right-click the `cubes` directory, and select **Properties.**
3. The Properties dialog box opens. Click the **Security** tab.
4. Verify that each SAS Cost and Profitability Management user who creates cubes has **Modify**, **Read**, and **Write** access to the directory. When you select **Modify**, the **Read & Execute** and **List Folder Contents** privileges are also selected.
5. Make sure that each SAS Cost and Profitability Management user who views cubes has **Read** access to the directory.



6. Finally, make sure that each user who creates SAS OLAP cubes has permission to **Log on as a batch job**.

   Note: *This setting was configured in Chapter 5 when you created the SAS Server Users group.*

UNIX

Take the following steps to configure OLAP permissions in a UNIX environment:

1. Navigate to the directory where SAS OLAP cubes are created on the SAS Cost and Profitability Management *OLAP Server*: `CONFIGHOME/AppData/SASCostAndProfitabilityManagement/cubes`.

   Create this directory if it does not already exist.

2. Make sure each SAS Cost and Profitability Management user who creates cubes has **Read**, **Write,** and **Execute** access to the directory. Also make sure each SAS Cost and Profitability Management user who views cubes has **Read** access to the directory

3. Each user who creates SAS OLAP cubes must be part of the SAS Server Users group. Refer to Chapter 5, where you set up the SAS Server Users group.

4. Execute the following command to change permission on the directory: `chmod 002 CONFIGHOME/AppData/SASCostAndProfitabilityManagement/cubes`.

5. Finally, the default security setting for files created is 755 or lower, so add `umask 002` to the `.sh` file that launches the SAS Workspace Server on your *OLAP Server.* Files that are created in the `cubes` folder will then have the proper permissions.

MSAS/SSAS Configuration

Additional settings are required if you are using Microsoft SQL Server Analysis Services to generate cubes. You must modify two configuration files.

The files named `ABMServer.exe.config` and `sas.activitybasedmanagementsvr.service.exe.config` are located in the following directory:

`SASHOME\SASCostandProfitabilityManagementMidTier\8.4\bin`. These files should contain the following entries:

- For Analysis Services 2012:
  `<bindingRedirect oldVersion="9.0.242.0" newVersion="11.0.0.0"/>`
- For Analysis Services 2014:
  `<bindingRedirect oldVersion="9.0.242.0" newVersion="12.0.0.0"/>`
- For Analysis Services 2016:
  `<bindingRedirect oldVersion="9.0.242.0" newVersion="13.0.0.0"/>`
- For Analysis Services 2017:
  `<bindingRedirect oldVersion="9.0.242.0" newVersion="14.0.0.0"/>`

- For Analysis Services 2019:
  `<bindingRedirect oldVersion="9.0.242.0" newVersion="15.0.0.0"/>`

SAS OLAP Configuration

Additional settings are required if you have an internationalized deployment, where non-English characters are part of the model data and the database that is used is either Oracle or PostgreSQL.

To set these additional properties, take the following steps:

1. In SAS Management Console, open Data Library Manager → Libraries → CPM Library.
2. Open the **Properties** dialog box, and click the **Options** tab.
3. Click **Advanced Options**.
4. Click the **Output** tab. Set Preserve column names as in the DBMS to Yes.
5. Click the **Input/Output** tab. Set **Preserve DBMS table names** to **Yes**.
6. Click **Ok** to save your changes.

Windows Services

In Windows installations that are using Microsoft SQL Server Analysis Services for OLAP, the deployment process provides an option to launch some processes manually or to use management scripts to run them. This section explains how to launch SAS Cost and Profitability Management processes if you did not select **Run as Windows Services**.

If you are using Microsoft SQL Server Analysis Services, an ABMServer process handles communications between the Java-based process on the *Middle-Tier Server* and the .NET-based processes on the *OLAP Server* (which in this specific case is a Windows machine using Microsoft SQL Server Analysis Services). If you elected not to run this process as a service, you must run it under a user account. The user that runs the ABMServer process must have sufficient privileges to impersonate the cube creation user that you provided in the Microsoft SQL Server Analysis Service**s** wizard on your *OLAP Server*. Typically, this user must be a member of the Power Users group on the *Middle-Tier Server*.

You must manually restart this process each time you restart or log out of the *Middle-Tier Server*. To launch the ABMServer process manually:

1. Open Windows Explorer on the SAS Cost and Profitability Management *Middle-Tier Server* and browse to the folder at
   SASHOME`\SASCostAndProfitabilityManagementMidTier\8.4\bin`.
2. Right-click **ABMServer.exe** and select **Run as**.
3. Select to run it as the **Current user** (if the user has sufficient privileges), or click **the following user** and specify a username and password.
4. Click **OK**.

Do not log off the machine. If you do, this process will stop running and your SAS Cost and Profitability Management server will not properly create cubes.

Post-Migration Steps for In-Place Migration

This section describes the steps to migrate database models from version 7.x to SAS Cost and Profitability Management 8.4 for an in-place migration. For all other types of migration, skip this section.

Model Migration Utility

After an in-place data migration, you must run the SAS Model Migration utility on the *Model Server.* This utility reads the models that are stored in the relational database and creates model files on disk that are optimized for fast loading into memory.

Important: *To run the Model Migration Utility on Linux, you must use the same external user credentials that you specified in SDW for Model Server. This user will later be used to access and modify model files on disk. Using a different user to run Model Migration Utility may cause file permission issues and the product may not function properly.*

On the Model Sever, open a command prompt and change the directory to `SASHOME/SASFoundation/9.4/abmiomsvr/sasexe`. Then run the following command:

Windows:

```
AbmDbToMdl.exe DSN DBUSER DBPWD DBTYPE MDLFOLDER CONFIGFOLDER >
AbmDbToMdl.log
```

Linux:

```
export LD_LIBRARY_PATH=SASHOME/SASFoundation/9.4/abmiomsvr/sasexe:$
LD_LIBRARY_PATH

AbmDbToMdl DSN DBUSER DBPWD DBTYPE MDLFOLDER CONFIGFOLDER >
AbmDbToMdl.log
```

Substitute the following information for the variables (shown in italics):

DSN: The ODBC data source that is pointing to relational database used by Cost and Profitability Management. It should be pre-created on the *Model Server* with the same name as specified at the installation time.

DBUSER: A user (or schema) to connect to the SAS Cost and Profitability Management database.

DBPWD: The password for the user.

DBTYPE: The database type. Specify **1** for Microsoft SQL Server and **2** for Oracle.

MDLFOLDER: The directory location where SAS Cost and Profitability Management models will be stored on the *Model Server*. The default location is `CONFIGHOME\SASApp\ABMServer\Models`.

CONFIGFOLDER: The location of the Configuration file. Specify `CONFIGHOME\SASApp\ABMServer\config`

Here is an example of a Model Migration utility command for Microsoft SQL Server on Windows:

```
AbmDbToMdl.exe ABMDSN_Lev1 sascpmuser pwd 1
C:\SAS\Config\Lev1\SASApp\ABMServer\Models
"C:\SAS\Config\Lev1\SASApp\ABMServer\config" > AbmDbToMdl.log
```

Here is another example for Oracle on Linux:

```
./AbmDbToMdl ABMDSN_Lev1 sascpmuser pwd 2
/install/SAS/Config/Lev1/SASApp/ABMServer/Models
/install/SAS/Config/Lev1/SASApp/ABMServer/config > AbmDbToMdl.log
```

Important: *SAS Cost and Profitability Management 8.4 enforces business rules more rigidly than the previous versions of SAS Activity-Based Management. Some models may fail to completely migrate with the Model Migration Utility. The migration utility provides warnings or errors in those cases. You will then need to export the affected models from the old version of the software and replace the partially migrated models in SAS Cost and Profitability Management 8.4 by importing them.*

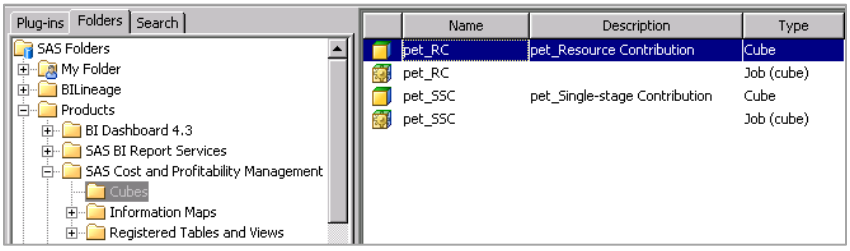
Delete Old SAS OLAP Cubes from SAS Metadata Server

If you were using SAS OLAP Server with your previous version of SAS Activity-Based Management, you must delete old cubes. This requirement is caused by changes in physical directory names in SAS Cost and Profitability Management 8.4. If you were using Microsoft Analysis Services with your previous version of SAS Activity-Based Management, this section does not apply to you.

To delete cubes, take the following steps:

1. Open SAS Management Console and log in as a user with cube creation privileges.
2. Click the Folders tab and expand Products → SAS Cost and Profitability Management.

   Click the **Cubes** folder. The right pane lists old cubes:



3. Select all cubes (or repeat the steps for each cube) and press the **Delete** button.

   You are prompted to confirm the deletion.

   When prompted for the "Default Application Server," select the application server that is configured for the SAS OLAP Server, and click **OK**.

You may also see warnings or errors in the SAS log stating that the old physical path is not found. Such messages reflect the fact that the old path does not exist and can safely be ignored.

Update Cube Configurations

If you were using SAS OLAP Server with your version of SAS Activity-Based Management 7.x, you must update cube configuration that was created with this solution. This requirement is due to changes in SAS Metadata folder names in SAS Cost and Profitability Management 8.4. If you were using Microsoft Analysis Services with SAS Activity-Based Management, this section does not apply to you.

To update cube configuration, take the following steps:

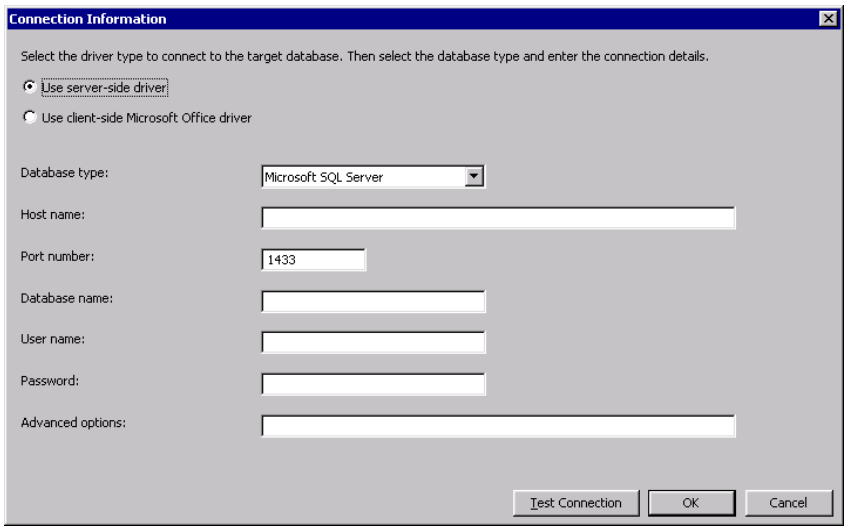
1. Log in to SAS Cost and Profitability Management client.
2. Click on the Cube Configuration workspace folder.
3. Edit each configuration in the right pane and update the metadata folder path. Change it from `/Products/SASActivityBasedManagement/Cubes` to `/Products/SASCostAndProfitabilityManagement/Cubes`.

Or you can remove old cube configurations and create new ones for each model. Contact SAS Technical Support if you have any issues.

Warning: *Attempting to generate cubes from old cube configurations without updating them produces errors because the old metadata folder path does not exist in SAS Cost and Profitability Management 8.4.*

Data Import and Export Configurations

SAS Cost and Profitability Management 8.4 uses SAS drivers to connect to relational databases using ODBC. SAS Activity-Based Management 7.x used JDBC for database connections. As a result of this change, you must recreate the data sources for model data import and export configurations. You can update a data source by opening each configuration, which launches a wizard, and re-attaching to your data source using one of several available methods.



For more information about the available options when creating data sources, see the topic "Connect to a Database" in the SAS Cost and Profitability Management 8.4 online Help.

Creating SAS Cost and Profitability Management Users

Each SAS Cost and Profitability Management user requires an account in SAS Metadata server. Before you run SAS Cost and Profitability Management, you must create at least one user. Add a single user now, or add all users. For information on adding users see the *SAS 9.4 Intelligence Platform Installation and Configuration Guide*.

Once you have at least one SAS Cost and Profitability Management user in SAS Metadata server, you can create the necessary group(s) and role(s) to manage authorized users. Each authorized user can have unique feature access privileges, or *capabilities*, in SAS Cost and Profitability Management. Each user who wants to run SAS Cost and Profitability Management requires three items in SAS Metadata Server:

- an internal user account (on the Metadata Server)
- a role that provides at least one SAS Cost and Profitability Management capability
- membership in the "Cost and Profitability Management Users" group

We will walk through an example that creates a role for the users who have full access to the model-building features of SAS Cost and Profitability Management, the Create Models capability.

For more information about user capabilities, see "User Capabilities and Groups" in the SAS Cost and Profitability Management Client Help.

***Tip**: If you are not ready to add your SAS Cost and Profitability Management users to the Metadata Server, you may use your SAS First User account instead.*

Configuration-Created Metadata

The SAS Cost and Profitability Management configuration process creates three user roles, six groups, and one library in the SAS Metadata server.

The SAS Cost and Profitability Management roles are as follows:

- Cost and Profitability Management: Administration
- Cost and Profitability Management: Create Models
- Cost and Profitability Management: View Models

These roles are predefined to provide a common set of capabilities for you to use when configuring your installation. You may create as many additional roles as needed to customize your deployment.

The predefined groups are as follows:

- Cost and Profitability Management Users (an "umbrella" group for all Cost and Profitability Management users)
- Cost and Profitability Management Cube Creators (for SAS OLAP users who create cubes)
- Cost and Profitability Management Viewers
- Cost and Profitability Management Modelers
- Cost and Profitability Management Administrators
- Cost and Profitability Management Server Users

The first group, "Cost and Profitability Management Users" contains all the users who are authorized to use the SAS Cost and Profitability Management product. The users in this groups are added either directly as users or indirectly, through their membership in other groups.

The second group, "Cost and Profitability Management Cube Creators", contains all the users who will create SAS OLAP Server cubes. Users who have the **Create Models** and **Create Cubes** capabilities must belong to this group. If you are not using SAS OLAP Server to create your cubes, you may ignore this group.

The "Cost and Profitability Management Modelers" group needs to be added in the authorization tab for the folder "Registered Tables and Views". This enables the users from this group to register the reports in metadata.

The remaining groups are predefined to provide a common placeholder for users when you configure your installation. You may create as many additional groups as required to customize your deployment.

***Tip**: SAS recommends that roles contain an **active** name. For example: "Cost and Profitability Management: View Models," or "Cost and Profitability Management: Administration" are useful names. The product name should prefix the active name with a colon separator. This helps manage the diverse products, capabilities, and users in your SAS Metadata Server by partitioning them logically. In addition, SAS recommends that groups contain a user's activity.*

For example, "Cost and Profitability Management Administrators" without a colon separator clarifies the group's purpose.

The predefined library is named CPM Library.

The "CPM Library" library reference in the **Data Library Manager** is used by the SAS OLAP Server to store information about your cubes.

Creating a SAS Cost and Profitability Management Role

Take the following steps to create a new user role:

1. Open the SAS Management Console using a SAS administrative user.
2. Click the **Plug-ins** tab and select the **Foundation** repository.
3. Expand the **Environment Management** folder. A role named "Cost and Profitability Management: Create Models" should already be present. If it is not present, create it.
    a. Right-click the **User Manager** and select **New→Role**.
    b. Add a **Name** for the role. SAS recommends using "ABM: Create Models" with a **Display Name** of "Cost and Profitability Management: Create Models" as the role name.
4. Select the **Capabilities** tab, and expand the **Activity-Based Mgmt 8.4** folder
5. Check the **Create Models** capability.
6. Click **OK** to save the role.
7. Repeat these steps for the View Models and Administration roles.

Creating a SAS Cost and Profitability Management Group

Now create a group to hold all of the users who will have the SAS Cost and Profitability Management Create Models capability. Take the following steps:

1. Open the SAS Management Console using a SAS administrative user.
2. Click the **Plug-ins** tab at the top and select the **Foundation** repository.
3. Expand the **Environment Management** folder. If you do not see a group named **"**Cost and Profitability Management Modelers," create one. Or create a custom group:
    a. Right-click the **User Manager** and select **New→Group**.
    b. Add a **Name** for the group. SAS recommends using "CPM Modelers" with a **Display Name** of "Cost and Profitability Management Modelers" for the group name.
4. Add the Create Models role to this group:
    a. Select the **Groups and Roles** tab.
    b. Add the Create Models role by moving it from the **Available Groups and Roles** list to the **Member of** list.
5. Add the SAS Cost and Profitability Management users who require this set of capabilities:

a. Click the **Members** tab.

b. Add the desired users to this group by moving them from the **Available Identities** left-hand list to the **Current Members** right-hand list.

6. Click **OK** to save the group.
7. Repeat the previous steps for the "Cost and Profitability Management Viewers" and "Administrators" groups, replacing the linked role with the role that you created for each group.

Adding a Group to the Cost and Profitability Management Users Group

The new groups that you create must be members of the main Users group so that they can access the SAS Cost and Profitability Management software. Take the following steps to add a group to the Users group:

1. Open the SAS Management Console using a SAS administrative user.
2. Click the **Plug-ins** tab and select the **Foundation** repository.
3. Expand the **Environment Management** folder**.**
4. Select the **User Manager** folder.
5. Select the group "Cost and Profitability Management Users" and view its properties.
6. Click the **Members** tab.
7. Add all of the groups that you have created to this group as you did in Step 4 in the previous topic.
8. Click **OK** to save the group.

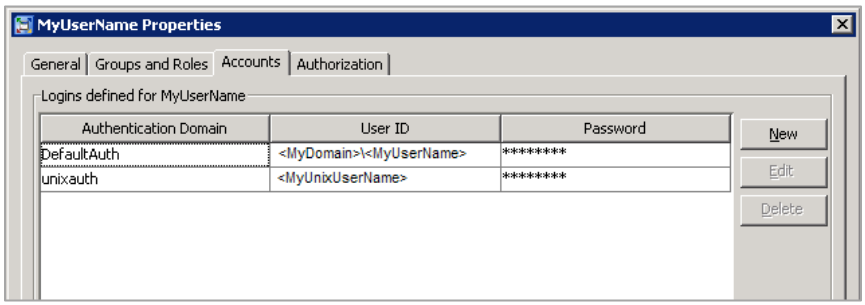
To summarize: To allow users to run SAS Cost and Profitability Management with the capabilities that they require, we performed four basic steps:

1. We created a role with the desired capability.
2. We created a group and added the new role to it so that all the users in that group can access those capabilities.
3. We added all the SAS Cost and Profitability Management users who require this set of capabilities to the group.
4. We added this new group to the "Cost and Profitability Management Users" group so that these users can run the SAS Cost and Profitability Management software.

If this deployment is using SAS OLAP Server to create cubes, you must also add the "Create Models" group to the "Cube Creators" group so that users can build SAS OLAP cubes.

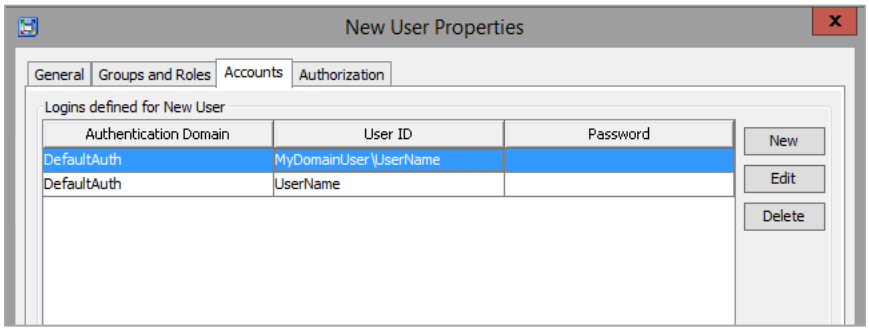
Setting Up Users for Mixed-Architecture Environments

If you use both Windows and UNIX servers in your SAS Cost and Profitability Management deployment, verify that the SAS Cost and Profitability Management users have logins for both machines. The authentication domains are defined when you create the servers in metadata.



Setting Up Users for Integrated Windows Authentication

If your deployment is IWA-enabled, and if the SAS Server Tier is running on Windows, you will need two accounts for each user in metadata, as shown below:



For Linux, define the username with a single account and without the domain name.

Validating the SAS Cost and Profitability Management Solution

SAS Cost and Profitability Management ships with two diagnostic utilities. One is installed with the Client and the other is installed on the Middle Tier.

Client Diagnostics Utility

The client diagnostic application is available from the **Start** menu at **All Programs→SAS→SAS Cost and Profitability Management 8.4→Tools→SAS Cost and Profitability Management Client Diagnostic**. The client diagnostic tool validates many aspects of the SAS Cost and Profitability Management client installation. Verify that all tests pass successfully. They execute very quickly and take only a few seconds to run.

The client diagnostic application also provides a System Information report that provides deployment and version information. The System Information report must run as an authorized SAS Cost and Profitability Management user. You are prompted to log in when you run it.

Server Diagnostics Utility

Start the server diagnostics utility from the **Start** menu on Windows at **All Programs→SAS→ SAS Cost and Profitability Management Server 8.4**, or by locating an executable named *SASHOME*`/SASActivityBasedManagementMidTier/8.4/ServerDiagnostic` on UNIX. On UNIX, SAS Cost and Profitability Management Server Diagnostics is an X Window application. If you are running from a personal computer, you must enable the display to that computer. For example:

```
DISPLAY=your_machine_absolute_address:0.0
export DISPLAY
```

The diagnostics utility performs two types of tasks: it verifies that the correct code and permission are defined on the machine where it is running; and it communicates with the web server to determine whether the permissions are set up correctly for SAS Cost and Profitability Management.

A temp folder must be created on the drive from which the diagnostics utility is executed. For example, it can use `C:\Temp`.

If you have problems invoking the diagnostics, open the `ServerDiagnostic.ini` file. It is located in the folder above the diagnostic executable folder:

Windows: *SASHOME*`\SASCostAndProfitabilityManagementMidTier\8.4`

UNIX: *SASHOME*`/SASCostAndProfitabilityManagementMidTier/8.4`

Check for the following lines:

1. `JavaArgs_2=-Dsas.app.class.path="`*fully-qualified-name-of-junit.jar*`"`

   If the name is not specified, supply the fully qualified name of the `junit.jar` file.

2. `JavaArgs_5=-Denv.definition.location="`*fully qualified name of the SAS environment file*`"`

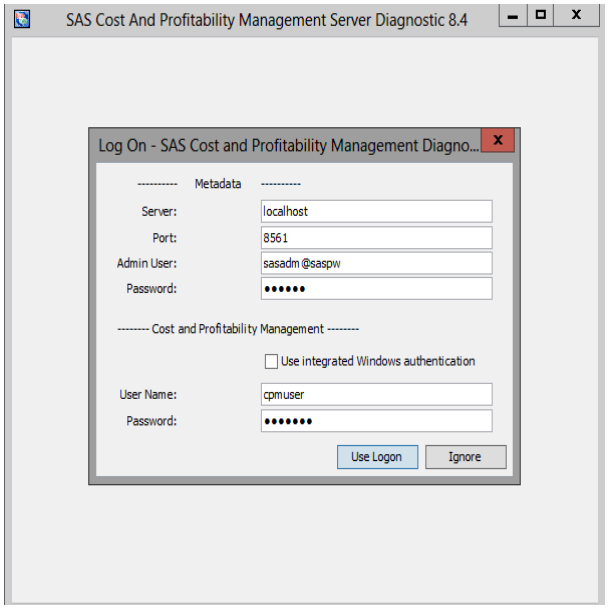
   If the name is not specified or a message reports that the XML file is not found, supply the fully qualified name of the `sas-environment.xml` file. It is usually located in

   CONFIGHOME`\Web\Common`

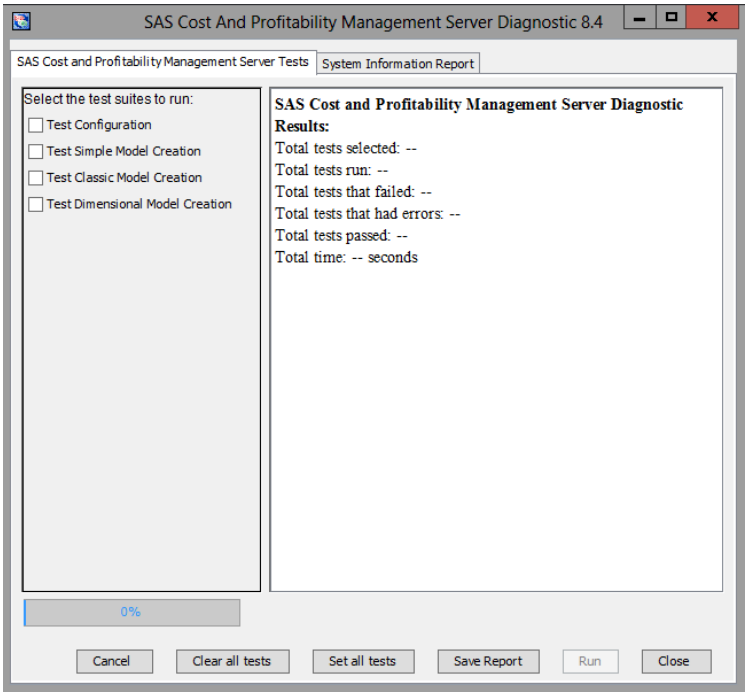
Update the following line to create a log:

`applogloc=`**`launcher.log`**

The following image shows the first dialog box of the diagnostic utility. You are prompted for a metadata login, a modeler login, and other information. If your servers are of mixed architecture, you must fully qualify the name of the Metadata Server. If your deployment is IWA-enabled, select the check box to **Use Integrated Windows authentication** on the Windows machine only.

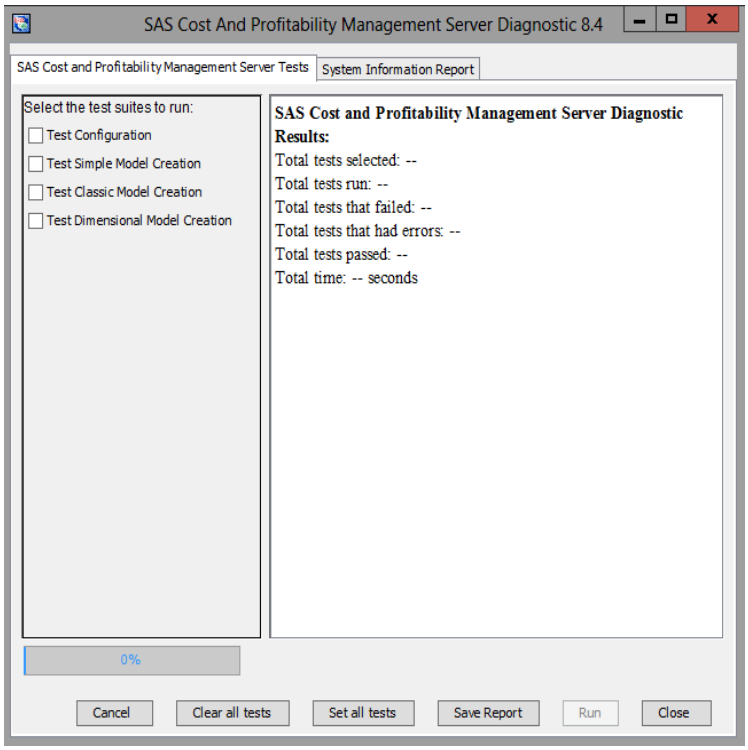


Select the specific tests to run or click **Set all tests** to enable all tests.



The log can be saved to the local machine. The filenames are displayed in the window after the report is saved. On Windows, the default location for this log is `C:\Documents and Settings\`*`UserID`*`\SAS\SAS Cost and Profitability Management Diagnostic\8.4`.

The second tab displays information about your system:



Appendix A – Installing Microsoft SQL Server

This appendix describes some basic steps to install Microsoft SQL Server. This section shows sample steps for a generic installation. Take equivalent steps to install the Microsoft SQL Server version that you plan to use with SAS Cost and Profitability Management solution.

Installing Microsoft SQL Server

When installing Microsoft SQL Server, select the default values, with a few notable exceptions that are documented below.

Verification of an Existing Version

If you already have an instance of Microsoft SQL Server installed, verify that the correct version and service pack are installed.

1. Launch the **SQL Server Management Studio** from the **Start** menu.
2. Make sure you have selected Database Engine. On the machine where your Database Engine is running, log into **SQL Server Management Studio** using an appropriate administrative account.
3. Open a query window by clicking the **New Query** button on the toolbar.
4. Paste the following query into the query window:

```
SELECT SERVERPROPERTY('productversion'), SERVERPROPERTY
   ('productlevel'), SERVERPROPERTY ('edition')
```

5. Select **Execute**.
6. As an example, for SQL Server 2008 SP1, the version number should appear similar to 2007.1100.2531.0 or 10.0. 2531.22. The key point is that the four-digit numerical version should be 2531 or higher to indicate Service Pack 1 or higher.

Warning: *The version of the database engine cannot be checked using the About dialog box in SQL Server Management Studio. The version reported in the About dialog box is the client software version, not the database engine version.*

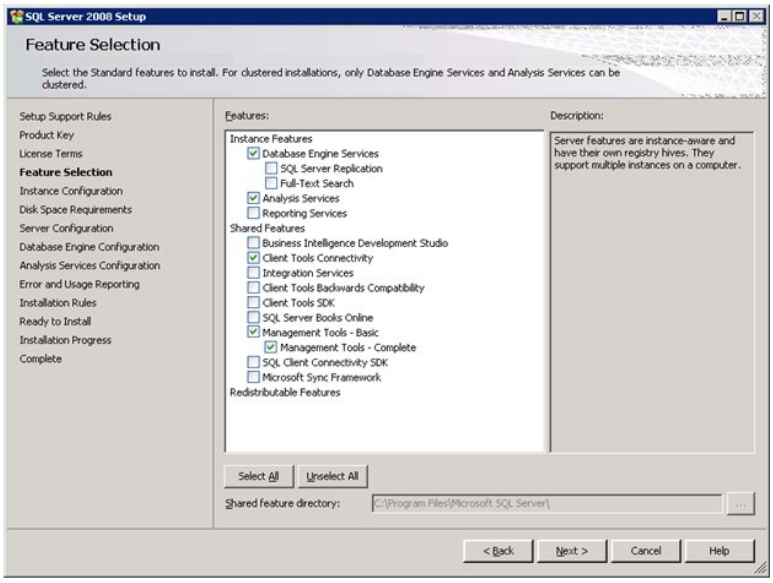
Installation

Begin installing SQL Server by launching **setup.exe**, usually contained in the root directory of the DVD.

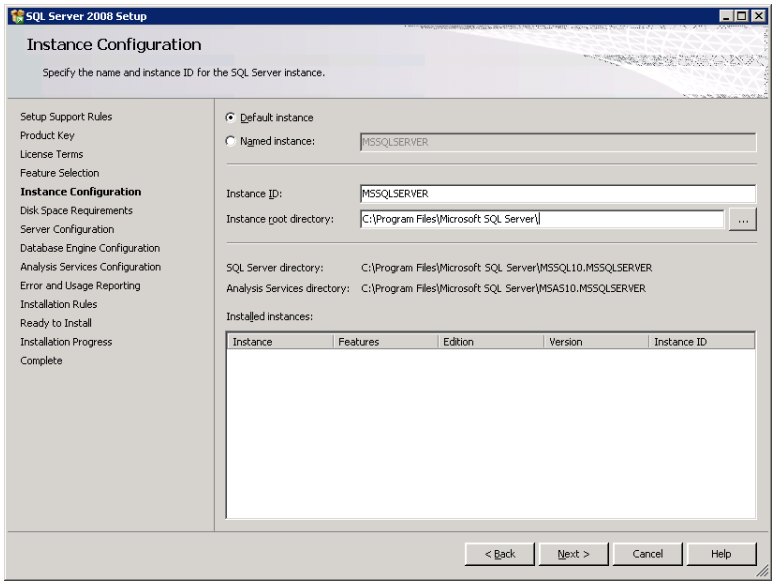
At minimum, SAS Cost and Profitability Management requires the following features on the *Database Server*:

- SQL Server Database Services
- Analysis Services (if you are using SQL Server Analysis Services for OLAP and your *Database Server* and *OLAP Server* are on the same machine).
- Client Tools Connectivity
- Workstation Components

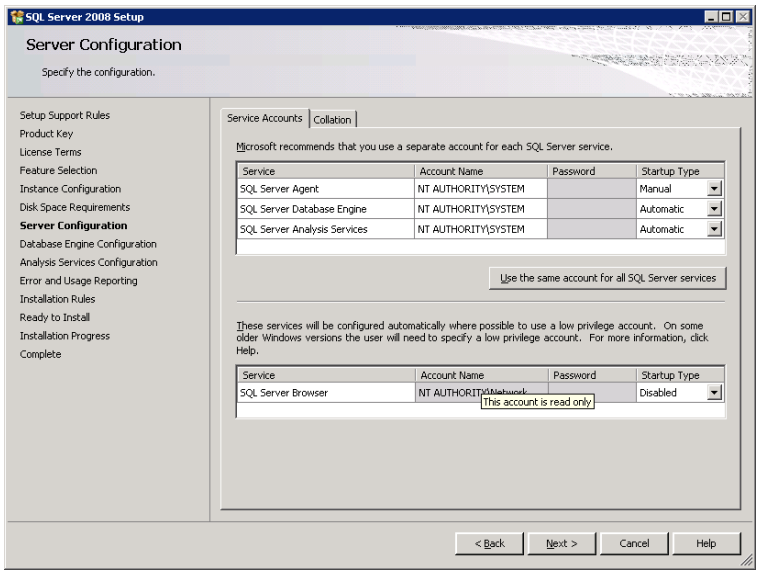
SAS also recommends installing the Workstation Components on the *Middle-Tier Server*. Users can then administer the database engine remotely from the *Middle-Tier Server*.



You can make this the default SQL Server database instance on this machine, or you can create a named instance. Both options are supported. If you want to create a Named Instance, SAS recommends the name **AbmSqlInstance**.

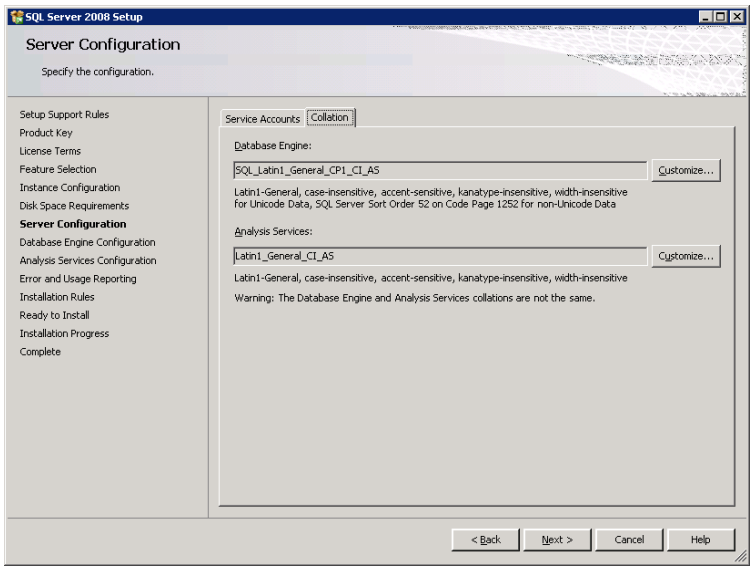


Select **NT Authority\System** for the services and provide a password **f**or the **Service Accounts** tab on the Server Configuration wizard dialog box.

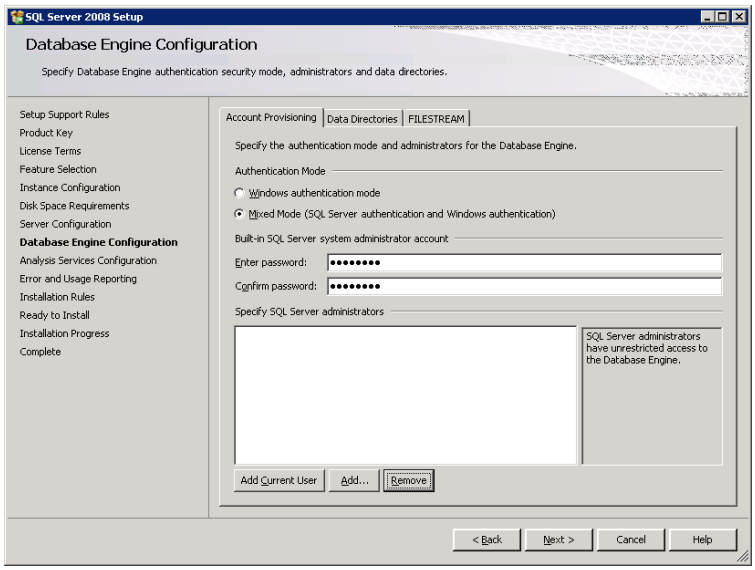


Select a default collation sequence for this SQL Server installation.

The default collation sequence for SQL Server, "SQL_Latin1_General_CPI_CI_AS," is acceptable for North American installations. Regardless of the collation sequence you select, you *must* select a case-insensitive collation. This is important because SAS Cost and Profitability Management does not distinguish between MyAccountName, MYACCOUNTNAME, and myaccountname.



Select **Mixed Mode Authentication** and specify a password for the local **system administrator** account.



Installing Microsoft SQL Server Analysis Services

Installation

Only Analysis Services is required. You must install it in multidimensional mode.

Configuration

In addition, it is necessary for the *Database Server* to resolve the *OLAP Server's* name, and the reverse. This is required to enable the communication between the two machines and for the SQL Server Management Studio to communicate properly with the SQL Server instance running on the *Database Server*. The most common difficulty arises when the *Database Server* and the *OLAP Server* are in different domains. Either the two servers need to be able to authenticate each other, or authentication should be disabled. If this is necessary, take the following steps:

1. Open **Administrative Tools** in the **Control Panel**.
2. Open **Component Services**.
3. Select **Component Services → Computers → My Computer**. Right-click, and select **Properties**.
4. On the **MSDTC** tab, click **Security Configuration**.
5. Select the option under **Transaction Manager Communication** that is appropriate for your installation. If required, select the **No Authentication Required** option.

Validation

SAS recommends verifying that the Microsoft SQL Server Analysis Services tools and components are installed correctly and that the SSAS user for SAS Cost and Profitability Management has the required permissions.

Depending on where you are in your installation process, you may not be able to complete all of these steps now. If you cannot complete them now, you can finish the SAS Cost and Profitability Management installation and return to these validation steps later.

On the machine where you installed Microsoft SQL Server Analysis Services:

1. Log in to the server where the SSAS is installed as the SSAS OLAP user that SAS Cost and Profitability Management will use.
2. Start SQL Server Management Studio and connect to the analysis server.
3. Verify that in addition to connecting, you can browse an existing cube. A sample cube that is installed by Microsoft will suffice.

If any part of that does not work, look for a problem in your SSAS server installation.

On the machine where you installed the SAS Cost and Profitability Management Middle Tier:

1. Log in to the Middle-Tier Server as the SSAS OLAP user that SAS Cost and Profitability Management will use.
2. Start SQL Server Management Studio and connect to the Analysis Server.
3. Verify that in addition to connecting, you can browse an existing cube.
    - If you cannot log in to the SSAS server, the permissions for your OLAP user are incorrectly configured.
    - If you can log in to the server but are unable to browse a cube, the Client Tools for SSAS are not installed properly on the Middle-Tier Server. Make sure that the Microsoft AMO tools are installed. SAS Cost and Profitability Management uses these tools to communicate with the SSAS server.

Configuring Microsoft SQL Server

JDBC Driver

The Microsoft SQL Server JDBC Driver works properly with SQL Server and is suitable for use with all supported web application servers and is available from the Microsoft website for download.

The following website provides information about the JDBC driver versions and supported SQL server versions: https://docs.microsoft.com/en-us/sql/connect/jdbc/microsoft-jdbc-driver-for-sql-server-support-matrix.

Create the SAS Cost and Profitability Management User

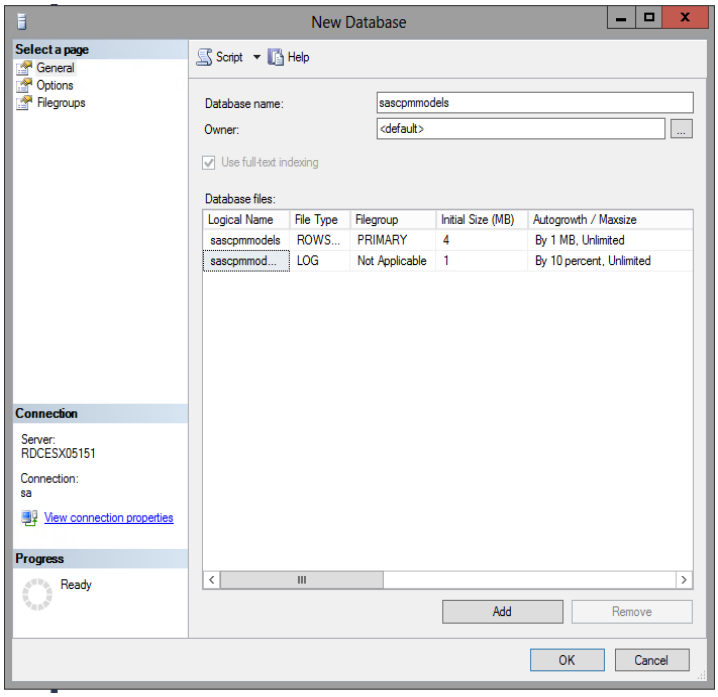
For a new installation of SAS Cost and Profitability Management, create a Microsoft SQL Server database and a user that will execute SAS Cost and Profitability Management queries. Assign the appropriate access privileges for this user to the new database that will contain the SAS Cost and Profitability Management data.

You must create a SQL Server Database and an Administrator User ID.

1. Open the SQL Server Management Studio program on the *Database Server*.
2. Right-click on **Databases** and select **New Database**. The recommended database name is **sascpmmodels**.

3. Change the default size and autogrow settings for the database and the transaction log.

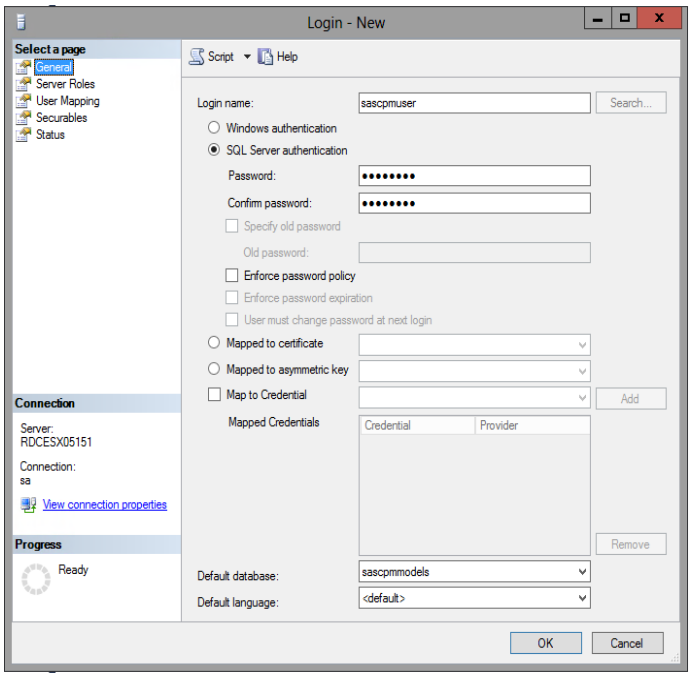
   These parameters have very small default values that can impede performance. Change them to suit your expected data volumes. The **sascpmmodels** database shown in the following image has an initial size of 500 MB and an autogrow size of 500 MB. The transaction log has an initial size of 50MB and an autogrow size of 50MB. These settings are appropriate for small- to medium-sized data volumes.



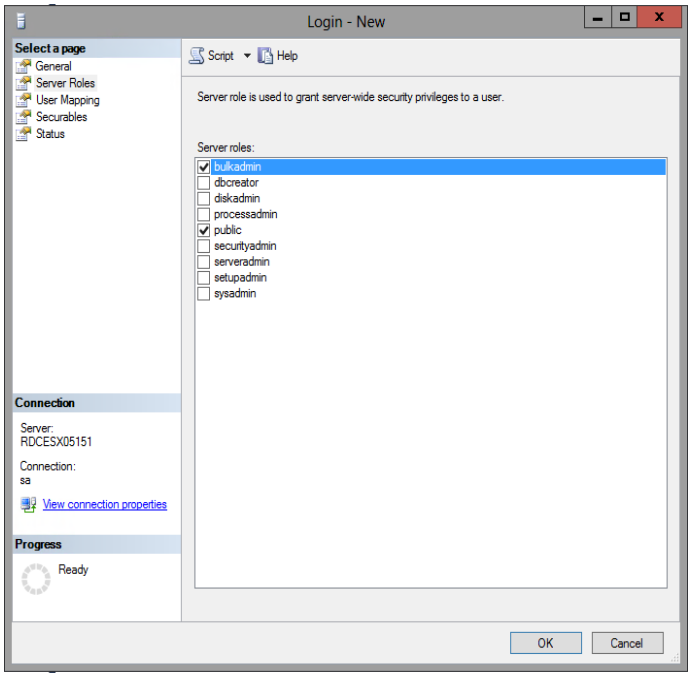
4. Click **OK** to create the **sascpmmodels** database.

To create the database Administrator account:

1. Expand the **Security** folder. Right-click on **Logins** and select **New Login**.
2. Enter the user name in the **Login Name** edit field. SAS recommends **sascpmuser**.
3. Select **SQL Server Authentication** and supply a **Password** that adheres to the policies at your enterprise.
4. Select **sascpmmodels** for the **Default database**.



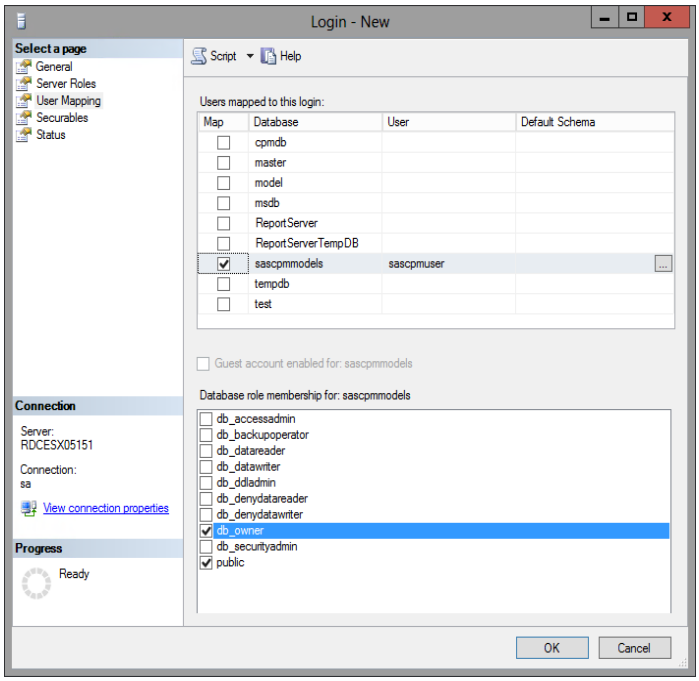
5. Select the **Server Roles** admin page.
6. Select **Bulk Admin** from the list of server roles in the right pane.



7. Select **User Mapping** and select **sascpmmodels** in the list of models.

   Note: *The bulkadmin role does not exist for SQL server installed on Amazon Web Services. Therefore, it cannot be selected, but SAS Cost and Profitability Management will work as expected without this setting.*

8. Select **db_owner** in the list of database roles.



9. Click **OK** to create the user with the selected database assignments.

Appendix B – Installing Oracle

These basic instructions are intended for installing Oracle 11g on Windows as an example. Oracle 11g installation on UNIX can vary by operating system. These instructions, particularly the Oracle Net Configuration portions, provide an example of the installation options that SAS used to install Oracle 11g for testing with SAS Cost and Profitability Management. Mandatory settings are noted.

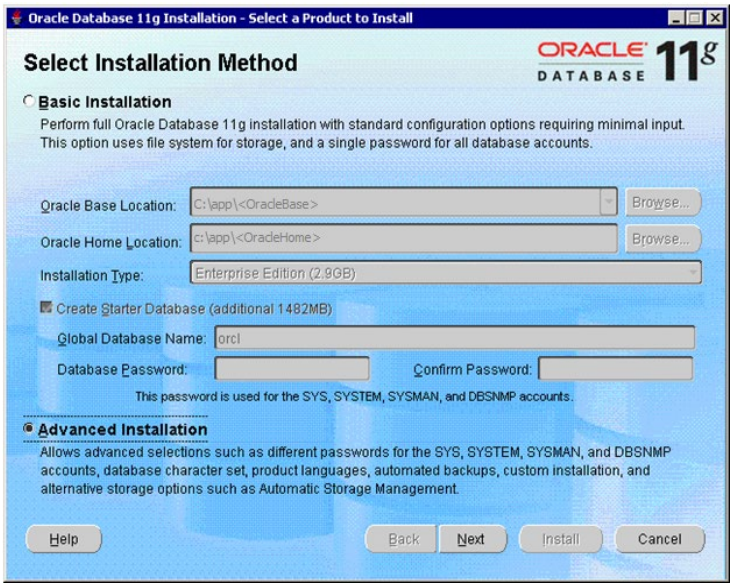
Oracle databases have numerous configuration options that can be tuned to maximize performance in different environments and for different usage patterns. Unless you are an experienced Oracle administrator, adhere to the following guidelines for an optimal installation that has been tested.

Warning: *SAS has validated the following installation and configuration options for Oracle 11g. Many other options are available for an Oracle deployment.*

Installing Oracle on Windows

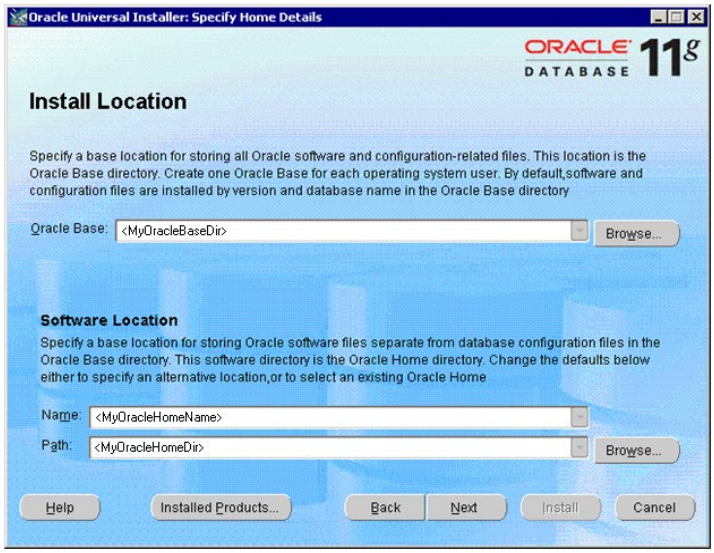
Begin installing Oracle 11g by double-clicking on the **setup.exe** to begin the installation process.

1. Select the **Advanced Installation** option and click **Next**.



2. Select the **Installation Type** based upon your need. Click **Next**.
3. In the Install Location dialog box, configure the **Oracle Base** location (the installation path) and the **Oracle Home** name and path.

   These locations are important and are frequently referenced in Oracle documentation. The `<MyOracleHomeName>` parameter determines how the Oracle data sources appear in the Windows ODBC Data Source Administrator dialog box for SAS Cost and Profitability Management. The `<MyOracleHomeDir>` parameter is used later in the configuration process to create the **ORACLE_HOME** environment variable to locate the Oracle bulk load utility.
4. Click **Next**.



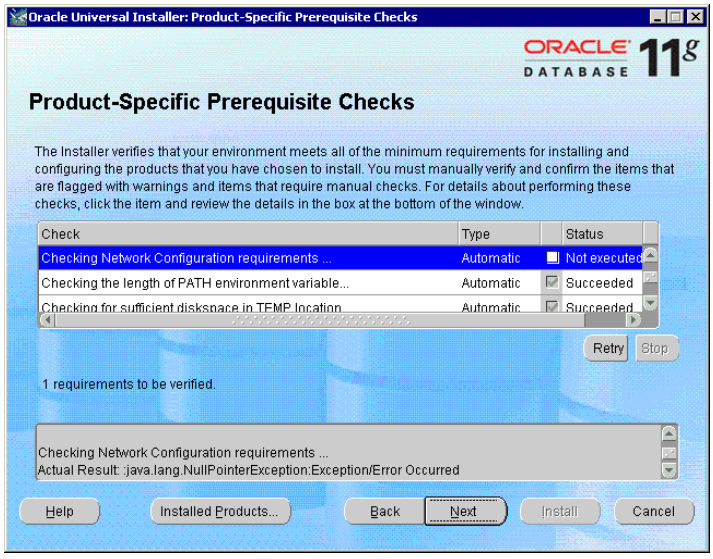
5. Verify that all the **Product-Specific Prerequisite Checks** have succeeded. These checks are very important.

6. Pay close attention to any warnings or errors and correct them before proceeding. Also verify that there are "0 requirements to be verified."

   Warning: *The Oracle installer performs a few prerequisite tests. If any tests fail, refer to the Oracle installation guide for help. For example, the Oracle database may require a Loopback Adapter. If the Loopback Adapter is not installed but is required, the Oracle database will appear to operate properly most of the time. However, SAS has determined that random failures, typically involving "concurrency" (according to the Oracle error messages), will occur. The Oracle documentation has instructions for installing the Loopback Adapter on your operating system.*

   In particular, the Oracle prerequisite checks might identify a problem with the DHCP configuration of your host machine. The error displays as follows:

```
Checking Network Configuration requirements...
Actual Result: :java.lang.NullPointerException:Exception/Error Occurred
```

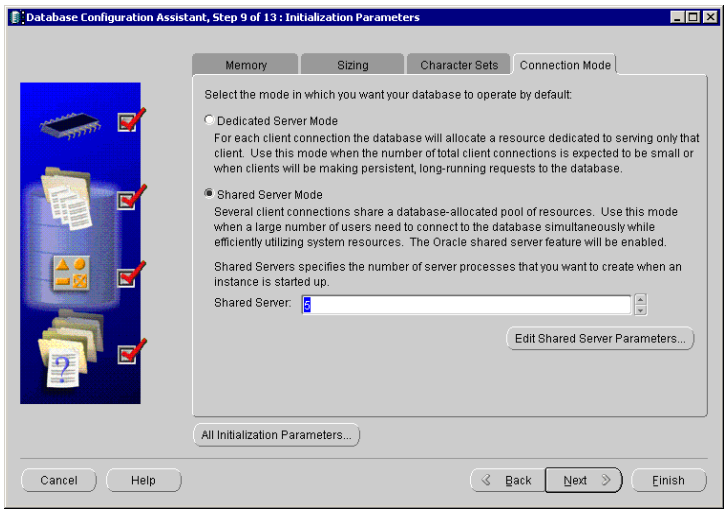


Oracle supports systems with DHCP-assigned IP addresses, but you may need to perform additional configuration steps on your machine before proceeding. You may need to install a loopback adapter and configure it to be the primary network adapter. Search for the string "DHCP" in the Oracle *Database Installation Guide* for more details on installing the Oracle on systems configured with DHCP.

7. Click **Next** if all tests succeed. Otherwise, cancel the installation and resolve the problems before proceeding
8. Select **Create a Database**, and click **Next**.
9. Select **Advanced** database configuration, and click **Next**.
10. Click **Install** to begin installing the Oracle database engine. A progress dialog displays.
11. Look for the Database Configuration Assistant wizard, which occasionally displays the first step behind a main dialog box. Select **General Purpose or Transaction Processing**, and click **Next**.
12. Select a Global Database Name (GDB) and a SID for your database. The standard Oracle convention for the formatting the GDB name is `SID.MyDomain` where `SID` is the name that you assigned to the SID. Click **Next**.
13. Select **Configure Enterprise Manager**. SAS recommends selecting **Configure Database Control for local management**. Click **Next**.
14. Supply a password for the administrative account. Click **Next**.
15. Select the **Storage Management** option that suits your installation. Click **Next**.
16. Select the location for database files. Click **Next**.
17. Select the recovery options for the database. Click **Next**.
18. Clear the **Sample Schemas** option unless you want to retain them for reference. Click **Next**.
19. Click the **Sizing** tab in the next wizard dialog box. Verify that the number of **Processes** is large enough to service the expected workload from SAS Cost and Profitability Management users.

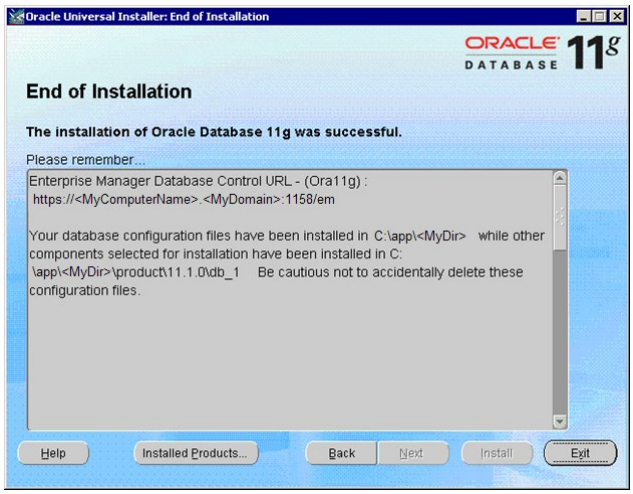
    The required number of processes is difficult to estimate. The Oracle database may divide large queries into multiple smaller ones that execute in parallel, with each sub-query consuming a process. Thus, the number of needed processes is not directly tied to user load or query load. The default value is typically 150.
20. Click the **Character Sets** tab, and select **Use Unicode**.
21. Click the **Connection Mode** tab. Select **Shared Server Mode** to avoid concurrency problems, and pick the appropriate number of server processes.

    This value depends on the capability of your machine. If you select **Dedicated Server Mode**, you must register the database (SID) with Oracle listener after installing to avoid concurrency problems. SAS recommends **Shared Server Mode**.
22. Click **Next**.



Warning: *SAS has encountered intermittent failures relating to "concurrency" problems when* ***Dedicated Server Mode*** *is selected. If your deployment requires the* ***Dedicated Server Mode****, follow the instructions in the Oracle Database Installation Guide for registering the database SID. These steps appear to resolve the problems. SAS Cost and Profitability Management generates errors during certain multi-user operations if the database SID is not registered.*

23. Select **Keep the enhanced security settings**, and click **Next**.
24. SAS recommends selecting the **Enable automatic maintenance tasks** option. Change this option if required for your deployment. Click **Next**.
25. Click **Next** on the Database Storage dialog box.
26. Click **Finish** on the Database Creation dialog box. Click **OK** to confirm your selections.
27. When the **Database Configuration Assistant** dialog box opens, click **Exit**.
28. In the Oracle End of Installation dialog box, click **Exit**.



Configuring Oracle

JDBC Driver

The JDBC driver for Oracle 11g is included as part of the Oracle Administrative Client installation and is saved in *OracleClientDirectory*\sqlj\lib\jdbc\lib\ojdbc5.jar on Windows. You must install the Oracle Administrative Client on the *Middle-Tier Server* to provide this driver. If necessary, this driver can be downloaded directly from the Oracle website at http://www.oracle.com/technology/software/tech/java/sqlj_jdbc/index.html.

The following website provides information about the JDBC driver versions and supported Oracle versions: http://www.oracle.com/technetwork/database/enterprise-edition/jdbc-faq-090281.html#01_02

Important: *SAS recommends installing the JDBC drivers using the Administrative Client Tools options on your Oracle installation CDs. This guarantees that the Application, and hence the JDBC drivers, will receive any updates as part of a database update provided by your vendor. Additionally, the Middle-Tier Server uses the Oracle SQL*Loader (bulk loader) to improve performance for the data import process. The bulk loader is also part of the Administrative Client Tools installation.*

Environment Variables

Windows

Create an environmental variable named ORACLE_HOME on the *Middle-Tier Server* to point to the client tools installation directory. The client tools are installed at *MyOracleHomeDir*, and in most deployments, which include the client tools, this corresponds to the client_1 directory. If only the database engine is installed without the client tools, the location is the db_1 directory. For example, take the following steps if you installed the client tools at C:\Oracle\product\11.1.0\client_1.

1. Click **Start→Control Panel→System**.
2. Open the **Advanced Tab** and click **Environment Variables**.
3. Under **System Variables**, highlight **ORACLE_HOME** and click **Edit**. If **ORACLE_HOME** does not exist, click **New**. Type the path to the client tools: C:\Oracle\product\11.1.0\client_1.
4. Click **OK** for each of the windows opened.

See the discussion of **Oracle Home** in "Installing Oracle 11g" earlier in this section.

Important: *Close and reopen DOS prompts to pick up environment changes. Issue the* set *command without any parameters and check for* ORACLE_HOME. *If it is still not set, restart the system.*

UNIX

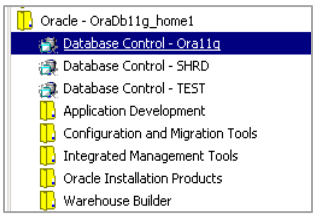
To set the ORACLE_HOME environment variable on UNIX, you must add statements to the .profile file of the user that starts the web application server (such as IBM WebSphere or JBoss). Or you can add them to a common profile that this user can access.

For example, if you installed Oracle in the `usr` directory, you would issue the following commands:

```
ORACLE_HOME=/usr/Oracle
export ORACLE_HOME
```

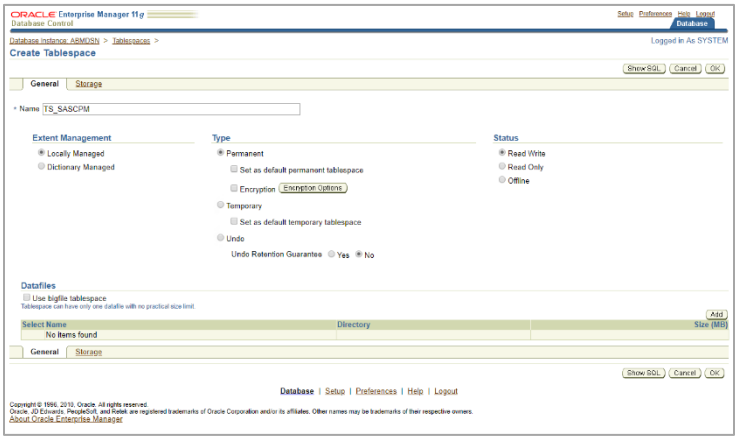
Create a TableSpace

The TableSpace file contains the data that is stored in your database. SAS recommends creating a SAS Cost and Profitability Management tablespace that is not shared with other applications. To create a tablespace in Oracle 11g, run Database Control for the SID that you created. It is available from the **Start** menu under your Oracle installation. In the following image, "Database Control – Ora11g" is highlighted. Ora11g is the SID.

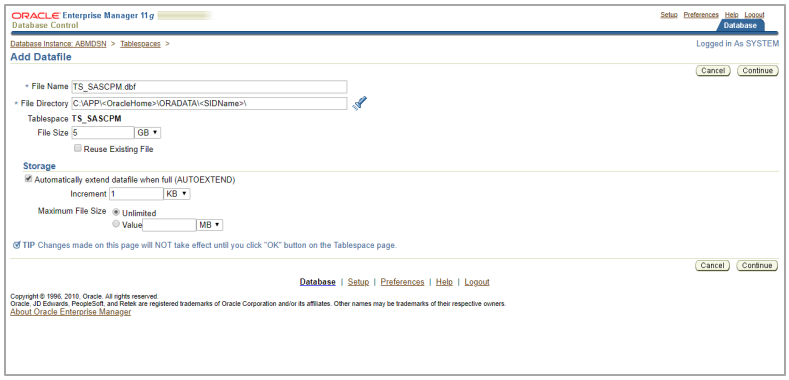


Tip: *The Oracle Database Control is a web application in Oracle 11g. If your browser security settings prevent you from accessing the Oracle web page, add the Oracle website to the list of trusted sites.*

1. Log in to the Database Control application using the administrative user and password that you created previously.
2. Click the **Server** tab.
3. Under the **Storage** subsection, select **TableSpace**.
4. Click **Create**.
5. Enter a name for your tablespace. SAS suggests **TS_SASCPM**. Accept the other default values.
6. Click **Add** to add this new tablespace.



7. Enter a name for the tablespace file. SAS suggests using the tablespace name with a suffix of `.dbf` (which is standard for tablespace file names in Oracle).
8. Set the initial file size and increment size for your deployment, and click **Continue**.

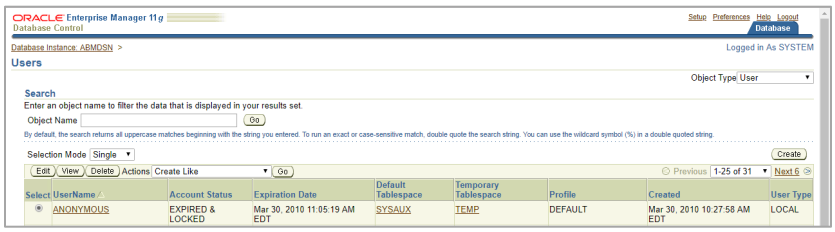


9. Tablespace creation is complete. Click **OK**.

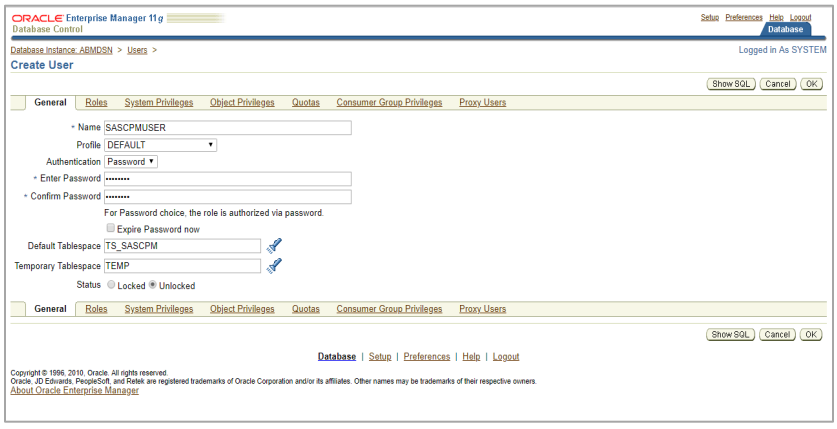
Create the SAS Cost and Profitability Management User

Create a user account for a user who can access the TS_SASCPM tablespace in the database.

1. Select **Users** from the **Security** subsection of the **Server** tab.
2. Click **Create**.

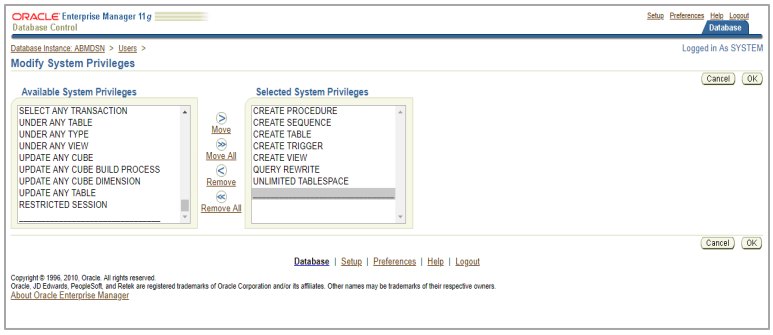


3. Enter the new name of the database user who will access the `TS_SASCPM` tablespace. SAS recommends **SASCPMUSER**. Enter a password for this user.
4. Verify that the default tablespace is `TS_SASCPM`, or the name you selected when you created it, and that the `TEMP` tablespace is selected for temporary work.

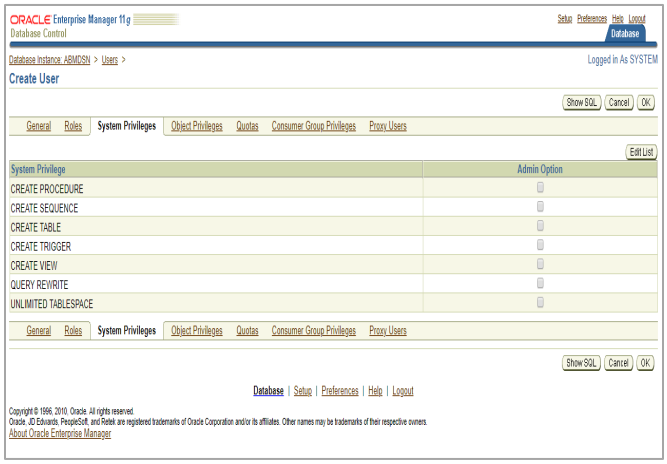


5. Click the **System Privileges** tab, and click **Edit List**.
6. Add the following privileges to the **Selected System Privileges** list: **Create Procedure, Create Sequence, Create table, Create Trigger, Create View, Query Rewrite,** and **Unlimited Tablespace**.

7. Click **OK**.



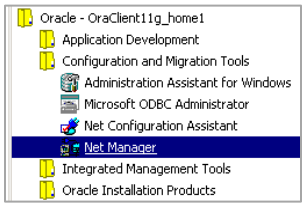
8. User creation is complete. Click **OK**.



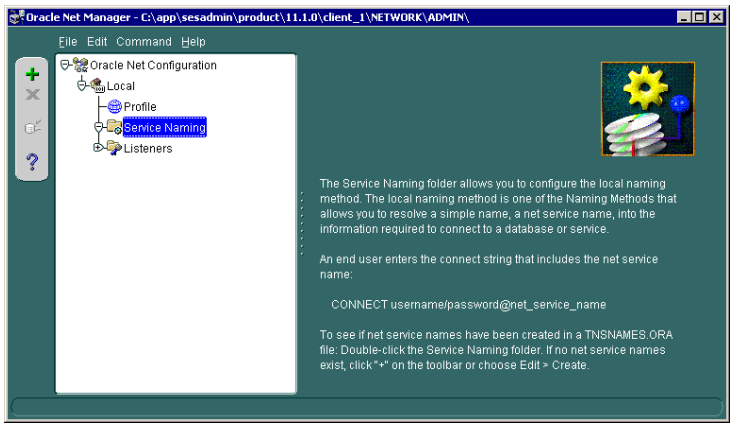
Oracle Net Configuration

Create identical Oracle Net Service Names (Aliases) on the following machines: *Middle-Tier Server*, *Model Server*, and the machine where you run the SAS Cost and Profitability Management Database Upgrade Utility. If two or more of these logical machines map to a single physical machine, the machine only requires a single Net Configuration.

Oracle uses aliases to facilitate communication with the Oracle database. Use the Oracle Net Manager utility, which is available from the **Start** menu, to create aliases.



1. When the **Net Manager** displays, expand the **Local** node.
2. Select **Profile**. The allowed connection methods appear in the right pane. On the **Methods** tab, verify that TNSNAMES and EZCONNECT are displayed in the **Selected Methods** list.
3. Expand **Service Naming**. Click the green plus sign or select **Edit→Create**.



4. The **Net Service Name Wizard** opens. Supply a name for your Net Service. SAS recommends using the name ABMDSN. This name must be the same as the DSN name that you created in Chapter 9 because the SAS Cost and Profitability Management calculation engine uses both a DSN and a Net Service Name to load data into the Oracle database. It assumes the Net Service Name is the same as the DSN name.

5. Click **Next**.

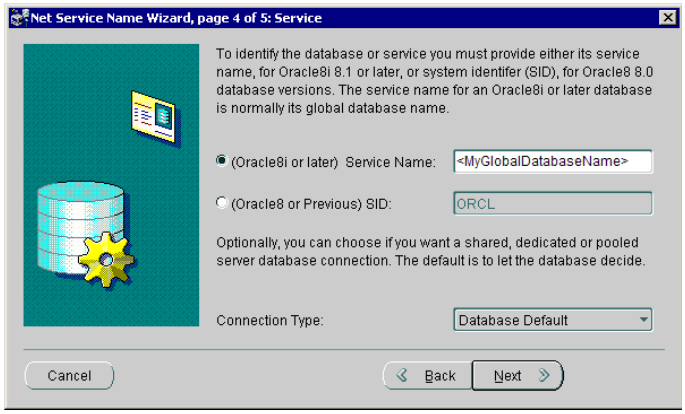
   Note: *Oracle documentation sometimes refers to the Net Service name as a Net Configuration name or an Alias name.*

6. In the wizard dialog box, verify **TCP/IP (Internet Protocol)** is selected. Click **Next**.

7. Enter the **Host Name** where the Oracle database is installed and the **Port Number** it uses. Click **Next**.

8. Next, you are prompted for either the Service Name or the system identifier (SID). SAS recommends selecting the **Service Name** option. The SID option is for backward compatibility or for Oracle databases on UNIX, but it is not recommended for Windows.

9. For the **Service Name**, type the Global Database Name that you used during the installation. This is your `MyGlobalDatbaseName`. Click **Next**.



10. Click **Test** to verify the connection.

11. The **Connection Test** dialog box displays. If necessary, click **Change User** before clicking **Test**. This user must be the same account that you used when you created the Global Database Name.

12. When you see the Success message, click **Close**.
13. Click **Finish**.
14. Save the alias that you have created. Click **File→Save Network Configuration** before exiting.

The Net Configuration is complete.

Verify the port that is configured for your Oracle database. Update the Database Server table at the beginning of Chapter 6 with the correct information.

Oracle Database Processes and Sessions

You may want to change the default settings for the number of available database connections and sessions. You can query the currently defined settings using the following commands:

```
SHOW PARAMETERS PROCESSES;
SHOW PARAMETERS SESSIONS;
```

If the number of process and settings is less than 200, it should be increased to at least 200, which is the Oracle recommended minimum values. SAS recommends 250. The settings can be changed using the following commands:

```
ALTER SYSTEM SET PROCESSES=250 SCOPE=SPFILE;
ALTER SYSTEM SET SESSIONS=250 SCOPE=SPFILE;
SHUTDOWN IMMEDIATE;
STARTUP;
```

These commands update the settings and restart the Oracle instance to enable the new settings to take effect.

The Oracle error **ORA-12516, TNS:listener** often appears in the log when either of these two settings is exceeded.

Appendix C - Third-Party Migration

This appendix describes migrating third-party software from SAS Activity-Based Management 7.x versions to the present version of SAS Cost and Profitability Management.

Migrating from SAS OLAP Server 9.2 or 9.3

If you did not use SAS OLAP Server to build your cubes with SAS Activity-Based Management 7.x you can skip this section.

When SAS Activity-Based Management built cubes with SAS OLAP Server 9.2 or 9.3, it created two types of data. The first is the operating system file representing the physical cubes themselves and the second is the metadata content about these cubes in the SAS Metadata Server.

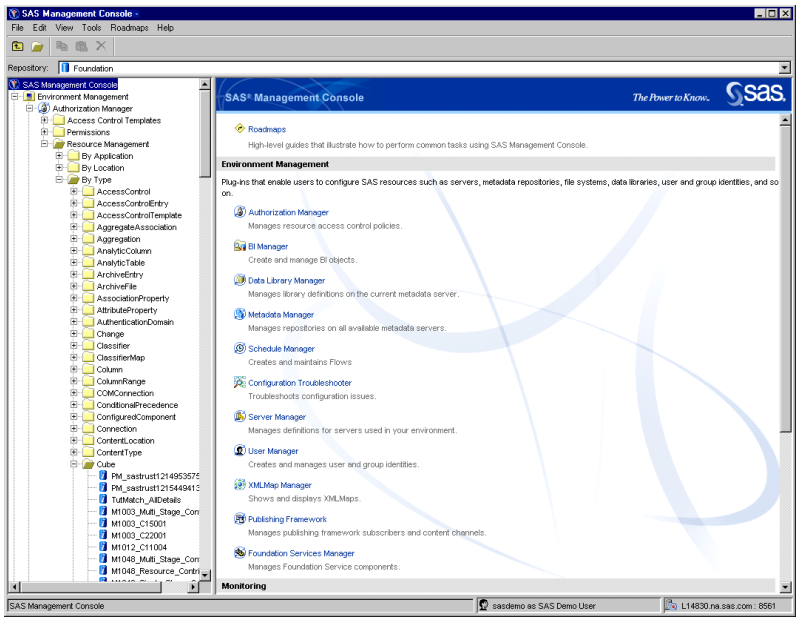
Deleting SAS OLAP Metadata

The cubes and information maps created by the SAS OLAP Server are located in the SAS Metadata Console with other cubes. They must be deleted as part of the migration.

To delete the OLAP metadata:

1. Open the **SAS Metadata Console** application.
2. Select the **Foundation** repository in the **Repository** list.
3. Expand the **Environment Management** folder.
4. Expand the **Authorization Manager** folder.
5. Expand the **Resource Management** folder.
6. Expand the **By Type** folder.
7. Expand the Cube folder.

   All of the cubes that were created by SAS Activity-Based Management have a name in the format `MXXXX_SomeName`, where `XXXX` is a number from 1000 onwards.



8. Open a Base SAS session by selecting **All Programs → SAS → SAS 9.4**.

9. Paste the following code into the Editor window, replacing the items in italics with information that applies to your deployment:

```
PROC OLAP cube=MyCubeName DELETE;

METASVR host="MyMetadataServer" port=8561 protocol=bridge
userid="MyAdminUser"

              pw="MyAdminPassword"

              repository="Foundation"

              olap_schema="MyOlapSchemaName";

         RUN;
```

   Where:

   MyCubeName is the name of each cube listed in the Metadata Server.

   MyMetadataServer is the name of the machine hosting your SAS Metadata Server.

   MyAdmin... is the administrative username and password that you provided to the SAS Activity-Based Management 7.x.

   MyOlapSchemaName is the schema name that you provided to the SAS Activity-Based Management 7.x.

10. Click **Submit** to execute the code. Repeat for each SAS Activity-Based Management cube that is defined in your metadata. This process also deletes the physical cube, if it exists, so you may skip the next section.

Deleting SAS OLAP Cubes

The OLAP cubes are stored as files on the operating system. Simply deleting the files will also delete the cubes. The cubes are stored in the directory that you specified when you selected the directory that you specified in the SAS Deployment Wizard while configuring the SAS OLAP Server (if you are migrating from SAS Activity-Based Management 7.x). By default, this directory is at: `C:\SAS\Config\Lev1\AppData\SASCostAndProfitabilityManagementx.x\cubes` where `x.x` represents the version of SAS Activity-Based Management you are migrating.

Rebuilding SAS OLAP Cubes

After completing the SAS Cost and Profitability Management installation, rebuild the SAS OLAP Server cubes using SAS Cost and Profitability Management 8.4.

Migrating from Microsoft SQL Server 2005

If you want to upgrade to a newer version of Microsoft SQL Server with a single database machine, SAS recommends the following steps:

- Back up your existing SQL Server data
- Detach the databases to be migrated and save the generated tables
- Uninstall the existing SQL Server version
- Install the new SQL Server version
- Re-attach the saved tables
- If migrating from SAS Activity-Based Management 7.x, update your databases to the 8.4 format/schema (see Chapter 9 – Post-Installation)

This procedure for backing up SQL Server data and moving data between SQL Server versions is documented at the Microsoft website: `http://support.microsoft.com/kb/224071` and `http://msdn.microsoft.com/en-us/library/ms345408.aspx`.

Tip: *Before installing the new version of SQL Server, SAS recommends installing a new operating system disk image with the latest service packs. This ensures the smoothest possible migration.*

Migrating from Microsoft Analysis Services 2005

If your installation of SAS Cost and Profitability Management contains a large number of cubes or a small number of very large cubes, you may find that they exceed the capacity of a 32-bit version of SSAS – even though they fit comfortably in a 32-bit version of MSAS. You have several options to mitigate this problem:

- Enable the Microsoft "3GB mode"
- Optimize the configuration settings of your SSAS instance
- Use a 64-bit version of SSAS

The first step, enabling the "3GB mode," may be necessary because it appears that SSAS uses system memory resources less efficiently than MSAS. Enabling the "3GB mode" increases the system memory available to SSAS from 2 GB to 3 GB. In situations where SSAS is managing many cubes or large cubes, enabling this option often increases performance and capacity.

Second, optimizing your SSAS settings may also be necessary. When installed, SSAS uses default settings for memory allocation, how it performs aggregations, etc. Many of these settings can be customized to improve performance or increase capacity on your system.

Finally, switching to a 64-bit version of SSAS (and SQL Server) running on a 64-bit operating system may also improve performance because 64-bit applications can access more memory. But be aware that simply installing a 64-bit version of the software on existing hardware might not produce noticeable performance or capacity gains. Both 32- and 64-bit versions of SSAS initialize many settings based on your hardware configuration. Without any custom configuration, both versions may create the same default settings that produce identical behavior on the same hardware.

For more information on all these topics, refer to the Microsoft documentation for *SQL Server Analysis Services*: `https://docs.microsoft.com/en-us/sql/analysis-services/server-properties/memory-properties?view=sql-server-2017`.

Migrating Cubes

At this point in the migration, you have cleaned up the physical cubes and, if using SAS OLAP, any of the metadata for those cubes as well.

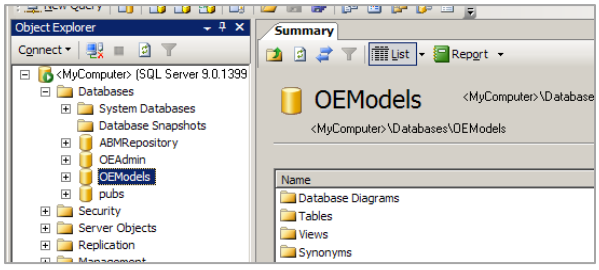
However, SAS Cost and Profitability Management also stores a small amount of data about the cubes that are available for viewing. This data must also be removed. This step is not performed automatically as part of the database upgrade process (Chapter 9). Instead, you must manually run two queries from your database management application.

Tip: *When you recreate your cubes using SAS Cost and Profitability Management 8.4, your saved OLAP Views will automatically access the new cubes.*

Microsoft SQL Server 2005

Take the following steps to remove data that corresponds to old cubes:

1. Launch the **SQL Server Management Studio** application from the **Start** menu.
2. Log in using your SAS Activity-Based Management database credentials. The user account can be the SQL Server database user that you created for SAS Activity-Based Management 7.x to access the database. Make sure that the **Server type** option is set to **Database engine**.
3. Expand the root folder, and then expand the **Databases** folder.
4. Select the folder representing the SAS Activity-Based Management 7.x database.



5. Right-click the folder and select **New Query**.

6. Paste the following two queries into the query window:

```
delete from WorkspaceNode where ObjectId in (select id from
WorkspaceObject where Type = 34);

delete from WorkspaceObject where Type = 34;
```

7. Click the **Execute** button on the toolbar.
8. Close the **SQL Server Management Studio** application. You do not need to save these temporary queries.

Oracle 11g

Several Oracle tools are available to execute the required queries to delete old cube data. These instructions represent one option.

1. Launch the **Oracle SQL Developer** application.
2. Expand the connection in the left pane if you have already have a connection to your SAS Activity-Based Management 7.x models' schema. Or create a new connection if necessary. When the connection has opened, the top right pane in the **Oracle SQL Developer** application is the query window.
3. Paste the following two queries into the query window:

```
delete from WorkspaceNode where ObjectId in (select id from
WorkspaceObject where Type = 3

delete from WorkspaceObject where Type = 34
```

4. Click **Run script** on the toolbar.
5. Close the **Oracle SQL Developer** application.

Appendix D – Debug Configuration Guide

This appendix discusses how to change logging properties. This advanced topic is typically used with the guidance of SAS Technical Support to monitor your SAS Cost and Profitability Management installation.

Logging

SAS Cost and Profitability Management 8.4 provides logging for the server applications as well as server diagnostics.

Model Server Logging

Model server logging is controlled by the ABMLogConfig.xml file in your configuration directory:

Windows: *CONFIGHOME*\SASApp\ABMServer\config

UNIX: *CONFIGHOME*/SASApp/ABMServer/config

The log file AbmLog_M*ModelID*.log is stored in the configuration directory that you selected.

Windows: *CONFIGHOME*\SASApp\ABMServer\Logs

UNIX: *CONFIGHOME*/SASApp/ABMServer/Logs

Default logging categories that are provided with the deployment are as follows:

```
<logger name="com.sas.solutions.abm.mdlsvr.model">
<logger name="com.sas.solutions.abm.mdlsvr.storage">
```

Different logical categories for the logging are as follows:

```
<logger name="com.sas.solutions.abm.mdlsvr.model">
<logger name="com.sas.solutions.abm.mdlsvr.storage">
<logger name="com.sas.solutions.abm.mdlsvr.oroscmd">
<logger name="com.sas.solutions.abm.mdlsvr.database">
<logger name="com.sas.solutions.abm.mdlsvr.rdbms">
<logger name="com.sas.solutions.abm.mdlsvr.operation">
<logger name="com.sas.solutions.abm.mdlsvr.equation">
<logger name="com.sas.solutions.abm.mdlsvr.biztier">
<logger name="com.sas.solutions.abm.mdlsvr.iom">
```

If logging is required for other logical areas, you can add entries to the ABMLogConfig.xml file.

Here is an example:

```
<logger name="com.sas.solutions.abm.mdlsvr.operation" additivity="false">
    <level value="INFO" />
    <appender-ref ref="filer" />
 </logger>
```

The different logging levels are as follows:

INFO – The default logging level. Provides information messages.

WARN – Logs warning messages.

ERROR – Logs any errors encountered while executing.

DEBUG – The detailed logging level, which provides debug information. Use it only when debugging an issue because it might create a large log file.

For detailed logging, set DEBUG under the respective category in the ABMLogConfig.xml file.

Here is an example:

```
<logger name="com.sas.solutions.abm.mdlsvr.model" additivity="false">
   <level value="DEBUG" />
   <appender-ref ref="filer" />
</logger>
```

Mid-Tier Logging

Mid-tier logging is controlled by the `SASCostAndProfitabilityManagement-log4j.xml` file in your configuration directory.

Windows: *CONFIGHOME*`\Web\Common\LogConfig`

UNIX: *CONFIGHOME*`/Web/Common/LogConfig`

The log file name is `SASCostAndProfitabilityManagement8.4.log`, and it is created in your configuration directory.

Windows: *CONFIGHOME*`\Web\Logs`

UNIX: *CONFIGHOME*`/Web/Logs`

Different logical categories for the SAS Cost and Profitability Management logging are as follows:

```
<category name="com.sas.solutions.abm.server.webservices">
<category name="com.sas.solutions.abm.server.bt">
<category name="com.sas.solutions.abm.server.core">
<category name="com.sas.solutions.abm.server.db">
<category name="com.sas.solutions.abm.server.common">
<category name="com.sas.solutions.abm.server.webservices.webappcore">
```

The different logging levels are as follows:

INFO – This is the default logging level. It provides information messages.

WARN – This will log the warning messages.

ERROR – This will log the errors encountered while executing.

DEBUG – The detailed logging level, which provides debug information. Use it only when debugging an issue because it might create a large log file.

For detailed logging, set DEBUG under the respective categories in the log4J.xml file.

Here is an example:

```
<category additivity="false" name="com.sas.solutions.abm.server.webservices">
<priority value="DEBUG" />
    <appender-ref ref="SAS_FILE" />
</category>
```

Server Diagnostic Logging

Server diagnostic logging is controlled by the log4j.properties file located in the following directory:

Windows: *SASHOME*\SASCostAndProfitabilityManagementServer\8.4\diagnostic

UNIX: *SASHOME*/SASCostAndProfitabilityManagementServer/8.4/diagnostic

The log, named `sas.solutions.abm.server.diagnostic.log`, is created in the same directory. The logging level is initially set to Warn.

Appendix E – Model Backup and Restore

This appendix details the backup and restore process for SAS Cost and Profitability Management models.

In all versions of SAS Activity-Based Management, the models were stored inside a relational database. In version 8.4, models are now stored in a file on disk on the *Model Server* and are optimized for fast loading into memory. It is very important to back up SAS Cost and Profitability Management models on a regular basis to recover from any catastrophic error.

Important: *To run the Model Backup and Restore Utility on Linux, you must use the same external user credentials that you specified in SDW for Model Server.*

No model should be open in either Read or Write mode while running Model Backup and Restore. Either the model user or an administrator can release locks on the models from the SAS Cost and Profitability Management client.

To back up SAS Cost and Profitability Management models, take the following steps on the *Model Server*.

1. Make sure all users have logged out of SAS Cost and Profitability Management.
2. Stop the SAS Object Spawner.
3. Open a command window.
4. Change the directory to

   SASHOME\SASFoundation\9.4\abmiomsvr\sasexe (Windows) or
   SASHOME/SASFoundation/9.4/sasexe (Linux).
5. Run the following command:

   Windows:
   ```
   AbmMdlMigration.exe -backup -src=MDLFOLDER -dst=BACKUPFOLDER
   -appcfg=CONFIGFOLDER > backup.log
   ```

   Linux:
   ```
   export LD_LIBRARY_PATH=<SASHOME>/SASFoundation/9.4
   /sasexe:$LD_LIBRARY_PATH./AbmMdlMigration -backup -src=MDLFOLDER
   -dst=BACKUPFOLDER -appcfg=CONFIGFOLDER > backup.log
   ```

   Where:

   MDLFOLDER: Specifies the directory where SAS Cost and Profitability Management models will be stored on the *Model Server*. The default location is *CONFIGHOME*\SASApp\ABMServer\Models.

   BACKUPFOLDER: Specifies the folder where you want to back up SAS Cost and Profitability Management models. Verify that the specified folder exists and is empty.

   CONFIGFOLDER: Specifies the configuration folder for SAS Cost and Profitability Management solution. The default location is *CONFIGHOME*\SASApp\ABMServer\config.

Here is an example of the backup command:

Windows:

```
AbmMdlMigration.exe -backup -src="C:\SAS\Config\Lev1\SASApp
\ABMServer\Models" -dst="C:\ModelBackup\May2014" -appcfg="C:\SAS
\Config\Lev1\SASApp\ABMServer\config" > backup.log
```

Linux:

```
export
LD_LIBRARY_PATH/local/install/users/cfgsas1/SASHome/SASFoundation/9.4
/sasexe:$LD_LIBRARY_PATH
```

```
./AbmMdlMigration -backup -src=/local/install/users/cfgsas1/SrcModels
-dst=/local/install/users/cfgsas1/DstModels -appcfg=/local
/install/users/cfgsas1/SASConfig/Lev1/SASApp/ABMServer/config >
backup.log
```

When you are executing the Backup operation on Oracle Linux, perform the following steps:

1. Perform steps 1 and 2 that are specified above.
2. If the database for SAS Cost and Profitability Management is PostgreSQL, set the following path to the LD_LIBRARY_PATH variable:

   ```
   */usr/local/lib:/usr/local/lib64:<SASHome>/AccessClients/9.4/PostgreS
   QL/lib:<SASHome>/SASFoundation/9.4/sasexe"
   ```

   If the database for SAS Cost and Profitability Management is Oracle, set the following path to the LD_LIBRARY_PATH variable:

   ```
   */usr/local/lib:/usr/local/lib64:<SASHome>/AccessClients/9.4/Oracle/
   lib:<SASHome>/SASFoundation/9.4/sasexe"
   ```

3. Run the backup utility.
4. Close the Oracle Linux session and then log back on.
5. Restart the Object Spawner.

To restore SAS Cost and Profitability Management models, take the following steps on the Model Server:

1. Verify that all users have logged out of SAS Cost and Profitability Management.
2. Stop the SAS Object Spawner.
3. Open a command window.
4. Change the directory to one of the following:

   SASHOME\SASFoundation\9.4\abmiomsvr\sasexe (Windows) or *SASHOME*/SASFoundation/9.4/sasexe (Linux).

5. Run the following command (note that variables are in italics):

   Windows:

   ```
   AbmMdlMigration.exe -restore -src=BACKUPFOLDER -dst=MDLFOLDER
   -appcfg=CONFIGFOLDER > restore.log
   ```

   Linux:

   ```
   export LD_LIBRARY_PATH=SASHOME/SASFoundation/9.4
   ```

```
/sasexe:$LD_LIBRARY_PATH./AbmMdlMigration -restore -src=<BACKUPFOLDER
-dst=MDLFOLDER -appcfg=CONFIGFOLDER > restore.log
```

Where:

BACKUPFOLDER: Specifies the model backup folder.

MDLFOLDER: Specifies the folder location where SAS Cost and Profitability Management models will be stored on the *Model Server*. The default location is *CONFIGHOME*\SASApp\ABMServer\Models.

CONFIGFOLDER: Specifies the configuration folder for SAS Cost and Profitability Management. The default location is *CONFIGHOME*\SASApp\ABMServer\config.

Here are examples of the restore command:

Windows:

```
AbmMdlMigration.exe -restore -src="C:\ModelBackup\May2014"
-dst="C:\SAS\Config\Lev1\SASApp\ABMServer\Models" -appcfg="C:\SAS
\Config\Lev1\SASApp\ABMServer\config" > restore.log
```

Linux:

```
export LD_LIBRARY_PATH:/local/install/users/cfgsas1/SASHome
/SASFoundation/9.4/sasexe:$LD_LIBRARY_PATH./AbmMdlMigration
-restore -src=/local/install/users/cfgsas1/DstModels -dst=/local/install
/users/cfgsas1/Dst2Models -appcfg=/local/install/users/cfgsas1
/SASConfig/Lev1/SASApp/ABMServer/config > restore.log
```

The restore command first renames any existing models to give them a `.bak` file extension and then restores the models from the backup directory.

When you are executing the Restore operation on Oracle Linux perform the following steps:

1. Perform steps 1 and 2 that are specified above.
2. If the database for SAS Cost and Profitability Management is PostgreSQL, set the following path to the LD_LIBRARY_PATH variable:

   ```
   */usr/local/lib:/usr/local/lib64:<SASHome>/AccessClients/9.4/PostgreS
   QL/lib:<SASHome>/SASFoundation/9.4/sasexe”
   ```

3. If the database for SAS Cost and Profitability Management is Oracle, set the following path to the LD_LIBRARY_PATH variable:

   ```
   */usr/local/lib:/usr/local/lib64:<SASHome>/AccessClients/9.4/Oracle/l
   ib:<SASHome>/SASFoundation/9.4/sasexe”
   ```

4. Run the Restore utility.
5. Close the Oracle Linux session and then log back on.
6. Restart the Object Spawner.

Appendix F – ODBC Data Sources on Linux

The ODBC Data Source Names (DSNs) are defined on Linux (and other UNIX platforms) in text files (odbc.ini and odbcinist.ini) and by exporting two shell variables: `ODBCINI` and `ODBCINST`. Make sure that the two `.ini` files are accessible and that variables are defined for all SAS Cost and Profitability Users (both interactive and system). The contents of odbc.ini and odbcinst.ini are determined by ODBC Manager and the database driver.

Note: *SAS Cost and Profitability Management includes the required ODBC drivers for both Oracle and PostgreSQL. For Oracle, it is deployed at `$SASHOME/AccessClients/9.4/Oracle`. For PostgreSQL, it is deployed at `$SASHOME/AccessClients/9.4/PostGres`.*

Oracle

SAS Cost and Profitability Management uses the non-wired DataDirect driver for Oracle. Add or update the following properties in the odbc.ini file (italics indicate values that are specific to your environment):

[ODBC] section:

- `InstallDir=install_path_of_ODBC_driver`
  For example, `InstallDir=$SASHome/AccessClients/9.4/Oracle`
- `TraceDll=`*`install_path`*`/lib/S0trc27.so`
  For example, `TraceDll=$SASHome/AccessClients/9.4/Oracle/lib/S0trc27.so`

[Oracle Wire Protocol] section:

- Rename this section to match the name of the DSN that was used while configuring SAS Cost and Profitability Management.
  For example, `ABMDSN_Lev1`
- `Driver=`*`install_path`*`/lib/S0ora27.so`
  Change this driver name and use the non-wired ODBC driver, S0or827.so.
  For example, `Driver=$SASHome/AccessClients/9.4/Oracle/lib/S0or827.so`
- `Database=database_name`
- `HostName=Oracle_host`
- `PortNumber=Oracle_server_port`
- `EnableDescribeParam=1`
- `EnableNcharSupport=1`
- `ColumnsAsChar=1`
- `ColumnSizeAsCharacter=1`
- `IANAAppCodePage=106`
- `ServerName=`*`ServiceName`*

Add or update that path to odbc.ini in the `.profile` and in `$SASConfig/Lev1/level_usermods_env.sh`.

You can define ODBCINI and ODBCINST variables at a global location, for example, /etc/profile. Or you can define them for a specific SAS installation configuration only. The best place to define the variables for a SAS installation is *CONFIGHOME*/level_env_usermods.sh.

You must also modify the PATH and LD_LIBRARY_PATH variables to include database binaries and libraries.

Here is an example of changes in *CONFIGHOME*/level_env_usermods.sh for Oracle:

```
ORACLE_HOME=Oracle_installation_folder
ORACLE_SID=Oracle_SID
ODBCINI=$SASHOME/AccessClients/9.4/Oracle/odbc.ini
ODBCINST=$SASHOME/AccessClients/9.4/Oracle/odbcinst.ini
LD_LIBRARY_PATH=$SASHOME/AccessClients/9.4/Oracle/lib:$ORACLE_HOME/lib:
$LD_LIBRARY_PATH
PATH=$SASHOME/AccessClients/9.4/Oracle/lib:$ORACLE_HOME/bin:$PATH

export ORACLE_HOME
export ORACLE_SID
export ODBCINI
export ODBCINST
export LD_LIBRARY_PATH
export PATH
```

After modifying these files, you must restart the Object Spawner.

PostgreSQL

Add or update the following properties in the odbc.ini file (italics indicate values that are specific to your environment):

[ODBC] section:

- InstallDir=install_path_of_ODBC_driver
  For example, InstallDir=$SASHome/AccessClients/9.4/PostgreSQL
- TraceDll=*install_path*/lib/S0trc27.so
  For example,
  TraceDll=$SASHome/AccessClients/9.4/PostgreSQL/lib/S0trc27.so

[Postgres Wire Protocol] section:

- Rename this section to match the name of the DSN that was used while configuring SAS Cost and Profitability Management.
  For example, ABMDSN_Lev1
- Driver=*install-path*/lib/S0psql27.so
  Replace *install-path* with the actual path to the driver.
  For example, Driver=/install/SASHome/AccessClients/9.4/PostgreSQL /lib/S0psql27.so
- Database=*database-name*
- HostName=*Postgres-Host*
- PortNumber=*Postgres-Server-Port*

Add or update the path for `odbc.ini` in the `.profile` and in `$SASConfig/Lev1/level_usermods_env.sh`.

You can define `ODBCINI` and `ODBCINST` variables at a global location, for example, `/etc/profile`. Or you can define them for a specific SAS installation configuration only. The best place to define the variables for a SAS installation is *`CONFIGHOME`*`/level_env_usermods.sh`.

You must also modify the `PATH` and `LD_LIBRARY_PATH` variables to include database binaries and libraries.

Here is an example of changes in `CONFIGHOME/level_env_usermods.sh` for PostgreSQL:

```
ODBCINI=$SASHOME/AccessClients/9.4/PostgreSQL/odbc.ini
ODBCINST=$SASHOME/AccessClients/9.4/PostgreSQL/odbcinst.ini
LD_LIBRARY_PATH=$SASHOME/AccessClients/9.4/PostgreSQL
/lib:$LD_LIBRARY_PATH
PATH=$SASHOME/AccessClients/9.4/PostgreSQL/lib:$PATH

export ODBCINI
export ODBCINST
export LD_LIBRARY_PATH
export PATH
```

After modifying these files, you must restart the Object Spawner.

Appendix G – Enabling SSL on the Model Server

If you are configuring SAS Web Application Servers to use HTTPS, you must also specify the security certificate on the Model Server.

Linux

Take the following steps to create the certificate on Linux:

1. Create a `.pem` file for the chained certificate, if you have not done so already. Run the following command to create the file:

   `openssl x509 -in .crt file with path –out .pem file with path-outform PEM`

2. Use your preferred text editor to modify the following file:
   CONFIGHOME`/SASApp/ABMServer/ABMServer.sh`

   Add the following to the `CMD_OPTIONS` variable:

   `-SSLCALISTLOC .pem file with path`

   For example, if you generated the `servercert.pem` file in `/usr/ssl`, the `CMD_OPTIONS` in *CONFIGHOME*`/SASApp/ABMServer/ABMServer.sh` would look like this:

   `CMD_OPTIONS=" -logconfigloc $CONFIGDIR/logconfig.xml –SSLCALISTLOC /usr/ssl/servercert.pem"`

3. Restart the Object Spawner.

Windows

Take the following steps to create the certificate on Windows:

1. Open the Microsoft Management Console (MMC) by running `mmc.exe` as Administrator.
2. If you do not have Certificate Manager installed in MMC, install it:
   a) From the File menu, select **Add/Remove Snap In**.
   b) Select **Certificates** from the Available Standalone Snap-ins dialog box, and click **Add**.
   c) Select **Computer Account** and click **Next**.
   d) Select **Local Computer** and click **Finish**.
   e) Click **OK**.
3. In the left pane, expand **Certificates (Local Computer)→Trusted Root Certification Authorities**.
4. In the left pane, locate **Certificates (Local Computer)→Trusted Root Certification Authorities**. Right-click **Certificates** and select **All Tasks.**
5. Click **Import**.
6. Browse to the certificate and click **Next**.
7. Select **Place all certificates in the following store** and click **Browse**.
8. In the Select Certificate Store dialog box, click **Show physical store**.

9. Expand **Trusted Root Certification Authorities** and select **Local Computer**.
10. Click **Next**, and then **Finish** to import the certificate.
11. Restart the Object Spawner.

Appendix H – Memory Settings

This section describes the recommended memory settings for each server process that is used by SAS Cost and Profitability Management 8.4. This section does not provide physical memory requirements for various servers. The suggested memory settings apply to all server operating systems.

Suggested Memory Settings on Servers

Below are the suggested memory settings by model size. These values are estimates because the real memory consumption depends on multiple factors, such as the number of accounts, assignments, period/scenario, dimension structure, etc. For purposes of this document, the suggested memory allocation applies to all SAS servers.

Small models

Number of Accounts:	1,000
Number of Assignments:	5-10 times the number of Accounts
Suggested Memory:	1 GB

Medium models

Number of Accounts:	10,000
Number of Assignments:	5-10 times the number of Accounts
Suggested Memory:	2 GB

Large models

Number of Accounts:	200,000
Number of Assignments:	5-10 times the number of Accounts
Suggested Memory:	8 GB

Huge models

Number of Accounts:	1,000,000
Number of Assignments:	5-10 times the number of Accounts
Suggested Memory:	16 GB

Adjusting Memory Settings on Servers

Cost and Profitability Management Mid-Tier

To adjust memory settings for the Middle Tier:

1. Use your preferred text editor to modify the following file:
   SASConfig/LevelN/Web/WebAppServer/SASServer9_1/conf/wrapper.conf
2. Change the value of – Xmx. The value is specified in MB. As an example, a max heap size of 2 GB would be -Xmx2048m.

   Specifying a maximum heap size does not necessarily mean that the Java process will take that much memory right away. Instead, this value specifies the maximum amount of memory that a Java process is allowed to allocate.
3. Restart SASServer9 for the change in memory settings to take effect.

SAS OLAP Server

If you experience memory-related issues while creating a SAS OLAP cube, the memory settings for the Workspace server that is generating the cube require modifications. Typically the Workspace server that is generating OLAP cubes is installed on the same machine as your OLAP server.

Use your preferred text editor to modify the following file:
SASConfig`/`*Level*`/SASApp/WorkspaceServer/sasv9_usermods.cfg`

Increase the values for the following options (substitute actual values for the italicized variables):

```
-memsize memsizeG
-sortsize sortsizeG
```

Both the `memsize` and `sortsize` values are in GB. For example, a `memsize` of 2 GB and a `sortsize` of 1 GB would be specified as follows:

```
-memsize 2G
-sortsize 1G
```

SAS does not automatically reserve or allocate the amount of memory that you specify in the `memsize` or `sortsize` system option. Instead, SAS uses only as much memory as it requires to complete a process.

A change in a Workspace server setting requires the Object Spawner to be restarted on that machine.

Reference

For more information, see *SAS 9.4 Web Applications: Tuning for Performance and Scalability*, located at http://support.sas.com/documentation/cdl/en/appsrvtuning/66878/PDF/default/appsrvtuning.pdf

Appendix I –SAS Visual Analytics Report Migration

This appendix describes the migration of SAS Visual Analytics reports from SAS Cost and Profitability Management 8.1, 8.1M2 and 8.1M4 to version 8.4.

With SAS Cost and Profitability Management 8.1M5 and later, the SAS Visual Analytics reports are stored at the following location: `/Products/SAS Cost and Profitability Management/VA Reports`. In previous versions they were stored at `/Products/Visual Analytics Administrator`.

Take the following steps to rebuild your reports at the new location after upgrading to version 8.4.

1. From SAS Cost and Profitability Management Client, launch the Metadata Server Options dialog box.
2. Select **CPM LASR library** as your LASR library.
3. Start the appropriate SAS LASR Analytic server.
4. Review the list of tables on the **LASR Tables** tab. Notice that all of the existing tables defined are in the `/Products/SAS Visual Analytics Administrator` Location.

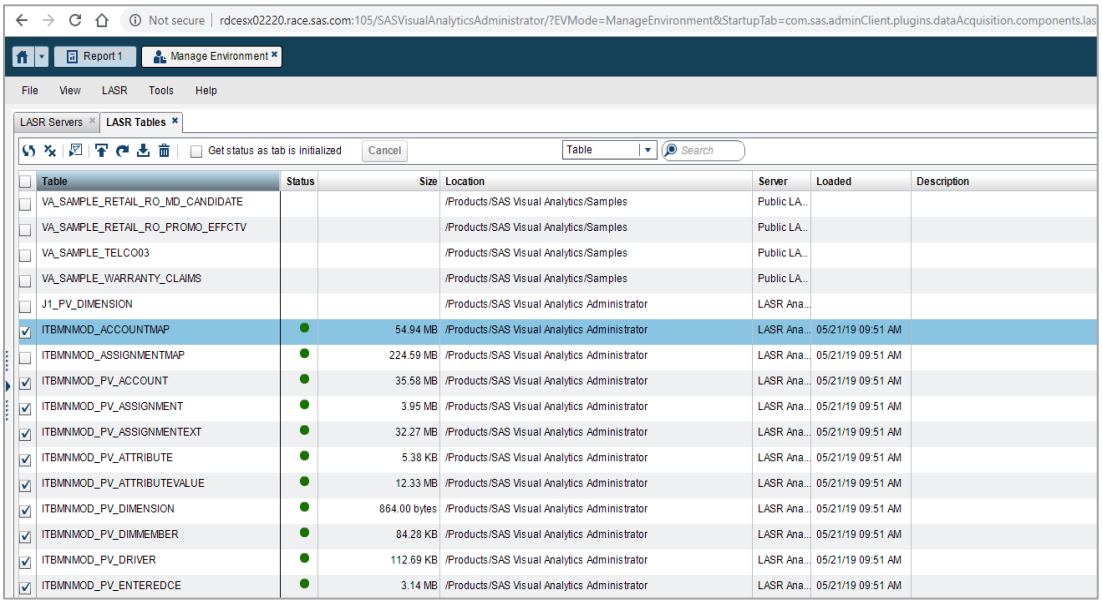
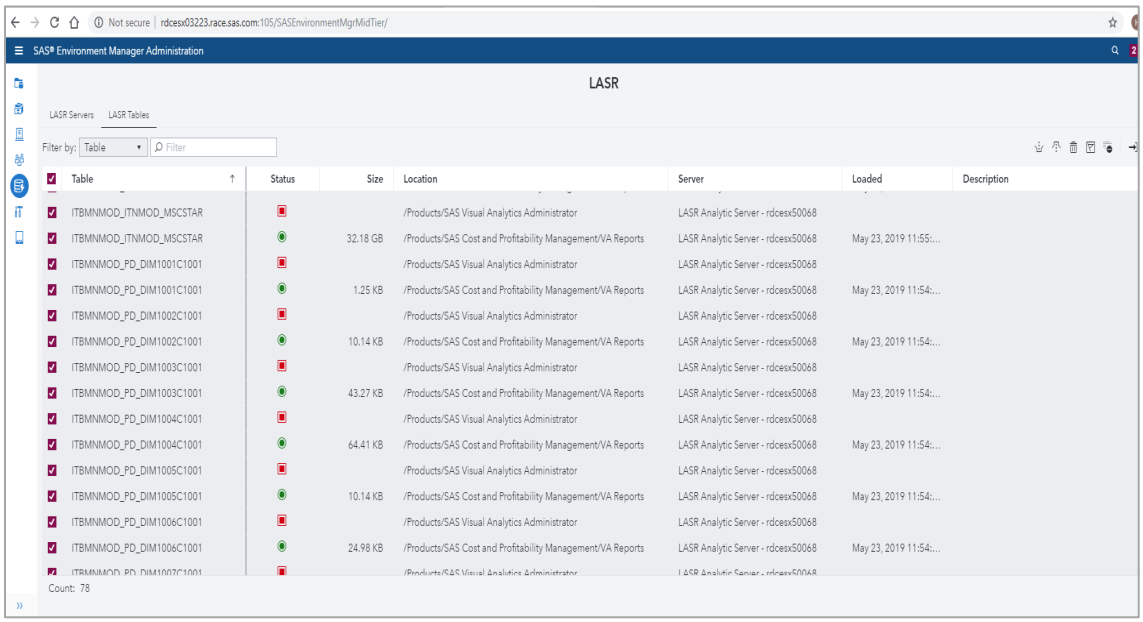


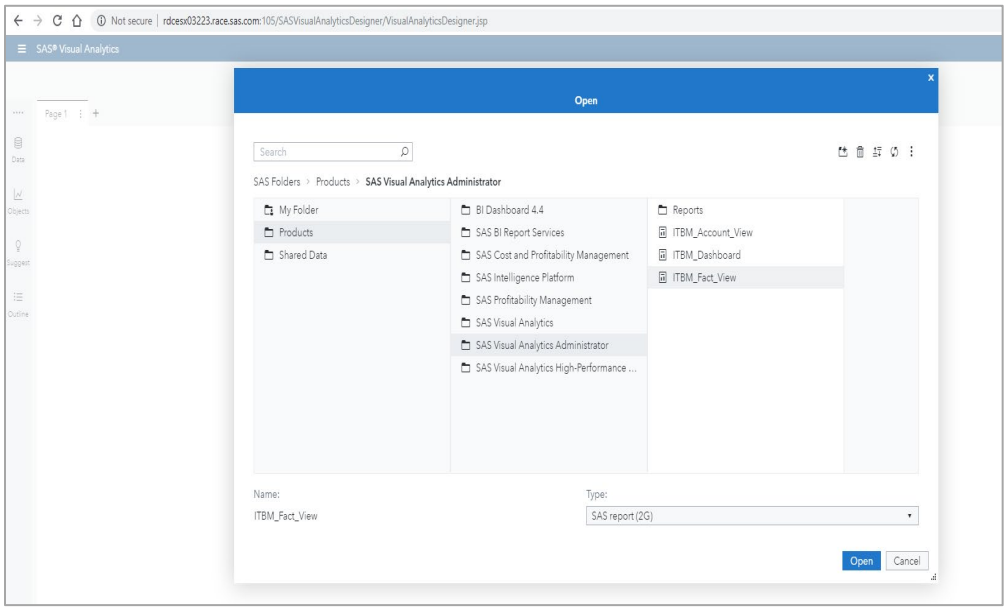
Table	Status	Size	Location	Server	Loaded	Description
VA_SAMPLE_RETAIL_RO_MD_CANDIDATE			/Products/SAS Visual Analytics/Samples	Public LA...		
VA_SAMPLE_RETAIL_RO_PROMO_EFFCTV			/Products/SAS Visual Analytics/Samples	Public LA...		
VA_SAMPLE_TELCO03			/Products/SAS Visual Analytics/Samples	Public LA...		
VA_SAMPLE_WARRANTY_CLAIMS			/Products/SAS Visual Analytics/Samples	Public LA...		
J1_PV_DIMENSION			/Products/SAS Visual Analytics Administrator	LASR Ana...		
ITBMNMOD_ACCOUNTMAP	●	54.94 MB	/Products/SAS Visual Analytics Administrator	LASR Ana...	05/21/19 09:51 AM	
ITBMNMOD_ASSIGNMENTMAP	●	224.59 MB	/Products/SAS Visual Analytics Administrator	LASR Ana...	05/21/19 09:51 AM	
ITBMNMOD_PV_ACCOUNT	●	35.58 MB	/Products/SAS Visual Analytics Administrator	LASR Ana...	05/21/19 09:51 AM	
ITBMNMOD_PV_ASSIGNMENT	●	3.95 MB	/Products/SAS Visual Analytics Administrator	LASR Ana...	05/21/19 09:51 AM	
ITBMNMOD_PV_ASSIGNMENTEXT	●	32.27 MB	/Products/SAS Visual Analytics Administrator	LASR Ana...	05/21/19 09:51 AM	
ITBMNMOD_PV_ATTRIBUTE	●	5.38 KB	/Products/SAS Visual Analytics Administrator	LASR Ana...	05/21/19 09:51 AM	
ITBMNMOD_PV_ATTRIBUTEVALUE	●	12.33 MB	/Products/SAS Visual Analytics Administrator	LASR Ana...	05/21/19 09:51 AM	
ITBMNMOD_PV_DIMENSION	●	864.00 bytes	/Products/SAS Visual Analytics Administrator	LASR Ana...	05/21/19 09:51 AM	
ITBMNMOD_PV_DIMMEMBER	●	84.28 KB	/Products/SAS Visual Analytics Administrator	LASR Ana...	05/21/19 09:51 AM	
ITBMNMOD_PV_DRIVER	●	112.69 KB	/Products/SAS Visual Analytics Administrator	LASR Ana...	05/21/19 09:51 AM	
ITBMNMOD_PV_ENTEREDCE	●	3.14 MB	/Products/SAS Visual Analytics Administrator	LASR Ana...	05/21/19 09:51 AM	

5. From SAS Cost and Profitability Management Client, perform the Export and Register Tables procedure. Make sure that the operation is successful and that the tables are registered successfully.
6. From SAS Cost and Profitability Management Client, perform the Generate Cube procedure for the cube configuration with the **Push to LASR** option selected.

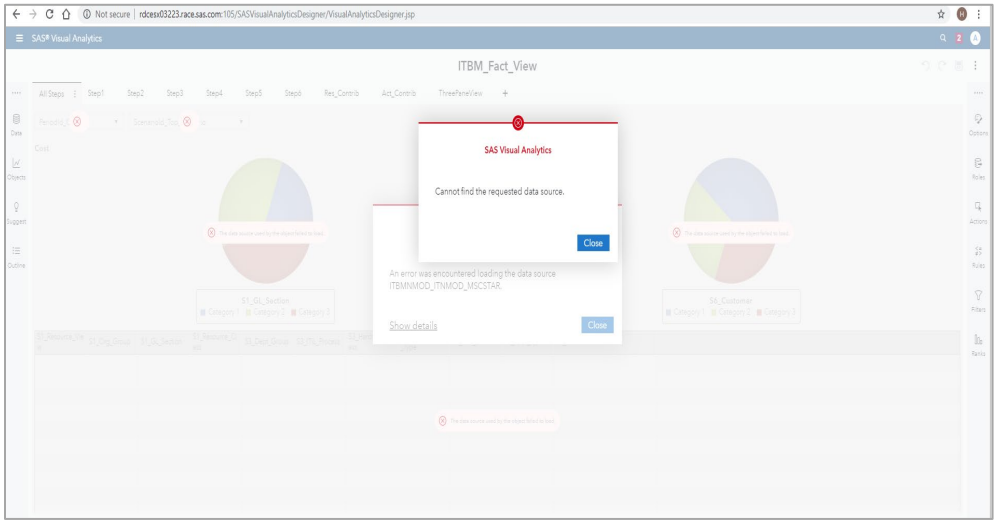
   Verify that the operation has succeeded, and that the tables are registered correctly.
7. Return to SAS Visual Analytics Administrator.
8. Review the list on the LASR Tables tab. Note that the new tables are loaded in the location `/Products/SAS Cost and Profitability Management/VA Reports` (with green indicators). The old tables that are not loaded are in the old location, `/Products/Visual Analytics Administrator`, and have a red indicator.



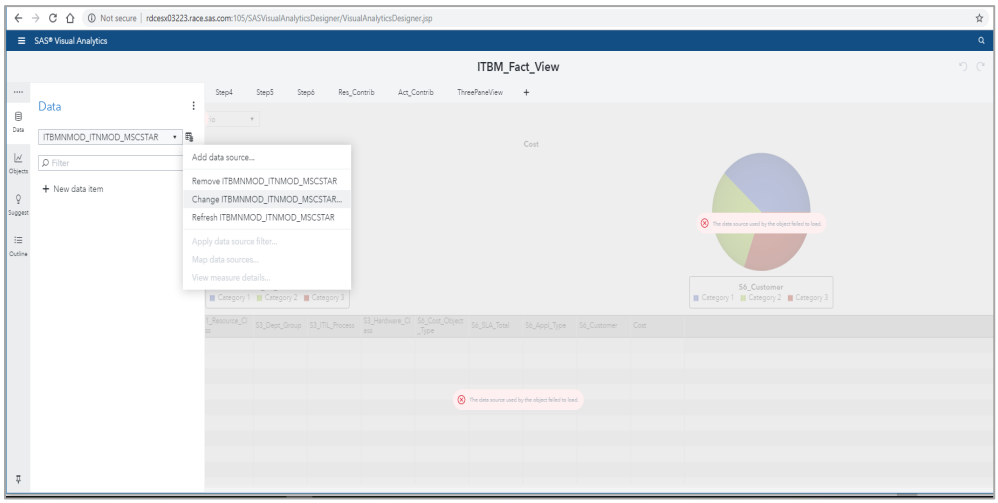
9. Open Report Builder and navigate to the report that you created in a previous release of SAS Cost and Profitability Management.

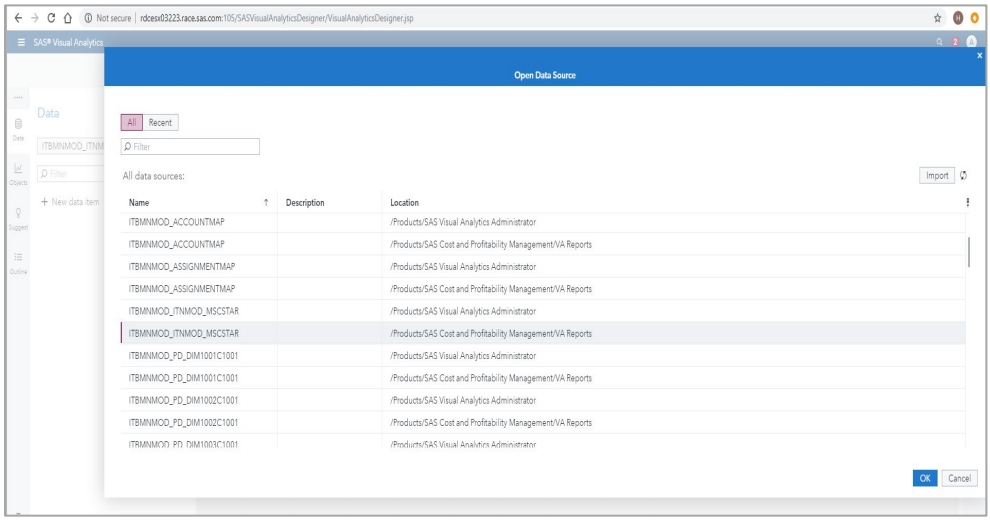


10. Because the source table has a changed library location, you are prompted to change the data source.

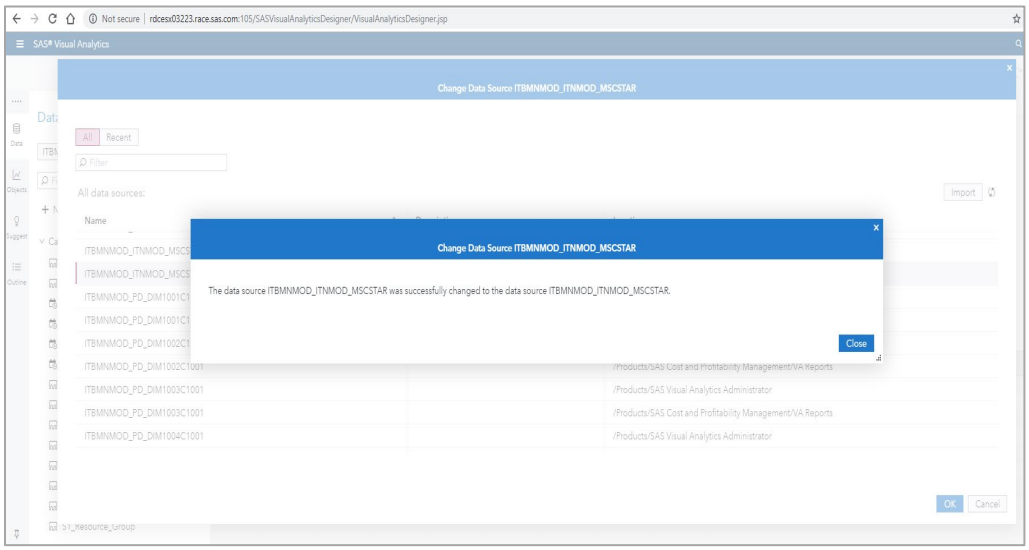


11. Select the new table from the Products/SAS Cost and Profitability Management/Visual Analytics Reports location.

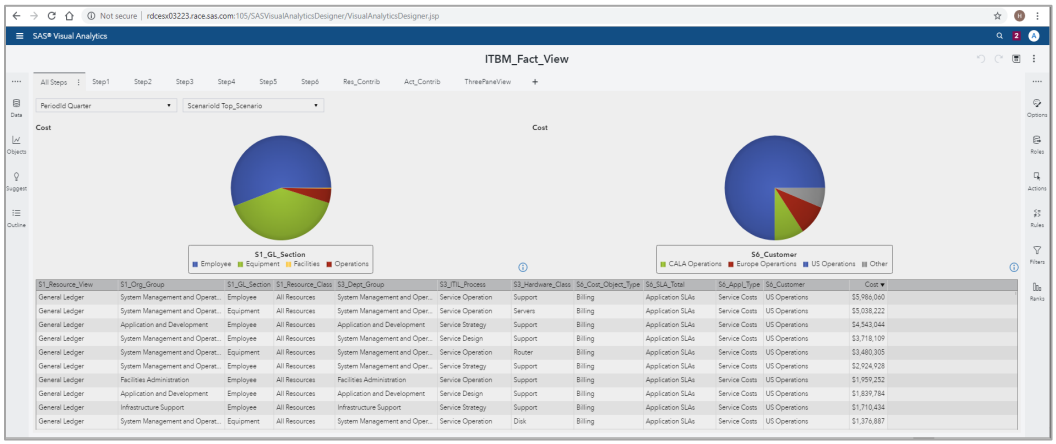




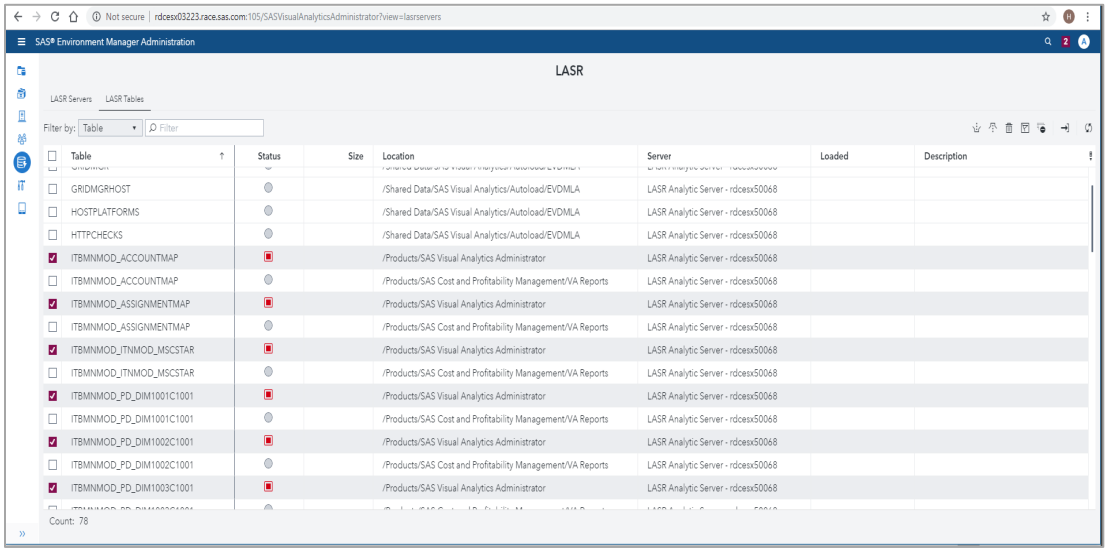
12. Click **OK**. The following message is displayed:



13. Verify that the report displays the same results that you saw before you updated your SAS solution software to release 8.4.

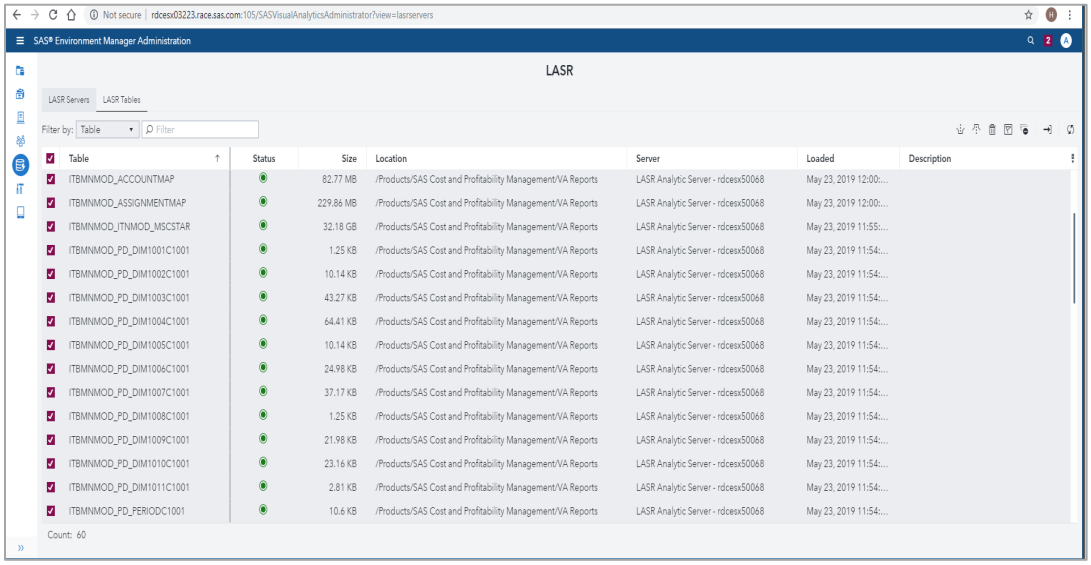


14. Save the report so that in future, users can directly open it from Report Viewer and the error that instructs you to change the data source will not be displayed.
15. Repeat steps 9 to 14 for all the other reports that were created in a previous release of the software.
16. Return to SAS Visual Analytics Administrator and delete all the tables in metadata that refer to the old path: `/Products/SAS Visual Analytics Administrator`. Delete a table by selecting the check box and clicking **Delete**.



17. You are prompted to confirm the deletion.

    After the Delete operation completes, the tables that are displayed in metadata inside SAS Visual Analytics Administrator are in the new location.



Appendix J – TLS 1.2 Configuration

SAS Cost and Profitability Management supports TLS 1.2-enabled SQL Server, Oracle and PostgreSQL databases. This appendix describes the post configuration steps needed to enable TLS 1.2. This is an advanced topic and you can contact SAS Technical Support for their guidance on this.

Enabling TLS 1.2 for Microsoft SQL Server Databases

Before proceeding, verify that your instance of Microsoft SQL Server is TLS 1.2-enabled. For more information, refer to the Microsoft documentation.

1. Open the Windows Registry and verify that all the protocols (SSL 2.0, SSL 3.0, TLS 1.0, TLS 1.1, TLS 1.2) are available under **Computer → HKEY_LOCAL_MACHINE → SYSTEM → CurrentControlSet → Control → SecurityProviders → SCHANNEL**. If any are missing, you must add them.

   Take these steps on all the SAS Cost and Profitability Management servers, including the client machines. **BE SURE TO TAKE A BACKUP OF THE REGISTRY BEFORE MAKING ANY CHANGES.**

   Create two keys named "Client" and "Server" under each of the protocols, each with two DWORDs named "DisabledByDefault" and "Enabled".

   Under the keys TLS 1.2 → Client and TLS 1.2 → Server, set the value of `DisabledByDefault=0` and the value of `Enabled=1`. Under the other client and server keys shown in the image above, set the values of `DisabledByDefault=1` and the value of `Enabled=0`.

2. Verify the domain name.

   The machine name must be the fully qualified domain name (FQDN). For example, `myComputer010.myDirectory.sas.com` uses the correct syntax. If it is not the FQDN, add the domain name (for example, sas.com) to the machine name.

   Take the following steps:

   - Access the Properties panel on your machine (on Windows, right-click the Computer icon on your desktop and select **Properties**).
   - Click **Advanced system settings** in the left pane.
   - Click the **Computer Name** tab.
   - Click **Change**.
   - Click **More**.
   - Enter your domain name in the **Primary DNS suffix** field.
   - Click **OK** and restart the machine.
   - Verify that your full machine name is now the FQDN.

   Take these steps on the Mid-tier, Compute-tier, and Database machines.

3. Make the following changes in the settings.xml file on the Compute-tier machine:

   - Locate the file: `$DRIVE:\SAS Config Folder\Lev1\SASApp\ABMServer \config\settings.xml`
   - Update the following tag above the `</settings>` section:

```
<!--
    Specify if the Database is TLS 1.2 Enabled. 1 if Yes 0
if No
  -->
<TLSEnabled>1</TLSEnabled>
```

- If the database is TLS-enabled, the value will be 1; otherwise, it is 0.

4. Make the following changes in the server.xml file on the Middle-tier machine:
   - File location: `$DRIVE:\SAS Config Folder\Lev1\Web\WebAppServer\SASServer9_1\conf\server.xml`
   - Add the tag "`encrypt=true;TrustServerCertificate=false;`" in the **URL** field of the SQL Server resource tag.

   It should resemble the following:

```
<Resource auth="Container"
driverClassName="com.microsoft.sqlserver.jdbc.SQLServerDriver"
factory="com.sas.vfabrictcsvr.atomikos.BeanFactory"
maxPoolSize="100" minPoolSize="10" name="sas/jdbc/abmDS"
password="${pw.sas.jdbc.abmDS}" testQuery="SELECT 1"
type="com.atomikos.jdbc.nonxa.AtomikosNonXADataSourceBean"
uniqueResourceName="sas/jdbc/abmDS"
url="jdbc:sqlserver://rdcesx16040.race.sas.com:1433;DatabaseNa
me=cpmdb;encrypt=true; TrustServerCertificate=false;"
user="cpmuser"/>
```

5. Perform ODBC driver updates on Mid-tier machines that have TLS 1.2 enabled.

   Verify that the **SQL Server Native Client Driver** on the Compute-tier machine is compatible with TLS 1.2. For more information, refer to the relevant Microsoft documentation.

6. Update the sqljdbc driver JAR file corresponding to your database version to the one that supports TLS 1.2. It is required to support TLS 1.2 from Microsoft.

   This driver needs to be updated in the following location on the Mid-tier machine: `$DRIVE:\SAS Config Folder\Lev1\Web\WebAppServer\SASServer9_1\lib`

7. Add a property to SAS Management Console:
   - Launch SAS Management Console and log in with an Unrestricted ID (for example, use the sasadm@saspw account).
   - Add the following property to Application Management → Configuration Manager → Cost and Profitability Mgmt 8.4 → Properties → Advanced tab:

     Property Name: `data.abmserver.db.host.tls.enabled`

     Property Value: `true`

8. Restart the SQL Server and SSAS (if present) services on the Database machine.
9. Restart the SASServer9_1 webapp server and Cost and Profitability Service (if present).
10. Restart the Object Spawner service.

Enabling TLS 1.2 for PostgreSQL Databases

If the PostgreSQL database is installed on Linux, contact SAS Technical Support for TLS-enabled PostgreSQL binaries. Update those binaries before proceeding further.

Before proceeding, make sure that PostgreSQL is TLS 1.2-enabled. For more information, refer to your PostgreSQL documentation.

Update the PostgreSQL database that is used by SAS Cost and Profitability Management:

1. Update the Postgres JAR file.

   Add the JAR file named postgresql-9.4.1212 (a compatible version that supports TLS 1.2) in the following location on the Mid-tier machine:
   `config_folder/Lev1/Web/WebAppServer/SASServer9_1/lib`

2. Modify the odbc.ini file on the Compute-tier machine.

   For Linux environments, add the following tags in odbc.ini:

   - Min_TLS=0
   - SSLCertFile=*path to root.crt*/root.crt
   - SSLKeyFile=*path to server.key*/server.key
   - SSLMode=require

   For Windows, configure `SSLMode = require` in the ODBC Driver Setup dialog box.

3. Make the following changes in the server.xml file on the Mid-tier machine:

   Add "`?ssl=true ?sslmode=require`" in the URL field of the Resource tag for the PostgreSQL database.

   It will resemble the following:

   ```
   <Resource auth="Container" driverClassName="org.postgresql.Driver"
   factory="com.sas.vfabrictcsvr.atomikos.BeanFactory" maxPoolSize="100"
   minPoolSize="10" name="sas/jdbc/abmDS"
   password="${pw.sas.jdbc.abmDS}" testQuery="SELECT 1"
   type="com.atomikos.jdbc.nonxa.AtomikosNonXADataSourceBean"
   uniqueResourceName="sas/jdbc/abmDS"
   url="jdbc:postgresql://rdcesx10052.race.sas.com:10332/abmmodels?ssl=
   true ?sslmode=require" user="cpmuser"/>
   ```

4. Add the exported certificate into the SAS Java keystore on the Mid-tier machine. For example:

   ```
   keytool -import -trustcacerts -keystore cacerts -storepass
   changeit -alias alias -file "file-name"
   ```

   You can also use SAS Deployment Manager to do this. Be sure to verify that the certificate was imported using the `keytool` command.

5. Make the following changes in the settings.xml file on the Compute-tier machine: (`C:\SAS\Config\Lev1\SASApp\ABMServer\config\settings.xml`):

   Update the following tag above the `</settings>` section:

   ```
   <!--
            Specify if the Database is TLS 1.2 Enabled. 1 if Yes
   0 if No
       -->
      <TLSEnabled>1</TLSEnabled>
   ```

   If the database is TLS-enabled, then the value will be 1; otherwise, it is 0.

6. Add a property to SAS Management Console:

   - Launch SAS Management Console and log in with an Unrestricted ID. For example, use the sasadm@saspw account.
   - Add the following property to **Application Management → Configuration Manager → Cost and Profitability Mgmt 8.4 → Properties → Advanced** tab:

Property Name: `data.abmserver.db.host.tls.enabled`

Property Value: `true`

7. Restart the PostgreSQL server.
8. Restart the Object Spawner service and SAS server 9.

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