SAS® Studio 3.8: Administrator's Guide

Contents

Using This Book

Audience

This book is intended for administrators who are installing and configuring SAS Studio in a SAS 9.4 environment.

Requirements

SAS Studio is available if your site licenses SAS in Windows environments, SAS Integration Technologies, or SAS In-Memory Statistics for Hadoop. SAS Studio can be deployed in Windows, UNIX, and z/OS operating environments.

This document assumes that you have completed the steps in your Software Order E-mail and created your SAS Software Depot.

Chapter 1

Introduction to SAS Studio

Overview of SAS Studio

SAS Studio is a development application for SAS that you access through your web browser. With SAS Studio, you can access your data files, libraries, and existing programs, and you can write new programs. You can also use the predefined tasks in SAS Studio to generate SAS code. When you run a program or task, SAS Studio connects to a SAS server to process the SAS code. The SAS server can be a hosted server in a cloud environment, a server in your local environment, or a copy of SAS on your local machine. After the code is processed, the results are returned to SAS Studio in your browser.

SAS Studio is available in three deployments: SAS Studio Mid-Tier (the enterprise edition), SAS Studio Single-User, and SAS Studio Basic.

SAS Studio Mid-Tier

The enterprise edition of SAS Studio is available if your site licenses SAS Integration Technologies. This edition includes the SAS Metadata Server, the SAS Web Application Server, the SAS Web Server, and the SAS Web Infrastructure Platform services, applications, and data server.

Server Tier	Middle Tier	Client Tier Windows or Macintosh Operating Systems
SAS Metadata Server	SAS Web Application Server	SAS Studio Web Interface
SAS Object Spawner	SAS Studio Mid-Tier	Web browser
SAS Workspace Servers	SAS Web Infrastructure Platform	
SAS Stored Process Server	SAS Web Server	
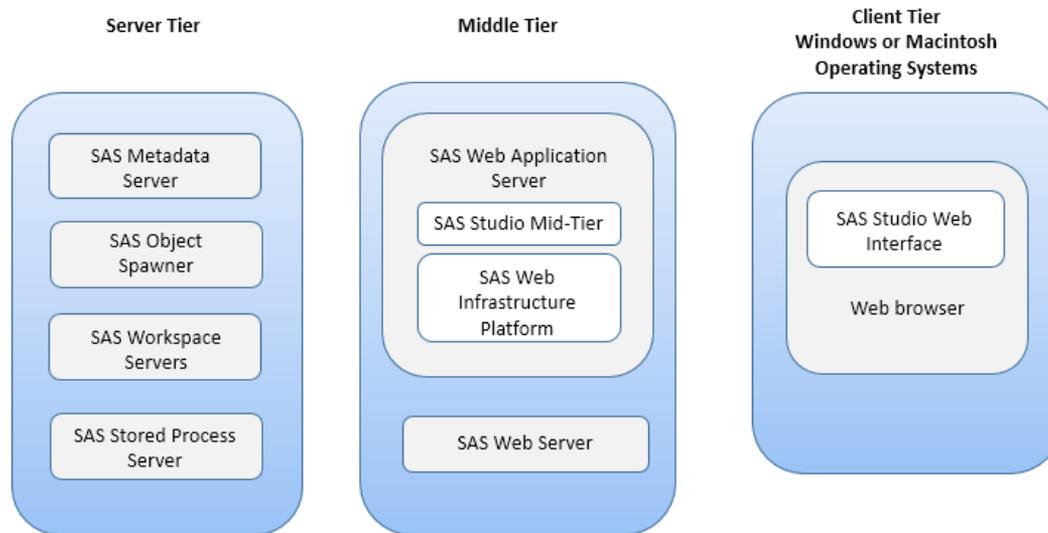
To use SAS Studio with a z/OS environment, the SAS middle tier must be a Windows or UNIX operating environment. The z/OS environment should be your server tier.

SAS Studio Single-User

The single-user edition of SAS Studio is delivered with Base SAS and runs on Windows operating environments. Because everything is installed on a single computer, users can access local files. There is no need to upload data or programs. For the single-user edition, all the parts of SAS Studio are installed on the same machine, and only one user identity is allowed access.

Client Tier
Windows Operating System
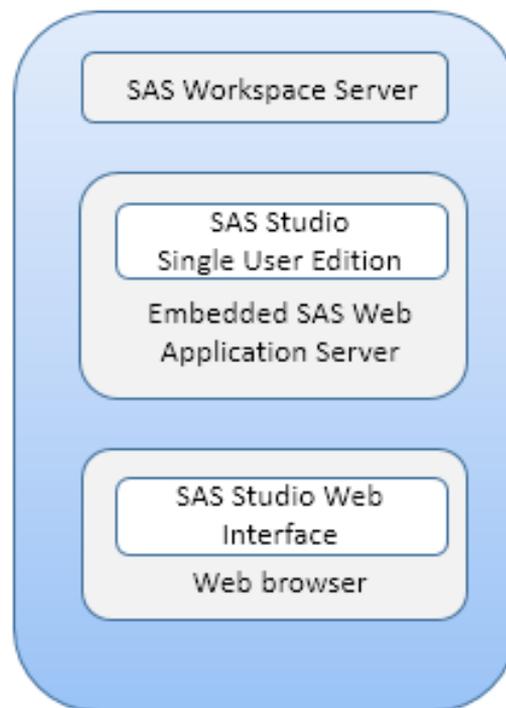
Note: The single-user edition does not support the email service that is available in the
SAS Studio Mid-Tier and SAS Studio Basic editions.

SAS Studio Basic

The basic edition of SAS Studio is delivered with Base SAS and runs on Windows and
UNIX operating environments. This edition includes the SAS Web Application Server
and the SAS Object Spawner. Any user who has an operating system account on the
Windows or UNIX machine can log on through a web browser over the network.

```
Server Tier and Middle Tier          Client Tier
Windows or UNIX Operating        Windows or Macintosh
       Systems                    Operating Systems

   ┌─────────────────────┐       ┌─────────────────────┐
   │ SAS Object Spawner  │       │  SAS Studio Web     │
   └─────────────────────┘       │    Interface        │
                                 │                     │
   ┌─────────────────────┐       │   Web browser       │
   │ SAS Workspace Servers│      └─────────────────────┘
   └─────────────────────┘

   ┌─────────────────────┐
   │ SAS Web Application  │
   │      Server          │
   │  ┌───────────────┐   │
   │  │  SAS Studio   │   │
   │  │ Basic Edition │   │
   │  └───────────────┘   │
   └─────────────────────┘
```
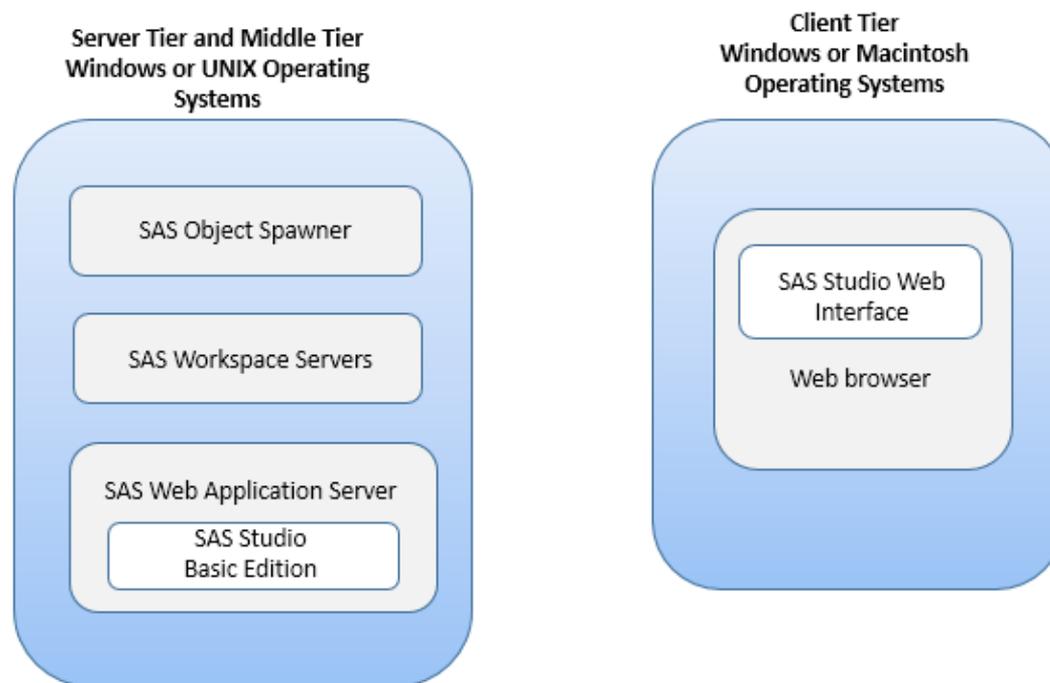
Using SAS Studio with a SAS Grid

SAS Studio can take advantage of the processing capabilities of a SAS Grid. The approach that you take to add grid support depends on the edition of SAS Studio that you are using.

For more information, see "Using SAS Studio with a SAS Grid" in *Grid Computing in SAS*.

Using SAS Studio with a CAS Server

The SAS Viya platform is the third generation of high-performance in-memory analytics. In SAS Viya, the data is held in memory, which means that complex algorithms and other analytical and statistical operations run very fast. The high-performance processing power of the SAS Viya platform is SAS Cloud Analytic Services (CAS). CAS is a server that provides the run-time environment for data management and analytics with SAS. (Run-time environment refers to the combination of hardware and software where data management and analytics take place.)

To configure SAS Studio to connect to a deployed CAS server, set the CASHOST and CASPORT options in a SAS autoexec file.

* To edit the SAS autoexec file by user, click and select **Edit Autoexec File**.

* To edit the autoexec file for all users at your site, add these options to the autoexec file for the SAS Workspace Server:

  * For SAS Studio Basic, add the CASHOST and CASPORT options to the autoexec_usermods.sas file. Example paths for this file are **studioconfig**

> `\workspaceserver\autoexec_usermods.sas` (Windows) and
> `studioconfig/workspaceserver/autoexec_usermods.sas` (UNIX).

- For the SAS Studio Mid-Tier (Enterprise) edition, add the CASHOST and CASPORT options to the autoexec_usermods.sas file for your deployment. Example paths are `Config\Lev1\SASApp\appserver \autoexec_usermods.sas` (Windows) and `config/Lev1/SASApp/ WorkspaceServer/autoexec_usermods.sas` (UNIX).

Use the STUDIO_CAS_INIT macro to customize your connection to the CAS server. Here is a simple example:

```
%macro studio_cas_init;
   cas;
   caslib _all_ assign;
%mend;
```

For more information about how to customize your CAS connection, see the CAS Statement in *SAS Cloud Analytic Services: User's Guide*.

Migrating Custom Tasks and Snippets

SAS Studio users can create custom tasks and snippets. These customized tasks and snippets are saved in their **My Tasks** and **My Snippets** folders, respectively. This content is saved in the user's home directory along with the SAS code. When you migrate to a new release of SAS Studio, these tasks and snippets (along with any other content in the user's home directory) is not migrated.

To continue using custom tasks and snippets from a previous release, you must copy the files from the source machine to the target machine. For snippets, the source directory contains a .sas file for each snippet. The `mysnippets.json.txt` file contains information about each snippet, including the location. You can edit the `mysnippets.json.txt` to change host-specific paths or other information.

Chapter 2

SAS Studio Mid-Tier

Installation and Configuration Process for SAS Studio Mid-Tier

You install the enterprise edition of SAS Studio by using the SAS Deployment Wizard. The enterprise edition can be installed across multiple machines. You must use a deployment plan, which contains information about what software should be installed and configured on each machine in a SAS deployment. A deployment plan is stored in a plan.xml file.

After installing the software, you might need to complete some post-configuration steps, such as setting up your users in the metadata.

How to Install SAS Studio Mid-Tier

To install and configure the enterprise edition of SAS Studio, use the SAS Deployment Wizard and follow the basic process that is described in *SAS Intelligence Platform: Installation and Configuration Guide*. Some steps in the SAS Deployment Wizard are specific to installing and configuring SAS Studio. Here is the information that you need to install SAS Studio:

1. Start the SAS Deployment Wizard from your SAS Software Depot. In a Windows system environment, double-click `setup.exe` in your SAS Software Depot folder. In UNIX environments, run `setup.sh`.

   The SAS Deployment Wizard opens.

2. In the Specify Deployment Plan step, select your deployment plan.

   Note: SAS Studio is installed as part of SAS Integration Technologies, so any plan that includes SAS Integration Technologies and the SAS Web Infrastructure Platform also includes SAS Studio.

3. In the Select Deployment Step and Products to Install step, verify that SAS Integration Technologies appears in the list of products to install.

4. Complete the remaining steps in the SAS Deployment Wizard by using the information for your site.

Setting Up Users in the Metadata

After you install the enterprise edition of SAS Studio, you need to specify your users in the metadata. You can do this by using SAS Management Console.

1. Open SAS Management Console.

   • In Windows operating environments, select **Start** ⇨ **Programs** ⇨ **SAS** ⇨ **SAS Management Console 9.4**.

   • In UNIX operating environments, run `SASHome/ SASManagementConsole/9.4/sasmc`.

2. In the Log On dialog box, enter `sasadm@saspw` as the user ID and the password for this account. (You specified this password when you created the sasadm account in the SAS Deployment Wizard.)

3. On the **Plug-ins** tab, expand the **SAS Management Console** ⇨ **Environment Management** folders.

4. Right-click **User Manager** and select **New** ⇨ **User**. The New User Properties dialog box appears.

5. On the **General** tab, specify the name of the user.

6. Click the **Accounts** tab, and then click **New**. The New Login Properties dialog box appears.

7. In the **User ID** text box, enter the operating system account for the user. Click **OK**.

Note: If your deployment supports Integration Windows Authentication (IWA), you need to use two logons. For the first logon, include the domain with your user ID, such as *domain\user ID*. For the second logon, use only your user ID.

8. Click **OK** to close the New User Properties dialog box.

T I P   You can also specify your users in the metadata by using SAS Environment Manager. For more information, see *SAS Environment Manager: User's Guide*

Setting PUBLIC Access

About PUBLIC Access

PUBLIC access enables unregistered users to participate if they can authenticate to the metadata server (directly or through a trust mechanism). Unregistered users are referred to as PUBLIC-only users because their only SAS identity is that of the PUBLIC group. A PUBLIC-only user has the logons, permissions, and capabilities of the PUBLIC group. A PUBLIC-only user cannot belong to any other groups, or have any personal logons, or have any specialized (individual) access controls. Not all applications allow a PUBLIC-only user to log on.

How to Enable PUBLIC Access in SAS Studio

To enable PUBLIC access, complete these steps in SAS Management Console:

1. Provide the necessary repository-level access.

   On the **Plug-ins**, tab, under **Authorization Manager** ⇨ **Access Control Templates** right-click the repository ACT (**Default ACT**) and select **Properties**. On the **Permission Pattern** tab, grant the ReadMetadata and WriteMetadata to PUBLIC.

   Note: Even users who consume only content need both of these permissions at the repository level, because some applications write system information about user activity, even during what appears to be a view-only transaction.

2. Provide Read access as needed.

   On the **Folders** tab, grant the PUBLIC group Read permission for any information maps, cubes, and MLE data that you want to make universally available. A good approach is to create a folder branch for such content. Next, set the grant on the top folder in that branch and allow the grant to flow through the branch.

   Note: Users also need ReadMetadata permission to folders and content objects. In general, it is not necessary to grant specific permissions because this permission must flow through from the ACT into the public areas of the folder tree (for navigational purposes).

   Note: If you want to allow everyone (including unregistered users) to contribute content to a particular folder, grant the PUBLIC group WriteMemberMetadata permission on that folder's **Authorization** tab.

3. Review role assignments for the PUBLIC group.

   On the **Plug-ins** tab, under **User Manager**, right-click the PUBLIC group and select **Properties**. Review the PUBLIC group's role memberships. Often, no adjustments are necessary, because the initial role assignments give the PUBLIC group basic capabilities.

4. Ensure that the PUBLIC group can use servers.

   a. On the **Plug-ins** tab, under **Server Manager**, verify that the PUBLIC group has the ReadMetadata permission for any servers that the PUBLIC-only users access.

   b. If necessary, add one or more logons on the PUBLIC group's **Accounts** tab (for example, to provide seamless access to a third-party DBMS).

   c. If you have configured client-side pooling, verify that PUBLIC is a designated puddle group.

5. Configure middle-tier properties applications to accept PUBLIC-only users.

   a. On the **Plug-ins** tab, navigate to **Application Management** ⇨ **Configuration Manager**. Select **SAS Application Infrastructure**, and then select **SAS Studio Mid-Tier**.

      Note: Not all deployments include and use all components.

   b. For SAS Studio, set the **App.PublicIdAllowed** property to **true**. (This property is on the **Advanced** tab of the properties dialog box for SAS Studio Mid-Tier.)

      Note: If the **App.PublicIdAllowed** property is not available, click **Add** to add it.

   c. In order for the changes to take effect, restart the SAS Web Infrastructure Services Application and then restart SAS Studio.

Adding Users to the SAS Studio: Usage Role

Users who are assigned to the SAS Studio: Usage role have access to SAS Studio. Administrators assign users to this role by using SAS Management Console.

By default, members of the SASUSERS group are assigned this role, so all SAS users at your site should have access to SAS Studio. If you remove this role from the SASUSERS group, you can assign this role to individual users or groups.

To add a user or group to a role:

1. Start SAS Management Console and connect as a SAS administrator (for example, sasadm@saspw).

2. Create a metadata account for the user in SAS Management Console and associate that account with the operating system account. For more information, see "Setting Up Users in the Metadata" on page 8.

3. In the User Manager, right-click the user and select **Properties**. The Properties dialog box appears.

4. Click the **Groups and Roles** tab.

5. Assign the user to the desired role.

6. Click **OK**.

Configuring the Mail Service for SAS Studio Mid-Tier

To use the email functionality in SAS Studio, an SMTP server and the following information are required:

• the host name of the SMTP server for the outbound mail.

• the port for the SMTP server.

• the user name that accesses the SMTP server. This user name is not necessarily the person who is sending the mail.

• the password for the user name that accesses the SMTP server.

In SAS Studio Mid-Tier, the **From** email address is the administrator email that you specified as **Sender of messages** in SAS Management Console.

About Locked-down Functionality

You can limit the reach and activities of a SAS server by putting it in a locked-down state. When SAS Studio enables you to navigate the server file system, there is a limited view of the server file system when the server is in a locked-down state. SAS Studio does not require the addition of any paths to the lock-down path list.

For more information, see *SAS Intelligence Platform: Security Administration Guide*.

Log On to SAS Studio

1. Open a web browser to http://*hostname*:*port*/SASStudio. (To determine this URL, see the SAS Studio Mid-Tier section of the Instructions.html file.)

   The SAS Logon Manager appears.

2. Log on using the credentials for your operating system account. (The user ID for your operating system account matches the user ID in the metadata. For more information, see "Setting Up Users in the Metadata" on page 8.)

   Note: You cannot log on using sasadm@saspw, the account for the SAS administrator.

SAS Studio opens.

Working with SAS Workspace Servers

About SAS Workspace Servers in the SAS Studio Mid-Tier Edition

In your deployment of SAS Studio Mid-Tier, you can have multiple SAS Workspace Servers. Depending on where your content is saved, you might need to connect to a different SAS Workspace Server. Once you select a SAS Workspace Server, the selection persists, and this is your default SAS Workspace Server when you launch SAS Studio. By default, SAS Studio connects to the first available workspace server.

Note: If you manually configured your servers, you must set the reconnect option to allow SAS Studio to reconnect to a server. When you manually configure your servers, the reconnect option is turned off by default, so if a user must disconnect from a server, the user cannot reconnect to that server.

To access the content on a SAS Workspace Server, you must log on to the workspace server.

Note: If the workspace server is not in the same authentication domain as the metadata server, the logon for SAS Studio might not be valid for that workspace server. In this case, a logon with a user name and password must exist in the metadata for that user. The authentication domain of the logon must match the authentication domain of the workspace server. A mismatch of authentication domains might occur when the metadata server tier and SAS Server tier are on two different operating environments, such as Windows and UNIX. In this case, the SAS Studio user needs two logons (one for each authentication domain) defined in the metadata.

Select the SAS Workspace Servers to Display in SAS Studio

By default, a user of the SAS Studio Enterprise Edition can access all the workspace servers that are configured in the SAS Metadata Server. As a SAS administrator, you can specify which workspace servers are available by using the `sas.programming.server` attribute in SAS Management Console. If the value of the `sas.programming.server` attribute is `True`, the workspace server is available in SAS Studio. If this attribute is `False`, the workspace server is not available in SAS Studio.

You can also specify a default server by using the `sas.default.server` attribute. If you specify multiple default servers, SAS Studio treats the first server in the list as the default.

To set these attributes:

1. Log on to SAS Management Console.

2. On the **Plug-ins** tab, expand the **Server Manager** folder. Expand the node for the application server that you want to use.

3. Expand the node for the *server-name* **- Logical Workspace Server**. Then right-click the *server-name* **- Workspace Server** and select **Properties**. The Properties dialog box appears.

4. Click the **Extended Attributes** tab.

5. Click **New**.

    a.   Enter the name of the attribute. You can enter `sas.programming.server` or `sas.default.server` .

    b.   For the value of the attribute, enter `True` or `False`.

    c.   Click **OK**.

6.   Click **OK** in the Properties dialog box.

7.   Restart all the SAS object spawners.

How to Set Up Multiple SAS Workspace Servers with Different Root Directories

Create a New SAS Workspace Server

To create a new SAS Workspace Server:

1.   Log on to SAS Management Console.

2.   On the **Plug-ins** tab, right-click the **Server Manager** folder and select **New Server**. The New Server Wizard appears.

3.   For the SAS server, select **SAS Application Server** and click **Next**.

4.   In the next step, click **Next** again.

5.   Select **Workspace Server** and click **Next**.

6.   Click **Next** and in the last step, click **Finish**.

The new workspace server now appears in the left pane.

How to Set Up Different Root Directories

SAS Studio users access their files and folders from the **Server Files and Folders** section in the navigation pane. The root directories in this section are determined by the settings in SAS Management Console.

To set up different root directories:

1.   Open SAS Management Console.

2.   On the **Plug-ins** tab, expand the **Server Manager** folder, and then expand the *name-of-workspace-server* folder.

3.   Right-click the *name-of-workspace-server* – **Workspace Server** folder and select **Properties**. The Properties dialog box appears.

4.   Click the **Options** tab and click **Advanced Options**. The Advanced Options dialog box appears.

5.   Click the **File Navigation** tab to set these options:

    •   **SAS User Root** displays your home directory (for UNIX and z/OS environments) or your `My Documents` folder (for Windows environments) from the **Server Files and Folders** section. **SAS User Root** is the default setting.

Here is an example of **SAS User Root** in a Windows environment:
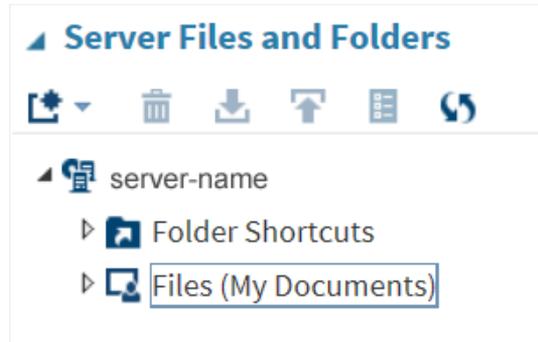
If you are connecting to a z/OS environment, a **My z/OS Files** node might also be available. This node contains any z/OS data sets that use the value of the SYSPREF option as the high-level qualifier. (Use PROC OPTIONS to determine the current setting of SYSPREF.)

In the **My z/OS Files** node, partitioned data sets and their members are displayed in a hierarchy. You can create folder shortcuts to these partitioned data sets. In the **Server Files and Folders** section, amber icons indicate that a node is from the z/OS file system.

- **System Root** displays your user root directory for that server and any drives on the selected server. By default, folder shortcuts are created to your home directory (for UNIX and z/OS environments) or to your `My Documents` folder (for Windows environments).

Here is an example of **System Root** in a Windows environment:
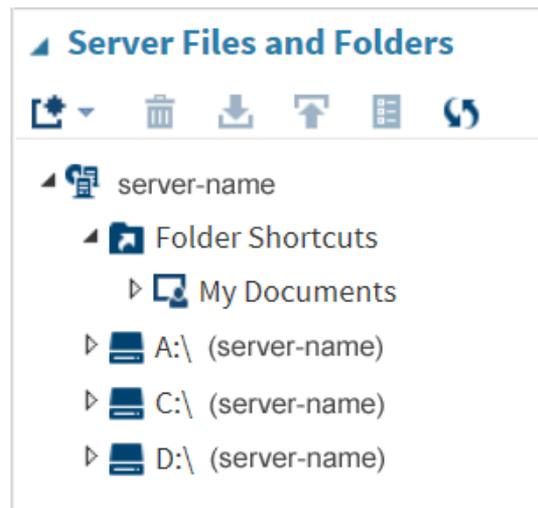
- **Path** enables you to specify the root directory for file navigation. You can use the `<userid>` token to specify different directory paths for individual users. The custom path that you specify must exist. An example of a directory path is `/tmp/<userid>`. If no tokens are specified, the root directory is the same for all SAS Studio users.

Here is an example of a custom root directory in a Windows environment:
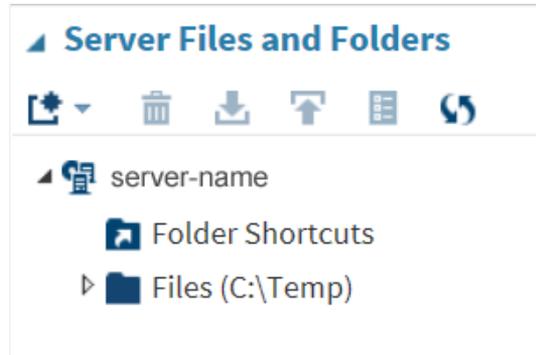
Select the SAS Workspace Server in the SAS Studio Mid-Tier Edition

In SAS Studio, a user can change the contents of the **Server Files and Folder** section by connecting to a different SAS Workspace Server. To change the SAS Workspace Server

in SAS Studio, click and select **Change SAS Workspace Server**. The SAS Studio user can select from these options:

- *server-name-1*, which is set by the **SAS User Root** option in SAS Management Console

- *server-name-2*, which is set by the **System Root** option in SAS Management Console

- *server-name-3*, which is set by the **Path** option in SAS Management Console

Enabling the SAS Workspace Server XCMD Option

When you are running the SAS Workspace Server in a UNIX environment for SAS Studio on a SAS 9.4 deployment, the XCMD option is turned off by default. As a result, you cannot use the SYSTEM function, the X command, or the PIPE option in a FILENAME statement. You must enable the SAS Workspace Server XCMD option to use this functionality.

To enable the XCMD option:

1. From SAS Management Console, expand the **Server Manager** node on the **Plug-ins** tab.

2. Expand **SASApp ⇨ SASApp - Logical Workspace Server**.

3. Right-click **SASApp - Workspace Server** and select **Properties**.

4. Select **Options ⇨ Advanced Options ⇨ Launch Properties**, and then select the **Allow XCMD** check box.

5. Click **OK**.

6. (Optional) Repeat steps 2–5 for each SAS Application Server that has a server type of Workspace Server.

7. Stop and restart your SAS Object Spawner.

Migrating from a Previous Release of SAS Studio

If you are migrating from a previous release, complete the steps in *SAS Intelligence Platform: Migration Guide* before installing the latest release of SAS Studio.

Chapter 3

SAS Studio Single-User

Installation Process for SAS Studio Single-User

The single-user edition of SAS Studio is delivered with Base SAS on Windows operating environments. Installing the single-user edition does not require a planned deployment. You can install the single-user edition of SAS Studio by using the SAS Deployment Wizard.

How to Install SAS Studio Single-User

To install the single-user edition of SAS Studio:

1. Start the SAS Deployment Wizard from your SAS Software Depot.

2. In the Choose Language dialog box, select the language for the SAS Deployment Wizard. Click **OK**.

3. In the Select Deployment Task step, select **Install SAS software**. Click **Next**.

4. In the Specify SAS Home step, select the `SASHome` directory. An example of this directory path is `C:\Program Files\SASHome`.

5. In the Select Products to Install step, verify that the **SAS Studio – Single User** check box is selected.

   Click **Next**.
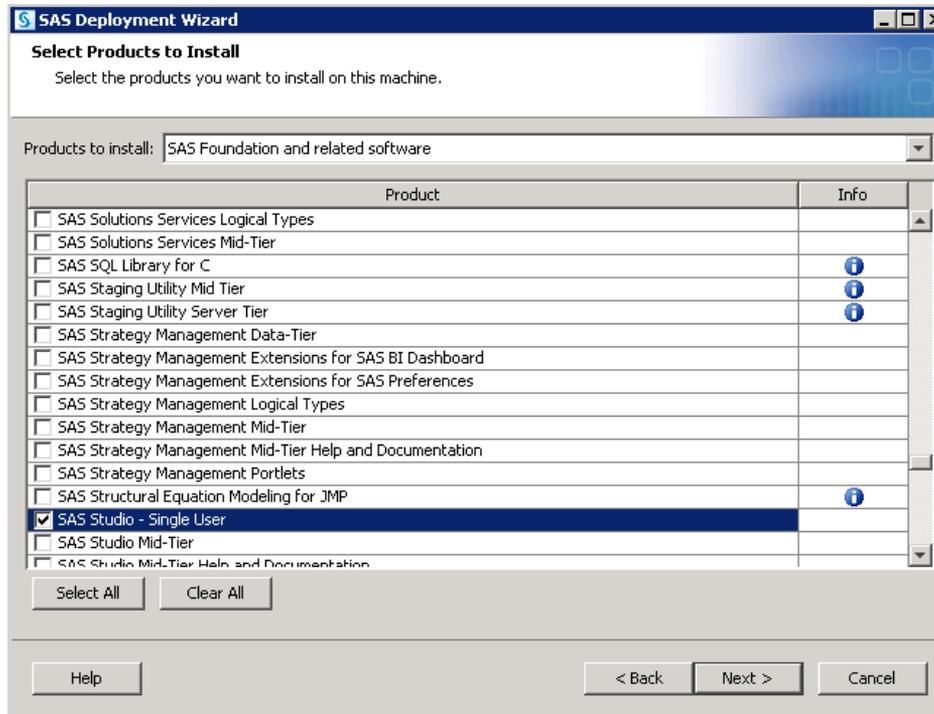
6. In the Specify SAS Installation Data File step, specify the full path for the SAS installation data file. Click **Next**.

7. In the Select Language Support step, select the languages for the products. Click **Next**.

8. In the Select Regional Settings step, click **Next**.

9. In the Select Authentication Type step, click **Next**.

10. In the Checking System step, click **Next** when the checking process is complete.

11. In the Deployment Summary step, click **Start**.

12. In the Deployment Complete step, click **Next**.

13. Carefully review the information in the Additional Resources step. Click **Finish** to close the SAS Deployment Wizard.

Starting SAS Studio

To start SAS Studio, select **Start ⇨ Programs ⇨ SAS ⇨ SAS Studio 3.8 (*n*-bit)**. In this example, *n* is 32 or 64, depending on whether you have a 32-bit or 64-bit order.

Note: You must have a JRE installed to run the Single-User edition.

The embedded SAS Web Application Server starts. (An icon appears in the Windows system tray.) Then your default web browser opens.

When you close the web browser, SAS Studio is still running because the embedded web application server is running. If you select **Start ⇨ Programs ⇨ SAS ⇨ SAS Studio 3.8 (*n*-bit)** again, the default web browser opens. To shut down the embedded web application server, right-click ⬛ in the system tray and select **Stop Server**.

File Navigation in SAS Studio Single-User Edition

Because the SAS Studio Single-User edition is installed directly on your local computer, you can access any files on your computer from the **Folders and Files** section in the navigation pane. By default, two folder shortcuts are created—one to your desktop and one to your **My Documents** folder.

Specifying the Web Browser to Use for SAS Studio

SAS Studio opens in the default browser for the local computer. You can specify an alternate browser for each user or for the entire machine.

To specify an alternate browser for a user:

1. In the **%userprofile%\.sasstudiohost_3.8** directory, create a file called **config.properties**.

2. In the **config.properties** file, set the BROWSERPATH property. Here is an example that uses Mozilla Firefox: **browserpath=C:\\Program Files (x86)\\Mozilla Firefox\\firefox.exe**

3. Save the **config.properties** file.

To specify an alternate browser for the local computer:

1. In the installation directory for SAS Studio (for example, **C:\Program Files \SASHome\SASStudioSingleUser\3.8**), open the **jvmoptions.cfg** file.

2. Add the **-D** option to set the browser path. In this example, the browser path is set for Microsoft Internet Explorer: **-Dbrowserpath=C:\Program Files \Internet Explorer\iexplore.exe**.

3. Save the **jvmoptions.cfg** file.

Uninstall SAS Studio Single-User

1. To start the SAS Deployment Manager, select **Start ⇨ Programs ⇨ SAS ⇨ SAS Deployment Manager**.

2. In the Select SAS Deployment Manager Task step, select **Uninstall SAS Software**.

3. In the Select SAS Products to Uninstall step, verify that all products are selected.

4. Complete the remaining steps in the SAS Deployment Manager and click **Finish**.

Chapter 4

SAS Studio Basic

Installation and Configuration Process for SAS Studio Basic

The basic edition of SAS Studio supports Windows and UNIX operating environments. Unlike the enterprise edition, installing the basic edition does not require a deployment

plan. However, before you can install the SAS Studio Basic edition, you must complete several prerequisite steps, such as selecting the directory for SASHome and the SAS Software Depot. To install SAS Studio Basic, use the SAS installer account.

Note: SAS does not support third-party proxy servers with the SAS Studio Basic edition. If you choose to use a reverse proxy server, you must configure and administer this proxy server. If you run into issues, SAS Technical Support might ask you to remove this proxy server.

How to Install and Configure SAS Studio Basic

Deployment Scenario with a Non-Planning Order

A deployment plan is not required to install and configure SAS Studio Basic.

To install and configure the basic edition of SAS Studio:

1. To start the SAS Deployment Wizard from your SAS Software Depot:

    *   In Windows environments, double-click **setup.exe**.

    *   In UNIX environments, run **setup.sh** at the command prompt.

2. In the Select Products to Install step, verify that the **SAS Foundation** and **SAS Studio Basic** check boxes are selected. If you are installing in a Windows environment, clear the check box for **SAS Studio Single User**.

    Click **Next**.

3. In the Select SAS Foundation Products step, verify that all products are selected. Click **Next**.

4. In the Configure SAS Studio Basic step, select the **Configure SAS Studio Basic** check box to configure SAS Studio Basic at this time. Click **Next**.

5. In the SAS Studio Basic Configuration Directory step, specify the directory to use for the configuration information.

    Note: This step is available only if you selected the **Configure SAS Studio Basic** check box in the previous step.

6. In the SAS Studio Basic Ports step, specify the ports for the SAS Web Application Server and the SAS Object Spawner. Typically, these port numbers are prefixed with the number 3.

7. (UNIX environments only) In the SAS Studio Basic Password Option step, specify whether you want to provide a sudo password. Providing a sudo password sets permissions on scripts that automatically start the services required by SAS Studio Basic.

8. (UNIX environments only) In the SAS Studio Basic Password step, specify the sudo password.

    Note: This step is available only if you selected the **Provide password** check box in the previous step.

9. In the SAS Studio Basic E-mail Support step, specify whether you intend to configure email support at this time.

10. In the SAS Studio Basic E-mail Server step, specify the connection information for the email server.

11. In the SAS Studio Basic E-mail Authentication step, specify the user ID and password required for authentication.

12. In the SAS Studio Basic Deployment Summary step, review the location of the SASStudioInstructions.html file. This file contains the start-up command for services (such as the SAS Object Spawner and the SAS Web Application) and the URL to use to open SAS Studio. By saving this information to an external file, you have access to this information after SAS Studio is installed. The path in this field was determined by the SAS Deployment Wizard based on your responses in previous steps.

13. In the Checking System step, click **Next** when the checking process is complete.

14. In the Deployment Summary step, click **Start**.

15. In the Deployment Complete step, click **Next**.

16. Carefully review the information in the Additional Resources step. Click **Finish** to close the SAS Deployment Wizard.

Deployment Scenario with a Planning Order

To install and configure the basic edition of SAS Studio:

1. To start the SAS Deployment Wizard from your SAS Software Depot:

    • In Windows environments, double-click `setup.exe`.

    • In UNIX environments, run `setup.sh` at the command prompt.

2. In the Select Deployment Type step, you can choose whether to install SAS Foundation and related software or to install additional software. Click **Next**.

3. In the Select Products to Install step, select the **SAS Studio Basic** check box. Click **Next**.

4. Continue through the SAS Deployment Wizard until you see the Configure SAS Studio Basic step. To configure SAS Studio Basic, select the **Configure SAS Studio Basic** check box. Click **Next**.

The configuration steps for SAS Studio Basic are the same regardless of whether you have a planning order. To complete the remaining configuration steps, start with step 12 in the instructions for installing SAS Studio Basic with a non-planning order.

Configuring User Authentication

UNIX Environments

Some SAS products include functionality that requires SAS to check user authentication and file access authorization. As a result, some files in your SAS installation must have setuid permissions and be owned by root. To set up the utilities that the spawner uses and to complete your deployment, run **SASHome/SASFoundation/9.4/utilities/bin/setuid.sh** as root. If you do not run this script, the setuid permissions are incorrect, and SAS Studio cannot spawn workspaces.

For more information, see the "Post-Installation Configuration for User Authentication and Identification" chapter in Configuration Guide for SAS Foundation for UNIX Environments.

Windows Environments

To log on to SAS Studio Basic, you must have the correct privileges. For more information, see "Window Privileges" in *SAS Intelligence Platform: Security Administration Guide* and Configuration Guide for SAS Foundation for Windows Environments.

Starting and Stopping the SAS Object Spawner and the SAS Web Application Server

Before you can open SAS Studio, you must start the SAS Object Spawner and the SAS Web Application Server. You then need to stop these services before you re-install, upgrade, or reconfigure SAS Studio.

In Windows environments, you can start and stop these services from the Control Panel. The SASStudioWebAppServer and SASStudioSpawner options are available from the services applet in the Control Panel.

In UNIX environments, the scripts that you use to re-install, upgrade, or reconfigure are located in the configuration directory that you specified when you installed the SAS Studio Basic edition. For example, to run the script that stops all services, enter `SAS-configuration-directory/sasstudio.sh stop`.

You can use these commands:

Command	Description
`sasstudio start`	Starts all services
`sasstudio stop`	Stops all services
`sasstudio status`	Shows the status of the services
`sasstudio restart`	Restarts the services

You can also start, stop, or restart only the SAS Object Spawner or only the SAS Web Application Server. Examples of these commands are `sasstudio stop webapp` and `sasstudio restart spawner.`

Note: In UNIX environments, you might have created a sudo password in the SAS Deployment Wizard when you installed and configured SAS Studio. If you did, you do not need to manually start the servers after deployment of SAS Studio completes.

Configuring the Mail Service for SAS Studio Basic

To use the email functionality in SAS Studio, an SMTP server and the following information are required:

- the host name of the SMTP server for the outbound mail.

- the port for the SMTP server.

- the user name that accesses the SMTP server. This user name is not necessarily the person who is sending the mail.

- the password for the user name that accesses the SMTP server.

When you install SAS Studio, the SAS Deployment Wizard prompts you for this information. The SAS Deployment Wizard uses these values for the mail configuration properties in the start-up scripts.

Here is an example:

```
#--- outgoing mail server properties
webdms.SMTP.hostName=mailhost.fyi.sas.com
webdms.SMTP.port=25
webdms.SMTP.user=site.administrator@your-company.com
webdms.SMTP.password=yourPassword

#-- domain for sender address
webdms.domain=your-company.com
```

When sending emails, the sender address is derived from the user name that logged on to SAS Studio and the value of the **webdms.domain** property in the **config.properties** file. For example, if the user name is test, the sender address is test@your-company.com.

Customizing the SAS Workspace Server

To customize umask or ulimit values for sessions that are created by the SAS Workspace Server, edit the **workspaceserver/workspaceserver_usermods.sh** file in the configuration directory for SAS Studio. For more information, see SAS Note 38040.

Enabling the X Commands

Windows Environments

To enable the X commands in a Windows environment:

1. In the Windows service, stop the SASStudioSpawner.

2. As an administrator, open a command window and enter this command: **sc delete "SASStudioSpawner"**.

3. Next, enter this command: **"C:\Program Files\SASHome\SASFoundation
   \9.4\objspawn.exe" –configFile "C:\sas\studioconfig\spawner
   \spawner.cfg" –install –name SASStudioSpawner –
   servicedescription "SAS Studio Object Spawner" –logconfigloc
   "C:\sas\studio\config\spawner\logconfig.xml" –allowxcmd**

   Note: These paths might be different at your site.

4. In the Windows service, select **Action** ⇨ **Refresh** to refresh the list of services.
   SASStudioSpawner should be listed.

5. Right-click **SASStudioSpawner** and select **Start**.

6. Log on to SAS Studio to see whether the X commands are enabled.

UNIX Environments

By default, the X commands are disabled. To enable these commands, edit the
spawner/spawner_usermods.sh file and specify the following command for the
USERMODS variable:

```
USERMODS="$JREOPTIONS -allowxcmd"
```

Add Support for Transport Layer Security (TLS)

SAS Studio 3.8 and 3.81

By default, SAS Studio Basic is not configured for HTTPS or encryption between the
web application server and the SAS Workspace Server.

To set up HTTPS between the web browser and the web application server that hosts
SAS Studio:

1. Create a new private key and keystore. Save this information in the keystore file
   named studio.keystore.

   • UNIX environments: At a command prompt, enter this command:

   ```
   $SAS_HOME/SASPrivateJavaRuntimeEnvironment/9.4/jre/bin/keytool -genkey
       -alias studio -keyalg RSA
       -keystore STUDIO_CONFIG_Directory/appserver/studio/conf/studio.keystore
       -storepass password -keypass password -validity 360 -keysize 2048
   ```

   • Window environments:

     1. Open a Windows command prompt as an administrator.

     2. Use the **cd** command to this location in your SASHome directory: **SASHome
        \SASPrivateJavaRunTimeEnvironment\9.4\jre\bin**.

     Note: The default path for SASHome is **C:\Program Files\SASHome**.
     However, this location might be different at your site.

     3. At the command prompt, enter this command. Be sure to specify the values
        for KEYSTORE, STOREPASS, and KEYPASS for your site.

     ```
     keytool -genkey -alias studio -keyalg RSA
         -keystore C:\sas\studdioconfig\appserver\studio\conf\studio.keystore
         -storepass password-for-keystore -keypass password-for-private-key
     ```

```
-validity 360 -keysize 2048
```

- For the KEYSTORE option, specify the full path to the studio.keystore file. By default, the path for the **studioconfig** directory is **C:\sas \studioconfig**.

- For the STOREPASS option, specify the password for the keystore. For the KEYPASS option, specify the password for the private key in the studio entry.

  Note: These passwords must be identical.

  Note: You might be prompted to enter organizational details to complete the certificate creation process. If you do not supply these details, the certificate cannot be created.

2. Change the permissions on the keystore file (studio.keystore) to be readable only by members of the appropriate group. The permissions should be Read/Write only.

3. Open the **STUDIO_CONFIG_Directory/appserver/studio/conf/ server.xml** file. Make the highlighted changes to the code for the **Connector** element. The value for the KEYSTOREPASS option should be the password from step 1.

```
<Connector acceptCount="100"
   connectionTimeout="20000"
   executor="tomcatThreadPool"
  keystoreFile="${catalina.base}/conf/studio.keystore"
   keystorePass="password"
   keyAlias="studio"
   maxKeepAliveRequests="15"
   port="38443"
   protocol="org.apache.coyote.http11.Http11Protocol"
redirectPort="38443"
   SSLEnabled="true"
   scheme="https"
   secure="true" />
```

4. Restart the web application server.

- UNIX environments: Enter this command at the command prompt:

  ```
  STUDIO_CONFIG_Directory/sasstudio.sh restart webapp
  ```

- Windows environments: Use the Windows Services menu to restart the web application server (SASStudioWebAppServer, or it could be named tcruntime-c-sas-studioconfig-appserver-studio).

5. Open SAS Studio using the new URL and the updated port number of 38443. Here is an example: **https://*machine-name.com*:38443/SASStudio**

  Note: The certificate generated in step 1 is self-signed, so most browsers display a warning when you use this URL. To remove the warning, configure your browser to trust the self-signed certificate for the SAS Studio web application, or replace the certificate generated in step 1 with a certificate generated by an official certificate authority.

SAS Studio 3.82

By default, SAS Studio Basic is not configured for HTTPS or encryption between the web application server and the SAS Workspace Server.

To set up HTTPS between the web browser and the web application server that hosts SAS Studio:

1. Create a new private key and keystore. Save this information in the keystore file named studio.keystore.

   • UNIX environments: At a command prompt, enter this command:

   ```
   $SAS_HOME/SASPrivateJavaRuntimeEnvironment/9.4/jre/bin/keytool -genkey
       -alias studio -keyalg RSA
       -keystore STUDIO_CONFIG_Directory/appserver/studio/conf/studio.keystore
       -storepass password -keypass password -validity 360 -keysize 2048
   ```

   • Window environments:

   1. Open a Windows command prompt as an administrator.

   2. Use the **cd** command to this location in your SASHome directory: **SASHome\SASPrivateJavaRunTimeEnvironment\9.4\jre\bin**.

   Note: The default path for SASHome is **C:\Program Files\SASHome**. However, this location might be different at your site.

   3. At the command prompt, enter this command. Be sure to specify the values for KEYSTORE, STOREPASS, and KEYPASS for your site.

   ```
   keytool -genkey -alias studio -keyalg RSA
       -keystore C:\sas\studdioconfig\appserver\studio\conf\studio.keystore
       -storepass password-for-keystore -keypass password-for-private-key
       -validity 360 -keysize 2048
   ```

   • For the KEYSTORE option, specify the full path to the studio.keystore file. By default, the path for the **studioconfig** directory is **C:\sas\studioconfig**.

   • For the STOREPASS option, specify the password for the keystore. For the KEYPASS option, specify the password for the private key in the studio entry.

   Note: These passwords must be identical.

   Note: You might be prompted to enter organizational details to complete the certificate creation process. If you do not supply these details, the certificate cannot be created.

2. Change the permissions on the keystore file (studio.keystore) to be readable only by members of the appropriate group. The permissions should be Read/Write only.

3. Open the **STUDIO_CONFIG_Directory/appserver/studio/conf/server.xml** file. Make the highlighted changes to the code for the **Connector** element. The value for the KEYSTOREPASS option should be the password from step 1.

   ```
   <Connector port="38443" protocol="HTTP/1.1"
       connectionTimeout="20000"
       redirectPort="38443"
       keystoreFile="${catalina.base}/conf/studio.keystore"
       keystorePass="password"
       keyAlias="studio"
       SSLEnabled="true"
       scheme="https"
       secure="true" />
   ```

4. Restart the web application server.

- UNIX environments: Enter this command at the command prompt:

  `STUDIO_CONFIG_Directory/sasstudio.sh restart webapp`

- Windows environments: Use the Windows Services menu to restart the web application server (SASStudioWebAppServer, or it could be named tcruntime-c-sas-studioconfig-appserver-studio).

5. Open SAS Studio using the new URL and the updated port number of 38443. Here is an example: **https://*machine-name.com*:38443/SASStudio**

   Note: The certificate generated in step 1 is self-signed, so most browsers display a warning when you use this URL. To remove the warning, configure your browser to trust the self-signed certificate for the SAS Studio web application, or replace the certificate generated in step 1 with a certificate generated by an official certificate authority.

Accessing Libraries

To make a library available to all users, add a LIBNAME statement to the **workspaceserver\autoexec_usermods.sas** file.

Log On to SAS Studio

To log on to SAS Studio:

1. Start the SAS Object Spawner and the SAS Web Application Server.

2. Open SAS Studio from a URL with this format: http://*hostname*:*port*/SASStudio.

   Note: If you do not know the specific URL for your site, see the SASStudioInstructions.html file in your configuration directory.

3. Log on using the credentials for your operating system account.

   Note: You cannot log on using sasadm@saspw, the account for the SAS administrator.

File Navigation Options for the SAS Studio Basic Edition

The root directories that are available in the **Server Files and Folders** section depend on whether you specify to show the system root directory. You can specify whether to show the system root directory by using the **webdms.showSystemRoot** option in the **config.properties** file.

- If the showSystemRoot option is set to False, the **Server Files and Folders** section displays an empty **Folder Shortcuts** folder and a **Files** folder. If you are running SAS Studio Basic on Windows, the **Files** folder is mapped to your **My**

Documents folder. If you are running SAS Studio Basic on UNIX, the **Files** folder is mapped to your home directory.

- If the showSystemRoot option is set to True, the **Server Files and Folders** section displays the following information:

  - In Windows environments, the **Folder Shortcuts** folder includes a predefined shortcut to your **My Documents** folder.

  - In UNIX environments, the **Folder Shortcuts** folder includes a predefined shortcut to your home directory. The **Files** folder is mapped to the system root directory for the server.

Viewing the Logs for the SAS Object Spawner and the SAS Web Application Server

The logs for the SAS Object Spawner and the SAS Web Application Server are saved in the configuration directory.

- SAS Object Spawner: *configuration-directory*\spawner\logs

- SAS Web Application Server: *configuration-directory*\appserver \studio\logs

Upgrading or Uninstalling the SAS Studio Basic Edition

Where Are My Customizations Saved?

You might have made some user modifications to the SAS Studio Basic Edition. These customizations are saved in the usermods files in ***SAS-Studio-configuration-directory*\workspaceserver**. If you upgrade or uninstall the SAS Studio Basic Edition, these files are copied to the ***SAS-Studio-configuration-directory*\userdata** directory. As a result, these files are not overwritten when you upgrade the SAS Studio Basic Edition, and these files are not deleted when you uninstall the SAS Studio Basic Edition.

Uninstall the SAS Studio Basic Edition

1. Stop all services.

   - In Windows environments, use the SASStudioWebAppServer and SASStudioSpawner options in the Control Panel.

   - In UNIX environments, run ***SAS-configuration-directory*/sasstudio.sh stop** at the command prompt.

2. To start the SAS Deployment Manager, run **SASHome/SASDeploymentManager/9.4/sasadm.sh** at the command prompt.

3. In the Select SAS Deployment Manager Task step, select **Uninstall SAS Software**.

4. In the Select SAS Products to Uninstall step, verify that all products are selected.

5. Complete the remaining steps in the SAS Deployment Manager and click **Finish**.

6. To clean up all files in the **SASHome** directory:

   - In Windows operating environments, delete the directories by using the **del** command or by using Windows Explorer.

   - In UNIX operating environments, either enter **rm –rf *SASHome*** at the command prompt or remove only the contents of this directory and leave the directory in place.

7. To clean up all files in the configuration directory:

   - In Windows operating environments, delete the directories by using the **del** command or by using Windows Explorer.

   - In UNIX operating environments, either enter **rm –rf*configuration-directory*** at the command prompt or remove only the contents of this directory and leave the directory in place.

Appendix 1

Configuration Properties for SAS Studio

Setting Configuration Properties

To set the configuration properties, you must edit the `config.properties` file in the
configuration directory for SAS Studio. The location of this file depends on the edition
of SAS Studio.

Edition of SAS Studio	Location of `config.properties` File

Mid-Tier (Enterprise)	Windows: `Config\Lev1\Web\WebAppServer `
	`\SASServerN_1\sas_webapps\sas.sasstudio.war`
	`\config\config.properties`
	
	UNIX: `Config/Lev1/Web/WebAppServer/SASServerN_1/`
	`sas_webapps/sas.sasstudio.war/config/`
	`config.properties`
	
	Note: N is the web application server that hosts SAS Studio.

Basic	Windows: `SASHome\SASStudioBasic\version\war`
	`\config\config.properties`
	
	UNIX: `SASHome/SASStudioBasic/version/war/config/`
	`config.properties`

Edition of SAS Studio	Location of `config.properties` File
Single User	Windows: `SASHome\SASStudioSingleUser\`*version*`\war` `\config\config.properties`

After editing the `config.properties` file, complete the steps for your edition of SAS Studio:

- For the Mid-Tier (Enterprise) and Basic editions, restart the web application server. By default, the SASServer1_1 is the web application server for the Mid-Tier edition, but this name could be different in your environment. SASStudioWebAppServer is the web application server for the Basic edition. For the Basic edition, you must restart the SAS Object Spawner (called SASStudioSpawner) and the web application server (called SASStudioWebAppServer).

- For the Single-User edition to shut down the embedded web application server, right-click ▤ in the system tray and select **Stop Server**. Then restart by selecting **Start** ⇨ **Programs** ⇨ **SAS** ⇨ **SAS Studio 3.8 (*n*-bit)**. In this example, *n* is 32 or 64, depending on whether you have a 32-bit or 64-bit order.

Note: If you re-install or reconfigure SAS Studio, any customizations in the `config.properties` file are lost. Before you upgrade to a new release of SAS Studio or reconfigure SAS Studio, record any changes that you made to the `config.properties` file. After you re-install or reconfigure SAS Studio, you must edit the `config.properties` file again.

General Configuration Properties for SAS Studio

As the SAS Studio administrator, you can use the configuration properties to enable certain functionality, such as submitting code in the background.

Note: In Java properties files, you must escape any backslashes. An absolute path, such as `C:\Global`, should be `C:\\Global`.

Property Name	Description
`webdms.allowFolderShortcuts`	Specifies whether you can create folder shortcuts in the user interface. The default value is `true`. For more information about folder shortcuts, see *SAS Studio: User's Guide*.
`webdms.allowFTPshortcuts`	Specifies whether to support FTP folders. The default value is `false`.
`webdms.allowRepositories`	Specifies whether user-defined task repositories are allowed. The default value is `true`. This functionality is available from the Preferences window.
`webdms.allowResultsActions`	Enables the user to open results in a new tab, print them, or send them as an email after the SAS program runs. The default value is `true`. If your site does not allow Cross Site Scripting (XSS), set this property to `false`.
`webdms.csrf.token.enabled`	Specifies the use of Cross Site Request Forgery (CSRF) protection as implemented in SAS 9.4M6. The default value is `false`.
`webdms.customPathRoot`	Specifies the directory path for the root node in the Folders tree. If you are specifying this value for Windows environments, you must use \\. The default value is `blank`. *Note:* This property is available only in the SAS Studio Basic edition.
`webdms.defaultEncoding`	Specifies the default SAS encoding that SAS Studio uses when reading or writing external files. The default value is `UTF-8`.
`webdms.defaultVMN`	Specifies the default value for the valid member names. The default value is `EXTEND`.
`webdms.defaultVVN`	Specifies the default value for the VALIDVARNAME option. The default value is `ANY`.
`webdms.globalSettings`	Specifies the directory location for global repositories and the XML files. The default value is `!SASRoot/GlobalStudioSettings`.
`webdms.headers.frameOptions`	Specifies the value of the X-FRAME-OPTIONS HTTP header.

Property Name	Description
`webdms.longPollingHoldTimeSeconds`	Specifies the maximum number of seconds to wait for a message from the client. The default value is **30**.
`webdms.maxParallelWorkspaces`	Specifies the maximum number of workspaces that can be allocated when running process flows in parallel mode. The default value is **3**. The maximum value is **8**.
`webdms.maxLogLinesThreshold`	Specifies how to stream updates to the log. The default value is **-1**, and content is streamed continuously to the log. If you set this configuration property to a specific value, a warning is written to the log when the maximum threshold is exceeded, and streaming stops.
`webdms.maxUploadSize`	Specifies the number of bytes allowed for file upload. The default value is **10485760** (10MB). *Note:* Large files can take a long time to load. If you have a large amount of content to upload, divide your content into smaller files if possible.
`webdms.maxSessionTimeoutInHours`	Specifies the maximum value for the Session time-out value in the Preferences window. The default value is **240**.
`webdms.maxSessionsByUser`	Specifies the maximum number of concurrent sessions for a user. By default, a user can have an unlimited number of concurrent sessions.
`webdms.showSASFoldersTree`	Determines whether to display SAS Folders in the user interface. For more information, see "Working with SAS Folders" in *SAS Intelligence Platform: System Administration Guide*.
`webdms.showExperimentalFeatures`	Displays any experimental features in the user interface. The default value is **false**.
`webdms.showSystemRoot`	Displays the system root location in the Folders tree. The default value is **true**. *Note:* This property is available only in the SAS Studio Basic edition.

Property Name	Description
webdms.showToolsMenu	Specifies whether to display the **Tools** option in the Applications Options menu. When the **Tools** option is available, the SAS Studio user can install and access SAS ODS Designer and SAS ODS Graphics Editor. For more information about these tools, see *SAS Studio: User's Guide*.
	By default, the **webdms.showToolsMenu** property is set to **true**.
webdms.studioDataParentDirectory	Specifies the location of SAS Studio preferences, snippets, my tasks, and more. This path is specific to the local computer. The default value is blank. An administrator must mount a shared location to access data from any workspace server session.
	Here are some examples of these paths:
	• In Windows environments:
	• **webdms.studioDataParentDirectory=c:/temp/studiodata/custom/path/<userid>** creates the **C:\temp\studiodata\custom\path\user-ID\SASStudio** directory.
	• **webdms.studioDataParentDirectory=\\\\dntsrc\u\<userid>** creates the **\\dntsrc\u\user-ID\SASStudio** directory.
	Note: In the **config.properties** file, you must use "\\" because "\" is a special escape character.
	• **webdms.studioDataParentDirectory=q:/temp/studiodata/custom/path/<userid>** cannot create this directory path because q: is not available. Instead, the **%AppData%\SAS\SASStudio** directory is used.
	• In UNIX environments: **webdms.studioDataParentDirectory=/tmp/studiodata/custom/path/<userid>** creates the **/tmp/studiodata/custom/path/user-ID/.sasstudio** directory.
	Note: In the directory path, **<userid>** is the token and should not be changed to the user's ID.

Configuration Properties for the SAS Workspace Server

Use these configuration properties to work with the SAS Workspace Server.

Property Name	Description
`webdms.workspaceServer.allowDownload`	Specifies whether to allow the user to download files from the SAS Workspace Server. The default value is `true`. When this property is `false`, the Download icon is not available from the SAS Studio toolbar.
`webdms.workspaceServer.allowUpload`	Specifies whether to allow the user to upload files to the SAS Workspace Server. The default value is `true`. When this property is `false`, the Upload icon is not available from the SAS Studio toolbar.
`webdms.workspaceServer.authenticationDomain`	Specifies the authentication domain to use at login. The default value is `DefaultAuth`.
`webdms.workspaceServer.hostname`	Specifies the machine where the SAS Workspace Server is running. This property is for the SAS Studio Basic edition. The default value is `localhost`.
`webdms.workspaceServer.logicalName`	Specifies the logical name of the deployed SAS Workspace Server. The default value is `SASApp - Logical Workspace Server`.
`webdms.workspaceServer.nativeEngines`	Enables SAS Studio to distinguish from SAS data set and DBMS tables. Valid values for this property are BASE, V9, V8, V7, V6, V612, V604, and XPORT. The default value is blank.
`webdms.workspaceServer.port`	Specifies the port where the SAS Workspace Server is running. This property is for the SAS Studio Basic edition. The default value is `8591`.

Configuration Properties for Tables

Use these configuration properties to tune table performance.

Property Name	Description
`webdms.useSortkeyFunction`	Specifies whether to use the SORTKEY function when sorting a table on a character column. The default value is **true**. Set this property to **false** if you are using the SQLIPONEATTEMPT option to avoid performance issues.
`webdms.workspaceServer.allowGetRecordCount`	Specifies whether to retrieve all of the rows for database tables. The default value is **true**. If you set this property to **false**, performance improves, but you might not see all rows of the table. For example, for large tables, total rows and filtered rows appear as Unavailable in the user interface. If the table has less than 100 rows or you scroll to the last page of the table, the values for the total rows and filtered rows are shown.
	This property does not apply to SAS data sets.
`webdms.workspaceServer.cacheTableRows`	Specifies whether to cache the rows from database tables to improve performance. The default value is **true**.
	If you use caching, the row count could be wrong if you modify the table. You must click **Refresh** to remove the value from the cache and force a re-query of the database. If correct row count is more important than performance improvement, set this property to **false** to disable caching.
`webdms.workspaceServer.largeTableRows`	Specifies the minimum number of rows that a table must have before the following behavior occurs:
	• SAS Studio displays a warning that sorting could take a long time.
	• SAS Studio does not generate a list of distinct values to select from when SAS Studio filters the data.

Configuration Properties for Background Submissions

By default, SAS Studio enables you to submit SAS code in the background. You can use the **webdms.maxNumActiveBatchSubmissions** and **webdms.maxNumActiveBatchSubmissionsSystem** properties to specify the maximum number of simultaneous background submissions for an individual user and your entire site. When customizing your setting, base the values for these properties on the number of processors on the server that is running the SAS IOM workspace or the number of processors for the local installation (for the Single-User Edition).

Property Name	Description
`webdms.allowBatchSubmit`	Specifies whether the **Background Submit** option is available when you right-click a .sas file in the navigation tree in the SAS Studi oworkspace. The default value is **true**.
`webdms.batchSubmissionResultsRetentionPeriod`	Specifies the number of hours that a submitted job entry is listed in the Background Job Status window. The default value is **24**. You cannot specify a decimal value for this property. No output files (.html or .log) are deleted when you use this configuration property. These files remain until they are deleted by the SAS Studio user.
`webdms.maxNumActiveBatchSubmissions`	Specifies the maximum number of active background jobs for each SAS Studio user. The default value depends on your edition of SAS Studio. • For the SAS Studio Mid-Tier (Enterprise) Edition and SAS Basic Edition, the default value is **3**. • For the SAS Studio Single-User Edition, the default value is **5**.
`webdms.maxNumActiveBatchSubmissionsSystem`	Specifies the maximum number of background jobs that can be submitted for a given instance of SAS Studio across all users. The default value depends on your edition of SAS Studio. • For the SAS Studio Mid-Tier (Enterprise) Edition and SAS Basic Edition, the default value is **24**. • For the SAS Studio Single-User Edition, the default value is **5**.

Configuration Properties for the Outgoing Mail Server

Use these configuration properties for specifying your outgoing mail server. The default value for all these configuration properties is blank.

Property Name	Description
`webdms.domain`	Specifies the mail domain. This value is used with the value of the `webdms.SMTP.user` property to form the sender address for outgoing mail.
`webdms.SMTP.hostName`	Specifies the host name of the outgoing mail server.
`webdms.SMTP.password`	Specifies the password for the outgoing mail server.
`webdms.SMTP.port`	Specifies the port of the outgoing mail server.
`webdms.SMTP.user`	Specifies the user ID for the outgoing mail server.

Configuration Properties for Git Integration

> *CAUTION:*
>
> **In the initial release of SAS Studio 3.8, the Git functionality was experimental and Git HTTPS password were not encoded.** With the application of the SAS Studio 3.8 hot fix, the Git functionality is production, and Git HTTPS passwords are encoded. For more information, see "Understanding Git Integration in SAS Studio" in *SAS Studio: User's Guide*.

Property Name	Description
`webdms.showGitSSLCertPath`	Enables the use of an SSL Certificate for Git authentication with an HTTPS profile. Set `webdms.showGitPassword=true` and `webdms.showGitSSLCertPath=true` to show the **Switch to HTTPS** button and the **SSL Certification** option in a Git profile. The default value is `false`. *Note:* This property is available starting with SAS Studio 3.81.
`webdms.showGitPassword`	Enables users to put their password in a profile definition that accesses Git. The default value is `false`. To allow the creation of Git profiles using HTTP authentication, set this property to `true`.
`webdms.allowGitSSHPassword`	Enables users to put their password in a profile definition that accesses Git by using SSH authentication. The default value is `false`. To allow authentication with SSH keys that contain a password, set this property to `true`.
`webdms.allowGit`	Specifies whether to display the Git elements in the SAS Studio interface. The default value is `true`.

After these configuration properties are set, here is the Git syntax to use.

* `GIT_PUSH("<local repo path>","<username>","<password>","<pub ssh key path>","<priv ssh key path>","<ssl cert file path>");`

* `GIT_PULL("<local repo path>","<username>","<password>","<pub ssh key path>","<priv ssh key path>","<ssl cert file path>");`

* `GIT_FITCH("<local repo path>","<username>","<password>","<pub ssh key path>","<priv ssh key path>","<target branch>","<ssl cert file path>");`

* `GIT_CLONE("<remote repo url>","<clone location>","<username>","<password>","<pub ssh key path>","<priv ssh key path>","<ssl cert file path>");`

Working with Repositories

To access repositories in SAS Studio, your SAS Studio administrator must complete these tasks:

* Set the `webdms.allowRepositories` and `webdms.globalSettings` configuration properties.

* In the `sas.conf` file, edit the content-security-policy so the SAS Studio user has access to the location of the task repository.

To develop your repository, you can use a variety of tools. If you are already familiar with web hosting, you can use the tool that you are already familiar with. SAS Studio repositories contain multiple file types. Because of the same-origin policy, you must use a web-hosting service such as GitHub. You cannot use a site that cannot host HTML web content with embedded JavaScript. For example, Google Drive, Drop Box, and Microsoft SharePoint are file-hosting mechanisms that cannot host true web content.

The security for the SAS Studio repositories depends on these security models:

* The best security is where the repository is deployed. For example, the repository can be deployed inside a firewall for maximum security or outside a firewall for lower security.

* Basic web authentication is supported.

* When possible, SAS Studio uses the existing security from external sources.

Because of security concerns, you might want to prevent users from adding any user-defined repositories to their SAS Studio sessions. When the `webdms.allowRepositories` property is set to `false`, the Repositories section is not available in the Preferences window in SAS Studio. To allow users to add user-defined repositories, set the `webdms.allowRepositories` property to `true`.

You might have a repository (or multiple repositories) that you want to make available to everyone at your site. Instead of requiring each SAS Studio user to add these repositories through the Preferences window, you can create global repositories. If defined, global repositories are always available to the SAS Studio user from the **Tasks** and **Snippets** sections in the navigation pane. The location of the global repository is defined by the `webdms.globalSettings` configuration property.

Opening SAS Enterprise Guide Project Files in SAS Studio

By default, users can open SAS Enterprise Guide project files in SAS Studio. To prevent users from opening SAS Enterprise Guide files in SAS Studio, set the **webdms.allowEGPOpen** property to **false** in the **config.properties** file:

```
webdms.allowEGPOpen=false
```

For more information, see "Converting SAS Enterprise Guide Projects to SAS Studio Process Flows" in *SAS Studio: User's Guide*.

Configuring Global Folder Shortcuts

In SAS Studio, you can create folder shortcuts from the **Server Files and Folders** section in the navigation pane. You might want to create global shortcuts for all the users at your site so that each user does not have to create these shortcuts manually.

To create global folder shortcuts:

1. In the **config.properties** file, specify a directory path for the **webdms.globalSettings** property. By default, this directory path is **!SASROOT/GlobalStudioSettings**.

   Note: In a multi-machine environment, the **GlobalStudioSettings** directory must be on the machine that hosts the workspace servers.

2. In an XML editor, create a shortcuts.xml file.

   If you are trying to create a shortcut to a network location, here is the format of the shortcuts.xml file:

   ```
   <?xml version="1.0" encoding="UTF-8"?>
   <Shortcuts>
   <Shortcut type="disk" name="A network location" dir="directory-path"/>
   </Shortcuts>
   ```

   If you are trying to create a shortcut to an FTP location, here is the format of the shortcuts.xml file:

   ```
   <?xml version="1.0" encoding="UTF-8"?>
   <Shortcuts>
   <Shortcut type="ftp" name="An FTP location" dir="." host="host-name"
      user="user-ID" password="password"/>
   </Shortcuts>
   ```

   Note: You can use **<userid>** substitution for the directory path. The brackets must be represented by escape sequences: **<** and **>**. Here is an example: **<Shortcut dir="C:\Users\<userid>" name="My Shortcuts" type="disk"/>**.

   The password can be {SAS001} or {SAS002} encoded.

3. Save the shortcuts.xml file to the global settings directory.

Appendix 2
Troubleshooting Tips

Session Time-outs

My session timed out unexpectedly.

The default time-out for SAS Studio depends on the edition.

- The default time-out for SAS Studio Mid-Tier is set by the SAS Web Infrastructure Platform.

- The default time-out for SAS Studio Single-User is one hour.

- The default time-out for SAS Studio Basic is one hour.

In the single-user edition and the basic edition, users of SAS Studio can use the **Time-out interval in hours** option to change the default time-out value. For more information, see *SAS Studio: User's Guide*.

Clearing Your Browser Cache

When I try to start SAS Studio, it stops responding unexpectedly.

Close any browser windows and clear your browser cache. Then try starting SAS Studio again.

SAS Studio Emails

I don't receive any emails sent by SAS Studio.

For many email providers, emails from SAS Studio might be flagged as junk mail. To receive SAS Studio emails in your inbox, add the email domain for SAS Studio to your configuration file or add SAS Studio to your list of contacts.

Using File Transfer Protocol (FTP)

I cannot use the FTP functionality in SAS Studio.

When using FTP, note these limitations:

- SAS Studio supports only FTP servers that use a UNIX style directory listing.

- In SAS Studio, filenames in Asian languages are not supported on the FTP servers.

Performance Tuning

The process flow functionality enables SAS Studio to run multiple tasks simultaneously. If a new Java Virtual Machine cannot be started to run a task, you might see an error.

By default, SAS Studio can run a maximum of three parallel tasks in the process flow. Each task is run on a separate workspace server. You can specify the maximum number of workspace servers by using the **maxParallelWorkspaces** parameter in the **config.properties** file that is available from the SAS Studio WAR file. Valid values range from 0 to 8. A value of 0 disables parallel processing.

- If you have enough RAM to support extra parallel processes, you can set this value to a higher number (up to 8).

- If you have a limited amount of RAM, you should set this value to a lower number.

Assigning Libraries

You can share library assignments between SAS Studio and SAS Enterprise Guide.

When you create a library by using SAS Environment Manager or SAS Management Console, the library is defined on the SAS Metadata Server, and the library assignment is shared across SAS servers. In SAS Studio, access to registered libraries is determined in part by the method that is used to assign those libraries.

In SAS Management Console, you can assign a library by using the AssignMode extended attribute. To view the extended attributes in SAS Management Console, right-

click the library name and select **Properties**. In the Properties dialog box, click the **Extended Attributes** tab.

SAS Enterprise Guide supports values of 0–4 for the AssignMode attribute. However, SAS Studio supports only these values for the AssignMode attribute:

- **1** – The library is assigned using the META engine. When you specify this value, the METAOUT= option is set to ALL. You can read, create, update, and delete observations in an existing physical table that is defined in metadata. You cannot create or delete a physical table, or alter a physical table's columns. This is the default behavior.

- **2** – The library is assigned using the META engine. When you specify this value, the METAOUT= option is set to DATA. You can read, create, alter, update, and delete a physical table. The user can access any table, regardless of whether it has been defined in the repository.

- **4** – The library is assigned using the META engine. You can read, update, alter, and delete a physical table that is defined in metadata. You can also create and delete physical tables that are not in metadata, but you cannot read or update the new tables until they are defined in metadata. This value is similar to METAOUT=DATA, except tables and columns that are not defined in the repository are not visible.

To share library assignments between SAS Studio and SAS Enterprise Guide, you must specify 1, 2, or 4 for the AssignMode attribute.

Working in a Multi-User, Multilingual Environment

What encoding should you use for a multi-user, multilingual environment?

The SAS Studio Mid-Tier (also called Enterprise) edition and the SAS Studio Basic edition enable multiple users to access SAS Studio. When running in a multi-user environment, run your SAS server in Unicode mode with a SAS session encoding of UTF-8. (The default encoding is UTF-8.) These settings allow multilingual data and user interfaces to be supported in the same deployment. For more information, see Multilingual Computing with SAS 9.4, which is available from support.sas.com.

Understanding SAS Workspace Processes

I see two SAS processes for a SAS Studio session.

Each connection of SAS Studio creates two SAS processes. Each process has its own **Work** directory. One process is for the execution of code. The second process is dedicated to file I/O, so these processes are not delayed or blocked by the execution of other processes.

Checking File Permissions on the FTP Server

I am unable to save files to an FTP shortcut.

If you see a `Physical file does not exist` error when trying to save a file to an FTP shortcut, verify that you have sufficient permissions to access the folders on the FTP server.

Recommended Reading

- *SAS Deployment Wizard and SAS Deployment Manager 9.4: User's Guide*

- *SAS Intelligence Platform: Installation and Configuration Guide*

- *Configuration Guide for SAS 9.4 Foundation for UNIX Environments*

- *SAS Intelligence Platform: Migration Guide*

- *SAS Studio: User's Guide*

- *SAS Studio: Developer's Guide*

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