SAS® Event Stream Processing 6.1 on Windows: Deployment Guide

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SAS® Event Stream Processing 6.1 on Windows: Deployment Guide

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Introduction

Steps for a Successful Deployment

Before You Begin

- Because the contents of this guide are subject to continual updates, make sure that you have the latest guide. You can always access the latest release of this guide from the following site:

  SAS Viya Deployment Guides

  If you accessed this guide directly from the Software Order Email (SOE), you are viewing the latest guide. If you are viewing a saved copy of the PDF version of this guide, the content might be outdated.
- To use this guide successfully, you should have a working knowledge of Microsoft Windows PowerShell and the Windows operating system.
- If your order included SAS Event Stream Manager, this guide contains instructions for installing and configuring it along with SAS Event Stream Processing.

Use this guide to deploy SAS Event Stream Processing in your Windows environment. SAS Event Stream Processing 6.1 is compatible with both SAS 9.4 and SAS Viya. It uses the same deployment tools and process as SAS Viya. However, SAS Event Stream Processing can still be installed as a stand-alone product without additional SAS Viya components.

To install on Linux, a separate order that specifies the Linux platform is required.

Step 1 — Prepare for the Deployment

1 Perform one of the following tasks:

   - To upgrade or update an existing deployment, go directly to “Managing Your Software” on page 29.

     Note: Upgrades of SAS Event Stream Manager are not available. The current release is the first to be compatible with a Windows operating environment.
   - To deploy a new instance of the software, continue with the following steps.

2 Go to “System Requirements” on page 3 to learn about requirements for hardware, software, user accounts, and more.

3 Go to “Pre-installation Tasks” on page 9 to prepare your environment before you deploy the software.

Step 2 — Perform the Deployment

1 Go to “Installing SAS Event Stream Processing” on page 17 to deploy the software.

2 Go to “Post-installation Tasks” on page 19 to perform post-installation configuration.

Contact SAS Technical Support

Technical support is available to all customers who license SAS software. However, you are encouraged to engage your designated on-site SAS support personnel as your first support contact. If your on-site SAS support personnel cannot resolve your issue, have them contact SAS Technical Support to report your problem.

Before you contact SAS Technical Support, explore the SAS Support website at support.sas.com/techsup/. This site offers access to the SAS Knowledge Base, as well as SAS communities, Technical Support contact options, and other support materials that might answer your questions.

When you contact SAS Technical Support, you are required to provide information, such as your SAS site number, company name, email address, and phone number, that identifies you as a licensed SAS software customer.

2

System Requirements

Hardware Requirements for SAS Event Stream Processing

SAS Event Stream Processing can be installed as a stand-alone product. It can also coexist with either SAS Viya or with SAS 9.4. All components of SAS Event Stream Processing are installed on the same machine. If your order included SAS Event Stream Manager, it is also installed on the same machine.

The following table describes a standard set of specifications for a machine where SAS Event Stream Processing is deployed:

Table 2.1 *Minimum Hardware Requirements*

Item	Recommended Level*
CPU	4 cores (x86 architecture) Intel or AMD 64-bit chip set with a minimum speed of 2.6 GHz
Memory	32 - 64 GB of RAM Memory clock speed of 1600 MHz

Item	Recommended Level*
Disk Space and Speed	20 GB or more 10,000 RPM

An additional machine can be used as a thin client from which end users can access the user interface for SAS Event Stream Processing Studio. This machine requires minimal processing power and storage space and can run on Windows or UNIX.

To use SAS Foundation in SAS Event Stream Processing deployments, as when, for example, you want to run SAS in a procedural window, SAS Event Stream Processing must be installed on the same machine as SAS Foundation. Depending on your version of SAS, a SAS/ACCESS engine might also be required.

Hardware Requirements for SAS Event Stream Manager

The following table describes a standard set of specifications for a machine on which SAS Event Stream Manager is deployed along with SAS Event Stream Processing:

Table 2.2 *Minimum Hardware Requirements*

Item	Recommended Level
CPU	2 cores (x86 architecture) Intel Xeon chip set with a minimum speed of 2.6 GHz
Memory	16 GB of RAM Memory clock speed of 1600 MHz
Disk Space and Speed	10 GB 10,000 RPM

An additional machine can be used as a thin client from which end users can access the user interface for SAS Event Stream Manager. This machine requires minimal processing power and storage space and can run on Windows or UNIX. Each machine that is used to access the user interface must have a minimum screen resolution setting of 1280 x 1024.

Operating System Requirements

Supported Operating Systems

For the full list of supported platforms, see: https://support.sas.com/en/documentation/third-party-software-reference/viya/34/support-for-operating-systems.html.

Note: SAS Event Stream Processing can also be installed on Red Hat Enterprise Linux, but a separate package, based on your software order, is required.

SAS Support for Alternative Operating Systems

SAS provides support on a limited basis for alternative operating system distributions that customers might select. For more information, see the official support policy statement at http://support.sas.com/techsup/pcn/altopsys.html.

Software Requirements

Windows PowerShell

Microsoft Windows PowerShell version 5.1 or later is required in order to install SAS Event Stream Processing on Windows. PowerShell is a framework that supports a scripting language and configuration management capabilities on Windows.

Follow these steps to determine the current version of PowerShell if it is already installed:

1. Start PowerShell.
2. At the PowerShell command prompt, enter the following command to find out the PowerShell version:

   ```
   $PSVersionTable.PSVersion
   ```

   In the output, verify that the major version is 5 and that the minor version is 1 or later.
3. If required, install a newer version of PowerShell by installing Windows Management Framework 5.1. Follow these steps:

   Note: You can skip this step if you are installing SAS Viya on Microsoft Windows Server 2016.

   a. Download Windows Management Framework 5.1. Navigate to https://www.microsoft.com/en-us/download/details.aspx?id=54616 to download the package.

   b. Double-click the executable, and follow the prompts to install it.
4. SAS Viya will use PowerShell scripts to configure and run services. Manually enable script execution in PowerShell by running the following command:

   ```
   Set-ExecutionPolicy  -scope LocalMachine Unrestricted
   ```

Additional Software

If you are installing on Windows Server 2012 R2, the Microsoft .NET Framework 4.6.1 or later is required.

Download the package from the following Microsoft website: https://www.microsoft.com/en-us/download/details.aspx?id=49981.

The Microsoft Visual C++ Redistributable Packages for Visual Studio 2013 and 2015 (64-bit version) are required for all supported platforms.

Download the packages from the following Microsoft website: https://support.microsoft.com/en-us/help/2977003/the-latest-supported-visual-c-downloads.

Note: Both packages must be installed before you can install SAS Event Stream Processing software.

Java Requirements

The Java Runtime Environment (JRE) must be installed on each machine in your deployment. Oracle Java 1.8.*x* is required for all SAS Event Stream Processing components and for SAS Event Stream Manager. Only the JRE is required, not the full JDK.

To determine the version of Java that is installed on the local machine, follow these steps:

1. Open the Windows Control Panel.
2. Navigate to **Programs and Features**.

   If Java is installed, one or more Java versions are listed in the **Programs and Features** panel.

You can also navigate to java.com to automatically detect the Java version on your machine and to update your version.

Web Browsers

SAS Event Stream Processing Studio, Streamviewer, and SAS Event Stream Manager include some advanced user interface features, which require a newer web browser. For information about supported browsers, see: https://support.sas.com/en/documentation/third-party-software-reference/viya/34/support-for-web-browsers.html

If you cannot install one of the supported web browsers, be aware of possible unexpected user interface behavior. Because session cookies are required in order to maintain session state, be sure to enable cookies in your browser.

Screen Resolution

The minimum screen resolution for each client machine that will access the SAS Viya user interfaces is 1280 x 1024.

User Account Requirements

The user account that is used to perform the deployment process requires Administrator privileges. Administrator privileges are not required after the installation has completed in order to run an instance of an ESP server. The installation directory path enables Write access per user group, and it is owned by the user account that is used to perform the installation. To enable users to edit the product configuration files, the administrator can use a Group policy to grant Write access to these files to any user.

A user account is required in order to enable the SAS Infrastructure Data Server to start automatically. The SAS Infrastructure Data Server runs on PostgreSQL. SAS recommends using the name postgres for this user account. Create the account before you start the deployment process. Make sure that the account has the following attributes:

- A standard user account without administrator privileges

  (Optional) You can use a domain account for this purpose.
- A password that does not expire

  When you create the postgres user account:

  - Clear the check box labeled **User must change the password at the next logon**.
  - Select the check box labeled **User cannot change password**.
  - Select the check box labeled **Password never expires**.

- The privilege to Log on as a Service

  This setting requires explicit configuration even if the postgres user has administrator privileges. Use the Local Security Policy editor to add the postgres user to the Log on as a Service policy.

As part of the installation process, you must specify security parameters for this user account. For more information, see "Specify Credentials for the postgres User Account" on page 15.

LDAP Requirements

An LDAP server is required to enable users to log on to SAS Event Stream Processing Studio, Streamviewer, and SAS Event Stream Manager. LDAP also enables some critical services. Read access to your LDAP provider is required.

Note: You have the option to install SAS Event Stream Processing Studio and Streamviewer as stand-alone applications. In this case, they are not integrated with SAS Event Stream Processing authentication services. If they are running as stand-alone applications, SAS Event Stream Processing Studio and Streamviewer use OAuth 2.0 for user authentication and run with authentication enabled by default. For instructions on setting up these components to run independently, see "Post-installation Tasks" on page 19.

SAS software requires a userDN and password in order to bind to the LDAP server. Anonymous binding is supported for clients that are authenticating to the LDAP server.

If the mail attribute is specified for LDAP accounts, it must have a non-null value that is unique for each user.

LDAPS is supported, but the required certificates are not configured automatically by the deployment process.

To configure LDAP to enable access to SAS Event Stream Processing Studio, Streamviewer, and SAS Event Stream Manager, follow the steps in "Configure LDAP Settings" on page 17 before you run the deployment script.

Directory Structure and Permissions

After you install SAS Event Stream Processing, the files for the engine and files to support optional authentication are located in the following directory:

`C:\Program Files\SAS\Viya\SASEventStreamProcessingEngine`

Configuration files are located in the following directory:

`%ProgramData%\SAS\Viya\SASEventStreamProcessingEngine\default`

The basic directory path is owned by the user who performed the installation. To grant permission to users to edit the configuration files, the administrator can set up Group permissions.

The metering server saves log files in **`C:\ProgramData\SAS\Viya\SASEventStreamProcessingEngine\default`**. If the metering server is running on Windows, a permissions issue might prevent the server from writing to the log directory. Launch the metering server executable as an administrator, even if you are logged in as a member of the Administrators group.

If you also purchased SAS Event Stream Manager, files are located in **`C:\Program Files\SAS\Viya\SASEventStreamProcessingManager`**.

Encryption and Authentication Options

SAS Event Stream Processing provides optional encryption and authentication features. You can enable encryption on TCP/IP connections within an event stream processing engine. You can also configure ESP servers to require client authentication for SAS TCP/IP clients.

To enable encryption, the OpenSSL libraries must be installed on systems that run the ESP server and clients. Version 1.0.2 or later of the Transport Layer Security (TLS) Protocol is required in order to take advantage of ECDH support for encryption ciphers used in encrypted connections.

Authentication and encryption apply to the following ESP server APIs:

- The ESP Server (XML Server) HTTPS API
  - Connections that are created by a client to communicate with an ESP server
  - Connections that are created by a file and socket connector or adapter that acts as a socket client or server
- C, Java, or Python Publish/Subscribe API
  - Connections that are created by a client that uses the C, Java, or Python Publish/Subscribe API to communicate with an ESP server
  - Connections that are created by an adapter to communicate with an ESP server

For more information about enabling security for an ESP server or for Streamviewer, see SAS Event Stream Processing: Security.

3

Pre-installation Tasks

(Optional) Create a Mirror Repository

Overview

SAS Mirror Manager is a command line utility for synchronizing a collection of software repositories from SAS. Its primary use is to create and manage mirror repositories for software deployment. Mirror repositories are optional and should be used if your deployment does not have access to the internet, or if you must always deploy the same version of software (such as for regulatory reasons).

As you select a location for your mirror repository, keep in mind that SAS Mirror Manager can be used to place the files in several locations, such as on a web server that serves the files by HTTP, or on a shared NFS mount. The default location for the files that SAS Mirror Manager will download is the `C:\Users\`*`user-ID`*`\sas_repos` directory. Ensure that the default location or the location that you select has adequate space. Also ensure that the machine where the mirror repository will be located has adequate space.

Using SAS Mirror Manager with a Proxy Server

If your environment requires a proxy server and is set up to use it, the SAS Mirror Manager commands will work automatically. However, if your environment is not set up to send data through the proxy, you can add an environment variable to the command to run SAS Mirror Manager. The environment variable identifies where the proxy is located and what is required to send data through it.

Use the environment variable that is appropriate for the target of the query that passes through the proxy. For example, if you are trying to reach a SAS repository, you should use the HTTPS environment variable because the SAS repository is on an HTTPS site. In most cases, the HTTPS environment variable is appropriate.

Here are some examples of SAS Mirror Manager commands that include environment variables.

Example 1: An HTTPS site.

```
set https_proxy=http://user-name:password@internet-proxy-server-FQDN:proxy-port
```

For example:

```
set https_proxy=http://proxyid:password@proxy.company.com:3129
```

Note: If you use the https_proxy variable, the command for SAS Mirror Manager might also require the `--cacert` option, which indicates the location of the certificate that the proxy will use. The proxy certificate will be one that your organization manages.

Example 2: An HTTP site.

```
set http_proxy=http://user-name:password@internet-proxy-server-FQDN:proxy-port
```

For example:

```
set http_proxy=http://proxyid:password@proxy.company.com:443
```

Using SAS Mirror Manager

To create a mirror repository with SAS Mirror Manager:

1. The Software Order Email (SOE) indicated that you should save the SAS_Viya_deployment_data.zip file attachment. If you have not already saved the file, save it now.

2. Download SAS Mirror Manager from the SAS Mirror Manager download site to the machine where you want to create your mirror repository.

   Note: If you use Internet Explorer to download the Linux or Macintosh version, save the file as a .tgz file instead of a .gz file.

3. Uncompress the downloaded file.

4. At a command prompt, run the following command:

   ```
   mirrormgr.exe mirror --deployment-data path-to-deployment-zip-file-from-SOE --latest
   ```

   Note: If you have an HTTPS proxy, you might also need the `--cacert` option, which indicates the location of the certificate that the proxy will use. The proxy certificate will be one that your organization manages.

   By default, the repositories are placed in **`C:\%USERPROFILE%\sas_repos`**. You can change this location by using the `--path` option, followed by the full directory location of the mirror destination. This guide refers to that location as **`\sas_repos`**. However, if you want to use a different location, replace instances of **`\sas_repos`** in this guide with the actual location that you select.

   The default location for the logs for SAS Mirror Manager is **`C:\%LOCALAPPDATA%\mirrormgr\mirrormgr.log`**. To specify an alternative log location:

   Note: Specify the command on a single line. Multiple lines are used here to improve readability.

   ```
   mirrormgr.exe mirror --deployment-data path-to-deployment-zip-file-from-SOE
   --path location-of-mirror-repository --log-file location-of-logs\mirrormgr.log --latest
   ```

   The **`\sas_repos`** directories are explained as follows:

   - The entitlements.json is a list of the repositories to which you are entitled.
   - The location_group_declarations.json file and the sasmd directory contain data that is used by the SAS Orchestration CLI to create the order-specific tools for your deployment.

- Any remaining directories are the software repositories, organized by native deployment tools:
  - repos contains yum files for Linux.
  - win contains MSI files for Windows.
  - deb contains APT files for Debian.

5 (Optional) After the initial download is complete, move the file structure to a web server or shared NFS mount. The destination machine does not have to be connected to the internet.

Create the Deployment Scripts

The SAS Orchestration Command Line Interface (CLI) uses the order information that was included in your Software Order Email (SOE) to create deployment scripts for your SAS Viya software. The SAS Orchestration CLI can be run on Linux or Windows and it requires the Java Runtime Environment 1.8.*x*. It also requires access to the internet.

Before you use the SAS Orchestration CLI, ensure that the SAS_Viya_deployment_data.zip file attachment from your SOE is copied to a directory on a machine that runs the Linux, Macintosh, or Windows operating system.

Download the SAS Orchestration CLI

1 The SOE indicated that you should save the SAS_Viya_deployment_data.zip file attachment. If you have not already done so, save that file now.

2 Go to the SAS Orchestration CLI download site and download the SAS Orchestration CLI for the operating system where you stored the ZIP file.

   The SOE recommended that you save the ZIP file to a machine that runs Windows, which is where you will install the SAS software that you purchased. But you could also store it on a machine that runs Macintosh or Linux.

3 If you used Internet Explorer to download the Linux or Macintosh version of the SAS Orchestration CLI, change the file extension from .gz to .tgz.

4 Uncompress the TGZ file (Linux or Macintosh) or ZIP file (Windows) in the same location where you downloaded it. The result is a file named sas-orchestration on Linux or Macintosh or a file named sas-orchestration.exe on Windows.

Create the Deployment Scripts with the SAS Orchestration CLI

Basic Command

To create the deployment scripts, use the command that is appropriate for the operating system where the SAS Orchestration CLI is located.

Note: The following commands are organized by the operating system where the SAS Orchestration CLI will run, rather than by the operating system where your SAS Viya software will be deployed. After you create the deployment scripts, you can move them to the machine where you will deploy your software.

Linux or Macintosh

```
./sas-orchestration build --input location-of-ZIP-file-including-file-name
```

Windows

```
.\sas-orchestration.exe build --input location-of-ZIP-file-including-file-name
```

Using the SAS Orchestration CLI creates a new file named sas-viya-deployment-script.zip.

Options

Use a Proxy Server

If you use an unauthenticated proxy to reach the internet, you must add the following option to the run command in order to make an outgoing connection:

```
--java-option "-Dhttps.proxyHost=proxy-server-IP-address-or-host-name"
```

In addition, if the proxy server is not using the default proxy port of 80, you must also add the following option:

```
--java-option "-Dhttps.proxyPort=proxy-server-port-number"
```

If you use both options, they should not be combined into a single option. The following is an example of using both options on a Linux machine:

```
./sas-orchestration --java-option "-Dhttps.proxyHost=my.proxy.com --java-option "-Dhttps.proxyPort=1111"
build --input /tmp/SAS_Viya_deployment_data.zip
```

The `--java-option` tags must come before the `build` command.

Use a Mirror Repository

If you created a mirror repository with SAS Mirror Manager, you must include its location with the `--repository-warehouse` option.

```
.\sas-orchestration build --input c:\sas\install\SAS_Viya_deployment_data.zip
--repository-warehouse URL-to-mirror-repository-content
```

Here is an example:

```
.\sas-orchestration build --input c:\sas\install\SAS_Viya_deployment_data.zip
--repository-warehouse c:\DeploymentFiles\sas_repos
```

For more information about SAS Mirror Manager, see "(Optional) Create a Mirror Repository" on page 9.

Help with Options

The SAS Orchestration CLI includes several options. To learn about all the options for the SAS Orchestration CLI, use the appropriate command:

Linux or Macintosh

```
./sas-orchestration build --help
```

Windows

```
.\sas-orchestration.exe build --help
```

Store the Deployment Files

SAS recommends that you create a directory for storing files that are used to deploy and maintain your software. SAS recommends using **`\sas\install`**. This guide assumes that you will use **`\sas\install`**. However, if you do not use**`\sas\install`**, replace those instances in this guide with the actual location that you select.

1. If necessary, move the sas-viya-deployment-script.zip file to the machine where you will be deploying your software. The recommended location is **`\sas\install`**.
2. In the same directory where you have saved sas-viya-deployment-script.zip, uncompress it.

Deployment Scripts and Security

The deployment scripts created by the SAS Orchestration CLI are PowerShell scripts. The PowerShell scripts are not digitally signed because they are created at deployment time based on your software order and the options you set when you run the SAS Orchestration CLI. If your organization requires that PowerShell scripts be digitally signed, you will have to sign the created scripts yourself. For information about how to digitally sign PowerShell scripts, see "About Signing" and the Microsoft PowerShell support site.

By default, the deployment scripts include a statement that allows them to bypass any PowerShell security policy that may be set up. Perform the following steps to remove this ability.

1. Open one of the BAT files from the uncompressed ZIP file. If you accepted the defaults, those files are located in **`C:\sas\install\powershell-deployment`**.
2. Locate the following line:

   ```
   set ARGS=%ARGS% -ExecutionPolicy Bypass
   ```

3. Revise the line using one of the following methods:
   - Turn the command into a comment by adding `rem` to the beginning of the line.

     ```
     rem set ARGS=%ARGS% -ExecutionPolicy Bypass
     ```

     Using this option allows you to enable the command later if you change your mind about the security policy or if it changes.
   - Delete the line completely.
4. Save and close the BAT file.
5. Repeat these steps for each BAT file in the directory.

Enable Required Ports

The following ports are used by SAS software and should be available before you begin the deployment process. The same ports should also be available for any firewalls that are configured on the operating system or the network.

Process	Required Port	Requires Allowed Inbound Traffic From	Notes
httpd	80 (internal) 443 (external)	anywhere	See note below.
default SAS Messaging Broker AMQP client access port	5672		
Vault	8200		
SAS Configuration Server	8300–8309, 8500, 8501		SAS uses HashiCorp Consul as its configuration server. Ports should be open to both UDP and TCP traffic.

Process	Required Port	Requires Allowed Inbound Traffic From	Notes
default SAS Messaging Broker management web console port	15672		

Note: In order to secure web access to your SAS software, only port 443 (HTTPS) should be open externally on the machine where SAS Event Stream Processing is deployed, and port 80 should be open internally.

In addition, any ports that will be used for ESP servers must be open to HTTP traffic. For more information, see Using the ESP Server.

Update the user port range. From a command prompt, run the following commands, based on your version of Internet Protocol:

```
netsh int ipvn set dynamicport tcp start=32768 num=32767
netsh int ipvn set dynamicport udp start=32768 num=32767
```

where *n* indicates the version of your Internet protocol, either 4 or 6.

After you run the command, restart Windows.

Tune Your Windows System

Update the Windows Registry

Microsoft recommends performing a system backup before editing the registry.

1. At a command prompt, type `REGEDIT`. The **Registry Editor** opens.
2. Go to the **`HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Tcpip\Parameters`** registry subkey.
3. Add the `DWORD` value with a name of `TcpTimedWaitDelay` and a value of **`30 Decimal`**.
4. Go to the **`HKEY_LOCAL_MACHINE\SYSTEM\ControlSet001\Control\PriorityControl`** registry subkey.
5. Add the `DWORD` value with a name of `Win32PrioritySeparation` and a value of **`36 decimal`**.
6. Go to the **`HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\AFD\Parameters`** registry subkey.
7. Add the following `DWORD` values:

Name	Recommended Value
EnableDynamicBacklog	1 decimal
MinimumDynamicBacklog	20 decimal
MaximumDynamicBacklog	1000 decimal
DynamicBacklogGrowthDelta	10 decimal

The recommended values specify the number of connections that you want to be available. These values request a minimum of 20 and a maximum of 1000 available connections. The number of available connections is increased by 10 each time

8 Modify the SubSystems registry value.

Note: If you are performing a programming-only deployment, skip this step.

a Go to the **HKEY_LOCAL_MACHINE\System\CurrentControlSet\Control\Session Manager \SubSystems\Windows** registry subkey. Here is an example of the value:

```
%SystemRoot%\system32\csrss.exe ObjectDirectory=\Windows SharedSection=1024,20480,768...
```

b Right-click the `Windows` registry name and select **Modify**. The Edit String window appears.

c Change the value for the third number in the `SharedSection` entry according to 20480. Here is an example of the revised entry:

```
%SystemRoot%\system32\csrss.exe ObjectDirectory=\Windows SharedSection=1024,20480,20480 ...
```

9 Click **OK**.

10 Close the **Registry Editor**.

11 Restart Windows.

Additional Tuning Suggestions

The following list includes general recommendations for configuring Windows systems:

- Disable Windows indexing on any directories that are used by SAS software.
- Set Windows performance settings so that background processes are favored.
- Set the maximum power profile in the system BIOS for all systems, except Intel Sandy Bridge.
- Disable the C1E BIOS setting on Dell systems.

Specify Credentials for the postgres User Account

Use a deployment script to save the credentials for the postgres user account that you created previously. This user account enables the SAS Infrastructure Data Server, which runs on PostgreSQL, to start automatically. SAS Infrastructure Data Server is required to support SAS Event Stream Processing Studio, Streamviewer, and SAS Event Stream Manager. Be sure to complete these steps before you start the deployment process.

Note: The name for this user account, postgres, is recommended. However, you might have selected another name for this account when you created it.

1 Navigate to the directory where you extracted the contents of the sas-viya-deployment-script.zip file that you created using the SAS Orchestration CLI.

The recommended location is **\sas\install**.

2 In the **\sas\install\powershell-deployment** directory, verify the presence of the encryptPostgresUser.bat script.

Note: The setup.bat script and the encryptPostgresUser.bat script must be in the same directory.

3 From that directory, run the following command:

```
.\encryptPostgresUser.bat
```

4 The script prompts you for the user ID and password of the postgres user account. If you are using a localhost account, you should provide only the user name. If you are using a domain account, the user name should include the domain name.

```
domain-name\user-name
```

As the script runs, it creates a file named postgres.xml in the same directory.

Note: Do not delete the postgres.xml file. Deployment components continue to use it after the deployment process has completed. Similarly, do not delete the postgres user account.

4

Installing SAS Event Stream Processing

Deploy the Software on Windows

Use the procedures in this section to deploy your SAS software. The information in this section assumes that you have completed the steps that are described in "Create the Deployment Scripts" on page 11.

When you order SAS software, SAS sends a Software Order Email (SOE) to your business or organization. Your SOE includes information about the software order, including several file attachments and instructions for generating a deployment playbook using the SAS Orchestration CLI.

If you have not already done so, be sure to uncompress the file that is attached to your SOE, as instructed in the email text.

The user account that performs the deployment requires Administrator privileges for the Windows machine where the software is installed.

Configure LDAP Settings

The sitedefault.yml file is used to configure authentication for SAS Event Stream Processing Studio, Streamviewer, and SAS Event Stream Manager. Before you run the installation script, enable the script to configure the LDAP server for use with SAS Logon Manager:

1. Locate the sitedefault_sample.yml file on the machine where you will be deploying your software.

   The unzip operation saves the file in **`\powershell-deployment\config\consul\files\sitedefault_sample.yml`**. The recommended location to unzip the sas-viya-deployment-script.zip is **`\sas\install`**.

2. Make a copy of sitedefault_sample.yml in the same directory, and name the copy sitedefault.yml.
3. Use your preferred text editor to open sitedefault.yml.
4. Add values that are valid for your site, and save the file.

When you run setup.bat, the updated sitedefault.yml file is used automatically.

Install SAS Event Stream Processing

1. Navigate to the **`C:\sas\install\`** directory where you uncompressed the sas-viya-deployment-script.zip file that you created.
2. Locate the setup.bat file in the **`C:\sas\install\powershell-deployment`** directory. You can use this file in one of two ways:
   - Right-click the file, and select **Run as Administrator** from the menu. Using this method does not include command options. The software is downloaded and installed on the local machine, and then the script configures and starts any necessary services.
   - Open a command prompt (being sure to select **Run as administrator**) from the Windows **Start** menu. Run the following command:

     ```
     setup.bat options
     ```

     When the command is run without options, the script downloads and installs software on the local machine and then configures and starts any necessary services. Descriptions of the optional flags follow.

     - -install

       Only installs the software and services. If you use this option, the software and services will not be configured and the services will not be started.

     - -config

       Configures the installed software, and configures and starts the services. This option fails if you run the command before the software and services have been installed.

   As the batch job runs, a **`\Downloads`** folder is created in the directory where you are running the batch script. The software is downloaded from secure repositories to this new folder on your computer.

To conserve space, after the setup.bat script has been run and the deployment is complete, you can delete the .msi files in the **`C:\sas\install\downloads`** directory.

If the deployment process fails, but you are able to recover from the error, be sure to restart the deployment using the appropriate deployment commands. In addition, if you receive a message to reboot during the deployment process, make sure that you use the same deployment commands.

5

Post-installation Tasks

Complete SAS Event Stream Processing Setup

Take a few steps to complete the SAS Event Stream Processing deployment.

Set the Environment Variables

You must set several environment variables before you install SAS Event Stream Processing. You can set these variables as either User or System variables.

1 Open the Control Panel from the **Start** menu. Navigate to **System and Security**.

2 Click **System** ⇨ **Advanced System Settings** in the left pane.

The System Properties dialog box appears. Click **Environment Variables**.

3 Click **New** to add the following variable definitions. Or select the variable from the list and click **Edit** to modify an existing variable definition:

Table 5.1 SAS Event Stream Processing Variables

Variable	Value
DFESP_HOME	C:\PROGRA~1\SAS\Viya\SASEventStreamProcessingEngine\6.1 The setting for this variable does not affect the default installation location, which is **`C:\Program Files\SAS\Viya`**. If you installed in a location other than the default, update the path to match the installation directory.
PATH	%PATH%;%DFESP_HOME%\bin;C:\PROGRA~1\SAS\Viya\SASFoundation\sasexe;C:\PROGRA~1\SAS\Viya\SASEventStreamProcessingEngine\6.1\ssl\bin If you installed in a location other than the default, update the path to match the installation directory.
(Optional) PYTHONPATH or PYTHONHOME Enables you to use the Anaconda Python support in SAS Micro Analytic Service.	Add the Python Lib directory to PYTHONPATH. Or set PYTHONHOME to the top-level Python directory: ■ PYTHONPATH=C:\Program Files\Miniconda3\envs\python*version*\Lib ■ PYTHONHOME=C:\Program Files\Miniconda3\envs\python*version*

4 Click **OK** to save your variable settings.

SAS Event Stream Processing includes the internal component SAS Micro Analytic Service. To use the Anaconda Python support in SAS Micro Analytic Service, you must set one of the optional variables listed in the table for your version of Python. For more information, see *SAS Micro Analytic Service: Programming and Administration Guide*, which is available on the SAS Event Stream Processing product page.

Enable Metering for ESP Servers

The deployment process applies the product license on each machine where you have deployed SAS Event Stream Processing. However, additional steps are required in order to enable the license. You must set up and run at least one metering server to track the number of incoming events and to maintain event counts.

The metering server aggregates counts that are based on the license, the source window, and the hour of day. It stores aggregated results so that a client can query and track the total volume of messages that are processed. Enabling the metering server ensures that your ESP server is in compliance with the terms of its license. Event metering is not required on development servers because they do not contribute to the event volume that is assigned to a license.

The metering server saves log files in **`C:\ProgramData\SAS\Viya\SASEventStreamProcessingEngine\default`**. A permissions issue might prevent the server from writing to the log directory unless you launch the metering server executable as an administrator.

1 Log on to the Windows server as an administrator.

2 Type **`cmd`** in the Windows Search box. In the search results, right-click **Command Prompt** and select **Run as Administrator**.

3 Run the following command:

```
%DFESP_HOME%\bin\dfesp_metering.bat -d
```

The -d argument creates a log file in the configuration directory.

For more information about the metering server, see Using the Metering Server in the SAS Event Stream Processing user documentation.

Start the ESP Server

When the playbook has completed, the SAS Event Stream Processing Studio, Streamviewer, and SAS Event Stream Manager processes are already running. Before you can open or create a model in SAS Event Stream Processing Studio, you must start the ESP server.

If you have deployed SAS Event Stream Manager, you can take some additional steps to set up a connection between the ESP server and SAS Event Stream Manager. For more information, see "Configure the ESP Server for SAS Event Stream Manager" on page 23.

To start an ESP server:

1. Open a command prompt by clicking **Start** and entering *cmd* in the **Search** box.
2. Start the ESP server. Here is an example of the command:

   $DFESP_HOME\bin\dfesp_xml_server -pubsub *n* -http *port* &

   The ampersand (&) enables additional commands to be entered in the same window that started the server. Other values that provide server start-up instructions are defined in the esp-properties.yml configuration file. For more information, see Server Configuration Properties.
3. The following message is displayed:

   ```
   Access control disabled (permissions.yml not present)
   ```

   The file that is referenced is required only to enable access control on the ESP server. You can ignore this message.

For more information about the ESP server, see Setting Up and Using the ESP Server.

Log On to SAS Event Stream Processing Studio

SAS Event Stream Processing Studio provides a user interface for creating models. It is automatically started during the installation. However, you can start it manually if you find that the service is not running.

1. Verify that you have set the required environment variables. For more information, see "Set the Environment Variables " on page 19.
2. Verify that the SAS Event Stream Processing Studio service is running. Click **Start**, and enter *services.msc* in the **Search** box. Select **services.msc** from the search results.

   The **Services** panel is displayed.
3. Scroll through the list of services and locate the **SAS Event Stream Processing Studio** service. If it has not been started automatically, click **Start** to start the service.
4. Launch the SAS Event Stream Processing Studio user interface from a browser window using the following URL: http://*server-host-name*/SASEventStreamProcessingStudio/index.html.

   For *server-host-name*, substitute the host name or IP address of the server where you installed the SAS Event Stream Processing Studio software.

   SAS Event Stream Processing Studio is integrated with SAS Viya authentication and uses SAS Logon Manager.

(Optional) Enable Kerberos Connections for SAS Event Stream Processing Studio

When Kerberos is configured for the machine where the ESP server is running, additional setup is required to enable connections from SAS Event Stream Processing Studio. If Kerberos is not used for authentication in your environment, you can skip these steps.

If you have also deployed SAS Event Stream Manager, the required steps to enable Kerberos connections are similar. For more information, see "(Optional) Enable Kerberos Connections for SAS Event Stream Manager" on page 25.

1 Open the Control Panel from the **Start** menu. Navigate to **System and Security**.

2 Click **System** ⇨ **Advanced System Settings** in the left pane.

   The System Properties dialog box appears. Click **Environment Variables**.

3 Click **New** to add the following variable definitions. Or select the variable from the list and click **Edit** to modify an existing variable definition:

   Table 5.2 SAS Event Stream Manager Kerberos Variables

Variable	Value
ESM_KEYTAB_LOCATION	`C:\ProgramData\SAS\Viya\etc\`***`keytab-file-name`*** For *keytab-file-name*, substitute the name of the keytab file, such as krb5.keytab.
ESM_USER_PRINCIPAL	*user-name\fully-qualified-host-name@KERBEROS-REALM* For *user-name*, substitute the primary portion of the user principal name, which is typically a user name. For *fully-qualified-host-name*, substitute the fully qualified host name of the machine where the ESP server is running. An example might be myhost.machine.domain.com. For *KERBEROS-REALM*, substitute the name of the Kerberos realm of which the user is a member, such as MYREALM.COM.

4 Click **OK** to save your variable settings.

5 Restart the SAS Event Stream Processing Studio service. Click **Start**, and enter *services.msc* in the **Search** box. Select **services.msc** from the search results.

   The Services panel appears.

6 In the list of services, select the SAS Event Stream Processing Studio service. Click the **Start** link to start the service.

   Note: The Event Stream Processing XML Server does not require a restart.

Complete SAS Event Stream Manager Setup

If you deployed SAS Event Stream Manager, take a few steps to complete the deployment. Otherwise, you can skip this section.

Configure the ESP Server for SAS Event Stream Manager

In order to manage SAS Event Stream Processing instances with SAS Event Stream Manager, you must define the ESP servers that are running in your environment. However, instead of manually defining ESP servers, you can start your ESP servers with some additional instructions that enable secure, persistent sockets between SAS Event Stream Manager and ESP servers.

To start an ESP server with a connection to SAS Event Stream Manager:

1 Provide SAS Logon Manager with a client ID and client secret for SAS Event Stream Manager.

   Run a curl command to request a registration token for a new client. In this example, the client is named app:

   ```
   curl -X POST "http://localhost/SASLogon/oauth/ clients/consul?
   callback=false&serviceID=app" -H "X-Consul-Token: 29c4700f-
   ea89-41cd-8bc4-4198ccaa5bf9"
   ```

   Note: This request must pass a `callback=false` query string parameter and authenticate directly by passing a SAS Configuration Server (Consul) token. If the Consul token on your local machine is valid, SAS Logon Manager returns the OAuth access token for registration in the response.

2 Use the registration token to register the client ID. This step establishes the ESP server as a new client of SAS Logon Manager. Run the following curl command:

   Note: Specify the initial line of the curl command on one line. Multiple lines are used here for improved readability.

   ```
   curl -X POST http://localhost/SASLogon/oauth/clients -H "Content-Type: application/json"
   -H "Authorization: Bearer token-from-previous-step"
       -d '{
            "client_id": "client-id",
            "client_secret": "client-secret",
            "scope": ["openid", "*"],
            "resource_ids": "none",
            "authorities": ["uaa.none"],
            "authorized_grant_types": ["password"]
            }'
   ```

   Note: You can find more information about the required steps to configure a new client for SAS Logon Manager in Obtain an Access Token Using Password Credentials in *SAS Viya Administration: Authentication*.

3 Create an XML file with filename esm.xml. Make sure that it uses the required syntax.

   Here is an example:

   ```
   <esm>
   a <server name="SAS-Event-Stream-Manager-host">
   b     <url>http://fully-qualified-host-name</url>
          <auth>
   c            <clientId>client-ID</clientId>
   d            <clientSecret>client-secret</clientSecret>
   e            <user>user-name</user>
   f            <password>password</password>
          </auth>
       </server>
   </esm>
   ```

   a For *SAS-Event-Stream-Manager-host*, substitute the host name of the machine where SAS Event Stream Manager is running.

b For *fully-qualified-host-name*, substitute the fully qualified domain name of the machine where the SAS Event Stream Manager server is running.

c For *client-ID*, substitute the client ID that you provided to SAS Logon Manager for the SAS Event Stream Manager instance.

d For *client-secret*, substitute the client secret that you provided to SAS Logon Manager for SAS Event Stream Manager.

e For *user-name*, substitute a user name for an LDAP user account that is valid for use with SAS Logon Manager.

f For *password*, substitute the password that corresponds to the user account that you specified.

Repeat the `<server></server>` section of the file as many times as required to accommodate all SAS Event Stream Manager servers.

4 Save the file in a network-accessible directory.

5 Open a command prompt by clicking **Start** and entering *cmd* in the **Search** box.

6 Start the ESP server. Here is an example of the command:

`$DFESP_HOME\bin\dfesp_xml_server -esm file:\\`*`full-path-to-file`*`\esm.xml`

The `-esm file:\\esm.xml` argument instructs the ESP server to read the contents of the esm.xml file. Other values that provide server start-up instructions are defined in the esp-properties.yml configuration file. For more information, see Server Configuration Properties.

7 The following message is displayed:

```
Access control disabled (permissions.yml not present)
```

The file that is referenced is required only to enable access control on the ESP server. You can ignore this message.

When it is started with the optional `-esm file:\\esm.xml` argument, the ESP server automatically registers with SAS Event Stream Manager, which can then manage it. The esm.xml file instructs the ESP server where to locate SAS Event Stream Manager. The ESP server registers itself with SAS Logon Manager as a new client with a new secret. SAS Logon Manager can then provide a token that enables the ESP server to set up a persistent web socket for secure communications with SAS Event Stream Manager.

For more information about the ESP server, see SAS Event Stream Processing: Using the ESP Server.

Log on to SAS Event Stream Manager

If your order included SAS Event Stream Manager, the required processes are started automatically by the deployment script. You are ready to start using it.

SAS Event Stream Manager uses SAS Logon Manager for logon functionality. LDAP is required for user authentication. A few steps are required to configure an LDAP server during the installation. For more information, see “Configure LDAP Settings” on page 17.

1 Open the following URL:

`http://`*`host:port`*`/SASEventStreamManager`

The host is the system on which SAS Event Stream Manager is installed. The port is the port number used by the system that hosts SAS Event Stream Manager. The default port is 80.

The Sign In to SAS window is displayed.

2 Enter your user ID and password, and click **Sign In**.

If you are a member of the SASAdministrators group, the Assumable Groups window is displayed. Group membership is not required.

Successful logon to the SAS Event Stream Manager user interface indicates that the software has been installed correctly.

(Optional) Enable Kerberos Connections for SAS Event Stream Manager

When Kerberos is configured for the machine where the ESP server is running, additional setup is required. You must set two environment variables in order to enable SAS Event Stream Manager to connect to the ESP server. If Kerberos is not used for authentication in your environment, you can skip these steps.

1 Open the Control Panel from the **Start** menu. Navigate to **System and Security**.

2 Click **System** ⇨ **Advanced System Settings** in the left pane.

The System Properties dialog box appears. Click **Environment Variables**.

3 Click **New** to add the following variable definitions. Or select the variable from the list and click **Edit** to modify an existing variable definition:

Table 5.3 SAS Event Stream Manager Kerberos Variables

Variable	Value
ESM_KEYTAB_LOCATION	`C:\ProgramData\SAS\Viya\etc\`***`keytab-file-name`*** For *keytab-file-name*, substitute the name of the keytab file, such as krb5.keytab.
ESM_USER_PRINCIPAL	*user-name\fully-qualified-host-name@KERBEROS-REALM* For *user-name*, substitute the primary portion of the user principal name, which is typically a user name. For *fully-qualified-host-name*, substitute the fully qualified host name of the machine where the ESP server is running. An example might be myhost.machine.domain.com. For *KERBEROS-REALM*, substitute the name of the Kerberos realm of which the user is a member, such as MYREALM.COM.

4 Click **OK** to save your variable settings.

5 Restart the service. Click **Start**, and enter *services.msc* in the **Search** box. Select **services.msc** from the search results.

The Services panel appears.

6 In the list of services, select the SAS Event Stream Manager service. Click the **Start** link to start the service.

Note: The Event Stream Processing XML Server does not require a restart.

Complete Streamviewer Setup

SAS Event Stream Processing Streamviewer is a web-based client that visualizes events that stream through event stream processing models. Streamviewer is installed automatically along with SAS Event Stream Processing.

You can also set up and run Streamviewer as a stand-alone application. In stand-alone mode, Streamviewer is not integrated with SAS Viya authentication and uses a separate database to store project information. For more information, see "(Optional) Set Up and Run Streamviewer as a Stand-Alone Application" on page 26.

Log on to Streamviewer

When the deployment process has completed, take the following steps to access Streamviewer:

1. The Streamviewer process is started automatically by the deployment script. If it is not running, start the Streamviewer service from the Windows Services panel.
2. Open the following URL:

   http://*ESP-server-host-name*/SASEventStreamProcessingStreamviewer

   For *ESP-server-host-name*, substitute the host name of the machine where Streamviewer is installed.
3. Enter your user ID and password and click **Sign in**.

When you successfully log on to Streamviewer, the home page appears.

(Optional) Set Up and Run Streamviewer as a Stand-Alone Application

By default, Streamviewer is installed as an integrated component of SAS Event Stream Processing. You can start using Streamviewer as soon as the deployment process has completed.

However, you can also install Streamviewer as a stand-alone application. If you prefer to run Streamviewer as an integrated component, skip this section.

Streamviewer Database Options

Streamviewer database support has changed in version 6.1. By default, Streamviewer is configured to use the same PostgreSQL database that SAS Event Stream Processing Studio uses. The PostgreSQL database is compatible with other SAS Viya products.

When you instead run Streamviewer as a stand-alone application, it uses a different database than when it runs as an integrated component of SAS Event Stream Processing. The Streamviewer JAR file includes H2, a file-based database engine. When it runs as a stand-alone application, only the H2 database is supported. The configuration is stored in a file that is created when you invoke the application from the command line. For more information about H2, see http://www.h2database.com/.

Note: Previous versions of Streamviewer supported some additional database management systems. If you have used one of those databases with a previous version of Streamviewer, you can export your Streamviewer data from that database and import it into version 6.1. For more information, see "Exporting Streamviewer Data" on page 35.

Start Streamviewer as a Stand-alone Application

Use the streamviewer.bat file to start Streamviewer as a stand-alone application. By default, the BAT file is included in the JAR file along with Streamviewer, in **$DFESP_HOME\bin**. All supported JDBC drivers are included in this JAR file.

On a Windows system where the JAR file has been saved, run a command that resembles the following example to start Streamviewer:

```
streamviewer.bat -http 5990 -h2file localpath\config -jar localpath
\streamviewer-6.1.jar -noauth
```

For *http_port*, substitute an available port number. Do not specify the `http` or `pubsub` port that you specified when starting the ESP server.

The H2 database file has the name **`config`**. If the database file **`config`** does not exist, the script creates the file in the current directory.

Table 5.4 *Additional Command Arguments for Streamviewer Start-up Utility*

Argument	Description
`-h2file database_file`	Specifies the name of a file where you want H2 to store the configuration. The file is created if it does not already exist. Specify the database file directory with a full path or point to the appropriate relative directory. The H2 database file has the name **`config`**. If the database file **`config`** does not exist, the script creates the file in the current directory.
`-local-oauth`	Runs Streamviewer with its default authentication enabled. Authentication is disabled by default.
`-jar jarfile`	Specifies the Streamviewer JAR file and script location. Defaults to **`$DFESP_HOME/lib/streamviewer-6.1.jar`**.

To log on to the Streamviewer user interface, open the following URL:

`http://`*`Streamviewer-host-name`*`/SASEventStreamProcessingStreamviwer`

For *Streamviewer-host-name*, substitute the host name of the machine where Streamviewer is installed.

Stop Streamviewer

Terminate the stand-alone application with `dfesp_xml_client`:

```
dfesp_xml_client -url "http://host-name:http-port/exit"
```

For *host-name* , substitute the host name of the machine where the Streamviewer files are installed and running.

For *http-port* , substitute the port number that you provided when you launched the streamviewer script.

Prepare the Windows Environment for Migration of Your XML Models

SAS Technical Support maintains a migration script that enables you to upgrade the XML models that you previously created using SAS Event Stream Processing 3.**`x`** so that they are compatible with SAS Event Stream Processing 6.**`x`**.

Before you can run the migration script, you must prepare your Windows environment by installing the XSLT libraries.

1. Download the XSLT files from the following FTP site:

   ftp://ftp.zlatkovic.com/libxml/

   SAS recommends selecting the 32-bit package. Be sure to install the libxml, libxslt, zlib, and iconv libraries.

2. Add the **`\bin`** folder of each downloaded library to the PATH environment variable.

3. Validate the installation by running the following command from a prompt:

```
xsltproc -version
```

For more information about the migration script, contact SAS Technical Support.

View Code Examples

The SAS Event Stream Processing code examples are automatically installed along with the software in the following location:

C:\Program Files\SAS\Viya\SASEventStreamProcessingEngine\6.1\examples

The examples directory includes files for C++, XML, Python, and Java. It also includes a readme.examples file, which briefly describes each example and its usage.

SAS recommends that you copy the examples that you require to a writable directory on the local computer so that you can run them.

For help with understanding the examples, see the following documents on the SAS Event Stream Processing product page.

- *Expression Language Reference Guide*
- *SAS Micro Analytic Service: Programming and Administration Guide*

Review Example Templates for SAS Event Stream Manager

Example files are provided to help you learn to use SAS Event Stream Manager. You can find the example job templates in the SAS Event Stream Manager examples package, which you can download from the SAS Support Knowledge Base.

The package includes the resources that are required to create a deployment and deploy a job. A full set of instructions for using example job templates is included in the *SAS Event Stream Manager: User's Guide*, which is available on the SAS Event Stream Manager product page.

6

Managing Your Software

Overview

SAS Event Stream Processing supports upgrades from a previous version of the software to version 6.1.

What Is an Upgrade?

An upgrade adds significant feature changes or improvements to your deployed software. To perform an upgrade, you run the same tools that were run during the initial deployment. You will need a new software order to upgrade your deployed software. An upgrade might require changes to the deployed software's configuration.

However, you can reuse models and data from a previous release. For more information, see "Support for Upgrades" on page 30.

What Is an Update?

An update replaces some or all of your deployed software with the latest versions of that software. Updated software is intended to be compatible with existing configuration, content, and data. To perform an update, you will run the same tools that were run during the initial deployment. You do not need a new software order to perform an update.

You might determine that your software requires an update, or you might be notified by SAS that updates are available.

SAS recommends that you create a backup of the deployed software environment before you perform an update.

Support for Upgrades

On Windows, you can upgrade SAS Event Stream Processing 5.2 to the current version, SAS Event Stream Processing 6.1. Upgrades of older versions of SAS Event Stream Processing are not supported. Upgrades of SAS Event Stream Manager are not available for Windows. The current release of SAS Event Stream Manager is the first to be compatible with a Windows operating environment.

Migrating models and data that you generated from a previous release of SAS Event Stream Processing is supported on a limited basis. You can import files from SAS Event Stream Processing 3.2, 4.x, or 5.*x*. However, if you plan to import files that you created with SAS Event Stream Processing 3.2, be aware of the following issues:

- Multiple XML elements in SAS Event Stream Processing 6.*x* have changed since 3.2. You must replace the elements that differ. Opening a legacy project in SAS Event Stream Processing Studio does not automatically upgrade your XML code to a valid format.
- Review your C++ code that was used with SAS Event Stream Processing 3.2. You must replace the registerMethod_ds2 function with the registerMethod_DS2TS function.
- The default date format of %Y-%m-%d %H:%M:%S for CSV timestamp and datetime fields is no longer valid. The new ESP_DATETIME fields contain a 64-bit integer that represents seconds since UNIX epoch. The new ESP_TIMESTAMP fields contain a 64-bit integer that represents microseconds since UNIX epoch.
- In addition, you can no longer specify an alternative date format when initializing a SAS Event Stream Processing engine. To pass CSV events using an alternative date format, that format must now be specified on the connector or adapter that is the source or sink of CSV data. All connectors and adapters that support CSV include an optional DateFormat parameter for this purpose.

To upgrade models that you created in SAS Event Stream Processing 4.*x* or 5.*x* to the current version, take the following steps:

1. In SAS Event Stream Processing Studio 4.*x* or 5.*x*, export the models that you want to use in the newer version of SAS Event Stream Processing.
2. Install SAS Event Stream Processing 6.1.
3. Use SAS Event Stream Processing Studio 6.1 to import the 4.*x* models that you previously exported. For more information, see *SAS Event Stream Processing: Using SAS Event Stream Processing Studio*.

To import models that you created in SAS Event Stream Processing Studio 3.2, a separate migration step is required. As noted above, you must run the dfesp_xml_migrate script to migrate your XML code to the 6.*x* XML schema. Some advance preparation is required to install the script on Windows, but you can run it on Linux without installing any prerequisites. For more information, see “Prepare the Windows Environment for Migration of Your XML Models” on page 27. For information about the migration script, contact SAS Technical Support.

You can also export data from an earlier version of Streamviewer and import it into the current version. For more information, see “Exporting Streamviewer Data” on page 35.

Upgrading Your SAS Software

Overview

An upgrade adds significant feature changes or improvements to your deployed software. To perform an upgrade, you will run the same tools that were run during the initial deployment. You will need a new software order to upgrade your deployed software. An upgrade might require changes to the deployed software's configuration.

You might determine that your software needs to be upgraded or you might be notified by SAS that upgrades are available.

An outage period is required, during which all SAS services must be stopped and then restarted.

Note: The process preserves any user-modified configuration values in the vars.psd1 file, but changes made to other files in the deployment might be lost. These steps include instructions for preserving customizations that you made to other SAS Event Stream Processing configuration files.

Before you begin, you should review the "System Requirements" on page 3 and "Pre-installation Tasks" on page 9 chapters of this guide.

You will need the location of the directory on each machine where you stored deployment and maintenance files. For more information about this directory, see "Create the Deployment Scripts with the SAS Orchestration CLI" on page 11.

Before you start the upgrade, SAS recommends reviewing all the steps to determine the tasks that are applicable to your deployed software. During your review, identify the tasks that can be performed before a scheduled outage and those that must be performed during a scheduled outage.

If you are using a PDF version of this guide, go to the Deployment Guides web page at https://support.sas.com/en/documentation/install-center/sas-viya/deployment-guides.html and verify that you have the latest version of the deployment documentation before you start the upgrade process. The release date of each document is located in the bottom right corner of the front page.

User Requirements

You must have administrator privileges for the machine.

Prepare to Upgrade SAS Software

SAS recommends that you create a backup of the deployed software environment before performing an upgrade.

To prepare to upgrade a SAS Event Stream Processing deployment:

1. Check for configuration files that have been customized.

   The version of the SAS Event Stream Processing software to which you are upgrading uses a new configuration file, esp-properties.yml. Some customizations that you have made to your installed software might require migration steps after the upgrade process has completed.

   On the machine where SAS Event Stream Processing is installed, compare any modified files with the copies that were included with the older version of the software. Run the following commands:

   Note: Specify each command on a single line. Multiple lines are used here for improved readability.

```
fc /N "%DFESP_HOME%\etc\connectors.excluded" C:\ProgramData\SAS\Viya\etc
\SASEventStreamProcessingEngine\default\connectors.excluded

fc /N "%DFESP_HOME%\etc\connectors.excluded" C:\ProgramData\SAS\Viya\etc
\SASEventStreamProcessingEngine\default\esp-logger.xml

fc /N "%DFESP_HOME%\etc\connectors.excluded" C:\ProgramData\SAS\Viya\etc
\SASEventStreamProcessingEngine\default\metatags.conf

fc /N "%DFESP_HOME%\etc\connectors.excluded" C:\ProgramData\SAS\Viya\etc
\SASEventStreamProcessingEngine\default\security-properties.yml
```

2 Save the results of the commands to a file. You will consult this file when you are ready to migrate the configuration changes to esp-properties.yml. For more information, see "Merge Configuration Changes into New File" on page 33.

3 If the user performing the upgrade is different from the user that performed the original deployment, or the password for the postgres account has changed, the postgresUser.xml file must be regenerated using the encrptPostgresUser.bat script. For more information, see "Specify Credentials for the postgres User Account" on page 15.

4 If you are upgrading a deployment that used a mirror repository and you want to use a mirror repository again, download the current version of SAS Mirror Manager. For more information, see "(Optional) Create a Mirror Repository" on page 9.

5 When you upgrade SAS software, you receive a new Software Order Email (SOE) from SAS. Use your SOE to download the SAS Orchestration CLI.

   Note: Your upgrade to SAS Event Stream Processing 6.1 must use a newer version of the SAS Orchestration CLI.

6 Using the SAS Orchestration CLI that you downloaded, create new deployment scripts using the instructions on the SAS Orchestration Command Line Interface (CLI) download site. For more information, see "Create the Deployment Scripts" on page 11.

7 Extract the new deployment scripts to a location that is different from that of your original deployment scripts. For example, if you extracted your original deployment scripts to **`C:\ProgramData\SAS`**, you might extract the new deployment scripts to **`C:\ProgramData\SASupgrade`** instead. Extract the new deployment scripts to a different location for the following reasons:

   - To preserve the original vars.psd1 file.
   - To ensure that the directory that contains the deployment scripts correctly reflects what is delivered. If the new deployment scripts are accidentally extracted over existing deployment scripts, files that have been removed in the newer version of the orchestration tools would still be available and could negatively affect the process for researching and resolving deployment issues.

8 Copy the postgresUser.xml file that is used to store the encrypted passwords for the postgres user account from the previously generated deployment scripting directory to the new deployment scripting directory.

9 Locate the sitedefault.yml file from the previous deployment. Make a copy of it with a new filename, `sitedefault_original.yml`. You will use it as a reference for any future deployments.

   Note: Do not edit sitedefault.yml or sitedefault_original.yml.

10 Follow the steps that are described in "Tune Your Windows System" on page 14 on the target machine before starting the upgrade process.

11 System requirements for RAM, CPU, and disk space are likely to change with each SAS Event Stream Processing release. Verify that your environment meets the requirements that are listed in "System Requirements" on page 3.

Upgrade Your Software

To upgrade a SAS Event Stream Processing deployment on Windows:

1 Stop all SAS services. For more information, see Start and Stop Servers and Services in *General Servers and Services: SAS Viya Administration*.

2 If you installed Streamviewer, stop the Streamviewer process:

```
dfesp_xml_client -url "http://host-name:http-port/exit"
```

Replace *host-name* with the host name of the machine where Streamviewer is running.

Replace *http-port* with the port number that you provided when you started Streamviewer with the start-up script.

3 Stop the metering server:

```
dfesp_xml_client -url "http://host-name:port/SASESP/exit"
```

Replace *host-name:port* with the host name and port of the machine where the metering server is running. By default, it uses port 31001.

4 To upgrade a SAS Event Stream Processing deployment on Windows, run the following command:

```
setup.bat
```

Available upgrades will be downloaded and installed.

5 If any SAS services are running, the following message is displayed:

```
Viya services are still running.

Please shut down all Viya services before an install or update.

See 'General Servers and Services: Start and Stop All Servers and Services' in
the 'SAS Viya Administration' documentation for instructions on shutting down
Viya services.
```

Stop all services as described in Step 1 on page 33, then run `setup.bat`.

6 When the upgrade completes, one of the following two events will happen:

- If a reboot is not required, setup.bat exits to a prompt and the upgrade is complete.
- If a reboot is required, the following message is displayed:

  ```
  You must reboot in order to complete install
  ```

  Reboot the machine, then run `setup.bat -config` to configure the upgraded products and start all the services.

Merge Configuration Changes into New File

In "Prepare to Upgrade SAS Software" on page 31, you were instructed to compare versions of SAS Event Stream Processing configuration files and save a file reflecting the differences between them. Now merge any differences that you found into the new configuration file for SAS Event Stream Processing 6.1, named esp-properties.yml. Or, if no changes were detected, your upgrade has completed.

1 Open the file that contains the results of the fc commands that you saved in "Prepare to Upgrade SAS Software" on page 31.

2 Use your preferred text editor to modify the following file: **%ProgramData%\SAS\Viya\etc\SASEventStreamProcessingEngine\default\esp-properties.yml**.

3 For the customizations that you found in connectors.excluded, locate the connectors: section of esp-properties.yml. For each connector that you excluded, set the connector's value to false.

4 For the customizations that you found in esp-logger.xml, copy the changes from your comparison file to the logging: section of esp-properties.yml.

5 For the customizations that you found in metatags.conf, copy the changes from your comparison file to the meta: section of esp-properties.yml.

6 For the customizations that you found in security-properties.yml, copy the changes from your comparison file to the security: section of esp-properties.yml.

7 When you have completed the modifications, save esp-properties.yml.

8 Now complete the post-installation tasks that are described in "Post-installation Tasks" on page 19.

About Updates

A software update makes your deployed software up-to-date with the latest software. Updates are performed by running the same tools that you ran during the initial deployment. You might determine that your software needs to be updated, or you might be notified by SAS that updates are available.

The term *upgrade* is used to refer to a type of software update that introduces new functionality. At SAS, an upgrade generally involves a new release number. By contrast, an *update* refers to minor changes to the software such as fixes. A new Software Order Email (SOE) is not required in order to retrieve the updated software packages.

Applying Updates

You apply updates to the deployed software environment in order to bring the software to the latest version. For SAS Event Stream Processing, you can perform the update using Windows installation tools along with MSI files.

After an update has completed, any user-modified configuration values are maintained.

Update SAS Event Stream Processing on Windows

You can use Windows installation tools that work with MSI files to apply all available updates to SAS software on a selected machine.

1 On the machine where you installed SAS Event Stream Processing, create a backup copy of the current configuration by saving copies of any files that are located in **C:\ProgramData\SAS\Viya\etc\SASEventStreamProcessingEngine\default**. Save them in a directory outside of the installation directory, which is **C:\Program Files\SAS** by default.

2 Stop the metering server:

```
dfesp_xml_client -url "http://host-name:port/SASESP/exit"
```

Replace *host-name:port* with the host name and the port of the machine where the Metering Server is running. By default, it uses port 31001.

3 Navigate to the directory where you uncompressed the ZIP file that you downloaded.

Note: The SOE that enabled you to install the SAS software provided a link to the ZIP file to be downloaded.

4 Locate the setup.bat file. Right-click the file, and select **Run as Administrator** from the menu.

The update proceeds automatically.

When the software update has completed successfully, a message is displayed that indicates success.

Exporting Streamviewer Data

Streamviewer 6.1 is integrated with SAS Viya. By default, it uses the SAS Viya database, known as SAS Infrastructure Data Server and running on PostgreSQL. You also have the option to install Streamviewer as a stand-alone application, in which case, it uses an H2 database.

Previous versions of Streamviewer supported multiple database types. If you have Streamviewer data that you want to preserve from a previous version of Streamviewer, you must export it to a file. You can then import the file into Streamviewer 6.1.

1 Open the Streamviewer user interface from the following URL:

2 Supply your credentials to log on.

3 Click  on the dashboard pane to export Streamviewer data to a file. The Export Data window appears.

This window shows the dashboard configuration in XML format.

4 Copy the XML configuration from the Export Data window to save it to a local file.

The file that was created by the export operation can be imported into any instance of Streamviewer.

Importing Streamviewer Data

You can import Streamviewer data directly from another running Streamviewer instance or from a file. Take the following steps:

1 Log on to the Streamviewer user interface.

2 Click  . The Import Data window appears.

3 Select whether to import data from a running Streamviewer **Server** or from a **File**.

Note: Streamviewer 6.1 supports only data imports from Streamviewer 5.2 and 5.1 instances.

If you select **Server**, complete the following fields and click **Ok**:

- **Source Config URL**

  Enter the configuration URL of the server from which to import data. The URL is the host name and port of the Streamviewer instance.

- **Access Token**

If the Streamviewer instance is secure, enter the access token. Access tokens are not supported when Streamviewer is running as a standalone application.

If you select **File**, click **Choose File** to browse for the file to upload.

Note: The imported file has a particular XML structure. Here is an example of the output from following the instructions in "Exporting Streamviewer Data" on page 35:

```
<rows continue-on-error='false'>
   <insert table='streamviewer_server'>
      <values>
         <value column='id'>e01b157a0318250a09408857a472898e</value>
         <value column='name'>bserv</value>
         ...
         </values>
   </insert>
   <insert table='streamviewer_dashboard'>
      <values>
         <value column='id'>e01ab91c-0318250a-09408857-455cf343</value>
         <value column='name'>sample</value>
         <value column='creation_time'>1485523728055</value>
         ...
         </values>
   </insert>
   ...
</rows>
```

7

Uninstalling SAS Event Stream Processing

Overview

You can remove your SAS software by using the remove.bat script or by using the Windows control panel. After the software is removed, you must clean up the deployment by performing a few steps.

Use the Software Removal Script

1 Navigate to the `C:\sas\install\` directory where you uncompressed the sas-viya-deployment-script.zip file that you created.

   SAS Viya software is installed in the `C:\Program Files\SAS` and `C:\ProgramData\SAS` directories.

2 Locate the remove.bat file in the `C:\sas\install\powershell-deployment` directory. You can use this file in one of two ways:

   - Right-click the file, and select **Run as Administrator** from the menu.
   - Open a command prompt (being sure to select **Run as administrator**) from the Windows **Start** menu. Run the following command:

     ```
     remove.bat
     ```

   The services will be stopped, and the SAS Event Stream Processing software and services will be uninstalled.

Use the Windows Control Panel

1 Go to the Control Panel for your Windows machine and select either **Add/Remove Programs** or **Programs and Features**, whichever is appropriate for the version of Windows that you are using.

2 Select **SAS Viya**, right-click, and select **Uninstall**.

The services will be stopped, and the SAS Event Stream Processing software and services will be uninstalled.

Final Cleanup Steps

1 After most of the software is removed, the SAS Package Manager for Windows will still be installed. To remove SAS Package Manager for Windows:

   a Go to the Control Panel for your Windows machine and select either **Add/Remove Programs** or **Programs and Features**, whichever is appropriate for the version of Windows that you are using.

   b Select **SAS Package Manager for Windows**, right-click, and select **Uninstall**.

2 Manually remove the `C:\Program Files\SAS` and `C:\ProgramData\SAS` directories.

   Note: `C:\ProgramData` is a hidden directory. If it is not viewable, go to the **View** tab on Windows Explorer and select **Hidden Items** under **Show/hide**.

   After the directories are manually removed, the removal of your SAS Event Stream Processing deployment is complete.