# System Requirements for SAS® 9.4 Foundation for z/OS

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**System Requirements for SAS® 9.4 Foundation for z/OS**

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# Welcome

This document provides requirements for installing and running SAS 9.4 Foundation under IBM z/OS. It has been updated for SAS 9.4M9 (TS1M9).

You must update your system to meet the minimum requirements before deploying SAS 9.4 Foundation.

For installation information, see the following SAS Support site: SAS 9.4 Installation Guide for z/OS.

SAS/ACCESS Interface to Teradata is not available in SAS 9.4M8. Support for this SAS/ACCESS engine has been restored in SAS 9.4M9.

# Software Requirements

The following sections summarize system requirements for running SAS 9.4 Foundation software on IBM z/OS.

## *Operating System*

The requirements for 31-bit and 64-bit z/OS to host a SAS 9.4 Foundation deployment are similar:

- Only the z/Architecture chip family is supported.
- z/OS must be using the 31-bit z/Architecture instruction set.
- SAS 9.4M9 requires z/OS V3R1 or later within V3.
- SAS 9.4M8 requires IBM z/OS V2R4 or later within V2 and V3R1 (z/OS 3.1) or later within V3.
- SAS 9.4M0 through SAS 9.4M7 offer support for IBM z/OS V1R11, or V2 and later within V2.

***Note:*** *Some SAS 9.4 solutions enable you to deploy the SAS Metadata Server on 64-bit z/OS. For this situation, SAS 9.4M9 supports z/OS V3R1 or later within V3 on z/Architecture (using the z/Architecture instruction set).*

***Note:*** *With SAS 9.4M8 and later, SAS Foundation running in z/OS for the 31-bit z/Architecture includes support for Pervasive Encryption. Pervasive Encryption is available for SAS direct access bound libraries (using EXCP) and sequential access libraries (TAPE) using both the older CCW based channel programs and the newer zHPF channel programs. See* *Pervasive Encryption on page 3* *for more information.*

## *UNIX System Services Requirements*

In SAS 9.4, each user needs an OMVS segment, either specifically defined or as a default for all user IDs, so that the user can be "dubbed" in UNIX terms. End users do not require their own UNIX file system directory.

The user completing the installation needs the ability to install Help content and other SAS 9.4 content into a UNIX file system (preferably zFS).

## Java Requirements

Some features of SAS 9.4 require a Java Software Development Kit (SDK).

With SAS 9.4M9 on z/OS, IBM Java 21.0.4 or later (64-bit) SDK is required. The following SAS hot fixes must be downloaded along with your SAS 9.4M9 software order, and they must be applied with the initial installation in order to support this change to the Java requirement:

- P6Z001 for Threaded Kernel Java 9.4_M9
- P7N001 for Base SAS JAR Files for z/OS 9.4
- P7P001 for SAS Integration Technologies JAR Files for z/OS 9.4

If you are using IBM Semeru, the IBM Semeru Runtime Certified Edition for z/OS document for Java 21 includes a section titled "Semeru fonts support on z/OS." It states, "For Semeru, the default location for fonts is `/usr/lpp/fonts/worldtype`.

"Make sure that the following FMIDs for the z/OS Font Collection are made available on your z/OS system at that location:

- FMID HFNT140 - The base element that provides a comprehensive set of single-byte fonts.
- FMID HFNT14J - The z/OS Japanese base feature collection that includes double-byte fonts for Chinese, Japanese, and Korean (CJK)."

See SAS KB0041603, "Java service refresh levels currently supported by SAS in the z/OS operating environment," for recommendations about the supported Java releases.

You must obtain the SDK for z/OS systems directly from IBM and deploy the appropriate version in your environment.

***Note:*** *When launching the SAS Deployment Tools or SAS 9.4M9 with IBM Semeru Java 21, be sure to follow the IBM instructions in IBM Semeru Runtime Certified Edition for z/OS v21.1.0 in the section titled Semeru fonts support on z/OS. Otherwise, you will see a message that resembles the following:*

*"`Probable fatal error: No physical fonts found`."*

For earlier maintenance releases of SAS 9.4 Foundation, check the SAS Third-Party Support for Java page for information about the version of the Java SDK that SAS has tested and supports.

Later patch levels and versions of this SDK might work; however, they have not been tested by SAS.

For information about Java configuration, refer to the section titled "Configuring SAS Software for Use with the Java Platform" in the *Configuration Guide for SAS 9.4 Foundation for z/OS*.

## SAS Download Manager Requirements

SAS Download Manager is a deployment tool that enables you to download a SAS software order from secure SAS repositories. You should ensure that you are using the most recent version of SAS Download Manager that is available from the SAS Downloads page on the Support website.

If you see an error when attempting to download SAS software or hot fixes, you might need to provide server exclusions to allow SAS Download Manager to send data through a firewall. Your network administrator should make the following exclusions on the network firewall for the HTTPS protocol (TCP over Port 443):

- support.sas.com
- tlshq.esd.sasinstitute.net

- tlsesd.sas.com
- tshf.sas.com
- tlsbwp1.esd.sasinstitute.net
- tlsbwp2.esd.sasinstitute.net

HTTPS is the default protocol used by SAS Download Manager. If you prefer to use HTTP, see SAS KB0036237, "SAS Electronic Software Delivery might require server exclusions to pass through a firewall" for a list of required exclusions.

## Security Requirements

This section contains information about SAS 9.4 Foundation support for security in a z/OS deployment:


- Encryption (TLS)
- Supported Certificates
- Pervasive Encryption
- Multifactor Authentication


### Encryption (TLS)

Starting with SAS 9.4M8, SAS Foundation servers use the cryptographic libraries that are available from the operating systems supported by SAS to provide encryption. Each SAS-supported cipher suite might not be available from all operating systems. When this issue is encountered, use a cipher suite that is supported by both SAS and that operating system, or install a third-party SSL provider for use by SAS.

For z/OS, TLS is the recommended security protocol for data in motion. TLS 1.2 is supported. Starting with SAS 9.4M9, TLS 1.3 is also supported. See the *Configuration Guide* for more information. Compare the list of SAS-supported cipher suites to those supported by IBM System SSL for TLS 1.3. These are documented in the z/OS Cryptographic Services System Secure Sockets Layer Programming documentation in the Cipher Suite definitions section.

For more information and configuration steps, see *Encryption in SAS 9.4*.

### Supported Certificates

The following certificates and certificate storage options are supported for SAS 9.4 Foundation components deployed on z/OS, including clients:

- .kdb files
- a PKCS#12 file
- SAF KeyRings (both real and virtual)

Keep in mind that IBM associates a key ring with a specific user ID, which works well for a server that is spawned to run under a single user account. However, multiple user IDs are involved in an environment where, for example, SAS/CONNECT Server and SAS/CONNECT Spawner are in use: all spawned SAS/CONNECT Servers run under different user IDs.

SAS Note 70752 provides tips for configuring KeyRings in such an environment. It also provides additional information about encryption for z/OS and links to multiple IBM documents that are helpful for setting up encryption for SAS 9.4M8 and later on z/OS.

## Pervasive Encryption

Starting with SAS 9.4M8, support for the IBM Z Pervasive Encryption feature is available. This support is limited to SAS direct access bound libraries (via EXCP) and sequential access libraries (such as TAPE). Note that z/OS data set encryption currently only supports data-encrypting keys that are using the AES algorithm with a 256-bit key length.

Pervasive Encryption makes it easier to manage encryption keys and passwords. Pervasive encryption also enables system administrators to control and track encryption of both SAS and non-SAS stored data sets and libraries using the same approach and the same system tools.

At this time, pervasive encryption support is available for the SAS 9.4 Foundation for 31-bit z/OS offering, but not for the 64-bit offering. SAS 9.4M8 or later is required.

Pervasive Encryption support within SAS 9.4 Foundation also requires the following:

- SAS libraries must reside in SMS (Storage Management Subsystem) managed data sets.
- An appropriate key has been enabled with ICSF.
- An encryption key label must be set up in the CKDS and provided to the SAS deployment. The key label must point to an AES-256-bit encryption DATA key within the z/OS ICSF key repository (CKDS). Authorized users must have at least READ access to the label name in the RACF CSFKEYS class.
- Pervasive Encryption is only supported on 3390 device types.

Refer to the *Configuration Guide for SAS 9.4 Foundation for z/OS* for more information about enabling Pervasive Encryption.

## Multifactor Authentication

In order to support multifactor authentication with SAS 9.4M9, SAS has validated SAS/CONNECT and the Object Spawner with IBM Z Multi-Factor Authentication (z/MFA). IBM z/MFA allows IBM Resource Access Control Facility (RACF) to use alternate authentication mechanisms in place of the standard z/OS password. SAS has validated z/MFA support in environments with RACF configured.

SAS 9.4M9 support for multifactor authentication extends to logins that are performed by SAS Logon Manager. Support for additional factors includes authentication mechanisms for z/OS networks that are used in conjunction with RSA SecurID-based authentication systems, including the following:

- Apple Touch ID devices
- Certificate authentication options such as PIV/CAC cards,
- RADIUS

Additional options supported by z/MFA are expected to work, although SAS has not validated SAS 9.4M9 with all of them.

IBM Z Multi-Factor Authentication supports both in-band and out-of-band authentication. With SAS 9.4M9, SAS has validated both out-of-band (using a web interface to acquire a time-based one-time password), and in-band authentication (specifically, phone or personal device-based token management combined with an actual password). These types of authentication have been validated with the SAS/CONNECT Spawner for z/OS, the SAS z/OS Object Spawner, and SAS/SHARE deployed on z/OS.

The RACF user account must be configured for IBM z/MFA Out-of-Band and a policy that defines the factors that the user must specify during authentication.

When using the SAS/CONNECT and Object Spawners with IBM z/MFA, for time-based one-time password (TOTP) authentication, users can log in to SAS by using an application such as IBM Verify, Google Authenticator, or Duo Mobile using an Android or Apple iOS device. The device generates a one-time password with a timeout. End users can specify this password along with their z/OS user name to log on to SAS applications running on IBM z/OS. PIV cards can also be used.

Note that the TOTP is only good once, and only for a certain period of time. Therefore, SAS users might need to refactor their scripts so that only one `CONNECT SIGNON` is performed because an authentication occurs with each sign-on.

For more information about multifactor authentication for SAS 9.4 running on z/OS, see About IBM Z Multifactor Authentication in the *SAS 9.4 Security Administration Guide*.

## Web Browsers

Both SAS 9.4 Foundation software and client applications support recent versions of popular web browsers to display SAS user interfaces. To run SAS clients, use a browser and platform combination that is listed on the SAS 9.4 Support for Web Browsers page.

On client machines, install a recent version of your preferred web browser, such as Microsoft Edge, Google Chrome, or Mozilla Firefox, to support modern SAS user interfaces. Many SAS product user interfaces deploy HMTL5 to support newer features. For example, SAS Visual Analytics uses HTML5. These products require recent browser versions.

SAS 9.4 offers a Remote Browsing feature to display information. Instead of using a local browser, SAS 9.4 sends the information as a URL to your desktop computer for display in a web browser. This feature removes the browser overhead from the server and allows for the display of output that requires browser plug-ins that do not run on a 64-bit computer. A software agent, the Remote Browser Server, is installed on your desktop computer to enable SAS to communicate with your browser.

To enable remote browsing, your desktop computer must be running on Windows 8 or later or Linux for x64. For SAS 9.4M9, only Windows 10, Windows 11, and 64-bit Linux are supported.

## Maintenance Releases and Third-Party Support

***Note:*** *SAS 9.4M7 entered Limited Support from SAS in September 2025. SAS 9.4M0 through 9.4M6 entered Limited Support from SAS in February 2025.*

If you do not upgrade SAS 9.4 Foundation with each maintenance release, you are assuming risks beyond potentially running SAS software that might no longer be receiving security and bug fixes. Your SAS 9.4 maintenance level might be able to run only against versions of third-party database technologies that are no longer supported by the third-party vendor. If your SAS software is under Standard Support but the third-party software has reached end of life, SAS might not be able to assist you or address issues because the vendor is no longer providing assistance.

In these cases, SAS might move a SAS product's support to Limited Support. For the official SAS support policy regarding the loss of vendor support, see SAS Software Support When Third-Party Vendors Drop Support.

For more information about SAS Technical Support, visit https://support.sas.com/en/technical-support.html.

# Hardware Requirements

## Machines Supported

Both the zSeries and System z machines are supported.

## Tape Drives Supported

SAS uses standard operating system access methods to Read/Write tape files and will operate with any tape drive that can be used by these access methods. The list includes the following:

- IBM 3480 compatible drives
- IBM 3490 compatible drives
- IBM 3590 compatible drives
- IBM 3592 compatible drives (includes IBM TS1120 drives)

## Distribution Media

- Electronic Software Delivery
- DVD
- Cartridge (3590 only)

## Memory Requirements

The total memory required for a SAS session depends on the work being performed and SAS 9.4 Foundation options that are active. Most work, up to moderately large jobs, can be run in a region that provides 64 MB of storage above the line. This practice is recommended for both batch jobs and TSO sessions.

SAS 9.4 use of below-the-line storage is substantially less than was required for SAS 9.0. 4 MB of below-the-line storage should be adequate for most batch jobs and TSO sessions.

Programs that utilize AF and SCL program entries may require additional region size in SAS 9.4 to exploit the various functions of the product. Examples of SAS products which may require a larger region are SAS/ASSIST and SAS IT Resource Management. Refer to the "Specific Product Requirements" section for the recommended `REGION` size for these products.

***Note***: *This may also be necessary for user-written AF and SCL programs. For these, the site* ***must*** *determine what an appropriate REGION is.*

If you install the SAS bundles into the LPA, the region requirements for SAS jobs will be reduced, because less storage is needed in the region for SAS executable modules. Information regarding installation of LPA bundles can be found in the *Configuration Guide for SAS 9.4 Foundation for z/OS*.

No below-the-line storage is required for any of the LPA bundles.

### Java Memory Requirements

SAS sessions that invoke the Java virtual machine will require a much larger region. The JVM typically adds approximately 250 MB to the region requirement.

***Important:*** *SAS recommends that the logon user ID that will be running SAS Deployment Wizard to install SAS 9.4 Foundation for z/OS have a region size or ASSIZEMAX of 1 GB. This size accommodates both the Basic and Planned order deployment scenarios.*

## Space Requirements

The media you received are customized for your site and contain all the SAS software products for which you are licensed.

Approximate space requirements for all of the products available for SAS 9.4 Foundation are as follows:

- SAS Software Depot for all electronic download, DVD and tape planned orders (only needed during installation)
  - Base-only: 8.2 GB
  - All products: 24.1 GB
- Space for permanent installation
  - Traditional z/OS data sets: 6529 * cylinders
  - UNIX file system space for SASHOME directory: 3 GB (provides space for hot fixes and maintenance)

  * This amount includes SAS/GRAPH map data sets from GfKGeoMarketing of 3855 cylinders disk space.
- Temporary space for Maintenance/Add-on (Actions B/C) during installation
  Traditional z/OS data sets require 1200 cylinders to be released back to the system.

***Note:*** *SAS recommends a minimum of 100 MB of available* `/tmp` *space during installation and deployment.*

After the installation of the SAS software is complete, any unused space is released to the system.

# Specific Product Requirements

## Base SAS Software

### TCP/IP Access Method

Some features of Base SAS require TCP/IP; for example, Remote Help and the FTP access method require it. SAS requires either:

- A properly configured IBM z/OS TCP/IP.
- A third-party TCP/IP package. This package must fully support the function and interfaces found in the minimum system requirements for z/OS.

### Requirements for SPD Engine on z/OS

The minimum requirement for a computer system to support SPD Engine is a UNIX file system (zFS).

## SAS/ACCESS Interface to Adabas

***Important:*** *Starting with SAS 9.4M8, SAS/ACCESS Interface to Adabas is not available. If you upgrade or migrate SAS Foundation to SAS 9.4M8, SAS recommends that you install and use a different data source and a different SAS/ACCESS engine instead. Contact your SAS representative for assistance.*

*If you have an existing installation of SAS/ACCESS Interface to Adabas in your environment, SAS recommends that you first unconfigure and uninstall before upgrading or migrating to SAS 9.4M8. A best practice is to unconfigure retired SAS products before you upgrade and to uninstall them after you upgrade. For more information, see "Unconfiguring and Uninstalling Retired Products" in the SAS Guide to Software Updates and Product Changes.*

Base SAS is required for the installation of SAS/ACCESS Interface to Adabas software.

**DBMS Products Required:**

- ADABAS, Release 6.2.1 or later
- For SAS 9.4 M3: ADABAS, Release 7.4.1 or later

**Optional DBMS Products**

- NATURAL, Release 2.3.2 or later
- NATURAL Security, Release 2.3.2 or later
- PREDICT, Release 3.4.1 or later

## SAS/ACCESS Interface to CA-Datacom/DB

Base SAS is required for the installation of SAS/ACCESS Interface to CA-Datacom/DB software.

**DBMS Products Required**

- CA-Datacom/DB, Release 9.0 or later. For SAS 9.4 M3, Release 11 SP2 or later.
- CA-DATADICTIONARY, Release 9.0 or later

## SAS/ACCESS Interface to CA-IDMS

Base SAS is required for the installation of SAS/ACCESS Interface to CA-IDMS software.

**DBMS Products Required:**

- CA-IDMS, Release 14.0 or later
- For SAS 9.4 M3, Release 16.0 or later

## SAS/ACCESS Interface to DB2

Base SAS is required for the installation of SAS/ACCESS Interface to DB2.

**DBMS Product Required:** IBM Db2 Version 10 or later

### For SAS 9.4M9

**DBMS Products Required:**

- IBM Db2 version 11.5 or later
- Client utilities for IBM Db2 11.5 or later

For best results, SAS recommends installing the latest FixPack on the client and server.

## SAS/ACCESS Interface to IMS-DL/I

Base SAS is required for the installation of SAS/ACCESS Interface to IMS-DL/I software.

**DBMS Products Required:**

- IMS/VS, Version 6.1 or later
- For SAS 9.4 M3, Version 7 or later

## SAS/ACCESS Interface to Oracle

***Important:*** *Starting with SAS 9.4M8, SAS/ACCESS Interface to Oracle is not available. If you upgrade or migrate SAS Foundation to SAS 9.4M8, SAS recommends that you install and use a different data source and a different SAS/ACCESS engine instead. Contact your SAS representative for assistance.*

*If you have an existing installation of SAS/ACCESS Interface to Oracle in your environment, SAS recommends that you first unconfigure and uninstall before upgrading or migrating to SAS 9.4M8. A best practice is to unconfigure retired SAS products before you upgrade and to uninstall them after you upgrade. For more information, see "Unconfiguring and Uninstalling Retired Products" in the SAS Guide to Software Updates and Product Changes.*

Base SAS is required for the installation of SAS/ACCESS Interface to Oracle.

SAS/ACCESS Interface to Oracle software can be installed on either a full Oracle RDBMS server node or on an Oracle client node.

### For SAS 9.4M0 - SAS 9.4M7

**DBMS Products Required:**

- Oracle Database 12.1 or later
- Oracle Client 12.1 or later

## SAS/ACCESS Interface to R/3

Base SAS is required for the installation of SAS/ACCESS Interface to SAP R/3. To use the SAS client/server support, SAS/CONNECT or SAS/SHARE is required.

SAS/ACCESS Interface to SAP R/3 requires extensive post-installation configuration before it can be used. For detailed information about configuration and additional requirements, refer to the *Post-Installation Instructions for SAS/ACCESS 9.4 Interface to R/3*.

**Products Required:**

- SAP NetWeaver 7.0 (Application Server ABAP) or later
- SAP NetWeaver RFC library 7.20 or later (64-bit)

## SAS/ACCESS Interface to SYSTEM 2000

Base SAS is required for the installation of SAS/ACCESS Interface to SYSTEM 2000.

**DBMS Products Required:** SYSTEM 2000, Version 2.0 (current release), or Release 11.6 with Field Fix 1 or later.

## SAS/ACCESS Interface to Teradata

***Important:*** *In SAS 9.4M8, SAS/ACCESS Interface to Teradata is not available. Support for this SAS/ACCESS engine has been restored in SAS 9.4M9.*

*To use a Teradata data source with SAS 9.4 Foundation, upgrade or migrate SAS Foundation to SAS 9.4M9. Contact your SAS representative if you need assistance.*

*SAS/ACCESS Interface to Teradata on z/OS remains unsupported for SAS 9.4M8. If you upgraded or migrated SAS Foundation to SAS 9.4M8, you should install and use a different data source and a different SAS/ACCESS engine instead.*

*If you have an existing installation of SAS/ACCESS Interface to Teradata in your environment, SAS recommends that you first unconfigure and uninstall before upgrading or migrating to SAS 9.4M9. A best practice is to unconfigure retired SAS products before you upgrade and to uninstall them after you upgrade. For more information, see "Unconfiguring and Uninstalling Retired Products" in the SAS Guide to Software Updates and Product Changes.*

Base SAS is required for the installation of SAS/ACCESS Interface to Teradata.

Teradata has ended support for versions that precede Teradata 17.xx. For more information, see the Teradata Products Support Lifecycle and Compatibility Matrix.

**Baseline DBMS Products Required for SAS 9.4M0 – 9.4M3:**

- Teradata Database 12 or later (or 13.10 or later if Temporal features are required)
- Teradata CLIv2 client libraries TTU 12 - 16.20 on the machine where you run SAS and SAS/ACCESS Interface to Teradata. CLIv2 is part of Teradata Tools and Utilities (TTU). TTU 13.10 or later is required for Temporal features.
- If you are running any Teradata Utility (BTEQ, FastLoad, MultiLoad, FastExport, TPump), CLIv2 is already on your machine.

***Note:*** *Connectivity from the z/OS client to the Teradata DBS server should be established and validated as described in the Teradata Tools and Utilities Installation Guide for MVS. If you are successfully accessing tables with BTEQ, FastLoad, or other Teradata utilities, you already have the needed connectivity.*

#### *For SAS 9.4M2 – 9.4M7*

- Teradata Database 14.10 or later.
- Teradata CLIv2 client libraries TTU 12 - 16.20 on the machine where you run SAS and SAS/ACCESS Interface to Teradata. TTU 13.10 or later is required for Temporal features.

#### *For SAS 9.4M9*

Starting with SAS 9.4M9, functions that were previously provided by the Teradata FastLoad, MultiLoad, and FastExport utilities are now provided by analogous functions of the Teradata Parallel Transport Utility (TPT). This functionality requires release 17.20 or later of Teradata Tools and Utilities (TTU). For more information, see the *Configuration Guide for SAS 9.4 Foundation for z/OS*.

**DBMS Products Required:**

- Teradata Database 17.10 or later within Teradata 17, or Teradata 20.*xx* or later within Teradata 20
- Teradata CLIv2 client libraries with TPT, TTU 17.20 or later within TTU 17, or TTU 20.*xx* or later within TTU 20 (64-bit libraries)

## *SAS/ASSIST*

**Products Required:** Base SAS software

**Memory Requirements**

Due to the increased storage requirements for SAS 9 and above, it may be necessary to increase the default REGION to 64 MB.

## *SAS/CONNECT*

### TCP/IP Access Method

See "TCP/IP Access Method" in "Base SAS Requirements" on page 8 for details.

***Note:*** *If you are familiar with earlier SAS releases, note that the SAS/C Transient Library is no longer used and is not shipped with SAS 9.4. The associated configuration options (such as CTRANSLOC) are accepted but ignored.*

### Components Required

Version 9 SAS SVC Routine is required, except for Basic Telnet SAS/CONNECT Session.

Refer to "Chapter 1 — Setting Up SAS 9.4 Foundation" in the *Configuration Guide for SAS 9.4 Foundation for z/OS* for information about the Version 9 SAS SVC Routine.

## SAS/Genetics

*Important:* *Starting with SAS 9.4M8, SAS/Genetics is not available. In order to continue using SAS/Genetics, do not upgrade Base SAS or SAS Foundation to SAS 9.4M8.*

*A best practice is to unconfigure retired SAS products before you upgrade and to uninstall them after you upgrade. For more information, see "Unconfiguring and Uninstalling Retired Products" in the SAS Guide to Software Updates and Product Changes.*

Base SAS and SAS/GRAPH are required for the installation of SAS/Genetics software.

## SAS/GIS

**Products Required**

- Base SAS software
- SAS/GIS software
- SAS/GRAPH software

Other products may be required depending on the application.

## SAS High-Performance Forecasting

Base SAS is required for the installation of SAS High-Performance Forecasting software.

## SAS/IntrNet

SAS/IntrNet software consists of several components that may be installed independently. SAS/IntrNet Server software is installed on an existing SAS system and is included on SAS 9.4 installation media.

All SAS/IntrNet components require the use of TCP/IP. See "TCP/IP Access Method" in "Base SAS Requirements" on page 8 for details.

### CGI Tools and Applications

#### Installation Notes

For a new installation of CGI Tools for the Web Server (CGI Tools), including an add-on installation, the SAS Foundation product is required to be selected. If CGI Tools is being installed as the only add-on product, we recommend using an Action C staged install. This is because the SAS Foundation product in the order will be installed again. The CGI Tools data content is only installed to the UNIX file system area, so in the case where CGI Tools is the only product being installed, the PROMOTE job does not have to run.

#### Application Dispatcher

Requires Base SAS software and SAS/IntrNet Server software. The Application Broker component of the Application Dispatcher must be installed on the same machine as the web server. Use of the Pool Services feature requires the installation of the z/OS Spawner.

#### htmSQL

Requires Base SAS software, SAS/SHARE software, and a SAS/IntrNet software license (SETINIT). The htmSQL component must be installed on a web server.

#### MDDB Report Viewer Application

Requires Base SAS software, SAS/GRAPH software, SAS/IntrNet software, and SAS OLAP Server software. The Application Dispatcher component must be installed and configured.

#### Xplore Sample Web Application

Requires Base SAS software and SAS/IntrNet Server software. The Application Dispatcher component must be installed and configured.

### Java Tools and Applications

#### SAS/CONNECT Driver for Java

Requires Base SAS software, SAS/CONNECT software, SAS/IntrNet Server software, and a configured SAS/Connect spawner. SAS/SHARE software must also be installed if data services are used. The Java Tools package must be installed on a web server or client system.

#### Tunnel Feature

Must be installed on a web server running on a UNIX or Windows system.

## SAS/OR 12.1 Software

The use of graphics in SAS/OR software requires a SAS/GRAPH license. Invoking the OPTLP, OPTMILP, OPTQP, and OPTMODEL procedures in distributed computing mode requires a SAS High-Performance Analytics license.

## SAS/SESSION Software

**Products Required:** CICS Transaction Server for z/OS version 3.1 or later.

## SAS/SHARE Software

**Products Required**: Base SAS software

**Components Required**

- Version 9 SAS SVC Routine
- Refer to "Chapter 1 — Setting Up SAS 9.4 Foundation" in the *Configuration Guide for SAS 9.4 Foundation for z/OS* for information about the Version 9 SAS SVC Routine

### TCP/IP Access Method

See "TCP/IP Access Method" in "Base SAS Requirements" on page 8 for details.

***Note**: If you are familiar with previous SAS releases, note that the SAS/C Transient Library is no longer used and is not shipped with SAS 9.4. The associated configuration options (such as CTRANSLOC) are accepted but ignored.*

### Security System

A security system is required for z/OS SAS/SHARE sites making use of the cross-host or cross-architecture capabilities. This requirement can be met by any of the following:

- IBM Security Server for z/OS
- Any Security system that provides support equivalent to these servers via the SAF system interface

## *SAS Studio Software*

### User Address Space

SAS recommends that you set the user address space maximum (`ASSIZEMAX`) to an address storage size large enough to allow the Java JVM to load and the SAS programs to properly execute.

Set the `ASSIZEMAX` variable for the user address space in the OMVS shell.

# Graphics Hardware and Software Compatibility

## *Terminals and Displays*

SAS/GRAPH software supports standard IBM graphics terminals (such as the IBM 3179G, IBM 3192G, and IBM 3472G terminals).

SAS/GRAPH software should also be able to support most 3270 emulation packages as long as the 3270 emulation software is configured to provide host graphics support.

## *Recent Changes and Interfaces with Other Graphics Software*

SAS/GRAPH software provides device drivers to create output in various graphics file formats, such as PNG, GIF, JPEG, TIFF, RTF, PDF, CGM, and PostScript.

Starting with SAS 9.4M8, the ACTIVEX, ACTXIMG, JAVA, and JAVAIMG devices are no longer supported on z/OS. Because the GKPI procedure supports only the JAVAIMG device, starting with SAS 9.4M8, the GPKI and GTILE procedures no longer run on z/OS. In addition, KPI charts and Tile charts are no longer supported.

For more information about SAS/GRAPH, and for z/OS-specific SAS/GRAPH tips and examples, see *SAS/GRAPH 9.4: Reference*.

## Requirements for ActiveX and Java Graphics

The ActiveX and Java device drivers enable you to create HTML pages from within SAS 9.4 Foundation. Before you can do this, verify the following:

- Your system meets the JDK requirements (see "Java Requirements" on page 2).
- Your job or TSO session has sufficient memory to invoke Java.

For a list of supported browsers, see SAS 9.4 Support for Web Browsers.

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