

System Requirements

SAS[®] 9.1 Foundation z/OS

Note: *z/OS is the successor to the OS/390 operating system. SAS 9.1 Foundation for z/OS runs on both z/OS and OS/390, and throughout this document any reference to z/OS should be interpreted to refer equally to OS/390, unless otherwise stated.*

This document provides requirements for installing and running SAS 9.1 Foundation under z/OS. You must update your system to meet the minimum requirements before running SAS 9.1 Foundation. The major requirements listed in the document are:

- Software Requirements
- Hardware Requirements
- Specific Product Requirements
- Graphics Hardware and Software Compatibility

For additional information and to view the latest system requirements for your system, access the following Web site:

<http://www.sas.com/installcenter>

or contact SAS Institute Technical Support (refer to the "Service and Support" section in the Installation Kit).

Software Requirements

Operating System

- OS/390, Version 2, Release 10
- z/OS, Version 1, Release 1, or any subsequent releases

(if using the SAS ISPF interface, the current IBM-supported release of ISPF for your operating system release is supported)

UNIX System Services Requirements

In SAS 9.0 and later releases, the user completing the installation needs minimum access to UNIX System Services (USS). This means an OMVS segment is needed for the user ID either specifically defined or as a default for all user IDs. This minimum requirement allows the user to be 'dubbed' in UNIX terms, but does not require any use of a UNIX File System (HFS or zFS).

Note: *The USS requirement is not restricted to installation. All users of SAS 9.0 and later releases will require an OMVS segment.*

Java Requirements

Some features of SAS 9.1 require the use of a Java Software Development Kit (also referred to as an SDK) to function properly. Determine that you have at least the following version or release of the Software Development Kit:

SDK Version: 1.4.1, which also requires z/OS V1R4.

This is the version of the SDK that SAS has tested and supports. Later patch-levels and versions of this SDK may work; however, they have not been tested by SAS.

You can check SAS's third party support Web page for information about the latest supported version of the SDK for z/OS at <http://support.sas.com/sasnavigator91>.

Additional Requirements

SAS 9.1 Foundation for z/OS uses IBM's USS Assembler Callable Service BPX1MPC to prevent A03 abends. This facility will not work unless BPXPRMPC is at maintenance level UW89958 or above on the z/OS system where SAS is running.

Hardware Requirements

Note: If there are only limited tape drive resources available for the installation of SAS 9.1 Foundation, then refer to the section **Enabling minimal cartridge mounts from a Multi 3480 cart media** in the **Installation Instructions for SAS 9.1 Foundation for z/OS**.

Machines Supported

- ESA/390 architecture machines and compatibles
- zSeries architecture machines and compatibles

Tape Drives Supported

- IBM 3480 compatible drives
- IBM 3590 compatible drives

Distribution Media

- Cartridges for IBM 3480 drives
- Cartridges for IBM 3590 drives

Memory Requirements

The total memory required for a SAS session depends on the work being performed and SAS 9.1 Foundation options that are active. Most work, up to moderately large jobs, can be run in a region that provides 32 MB of storage above the line. This is recommended for both batch jobs and TSO sessions.

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 9.1 Foundation for z/OS*.

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

Java Requirements

- A G5 or later processor is required.
- IEEE floating point support is required.

Mouse Requirements

- IBM 3179G, 3192G, and 3472G
- Most 3270 emulation packages with host graphics allow for mainframe mouse support

Space Requirements

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

Approximate space requirements for all of the products available for SAS 9.1 Foundation are 23,083 3390 tracks (or equivalent) equating to 1,130 MB.

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

Note: This estimate does not include approximately 2,000 additional tracks that are required on your installation volume for a temporary cataloged `DATALIB` used during SAS 9.1 Foundation install. This additional space will be released at the conclusion of the install.

Specific Product Requirements

Portal Server Components 9.1

Products Required for Portal Server Components 9.1:

- Base SAS software
- SAS Integration Technologies software

SAS/ACCESS Interface to ADABAS Software

Products Required:

- Base SAS software
- SAS/ACCESS Interface to ADABAS software

DBMS Products Required:

- ADABAS, Release 6.2.1 or subsequent releases

Optional DBMS Products:

- NATURAL, Release 2.3.2 or subsequent releases
- NATURAL Security, Release 2.3.2 or subsequent releases
- PREDICT, Release 3.4.1 or subsequent releases

SAS/ACCESS Interface to CA-DATACOM/DB Software

Products Required:

- Base SAS software
- SAS/ACCESS Interface to CA-DATACOM/DB software

DBMS Products Required:

- CA-DATACOM/DB, Release 9.0 or subsequent releases
- CA-DATADictionary, Release 9.0 or subsequent releases

SAS/ACCESS Interface to CA-IDMS Software

Products Required:

- Base SAS software
- SAS/ACCESS Interface to CA-IDMS software

DBMS Products Required:

- CA-IDMS, Release 14.0 or subsequent releases

SAS/ACCESS Interface to DB2 Software

Products Required:

- Base SAS software
- SAS/ACCESS Interface to DB2 software

DBMS Products Required:

- DB2, Release 6.1 or subsequent releases

SAS/ACCESS Interface to IMS Software

Products Required:

- Base SAS software
- SAS/ACCESS Interface to IMS software

DBMS Products Required:

- IMS/VS, Version 6.1 or subsequent versions

SAS/ACCESS Interface to ORACLE Software

Products Required:

- Base SAS software
- SAS/ACCESS Interface to ORACLE software

DBMS Products Required:

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

The minimum required Oracle release is:

- Oracle 8.1.7.x

Note: ORACLE clients with version ORACLE 9i or above cannot be used with SAS/ACCESS to ORACLE because of the IBM Language Environment (LE) dependency of this version. The workaround is to use ORACLE 8 clients that can connect to servers running ORACLE 9i or above.

SAS/ACCESS Interface to R/3 Software

Note: The graphical user interface of the SAS/ACCESS Interface to R/3 is not supported on z/OS.

Products Required:

- Base SAS software
- SAS/ACCESS Interface to R/3 software

Additional functionality is obtained if the following products are installed:

- SAS/CONNECT software
- SAS/SHARE software

SAP R/3 Products Required:

- SAP R/3, Release 4.5B or higher

Note: For the RFC server, the thread safe shared library for RFC must be installed. This shared library is provided by SAP AG. Download the shared library for your platform per instructions in SAP Note 413708.

SAS/ACCESS Interface to SYSTEM 2000 Software

Products Required:

- Base SAS software
- SAS/ACCESS Interface to SYSTEM 2000 software

DBMS Products Required:

- SYSTEM 2000, Release 11.6 with Field Fix 1 or higher

SAS/ACCESS Interface to Teradata Software

Products Required:

- Base SAS software
- SAS/ACCESS Interface to Teradata software

DBMS Products Required:

- Teradata RDBMS Server, Version 2, Release 2 (V2R2) or higher
- CLIV2 libraries on the machine where you run SAS and SAS/ACCESS to Teradata. CLIV2 is part of Teradata Utilities Foundation (TUF) software. If you are running any Teradata Utility (BTEQ, FastLoad, MultiLoad, FastExport, TPump), then CLIV2 is already on your machine.

Note: Connectivity from the z/OS client machine to the Teradata DBS server machine 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.

SAS BI Server 9.1

Products Required for SAS BI Server 9.1:

- SAS BI Server, which contains:
 - Base SAS software
 - SAS Integration Technologies software
 - SAS/GRAPH software

SAS/CONNECT Software

TCP/IP Access Method:

To use the TCP/IP access method, you need the SAS C Transient Library shipped with this version of SAS 9.1 Foundation and one of the following TCP/IP packages:

- Computer Associates TCPAccess 5.3 or later
- IBM OS/390 V2R8 TCP/IP or later

The z/OS Spawner can be used with the TCP/IP access method to establish connections to a remote z/OS host.

SAS Data Quality Server Software

Memory:

The memory requirements for SAS Data Quality Server software are dependent upon the complexity of the data and the number of locales loaded from the Quality Knowledge Base at one time.

- 100 MB recommended per locale

SAS Enterprise BI Server 9.1

Products Required for SAS Enterprise BI Server 9.1:

- SAS Enterprise BI Server, which contains:
 - Base SAS software
 - SAS Integration Technologies software
 - SAS OLAP Server
 - SAS/GRAPH software
 - SAS/IntrNet software

SAS Enterprise ETL Server 9.1

Products Required for SAS Enterprise ETL Server 9.1:

- SAS Enterprise ETL Server, which contains:
 - Base SAS software
 - SAS Data Quality Server and the Quality Knowledge Base of choice
 - SAS Integration Technologies software
 - SAS/ACCESS software of choice
 - A second SAS/ACCESS software of choice
 - SAS/CONNECT software
 - SAS/SHARE software

Enterprise Miner Solution 4.3

Products Required for Enterprise Miner Server:

- Base SAS software
- SAS/STAT software
- Enterprise Miner Server Solution, which contains:
 - Enterprise Miner Server software and necessary elements of the following:
 - SAS/CONNECT software
 - SAS/ETS software
 - SAS/GRAPH software
 - SAS Integration Technologies software

Memory for Enterprise Miner Server:

The memory requirements for Enterprise Miner Server software are dependent upon the size of the data to be analyzed and the analysis methods selected.

- 48 MB required
- 64 MB recommended

Large applications will see performance improvements with more available memory.

SAS ETL Server 9.1

Products Required for SAS ETL Server 9.1:

- SAS ETL Server, which contains:
 - Base SAS software
 - SAS Integration Technologies software
 - SAS/CONNECT software

SAS/GIS Software

Products Required:

- Base SAS software
- SAS/GIS software
- SAS/GRAPH software
- Other products may be required depending on the application

SAS/GRAPH Software

The Graphics Editor

Terminals:

- IBM 3192, 3179, 3472 graphics terminals
- Most 3270 emulation packages with host graphics should support the SAS/GRAPH graphics editor

SAS Information Delivery Portal (Release 1.1)

Products Required for SAS Information Delivery Portal Server:

- Base SAS software
- SAS Information Delivery Portal Server Components, which contains necessary elements of the following:
 - SAS Integration Technologies Software

SAS/IntrNet Software

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 9.1 Foundation media. Other SAS/IntrNet software components may be installed from the Client-Side Components CD.

All SAS/IntrNet components require the use of TCP/IP. One of the following versions of TCP/IP is required:

- Computer Associates TCPAccess 5.3 or later
- IBM OS/390 V2R8 TCP/IP or later

CGI Tools and Applications

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 OS/390 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 the z/OS 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/LAB Software

Products Required:

- Base SAS software
- SAS/LAB software
- SAS/FSP software (required for interactive data entry)
- SAS/GRAPH software

SAS OLAP Server Software

Products Required:

- Base SAS software
- SAS OLAP Server contains necessary elements of the following:
 - SAS/AF software
 - SAS/GRAPH software
 - SAS Integration Technologies software

Memory:

The memory requirements for SAS OLAP Server software are dependent upon the complexity of the hierarchies generated.

- 512 MB required

Large applications will see performance improvements with more available memory

SAS/SESSION Software

Products Required:

- CICS/ESA, Version 3, Release 3 or subsequent versions
- VTAM/ESA, Version 4, Release 3 or subsequent versions

SAS/SHARE Software

Products Required: Base SAS software

Components Required:

- Version 9 SAS SVC Routine
- Refer to **Chapter 1, Setting Up SAS 9.1 Foundation** in the *Configuration Guide for SAS 9.1 Foundation for z/OS* for information on the Version 9 SAS SVC Routine.

TCP/IP Access Method:

To use the TCP/IP access method, you need the SAS C Transient Library shipped with this version of SAS 9.1 Foundation and one of the following TCP/IP packages:

- Computer Associates TCPAccess 5.3 or later

RACF:

RACF Release 1.8 or beyond (or the equivalent) is required for z/OS SAS/SHARE sites making use of the cross-host or cross-architecture capabilities available in Release 6.08, TS410 and beyond. Note that this is only required if the z/OS SAS/SHARE server runs in a "secured" mode. For more information on the cross-architecture capabilities and modes of server execution, refer to the appendix, "Implementing SAS/SHARE Software" in the in the *Configuration Guide for SAS 9.1 Foundation for z/OS*.

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.

Printers

SAS/GRAPH software should be able to support almost any graphics printer on the market (provided that the graphics format that a printer supports is compatible with the graphics format written out by SAS/GRAPH device drivers). SAS/GRAPH software is compatible with most (if not all) printers that support HP-PCL, HP-GL, HP-GL/2, and PostScript languages. SAS/GRAPH software supports most printers from manufacturers such as Hewlett-Packard, Xerox, QMS, and Tektronix.

SAS/GRAPH software supports most IBM printers (such as the IBM 3800, IBM 3812, IBM 3816, IBM 3820, IBM 3900, and IBM 4224). SAS/GRAPH software support for some IBM printers (such as the IBM 3800 and 3900 printers) may require the GDDM base product. For more information on which printers require the GDDM base product, contact SAS Institute Technical Support.

To view a complete list of all SAS/GRAPH device drivers, submit the following SAS program:

```
proc gdevice c=sashelp.devices nofs;
  list _all_;
run; quit;
```

The device driver list is sent to the SAS Output window (if running interactively) or to the SASLIST file (if running in batch).

Plotters and Film Recorders

SAS/GRAPH software should be able to support most plotters and film recorders on the market today. SAS/GRAPH software supports all HP and HP-compatible plotters that support HP-GL and HP-GL/2 languages. SAS/GRAPH software should also be able to support most film recorders that support HP-GL, Scodl, and Lasergraphics languages.

To view a complete list of all SAS/GRAPH device drivers, submit the following SAS program:

```
proc gdevice c=sashelp.devices nofs;
  list _all_;
run; quit;
```

The device driver list will be sent to the SAS Output window (if running interactively) or to the SASLIST file (if running in batch).

Protocol Converters

SAS/GRAPH supports the following 3287-type protocol converters:

- Agile
- Andrew Data Systems
- Avatar
- Axis
- Cablenet
- I-Data
- IDEX
- I/O Corporation
- IRMAprint and IRMAprint2
- ISI 87
- KMW 3287
- Local Data Interlynx 3287
- NetCommander

Use of most graphics printers with 3287-type protocol converters listed above requires special communications software (such as VPS) that can access these types of devices through the JES subsystem. Contact SAS Institute Technical Support for more information.

SAS/GRAPH supports the following 3270-type protocol converters:

- Commtext C-80
- Datastream
- IBM 7171
- KMW 3270-FS
- Local Data Datalynx
- Micom 7400
- PCI 1071, 1076
- Renex
- Hydra

Interfaces with other Graphics Software

Included with SAS/GRAPH software is a series of device drivers that can produce output in Computer Graphics Metafile (CGM) format. These files can be used to transfer SAS/GRAPH output to other products that can import CGM files, such as Harvard Graphics, Microsoft Word, and Microsoft PowerPoint.

SAS/GRAPH software also provides device drivers to create output in various other graphics file formats, such as HP-GL, PostScript, Encapsulated PostScript, GIF, JPEG, TIFF, and PDF format.

To view a complete list of all SAS/GRAPH device drivers, submit the following SAS program:

```
proc gdevice c=sashelp.devices nofs;
  list _all_;
run; quit;
```

The device driver list will be sent to the SAS Output window (if running interactively) or to the SASLIST file (if running in batch).

The GIMPORT procedure, part of SAS/GRAPH software, can be used to convert CGM files produced by other applications to graphics entries in a SAS catalog. You can use this feature to display output from other applications using SAS/GRAPH device drivers.

Viewing HTML Pages Created with the ActiveX and Java Device Drivers

The ActiveX and Java device drivers allow you to create HTML pages from within SAS 9.1 Foundation.

For a list of supported browsers, refer to the System Requirements documentation for your client system.

To view the Java applets, the Java plug-in must be installed on each client machine. On Windows systems, the user can install the plug-in when prompted if it is not already installed. On other systems, the plug-in can be installed from one of the Third Party Software Components CDs. Follow the instructions included with the Java and Web browser installation for your system to enable the Java plug-in.

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