

System Requirements

The SAS[®] System Version 9 (TS M0) OS/390[®]

This document provides requirements for installing and running the SAS System under OS/390. You must update your system to meet the minimum requirements before running the SAS System. The major requirements listed in the document are:

- Software Requirements
- Hardware Requirements
- Space 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

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- OS/390, Version 2, Release 8 or subsequent releases
- 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)

Java Requirements

Some features of the SAS System 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: 1.3.1

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.

Hardware Requirements

Note: If there are only limited tape drive resources available for the installation of the SAS System, then refer to the section **Enabling minimal cartridge mounts from a Multi 3480 cart media** in the **Installation Instructions for Version 9 (TS M0) of the SAS System under OS/390**.

Machines Supported

- ESA/370 and ESA/390 architecture machines and compatibles
- Z/800 and Z/900 architecture machines and compatibles

Tape Drives Supported

- 9-track (1600 bpi or 6250 bpi)
- 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 the SAS system 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 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.

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 with Version 9 (Pre-production) of the SAS System are listed below. Amounts reflect estimated space usage on 3390 DASD (or equivalent) following a default install of all libraries associated with each product.

Software Product	3390 Tracks (or equivalent)	MB	DBCS Asian Language Support Software ³ 3390 Tracks (or equivalent)	MB
Control Data Set	62	3.0		
Base SAS Software ¹	6469	316.5	439	21.5
SAS/ACCESS Interface to ADABAS Software	14	0.7	3	0.2
SAS/ACCESS Interface to CA-Datcom/DB Software	15	0.7	4	0.2
SAS/ACCESS Interface to CA-IDMS Software	6	0.3		
SAS/ACCESS Interface to DB2 Software	19	0.9	4	0.2
SAS/ACCESS Interface to IMS Software	17	0.8	3	0.2
SAS/ACCESS Interface to ORACLE Software	18	0.9	4	0.2
SAS/ACCESS Interface to PC File Formats Software	4	0.2	3	0.1
SAS/ACCESS Interface to SYSTEM 2000 Software	34	1.7	4	0.2
SAS/ACCESS Interface to Teradata Software	12	0.6		
SAS/AF Software	14	0.7	9	0.4
SAS/ASSIST Software	331	16.2		
SAS/CONNECT Software ²	49	2.4	14	0.7
Enterprise Miner Server Software	1712	83.8	3	0.2
SAS/ETS Software	506	24.8		
SAS/FSP Software	16	0.8	7	0.4
SAS/Genetics Software	22	1.1		
SAS/GIS Software	1222	59.8		
SAS/GRAPH Software	3244	158.8	111	5.5
SAS High-Performance Forecasting Software	19	0.9		
SAS/IML Software	132	6.5		
SAS/IntrNet Software	223	10.9		
SAS Integration Technologies Software	169	8.3	3	0.1
IT Service Vision Server Software	2094	102.5		
SAS/LAB Software	147	7.2	21	1.0
SAS/MDDDB Server Software	166	8.1		
SAS/OR Software	260	12.7		
SAS/QC Software	250	12.3	10	0.5
SAS/SECURE 168-bit Software	39	1.9		
SAS/SESSION Software	3	0.2		
SAS/SHARE Software ²	13	0.6	2	0.1
SAS/STAT Software	603	29.5	17	0.8
SAS Support Tools	39	1.9		

1. This estimate does not include approximately 2000 additional tracks that are required on your installation volume for a temporary cataloged datalib used during the SAS System install. This additional space will be released at the conclusion of the install.

2.

1. If you are installing a new SAS System from this media, double the space requirement computed from the table above. This additional space will be released at the conclusion of the install.
2. SAS/CONNECT Software and SAS/SHARE Software share the SAS/C Transient Library. If your site does not already have the SAS/C compiler, add 72 tracks or 3.2 MB.
1. This space may be released following installation if DBCS Asian Language Support is not needed at your site.

Languages

If you intend to install any language (French, German, Italian, Spanish-Castilian, or Japanese), please add an additional 10% of space for each language you install.

Specific Product Requirements

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

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

DBMS Products Required:

- CA-IDMS, Release 14.0 or subsequent releases

SAS/ACCESS Interface to DB2 Software

DBMS Products Required:

- DB2, Release 6.1 or subsequent releases

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

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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

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 OS/390 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/CONNECT Software

APPC Access Method:

To use the APPC access method, you must have the APPC software that is bundled with a level of the operating system required by this release of the SAS System.

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TCP/IP Access Method:

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

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

The OS/390 Spawner can be used with the TCP/IP access method to establish connections to a remote OS/390 host. or OS/390 UNIX Services

Enterprise Miner Solution (Release 4.2)

Products Required for Enterprise Miner Server:

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

Disk Space Required for Enterprise Miner Server:

The disk space required for the Enterprise Miner Server Solution is the combined total space requirements for the SAS software products listed above. See the **Space Requirements** table for more information.

Note: If you have Version 9 of the SAS System already installed, then the amount of disk space required to install the Enterprise Miner Server Solution should be decreased by the disk space of any of the above products that have been previously installed.

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

Disk Space Required for SAS Information Delivery Portal Server:

The disk space required for the SAS Information Delivery Portal Server Components is the combined total space requirements for the SAS software products listed above. See the **Space Requirements** table for more information.

Note: If you have Release 9 of the SAS System already installed, then the amount of disk space required to install the SAS Information Delivery Portal Server Components should be decreased by the disk space of any of the above products that have been previously installed.

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

SAS/IntrNet components may be used with a Web server installed on OS/390 or on another operating system. If the Web server is installed on OS/390, Version 2.2 or later of IBM Internet Connection Server is required. Note: If you use the FSCP option of the IBM Internet Connection Server to specify any encoding other than the default *ibm-1047*, you must install the patch associated with IBM APAR #PQ47248.

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. The OS/390 Spawner requires OS/390, Version 2, Release 8 or later.

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 OS/390 Spawner. The OS/390 Spawner requires OS/390, Version 2, Release 8 or later. 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.

IT Service Vision Server Software (Release 2.5.1)

Products Required for IT Service Vision Server:

- Base SAS software
- IT Service Vision Server software, which requires installation of the following:
 - SAS/AF software
 - SAS/CONNECT software
 - SAS/ETS software
 - SAS/FSP software
 - SAS/GRAPH software
 - SAS/MDDDB Server software
 - SAS/STAT software

Disk Space Required for IT Service Vision Server:

The disk space required for the IT Service Vision Server is the combined total space requirements for the SAS software products listed above. See the **Space Requirements** table for more information.

Note: If you have Version 9 of the SAS System already installed, then the amount of disk space required to install the IT Service Vision Server should be decreased by the disk space of any of the above products that have been previously installed.

Terminals Required:

- 32-line terminal
- Terminal emulation package with graphics capability
- Terminal that supports vector graphics and uses a mouse recommended

IT Service Vision Server software supports MXG releases beginning with Release 11.06. New MXG releases are supported within a few months of their shipment.

SAS/LAB Software

Products Required:

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

SAS/MDDDB Server Software

Memory:

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

- 48 MB required
- 64 MB recommended

Large applications will see performance improvements with more available memory.

SAS OLAP Server Package

Products Required:

- Base SAS software
- SAS OLAP Server Package, which contains necessary elements of the following:
 - SAS/MDDDB Server software
 - SAS/AF software
 - SAS/GRAPH software

Disk Space Required:

The disk space required for the SAS OLAP Server Package is the combined total space requirements for the SAS software products listed above. See the **Space Requirements** table for more information.

Note: If you have Version 9 of the SAS System already installed, then the amount of disk space required to install the SAS OLAP Server Package should be decreased by the disk space of any of the above products that have been previously installed.

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

Components Required:

- Version 9 SAS SVC Routine
- Refer to **Chapter 1, Setting Up the SAS System** in the Configuration Guide for the SAS System under OS/390, Version 9 (TS M0) for information on the Version 9 SAS SVC Routine.

APPC Access Method:

To use the APPC access method, you must have the APPC software that is bundled with a level of the operating system required by this release of the SAS System.

TCP/IP Access Method:

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

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

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RACF:

RACF Release 1.8 or beyond (or the equivalent) is required for OS/390 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 OS/390 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 **Configuration Guide for the SAS System under OS/390, Version 9 (TS M0)**.

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 the SAS System.

The HTML pages created with the ActiveX device driver can only be viewed on Windows operating systems with Internet Explorer, Version 5.

The HTML pages created with the Java device driver can only be viewed *with* the following Java-enabled Web browsers *on* the following operating systems:

Java-enabled Web Browser	Operating System
None	OS/390, OpenVMS Alpha
Netscape 6.2.1	HP-UX, Linux for Intel Architecture
Netscape 4.78 - Obtain from http://www.sun.com/software/solaris/netscape	Solaris
Netscape 4.79	HP UX for the Itanium Processor Family Architecture
Netscape Communicator 4.78i	AIX
Netscape 4.76	Compaq Tru64 UNIX
Internet Explorer, Version 5.5 or higher or Netscape, Version 6.2 or higher	Windows NT, Windows 2000, Windows XP
Internet Explorer, Version 6 (32-bit only)	Windows 64-bit editions

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