System Requirements for SAS® 9.2 Foundation for z/OS®

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Note: *If you are familiar with previous SAS releases, please note that the SAS/C Transient Library is no longer used and is not shipped with SAS 9.2.*

This document provides requirements for installing and running SAS 9.2 Foundation under z/OS. You must update your system to meet the minimum requirements before running SAS 9.2 Foundation. The major requirements listed in the document are:

- Software Requirements on page 1.
- Hardware Requirements on page 3.
- Space Requirements on page 4.
- Specific Product Requirements on page 5.
- Graphics Hardware and Software Compatibility on page 15.

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

`http://support.sas.com/installcenter/`

or contact SAS Institute Technical Support at `http://support.sas.com/techsup/contact/`.

Software Requirements

Operating System

- z/OS, Version 1, Release 8, or any subsequent releases
- z/OS.e, Version 1, Release 8, or any subsequent releases

UNIX System Services Requirements

In SAS 9.2, 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 9.2 content into a UNIX file system (preferably zFS).

Java Requirements

Some features of SAS 9.2 require the use of a Java Software Development Kit (also referred to as an SDK) to function properly. The features are:

- SAS Deployment Wizard (***Note:*** *the minimum java level for the SAS Deployment Wizard is higher than the level stated for SAS, namely, SDK 5 SR8a-1*)
- SAS Migration Utility
- SAS Deployment Manager
- SAS/GRAPH support for the `javaimg` device
- The SAS REPORT procedure

Please refer to the section entitled “Configuring SAS Software for Use with the Java Platform” in the *Configuration Guide for SAS 9.2 Foundation for z/OS* for configuration details.

If you are using any of these features, determine that you have at least the following **31-bit** version or release of the Software Development Kit: SDK 5 SR5.

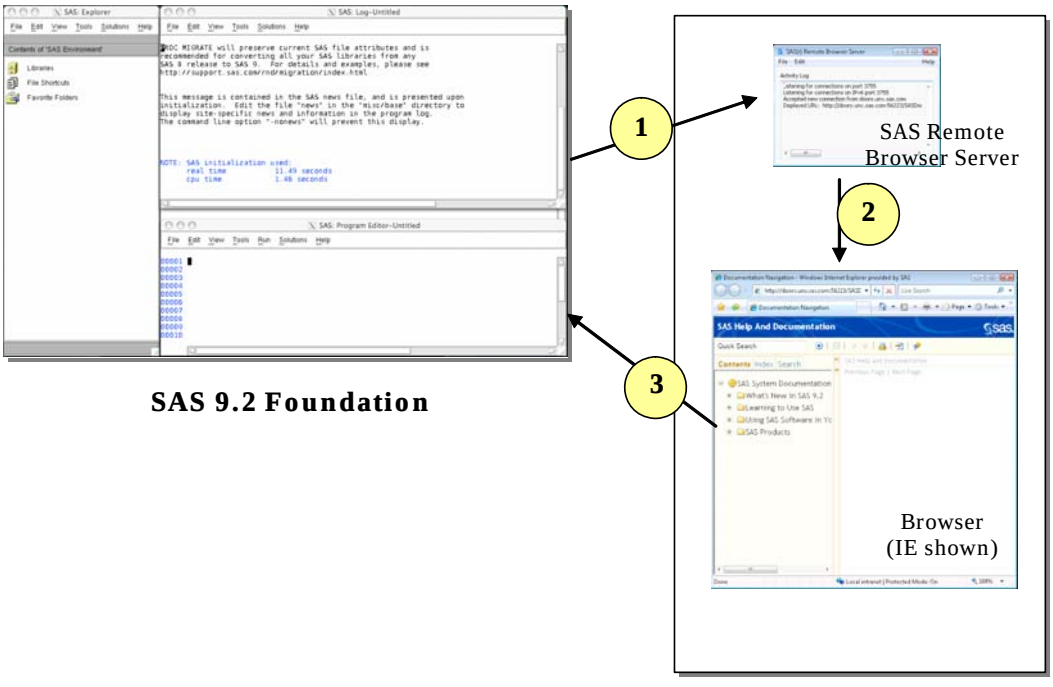
This is the version of the SDK that SAS has tested and supports. Later patch-levels and versions of this SDK may work; however, they have not been tested by SAS.

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/resources/thirdpartysupport/.

Web Browser

SAS 9.2 Foundation uses a new system, Remote Browsing, for displaying Web-based information. Instead of running a browser within your SAS session, SAS 9.2 Foundation displays the information in an external browser running on your desktop computer. A small software agent named the Remote Browser Server is installed on your desktop computer to enable SAS to communicate with your browser. A sample process is illustrated below—the actual screens may be somewhat different at your site.

SAS creates a URL that references the information to be displayed (usually program help or ODS output), then sends the URL to the SAS Remote Browser Server on your desktop computer (step 1). The Remote Browser Server then sends a request to the browser to display a page (step 2). The browser then reconnects to SAS to retrieve the information to be displayed and displays it in the browser (step 3).



To use remote browsing, you must be running SAS 9.2 from an emulated 3270 window on a desktop computer, which must be one of the following platforms, and you must have installed one of the supported browsers.

Platform	Supported Browser
Windows XP/Vista 32-bit	Firefox 3.0.6
	Internet Explorer 6 with SP2 or Internet Explorer 7
Linux	Firefox 3.0.6

The Remote Browser Server must be installed and running for SAS to display Web information. The first time that you attempt to display Web-based information, instructions for downloading and installing the Remote Browser Server will be displayed in your SAS log.

For SAS to be able to use your Web browser, the browser must be configured to allow pop-up windows.

Hardware Requirements

Machines Supported

- zSeries machines

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. This includes:

- 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 9.2 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.

SAS 9.2 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 9.2 to exploit the various functions of the product. Examples of SAS products which may require a larger region are SAS/ASSIST and SAS/ITRM. 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 9.2 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 will typically add approximately 250 MB to the region requirement.

Important: *The logon user ID that will be running the SAS Deployment Wizard to install SAS 9.2 Foundation for z/OS must have a region size or ASSIZEMAX of at least 800M. If you are performing a migration from 9.1.3, memory requirements may be larger.*

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 9.2 Foundation are:

- ESD Download (zfs space)
  - Base-only 5 GB
  - All products 17 GB
- Installation size 2480 cylinders (z/OS data set space)

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

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

Specific Product Requirements

Base SAS Software

TCP/IP Access Method

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

General guidelines for a minimum computer system to support SPD Engine include:

- UNIX file system (zFS)

ODS Graphics

The use of ODS Graphics in Base SAS software requires a SAS/GRAPH license.

SAS BI Server Software

The following products are included in SAS BI Server. Unless explicitly licensed, use of this software is limited to SAS BI Server.

- Base SAS software
- SAS Integration Technologies software
- SAS/GRAPH software

SAS Data Integration Server Software

The following products are included in SAS Data Integration Server. Unless explicitly licensed, use of this software is limited to SAS Data Integration Server.

- Base SAS software
- SAS Integration Technologies software
- SAS Metadata Server software
- SAS/CONNECT software

SAS Data Surveyor for SAP Software

Base SAS software is a prerequisite for the installation of SAS Data Surveyor for SAP.

The following products are included in SAS Data Surveyor for SAP. Unless explicitly licensed, use of this software is limited to SAS Data Surveyor for SAP.

- SAS Integration Technologies software
- SAS Metadata Server software
- SAS/ACCESS Interface to R/3 software
- SAS/CONNECT software

Configuring SAS/ACCESS Interface to R/3 Software

SAS/ACCESS Interface to R/3 software requires extensive post-installation configuration before it can be used. Refer to the *Configuration Instructions for SAS/ACCESS 4.3 Interface to R/3* on Install Center (`http://support.sas.com/documentation/installcenter/92/documents/index.html`) for detailed information.

SAS Digital Marketing Software

The following products are included in SAS Digital Marketing SAS Server. Unless explicitly licensed, use of this software is limited to SAS Digital Marketing SAS Server.

- Base SAS software
- SAS/GRAPH software
- SAS/SHARE software
- SAS Integration Technologies software

SAS Enterprise BI Server Software

The following products are included in SAS Enterprise BI Server. Unless explicitly licensed, use of this software is limited to SAS Enterprise BI Server.

- Base SAS software
- SAS Integration Technologies software
- SAS OLAP Server software
- SAS/AF software
- SAS/GRAPH software

SAS Enterprise Data Integration Server Software

The following products are included in SAS Enterprise Data Integration Server. Unless explicitly licensed, use of this software is limited to SAS Enterprise Data Integration Server.

- Base SAS software
- Quality Knowledge Base locale of choice
- SAS Data Quality Server software
- SAS Integration Technologies software
- SAS Metadata Server software
- SAS/ACCESS engine of choice
- a second SAS/ACCESS engine of choice

- SAS/CONNECT software
- SAS/SHARE software

SAS Enterprise Miner 4.3 and 6.2

Base SAS software and SAS/STAT software are prerequisites for the installation of SAS Enterprise Miner Server.

The following products are included in SAS Enterprise Miner Server 4.3 and 6.2. Unless explicitly licensed, use of this software is limited to SAS Enterprise Miner Server.

- SAS Enterprise Miner software
- SAS Integration Technologies software
- SAS/ACCESS to PC Files software
- SAS/CONNECT software
- SAS/ETS software
- SAS/GRAPH software
- SAS/OR software

Memory Required for SAS Enterprise Miner Server 4.3 and 6.2:

- 1 GB required per concurrent user

SAS Fair Banking Software

The following products are included in SAS Fair Banking Data Integration and Enterprise BI Server. Unless explicitly licensed, use of this software is limited to SAS Fair Banking Data Integration and Enterprise BI Server.

- Base SAS software
- SAS Integration Technologies software
- SAS Metadata Server software
- SAS OLAP Server software
- SAS/ACCESS Interface to PC Files software
- SAS/ACCESS engine of choice
- SAS/AF software
- SAS/CONNECT software
- SAS/GRAPH software
- SAS/SHARE software

SAS Fraud Management Software

The following products are included in SAS Fraud Management Server - OnDemand Scoring Engine Server. Unless explicitly licensed, use of this software is limited to SAS Fraud Management Server - OnDemand Scoring Engine Server.

- Base SAS software
- SAS Fraud Management OnDemand Scoring Engine software
- SAS Fraud Management Transaction Extensions software
- SAS/ACCESS engine of choice

SAS Information Delivery Portal Software

Base SAS is a prerequisite for the installation of SAS Information Delivery Portal software.

Software Included in SAS Information Delivery Portal software:

SAS Integration Technologies software is included in SAS Information Delivery Portal Server software. Unless explicitly licensed, use of this software is limited to SAS Information Delivery Portal Server software.

SAS IT Resource Management Server Software

The following products are included in SAS IT Resource Management Server. Unless explicitly licensed, use of this software is limited to SAS IT Resource Management Server.

- SAS IT Resource Management Server software
- SAS IT Resource Management MVA Data software
- Base SAS software
- SAS High Performance Forecasting software
- SAS Integration Technologies software
- SAS IT Management Solutions Core Components MVA Data software
- SAS OLAP Server software
- SAS Threaded Kernel Extensions for Operations Research software
- SAS/ACCESS to DB2 software
- SAS/ACCESS to ODBC software
- SAS/ACCESS to Oracle software
- SAS/ACCESS to PC Files software
- SAS/AF software
- SAS/CONNECT software
- SAS/ETS software
- SAS/GRAPH software
- SAS/SHARE software
- SAS/STAT software

Other Requirements for SAS IT Resource Management Server:

- Adobe Reader is required for some online documents supplied in printable form.
- SAS IT Resource Management 3.2 requires a screen resolution of at least 800x600. If your display is set to a lower screen resolution, some windows may be truncated to fit the screen. If you experience font display problems, you may want to use the default SAS font. To set the default font type, issue the SAS command **dlgfont** at the command prompt. In the Font window, select the font `Sasfont`, a style of *regular*, and font size 10.
- SAS IT Resource Management 3.2 requires an Xwindows device that supports 256 or more colors.

SAS Metadata Server

The following products are included in SAS Metadata Server. Unless explicitly licensed, use of this software is limited to SAS Metadata Server.

- Base SAS software
- SAS/CONNECT software

SAS OLAP Server Software

Base SAS is a prerequisite for the installation of SAS OLAP Server software.

The following products are included in SAS OLAP Server software. Unless explicitly licensed, use of this software is limited to SAS OLAP Server.

- SAS OLAP Server software
- SAS/AF software
- SAS/GRAPH software

SAS Profitability Management Software

The following products are included in SAS Profitability Management Data Integration and Enterprise BI Server. Unless explicitly licensed, use of this software is limited to SAS Profitability Management Data Integration and Enterprise BI Server.

- Base SAS software
- SAS Integration Technologies software
- SAS Metadata Server software
- SAS OLAP Server software
- SAS/ACCESS Interface to PC Files software
- SAS/ACCESS engine of choice
- SAS/AF software
- SAS/CONNECT software
- SAS/GRAPH software
- SAS/SHARE software

SAS Visual Data Discovery Software

The following products are included in SAS Visual Data Discovery Server. Unless explicitly licensed, use of this software is limited to SAS Visual Data Discovery Server.

- Base SAS software
- SAS Integrations Technologies software
- Standard SAS/ACCESS engine of choice
- SAS/GRAPH software
- SAS/STAT 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: Any supported release of DB2

SAS/ACCESS Interface to IMS-DL/I Software

Products Required

- Base SAS software
- SAS/ACCESS Interface to IMS-DL/I 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 client release is: Oracle 9i.

SAS/ACCESS Interface to SYSTEM 2000 Software

Products Required

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

DBMS Products Required: SYSTEM 2000, Version 2.0 (current release), or 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 6 (V2R6) or higher
- CLIv2 libraries on the machine where you run SAS and SAS/ACCESS Interface to Teradata. CLIv2 is part of Teradata Tools and Utilities (TTU) 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/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 Software

TCP/IP Access Method

See "TCP/IP Access Method" in "Base SAS Requirements" on page 5 for details.

Note*: Prior to SAS 9.2, SAS for z/OS also required the installation of the SAS/C Transient Library. This library is no longer used, and need not be installed. The associated configuration options (such as CTRANSLOC) are accepted but ignored.*

Components Required

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

Refer to "Chapter 1 — Setting Up SAS 9.2 Foundation" in the *Configuration Guide for SAS 9.2 Foundation for z/OS* for information on the Version 9 SAS SVC Routine.

SAS/ETS Software

The use of ODS Graphics in SAS/ETS software requires a SAS/GRAPH license.

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

Viewing SVG output requires a browser capable of displaying SVG content, such as Mozilla 1.8+ based browsers like Firefox 1.5+, a plug-in such as Adobe's SVG plug-in, or an application such as Batik's SVG viewer.

Users need Adobe Reader to view PDF output.

Note: *See "Graphics Hardware and Software Compatibility" on page 15 for detailed information about SAS/GRAPH hardware and software compatibility requirements.*

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 9.2 media.

All SAS/IntrNet components require the use of TCP/IP. See "TCP/IP Access Method" in "Base SAS Requirements" on page 5 for details.

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 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 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/OR Software

The use of traditional graphics in SAS/OR software requires a SAS/GRAPH license.

SAS/QC Software

The use of ODS Graphics and traditional graphics in SAS/QC software requires a SAS/GRAPH license.

SAS/SESSION Software

Products Required

- CICS/ESA, Version 3, 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 9.2 Foundation" in the *Configuration Guide for SAS 9.2 Foundation for z/OS* for information on the Version 9 SAS SVC Routine

TCP/IP Access Method

See "TCP/IP Access Method" in "Base SAS Requirements" on page 5 for details.

***Note**: Prior to SAS 9.2, SAS for z/OS also required the installation of the SAS/C Transient Library. This library is no longer used, and need not be installed. 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 available in Release 8.2 and beyond. This requirement may 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/STAT Software

Product Required: Base SAS software.

The use of ODS Graphics in SAS/STAT software requires a SAS/GRAPH license.

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 Brother, Canon, Hewlett-Packard, IBM, Konica Minolta, Lanier, Lexmark, Okidata, QMS, Ricoh, Sharp, Xante, and Xerox.

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.

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:

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

Interfaces with other Graphics Software

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

Please refer to the following Web site for several z/OS-specific SAS/GRAPH examples:

`http://support.sas.com/documentation/hosts/mainframe/zos/tips/index.html.`

Requirements for ActiveX and Java Graphics

The ActiveX and Java device drivers allow you to create HTML pages from within SAS 9.2 Foundation. Before you can do this, please verify that:

- Your system meets the JDK requirements (see "Java Requirements" on page 1).
- You have set up the JREOPTIONS (refer to the section entitled "Configuring SAS Software for Use with the Java Platform" in the *Configuration Guide for SAS 9.2 Foundation for z/OS)*.

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 SAS's third party support Web page at http://support.sas.com/resources/thirdpartysupport/. Follow the instructions included with the Java and Web browser installation for your system to enable the Java plug-in.

support.sas.com

SAS is the world leader in providing software and services that enable customers to transform data from all areas of their business into intelligence. SAS solutions help organizations make better, more informed decisions and maximize customer, supplier, and organizational relationships. For more than 30 years, SAS has been giving customers around the world The Power to Know®. Visit us at **www.sas.com**.