

Mainframe Directions
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Abstract

While SAS® development interest has seemed to be focused on desktop platforms, mainframe development staff have been quietly keeping Version 6 of the SAS System up to date with their respective Operating Systems, adding new functionality, and planning for the future.

This paper discusses some of the ongoing work, portions of which have been delivered along with maintenance to the 6.08 SAS System, and some of our thinking about the future direction of the SAS System on the mainframe systems.

Introduction

SAS Institute remains committed to large systems and the users that help make mainframes play a major role in today's computing environment. Since the introduction of Release 6.08 of the SAS System under MVS and the SAS System under CMS in April, 1993, regular software enhancements demonstrate our commitment to mainframe systems and users. Some of these enhancements apply to individual operating systems, others to mainframes as a whole.

Historical Perspective

With the introduction of Version 6, SAS Institute delivered a system to mainframe users that supports a feature-rich SAS System within a customizable graphical user interface. Release 6.08 of the SAS System under MVS presented users with features, advancing mainframe software use from Version 5 technology by offering increased client-server functionality, distributed computing capabilities, new opportunities for interoperability and a data warehouse toolset. SAS development continues to offer users superior quality software by supporting a maintenance schedule that incorporates features from implementations of the SAS System across all operating systems. Each maintenance cycle allows mainframe developers to embrace functionality from desktop platforms and incorporate any features compatible with the 3270 architecture.

This paper reviews the advances made within the SAS System for mainframe users on both MVS and CMS. As the latest release of the SAS System under MVS and CMS, the SAS System 6.09 Enhanced Release aligns the mainframe with desktop implementations of the SAS System. Desktop functionality is incorporated where 3270 restrictions do not apply.

Here and Now of the SAS System under CMS

New SAS Options

APPCSEC=

This option overrides the security option specified in the SCOMDIR NAMES file for the APPC access method of SAS/CONNECT ® Software or SAS/SHARE ® Software. This will prevent each user from having to maintain their own copy of a UCOMDIR NAMES file on their disk. Without this option, the security information is taken directly from the UCOMDIR or SCOMDIR file. SCOMDIR NAMES is the system-wide communications directory file while UCOMDIR NAMES is the user communications directory file.

CAPSOUT

This option specifies that all printed output is to be translated to uppercase characters. NOCAPSOUT specifies that all printed output is not to be translated to uppercase. NOCAPSOUT is the default.

DB2CMTRLSE

This option specifies that the SQL/DS connection for a user is to be released when a COMMIT WORK is issued to SQL/DS. The NODB2CMTRLSE option specifies that the connection is to be maintained. DB2CMTRLSE is the default.

DEFWORKUNIT

This option specifies that a single work unit is used for all SFS files opened for output. NODEFWORKUNIT specifies that a unique work unit is used for each SFS file opened for output. NODEFWORKUNIT is the default.

ORAVER=

This option tells the SAS System which version of the ORACLE ® product is installed. This will enable the appropriate SAS/ACCESS ® Software interface to be loaded. The default is V7.

SORTCUT=

This option controls which sorting method is used when the SORTPGM=BEST SAS system option has been specified. If the number of observations in a SAS data set being sorted is more than this option value, an external sort is used. Otherwise, an internal sort is utilized. The default value for this option is 2500.

SORTPARM=

This option specifies a string to be appended to the OPTION statement that is passed to the external sort program. Up to 200 characters of sort option data can be passed. The option is only used when the SORT31PL SAS system option is also specified. The default value for this option is a null string.

The uses for this option are specific to the particular external sort program being used.

SORT31PL

This option specifies that the external sort program is to be called with the extended (31-bit) parameter list. NOSORT31PL specifies that the external sort program is to be called with the standard (24-bit) parameter list. The default is NOSORT31PL.

TCPSEC=

This option specifies the type of security necessary to use the TCP/IP access method with SAS/CONNECT Software or SAS/SHARE Software.

Prototype Graphical User Interface**Main/FRAMEs**

Main/FRAMEs is a quite user-friendly graphical user interface (GUI) for the SAS System on CMS. It combines existing functions available in both CMS and SAS to provide its functionality.

If you are accustomed to a workstation environment, Main/FRAMEs should make you feel right at home. You are able to manage files and manage your mail with this experimental implementation, without having to know the CMS commands essential for these tasks.

Main/FRAMEs is written using Screen Control Language (SCL) programs. SCL is part of the SAS/AF © Software, and is used to maneuver you through the FRAMEs that make up Main/FRAMEs. FRAME is a new type of catalog entry available with the SAS/AF Release 6.08 Software. A FRAME entry lets a user design, build and execute interactive applications using Object Oriented Programming (OOP) SCL programs.

You only require Release 6.08 SAS/BASE Software to run Main/FRAMEs. If you want to expand the capability of our prototype, you must have SAS/AF Software.

Tape Examples

Included in SAS Help are some example SAS statements for processing tapes. These examples explain how to:

- Copy a SAS data library to a blank tape
- Copy multiple SAS data libraries to a single SAS data library residing on a blank tape
- Append an additional SAS data library to an existing tape containing a SAS data library
- Append a SAS data set to an existing SAS data library on a tape

There can be some confusion about the differences between the ABOFF and NL values of the LABEL= LIBNAME option. The examples given will aid users in determining which setting is proper for the desired result.

SAS 6.09 Enhanced Release**Installation**

Some of the highlights of the new installation procedure are:

- All disk requirements will now be calculated for you. This can be exploited by running the install process in two passes:
 - ▶ Select what you want to unload. Disk requirements will then be displayed.
 - ▶ Set up your disk space and re-run the install. You can have your answers from the first pass used as defaults, then just specify which filemode(s) to use.
- You are able to page backward through the install screens. Some screens have cosmetic wording or format changes which will make the install procedure more intuitive.
- An audit trail will be kept of all answers given. So a full screen install will have a record of your answers (you no longer have to do a linemode install with a spooled console to have a record of this information).
- Maintenance installs are easier. Support for staging a delta maintenance level has been discontinued. Instead we recommend that you copy your current SAS system to a separate disk and install maintenance to that copy. This eliminates the step of applying staged maintenance to your production system.
- Maintenance installs are faster, and require less peak disk space. Maintenance tapes will contain full replacement LOADLIBs, instead of LOADLIBs with just those members that have changed. The install simply loads them down from tape - it no longer has to issue LOADLIB COPY or LOADLIB COMPRESS (and you don't have to wait while these happen).

Performance Improvements

Some of the performance highlights are:

- SAS Help can now be stored in a saved segment
- SAS Messages can now be stored in a saved segment
- SAS Version 6 data libraries that are shared in read-only mode may be stored in a saved segment
- SAS Images for CMS have been repackaged into larger "bundles" or groups of related images

A noticeable performance boost has been seen during our testing. This is mainly due to a vast reduction in real I/O needed to load SAS Images, Help and Messages.

Here and Now of the SAS System under MVS

Release 6.08 of the SAS System under MVS revolutionized the SAS System for many mainframe SAS users. Both the windowing environment and the application layer with Version 6 of the SAS System brought a "windows look and feel" to users able to take advantage of these features in their application development. Release 6.09 Enhanced Release aligns MVS SAS with other operating systems that allow users flexibility and functionality to point and click their way through the "information data highway".

Enhanced Connectivity

Release 6.09 Enhanced Release of the SAS System under MVS introduced greater connectivity options, giving mainframe users freedom to choose the access method most appropriate for their production systems. Users can now connect to SAS under MVS in a variety of ways. From the MVS environment, users can logon to SAS using 3270 terminals or terminal emulators, such as Emulus, or from CICS® using SAS/SESSION®. From other environments, users can connect to MVS using SAS/CONNECT or SAS/SHARE.

SAS/CONNECT offers MVS SAS users a variety of advanced communications protocols (including TCP/IP, APPC, TELNET, EHLLAPI, Async, and 3270), to establish communications with one or more SAS applications or programs running in remote environments. Data transfer services enable users to explicitly upload and download files. Remote library services allow users to edit and query remote data as if it were resident on the local system.

Now, TCP/IP support has been updated to use the SAS/C® socket library that offers users a more reliable and better supported interface to IBM's TCP/IP® than the VMCF-based interface used in previous versions. Consequently, TCP access methods are now able to resolve host names through nameservers. Additionally, it is possible to use the TCP access methods with TCP/IP products from other vendors such as Interlink® and OpenConnect Systems®.

Building A Data Warehouse

Making data easily accessible to decision makers throughout the organization, without impacting overall system performance is a challenging goal of today's large systems and the key for building a data warehouse. MVS SAS users have watched the SAS/ACCESS family of products mature, becoming the foundation for building an enterprise data warehouse. The SAS/ACCESS family of products now offers users direct access to over 50 relational, hierarchical and network database management systems, data gateways and standard API's. This includes ODBC drivers, and external file formats, such as VSAM. Through maintenance releases, database interface developers have added and enhanced access engines to data stored in DB2®, ORACLE, DRDA™, IMS®, CA-IDMS®, and Adabas® making data access transparent and readily available to MVS SAS users.

As evidence of development's commitment to expanding access methods to non-SAS data stores, Release 6.09 Enhanced Release offers enhancements to SAS/ACCESS to IDMS which include a DATA step component that allows users to directly access network data using special SAS System extensions, the standard SAS INFILE statement, along with DATA step programming statements. Additionally, all the latest SQL query window enhancements allow users flexible and powerful tools to access many data sources, including IMS-DL/I database files and IBM's Distributed Relational Database Architecture (DRDA) support for DB2. The DL/I DATA step interface allows mainframe shops which have investments in Version 5 DATA step programs to access the data directly without the need for an intermediate data set.

Interface Exploitation

Included in the base SAS System is an interface to IBM's Interactive System Productivity Facility (ISPF®), replacing the SAS/DMI® (SAS/Dialog Manager Interface) product available in Version 5 of the SAS System. ISPF provides dialog management services for developing applications (dialogs) in an interactive (or batch TMP) TSO environment. The SAS interface enables the DATA step to be used as a dialog development language. For SAS programmers, using this interface is often preferable to using other languages to implement interactive ISPF applications, because existing SAS data files and applications can be exploited. The interface also minimizes the need for the SAS programmer to learn another language.

REXX, the procedure language for computing platforms that conform to the IBM Systems Application Architecture (SAA), is well known for combining powerful programming features with ease of use. By enabling SAS users to supplement the SAS language with REXX, the SAS System's interface to REXX provides new SAS programming possibilities in the MVS environment.

New automatic macro variables allow users to facilitate diagnosis of failures in dynamic allocation: SYS99ERR, SYS99INF, SYS99MSG, and SYS99R15. The values of these macro variables are updated each time the SAS System does a dynamic allocation as a result of a FILENAME or LIBNAME statement (or equivalent SCL functions). Additionally, the new macro variables SYSUID, SYSJCTID, and SYSJMRID can be used to retrieve the userid from various locations in the operating system.

Exploitation of MVS Features

MVS host developers strive to keep pace with operating system enhancements, such as OpenEdition™ MVS. OpenEdition MVS is an addition to the MVS/ESA operating system that provides conformance to the ANSI® POSIX.1® standard and eventually will bring full UNIX compatibility to MVS. OpenEdition MVS includes the OpenEdition shell and the hierarchical File System (HFS) - a directory-based file system very similar to the file system used in UNIX. Release 6.09 Enhanced Release of the SAS System under MVS includes support for reading and writing files in the Hierarchical File System, piping data between the SAS System and OpenEdition MVS commands, and issuing a number of OpenEdition shell commands through the X statement.

The Future

Future developments in SAS software under MVS and CMS are supported by ongoing research activities. Institute developers are continually researching how to offer users state of the art features within the capabilities of the mainframe environment. As these developers continue to research client-server technologies, distributed computing environments and interoperability, SAS software will strive to offer these capabilities to users. New features continually added to the SAS System under MVS and CMS enhance the product, making it the right solution for many everyday tasks.

Acknowledgments

The following staff members of the Mainframe Research and Development team assisted in the preparation of this paper:

Matt Aaronson	Charles Antle
Dan Berry	John DeBoskey
Kent Fiala	Mark Gass
Joseph Gosselin	Rusti Ludwick
Slava Moore	Paul Mortensen
Lisa Ripperton	Michelle Ryals
Tony Valmassoi	Jim Weathers
Chris Williams	

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