"Rumors of My Death Have Been Greatly Exaggerated": Mark Twain Discovers SAS/SHARE* Software in Version 6
Bill Brideson, SAS Institute Inc., Cary, NC

ABSTRACT
This paper reviews the progress of SAS/SHARE* software since Release 5.18 of the SAS® System, including demonstrations at SUGI conferences and the current experimental release program. It highlights new features that have been added to the software, and it sketches SAS Institute's plans for the software for the near future.

INTRODUCTION
This paper has two goals. The first is to bring you up to date on the progress made in implementing SAS/SHARE software in Version 6 of the SAS System. The two parts of that history are the demonstrations by SAS Institute of SAS/SHARE software at past SUGI conferences and a history of the experimental release program during which SAS/SHARE software was tested at SAS Institute and at customer sites. The second goal is to introduce you to the similarities and differences between SAS/SHARE software in Version 6 of the SAS System and SAS/SHARE software in Release 5.18 of the SAS System. At the end of the paper I'll try to give you a glimpse of what you might expect to see from SAS Institute in future releases of SAS/SHARE software.

HISTORY
The history lesson for today begins with SUGI 13 which was in Orlando, Florida in March, 1988. That was the first SUGI conference at which SAS Institute demonstrated Version 6 of SAS software on mainframes and minicomputers. At that SUGI conference you were told that SAS/SHARE software would not be included in the first release of Version 6 of the SAS System but that it would be available in a subsequent release of Version 6 of the SAS System. Of interest to the Release 5.16 SAS/SHARE users at SUGI 13 was the upcoming Release 5.18 of the SAS System, which was to include enhanced accounting capability for SAS servers.

Later that year (July), SAS Institute began to ship Release 5.18 of the SAS System to MVS customers and, in August, to CMS customers. This was an exciting release for SAS/SHARE software because it included new accounting facilities, options, and user exits. In Release 5.18 the VTAM* communication capability of SAS/SHARE software achieved production status for CMS customers.

SUGI 14 took place in San Francisco during April 1989. At that SUGI conference, Version 6 of the SAS System was used to show many new capabilities in the demonstration area. What some attendees didn't know, though, was that at SUGI 14 there were two demonstration areas, the regular one and a "future software" demonstration area. In the regular demonstration area SAS/SHARE software was shown under Release 5.18 of the SAS System; in the "future software" area SAS/SHARE software was shown under Version 6 of the SAS System.

Many visitors to the SAS/SHARE stations in the regular demonstration area expressed grave concern that they had heard very disturbing news about the prospects of SAS/SHARE software in Version 6 of the SAS System. As frequently happens, rumors spread and grew; the questions ranged from "In which release of Version 6 will we first see SAS/SHARE software?" to "Why have you decided to discontinue SAS/SHARE software?". In fact, many SAS Institute employees who attended SUGI heard these concerns and returned to Cary with a freshly clarified understanding of how integrated SAS/SHARE software had become in customers' applications.

Comments from attendees at SUGI 14 indicated, broadly, two opposing points of view. The customers at the most adventurous end of the spectrum had no problem with an introductory release of Version 6 of the SAS System, because they could use it to learn the new features in Version 6, including Screen Control Language and SAS/ASSIST*. At the other extreme were the customers who could use nothing in Version 6 of the SAS System without SAS/SHARE software.

In the fall of 1989, those of us in SAS/SHARE software development allowed SAS/SHARE software beyond the walls of our offices to be used for a few applications on the Institute's MVS system. Throughout the winter and spring the number of internal applications using SAS/SHARE software in Version 6 increased rapidly, and use of SAS/SHARE software on the Institute's MVS system continues to be very active. In the summer of 1990 the experimental SAS/SHARE software was installed on the Institute's VM (CMS) system. The number of internal applications using SAS/SHARE software in Version 6 on the Institute's CMS system continues to increase.

The Experimental Release Program
At the time this paper is being written there have been four experimental releases of SAS/SHARE software under Release 6.06 of the SAS System:

May 4, 1990, to six MVS sites
June 14, 1990, to 11 MVS sites
July 23, 1990, to 22 MVS sites

Release 6.06 of the SAS System under CMS, MVS, and VMS® shipped between March and August, 1990, without SAS/SHARE software.

SUGI 15 was held in Nashville, Tennessee during April, 1990. At that SUGI conference, SAS Institute announced plans to begin releasing SAS/SHARE software for experimental use in about a month. In the demonstration area Release 6.06 of the SAS System was used to show SAS/SHARE software; Release 5.18 of SAS/SHARE software was not used for anything at all. SAS/SHARE software was demonstrated in combination with Screen Control Language in an application that maintained a background "inventory" data set in addition to the "request" and "supply" data sets being edited by the end users. Rumors die hard, though, and many SUGI 15 attendees asked why SAS/SHARE software was not going to be available in Version 6 of the SAS System. Fortunately, those questions could be answered by showing SAS/SHARE software actually running under Version 6; the force of visible evidence proved an effective and, yes, satisfying way of reducing the alarm generated by the rumor mill.

On May 4, 1990 (exactly one month after the end of SUGI 15) the first experimental release of SAS/SHARE software under Version 6 was distributed.

THE EXPERIMENTAL RELEASE PROGRAM
At the time this paper is being written there have been four experimental releases of SAS/SHARE software under Release 6.06 of the SAS System:

May 4, 1990, to six MVS sites
June 14, 1990, to 11 MVS sites
July 23, 1990, to 22 MVS sites
November 12, 1990, to 28 MVS sites and 12 CMS sites

A fifth experimental release will have occurred by the time you read this.

SAS Institute approached this experimental release program very cautiously. SAS/SHARE software is different from other SAS software in that when something goes wrong it is frequently impossible to reproduce the environment that exposed the problem, so problem determination can take a large amount of time. (That is because of the nature of SAS/SHARE software: the users of a SAS server tend to be unaware of each other’s actions so nobody knows or, ordinarily, should need to know precisely who did what when.) Also, a change in concurrently accessed data that cannot be accounted for by a user’s action might not be discovered until a very long time after the unaccounted-for change occurs, unless someone (or some process) is charged with frequently checking the health of the concurrently accessed database.

For these reasons the experimental release program was to include a small number of sites that would commit to taking an active role in testing the software. Conversely, sites that would install the software and then make it available to their users as though it were production were excluded from the experimental release program. Sites were selected that would agree to install the software in controlled environments so they could spot problems as early as possible and limit the number of variables during problem determination.

To select a group of test installations, prospective sites were sent a letter that asked how they expected to use the software, whether they could provide diagnostic information in a timely manner, whether they could control their users’ access to SAS servers that were executing the experimental software, and other detailed questions. It was made clear that the experimental sites were expected to monitor use of the software and report anything unusual immediately. With the software, a SAS program was included that reads a SAS server log and produces a summary report of the execution of the server. The test sites were asked to execute that program on the logs of their SAS servers that executed the experimental software and send in the program’s output to allow tracking of what was actually being done to test the software. This would show how much and what kind of testing the software had been subjected to when it came time to decide whether the experimental program was complete.

The experimental release program began with a very small number of sites. As time went on and the number of problems reported remained low, more test sites were added. Occasionally a customer would become unable to test the software, and a few dropped out of the experimental program for that reason.

Customer Feedback

A very important goal of the SAS/SHARE software experimental release program was collecting information from users to identify how the experimental software was used and what was tested, and to enable problems to be corrected. In the summary data below, SAS Institute is included as an experimental SAS/SHARE site because the experimental software was extensively used on the Institute’s MVS and CMS systems by SAS programmers and end users.

The longest continuous SAS server execution reported by an experimental server was 457 hours, 53 minutes, and 51 seconds. The maximum number of users accessing data through a SAS server at a single instant in time was 26, and the maximum number of SAS libraries accessed through a server at a single instant in time was 79.

The DATA step and many SAS procedures were used to access data through SAS servers during the experimental release program. The SAS procedures included the APPEND, BUILD, CALENDAR, CAPABILITY, CATALOG, CHART, COMPARE, CONTENTS, COPY, CPM, CPORT, DATASETS, DBLOAD, DELETE, DISPLAY, DOWNLOAD, FORMAT, FORMS, FREQ, FBROWSE, FEDIT, FSLETTER, FSPRINT, FSVIEW, GANNT, GCHART, GPLLOT, GPRINT, GREPLAY, MEANS, NETDRAW, NPAR1WAY, PARETO, PMENU, PRINT, REPORT, SHEWHART, SORT SQL, SUMMARY, TABULATE, TRANPOSE, TTEST, UNIVARIATE, UPLOAD, and VSTOV6 procedures.

The SAS windows that were used to access data through SAS servers during the experimental release program included the ACCESS, BFROWSE, DIR, FSFORMS, HELP, KEYS, LOG, NOTEPAD, and VAR windows.

In addition to SAS data sets, SAS catalogs were accessed through SAS servers very frequently. The catalog object types that were read or written through a SAS server during the experimental release program included the AFGO, AFMACRO, CALC, CBT, DEV, DEVMAP, FONT, FORM, FORMAT, FORMATIC, FORMULA, GRSEG, INFMTC, KEYMAP, KEYS, LETTER, MATRIX, MENU, PARMS, PGM, PMENU, POPT10N, PROGRAM, SGREEN, SOURCE, SYSRES, SYSTEM, TEMPLATE, TRANTAB, and WSAVE object types.

This is a summary of the telephone calls SAS Institute received during the experimental release program in which problems were reported. This list does not include problems that were reported by experimental sites but had nothing to do with the experimental software.

On the very first experimental release the SASVXMS load module was not marked “reentrant” and $SUBSYSID was not included. This was corrected in subsequent experimental releases.

Most of the calls SAS Institute received from experimental SAS/SHARE sites had to do with installing the experimental software under MVS. The most frequently reported problem was failing to set the $SUBSYSID= option, setting it incorrectly, or attempting to specify it on an OPTIONS statement instead of including the option in the CONFIG file. Other reported problems included installation of the SAS VBC on the correct system and modifying the STEPLIB and SASFMSG allocations in JCL and OJIS procedures. These steps were described in the Installation Instructions included with the experimental software; those descriptions may be expanded in future releases of SAS/SHARE software.

Experimental sites that used the experimental SAS/SHARE software in combination with the SAS/ACCESS Interface to SYSTEM 2000 Data Management Software discovered problems in the interactions between the two products. Zaps are available that fix those problems.

Experimental sites that used the experimental SAS/SHARE software in combination with SAS/CONNECT software learned that they needed to reset the COMAMID= option after establishing the remote session. Occurrences of this problem were not caused by an error in the software, but instead by SAS Institute’s failure to provide documentation of the correct use of the COMAMID= option when using SAS/CONNECT software in combination with SAS/SHARE software. This omission will be corrected in future documentation.
These errors in the experimental software were reported:

- When the MSGCASE option was in effect for the server, the experimental software could not assign a SAS library via a server.
- A quiesced server could fail to terminate under certain circumstances.
- PROC OPERATE commands did not accept national characters in userids.
- The DISPLAY LIBRARY command did not correctly process libraries that were defined to the server by local-form libname statements in the server's execution. All of these errors have been corrected in the current experimental release of SAS/SHARE software.

SAS/SHARE SOFTWARE, VERSION 6, TODAY

Of what is it made? The SERVER procedure retains its purpose. The OPERATE procedure also comes forward from Release 5.18: an execution of PROC SERVER is a SAS server. The WHERE statement, the WHERE command, and the WHERE=data set option, newly available in Version 6 of the SAS System, can be used to reduce the amount of time required to locate an observation in a SAS data set that is accessed through a server.

In Release 5.18 there was no concise name for the code that enables a user's SAS execution to access data via a SAS server. In Version 6, that bundle of code is referred to as the REMOTE engine. The REMOTE engine is part of the Multiple Engine Architecture (MEA) that you may have seen Steve Beatrous and Bill Clifford describe at past SUGI conferences. Like other engines, the REMOTE engine is used to access SAS files: one executes a LIBNAME statement that associates a SAS libref with a SAS library and specifies the server through which that library will be accessed. (For compatibility, if the SERVER= option is present in a LIBNAME statement then the REMOTE engine is assumed, so server-form LIBNAME statements in your Release 5.18 SAS programs will continue to work with SAS/SHARE software in Version 6 without the requirement of explicitly specifying the REMOTE engine.)

The documentation of SAS/SHARE software is restructured in Version 6. The experimental releases have been documented by a "Changes and Enhancements" document that points to specific places in the Release 5.18 documentation and gives the updated information. Recently, separate booklets were added for SAS server administration under CMS and MVS, replacing "Appendix 1" ("Server Administration under CMS") and "Appendix 2" ("Server Administration under OS") of the SAS/SHARE Administrator's Guide, Version 5 Edition and, for CMS, incorporating relevant information from the SAS/SHARE Installation and Tuning Guide. (The two new booklets are titled SAS/SHARE Server Administration Under CMS and SAS/SHARE Server Administration Under MVS.)

SAS/SHARE software in Version 6 of the SAS System has a number of new features, many of which have been requested by customers at SUGI conferences and on the SASware Ballot. Here are some highlights:

Server Access

On the SASware Ballot, customers have requested the ability to restrict access to a SAS server. SAS/SHARE software in Version 6 implements this functionality by adding the UAPW= or OAPW= option, or both, can be specified in the PROC SERVER statement. The two options are independent.

The LIBNAME Statement

The output produced by the QUERY, LIST, and SHOW options of the LIBNAME statement is now consistent between CMS and MVS. A physical name may now be specified in a LIBNAME statement used to access a library through a SAS server executing under CMS. This gives SAS/SHARE applications under CMS more flexibility in the storage of SAS libraries on the server's mindisk and, with the ALLOC option of PROC SERVER, adds user-defined server libraries to CMS. Host- and Engine-specific options specified in a specified the LIBNAME statement are not yet passed to the server's execution, but that functionality is expected to be implemented in the next major release of SAS/SHARE software.

WHERE

The WHERE statement, the WHERE command, and the WHERE=data set option, newly available in Version 6 of the SAS System, can be used to reduce the amount of time required to locate an observation in a SAS data set that is accessed through a server. When used with an index, the WHERE statement, command, and data set option locate observations directly and this provides the greatest reduction in the amount of time required to locate an observation. But even without an index, the search for the observation that satisfies the WHERE expression is executed by the server, so even a sequential search through a SAS data set is executed without the communications overhead required of other searching methods (e.g., the subsetting IF statement or the FIND, SEARCH, and LOCATE commands of SAS/FSP* procedures).

The SERVER Procedure

The documentation of SAS/SHARE software is restructured in Version 6 of the SAS System. This option allows you to request that the identifying number of each message be written to the server's log between the time stamp and the message text. This can be used by those of you who write SAS programs that process your server logs to select the messages you want to process instead of attempting to identify messages of interest by scanning for text strings.

Be certain to use SAS macro variables set to the message numbers instead of the message numbers themselves in any SAS programs you write that process server logs. Message numbers may change in future releases of SAS/SHARE software.

In Version 6, more information is contained in some of the messages written to the server's log. In particular, the physical name of the SAS library is included in the message written when a user accesses a library through a server, and the name of the procedure is included in the message written when a data set is opened.

Release 5.18 of SAS/SHARE software included the NOALLOC option, which allows MVS sites to disallow users from defining libraries through a SAS server other than those which the server administrator defined to the server. Version 6 of SAS/SHARE software retains this option and adds its complement, the ALLOC option. NOALLOC remains the default for SAS servers executing under CMS, but the ALLOC option enables CMS server administr...
tors to allow users to define and create libraries on a SAS server's minidisks without the need to request permission from the server administrator.

The OPERATE Procedure

Engine- and host-specific options may be specified in the ALLOCATE LIBRARY command in Version 6 of SAS/SHARE software. The options are passed to the server's execution and are processed during the assignment of the library to the server. MVS sites will be able to take advantage of this to simultaneously create and assign a SAS library to a server.

The DISPLAY USER and DISPLAY LIBRARY commands display additional tables in Version 6 of SAS/SHARE software that allow the PROC OPERATE user to identify users who have one or more libraries accessed through a SAS server but have no data set(s) open in any of the libraries. The DISPLAY LIBRARY command explicitly lists "(operator)" for a library assigned to a server by an ALLOCATE LIBRARY command, which makes identifying such a library more straightforward than it was in Release 5.18.

SAS libraries can now be specified by physical name or by libref in the DISPLAY LIBRARY, START LIBRARY, QUESCE LIBRARY, STOP LIBRARY, and FREE LIBRARY commands. This is another capability that users requested on the SASware Ballot; it is useful for an installation at which most server libraries are user-defined and the server's librers are not standardized.

The PRINTFILE= option has been added to PROC OPERATE in Version 6. It allows the procedure's output to be directed to the SAS listing file instead of the SAS log. (The PRINTTO procedure can be used to redirect output to another physical name or fileref, so it can be used in combination with the PRINTFILE= option to direct the output of PROC OPERATE arbitrarily.)

FUNCTIONS THAT ARE NOT IMPLEMENTED IN VERSION 6

The PW= option of PROC OPERATE and PROC SERVER is not implemented in Version 6 of SAS/SHARE software. In Release 5.18 this option restricted the ability to execute the procedures to users who knew the SAS/SHARE password. (Execution of a SAS procedure or any other program can be restricted by operating system facilities.) Some installations used the SAS/SHARE password to restrict the ability of users to execute PROC OPERATE to gain administrative access to a SAS server. Control of that access is provided in a more useful way in Version 6 of SAS/SHARE software by the OAPW= option of PROC SERVER. (In addition, the UAPW= option of PROC SERVER can be used to restrict users' non-administrative access to a SAS server.)

When using the experimental SAS/SHARE software, the "help" key of the FSEEDIT procedure can not be used to show who is locking the observation and the "reread" command of PROC FSEEDIT does not wait for a period of time when the observation is locked by another user. These areas of functionality are expected to be restored in future Version 6 releases of SAS/SHARE software.

The trace facility has not yet been implemented in Version 6 of SAS/SHARE software. This facility caused a SAS server to produce diagnostic information for use by SAS Institute in problem determination; it may or may not return in a future release.

The MSG option of PROC SERVER, which under MVS wrote a message to the console operator when a server terminated, is not yet available in Version 6 of SAS/SHARE software. This option may or may not return in a future release of the software.

ACCOUNTING

Since Release 6.06 of SAS software does not include a formal user exit facility, the accounting and I/O exits have not been carried forward from Release 5.18. A user exit facility should be available in a future release of SAS/SHARE software, though at this time its similarity to the Release 5.18 user exit facility cannot be predicted.

However, the accounting options of the PROC SERVER statement are available in Version 6 of SAS/SHARE software, and accounting information is printed on the server's log. Those of you who extracted accounting information from your Release 5.18 server logs will be able to do that in Version 6, too, and the MSGNUMBER option of PROC SERVER makes that task even easier.

The amount of CPU-time overhead (the total amount of CPU time used by the server minus the amount of CPU time that is reported for users) is greater in the experimental SAS/SHARE software than it was in the Release 5.18 production SAS/SHARE software. This area is under study and will be minimized to the extent possible in future releases of SAS/SHARE software.

WHAT'S NEXT

SAS Institute foresees these events as the next stages in the availability of SAS/SHARE software in Version 6:

The experimental release program will be completed.

SAS/SHARE software will be available in beta test status for use with Release 6.06 of the SAS System.

SAS/SHARE software will be released coincidentally with the next major release of the SAS System under CMS and MVS, through its test and production releases.

Experimental SAS/SHARE software will be released on new platforms. (We currently hope to provide experimental releases under VMS® and OS/2® in the next major release of the SAS System.) Please contact SAS Institute if you are interested in participating in a future experimental release of SAS/SHARE software and which platform(s) would be of interest to you.

WHAT'S AFTER THAT

During Release 5.18 of SAS/SHARE software and the recent Version 6 experimental SAS/SHARE software release program, customers have requested that SAS Institute devote significant development effort in several specific areas. These are some of the areas (in no particular order) in which developmental effort will be concentrated during the coming months:

- There is considerable interest in sharing SAS catalogs through a server, allowing several users to work on different objects in the same catalog at the same time. The experimental software includes an initial implementation of this capability; as more sophisticated locking technology is implemented in the SAS System the ability of users to conveniently share SAS catalogs will continue to improve.

- Users have requested the capability of producing an audit trail of updates made through a SAS server.

- The installations that administer their SAS servers intensively have requested improved ability to identify and manage "idle users" that are connected to a SAS server.
• As computing environments become more heterogeneous and networked, installations have begun to request that users on one type of computer be able to access SAS data that is stored on a different type of computer. A first step in that work is using IBM’s Advanced Program-to-Program Communications to allow communication between CMS and MVS, which SAS Institute is demonstrating at this SUGI conference.

• Users have requested that a SAS server honor the settings of a user’s global options COMPRESS, BUFNO, BUFSIZE, and REUSE.

• Efficient processing of VIEWs in a SAS server will place additional demands on the management of the multiple tasks executed by a SAS server.

CONCLUSION

This paper began with a brief overview of the last few years of the development of SAS/SHARE software. It showed that, far from having been discontinued, the software was being developed for Version 6 of the SAS System. The paper reviewed the experimental releases of SAS/SHARE software for Release 6.06 of the SAS System under MVS and CMS during 1990 and 1991. The paper highlighted some of the functionality that was added to the software during its development for Version 6. The paper sketched SAS Institute’s plans for SAS/SHARE software for the foreseeable future.

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