THE IMPACT OF RECENT IBM HARDWARE AND SOFTWARE ANNOUNCEMENTS ON THE SAS PRODUCT LINE

by

WILLIAM H. BLAIR
SAS INSTITUTE INC.

How recent is recent? The impact of IBM announcements on the SAS product line started a long time ago. Many say that IBM's announcement of the unbundling of software and hardware pricing in 1969 led to the present proprietary software industry. That may be true, but it needn't have been. I think there would have been a strong market for quality software products in any event.

Nevertheless, the fact remains that SAS grew up under the IBM hardware and OS software umbrella. Only recently were we able to move slightly out from under the OS software umbrella and under a similar one, VM. And we have just announced a DOS/VSE version of SAS. But we still remain under the hardware umbrella, and that is obviously the next area to tackle.

Over the past few years, IBM has made several announcements that, in retrospect, appear to have had some impact on the SAS product line. In some cases the effects are yet to be seen, but they can be recognized as significant now. First, I would like to review my list, briefly describing each one, and placing it in time with other IBM announcements and SAS products. Then, I will discuss the individual and aggregate effects of these announcements.

24JAN77: TSO 3270 Display Support & Structured Programming Facility (the old SPF) effectively started the IBM march down the full-screen product road.

31JUL78: Session Manager (OS/VS2 MVS TSO 3270 Extended Display Support-Session Manager) provided full-screen support for the line-oriented TSO terminal message traffic, journaling of the TSO session input and output, and scrolling facilities similar to the already available SPF.

JAN 79: SAS 79.1 available.

JUN 79: SAS 79.2 available.

29SEP79: Network Terminal Option (NTO) for ACF/NCP/VS which provides TWX-like terminal (including the IBM 3101) support in the TSO/VTAM/HCP environment.

02OCT79: The 3101 Display Terminal, which communicates in asynchronous ASCII protocol.

02OCT79: The 3279 Color Display Station with graphics capability via Programmed Symbols, the 3274-51C Control Unit, and Programmed Symbols for the 3278 series of terminals. The IBM software to support the graphics capability of the 3270s, GDDM and PGF, will not only be supported under TSO and CMS, but also under IMS and CICS.

JAN80: SAS 79.3 available.

MAR80: SAS Institute installed a 370/158-3, our first in-house computer.

01MAY80: SAS Institute installed a 6670. The SAS/ETS User's Guide went to press 01JUN80. The entire document and the software to produce it on the 6670 was written in just one month.

1JUN80: The IBM Total Storage Management and MVS/SP announcement, including 3375 and 3380 disk drives, data streaming for 303X CPUs, 3880 Speed Matching Buffer and additional models, 3633 Extension for MVS/SP Release 2, up to 32 Meg real memory, Cross Memory Services, Global Resource Serialization, the 3814 replacement for the RPQ 2914, and the DF/DS, DF/EF, and DF/DSS software products.

JUN80: SAS 79.4 and SAS/GRAPH available. SAS Institute is, to date, the only vendor supporting the 3279 and 3287 independently of IBM's GDDM.

22JUL80: The 4341 processor will be supported by MVS/SP.

18AUG80: System Productivity Facility (the new SPF) with a major new function: Dialog Management Services facilitating full-screen, interactive applications development.

15SEP80: The 4341 model group 2 processor announcement.

30OCT80: IMS/VS Version 1 Release 2 includes a data sharing facility with the
The 210CT81: 370 Extended Architecture, via update tapes, not zap decks; also APR81: SAS 79.5 available, the first release of SAS which we planned to maintain cheaper now), but it was the 4341 one on our schedule, we went back to looking a 4341. When IBM couldn't provide us with in-house computing into our range, and FEB82: SAS 79.6 available.

The 4300 announcement put the price of in-house computing into our range, and probably into the range of a lot of other software vendors as well. We had been looking at OEM systems before, but were not satisfied with what we could get for our budget. Eventually, we ended up with a used 370/158-3 about the current price of a new 4341-2 (158's are considerably cheaper now), but it was the 4341 announcement that adjusted the price of 158's downward. And that was not the only side effect. What we wanted initially was a 4341. When IBM couldn't provide us with one on our schedule, we went back to looking at OEM CPUs. This naturally caused IBM to try to convince us to get an IBM CPU -- even if it wouldn't come from IBM. One of the arguments was the service that comes with being an IBM customer. So we asked them for some help with technical questions in the VM/CMS area (we were just then starting to get the CMS version of SAS running). IBM helped. The help we got is not so important; what was, is that it helped convince management of the value of being an IBM customer and having access to the information and resources that an IBM account team could wield.

Without an in-house computing system, it would have been literally impossible for us to have developed the 3279/3287 support in SAS/GRAPH, SAS/FSP, Release 2 of SAS/IMS-DL/1, many of the device drivers in SAS/GRAPH, and the new TSO enhancements in SAS 79.6.

The CMS version of SAS would not have been in as good a condition as it is without an in-house VM/CMS capability. Although all areas of the company have certainly benefitted, the one or sometimes two or three terminals on each desk, usually instantaneous response, and readily available, on-site technical resources, has particularly enhanced our programming productivity and our ability to attract and retain the most highly qualified individuals.

The 3101 Display Terminal announcement, by which IBM leapt into the asynchronous ASCII world, had no immediate impact. But, the software byproducts of the necessity to support the device (e.g., NTO, which enables the 3101 to get to TSO through ACF/NCP/VS and ACF/VTAM) had a profound effect on SAS/GRAPH: the majority of our customers using non-IBM terminals do so through VTAM. More recent IBM announcements in this area include VM/PASS-THRU and 3101 PASS-THRU support.

The 3279 announcement meant that SAS/GRAPH could be used in both the pure IBM environment and in the local attach environment. The 3279 support in SAS/GRAPH first got us into the full-screen area, as well as deeply in the bowels of the hardware and ACF/TCAM and ACF/VTAM. We later used this knowledge to help build SAS/FSP. SAS/FSP was the outgrowth of SAS/GRAPH, internal data processing requirements, user demand, and the use of two IBM software products: the original SPF and Session Manager. SPF is a very popular product, except in the CMS community, where its main acceptance comes from dual (MVS/TSO and VM/CMS) shops. Session Manager is not so popular: the idea (architecture) is great, but the design (implementation) and human factors are not.

Just as many of the good ideas in SPF have found their way into other full-screen, menu-driven, user-friendly software (particularly IBM's), some of them found their way into SAS/GRAPH and SAS/FSP. We plan to incorporate some of the good ideas in Session Manager and the VM/SP editor (XEDIT) into a future release of SAS/FSP. PROC FSLETTER in SAS/FSP derived from our use of the 6670 to write letters (i.e. word processing) and our need to do it a better way.

I haven't listed a specific IBM product, but those of you familiar with the MVS TSO CLIST facility will be right at home. I'm told, with the new SAS macro facility already available in the DOS version of SAS and to be available later this year for the ASP and CMS environments in the next major release of SAS. This represents an example of how systems-programming type persons' thinking can get inbred very quickly. Our customers who are familiar with the IBM PL/I compiler's preprocessing facility or TSO bigots will be happy. Our CMS customers will probably yearn for EXEC2. I just hope our DOS customers will be happy.

The more recent IBM announcements have caused some development activity, and will certainly cause more.

The facility to read an OS VTOC via INFILE was impacted by the DF/DS indexed VTOC facility. The next release of SAS will include CVAF support, including compatibility features, and functional improvements such as retrieving the DSCBs in sorted order.

The 3375/3380 announcement has to date caused
the most problems, yet at the same time resulted in the most benefit to the customer. SAS has device dependencies in its data library access method (which uses EXCP), and the PDS and PDSCOPY procedures, and minor descriptive dependencies elsewhere.

It is instructive to look at why these dependencies exist in SAS. The SAS data library access method uses EXCP, which immediately makes it device dependent, because all the normal and usual access method responsibilities of determining where blocks go on a track and in the data set and constructing the channel programs befall it. SAS uses EXCP because 1) the designer wished to randomly access and update the disk data set, 2) extend its space allocation when more was needed, 3) change the length of a block in the data set by rewriting it, and 4) write differing length blocks in different areas of the same OS data set, even within the same track. The BDAM access method does not support any but the first of these items, therefore EXCP is the only choice (given the design criteria). The KILL option of PROC PDS works -- efficiently and simply -- by rewriting an empty first block into the directory of the PDS; hence EXCP and the need to know how to reset the DSILSTAR and DS1TRBAL fields in the data set's DSCB to reflect an empty PDS; hence device dependency. The PDSCOPY procedure uses all available space on a load module PDS track by being aware of how much space is available on a track and constructing records that will just fit; hence device dependency.

The 3375 and 3380 devices are slightly different from other IBM DASD. Electrically and physically similar to the fixed-block architecture (FBA) 3370 DASD, programmatically more similar to the previous count-key-data (CKD) DASD (e.g. 2314, 3330, 3380), the 3375 and 3380 DASD are extended count-key-data (ECKD), or modulo, devices in IBM terminology. Data on these devices are written in 32 byte chunks, including the CKD-style record count and key areas, as well as the interblock gap (IBG) or interrecord area, but with the CKD channel command set, instead of the FBA command set that characterizes the 3370.

Modulo device support was added to SAS 79.5 back in MAR81. That was one of the reasons 79.5 was late; we wanted to get 3380 support in before IBM shipped or could ship any of them to our customers. As you well know, it turned out that we needed to rewrite all of SAS to support the new devices. We had to rewrite the entire data set structure, and it took us a long time to get all the bugs out of the code. We received our first 3375's in DEC81 and used one of them to test the modulo device support. A zap for 79.5 is available to fix the two bugs that were discovered, and the support is integrated into 79.6.

The primary benefit of all of this effort was that, while we were in the code, we looked at, tested, and fixed a lot of bugs in the area. Some of these had been outstanding for a long time, but had not been able to be reproduced, until a radically different device came along. One of the things we discovered is that SAS data libraries were not really moveable (or even copyable) all along, even the tape (sequential) format. Most of the time it seemed to work, but some of the time it didn't. Hence, we developed a tape format transportability feature that has been fixed in SAS 79.6. The disk-format one has not, because the problem is simply a design error; and, although IEHMOVE and other programs will correctly copy a SAS data library, the data is simply not there in the complex structure of the SAS data set to determine what kind of device the data set was originally created on. We are presently investigating the technical feasibility of several alternative solutions to this problem, and expect to deliver one (or more) in the next major release of SAS.

The above problems have convinced us that the current data library access method is both a maintenance burden and a hindrance to further development in this area (such as the popular SASware ballot item - indexed data sets). Hence, we plan to completely rewrite it for the third time, with due and appropriate consideration, we hope, to all of the hard-earned lessons from the past two.

What the VM/CMS effort started and the DOS/VSE effort continued, MVS/XA will complete: the appropriate internal layering/black boxing of the components and functions in the SAS supervisor. We already know that SAS will run under the MVS/XA system. The control block dependencies that help provide all the wonderful function that many of our customers desire have come back to haunt us (and them). Besides having to simply deal with the control block format issue all over the SAS supervisor, the creation of an MVS/XA version of SAS presents a logistical problem: a test facility. MVS/XA is currently announced only for the 3081 processor, and we're not likely to have one before IBM delivers the MVS/XA software to our large customers. Therefore, we need a test site, to which we would preferably connect via SDLC, so that we could utilize both TSO and SNA facilities.

The facilities of the NJE versions of JES2 and JES3, and ACF/VTAM and ACF/TCAM with multi-system networking facilities (MSNDF), coupled with the incorporation of these facilities into the latest releases of MVS/SP and ACF/VTAM Version 2, and customer experience with our 3287 SAS/GRAPH support, have created the desire among many of our
customers to be able to ship data such as SAS
data sets and SAS output around their
 corporate network. We have only been looking
 at this requirement conceptually, but it
certainly is interesting and we welcome any
 comments, suggestions, or requirements that
 you care to extend.

The IMS/VS Version 1 Release 2 announcement
provided for data sharing whose expected
usage is compatible with current styles of
SAS usage. This meant that the SAS/IMS-DL/I
product will be fully usable in both batch
and TSO, no matter what the customer's
environment, as our customers would expect,
and relieved us of the responsibility of
solving a lot of functional problems, thus
helping justify and push the product out the
doors.

We had written a sort procedure for use in
the CMS environment that was suitable for
sorting small sets of data. For large data
sets, we were supporting an extensively
modified version of the original OS/360
system sort utility, sometimes referred to as
SM023. The announcement of CMS support for
DOS/VS Sort/Merge Release 4 meant that IBM
would be doing the hard work from then on;
all we would have to do is support it. This
announcement also brought the competition
out: SYNSORT and CA/SORT, and we support
these also.

Now, some of this might sound to you as if we
are merely following IBM's lead, or as if
only IBM software and hardware had any
influence on our product line. Well, that
simply isn't the case; but what I was invited
to talk about was the effect of IBM
announcements. Of course, many things we do,
we have to do in a purely reactive mode. We
cannot, for example, support SAS/GRAPH on the
3279 until IBM designs, builds, announces,
and delivers both the hardware and software.
We didn't build SAS/GRAPH for the IBM 3279,
but it sure is nice to support it along with
the other equipment. It is the principal
terminal that we have installed for our own
use. Another thing to keep in mind is that
the principal effect that IBM software has on
SAS software is to show us how not to do
something. While it may be evident that, at
least conceptually, the designer/architect
had a good idea, it's often painfully obvious
that the implementation and/or realization of
that idea has left much to be desired. Many
examples come to mind, but the two most
notable, in my opinion, are Session Manager
and Information/Management.

We would like to think that by being closer
to our users, the developers of software
products at SAS Institute are able to react
quickly to our customer's rapidly changing
needs. Of course, we have ideas of our own,
but the "suggestion" category of our problem
data base, only a portion of which is
incorporated into the SASware Ballot, is
quite large.

The largest impact on the SAS product line is
going to continue to derive from the needs
and wishes of our clients.