Three Year Follow-up of a Transition from a Mainframe to a PC Computing Environment Using SAS® Software

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ABSTRACT

This paper describes a three year follow-up evaluation on the effectiveness of a PC computing environment using PC SAS® on a local area network. This computing environment was prompted by the encouragement of decentralized computing environments by large universities and companies that have typically used mainframes to meet their computing needs. This trend continues to be seen across the country, primarily because of (1) cost (2) system overcrowding (3) the desire to gain localized control. The University of Southern California Institute for Health Promotion and Disease Prevention (IPR) was one of the first organizations, with a substantially large amount of data and computational needs to make this change in computing environments. Little has been written longitudinally about the technological upgrades, patterns of change and needs, long term cost effectiveness, the stability of the software, the efficiency of such a change, and the humanware involved in this inevitable changing system. We have found the transition to a PC environment using the SAS® system to be extremely cost effective and that the SAS® system has met and grown with our computer intensive and data management needs.

INTRODUCTION

Most large companies and institutions have traditionally found the mainframe computing environment to be the best solution for the storage, processing and printing of multiple large data bases, and that SAS® software greatly accentuated the power of that environment.

Within the last 5 years however, due to the decreasing price and increasing power of the micro computer, many institutions have found that they were able to handle the storage, processing and printing of multiple large data bases, and that SAS® software greatly accentuated the power of that environment.

The decision to move to the DOS environment was not instantaneous and was much belabored. We needed to decentralize from the mainframe computer and were thus faced with either simulating a mainframe environment in house with a minicomputer (a centralized processing machine), or pioneer a local area network (LAN) for the distribution of processing, printing and storage (see Dent et al 1988). Our decision to go with the later was based on the 386 microprocessor technology. We therefore built our IBM Token ring network around 4 Compaq 386 file servers and 10 286 work stations. Using multiple large Winchester drives in the servers that supplied almost 1 gigabyte of storage, 4 WORM laser disk drives (for large long term storage) and heavy duty Hewlitt Packard 500 printers, we were poised for the future (not to forget that in 1987 this was state of the art).

The transition from the SAS® mainframe to PC SAS® was relatively smooth, data transfer was probably the biggest concern yet was expedited with 9-track tape and a SAS® Data Step programming application (see Dent et al 1988, SUGI 13). The new DOS based system handled our storage, computing and printing needs quite well with only one complaint emerging from those born and raised on the mainframe. That complaint was: "It's not the mainframe". True the system was comparatively slow and the single job submission was disconcernting to some. Also our seeming endless disk storage capacity soon became limited and the DOS 640k RAM limitation caused many individuals to alter their programming and file storage work habits (i.e. subsetting large datasets to
manageable sizes and cleaning up old files became a necessity.

We knew these problems were of passing importance. Based on our observations that a microprocessor has a useful life of about 5 years, we were poised for the future with the 386 based system. We just had to tough it out and wait for the new version of PC SAS® that would overcome the 640K limitation. We also waited for the operating system (OS/2) that would take full advantage of the 386 32 bit processor. With the promise of the emerging Windows technology we knew that with a little time we would eventually have speed, run larger datasets and submit multiple SAS® jobs right on our desk tops.

THE FUTURE HAS ARRIVED

The future came, and went. Did we miss something? SAS® Version 6.03 gave us that extra 2MB of extended memory and freed up some base memory that allowed us to run bigger jobs but we were still stuck with single subtasks and only 32 bit processing capabilities. Second party multi-tasking software was introduced to our users, however it proved to be unstable and users were reluctant to use it. The first versions of OS/2 were still 16 bit and required a lot of memory (which used to be costly). It was only until very recently that OS/2 came out with the 32 bit processing.

Decision time came upon us again. We are rapidly reaching the end of the 386 era and we are still not 100% completely satisfied with our computing environment. Do you upgrade to 486s? How about waiting for those 586s? Our new demands? We need mainframe power without mainframe hassle and we want it on our desk. A tall order? If we could get true 32 bit processing and multi-tasking (An order unfilled by our 386 based system) we would say that indeed we had arrived.

EVALUATION OF THE PROBLEM

In coming down from the mainframe to the PC level, we did what we thought was appropriate at the time in order to decentralize processing and gain control over printing and storage within a generous but not extravagant budget. We are now faced with the problem of missing the computing power of the mainframe and not really being able to realize the promises that the "future" held for us in terms of the 386 technology.

Is the answer found by increasing the processing power to the 486 33 Mhz machine for the speed and running OS/2 version 2 to overcome the 640K limit and obtain multi-tasking? These options were not available in 1987 and would seem like an appropriate move now. However, SAS® PC DOS software has not currently developed a version for this 32 bit platform and if it has not done so by now may not in the future. Even if they do, will it be worth it to upgrade the PCs and wait? We think not.

OUR ANSWER FOR 90's

PC SAS® under DOS is fine for many user needs and applications. We, on the other hand have decided to move some of our heavier computer users up one power step. Not to the Mini but to the powerful work stations (IBM RISC 6000, SUN, HP), where we believe the best of both worlds exists. The power and speed of mainframe computing and the local control of processing, storage and printing of data.

In considering the best platform one must take full advantage of the continuing trend of the inverse relationship between price and power, remembering not to be penny wise and pound foolish. Three years ago these UNIX work stations approached $50,000, cost prohibitive for most research and development groups (especially academic groups). However these same machines can be obtained for around $15,000-$20,000. A comparable 486 33Mhz machine might go for $10,000-

For the price of upgrading to OS/2 version 2 and 486 33mhz machines we found it would be worth the relatively small extra expense and go with a UNIX based work station at a substantial increase in power (from 300% faster on up depending on the applications). True multi-tasking is gained and the SAS® Version 6.06 platform takes advantage of these machines' powerful processing.

Many corporations can afford to go with the mainframe all the way, or use mini-computers on site. These computing methods require a lot of support staff and upkeep. Also user control is largely taken away. In smaller groups such as our research team of 50-100 researchers and staff and other comparable groups, cost must be balanced with the computing needs of the group. Therefore the PC environment has worked well. However we feel we have only year or two more of technological usefulness of the 386 chip and have decided not to place our computing money into hardware alone, but to consider the operating system into the purchase of new technology. Operating systems seem to have a much longer useful life than the hardware they run on. Since PC SAS® has served us well from our descent from mainframe computing, we have decided to make an ascent to the IBM RISC work station because SAS® has shown that it is committed to this platform (we are currently running the beta version).

The heaviest users in our group will be using the UNIX system at their desks and have most of the groups' master data files, others will be able to access data remotely, creating subset datasets and
down-loading them onto their hard disks. Occasionally other users might submit their jobs to the UNIX machine (Mainframe style) although this will not really be encouraged do to speed reductions.

The nice thing about this computing upgrade is that the older technology can be incorporated into the existing network structure. The older 386 machines that were used by the heavy users can then be distributed out to the lighter users, who mostly have 286 based machines. All these peripheral machines will still run PC SAS®.

One current problem we are encountering is the inability to access the UNIX machine while running Novell netware. This is problematic because the printers and external storage devices (WORM drives) are accessible through the Novell Token Ring network. Therefore users must reboot their machines to redirect their system attachments. This however can hopefully be overcome with system drivers written specifically to address this problem. We have not found any support thus far toward this problem.

FUTURE GOALS

Eventually our goal will be to incorporate several UNIX workstations into the network. With the heaviest users working on them at their desks. We would like to develop a front end on the PC's using SAS/AF® that would allow remote access through a menu driven system. The menu would ask users about the dataset they wanted, allow them to pick the variables needed and proceed to convert and download a DOS version of the dataset from the UNIX system. This approach would most benefit inexperienced, novice and infrequent users of the system by allowing them easy access to UNIX data.

Another goal for our system is a front end to SAS/GRAPH® that would allow users to graph their data with the ease that many second party graphics software packages enable. Many users who are quite adept at using SAS software to run statistical problems have never familiarized themselves with the SAS/GRAPH® language and prefer to use other graph software. The problem with this is that the output data must then be reentered into the graph program (sometimes time consuming and prone to error). If a front end to SAS/GRAPH® can be used that would give the user easy access to frequently used graphing techniques such as regression lines and standard error bars, then this would be a preferred method.

CONCLUSIONS AND RECOMMENDATIONS

In considering PC based network systems consider the computing needs of the group. Though the budget may be slim it might be wise in the long run to incorporate into your network the slightly more expensive technologies that have come down in price. Especially when these technologies have been around and have proven themselves worthy (SAS® running on Hewlitt Packard workstations). Sometimes this is risky business but you can't always play it safe.

You can make informed decisions about new equipment or new directions by having someone in your group who has the proclivity, interest and time to keep up with the technology. This is a must. This will save a lot of costly consultation time and provide your group with the necessary expertise to run and maintain a current state of the art network. Once the network is installed don't think it will run itself.

Our early decision to use SAS® software for the PC has paid off. As we have changed our operating systems SAS® software has easily incorporated itself. Our users are familiar with it and change hasn't meant complete restructuring. Furthermore using the same software has eliminated the need for retraining and loss of productive time.

REFERENCES


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