I'm going to give an overview of the processors on which the SAS System runs and an overview of our AOS/VS operating system. I will discuss the role that PUI plays in Data General Corporation. I'll give an overview of Data General's communication products, as well as some of our commitments to communications. I'll attempt to cover all of this information in a manner that reflects the relationship with SAS software and our commitments to SAS Institute.

One of the things I want to review with you before I get into some of the items I am going to discuss is the relevance that we at Data General place on our relationship with SAS Institute. From the time Data General started business until the late 70s we were primarily a hot box manufacturer. We were very well received in the scientific and industrial communities. Most of our marketing of systems was through OEMs, and from the beginning until the late 70s, we enjoyed an increased place in the commercial market. But even that was primarily through commercial OEMs. We got caught flatfooted in the early 80s from the beginning until the late 70s, we enjoyed an increased place in the commercial market. But even that was primarily through commercial OEMs. We got caught flatfooted in the early 80s when the transition in the data processing community, particularly in the mini part of it, came about, and we migrated from 16- to 32-bit processors. During that time, our competitors had the opportunity to jump out and gain about a two-year lead. Data General had to do some very fancy footwork in order to regroup and move forward.

Part of the corporate commitment we made at that point was a specific definition of where we were going in the marketplace. The commitment we have today represents a number of areas, yet it is very specific in that we have broadened our market focus. We have carefully defined select market segments, all of which could easily employ the SAS product.

The corporate commitment we have today depends heavily on what we refer to as independent software vendors (ISV). SAS Institute is an independent software vendor for Data General, and I might add that the Institute is one of our more important ISVs.

When Data General made the transition from 16-bit to 32-bit technology, we made a commitment to compatibility. We maintained compatibility very vigorously while making it possible for those Data General customers to migrate to our 32-bit architecture without having to go back and do a great deal of software conversion. Compatibility was even maintained to a great extent with some of the hardware products. We feel that this kind of commitment is worth talking about because, as SAS users, as you develop software today, the commitment you make on behalf of your company, and the money you will be investing in that software will not be trivial; therefore, it is an investment you will want to protect.

I would just say again that Data General has and will continue to do its best to maintain compatibility as a first consideration regarding any of our future products.

I would now like to talk about the MV processors. I would like to put the MV/4000, MV/8000, and the MV/10000 into a global perspective regarding performance as compared to dollars. I would also like to do this in two categories: MIPS and whetstones. The MV/4000 has an entry price of around $35,000 and the 32-bit normalize MIPS for this processor are .6. The MV/8000 has an entry price of around $100,000. The 32-bit normalize MIPS for this processor are 1.2. Our MV/10000 is approximately $150,000 to $175,000 for an initial entry system. It has 32-bit normalize MIPS of 2.5.

The MV/4000 has whetstone single precision of 600, and it has whetstone double precision of 400. The MV/8000 has whetstone single precision of 1,260 and whetstone double precision of 995. The MV/10000 has whetstone single precision of 2,500, and the whetstone double precision is 1,900.

One of the issues discussed openly was that of performance. Performance is when you are considering a system like the MV/4000, MV/8000, or MV/10000 to be shared by the computer vendor. The SAS Institute staff is doing its best to develop these portable SAS products and optimize the code to continue giving you the greatest overall performance. However, you must also consider that the Institute cannot bear the responsibility alone; the responsibility of the computer vendor must also be evaluated. Regarding performance, there are a number of things that are done by computer vendors, and there are a number of things not done by computer vendors that can have an impact on your performance. So before you take anyone to task with regard to performance, I encourage you to consider all the elements of your particular product problem before you decide it's vendor problem, it's a SAS problem, and so forth.

I'd like to make a few general comments about our MVs. The color scheme for our MVs is earthtone over brown. Typically, they do not require a great deal of environmental consideration like larger mainframes. The power is there, but the requirement for raised floors, special air conditioning, and so forth is not always necessary.

Features of the MV/4000:

- Nine I/O slots are available
- Expandable to 4.7 billion bytes of disk storage
- Accommodates up to 64 terminals
- CPU memory expandable to 8 megabytes (an expansion chassis is available)
- It is a virtual machine
• extensive self-diagnostic capabilities (checks every component of the system and logs any problems)
• automatic power up and test sequence
• error correcting memory and memory sniffing (tests every memory location every four seconds)
• comes in a meter high cabinet.

The MV/8000 is a little more assuming. The CPU, the chassis, power supplies, and so forth are in a 30-inch cabinet. All peripheral cabinets are 19 inches wide.

Features of the MV/8000:
• system will support up to 128 terminals
• 12 megabytes of physical memory
• 7 million bytes of on-line storage
• 25 I/O slots are standard
• optional floating point processor
• intelligent high sequence controllers are standard
• double precision whetstone speed is 995
• single precision whetstone speed is 1260

The MV/10000 is the flagship of Data General’s MV products. It is the top of the line, and it is much more assuming. It supports all the peripherals offered by Data General, which are numerous. Of course, it is expensive.

The MV/10000 has a very high resolution and a lot of color, but Data General is very seriously committed to color in graphics, and we will have low cost devices in the graphics arena. It has high-end graphics hardware and software. Data General subscribes to ANSI standards, de facto standards such as those of IBM, the Department of Defense, and international standards. As a corporation, we also subscribe to the graphics standards.

Features of the MV/10000
• high resolution raster scan graphics products
• Resolutions in the range of 1280 x 1024 and 1024 x 1024 and 850 x 640 and 680 x 240
• will support up to 192 asynchronous terminals, which should be 16 synchronous lines
• 18.5 billion bytes of on-line disk storage
• optional expansion chassis
• single precision whetstone speed is 600
• double precision whetstone speed is 400
• 13 megabyte a second global band width
• 5 megabyte-a-second burst multiplexer channel for high speed disks
• interval systems controller (processor controls the CPU, does diagnostics, and so forth)
• intelligent, self-monitoring power supply (this device looks for power and cooling problems and feeds information on a continuous basis to the system control processor)
• continuous memory error checking and correction
• all of ERCC detects and corrects all single bit errors and detects double bit errors
• remote diagnostic capability—guaranteed 96% to 99% up time availability on many of the MV processors
• hardware floating point processor is a standard feature
• supports architecture
• 2500 single precision whetstone speed
• 1900 double precision whetstone speed

I’ll just say a little bit about the AOS/VS. The acronym stands for Advanced Operating Systems/Virtual System. It supports time-share batch on-line. It can support 1,024 concurrent processes. This system has sophisticated security. It is virtual, and it is user-friendly.

AOS/VS is a superset of our AOS operating system. It came into existence at the same time as our MV processors, and it was co-developed by our development engineers for the processor along with our development engineers for AOS/VS. There were some features that were software features under AOS on our 16-bit ECLIPSE processors, but they were made hardware features on the MV simply because they improved performance substantially. There were also some hardware features that were changed to software. So, when you are thinking in terms of the specifications of a Data General MV class system, we probably don’t really have that many features that are earthshaking compared to the competition. Our position is that you have to evaluate an MV class system based on the total system, and that includes the AOS/VS operating system.

Our operating system makes a substantial difference in the overall performance of our hardware, and, admittedly, you can take a benchmark and you can run one copy of a program, perhaps two or three, and there may
not be a lot of difference compared to some of the competition, depending on how the benchmark is written. But if you run eight, ten, twelve, or fifteen copies of that application, or of different applications concurrently, you will really begin to see that the performance of the Data General system gives you a competitive edge. Again, based on what I have heard, performance is very important to you. The SAS System is dependent on hardware and operating systems to achieve the overall performance that you, as the user, can expect from the system.

This is not an inclusive list of all of our programming languages, but it represents the ones that most people are interested in. I was asked to discuss Data General's commitment to PL/I. Obviously, the main reason for that is because SAS is written in PL/I.

The discussion this morning is on how to minimize machine dependency. Everybody subscribes to ANSI standards of PL/I, yet I can go to different vendors and get implementations that are different. While everybody subscribes to the ANSI standards, everybody always has extensions. We are guilty of it as well. Everyone who has PL/I has extensions that complement the hardware and software.

Data General is very committed to PL/I. We are also committed to integrating user software into our operating system, utilities, and the applications software products we will be providing, which will be global, in fact, very general purpose in nature.

To give you some idea of the commitment to PL/I, PL/I is Data General's systems programming language. I mention an application made by Data General that is very general purpose but is targeted to a specific market. That application is our comprehensive electronic office: our office automation product, which is written in PL/I. The compilers for FORTRAN 77, BASIC, and COBOL are all written in PL/I. In addition, PL/I is the language for all our system utilities, including our SWAT (our native debugger); our INFOS (file management system); parts of the operating system (the AOS/VS); our present and future products. As we are building into our operating system and into our applications software, which we hope will make it possible for SAS Institute and other independent software vendors to integrate their products into our products in the future, this commitment is especially relevant to SAS users.

Under BYSINC and under RJE (the old 2780 and 3780 protocols), HASP is the old 3620 workstation protocol and RCX 70 is Data General's 3270 BYSINC emulator. Under S and A and under 3270, that is the 3274 and 3276 close to controller emulation for 3278 terminals and 3287 and 89 printer emulation. S and A RJE is the 3770 type of S and A RJE workstation. For example, the 3777 model 4 X25 certified on major public data networks, such as X25, as well as some of the major protocols. Zodiac Network Management System is Data General's proprietary networking system using X25. We allow connections through local area networks, such as Ethernet and our own proprietary network BUS system, as well as standard synchronous capabilities.

Data General recognizes the requirement to be able to interface certain peripherals of other vendors who, in turn, recognize the need to be able to exchange data from an IBM, a PECK, or a WANG processor. We have much of the hardware and software in place now to make that possible. And again, as a SAS user, not everything you ever have is going to be on an IBM, a Data General, or other processor. The need is always going to be present for you to transmit the data and expect them to get there in a format that the host system or the remote system to which you are transmitting can acknowledge and then will be usable. You are going to want the same capability from a non-Data General system.

Now I'll offer a little different perspective from a field network. Again you see the WANG word processor, but again the commitment here is exemplified, and the commitment is Data General's willingness and readiness to acknowledge that we don't have all the answers. We want to be able to provide a solution that will protect the investment that SAS Institute has made, and we are very aggressively positioning ourselves to make that possible.

I'd also like to talk about the PBX vendors. Right now, we have agreements with Northern Telecom, Intecom, ROLM and Lexar. We can tie our terminals into their switches, and they can tie their switches into our processors. This is a kind of a global connectivity.

I'd like to run down some of the implied standards, as well as some of the standards that are on the table right now, for instance, DIA and DCA for mail within the IBM network as well as outside that IBM network. We have the specifications on DIA: IBM is still working on the DCA, and we are committed to supporting that. We have the DIF, which is the document interchange facility that has been proposed by the Navy. We are on the committee that the Secretary of the Navy organized, and we are working with them in a joint effort to develop and make available that particular standard. The PBX interface that we referred to earlier, S and A, local area networks, Ethernet, and public data networks. As soon as the standards for the DIF are completed, we will implement and make available interfaces and any equipment that meets those standards.

Some of the commitments that we have to communications are OSI and IEEE802 voice, S and
A Zodiac, IEEE802 on our desktop products, an intelligent synchronous controller, X25, a synchronous X25, and S and A 3278 APL. I have given you an overview of a processor, not a lot of detail. I have tried to give you some idea of where Data General fits into the scheme of the whole data processing community and system manufacturers. I have also tried to give you a little information on the commitment that Data General has to independent software vendors.

Although I would like to say a word about futures, Data General has a policy of not disclosing futures. So I will not do that, but what I would like to do is tie back to where we have come from as a corporation and do some extrapolation from our past, and then do some projections into the future. I'd also like to give you an idea of the kinds of commitments that Data General is prepared to make to our users, whether they be SAS Institute or their customers, or customers of Data General, or both.

When we announced the MV/8000, we announced a new product family for Data General, and that processor was the middle of the processor family. We have since announced two smaller ones, one of which has survived, a replacement for the MV/8000, and a larger one which is the MV/10000. From a futures point of view, I think it is reasonable to expect that you are going to see still smaller MVs, and you are going to see at least two MVs--two processors in the MV family--that will be larger. Although I cannot give you a time frame, I think some of these announcements are probably not too far off. Some of the announcements are going to be determined by market conditions (that is, is the market right for a much larger processor); if and when it is, the processor will be announced. But I can also tell you that we often position our processor on what our friendly competitors do. I think you can expect that major announcements from our competition will be followed by major announcements from Data General.

Over the years we have migrated from the Nova to the 16-bit ECLIPSE to the 32-bit ECLIPSE, and at the same time, we had some low-end products--Micro Nova and the Micro ECLIPSE. We now have a desktop family; it is the 16-bit family. As we announce the 32-bit high-end MV class and the desktop on the low end, we really put a squeeze on the 16-bit Nova and ECLIPSE products. I think it is reasonable to look for some desktop 32-bits from Data General; although I don't know what time frame we are talking about.

I mentioned earlier that you should expect a great deal of graphics. Data General is very committed to Robotics, CAD/CAM, CAI, and the various disciplines in the scientific and engineering community. The greatest visible commitment that we have right now is obviously to the business community. We really do have a hole in our graphics products for the business community. I think it is very reasonable to expect Data General to close that gap. Again, I am just speculating on this. I am not telling you any company secrets because I am not in marketing; I am in a group that is last to know.

Data General's real emphasis is being placed on software. I am going to refer back to one of our products, the CEO, as an example. We recently announced a product from one of our ISVs that is totally integrated into that product. Discussions with our software development people indicate that is the direction in which Data General is going. We want to structure our operating systems, utilities, or any applications software that we provide as a corporation in such a way that it can all be integrated. Whether it is a financial package, a technical package, or whatever, it can be integrated into a very large universal type application package. I think that is what you are going to see within six months or so. I think my suspicions will be confirmed to you who remember this conversation. For that to take place, Data General has got to talk to SAS Institute and the Institute has got to talk to Data General about what kind of a standard Data General should implement. The standard must make it possible for the SAS System to hook into one of the large, universal application packages, operating systems, or utilities so that any software SAS Institute develops can be integrated into a large universal application package. This package would make usage easier for people unfamiliar with data processing. That's the kind of thing I expect to see from Data General, and I think that it is the kind of thing that would make life a great deal easier for users of SAS software.

We definitely appreciate the relationship that we have with SAS Institute, and we look forward to expanding it considerably beyond what we have today.