The study of this potential merger has been limited to five specific areas:
- The capacity of the 360/67 to absorb the ACME load;
- An overview of services and cost considerations;
- A brief statement of the planned changes to the Campus Facility;
- A list of relative advantages and disadvantages of such a merger; and
- Comments on cost comparisons.

There follows a summary of considerations in these five areas.

360/67 Capacity:

In July a test was conducted to determine whether the 360/67 timesharing monitor called ORVYL could handle its current load plus ACME's current load plus the anticipated load associated with the new information retrieval system called SPIRES. The test indicated that the 360/67 had adequate cycles and performance capability to handle the anticipated SPIRES load plus a substantial ACME load based on current ACME usage levels. The 360/67 has considerable unused capacity today. The test of ORVYL capacity demonstrated that a considerably heavier load could be handled with acceptable degradation and response times to the user. The test did tax the capability of the system with respect to its paging system on the drums; but this was fully expected. The ACME portion of the test appeared to consume approximately 29 per cent of the 360/67 cycles. The simulation of the ACME load consisted of a series of FORTRAN routines which would require cycles corresponding to approximately 15 users in execution on the current ACME hardware (360/50 with 2 megabytes of 8 microsecond bulk core).

Overview of Service and Cost Considerations:

The Campus Facility provides the following services: production batch service, quick partition batch service, timesharing in at least three languages, text editing, (one of the best found anywhere), plotting, and remote job entry. Many languages are supported in the production batch partition. Rates for use of the system have been designed to remove administrative fiat with respect to scheduling of resource utilization. Thus, priority can be obtained by any user who is willing to pay a fee. No realtime support services are offered at the present time, although there is limited small machine support through the PDP-9.

Card readers are handled by both computer operators and users. Fast printing service is available and normally the turn around time is extremely good (a few minutes). Terminal services are normally offered between 8 a.m. and 1:00 a.m. except for brief periods of system staff time from 5 to 8 p.m. three days per week, plus some system time on weekends.

Comments On Planned Changes:

The Campus Facility is likely to acquire some new hardware by January 1973. The new hardware could either replace existing systems or could supplement them. For example, a fast batch engine could be acquired to support the current 360/67 services. It is essential that any potential hardware changes in the Campus Facility be capable of demonstrating cost effectiveness. Operations over the past 4 years have led to an approximate $600,000 deficit. It is hoped that user fees and cost reductions over the next couple of years can remove the deficit. The Campus Facility anticipates having the SPIRES Information Retrieval System operating for users within the next year. This new service will fill a major need. The library automation system BALLOTS developed in the environment provided by SPIRES and ORVYL is being developed and has the University Large Library Commitment. Some of the planned changes on the 360/67 entail optimizing the systems which are presently run there. A major new service to be offered by the Campus Facility will be an interactive version of a subset of the PL/1 language. This will be especially interesting to users of the current ACME system.

Advantages of Potential Merger:

1) Availability of an increased range of services to the Medical School users, including batch service and additional languages;

2) Participation in the system which the University is committed to support would increase the financial support available for computing. The University Computing Fund used for unsponsored research and student computing has been running approximately $700,000 per year. The Medical School use of such funding has been limited to approximately $15,000 per year, primarily due to the availability of ACME. The University's Computing funds have been declared to be unavailable for use on the ACME system since the primary focus of the University must rest with the support of a central system;

3) Data bases could be easily shared among various disciplines within the University;

4) The new SPIRES Information Retrieval facility would be available to medical users;

5) The service center would not be totally dependent upon one source of funding such as NIH with respect to medical funding. Thus it would be less sensitive to use by a single group of users;

6) There may be long term advantages associated with economy of scale with respect to hardware, staffing, and physical plant;

7) The Medical School would not have to assume full financial responsibility for a sizable computing facility such as ACME; the risk would be shared among all schools within the University for a central facility.

Disadvantages of the Potential Merger:

1) The realtime services which already exist on the ACME system do not exist on the Campus Facility. ACME is currently attempting to develop a real time support system which would be host-machine independent. Campus Facility may add it as a service.

2) ACME type service has a strong personal relationship quality which may be more difficult to attain in a system shared by several thousand users;

3) The Campus Facility is located more than a quarter mile from the Medical School. Although this distance may sound small, it is a physical obstacle which does present potential interaction problems, despite the terminal service available;

4) Current disk rates and the ORVYL file system will make disk storage more expensive for medical users that the current ACME rates. See the subsequent section on Cost Considerations;

5) A large facility serving several thousand users may have less flexibility in terms of changing its systems than a smaller facility serving approximately 300 user projects;

6) ACME users would have to translate their programs to the form of interactive PL/1 mounted on the Campus Facility. Hopefully the conversion cost can be minimized with translation aids prepared by the facility.

Comments on Cost Comparisons between Campus and ACME Services:

Cost comparisons have been difficult to draw between Campus and ACME Facilities due to the disparate nature of the facilities and the accounting algorithms. Three of the FORTRAN programs used in the ORVYL capacity study were translated into PL/ACME. The three were of different types: A matrix multiplier which is heavily compute-bound, a file writing program, and a psuedo parser which is primarily a string manipulator with a great deal of 2741 output. Considering only the charges for CPU time and terminal access time under both systems, the compute-bound job would cost 42% less on Campus Facility than on ACME assuming that ACME is used during hours of heavy activity. The other two programs (which were heavily dependent on output speeds) provided roughly equal costs at Campus and ACME. These cost statements assume that ACME is charged at 2-1/2¢ per pageminute plus $3.75 per terminal hour on the old 8 microsecond bulk core. The Campus rates were the standard $10 per CPU minute on ORVYL, plus $3.50 per terminal hour. One factor which is difficult to evaluate is the extent to which the CPU plus terminal access at Campus reflects the total cost of the job. Averaging all user charges for fiscal year 1971 at the Campus Facility, a total of 68% was derived from CPU usage and terminal access. This means that another 35% of the income was derived from disk storage, printing, card punching, card reading, offline plotting, and use of the WYLBUR text editor. The point is that 32% of the income comes from sources other than those used in the above comparison.

At ACME the charges to users other than pageminutes and terminal access cover disk storage and terminal rental service. ACME's terminal rental service includes an add-on to cover general services to the community whereas the Campus Facility terminal rental rate covers only costs. The rate is $135 per month plus $4 to $13 for telephone lines on the Campus Facility versus $225 per month on ACME for a private 2741 terminal. The disk storage rate at ACME is 1¢ per track per day versus Campus Facility rate recently announced of 2¢ per track per day. Since ACME has moved to a faster bulk core, it can now provide more computing per dollar than the old 2 1/2¢ per pageminute rate permitted; the effect of the new core will vary by types of use. Cycle intensive users will use 50" to 70% of the pageminute usage encountered with the slower bulk core. Data input via terminals and program development will require about the same number of pageminutes on the new core.

The cost comparisons are difficult to make. It is clear that compute-bound jobs can be executed more efficiently on the Campus Facility than on the ACME configuration. I/O bound jobs tend to run at roughly comparable costs on each facility. On the basis of these findings, it appears that short term economics should not be the basis for any decision with respect to merger or lack of merger.

Dist: Staff/All