FREE ACCESS AT UW-MADISON

by

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The University of Wisconsin-Madison Academic Computing Center (MACC) is in the second year of an experimental open access computing program called the All-Campus Computing Educational Support System (ACCESS). For the first time, every student, staff member, and faculty member on the Madison campus has free access to computing on a large scale, general purpose system. They may use computing like the University libraries, both for course work and for personal projects.

There are a number of limitations on ACCESS jobs. All ACCESS computing is done in batch mode from input/output stations throughout the campus. Users must prepare their input on punched cards; they receive their output on printed listings. ACCESS runs may not use magnetic tape, punch output, or direct output to other printers. They may not create other runs or be created by other runs. Source code and data sets of up to about 250 card images and object code on a similar scale may be saved in a mass storage file. The number of items that a user may save is not limited, but total storage is limited, and unused items are deleted when space is needed.

Control is maintained over the total computer resources used by an ACCESS run by limiting the "cost" of the run as computed using our normal billing algorithm and rates. ACCESS runs initiated before 5:00 p.m. on weekdays are limited to a total "cost" of $.50. Weekdays after 5:00 p.m. and weekends before 5:00 p.m., jobs may "spend" up to $.75. After 11:00 p.m. weekdays and after 5:00 p.m. weekends, the limit is $1.00.

The lowest limit of $.50 is large enough to run a small program in our load-and-go version of Fortran, Basic, or PL/I. Nonprogrammers can use existing software packages to solve various problems. For example, the $.50 limit allows simple data analysis on a small data set with Minitab.

The University, MACC, and ACCESS

The UW-Madison, like most large universities, has encountered difficulties in providing free access computing. Some of these stem from the traditional organization and governance of the University and from MACC's place within the University. The Madison campus of the University of Wisconsin has a long and strong tradition of decentralized decision making. The faculty collectively and individually has the power and authority to make most decisions related to research and instruction. In particular, faculty members have always been encouraged to fund their research with grants from outside agencies. Once a faculty member gets outside funding, he retains control over it.

Although MACC is the principal facility for research and instructional computing on the Madison campus, it is not a monopoly. MACC must compete for the independent researcher's computing dollar. A direct subsidy in the state budget allows MACC to set favorable rates and capture much of the UW-Madison computing business. However, researchers may spend their computing money elsewhere, provided they can show that MACC does not meet their needs. There are 250 to 300 small and medium-size computers in use throughout the campus. We have no way of knowing the exact number, since they are not under our control.

Faculty autonomy carries over into instructional computing.

Resources for instructional computing have been tight for a number of reasons. MACC must bill instructional computing at the same rates as research computing, since the federal government requires that computing for federally-funded research projects be charged at the lowest rate charged anyone. Departments and Schools must pay for instructional computing on a real-money basis, since MACC is a service organization within the University, selling computing to any and all users. And they must pay for instructional computing with general instructional funds, including money that might otherwise go for instructors' salaries, since the state legislature has never allocated funds specifically for instructional computing. As a result, student use of MACC facilities has always been on a strict project-account, individual-authorization basis. Students who wished to used computing in courses for which funds had not been allocated by the teaching department have been disappointed. Many students have opened individual accounts with MACC, paying out of their own pockets, to pursue interests that require computing.

Some students have had free access to limited computing. For many years the Engineering Computing Laboratory (ECL) of the College of Engineering has provided free computer access for any Engineering student or faculty member. "Small" jobs are run under automatic authorization. To run larger programs, the user must be authorized on a special project account. ECL is a long-standing, integral part of the instructional program of the College of Engineering. A similar facility, the Data Processing Center, provides computing services for School of Business students and faculty. Finally, some individual departments have their own computers for student use. The Computer Sciences Department, for example, runs an open computer laboratory in which students studying assembly language programming or operating systems may get hands-on experience with a variety of machines.

Even with these facilities, and in part because of the success of ECL, planners saw a need for a free access computing service available to all students and faculty. They argued that since the University did not have such a service, in many cases faculty and students were forced to decide about educational matters on a purely dollars- and-cents basis, when other measures of value also should have played an important role. Many students learned computing in high school or in computing courses, but they were given no opportunity to apply that knowledge and skill in other course work.

Studies conducted in 1970 and 1972 recommended an open access computing service for all UW-Madison students and faculty members, and late in 1973, a subcommittee of the University Computing Advisory Committee prepared a specific proposal. Counter to the tradition described above, centralized funding was proposed for the experimental project. Deans of various schools and colleges were asked to provide funds to a level commensurate with expected use by their staffs, faculty members and students. The Graduate School and the College of Letter and Sciences provided a large proportion of the money needed. The framers of the proposal expected that some of the funds spent on the ACCESS project would be offset by reduced need to spend on regular instructional computing.

ACCESS: 1975-1976

Because of the need for strict limits on cost, the first year ACCESS experiment included only two processors which had the necessary controls. Batch Fortran was run using the Ditran student load-and-go compiler. Interactive Basic ran on a multi-user Basic system which we called "Quick Response Basic" (QRB), modified from the "Real Time Basic" system developed at the State University of New York at Albany.

The number of terminals funded for the Basic service was known to be inadequate for the expected use. Additional unforeseen problems, however, developed with interactive ACCESS. The primary problem was the severe effect of QRB on other jobs in the job mix, most noticeably a marked deterioration of batch throughput. Attempts to reduce the problem by changes to the QRB program were not successful. Another problem with the Basic service was what many, including some of the deans providing the funds, interpreted as frivolous use. Interactive games, especially "Star Trek", accounted for a large portion of the use of Basic. This kind of use, along with more "legitimate" use tied up the limited phone lines to such an extent that on just one day soon after the experiment began, more than 7100 busy signals were issued by the ACCESS Basic lines. The demands on the system just could not be met.

This is not to say that useful work was not done with ACCESS Basic. Instructors assigned course work using it, and students used it

independently. Users developed a number of interesting programs, including one which allowed them to leave messages in the ACCESS Basic mass storage files to be retrieved later by their friends.

Because of its effect on other work that had to be done, QRB was cut back in the middle of the first year. It was removed from the system during the middle of the day, when the greatest demands are placed on computing resources. It was still available in the mornings, evenings, and late at night, and it was still used extensively. But at the end of the first year, it was removed from centralized funding under ACCESS. Interactive computing is not included in ACCESS this year.

MACC management is disappointed that we have not been able to make interactive ACCESS service work on the Univac 1110. We had hoped that MACC could maintain a coherent computer system by providing individually funded and ACCESS service in both batch and interactive mode on the same hardware. We have not yet completely given up this goal. However, we are actively investigating alternative, stand-alone systems that could support interactive ACCESS computing.

Experience with batch ACCESS in the first year was more favorable. Ditran had been used for many years by beginning programming students in Computer Sciences courses and had reached a level of stability attained only by the most frequently used software.

The cost of ACCESS Ditran was limited by controlling the rate of job execution. One of the main purposes of Ditran is to give quick turnaround for small student jobs. Before the ACCESS experiment, paid Ditran runs usually were returned about fifteen minutes after submittal. Our attempt at controlling the rate of execution of ACCESS Ditran jobs resulted in much longer turnaround times for ACCESS Ditran during peak hours. It seemed to be impossible to adjust the scheduling factors to account for variation in the load of Ditran work over the day, week and semester, so rate limitations were substantially relaxed early in the experiment. This improved turnaround. Later a size restriction on ACCESS Ditran jobs was removed. During the last half of the first year of the experiment, any job which could be run with Ditran could be run under ACCESS.

125,805 Ditran jobs were processed under ACCESS in the first year. 21,915 hours of Basic were logged, representing approximately 85,000 interactive sessions. Neither component of the ACCESS experiment stayed within budget. In the long run, of course, ACCESS funding will have to be adjusted so that the service pays its own way.

ACCESS: 1976-1977

This year's ACCESS service has much greater batch capabilities. Users are no longer limited to the Fortran language or the Ditran implementation. Nonprogrammers may use existing programs and software packages in the MACC library. Instructors may create programs or data sets for their students.

Batch ACCESS has a new mass storage capability. Users may store program text, data, or compiled code for later use. Information in the ACCESS file may be private or open to all who know an assigned key, so that people working on a common project may share programs and data. Modifications to MACC's version of the 1110 operating system allow cost control on all ACCESS runs.

The limitations on ACCESS do not appear to be excessively frustrating for most of those users for whom the service is intended. Students learning programming or using computing in a course are usually running small programs or applying existing programs to small data sets. A user with a larger program can break it up into subprograms, compiling each one in a separate ACCESS run. The programmer may use the ACCESS mass storage file to save the results of the compilations until the whole program is done and ready to execute.

In September, 1976, the first month of ACCESS's second year, approximately the same number of Ditran jobs were run as in September, 1975. About an equal number of other ACCESS jobs were run, using a variety of languages and software packages. A preliminary glance at the collected data and informal discussions with users seem to indicate that ACCESS is being used for a broad range of applications. Course work, unassigned work related to courses, and purely personal projects are represented. Because of the variety of processors available with ACCESS this year, instructors in nonprogramming courses may suggest or assign the use of the computer when it is in keeping with the course's educational objectives. For small applications, instructors need no longer worry whether their students can program or whether they have funds for instructional computing.

User Services and ACCESS

ACCESS is a new type of computing and places new demands on the User Services function at MACC. First of all, ACCESS has created a new, very large potential user population. Although we have always tried to convince the campus population that MACC's services could benefit them, a large group of students, staff, and faculty were completely disinterested, since they had no computing funds available. With the advent of ACCESS, every student, staff member, and faculty member is realistically a potential MACC user.

One of our first aims was to publicize ACCESS to the students. To this end we bought advertisements in the registration issues of the two campus newspapers. We also supplied a flyer for a Student Services Packet which was handed to each student during the registration process. Both the ad and the flyer described MACC in general and featured ACCESS. Both referred the reader to a telephone tape service in which we have deposited a general tape on MACC and a tape on ACCESS. Figures compiled by the tape service show that our tapes were asked for about twice a week for the three months before fall registration and more than thirty times a week during the month after registration began. This, along with the healthy level of ACCESS use, indicates that we have reached a large number of students.

In addition, a longer article was printed in the feature section of the weekly newsletter of campus events. Of course, all of the news about ACCESS is published in MACC News, our monthly newsletter for our users.

Obviously, it is not enough to inform potential users of the existence of a service, or even to convince them that they can profit from using that service. It is important to supply training and documentation for the service, and to make the service easy to use. Because ACCESS is a new kind of computer service, the users need help and ideas. The limitation on the total amount that a run can "spend" requires different techniques and programs. Workshops that describe ACCESS and suggest effective ways for getting work done within its limitations are being held throughout the semester. Close to 100 users attended the first two sessions. The ACCESS User Guide, a small, convenient reference card, contains a general description of the features of ACCESS. Nearly 1000 copies of it were distributed in September 1976. Definitive documentation is in our Computing Handbook.

We plan to supply more specific information for ACCESS users via a public computer file. Users will be able to consult a current table of contents and print any bulletin that interests them. Material in the bulletins will include hints submitted by users and techniques of special and general interest devised by members of MACC's staff. Users will be able to retrieve any or all of this on-line documentation without cost by using ACCESS.

Enrollment in short courses and workshops also reflects ACCESS use. We have attempted to schedule enough sessions teaching languages and packages appropriate for use with ACCESS to handle this semester's demand. With experience, we hope to provide helpful training along with useful documentation for important ACCESS software.

The User Services group must also be responsive to the needs of classroom instructors. We are available to go to classes to introduce ACCESS and some of its possible uses. We will also work with instructors in preparing materials to be used with ACCESS.

ACCESS will put new demands on program consulting. As use of the computer becomes more widespread, a smaller proportion of the student users will be served by the consulting provided by the Computer Sciences Department for students in their courses. This means that MACC's consulting staff will need to help students with new problems and new types of problems. We have not yet seen a significant change in the use of consulting, but we anticipate one and we plan to be ready.

Expectations and Hopes

ACCESS is an experiment with centralized funding of computing services to enable their integration into the educational process on a par with library services. Where the experiment has failed, particularly with interactive services, we are going to try again. And we hope to continue to build on what has worked so far. We have a long way to go before we match library service in the number of instructors and students reached, and in the variety of services offered. Perhaps computing will never be as important to education as reading and we should never reach the library level. But it is clear beyond a doubt that we should be doing a lot more than we are.