APPENDIX—COMPUTER OVERHEAD

Accountancy requires that computer overhead costs be borne by users who are charged directly for their demands on the system. Data collection systems tend to include this requirement as a basic assumption underlying their structures. The resulting aggregation obscures the type of overhead most prominent in a system, the resources heavily used by overhead activities, and the portion of total system capability devoted to overhead activities. System analysis requires these data; they need definition and should be available for performance analysis.

From the viewpoint of performance analysis, at least five components of overhead can be identified in most multiprogramming systems. These are:
1. I/O handling
2. User resource request handling
3. System handling of spooled I/O
4. Job or sub-job (e.g., job step or activity) initiation/termination
5. System operation (including task switching, swapping, maintaining system files, etc.)

I/O handling may require large amounts of time, but this is largely controllable by the individual user. Item one, therefore, may not be a candidate for inclusion in a definition of overhead in many analyses.

User resource request handling (at least at the time of job or sub-job initiation) is similarly controllable by the users except for required system-required resources (such as system files). Item two might be included in definitions more often than item one, particularly since item two is often influenced strongly by installation-specified practices (such as setting the number of required files).

System handling of spooled I/O is under the control of users to the extent that they do initial and final I/O, but the alternatives open to installation managements for influencing its efficiency are often very great. For example, changing blocking sizes or using an efficient spooling system (such as HASP) can have great effects on the amount of resources consumed in the process. Installation management’s control over this is so high that item three is often included in a definition of overhead.

Initiation and termination appear to consume far more resources than usually assumed. User-specified options influence the amount of resource usage, but installation-chosen options and installation-written code can impact usage to a large degree. The choice of specific operating system, order of searching files for stored programs, layout of system files, and options in the operating system can change the resources used to such an extent that item four should be included in overhead in nearly all cases.

System operation is always included as a part of overhead. The difficulty of separating this element of overhead from all the rest is very difficult, so analyses usually assume that it is included as part of one of the other elements. One technique for quantifying its magnitude is to decide on the parts of code whose execution represents it and then to measure the size of these elements. The same parts of code can be monitored with a hardware monitor to determine the amount of processor time and I/O requests that arise from execution of the code. The sizes of system files are usually not difficult to obtain for determining the amount of rotating memory used by this type of overhead. This technique, however, will nearly always underestimate that amount of overhead since pieces of overhead are so scattered throughout the system.

Ideally, each of the types of overhead would be identified and measured so that installations could control the amount of each resource that is lost to it. If the resource loss to overhead were known for typical systems, each of the applications of performance analysis would be eased.

Computing societies—Resource or hobby?

by ANTHONY RALSTON

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ABSTRACT

The fodder for a technical society is people but people can nevertheless use as well as be used by the society. Such use can be passive (e.g., publishing articles in the society’s journals) or active through direct participation in the professional activities or administration of the society. As in the use of all computing resources, there is a potential for both profit and loss; these will be examined, in part at least, seriously.
The special libraries association today

by E. A. STRABLE

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ABSTRACT

Special librarians are part of the larger library community but can be differentiated from other groups of librarians (school, public, academic) by where they practice their profession, by the groups with whom they work, and most importantly, by their goals and objectives. The major objective, the utilization of knowledge for practical ends, brings special librarianship thoroughly into information processing in some unusual and unique ways. The Special Libraries Association is the largest society to which special librarians belong. The Association, like its members, is also involved in a number of activities which impinge directly upon, and affect, the role of information processing in the U.S.

Copyright problems in information processing

by B. H. WEIL

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ABSTRACT

Present copyright laws were developed largely to protect “authors” against large-scale piracy of books, articles, motion pictures, plays, music, and the like. These laws and related judicial decisions have in recent years raised serious questions as to the legality of such modern information processing as the photocopying, facsimile transmission, microfilming, and computer input and manipulation of copyrighted texts and data. Congress has so far failed to clarify these matters, except for sound recordings. It has proposed to have them studied by a National Commission, but it has repeatedly refused to establish this without also passing revisions chiefly dealing with cable-TV. Emphasis will be placed in this talk on consequences for libraries, library networks, and other information processors, and on recent legislative developments.

Standards for library information processing

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ABSTRACT

Technical standards will be described in terms of their intent, their variety (national, international, etc.), their enumeration, and their development process. Their importance will be evaluated in terms of their present and future usefulness and impact.
A network for computer users

by BRUCE K. ALCORN
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ABSTRACT

Computer networks are an accepted fact in the world of computing, and have been for some time. Not so well accepted, however, is the definition of a computer network. Some claim that to be a network the communications system must connect a group of computers as opposed to a network of terminals communicating with one computer. Still others hold that both are examples of computer networks; the first being a ring network and the latter a star network.

Within education, computer networks of many descriptions exist. Most such activities have dealt with the institutions of higher education, but there are some notable exceptions. These networks are operated by universities, independent non-profit corporations, branches of state governments, and private industry. Some are time-sharing systems, some operate in the remote batch mode, and others offer both types of service. Most of the computing done through these networks has been for instructional purposes; however, a great many research problems are processed with administrative applications last in amount of activity, although increasing.

During 1968 the National Science Foundation initiated a number of projects which gave a great impetus to computer networks, mainly among colleges and universities. This effort continues today in a different form through the Expanded Research Program Relative to a National Science Computer Network of the NSF.

Currently the National Institute of Education is supporting the development of the Nationwide Educational Computer Service, a network designed to help colleges and school systems meet their computing needs at a minimum of cost. This network will consist of a large scale computer serving a series of intelligent terminals in institutions in various parts of the United States. The system is configured in such a way so as to assist the student, faculty, and administrator at a cost effective rate. The factors involved in producing this saving include the particular hardware and software at the central site and at the terminal location, the mode of operation and the effective use of existing tele-communication facilities.

Uses of the computer in large school districts

by THOMAS J. McCONNELL, JR.
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ABSTRACT

In this age of accountability in education it is apparent that the most economical and efficient systems conceivable must be made available to the administrator. This fact is true at all levels of management from the classroom to the superintendent.

Most large school districts could not perform all of the tasks required of them if they had to operate in a manual mode. This fact is certainly not unique to school districts but is a common problem of our dynamic society.

The administrative use of the computer in most school districts came about as a result of a need for more efficient and faster methods of performing accounting functions. After their first introduction they generally just "grewed" as Topsy would say. Most large school districts today will have a rather sophisticated set of hardware and software supported by a very fine staff of professionals.

With the advent of tighter budget control and with most educators today clamoring for some form of "program budgeting" the computer is an even more vital ingredient that is required if we are to provide for quality education.

Additionally, it is no longer sufficient to provide automation to the administrative functions in a school district. The computer is fast becoming an essential part of our instructional program. This instructional role of the computer is coming into being in the form of Computer Managed Instruction (CMI) as well as Computer Assisted Instruction (CAI).

Although development of uses for the computer for instructional purposes has only been under way for a few short years, we have witnessed some very dramatic results. Most educators are in agreement as to the effectiveness of the computer for instructional purposes; the fact that it has not expanded as many had hoped and assumed is a function of finances rather than a shortcoming of the implementation.

Education can expect to have some very rewarding experiences in its relationship with the computer and the computer professional in the seventies. This fact will come about as a result of developments in computer technology both in hardware and in software. Also, the reduction in the cost factor should be of such magnitude that computer services will be available to more school districts and at a cost that they can afford.

With proper organization and cooperation the computer can begin to realize its full potential in bringing about efficient, effective education in its many aspects.
Training of teachers in computer usage

by DUANE E. RICHARDSON
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ABSTRACT

I plan to discuss the need in teacher education for training and experience in the selection of instructional materials for use on computers and the teacher’s role in helping to identify criteria for developing additional instructional materials.

Specific discussion will be directed at describing a course which will guide teachers through the development of a set of criteria by which to judge the value of such instructional applications and will demonstrate how the criteria can be applied. The course will allow the teacher to practice application of the criteria to sample instructional uses from his particular interest.

How schools can use consultants

by DONALD R. THOMAS
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ABSTRACT

Data processing consulting firms today offer a variety of professional services to schools. Users of these services, however, often differ in their opinions of the value of these services.

The point of this presentation is simply that unsatisfactory consultant relationships can have their source not only in the consultant himself, but also in the school’s use of the consultant’s services. In other words, use of consultative services implies a two-way relationship which is subject to misuse and abuse by either party.

The experience throughout the educational computer area demonstrates that time and effort devoted to sound use of consultants will pay substantial dividends. That factor should be a major one in the planned use of a consultant.

An experienced consultant will bring expertise to a study based upon his experiences with other clients. This should result in client confidence and in assuring that the unique needs of the clients will be identified and addressed.