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Computerizing the Small Library: Equipment and other Considerations

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INTRODUCTION

With the availability in the market of inexpensive mini and microcomputer systems, it may indeed be feasible, economically, for medium and small libraries to computerize their operations. The power and capacities of these equipment have grown enormously during the past few years while their prices have continued to remain low. This affects, in some way, the approach to library computerization. Although it is now cheaper to computerize, it may not be easier for some libraries. The small, powerful and inexpensive computers have not entirely removed the difficulties which all libraries will face in their effort to computerize.

This chapter will examine the current hardware, software and communication technology for mini and microcomputer systems which are relevant to the computerization of small libraries. A library must look into the area of computer facilities before going ahead with computerization. Some of these important considerations will also be discussed.

COMPUTER HARDWARE

Microcomputers

These are also conveniently called personal computers and are becoming widely available. The latest models use sixteen-bit microprocessors to give the performance previously found only in minicomputers. The small systems are meant for stand-alone single-user applications which require low volume of data storage. A typical system comes with 16 to 64 Kb of RAM memory, one or two floppy disc drives with 170 to 500 Kb storage capacity each, a VDU and a matrix printer. There are already a number of such stand-alone microcomputers in the market.

The microcomputers may also be clustered to be used in a multi-user, resource sharing environment. Each multi-user system consists of a supervisor terminal with at least 128 Kb of memory, one to three user terminals, and a hard disc drive and printer to be shared by all users. The hard disc drive is based on reliable Winchester technology and has a capacity of at least 5

to 10 Mb. The user stations may also function as stand-alone computers if they have their own RAM and floppy disc drives. The TRS 80 model II and the ICL models 31 and 32 are good examples of these multi-user systems.

Business/Office Systems

At the low end of these high performance and low cost office systems, a primary node or supervisor terminal with 256 Kb of memory can have up to fifteen secondary nodes attached to it. These secondary nodes can be intelligent workstations. One to three fixed discs drives of different capacities can be used. These can provide total on-line storage of between 16 to 80 Mb. Diskette drives of one Mb capacity and 20-Mb magnetic cartridge tape streamers are also used on such systems. The ICL DRS model 50 is an example of this category of equipment.

The larger office systems have more room for growth. One latest model, PRIME 2250, has a basic configuration which includes 512 Kb of memory, one 68 Mb or 158 Mb non-removable disc, a communication controller for eight asynchronous and one synchronous lines, and one cartridge tape unit. The system can have up to four Mb of main memory and a total of 632 Mb of disc storage.

COMMUNICATION AND NETWORKING

The requirement for communication between two computer systems is twofold. Firstly, the prices of peripherals such as disc/tape storage and printers have not fallen sharply and cost savings can be achieved by sharing these facilities. The second requirement relates to the need to pass data from one computer system to another. Communication is therefore initially concerned with the need to cut costs by sharing or providing access to expensive resources, but the long term goal is to inte-

grate the distributed equipment.

Many computer manufacturers are developing Local Area Networks (LANs) to provide a means of linking existing and new equipment (computers or terminals) within a limited area.

LANs can be 'open' or 'closed'. 'Closed' LANs are designed for specific systems whereas 'open' systems (e.g. Ethernet) are intended to be universal communication networks. A closed LAN like Nestar has been used successfully on Apple microcomputers and IBM personal computers.

ICL is one of the firms which has been propagating the concepts of distributed computing and local networking. Two items in ICL's LAN range are the open system LAN which is based on Ethernet and MICROLAN which was designed to connect up to fifteen DRS 20 distributed microcomputers by means of simple cabling.

PRIME has its LAN product called PRIMENET which allows PRIME computers to communicate with other PRIME computers, and with computers from other vendors.

Special nodes on the networks, the gateways, may provide the interfaces to other (local or remote) networks.

With local area networking, an organization can distribute computer power according to organizational structure and share resources at different sites instead of duplicating them. Micros and minis can therefore be distributed by department, function or application.

Decentralized Processing and Data Base

Traditionally a computer, be it a mainframe or mini, is shared by many users in a mixed environment. With the advent of cheap and powerful mini and micro systems, it is possible to duplicate the capability of expensive systems with a number of micros and minis at a lower cost.

The benefits of decentralized processing are cost reduction, increased reliability

and responsiveness, and extensibility of the decentralized computer. Cost reduction is obtained through hardware advances in smaller computers and resource sharing. Although there may be some redundancy of hardware, software and data, there is increased reliability since individual micro or minicomputer failures will not affect the functioning of other dedicated systems. There is also increased responsiveness and this is measured in terms of faster response time and lower turnaround time. Extensibility is obtained through the potential for incremental growth. A properly designed system threatened by overload can be incrementally expanded by adding more micros or minis and connecting them.

Decentralized processing therefore means that a library within an organization can have a separate micro or minicomputer system.

Distributed Processing

In contrast, distributed processing involves connecting local departmental computers to some central computing facilities via either a public or local network.

Distributed processing normally means distributing the central data base too so that each local mini or micro system will have control and access to its own data.

MICRO AND MINICOMPUTER SOFTWARE

Different operating systems have been developed by different microcomputer manufacturers and this means that software written for one system will not be compatible with those of another. Then came the introduction of CP/M and MP/M as standard operating systems for microcomputers.

CP/M (Control Program for Microcomputers) is an Operating System which is already widely used on all microcomputer

systems and so is MP/M, a multi-user version of CP/M. Thus CP/M and MP/M users have access to a wide range of software available from numerous software houses.

A very simple, easy-to-understand and powerful Operating System for minis is the UNIX system. Judging from its popularity, the UNIX system or its variant may become the standard Operating System for small computers.

Software development aids like languages, editors and generators are in abundance. Major industry standard high level programming languages like BASIC, FORTRAN, COBOL, PASCAL and PL/1 are available even on the smallest microcomputer systems. User-friendly full screen text editors and program code generators are productivity tools which are already very common.

Even data base management tools which allow easy manipulation of small to medium-sized data base using English-like commands are available on these small computers. DBASE II and MDBS III are examples of data base management system designed for use on mini and microcomputers.

IMPORTANT CONSIDERATIONS

Regardless of the size of its library, an organization should conduct a preliminary study to determine whether its library functions should be computerized. Library staff do not know or know very little about computers, and support, from the computer department within the organization, in the study should be given. If there is no computer expertise in the organization, help from outside should be obtained.

The type of computer equipment to use and how the equipment should be used is just one of the many considerations for a library computerization project. A number of other considerations are just as important.

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NEED TO COMPUTERIZE

The most obvious consideration is whether there is a genuine need to computerize. A library may want to effectively cope with the increasing volume of activities, or it may want to improve its current services or introduce new services. Sometimes, library computerization may be suggested by management just because computing facilities are already available and computerized library applications will give more prestige to the organization.

COMPUTERS

Computer facilities have to be used. If a computer system is already available, then it is only relevant to see whether the same computer system can be used by the library. The specific requirements of the library function to be computerized must first be established. The existing equipment may not be suitable or it may not have enough capacity to handle the requirement of the intended library applications. Consideration must be given to how the computer will be accessed. For example, there is a need to know whether the library aplication requires only a few hours a week of computer time or whether it requires on-line facilities eight hours every day.

It may be possible to upgrade the existing computer so that it can handle a particular library application. If, however, the maximum capacity of the machine is nearly reached, then it is unlikely that future library applications can be integrated into the one to be introduced. The existing equipment must therefore be expandable to accommodate the growth of the already implemented systems and the introduction of related library systems in the future. To upgrade the present computer may also be more expensive than purchasing a new one.

Decentralized or distributed processing and data bases, as discussed earlier, should be encouraged.

An organization can have separate computers for separate functions. The library can have its own computer located at the library. This computer may or may not be connected to some central computing facilities or other local department computers to form a network.

Distributed processing systems are normally also distributed data base systems. This means that instead of having a centralized data base, the data base is also distributed.

In the case of a library with a number of branches, instead of having a centralized data base containing information of all materials, it is better for each small branch library to have its own computer to handle the local operations and have its own data base containing information of all the branch library's materials.

COMPUTER PERIPHERALS

Special I/O equipment for the library application may have to be purchased. VDUs are normally used for on-line library systems.

However, the transaction rate for a Circulation Control System may be high enough to justify the installation of special input equipment like optical character readers or barcode readers. These equipment will enable data collection to be done in a simple, speedy and cost-effective manner.

APPLICATION SOFTWARE DEVELOPMENT

The development of a computerized library system can be undertaken as a local project, as a combined project with another organization or as an effort carried out, whether partially or substantially, by a software house. Each of these approaches has its own merits. However, we are concerned here with the organization which

will be carrying out its own library computerization program.

Use of Ready-Made Packages

Many library system packages for the small libraries are already in the market. Various types of library software for various library applications are available. Costs of such systems range from $500 to $10,000. However, before any software is purchased it should be properly evaluated. An evaluation team consisting of library and data processing/systems staff should be involved. In an organization with no computer personnel, the users may have to perform all functions of the team. A statement of requirement should be made at the beginning. This should be divided into two parts:

a   It should define the environment in which the application package would be expected to operate and what would be expected of the package itself; and

b   It should also specify the features and contents of the application area.

When studying a package, it is important that it meets most, if not all, of the specifications.

The important considerations when evaluating a package are:

a   Costs
b   System Maintenance and Enhancement
c   Installation and User Support
d   Documentation
e   Reviews and experience of other users

It should be noted that readymade library systems based on microcomputers have their limitations and the library with the intention of using them must be prepared in some cases to change their procedures and practices.

Developing own Library Systems

In order to be able to develop its own library systems, the organization must have adequate and experienced technical personnel for the job. Library staff should never turn the entire project to the computer staff and must show enough commitment.

The common difficulties encountered by most organizations are that library staff lack computerization experience and that computer personnel lack experience in library procedures. These necessitate a lot of interactions between library and computer personnel throughout the system development cycle.

FILE CONVERSION

A time-consuming task in all library projects is the conversion of existing files to machine readable form. The tasks of editing, data entry and data verification can be monumental especially when the whole library catalogue has to be converted.

Records in machine readable form may be obtained from outside data bases but at a charge. These are recorded on magnetic tapes and what is needed is the extraction of all the required data and putting them into the local files.

It is not always required to have the whole catalogue in machine readable form before a library function can be computerized. If a circulation control system is to be implemented, then only very brief records are required. Records of items can be entered as and when they are circulated for the first time through the system.

EXPERIENCE OF OTHERS

Successful experience gained by other libraries should be noted and used. A large number of library computerization projects have been carried out. Reports and articles have been written on these projects and a

library which is attempting to computerize should get as much information as possible from such publications. Attendances at conferences and seminars also allow the exchange of ideas, news, views and experience. Study tours of libraries with computerization activities/projects going on will be beneficial.

APPROACHES

When a library decides to computerize its functions, there are basically three approaches it can choose from. These are:

A   Carry out independent project for one or two library functions but make sure the total operation or the long term plans of the library are not affected;

B   Have an overall plan without all details of a total system and computerize one or two functions which do not deviate from the plan; and

C   Design a totally integrated system before any one function is computerized.

Smaller libraries tend to consider Approaches A and B. Often with a small staff, it may be more feasible to undertake small independent projects. The library will have the greatest benefits and the best chance of success in computerizing only one of two functions where there is a need.

The time lapse for the implementation of a computerized system is so extensive that a totally integrated system design (Approach C) is not practical. However, some planning is always preferable and Alternative B should have its appeal. Implementing one function at a time allows for one part of the system to be completely operational while the library is concentrating on the next function to be computerized.

The first application which the library should computerize should be:

a   easiest so that experience could be

gained for more difficult tasks to come;

b   an operation which can stand alone while other areas are being developed to be added to the system;

c   able to yield quick results and generate confidence;

d   useful to library users; and

e   least disruptive to normal library operations.

CONCLUSION

Small computer systems, being so powerful and inexpensive, are both cost effective and cost justifiable for the small library. Networking facilities give the small computers increased flexibility and expandability. To expand, the library need to buy another compatible computer and then link them together to give greater computing power. System and utility software, software development tools and language compilers for the small computers are already in abundance. The more efficient ones will no doubt be adopted as industry standard software. There are also numerous application packages available to the small library but care must be taken to choose those which satisfy all the requirements of the library. Developing and implementing one's own library system will involve more effort. The task of computerization is not entirely free from difficulties and the library should consider very carefully whether it is in a position to begin.

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