Chapter III

LIBRARY APPLICATIONS OF ELECTRONIC DATA PROCESSING

Since 1960, computers have been used in many libraries. In 1966, the Documentation Division of the Special Libraries Association and the Library Technology Program of the American Library Association conducted a survey of the use of data processing equipment by libraries and information centers in the United States. It was found that 638 libraries had mechanized one or more functions and 942 had approved plans for automation. The survey revealed that of the 638 libraries using data processing equipment, 75 percent were academic and special libraries, and 90 percent of the 942 libraries with authorized plans for automation fell under the same categories.[1]

Unlike the earliest library computerization, this period was devoted to the employment of computers to perform repetitive, routine library tasks, such as catalog production, order and accounting procedures, serials control and circulation control. This type of library computerization is very important since it is a first step toward an increasing productive library technology,

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[1]Eugene B. Jackson, "The Use of Data Processing Equipment by Libraries and Information Centers," Special Libraries, 58 (May-June, 1967), 317-27.

which must be an ultimate goal if libraries are to be economically viable to the future.[2]

Acquisitions

The National Reactor Testing Station Library was the first library that used a computer in ordering processes in 1963. A multiple-part form was produced for library records and for dealers. One year later, the Library of the Thomas J. Watson Research Center activated a more sophisticated system that produced a processing information list containing titles of all items in process, a shelf list card, a book card, and a book pocket label.[3]

Later on, many libraries developed computerized acquisitions system, such as the Pennsylvania State Univertity Library and the University of Michigan Library. The first on-line[4] acquisitions

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[2]Kilgour, op. cit., pp. 218-9.

[3]G.E. Randall, and Roger P. Bristol, "PIL (Processing Information List) or a Computer-Controlled Processing Record," Special Libraries, 55 (February, 1964), 82-6.

[4]On-line system is a system in which input data enters the computer directly from the point of origin and/or output data is transmitted directly to the point of the use. This term also indicates a data communication system in which the computer transmits directly into a telegraph line.

system occurred in 1968 at the Washington State University Library.[5]

In Thailand, the Library and Information Center of the Asian Institute of Technology was the first that started to operate a computerized acquisitions and accounting system in September, 1970. The operation has been quite satisfactory. Multiple order forms, Book-on-Order List, New Title List, and lists of orders to be claimed have been produced. Statistics of the library accessions and the detailed and up-to-date account of encumbrances and expenditures has been kept.[6]

Acquisitions operation involves the following steps: receiving requests; bibliographic searching; ordering, receiving and paying; physical preparation of the issue; and keeping track of its status from the beginning through cataloging. After searching and verifying the bibliographic data, price, etc., the information is put into machine-readable form by keypunching a set of cards for each item. Then the punched cards are put into the computer to store on a magnetic tape as the items to be ordered. The data are merged into an existing file, if any. In an on-line system, after verification, the bibliographic data is keyed directly into the computer.

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[5]Kilgour, op. cit., p. 224.

[6]Hwa-Wei Lee, "Library Mechanization at the Asian Institute of Technology," International Library Review, 3 (June, 1971), 255-70.

Purchase orders can be printed out in various forms, such as a traditional order form, listing all items desired, and in addition, a punched card for each item. The vendor might be expected to send back the punched card either with each item ordered, or separate as a report. If returned with the item, the vendor might be expected to note the actual cost on the punched card. Probably this data would not be in punched form, but merely written in pencil or ink. When the book is received, the punched card might be entered into the computer or into some sort of data collection device along with the keyed-in data concerning the actual price of the item. Then either on the computer or on an accounting machine, might update the fund records.[7] Reports on the status of all the funds can be printed out periodically, showing the encumbered and expended totals for each fund and providing up-to-the-minute information of free balances available on funds.[8]

When the book has been received and forwarded for cataloging, the computer then produces the print-out showing this change of status by symbolism, so that at all time during the entire ordering-cataloging process, some indication is made whether the book has been ordered, received, is in cataloging or at the bindery.[9]

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[7]Gloria L. Smith, and Robert S. Meyer (eds.), Library Use of Computers; An Introduction (New York: Special Libraries Association, 1969), pp. 51-2.

[8]Hayes & Becker, op. cit., p. 549.

[9]Smith & Meyer, op. cit., p. 52.

A claiming cycle can also be established. Claims notices on overdue orders can be produced if the cycle is exceeded.

Other useful end products can be automatic production of spine labels and book pocket labels for use in preparation of the book for shelving and of prepunched book cards for use in circulation control. Bibliographic data developed during order can also be used for input to the production of catalogs.[10] Machine processing can provide information for library management. A wide variety of statistical analyses and compilation can be derived from the ordering process, such as the types of books the library purchases and what they cost; the booksellers and the quality of service they give. An automated ordering system facilitates various kinds of reporting which includes lists of books on order and in process for use of library staff and readers, and, in university libraries, reports to departments on the progress of the book orders originating from them.[11]

Cataloging

In 1960, L. R. Bunnow prepared a report for the Douglas Aircraft Company. He recommended a computerized retrieval system

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[10]Hayes & Becker, op. cit., p. 550.

[11]Richard T. Kimber, Automation in Libraries (Oxford: Pergamon, 1968), 36.

like those of the U.S. Naval Ordnance Test Stations and the General
Electric's Aircraft Gas Turbine Division that would also include
catalog and card production. Bunnow was perhaps the first who
introduced the concept of production of one machine readable record
from which multiple products could be obtained, such as printed
catalog cards and subject bibliographies produced by machine search-
ing. Catalog card production started in 1961. The cards had an
unconventional format and were printed all in upper-case characters.
Accession lists were also produced from the same machine readable
data.[12]

In 1963, the next development in catalog card production
happened at the Air Force Cambridge Research Laboratory Library,
which began to produce cards mechanically in upper-and lower-case.
Two years later, there were catalog cards in upper-and lower-case
produced by Yale.[13]

The important movement of this type of application was the
Library of Congress' Machine Readable Catalog project (MARC) which
started in 1966 as an experiment. This project was intended to
determine if it was feasible to produce a standardized machine-
readable catalog record that could be manipulated and reformatted
in local installations to serve local practices and needs. Sixteen
libraries were selected as participants in the MARC experimental

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[12]Kilgour, op. cit., p. 220.

[13]Ibid., p. 221.

project. The Library of Congress sent the tapes recorded complete bibliographic information of selected catalog entries to the participants. The tapes were used as input for local processing. A revised format for machine-readable cataloging data had been developed after the experimentation. Now the MARC II format is accepted as the standard by the American Standards Associations and the American Library Association.[14]

By the end of 1971, approximately 228,000 bibliographic records for English language monographs had been converted into machine-readable form. Of this number, 111,027 were converted during 1971. MARC tapes are now duplicated and distributed directly from the Library of Congress to 62 subscribers in the United States and other countries, such as Great Britain, France, Italy, West Germany, Australia, Canada, the Netherlands, and Japan. The MARC Distribution Service expanded to include records for motion pictures and filmstrips during 1972 and for French monograph titles in 1973.[15]

History of book catalogs can be traced back in 1962 when the Information Center of the Monsanto Company in St. Louis, Missouri published the earliest report on a bookform catalog in upper-case

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[14]Hayes & Becker, op. cit., pp. 42-3.

[15]Henriette D. Avram, Lenore S. Maruyama, and John C. Rather, "Automation Activities in the Processing Department of the Library of Congress," Library Resources & Technical Services, 16 (Spring, 1972), 196-8.

produced by computer. It was a union catalog of the holdings of seven Monsanto libraries. Book catalogs could increase availability of cataloging information to users. Bookform catalog in upper-and lower-case appeared in 1964 at the Florida Atlantic University Library and in 1965, at the University of Toronto Library.[16]

The first major stage in the cataloging process is to produce one catalog record on magnetic tape for each book being cataloged. Three alternatives can be distinguished: the starting point may be cataloging copy in written or printed form, the result of original cataloging by the library itself, or supplied from a central agency; full cataloging data may be supplied in machine-readable form on magnetic tape from a central agency, LC MARC; or partial cataloging data may be available in machine-readable form resulting from the operation of an automated ordering system.[17]

After creation of catalog records in machine-readable form, the computer arranges the entries in order and prints the catalog. Problems are encountered when programs are required to sort catalog entries in the same order as catalog cards are filed manually. Three ways in which this difficulty can be approached and overcome are suggested. Catalog headings can continue to be written in their existing forms and computer filing rules applied to them directly.

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[16]Kilgour, op. cit., pp. 221-2.

[17]Kimber, op. cit., p. 92.

Though the resulting order will not coincide with that already established in libraries, it will be logical and can therefore be used by users after a little practice. Alternatively, the headings can be altered so that when acted upon by standard machine filing rules the result is the established library filing order. The third possibility is to retain catalog headings in their present form and to write a special computer sort program which will file the headings in their correct library order.[18]

To print the catalog, the computer system can be designed to produce as its final product sets of catalog cards which then filed manually into a card catalog. Alternatively, the entries produced at each run can be merged with an existing file of catalog entries on magnetic tape. Periodically, this tape is printed to yield a catalog in book form and merged from time to time with the main catalog file stored on one or more tapes.[19] Today, book form catalogs are becoming more and more popular. Many book catalogs have been published using computer-controlled typesetting which provides a catalog that is not only useful but also well-designed and of pleasing appearance.[20]

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[18] Ibid., pp. 107-8.

[19] Ibid., p. 109.

[20] Smith & Meyer, op. cit., p. 57.

Circulation

The Picatinny Arsenal reported the first computerized circulation system. The system began to operate in April 1962 with production of a computer printed loan record, lists of reserves, overdues, lists of books on loan to borrowers and statistical analysis.[21]

The circulation system controlled by computer had been developed at the Thomas J. Watson Research Center in the fall of 1962,[22] and at Southern Illinois University in 1964.[23] However, these systems did not satisfy the user because they were batch processed operations. Current records are unavailable on the average for half the period of the frequency of the printout. Such delay can be corrected in an on-line system, wherein information about the loan is available immediately after recording the loan.

An on-line system was introduced at the Illinois State Library and the Redstone Scientific Information Center in 1966.[24]

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[21] L. Haznedari, and H. Voos, "Automated Circulation at the Government R & D Installation," Special Libraries, 55 (February, 1964), 77-81.

[22] R.W. Gibson, Jr., and G.E. Randall, "Circulation Control by Computer," Special Libraries, 54 (July-August, 1963), 333-8.

[23] Ralph E. McCoy, "Computerized Circulation Work: A Case Study of the 357 Data Collection System," Library Resources & Technical Services, 9 (Winter, 1965), 59-65.

[24] Kilgour, op. cit., p. 223.

In a computerized circulation system, both books and users need to be supplied with identification cards in machine-readable form. Data collection for both the charging and discharging processes can be automatic, but once a transaction record, containing information about the borrower, the book being borrowed and the loan, has been placed in the machineable loans file, then all of the controls and features offered by conventional systems can be provided by computer without any further manual intervention.[25] Various statistics from the circulation system can be produced and typically includes the following:

"Total number of loans each day, week, month, etc.

The above totals devided by subject and by form of publications

Total number of reserved books each day, month, etc.

Total reservations by class of borrower

Total loans devided by class of borrower

Total loans devided by subject and by class of borrower."[26]

Serials

In 1962, Melvin J. Voigt, a university librarian, and Clay L. Perry, Director of the Computer Center at the University of

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[25] Kimber, op. cit., p. 52.

[26] Ibid., p. 69.

California, San Diego, announced in a report the first use of a computerized serials control system. In an experimental project, the computer produced lists of periodicals received for the use of library patrons. A print-out of the library's holdings for all the 700 periodicals in the program could be produced at low cost.[27] The main production of this system were a complete holdings list, lists of current receipts, binding lists, claims, nonreceipt lists, and expiration of subscription lists. There were many libraries which began to operate computerized serials control next to the University of California, such as Washington University School of Medicine Library, and University of Minnesota Biomedical Library.[28]

The first public library in the United States that had a completely computer-controlled serials system was the San Francisco Public Library. Preliminary planning began in February 1967. Title Catalog, Subject Catalog, and Foreign Language Catalog were printed by the computer. It was reported that this system helped minimize the number of difficulties encountered, provided better service to the user and increased internal efficiency of the library.[29]

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[27]"Computer Used in Operation of a University Library," Library Journal, 87 (September, 1962), 3015.

[28]Kilgour, op. cit., p. 224.

[29]Linda F. Crismond, "A Computer System for Periodicals; A Report on the Experience of the San Francisco Public Library," Library Journal, 94 (October, 1969), 3619-21.

The Kansas Union List of Serials, which appeared in 1965, was the first computerized union list contained nearly 22,000 titles in eight colleges and universities.[30]

The Library and Information Center of the Asian Institute of Technology was the first library in Thailand that began to activate computerized serials control in 1969. The complete list of journal holdings with several other by-products were produced.[31] The Library and Information Center of the National Institute of Development Administration, which is also located in Thailand, operated another serials system in 1971.

The computerized serials control will be discussed in detail in Chapters IV and V.

Reference Services

A reference service that is increasing in popularity is "Selective Dissemination of Information" (SDI). It is the mechanical matching of user interests with documents received by collection system which was proposed by Hans Peter Luhn in 1958. The first library application of SDI was in 1962 at the IBM library at Owego.[32]

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[30]Kilgour, op. cit., p. 224.

[31]Lee, op. cit., pp. 259-61.

[32]Kilgour, op. cit., p. 222.

The two elements which are matched in the computer are the bibliographic record of the citation and the interest profile of the individual. Similarly, a list of terms from the index vocabulary is prepared for each user, based on his expressed interest. The user may make up a list of words which reflect his interests, or he may choose the words from a special list, or he may write a paragraph or two describing his interests, these to be indexed by an indexer.[33] When batches of new items are processed into the system, which is usually every two weeks or thereabouts, the bibliographic record tape is matched against the user profile tape. When these match sufficiently well, the bibliographic record is read off into another tape for the user. The latter tape is used to print either page-form listings or duplicates of the catalog card which are sent to the user. The user may order the item. If the item is not of use to him, he may suggest that the librarian correct his interest profile.[34]

SDI can be done by means of Keywords-in-Context (KWIC) indexing which is based on word rotation of titles of books, articles or technical reports so that alphabetical term listing and searching is possible. KWIC indexing can be used in preparation of bibliographies on new literature which are disseminated to interested

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[33]I.W. Warheit, "Dissemination of Information," Library Resources & Technical Services, 9 (Winter, 1965), 77.

[34]Smith & Meyer, op. cit., p. 76.

readers. This type of indexing has been employed by <u>Biological</u> <u>Abstracts</u> and <u>Chemical Titles</u> to provide promptly some form of index, as alternatives and immediates to expensive and tardy conventional indexes.[35]

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[35]William S. Budington, "Access to Information," <u>Advances in Librarianship</u>. Vol. II. Edited by Melvin J. Voigt (New York and London: Seminar Press, 1971), p. 13.