COMPUTER ASSISTED LIBRARY AND INFORMATION MANAGEMENT

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Library, Electronics Commission (IPAG), has been making use of the computer for enhancing its information handling activities. Initially an HP-2000 minicomputer was used to develop a small data base on experimental basis. Experience gained from this work initiated development of a much more comprehensive system on the CYBER 170/730 Computer System. Present version of the System came into operation in April 1981. The article describes the steps followed in designing the system, features of different Library Subsystems computerised (with sample outputs as illustrations), data elements and their structuring in the data base, computer hardware/software details and feedback studies. It also identifies the further work involved.

1 INTRODUCTION

National Informatics Centre (NIC), Electronics Commission, New Delhi, has been involved in assisting various ministries/departments of Government of India and associated semi-government and autonomous organisations, in the development of computerised information systems. To achieve this, NIC has established a large computing facility along with necessary manpower for maintenance, software development, data preparation, etc. The departmental library of Electronics Commission, which caters to scientific, technical and techno-economic information requirements of the staff, has been making use of the computer for library and information management.

The paper, beginning with a brief sketch of earlier work, reports the features of a Computer Assisted Library and Information Management System (CALIMS) developed on CYBER 170/730 system at NIC.

2 EARLIER WORK

During 1977-80 an experimental bibliographic data base was developed on an HP-21 MX minicomputer using IMAGE 2000 data base management software[2]. The data base was designed mainly to facilitate information retrieval using descriptors (subject terms), U.D.C. Class Numbers and for producing classified lists. The retrieval system was tested with a small group of users. Queries were accepted through 'Search Request' forms and converted to search expressions by the library staff. These search expressions were then used to perform retrieval. Search was limited to a maximum of 6 descriptors, with provision for providing threshold values (minimum number of descriptors that are to be present in the retrieved document) for retrieval. During this period, software programs were also developed to produce KWIC/KWOC type indices for an input text. These programs were used to test the feasibility of using KWIC/KWOC type indices as a means for quickly producing current awareness bulletins for articles appearing in recent periodicals, new books added to the library, etc.

Although the results of these experiments were encouraging, they also indicated the need for a much more comprehensive system which integrates and inter-relates different library subsystems so as to avoid dupli-
cation of data shared by them and to produce several outputs using a single input (a bibliographic record),

- provides an easy method for data input, modification, retrieval and reports generation,
- gives scope for the end user himself to interact with the data base in an user friendly environment, and
- makes it possible to produce exception (ad-hoc) reports without the need for special programming.

3 DEVELOPMENT OF THE PRESENT SYSTEM

Experience gained on the minicomputer system formed the basis for developing the present version of the system. Development of this system was initiated with the installation of CDC CYBER 170/720 computer system during the middle of 1980 (upgraded to 170/730 in May 1983). CYBER 170/730 is a general purpose main frame computing system with powerful time-sharing and networking capabilities along with interactive terminal facilities. A feasibility/requirements study was made in August, 1980 to identify the features required in the computer based library system to be designed. Due to advantages mentioned elsewhere in this article, (section 10) data base approach was adopted for implementing the system. System development started in September 1980 and the prototype system was ready in December, 1980. After testing the prototype model with actual (live) data, present version of the system was installed in April, 1981.

The system was developed with the following specific objectives:

i) to provide users rapid access to bibliographic information in an interactive, online mode;

ii) to provide an easy to use language so that the non-computer personnel can use it;

iii) to bring out information services like current awareness services, selective dissemination of information (SDI), etc.;

iv) to facilitate compilation of bibliographies, digests, abstract bulletins, etc., on a specific topic;

v) to facilitate preparation of various types of indices; and

vi) to perform routine library operations such as circulation control, cataloguing, serials control, etc.

Subsystems like book acquisition, journal receipt and claim were not included in the first phase of system development.

4 FEATURES OF THE SYSTEM

The system has been designed around the library activities. As of now, there are about 7000 document references in the data base. The document types are books, collected works, multi-volume publications, standards, reports, journals, journal articles and techno-economic news items appearing in daily news papers. No abstracts are stored. Data elements considered for the various document types is described in section 7.

All operations like data loading, retrieval, reports generation and modification are performed online using video/hard copy terminals connected to CYBER system. Retrieval and data modification is done in an interactive mode. The data base can also be searched through computers (like HP-1000, LSI/2, etc.) connected to CYBER system by telephone or VHF lines and operating within NICNET (NIC computer network).

Features of different library subsystems that have been computerised are described below.

4.1 Online Data Base Search (Information Retrieval).

Access to the data base is provided in an online, interactive fashion. After login through a local/remote terminal, retrieval subsystem can
be initiated very quickly by any valid user of
the library. Search is conducted using a simple,
easy to use command language with no re-
requirement on the part of the user to know the
data base structure or programming. System
provides appropriate diagnostics whenever an
invalid command is entered by the user. Re-
trieval can be performed through 13 access
points like author, keyword (subject term),
U.D.C. number, publisher, etc. Queries can be
refined stepwise using Boolean operators AND,
OR and NOT. Search can be conducted for
books, journals, journal articles or for all of
them. As the search subsystem is linked to
circulation subsystem, document availability
status can also be found out.

If an exact match for author or keyword
does not occur, the system automatically dis-
plays a list of alphabetically related headings
from which the user can choose correct head-
ings(s). System also supports substring search
for keywords using which appropriate key-
words for a query can be found out. Retrieval
outputs can be either displayed on the termi-

nal or printed out on the line printer.

Various commands available to the user
within the search subsystem are given in
Appendix-1. Library users have been provi
ded with a user primer which explains proce-
dures to retrieve information. A typical query session
is illustrated in Appendix-3.

42 Current Awareness Services

Although new document references added to
the data base are available immediately for on-
line retrieval, there is a need to bring out cur-
rent awareness lists to notify all users informa-
tion about the new documents. The three CAS
products brought out are:

1. List of new books added (approx.
monthly),

2. Selected articles from journals (approx.
monthly),

3. Current new update (new items)
(weekly).

Sample pages from a current awareness list is
given in Appendix-4. Entries in these lists are
arranged by subject class numbers with suitable
alphabetical indices. There is provision for
cumulating these lists periodically.

43 Cataloguing

Two products related to cataloguing are pro-
duced using new document information stored
into the data base. These are:

1. Author/Title Catalogue (Appendix-5)
2. Book cards (Appendix-6)

In the author/title catalogue, full entry is given
under each heading with title entry for reference
documents. The printed catalogue has replaced
the manually prepared 5" x 3" card catalogue
for new books added to the library. The printed
catalogue is cumulated once in six months. The
catalogue is in double column format with the
author/title entries arranged in a single alpha-
betical sequence. The book cards are kept in
book pockets and used for issue/return pur-
poses.

44 Current Serials Control

Presently only informational (catalogue) and
holdings data for current journals received in
the library are stored in the data base. It does not
include subscription, receipt and claim aspects.
Besides using the catalogue and holdings data for
online retrieval, following reports are generated
for the current journals:

1. Main list (alphabetical) giving com-
plete description of each journal
(Appendix-7),

2. U.D.C. Index,

3. Permuted keyword index,

4. Journal type index,

5. KWIC title index.

Reports at Sr. Nos. 2-5 list only the journal
titles under the respective index headings,
with complete details of the journal being avail-
able under each title in the first report. In
permuted keyword index, journal title is posted
under each keyword (thesaurus controlled
term), with remaining keywords provided just
below the title. Each journal has been assigned
one or more type for e.g., popular, statistical
data, abstracting, indexing, etc. This is used to produce journal type index.

Journal data is usually updated annually, with modifications being incorporated as and when noticed.

45 Circulation Control

Issue/return transactions of documents, collected at the circulation counter, become input to updation of the circulation subsystem. Functions performed in this subsystem are as follows:

1. Maintenance of current borrower's information,
2. Issue/returns updation, and
3. Reminders generation for overdue books and journals (Appendix-8).

As soon as a return has been made for a document, the issue and return data is removed from the circulation subsystem in the data base and transferred to an external file. This data, accumulated over a period of time, will be used to make document usage pattern studies. Besides the functions mentioned above, circulation subsystem has capabilities to inform when a user is over-borrowing, assist in giving quickly no-due certificates to resigned staff, assist in stock verification, etc.

46 Preparation of Indices, Compilation of Bibliographies, Digests, etc.

KWIC and KWOC type indices can be prepared for any input text. A sample page from KWIC index to journal titles is given in Appendix-9. Retrospective search on the data base is performed to compile bibliographies on specific topics.

5 ANALYSIS, DESIGN AND IMPLEMENTATION

Work on HP 21 MX minicomputer had indicated the need for a system which integrates different library subsystems. It was realised that using conventional file management software to design such a system will be very tedious, complex and the resulting system quite rigid. Data base approach was considered suitable for designing the library system. CYBER 170/720 system (now 170/730) supported a versatile, general purpose data base management software called IMF (Information Management Facility) with interfaces to application programs in COBOL, FORTRAN, etc. It was decided to use IMF as a tool for implementing the library system. Steps followed in developing the production system are briefly described below (Fig. 1).

Step 1: Feasibility/Requirements Study

First step was to identify the features required in the system to be designed. Besides the experience in handling user queries manually and using the data base developed on HP 21 MX Computer, relevant literature on library automation was also scanned to identify the required features. The following factors were taken into consideration in system design:

a) objectives of the system,
b) library subsystems to be considered for automation, in different phases,
c) scope of the system with respect to subject, document types, level of operation,
d) users of the system,
e) nature of queries to be handled,
f) expected benefits from the system,
g) different operations to be performed,
h) requirements for searching the data base,
i) mode of data input,
j) input record types and their description, and
k) volume of data involved.

Step 2: Designing the system

System design was made keeping in view the features identified in the requirements study. Basic aim at this stage was (i) to identify data elements and their relationships, (ii) to transform these relations into structures required by IMF, so that information can be manipulated easily to meet different requirements. Specifically, following steps were involved in this stage:
a) Identification of information to be stored into the data base in terms of elements. A close study of (i) queries to be handled by the system, (ii) outputs and reports to be produced, and (iii) inputs/outputs and operations performed in the existing system, revealed the data elements. Such a study was made for each subsystem.

b) Grouping, naming and characterising of data elements. Grouping was made according to relationships exhibited by the data elements. Unique names (Codes) were assigned to data elements for brevity, identification and manipulation. Characteristics of data elements in terms of data type (numerical/alphabetic/alphanumeric), length, etc. was specified. This stage also involved identification of constraints within and among groups that is to be observed while performing any operation on data in the data base.

c) Diagramatic representation of data elements, their groups, relations between groups, and constraints are illustrated in Fig.3.

d) Matching of the diagramatic representation with queries and functions identified in the requirements study to make further modifications in the model.

Step 3: Implementation

Resulting data base model was converted to IMF schemes (conceptual, internal and external) and a prototype system was designed. Application programs in COBOL were developed for data loading and retrieval. Actual data was loaded into the system and tested for a period of three months. Discrepancies and problems noted at this stage formed basis for modifying the prototype system. After incorporating modifications in the data base structure, present version of the system was installed. Application programs were developed for data validation, loading, retrieval and report generation for different subsystems.
6 WORKFLOW WITHIN THE SYSTEM

Information about new documents added to the library undergo several operations before it is stored in the data base and available for subsequent manipulation. These operations fall into a well defined sequence and are common for updating information for all library sub-systems.

It may be noted here that only data which is unique for a particular subsystem enters the data base separately whereas data shared by more than one subsystem, for e.g. catalogue information, is entered only once. Major steps involved in data base updation is shown in Fig. 2 and these are described briefly below.
61 Data Capture and Analysis

Data specific to each subsystem is collected at the location where corresponding manual operations are being done in the library. Further, data is analyzed to identify the data elements that are to be stored into the database. For example, in the cataloguing subsystem, a document is analyzed for its subject content in terms of class number (U.D.C.), Keywords (subject terms) and for bibliographic details. This also includes controlling the vocabulary using thesauri such as INSPEC, NCC computing terms, ROOT thesaurus (BSI), etc.

62 Coding

Data input sheet specific to the subsystem is filled-up. At this step special care is taken to standardize the names and headings of publishers, corporate authors, etc. using directory (look-up) lists generated from the database time to time. A code of instructions have been prepared to assist persons involved in coding.

63 Conversion of Data to Machine Readable Form

Data input sheets are submitted to the Data Preparation Unit along with information such as record format, length, special characters, field justification etc. Key-punch operators transfer data onto magnetic tapes using key-to-tape machines.

64 Data Validation

Hard copy listing of the data on tape is taken and proof read using data input sheets to detect key punching/transcription errors. These corrections are made online using the editor available on the computer system. Edited data file is validated using validation programs to identify incompatibilities among different data elements of a document, e.g., an author without author type (personal, editor, translator, etc.), a conference document without conference date etc. Any violations of predefined data characteristics are also identified, e.g., an invalid document type, accession number being non-numeric, etc. Diagnostics generated by validation program is used to correct all the errors in the input data. During validation, error free records are reformatted into structures defined in the data base schemes, and the reformatted records are written on to temporary working files.

65 Loading of Data

These working files are input to loader programs which identify the input records and store them at proper locations in the data base. Data incompatible with predefined structures/constraints in the data base are displayed for proper action to be taken. Such incompatibilities may arise, e.g., when attempt is made to store a document with an accession number already existing in the data base.

66 Retrieval/Report Generation

Data once loaded becomes an integral part of the data base and is available to all relevant report generation and retrieval programs. Most of the reports circulated to library users are generated immediately after loading the data. Directory listings of publishers, corporate authors, keywords, etc. which are required by the library staff are produced after 3 or 4 batches of data sheets have been stored in the data base. Reports that require searching, matching, special formatting, etc. are produced using application programs. Simple, ad-hoc reports are generated using the query language (IMFQU), which forms part of DBMS software.

67 Spelling/Format Error Corrections

Insipite of care taken at coding, validation and loading stages, many spelling and format errors get accumulated over a period of time. Most frequently these errors occur in title, keyword, author and publisher fields. Such errors are corrected using an application program which accepts, interactively, correct values and modifies error fields. Errors in data fields like page numbers, date of publication, class number, etc. are corrected using the query language. Interactive data modification is illustrated in Appendix-10.
7 DATA ELEMENTS DESCRIPTION

The study made to identify features of the system (Section 5) took into consideration data elements required to support different sub-systems. Documents like UNISIST Reference Manual were used to select data elements. Exhaustivity being not the primary aim, due consideration was given to factors like disc storage space availability, user requirements, operational and program requirements, and coding and data entry constraints.

Table in Appendix-2 gives list of data elements in the data base and their characteristics.

8 STRUCTURING OF INFORMATION IN THE DATA BASE

Although the data base consists of different record types for documents and other sub-systems, all information is integrated and is available within a single file. Basically, bibliographic information pertaining to different document types is organised into three record types:

1. Main Record;
2. Index Record; and
3. Directory Record.

The three records are inter-related using accession number (or record serial number) and the directory reference number.

Figure 3 illustrates a part of the data base structure showing the record types involved for books, authors and keywords and their inter-relationships. Book record, which is the main record, is linked to Author directory via Author index record. Book record is also linked to keywords in similar fashion. Lines represented by arrows indicate the path (linkage) through which navigation is made from one record to another to obtain all related data.

9 COMPUTER HARDWARE/SOFTWARE DETAILS

The system reported here has been implemented on CYBER-170/730 Computer installed at National Informatics Centre (NIC). The computer system has 196K memory, several peripheral processors, tape units, disk units and video/hard copy terminals. Data preparation is done using key-to-tape and key-to-floppy diskette machines.

The data base has been designed using IMF, a general purpose DBMS available on the Cyber system. Program routines for validation, storing, retrieval, report generation and modification are in ANS 1974 COBOL. Programs and files related to each subsystem are embedded within higher level procedures which can be used easily by persons without extensive knowledge of inner features of programs or data base. All operations on the data base are performed online using terminals connected to the computer. The data base is resident on online disc and a back-up copy is maintained on tape for quick recovery.

10 REASONS FOR USING A DBMS

A data base can be defined as a collection of stored data organised in such a way that all user data requirements are satisfied by the data base. A data base management system (DBMS) is a general purpose set of software routines that aid and control each user’s access to and use of the data base for adding, modifying and retrieving data, which also includes facilities giving data independence, integrity and security [3]. File management systems, the forerunner of the current data base technology, are systems which own their own files and contain their own internal definition of the file information. There is no sharing or way to use the files by multiple users, or by users who have different “views” of the data. Some of the major advantages of using a DBMS over file management software are given below [1,4]:

a) DBMS decreases developmental and implementation time since routines for transforming user description of data into suitable file structures, and performing operations like accessing, storing, modifying etc. are inbuilt in DBMS software.

b) DBMS offer facility to define different views of the same data, making it possible to provide user groups their own view of data in data base. For example, in a library data base, acqui-
sitions section may have view of acqui-
stions related data only and not circu-
lution related data in the data base.
c) Relations existing between different
subsystems can be more conveniently
reflected in the computerised system
implemented using a DBMS than using
conventional file management routines.
d) Query language is generally part of a
DBMS which can be used by non-
computer personnel to interact with
the data base for ad-hoc query reports
generation, perform data updation and
modification, etc.
e) DBMS offer greater level of data inde-
dependency. Data description is indepen-
dent of programs, thus any change
made in data description does not
necessitate large scale changes in
application programs.
f) DBMS offer better security measures
for data. User groups can be prede-
dined to have only certain operational
permission on the data base like read,
write, modify etc. Also, the user can be
limited to only subsets of the data base
through the view defined for them.
g) Creation and maintenance of physical
files containing data is taken care of by
the DBMS. User need not be concerned
about how his data is physically stored,
how it is fetched etc. by the DBMS.
Due to this there is an increased pro-
grammer productivity.

2. Document usage: Issue/returns data from
the circulation subsystem is being used to study
the document usage pattern among the users
of the library.

3. Information services usage: Various out-
puts generated from the data base and circulated
to the users form basis for eliciting feedback
regarding the output format, arrangement, etc.

4. Library staff experience: Experience of
the library staff with the computerised system
at different stages like input preparation, re-
ports generation, retrieval, terminal usage, etc.
provide feedback regarding any drawbacks/
inconveniences in the system.

Modifications that are to be made in the
system, as a result of these usage studies, are
being collected together for incorporating into
the system in the next revision. However, minor
modifications like changing print formats, vali-
dation criteria, etc. are made immediately.

12 FURTHER WORK

In subsequent phases of system development,
following subsystems will be incorporated into
the data base:

1. Book acquisition,
2. Journal subscription, receipt and
claims,
3. Enhancing of current awareness ser-
vices to SDI,
4. Administration and planning which in-
cludes monitoring, performance evalua-
tion, budgeting, etc.

13 CONCLUSIONS

Although many libraries in India are making
use of computers, they have mostly limited
themselves to developing isolated applications.
Major reasons for this have been non-available-
bility of computer resources and suitable soft-
ware. However, with rapid developments being
made in microelectronics, data base and related
technologies, more and more powerful com-
puting systems, at prices much lower than pre-
sent day figures, will be available in the market
in near future. These developments will provide excellent opportunities for libraries in India to automate their operations. But, in order to obtain full benefits of automation, libraries should utilise such opportunities for developing integrated library systems. Work reported in this paper is an attempt in this direction.

ACKNOWLEDGEMENTS

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REFERENCES


APPENDIX – I

RETRIEVAL SYSTEM: COMMANDS
SEARCH COMMANDS

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>COMMAND</th>
<th>FUNCTION</th>
<th>EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AT, X</td>
<td>AUTHOR</td>
<td>AT, MARTIN/J</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(With or without initials)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>KW, X</td>
<td>KEYWORD</td>
<td>KW, TV STUDIOS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Specific subject)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>BS, X</td>
<td>BROAD SUBJECT</td>
<td>BS, PROGRAMMING</td>
</tr>
<tr>
<td>4</td>
<td>CA, X</td>
<td>CORPORATE AUTHOR</td>
<td>CA, IEEE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Institution as author)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>CS, X</td>
<td>CONFERENCE SPONSOR</td>
<td>CS, IFIP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Institution sponsoring a Conference)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>RS, X</td>
<td>REPORT SPONSOR</td>
<td>RS, ACM</td>
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<tr>
<td></td>
<td></td>
<td>(Institution sponsoring Project)</td>
<td></td>
</tr>
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<td>7</td>
<td>UD, X</td>
<td>U.D.C. CLASS NO.</td>
<td>UD, 621.397</td>
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<td>8</td>
<td>IP, X</td>
<td>IPAG CLASS NO.</td>
<td>IP, 40</td>
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### CONTROL COMMANDS

<table>
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<th>EXAMPLE</th>
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<tr>
<td>1</td>
<td>HELP</td>
<td>EXPLAIN ALL</td>
<td>HELP</td>
</tr>
<tr>
<td>2</td>
<td>STOP or BYE or END</td>
<td>TERMINATE BISET</td>
<td>STOP</td>
</tr>
<tr>
<td>3</td>
<td>PRINT</td>
<td>DISPLAY DOCUMENT DETAILS (In steps of 6 documents)</td>
<td>PRINT</td>
</tr>
<tr>
<td>4</td>
<td>LPRINT</td>
<td>SEND OUTPUT TO LINE PRINTER</td>
<td>LPRINT</td>
</tr>
<tr>
<td>5</td>
<td>AND, X</td>
<td>BOOLEAN INTERSECTION</td>
<td>AND, AT, WILSON</td>
</tr>
<tr>
<td>6</td>
<td>NOT, X</td>
<td>BOOLEAN NEGATION</td>
<td>NOT, KW, FORTRAN</td>
</tr>
<tr>
<td>7</td>
<td>OR, X</td>
<td>BOOLEAN UNION (Inclusive)</td>
<td>OR, KW, SIMULATION</td>
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<tr>
<td>8</td>
<td>ISS, X</td>
<td>ISSUE STATUS OF A BOOK</td>
<td>ISS, N00001</td>
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<td>9</td>
<td>MASK, KW, X</td>
<td>MASKING</td>
<td>MASK, KW, INFORM</td>
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**NOTE:**  
1. 'X' is the value assigned by the user (See examples above)  
2. *MASK* can be used only with *KW* command.
## DATA ELEMENTS DESCRIPTION

<table>
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<td>Record Serial Number</td>
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<td>Natural</td>
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<td>Coded</td>
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<td>6</td>
<td>Title</td>
<td>AN</td>
<td>Natural</td>
<td>X X X X X</td>
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<td>7</td>
<td>Notes</td>
<td>AN</td>
<td>Natural</td>
<td>X X X X X X X</td>
<td>Includes edition statement Vol. No. etc.</td>
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<tr>
<td>8</td>
<td>Publisher</td>
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<td>Natural</td>
<td>X X X X X</td>
<td>Publisher Directory</td>
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<td>9</td>
<td>Publication date</td>
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### Note:

1. **AN-Alpha Numeric, N-Numeric, A-Alphabatic**
2. ‘Directory’ in the remarks columns means the input name for the data element gets converted into a code in the data base with corresponding updation in the Directory.
3. Document type: B-Book; C-Conference; M-Collected work; S-Standard; R-Report; A-Article; J-Journal.

---

### Appendix 3

#### A Typical Query Session

83/06/28. 13.15.59. TAI.
(0) NIC CYBER 170 MODEL 730. NOS 1.4 = 552/552.

**User Name:** lib0001
**Password:** inform

**Terminal:** 6, NamiaF
**Recover/Charge:** charge, libcnnc01, libpjgen01
**Charge:** libcnnc01, libpjgen01.

```
/get, biset.
biset. <==== Program initiation
HELLO FROM B.I.S.E.T !!!
```

---

**The program you have currently switched on —**
**called BISET — will enable you to retrieve**
**bibliographic information regarding “Electronics, computer and control” from the Electronics Commission — NIC/IPAG Library data base.**
DATE: 830628  TIME: 13164600

PL. ENTER YOUR NAME (NAME BLANK INITIALS)
(EXAMPLE: 1.RAMAN CV 2.GUPTA MN)
? manohar lal sharma

INVALID NAME. YOU HAVE 3 MORE CHANCE(S).

PL. ENTER YOUR NAME (NAME BLANK INITIALS)
(EXAMPLE: 1.RAMAN CV 2.GUPTA MN)
? sharma ml

DO YOU NEED INSTRUCTIONS FOR USING THE SYSTEM? ENTER Y/N.
? n

ENTER COMMAND
? at,donovan

I DO NOT FIND ANY DOCUMENT FOR YOUR AUTHOR
CHECK IF YOUR AUTHOR IS BELOW

DOLL DR
DOLOTTA TA
DONALDSON W
DONGARRA JJ
DONOVAN JJ
DORAN JE
DORFMAN R
DORN WS
DOUDNIKOFF B
DOUGLAS IJ
DOUQUE BCM
DOWN PJ
DPOYLE LB
DRAFFAN IW
DREYFUS B

ENTER COMMAND
? at,donovan/jj

YOUR QUERY: AT,DONOVAN/JJ
NO. OF HITS: 2

ENTER COMMAND
? print

DOCUMENT RETRIEVAL REPORT
**************  ***********

DOCUMENT NO: 1

---------
AUTHOR : JJ DONOVAN
TITLE : SYSTEMS PROGRAMMING
PUBLISHER : MCGRAW HILL
PUB DATE : 72
PAGES : 488
UDC NO. : 681.32.06
ACC NO. : N00436

118
DOCUMENT NO: 2

AUTHOR : JJ DONOVAN
SE MADNICK

TITLE : SOFTWARE PROJECTS: PEDAGOGICAL AIDS FOR SOFTWARE EDUCATION AND RESEARCH

PUBLISHER: MCGRAW HILL

PUB DATE: 77

PAGES: 504

UDC NO: 681.32.06:37

ACC NO: NOO468

END OF REPORT

***************

ENTER COMMAND

? kw,systems analysis=b

===== Keyword retrieval(b=books)

YOUR QUERY: KW,SYSTEMS ANALYSIS=B

NO. OF HITS: 49

ENTER COMMAND

? and,kw,water resources=b

==== Boolean operation

NO. OF HITS FOR YOUR BOOLEAN CONDITION = 2

ENTER COMMAND

? print

DOCUMENT RETRIEVAL REPORT

***************************

DOCUMENT NO: 1

AUTHOR : GC VANSILEN-KISTE

TITLE : SYSTEM SIMULATION IN WATER RESOURCES

CONF PLC : BRUGES

CONF DATE: 7509

PUBLISHER: NORTH HOLLAND

PUB DATE: 76

PAGES: 417

UDC NO: 628.1:061.3

ACC NO: NOO305

DOCUMENT NO: 2

AUTHOR : AK BISWAS

TITLE : SYSTEMS APPROACH TO WATER MANAGEMENT

PUBLISHER: MCGRAW HILL

PUB DATE: 76

PAGES: 429

UDC NO: 628.1

ACC NO: NOO459

END OF REPORT

***************************
Enter Command
? iss,n00459

N00459 is not issued

Enter Command
? ud,681.32:3

Your Query: ud,681.32:3

No. Of Hits: 3

Enter Command
? print

DOCUMENT RETRIEVAL REPORT

-------------------------------

DOCUMENT NO: 1

Author: A BRIER

Title: COMPUTERS AND THE SOCIAL SCIENCES

Publisher: COLUMBIA UNIV PR

Pub Date: 74

Pages: 285

Udc No. : 681.32:3

Acc No. : N00871

DOCUMENT NO: 2

Author: T LOGSDON

Title: COMPUTERS AND SOCIAL CONTROVERSY

Publisher: COMPUTER SCIENCE PR

Pub Date: 80

Pages: 397

Udc No. : 681.32:3

Acc No. : N01731

DOCUMENT NO: 3

Author: M LAVIER

Title: COMPUTERS AND SOCIAL CHANGE

Publisher: CAMBRIDGE UNIV PR

Pub Date: 80

Pages: 125

Udc No. : 681.32:3

Acc No. : N01/37

End of Report

-------------------------------

Enter Command
? &w,operations research=j

Your Query: OPERATIONS RESEARCH=j

No. Of Hits: 6
DOCUMENT RETRIEVAL REPORT

DOCUMENT NO: 1
JL. TITLE: COMPUTERS AND OPERATIONS RESEARCH
HOLDINGS: VOL.5, NO.1; 78
STATUS: CONTINUED
PUBLISHER: Pergamon, Dublin, Ireland

DOCUMENT NO: 2
JL. TITLE: INTERNATIONAL ABSTRACTS IN OPERATIONAL RESEARCH
HOLDINGS: VOL.13, NO.1; 7303
STATUS: CONTINUED
PUBLISHER: North Holland, Amsterdam, Netherlands

DOCUMENT NO: 3
JL. TITLE: JOURNAL OF THE OPERATIONAL RESEARCH SOCIETY
HOLDINGS: VOL.29, NO.1; 7801
STATUS: CONTINUED
PUBLISHER: Pergamon, New York, USA

DOCUMENT NO: 4
JL. TITLE: NETWORKS
HOLDINGS: VOL.8, NO.1; 7801
STATUS: CONTINUED
PUBLISHER: Wiley, New York, USA

DOCUMENT NO: 5
JL. TITLE: OPERATIONS RESEARCH
HOLDINGS: VOL.26, NO.1; 7801
STATUS: CONTINUED
PUBLISHER: ORSA, Baltimore, USA

DOCUMENT NO: 6
JL. TITLE: OPSEARCH
HOLDINGS: VOL.3, NO.1; 6603
STATUS: CONTINUED
PUBLISHER: OR Society of India, Delhi, India

END OF REPORT

ENTER COMMAND

? kw, fibre optics=a <==== Articles retrieval

YOUR QUERY: kw, FIBRE OPTICS = A
NO. OF HITS: 3

Vol 30 No 3-4 Sept-Dec 1983
ENTER COMMAND
? print

DOCUMENT RETRIEVAL REPORT
**************************
DOCUMENT NO: 1

AUTHOR: TCA SRINIVASA RAGHAVAN
TITLE: OPTIC FIBRES: ILLUSION OR REVOLUTION?
SOURCE: EASTERN ECONOMIST
REFERENCE: VOL.75, NO.11; 800912; P. 634 - 635

DOCUMENT NO: 2

AUTHOR: P. JEPPESEN
TITLE: DOMESTIC TELEVISION - BY SATELLITE, CABLE AND/OR OPTICAL FIBER?
SOURCE: ESA BULLETIN
REFERENCE: VOL.75, NO.23; 8008; P. 58 - 64

DOCUMENT NO: 3

TITLE: SPECIAL ISSUE ON COMMUNICATIONS ASPECTS OF SINGLE-MODE OPTICAL FIBER AND INTEGRATED OPTICAL...
SOURCE: IEEE JOURNAL OF QUANTUM ELECTRONICS
REFERENCE: VOL.17, NO.6; 8106; P. 823 - 1146

END OF REPORT
*****************

ENTER COMMAND
? kw,video game <==== Keyword selection

I DO NOT FIND ANY DOCUMENT FOR YOUR KEYWORD
CHECK IF THE KEYWORD IS BELOW

VIDEOCONFERENCE
VIDEOTEX
VIDEO CASSETES
VIDEO DISCS
VIDEO GAMES
VIDEO INDUSTRY
VIDEO RECORDING
VIDEO SIGNALS
VIDEO TAPES
VIDEO TAPE RECORDERS
VIDEO TAPE RECORDING
VIDEO TERMINALS
VIDEO TRANSMISSION
VIEWDATA
VIN INC
ENTER COMMAND
? kw,video games

YOUR QUERY: KW,VIDEO GAMES
NO. OF HITS: 3

ENTER COMMAND
? and,kw,vidotex

NO. OF HITS FOR YOUR BOOLEAN CONDITION = 1

ENTER COMMAND
? print

DOCUMENT RETRIEVAL REPORT
*************************
DOCUMENT NO: 1

AUTHOR : DK MATTHEWSON
TITLE : BEGINNER’S GUIDE TO VIDEO
PUBLISHER: BUTTERWORTHS
PUB DATE : 82
PAGES : 192
UDC NO. : 621.397.6:791.44
ACC NO. : 109955
END OF REPORT
*************************

ENTER COMMAND
? mask,kw,simulat

INVALID COMMAND. (IF STUCK ENTER HELP)

ENTER COMMAND
? mask,kw,simulat

ANALOGUE SIMULATION
CHEMICAL ENG SIMULATION
CHEMISTRY SIMULATION
COMPUTERISED SIMULATION
CONTINUOUS SYSTEM SIMULATION
DIGITAL SIMULATION LANGUAGES
DIGITAL SIMULATION
DISCRETE EVENT SIMULATION LANG
DISCRETE EVENT SIMULATION
ENGINEERING SIMULATION

DO YOU WANT MORE ? (ENTER Y/N)
? n

DISPLAY OVER

ENTER COMMAND
? kw,chemistry simulation

Vol 30 No 3-4 Sept-Dec 1983
YOUR QUERY: KW, CHEMISTRY SIMULATION
NO. OF HITS: 1

ENTER COMMAND
? print

DOCUMENT RETRIEVAL REPORT
***************************

DOCUMENT NO: 1

-----------

AUTHOR : MJ SHAH
TITLE : ENGINEERING SIMULATION USING SMALL SCIENTIFIC COMPUTERS
PUBLISHER: PRENTICE HALL
PUB DATE : 76
PAGES :
UDC NO. : 681.32:519.876.5:62
ACC NO. : N00264

END OF REPORT
*************

ENTER COMMAND
? bye

<==== Program termination

OK. GOODBYE TO YOU.
LOGOFF FROM BISET AT: 13302200

REVERT. THANKYOU.

<==== Log-off

/bye

LIB0001 LOG OFF 13.30.27.
LIB0001 SRU 24.656 UNTS.

IAF CONNECT TIME 00.14.18.
LOGGED OUT.

==== * ====

NOTE : 1. Lines in lower case letters are entered
by the user. Lines in upper case are
system messages.
2. Lines with "<==== " in right column
are remarks.
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ABBOTT J
ON-LINE PROGRAMMING- A MANAGEMENT GUIDE
NCC, 1981, 64P
681.32.06:681.32.022 I10100

ALLEN WS
SANDHI: THE THEORETICAL PHONETIC AND HISTORICAL BASES OF WORD-JUNCTION IN SANSKRIT
MOUTON, 1972, 114 P
809.12=462.2 N02309

BAHRI US, ED
TOPICS IN HINDI LINGUISTICS
VOL 1, BAHRI PUBLICATIONS, 1981, 122 P
809.143.2 N02310

BEAMES J
COMPARATIVE GRAMMAR OF THE MODERN ARYAN LANGUAGES OF INDIA
MUNSHIRAM MANOHARLAL, 1871, 316 P
809.14-5 N02304

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BIBLIOGRAPHY ON MICROELECTRONICS APPLICATIONS
UK INDUSTRY(DEPT OF), 19820831, P
621.38.049.77:016 I10053

CALDWERL R
COMPARATIVE GRAMMAR OF THE DRVIDIAN OR SOUTH-INDIAN FAMILY OF LANGUAGES
3RD REV ED, ORIENTAL BOOKS REPRINT CORP, 1913, 640 P
809.48-5 N02305

CERI S, ED
METHODOLOGY AND TOOLS FOR DATA BASE DESIGN
NORTH HOLLAND, 1983, 255 P
681.32.06DB N02350
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<td>Exchanged</td>
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<td>3</td>
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<td>USA</td>
<td>NIC</td>
<td>0362-5915</td>
<td>Data Bases/681.32.06DB/</td>
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<td>NIC</td>
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<td>West Germany</td>
<td>Free</td>
<td>0001-107X</td>
<td>Electrical Engineering/</td>
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INTERACTIVE DATA MODIFICATION

======= Program Initiation =======

/gl
!t.Iodproc.
/modproc.

LIBRARY DATABASE

======= ======== ========

DATA MODIFICATION/REPLACEMENT ROUTINE


**** CAUTION ****

1. ENSURE THAT A LATEST COPY OF THE DATA BASE IS TAKEN ON TAPE BEFORE RUNNING THIS PROGRAM. AS ANY ABNORMAL TERMINATION DURING EXECUTION WILL CAUSE IRRECOVERABLE DAMAGE TO THE DATA BASE.

2. DO NOT TERMINATE THIS PROGRAM ABNORMALLY.

BACK-UP COPY AVAILABLE ON TAPE ?(YES/NO)
? yes

YOU CAN MODIFY/REPLACE FOLLOWING ITEMS:
1 = PUBLISHER.
2 = KEYWORD.
3 = PERSONAL AUTHOR.
4 = CORPORATE AUTHOR.
(ENTER 0 FOR EXIT)

? ENTER OPTION(0,1,2,3 OR 4)
? 2

>> ROUTINE : KEYWORD <<

YOU CAN
0 = TERMINATE EDITING THIS DATA ITEM.
1 = MODIFY THIS DATA ITEM.
2 = REPLACE THIS DATA ITEM.

? ENTER MOD/REP OPTION(0,1,2)
? 1

>> ROUTINE : KEYWORD /MODIFY <<

? ENTER KEYWORD CODE(FMT:NNNNN)
? 01800

VALUE FOR THE CODE IN DATA BASE : ACOUSTIC HOLOGRAPHY

ENTER CORRECT NAME OF KEYWORD
? acoustics holography
RAJASHEKAR

KEYWORD CODE = 01800
KEYWORD NAME = ACOUSTIC HOLOGRAPHY

IS IT OK? (ENTER YES/NO)
? yes

KEYWORD MODIFIED

>> ROUTINE : KEYWORD <<

YOU CAN
0 = TERMINATE EDITING THIS DATA ITEM.
1 = MODIFY THIS DATA ITEM.
2 = REPLACE THIS DATA ITEM.

PL. ENTER MOD/REP OPTION(0,1,2)
? 2

>> ROUTINE : KEYWORD /REPLACE <<

ENTER KEYWORD CODE FOR ERROR RECORD(FMT: NNNNN)
? 02322

VALUE FOR THE CODE IN DATA BASE : AGRICULTURAL PRODUCT

ENTER KEYWORD CODE OF CORRECT RECORD(FMT: NNNNN)
? 01224

VALUE FOR THE CODE IN DATA BASE : AGRICULTURAL PRODUCTS

<< CHECK FOR ERROR/CORRECT VALUES >>

IS IT OK? (ENTER YES/NO)
? YES

KEYWORD REPLACE OVER

>> ROUTINE : KEYWORD <<

YOU CAN
0 = TERMINATE EDITING THIS DATA ITEM.
1 = MODIFY THIS DATA ITEM.
2 = REPLACE THIS DATA ITEM.

PL. ENTER MOD/REP OPTION(0,1,2)
? 0

YOU CAN MODIFY/REPLACE FOLLOWING ITEMS :
1 = PUBLISHER.
2 = KEYWORD.
3 = PERSONAL AUTHOR.
4 = CORPORATE AUTHOR.
(ENTER 0 FOR EXIT)

PL. ENTER OPTION(0,1,2,3 OR 4)
? 1
COMPUTER ASSISTED LIBRARY AND INFORMATION MANAGEMENT

>> ROUTINE : PUBLISHER <<

YOU CAN

0 = TERMINATE EDITING THIS DATA ITEM.
1 = MODIFY THIS DATA ITEM.
2 = REPLACE THIS DATA ITEM.

PL. ENTER MOD/REP OPTION(0,1,2) ? 1

>> ROUTINE : PUBLISHER /MODIFY <<

PL. ENTER PUBLISHER CODE(FMT:NNNNN) ? 0042

VALUE FOR THE CODE IN DATA BASE : BUTTERWARTHS

ENTER CORRECT NAME OF PUBLISHER
? butterworths

PUBLISHER CODE = 0042
PUBLISHER NAME = BUTTERWARTHS

IS IT OK ?(ENTER YES/NO)
? yes

PUBLISHER MODIFIED

>> ROUTINE : PUBLISHER <<

YOU CAN

0 = TERMINATE EDITING THIS DATA ITEM.
1 = MODIFY THIS DATA ITEM.
2 = REPLACE THIS DATA ITEM.

PL. ENTER MOD/REP OPTION(0,1,2) ? 0

YOU CAN MODIFY/REPLACE FOLLOWING ITEMS :

1 = PUBLISHER.
2 = KEYWORD.
3 = PERSONAL AUTHOR.
4 = CORPORATE AUTHOR.
(ENTER 0 FOR EXIT)

PL. ENTER OPTION(0,1,2,3 OR 4) ? 0

* END OF JOB *

PL. CONFIRM MODIFICATIONS USING IMFQU/BISET.
REVERT. MODIFICATION PROG. TERMINATED.

==== * ====

NOTE : 1. Lines in lower case letters are entered
by the user. Lines in upper case are
system messages.
2. Lines with " ===== " in right column
are remarks.

Vol 30 No 3-4 Sept-Dec 1983 133