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Retrieval capabilities of CDS/ISIS and LibSys: a comparison

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Examines the comparative retrieval effectiveness of the two packages, viz., CDS/ISIS and LibSys. A set of eight well defined parameters have been employed to compare the two packages. The result shows that neither of the two packages provide support for all the features that may be expected of ideal retrieval software. There appears to be some significant difference between CDS/ISIS and LibSys in terms of their ability to provide desirable features. There is a difference of 9.34% in the levels of performance of the two packages

Introduction

In recent years, a large number of software packages for information storage and retrieval as well as for library automation have become available in India. This is very much unlike the situation that was there about a decade ago when libraries choosing to automate their catalogues and other activities had to largely rely on packages developed in-house or on commercial general purpose database management systems (DBMS) such as dBase, Foxpro etc. Today information managers have to take appropriate decisions regarding the choice of software package. Two of the most widely used software packages in India are the Micro CDS/ISIS and LibSys. While the former is essentially a package for information storage and retrieval, the latter is a complete library automation package containing facility for information storage and retrieval.

CDS/ISIS

Micro CDS/ISIS is an advanced non-numerical information storage and retrieval software developed by UNESCO and is available since 1985 to satisfy the needs expressed by many institutions, especially in developing countries, to be able to streamline their information processing activities by using modern (and relatively inexpensive) technologies.

The software was originally based on the Mainframe version of CDS/ISIS, started in the late 1960s, thus taking advantage of several years of experience acquired in database management software development. Several partners contributed to its development through the years.

LibSys

Developed and marketed by LibSys Corporation, New Delhi, LibSys is an 'integrated multi-user library information management system'. A multi-user system refers to the capability of the system to allow more than one user to have simultaneous access to the same database and to allow them to carry out the work of their choice in any module. LibSys is completely menu driven in all of its functions. Menus are used to prompt the operator through the options available in each stage in the process. This design, of course, gives the novice user, confidence and reduces the requirement of memorizing the commands or consulting manuals to a minimum. LibSys supports the traditional house-keeping functions of a library like acquisitions, cataloguing, circulation, serials control and OPAC.

In this paper an attempt has been made to examine the comparative retrieval effectiveness of the two packages, viz., CDS/ISIS and LibSys. An important requirement

in such comparative studies is a set of well defined and acceptable criteria for comparison. Such criteria should necessarily be derived from the objectives of information retrieval systems such as OPACs. Cherry has listed a large number of attributes that may be expected of a good OPAC[1,2]. In this paper, these parameters have been employed with some modifications. More specifically an attempt has been made here to attach weights to the parameters enumerated by Lancaster based on their perceived importance for an OPAC[3]. A few studies have been reported in the literature that provides the features expected of a good OPAC[4,5]. There is no dearth of literature on evaluation studies of software systems. Further, reporting of strengths of an individual software is also not uncommon[6].

The relative strengths and limitations of the two packages in terms of their ability to conform to these expected parameters have been computed by assigning weights.

Methodology

A number of studies on OPACs/Web-OPACs are available in the literature. Most of them use some or the other checklists for their study[7-12]. As a matter of fact, the current study uses the parameters proposed by Lancaster. The parameters helpful in the assessment and evaluation of retrieval software have been grouped by him into eight broad categories, viz., database characteristics, operational control, search features, subject search aids, screen display, output control, commands, and user assistance[13]. Under each category, a number of parameters pertaining to it have been enumerated. However, in the application of this schema in the present study, some of the parameters have been clubbed and a few have been omitted based primarily on an assessment of their relevance and applicability in the Indian context. Further, each one of these parameters has been assigned a weight ranging from 0 to 10 based on an assessment of the relative importance in an operational environment as perceived by the investigators. It is, however, important to mention here that the total weightage carried by a particular subcategory is more a function of number of parameters in that particular sub-category, rather than an indication of the importance of sub-category in the overall schema. This is so mainly because it was difficult to exercise any control over the number of parameters in each sub-category.

Analyses

Database characteristics

Under this category, such attributes as ability to handle variable length data fields, repeatable fields, sub-fields, etc.; ability to allow for multiple database searches and limitations relating to maximum length of the record were examined (Table 1).

Multiple databases

In actual practice it is likely that the library/information system may want to maintain separate databases for different document categories such as thesis and dissertation, books, periodicals, microforms and electronic resources. In the Indian context this may be particularly relevant as most of our libraries maintain collection of documents in several different languages. It is therefore important for a software package to allow for sampling multiple databases using a single search command. LibSys develops a single database for different categories of library material pre-defined in the package itself. This means that the user does not have the flexibility to maintain different databases should the need arise. On the other hand, CDS/ISIS allows the user to develop the number and types of different databases system*. It is possible to maintain (within hardware limitations) any number of databases on a single installation. Each database is known to CDS/ISIS by a unique name assigned by the user.

Record length

LibSys can support a maximum record length of 2,340 characters. Within this, there is also a limitation of maxima for different areas/fields, for e.g. 900 characters for bibliographic description, 900 for abstracts, 60 for call number and 480 for keywords/subject descriptions. The data in each of these blocks/areas cannot exceed the upper limit mentioned above. In evaluating LibSys, it is important to keep in mind the objectives with which the package was developed viz., to provide a turnkey

*The basic version of CDS/ISIS distributed by UNESCO does not allow for executing a search in more than one database. However, a Pascal interface for CDS/ISIS (SELECT. PAS) to provide the facility of multiple database searching is available.

Table 1 — Database characteristics

Sl. No.	Feature	Weightage	LibSys	CDS/ISIS
1.	Does the system allow simultaneous access to more than one database?	4	0	4
	a) The ability of a system to allow creation and maintenance of different databases on a single computer /installation			
	b) The facility to simultaneously execute a search which is common for all the databases.	6	0	2
2.	Is there an upper limit for Total Record length?	7	4	6
3.	Does the system have the ability to handle			
	a. Variable fields/data elements?	8	8	8
	b. Sub-fields?	8	0	8
	c. Repeatable fields?	9	7	9
	Total	42	19	37

Table 2 — Operational control

Sl. No	Feature	Weightage	LibSys	CDS/ISIS
1.	Does the System provide a choice of command-driven and menu driven interface throughout?	9	6	6
2.	If menu choices are by letters and are they mnemonic?	2	0	1
3.	In the command mode:	5	0	0
	a) display of the commands available?			
	b) Are examples of how the commands are used available?	5	0	0
4.	Does the system support downloading of retrieved biblio graphic records to the local user's personal computer?			
	a) ASCII Text	8	0	8
	b) ISO 2709	8	0	7
	c) MARC tag format	7	0	3
	d) xxx Format suitable for general purpose DBMS	5	0	2
	Total	49	6	27

package for library house-keeping operation and to effectively meet the requirements that are encountered in such library environment. Looked at from this point of view, it does indeed appear that LibSys largely meets the requirements to handle effectively the situations encountered in most normal library context. However, problems have been faced. For example, while cataloguing multiple volume monographs, the requirement may exceed the upper limit imposed by LibSys. The software also does not allow user reallocation of unutilized space earmarked for a field/groups of fields to other areas/ fields where it may be required.

The DOS version of CDS/ISIS (Ver 3.07) permits a maximum record length of 8000 characters. Incidentally, this has been substantially enhanced in WINISIS - a window based version of the software.

Both LibSys and CDS/ISIS allow for handling variable-length data-fields. However, LibSys does not have the facility for defining sub-fields. Further, repeatable fields have been pre-defined in LibSys and the user cannot alter the status of other fields.

Operational control

Operational control includes such parameters as facilities to output the retrieval records in standard formats like ISO 2709, ASCII Text, MARC, ASCII Fixed-Width format, etc (Table 2).

Both the packages allow interaction through a series of menus, which are linked hierarchically. CDS/ISIS allows user to save retrieved records in a file and print/export them in an ISO 2709 or as an ASCII text file. LibSys does not support downloading of retrieved records in any

standard format suitable for uploading into user's personal database.

Search features

Information retrieval features supported by a package are among its most important attributes for purposes of evaluation particularly for bibliographic databases. The features considered in this study are shown in Table 3.

Boolean and Proximity Operators

It is not surprising that both LibSys (Ver 4.1) and CDS/ISIS support use of Boolean operations for combining search terms. However, an actual testing of Boolean search facility in LibSys indicated certain serious limitations of the package.

LibSys does not permit one component of a Boolean search statement to have more than one word.

LibSys provides two adjacency operations 'W' and 'N'. While 'W' is to be used if we require to specify the order in which words should occur, 'N' makes the order of the words insignificant. In reality, the present version of LibSys, however appeared to have serious limitation in this regard. In information retrieval, the use of proximity operation is intended to specify the maximum number of intervening words that can occur between two search terms. The two proximity operators 'W' and 'N' provided in LibSys are expected to behave in an identical fashion except with regard to word order. It does not appear to be possible in LibSys to specify those two words should occur adjacent to one another without any intervening word. While using the operator 'N', the number before the operator is understood by LibSys correctly to indicate maximum number of intervening words permitted. Thus, when a search expression is "*policy [2N] India*", items retrieved would include records containing the text "*Policy in India*", *India and Policy", "Policy on India*", "*India and its Policy*". However LibSys does not interpret say [*2W*] in the same fashion. In the above example, if the search expression were to be "*India[2W]Policy*", it would retrieve only documents containing the phrase "*India and its policy*" but not others. This suggests that 'W' is interpreted by LibSys to mean the exact number of intervening words rather than maximum number of intervening words.

CDS/ISIS provides adjacency and proximity operators. However, there is a major limitation in that it does not allow specifying exact order of words.

Truncation

Truncation and weighted term searching are the areas in which both the packages appear to be weak. Both of them are capable of supporting only right truncation and not other forms such as mid truncation, left truncation, etc.

An important and useful requirement in IR (Information Retrieval) package would be to provide for the user to identify and mark some of records as most relevant. Retrieval packages, particularly those based on expert systems, have been assigned to make use of such feedback to reformulate search expressions and carry out search. Neither of the two packages under study has such sophistication.

A facility often required by the user is to be able to re-use or modify a search expression. While LibSys does not allow this facility, CDS/ISIS saves all the search expressions used during a search session and will allow their re-use on modification. However, it is not possible to save search expressions for later use in another search session. This limitation can be overcome to some extent by the use of 'ANY' function.

Another important facility that is often required by and users, particularly in large databases, is the capability to conduct a search to retrieve a sub-set of a larger set limited by such fields as year, language, publisher, etc. In other words, both the software do not support "Limit search". Limit search refers to the ability to allow a broad search to be narrowed using special limiters, such as format, year of publication, or library collection.

LibSys has the capability to suppress initial articles like 'the', 'a', 'an', etc both from data fields for filing (indexing) and from search terms while retrieving. This is a useful feature, which is not found in CDS/ISIS. However, it can be achieved indirectly in the latter by adding those terms in a stop word file.

Indexing mechanism

CDS/ISIS is known for its flexibility in indexing support. There are nine different indexing techniques that CDS/ISIS supports. Any field can be indexed using one or more of these indexing techniques.

The LibSys, on the other hand, has several limitations in this regard. Only certain fields in a LibSys records can be indexed. LibSys offers a choice of two indexing

Table 3 — Search features

Sl. No.	Feature	Weightage	LibSys	CDS/ ISIS
1.	Can the user set default values for:			
	a) Search type (eg. A, T, S)?	5	0	0
	b) Display format?	4	2	4
	c) Dialogue mode (command or menu)?	4	0	0
2.	Can the user reset the default values during a search session?	4	0	0
3.	Can the user continue or start a search directly from the HELP screen?	5	0	0
4.	Does the system:			
	a) Support Authority-File based Searching (Thesaurus/Name-Authority File, etc)	6	0	2
	b) Support title keyword / key phrase search?	9	7	9
5.	Does the system permit creation of stop word file?	8	8	8
	Is there a list of stop words available for display?	5	5	5
	Does the system indicate that the word is not indexed, when the user tries to search a stop word?	5	0	0
6.	Which of the following Boolean operators are available?			
	AND	10	8	10
	OR	10	8	10
	NOT	10	8	10
	EXOR	6	0	0
7.	When is Boolean searching supported?			
	a. in keyword author search	10	10	10
	b. in keyword title search	10	10	10
	c. in keyword subject search	10	10	10
	d. in keyword search not limited to any fields	10	10	10
	e in cross-fields searches (i.e. two or more fields)	10	7	10
8.	Whether an unlimited number of Boolean operators can be used in a single search?	5	5	5
9.	Is a word adjacency operator available?	6	6	6
10.	Is a word proximity operator available?	6	6	6
11.	Can a user specify the exact order of words?	6	6	0
12.	Can a user specify:			
	a. Left-truncation (e.g., *ism)?	7	0	0
	b. Right-truncation?	9	9	9
	c. Infix truncation? (e.g., wom*n)	8	0	0
	d. Variable length wildcard character (e.g., behavi*r gets both behavior and behaviour)?	6	0	0
	e. User specified limits on truncation (e.g., librar*3 to get library and libraries but not Librarianship)?	5	0	0
13.	Does the system support weighted term search by ranking the search terms?	5	0	15

14.	Does the system allow the user to indicate which of the retrieved records are relevant to the search question and use the feedback information to automatically generate searches based on some algorithm to locate other items in the collection that are similar to the relevant record?	4	0	0
15.	Can the user "browse" up a list of index terms which are near the search term/phrase:			
	a. in author search?	8	8	6
	b. in title search?	8	8	6
	c. in subject search?	8	8	6
	d. do the indexes include cross-references?	5	3	0
16.	Can the user save a search strategy to be used again later?	7	0	3
17.	When a "see" reference is prescribed does the system alert the user, if the referred to term does not exist in the index file?	3	0	0
18.	Can the user save search results in sets for later use?	7	0	7
19.	Can the user easily switch from one type of search to another (e.g., author search to title search)?	2	1	1
20.	Does the system support browsing of retrieved records:			
	a. Forward?	8	8	8
	b. Backward?	8	8	0
21.	Does null retrieval produce a message?	4	4	4
22.	Does multiple-record retrieval produce:			
	a. Initial count of hits (responses)?	6	3	6
	b. Initial list of truncated entries?	6	6	0
	c. Full records?	10	10	10
23.	Can searches be limited by user defined fields such as Year, language, Publisher, etc.	8	1	1
24.	Does the system supports browsing of index/inverted file:			
	a. Forward?	9	9	9
	b. Backward?	9	9	4
25.	Does the system support 'free text' search?	4	0	4
26.	Does the system support embedded string search?	3	0	3
27.	Does the system have the capability to suppress indexing and/or searching			
	a. Initial articles?	5	5	0
	b. Special characters (like inverted commas etc)?	5	0	0
28.	Does the system allow the user to define indexing mechanism?	9	2	9
29.	Does the system support selection of search terms from a display of indexed terms?	5	1	5
30.	Does the system support varied type of indexing for a single field?	5	1	5
	Total	360	220	231

Table 4 — Subject search aids

Sl. No.	Feature	Weightage	LibSys	CDS/ISIS
1.	Can the user browse a display of			
	a. Classification outlines?	3	0	0
	b. Classification schedules?	3	0	0
2.	Can the user view a group of subject headings:			
	a. Which begin with the search term(s)?	7	7	7
	b. Which include the search term wherever imbedded in the subject headings?	8		
3.	Does the system display the following cross-references:			
	a. SEE/USE?	4	2	0
	b. SEE ALSO/BT/NT?RT?	4	0	0
4.	Does the system have transparent SEE/USE references, which automatically substitute the user's input terms with the correct subject headings without informing the user?	3	0	0
5.	Does the system convert an original zero hit subject search to, title, Title keyword or subject keyword search?	4	0	0
	Total	36	9	7

Table 5 — Screen display

Sl. No	Feature	Weightage	LibSys	CDS/ ISIS
1. .	Does the user have the option to change the case of display of data element in one or more fields, as may be required?	3	0	1
2.	Does the system support more than one way of displaying records?	5	0	5
3.	Does the system allow user to define the fields to be displayed?	6	0	3
4.	Does the system permit			
	a. Labeled display (Author=)?	5	0	5
	b. Tagged display?	4	0	4
6.	Does the system offer both brief bibliographic display and long bibliographic display?	6	6	0
7.	Are items in a set numbered successively (e.g. 8,9, to 18 etc)?	2	0	0
8.	Is the total number of items to be displayed identified in the display of each item (e.g., item 1 of 100)?	2	0	0
9.	Are there any limits to the number of records, which can be displayed?	4	4	4
	Total	37	10	22

mechanisms. Either a field has to be indexed as a whole or each word of a field has to be indexed. This means that the same field can't be indexed in more than one way. The indexing mechanism of LibSys is also rigid in other sense. The system does not allow the user to define the fields to be indexed. The system comes with an in-built facility to index a limited number of pre-defined fields. It is not flexible enough to allow the user to define additional index fields on ways in which a field has to be indexed.

Subject search aids

Modern library information retrieval systems offer end-users a number of search aids which enable them to enhance their searches. A list of such subject search aids are provided in Table 4. These are generally built in the form of search aids. LibSys and CDS/ISIS, however, do not have much to offer in this area. In their basic versions, the searcher is not given the facility to use thesaurus and/or classification systems on-line.

Table 6 — Output control

Sl. No.	Feature	Weightage	LibSys	CDS/ISIS
1.	When multiple records are retrieved in a single search, can the user select:			
	a. Any single record for full display?	5	5	0
	b. several records not in sequence for display (e. g, record #2, #5, etc)	5	0	0
	c. A range of records for display (ie., by specifying the first and the last records. e.g., from record #5 to #9)	4	0	0
2.	Can the results of several searches be merged for display?	4	0	4
3.	Does the system permit sorting of records by user- specified field?	6	0	3
4.	Does the system support ranked document display in decreasing order of probable relevance to the search query?	6	0	0
	Total	30	5	7

Screen display

It is important to provide for flexibility in the display of retrieved records. A number of screen display parameters have been used by earlier studies. A list of screen display parameters considered for this study has been given in the Table 5. CDS/ISIS offers considerable flexibility although these are certain limitations as well. A major limitation is the difficulty in end user defining the display format; the display/print of records in CDS/ ISIS governed by the display format which is written in the CDS/ISIS formatting language. It is therefore possible only for the system designer to define or add additional display formats.

LibSys on the other hand is rigid in this regard. The software itself determines the attributes/characteristics of the screen display in LibSys. Neither the system administers nor the end users have the option to modify the display format. The records are displayed in an AACR-II format. However, the system provides for two levels of display, viz., one line truncated bibliographic display and a full record display.

Output control

The facility to allow the end-user to choose certain records for display and certain other output control mechanisms are particularly useful in large bibliographic databases (Table 6). Both the packages have severe limitations in this area also.

Both CDS/ISIS and LibSys have the facility of brief display of the retrieved records. In the brief display, records contain only limited fields. They provide users an option to look into the full record display, if required. In addition, CDS/ISIS allows the user (information intermediary) to sort records before these can be viewed.

Commands

Consistency in use of function keys and provision of certain commands will certainly enhance the utility of OPAC software (Table 7). Both are largely menu driven and the use of function keys to execute certain commands in non-existent. Again both systems are mainly dependent on inverted files for search and retrieval. For example, there is very limited support for entering name of the authors in any other order other than the exact way in which they are to be indexed.

User assistance

User friendliness shown in Table 8 is an important feature expected of any retrieval software and more so of OPACs. Unfortunately, both the systems have yet to build in user-friendly features such as those enumerated in the table.

The overall performance of the two software is summarized in Table 9.

Conclusion

Generally, neither of the two packages examined alone provide support for all the features that may be expected of an ideal retrieval software. They seem to be operating at around 50% of the desirable level of performance. There appears to be some significant difference between

Table 7 — Commands

Sl. No.	Feature	Weightage	LibSys	CDS/ISIS
1.	Are function key definitions consistent (e. g, F1 always invokes help etc)	4	2	2
2.	Does the system permit the user to terminate the session at any time?	2	2	2
3.	Can function keys be used to reduce the number of keystrokes required to enter commonly used commands?	3	0	0
4.	Does the system ignore punctuation entered by the user when they are not required?	4	0	0
5.	Will the system accept an author's name in any order (e.g., Smith A or A Smith)	4	0	0
6.	Can searches be entered using a mix of upper and lower case?	2	2	2
	Total	19	6	6

Table 8 — User assistance

Sl. No.	Feature	Weightage	LibSys	CDS/ISIS
1.	Does the system provide a list of accessible databases?	4	0	1
2.	Does the system provide a list of search types?	6	6	0
3.	Is there an online tutorial?	4	0	0
4.	Are there general help messages, providing information on various aspects of search strategies, which can be called up at any point?	5	0	0
5.	Are there contextual help messages, specific to the point in the search reached by the user?	5	0	0
6.	Does the system routinely provide procedural prompts or guiding comments to indicate possible next steps during a search?	6	0	0
7.	Does the system make it clear how to edit search input?	4	0	0
8.	Is spell check software available to the user?	3	0	0
	Total	37	6	1

Table 9 — Overall performance

Functions Weight	Expected	LibSys ISIS	CDS/
Database Characteristics	42	19	37
Operational Control	49	6	27
Search features	360	220	231
Subject Search Aids	36	9	7
Screen Display	37	10	22
Output Control	30	5	7
Commands	19	6	6
User Assistance	37	6	1
Total Weight	610	281	338
Percentage	100	46.06%	55.40%

CDS/ISIS and LibSys in terms of their ability to provide desirable features. There is a difference of 9.34% in the levels of performance of the two packages. CDS/ISIS appears to score over LibSys when it comes to accommodating features related to 'database characteristics', 'operational control', 'search features' and 'score display'. Whereas in providing for features related 'subject', 'search aids' and 'use assistance', LibSys decidedly has an edge over CDS/ISIS. This difference is probably because LibSys has been designed as a total library automation package, whereas CDS/ISIS is essentially DBMS software for bibliographic data.

Considering the fact that the primary objective of a retrieval package is to support powerful search mechanisms, it should be obvious that there is

considerable scope for improvements in the retrieval components of the two packages. Measured purely in terms of their position with regard to accommodating various search features, it does indeed appear that both the systems are still far from achieving 80% of performance level.

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