UNIT 6 SOFTWARE PACKAGES: FEATURES

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6.0 OBJECTIVES

After going through this Unit you will be able to:

- understand functions and requirements of library automation packages;
- evaluate a library automation package; and
- know features of library automation packages available in India and trace their path of development.

6.1 INTRODUCTION

Software is defined as a set of related computer programs (stored set of instructions) that governs the operation of computer system and makes the hardware run. The software for a computer system may be classified as system software (e.g. Operating System) and application software. System software is responsible for the overall management of the computer resources whereas application software is designed to perform certain tasks and thereby make computers able to perform different predefined jobs. Library
automation software, as application software, performs day-to-day library activities through human interventions. Library automation packages are developed in view of the two most essential activities of any library – housekeeping and information retrieval.

An automated library is one where a computer system is used to manage the library’s key functions such as acquisitions, serials control, cataloguing, circulation and the public access catalogue. There are basically three strategies that can be followed for automation or mechanisation of library operations:

- Adopting a piecemeal approach, converting individual operations one at a time.
- Going directly for a fully automated system.
- Working towards an integrated, computerised system progressively, using a ‘planned installation’ approach.

Library Management Systems (LMSs) are now established as an essential tool in the support of effective customer service, stock management and management of library services. These are based on knowledge and experience of library professionals over the centuries. The rapid growth in the use of hardware, software, connectivity, and reduced costs has resulted in the development of LMSs. Current LMSs are integrated systems, based on relational database architecture. In such systems, files are interlinked so that deletions, additions and other changes in one file automatically activate appropriate changes in related files. The market for LMSs is now a mature one in India. Almost all special libraries and larger academic libraries in India have either adopted a computer-based system or planning actively to go for library automation.

6.2 EVOLUTION OF LIBRARY AUTOMATION SOFTWARE

Software upgradation is a continuous process. LMSs are no exception. A critical study of development of LMSs were the years suggests the developments that LMSs may be divided into four generations on the basis of sophistication of their capabilities, facilities for integration and interconnectivity. The LMSs developed in all parts of the world from mid 1970s to till date may be fitted into one of these four periods.

- The first generation LMSs were module-based systems with no or very little integration between modules. Circulation module and cataloguing module were the priority for these systems and were developed to run on specific hardware platform and proprietary operating systems.

- The second generation LMSs became portable between various platforms with the introduction of UNIX and DOS based systems. The LMSs of this generation offered links between systems for specific functions and were command driven or menu driven systems.

- The third generation LMSs were fully integrated systems based upon relational database structures. They were based on a range of standards, which was a significant step towards open system interconnection. Colour and GUI features, such as windows, icons, menus and direct manipulation have become standards and norms in this generation. They operate in client-server setup.

- The fourth generations LMSs are based on web architecture and facilitate access to other servers over the Internet. These systems allow accessing multiple information sources from single window user interface and support digital archiving.
Thus, the progress of LMSs through the generations has provided us an effective and straightforward user interface, which supports access to multiple sources and services from one multimedia interface. Moreover, the latest LMSs allow customised report generation and manipulation of data and investigate various scenarios and therefore they have all the potential to be a decision support tool. A comparison of features and functionalities of LMSs in four different generations is given in Table 6.1.

**Table 6.1: Comparison of the Features of Four Generations of LMSs**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Features</th>
<th>1&lt;sup&gt;st&lt;/sup&gt; Generation</th>
<th>2&lt;sup&gt;nd&lt;/sup&gt; Generation</th>
<th>3&lt;sup&gt;rd&lt;/sup&gt; Generation</th>
<th>4&lt;sup&gt;th&lt;/sup&gt; Generation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Programming Language</td>
<td>Low level language</td>
<td>COBOL, Proprietary</td>
<td>4GL</td>
<td>OOPS</td>
</tr>
<tr>
<td>2</td>
<td>Operating System</td>
<td>In house</td>
<td>Proprietary, MSDOS</td>
<td>UNIX, Windows, Windows</td>
<td>UNIX, Windows, Linux</td>
</tr>
<tr>
<td>3</td>
<td>DBMS</td>
<td>Non-standard</td>
<td>Hierarchical and Network</td>
<td>Entity Relation model</td>
<td>Object oriented model</td>
</tr>
<tr>
<td>4</td>
<td>Import/Export</td>
<td>None</td>
<td>Limited</td>
<td>Standard</td>
<td>Fully integrated and seamless</td>
</tr>
<tr>
<td>5</td>
<td>Communication</td>
<td>Limited</td>
<td>Some interface</td>
<td>Standard</td>
<td>Full connectivity across Internet</td>
</tr>
<tr>
<td>6</td>
<td>Portability</td>
<td>Machine dependent</td>
<td>Machine independent</td>
<td>Multi-vendor</td>
<td>Multi-vendor and Platform independent</td>
</tr>
<tr>
<td>7</td>
<td>Reports</td>
<td>Fixed format and limited</td>
<td>Fixed format and unlimited</td>
<td>Customised report</td>
<td>Customised report generation with e mail interface</td>
</tr>
<tr>
<td>8</td>
<td>Colour</td>
<td>None</td>
<td>None</td>
<td>Available</td>
<td>Fully available with Multimedia</td>
</tr>
<tr>
<td>9</td>
<td>Capacity of record holding</td>
<td>Limited</td>
<td>Improved</td>
<td>Unlimited</td>
<td>Unlimited</td>
</tr>
<tr>
<td>10</td>
<td>Module Integration</td>
<td>None</td>
<td>Bridges</td>
<td>Seamless</td>
<td>Seamless</td>
</tr>
<tr>
<td>11</td>
<td>Architecture</td>
<td>Stand-alone</td>
<td>Shared</td>
<td>Client-Server</td>
<td>Web-centric/ Distributed</td>
</tr>
<tr>
<td>12</td>
<td>Interface</td>
<td>Command driven (CUI)</td>
<td>Menu driven (GUI)</td>
<td>Icon driven (GUI)</td>
<td>Icon driven with Web and Multimedia</td>
</tr>
<tr>
<td>13</td>
<td>User Support</td>
<td>Single user</td>
<td>Limited number of users</td>
<td>Unlimited number of users</td>
<td>Unlimited number of users</td>
</tr>
<tr>
<td>14</td>
<td>Multi-lingual support/ UNICODE</td>
<td>Limited (through Hardware support)</td>
<td>Standard</td>
<td>Full support through UNICODE</td>
<td></td>
</tr>
</tbody>
</table>
Self Check Exercise

1) Compare 3rd and 4th generation automation packages.

Note:  
i) Write your answer in the space given below.

ii) Check your answer with the answers given at the end of the Unit.

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6.3 GENERAL FUNCTIONS OF LIBRARY AUTOMATION SOFTWARE

Software may be viewed as digital version of human skills. LMSs are based on skills, knowledge and experiences acquired by library professionals on the jobs. These (LMSs) are used as intelligent tools for performing housekeeping operations, information retrieval and MIS (Management Information System) activities. The whole array of functions carried out by a modern LMS is given in Figure 6.1.

Software Packages:

Features

LMS Application

Figure 6.1: Functions Carried out by LMS

LMSs support selection, ordering, acquisition, processing, circulation, serials control, information services and also extend help in library administration, planning and in the decision making process, as a management tool.
The LMSs presently follow a modular approach for the housekeeping operations. Generally, the whole package is divided in modules for each operational subsystem. Modules are divided into sub modules and each sub module supports various facilities to carry out tasks related to the library housekeeping operations and information services.

**Self Check Exercise**

2) Enumerate the role of LMS in library housekeeping.

**Note:**

i) Write your answer in the space given below.

ii) Check your answer with the answers given at the end of the Unit.

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**6.4 REQUIREMENTS FOR LIBRARY AUTOMATION SOFTWARE**

A library automation package or LMS should fulfill the expectations of library users, staff and authorities in terms of application to all the library activities and services, user-friendliness, flexibility for customisation, of the software and other relevant aspects. Libraries would like to develop or purchase a LMS that fulfills these requirements. The basic requirements for any modern library automation package to satisfy such expectations can be grouped under two broad heads – general system requirements and functional requirements.

**6.4.1 System Requirements**

These are applicable to all modules of any modern LMS and should include but not limited to the following features:

- The LMS must be fully integrated, using a single, common catalogue database for all types of bibliographical data covering different types of documents and a common interface across all modules
- The LMS should have capability of supporting multiple branches or independent libraries, with one central computer configuration sharing a common database
- The LMS must accommodate unlimited number of records, users and organisation-specific parameters (e.g. loan period rules, fine calculation criteria, hold parameters, etc.)
- The package should include following fully developed and operational facilities at multiple customer sites:
  - Information gateway
  - Bibliographic and inventory control
  - Authority control
  - Public access catalogue
  - Web catalogue interface
  - Circulation control
  - Acquisition management
  - Serials control
  - Electronic Data Interchange (EDI)
  - Reservation and materials booking
• Information gateway (telnet, www, Z 39.50, proxy server, external access, customised web portal)
• Circulation control
• Customised generation of reports and usage statistics

• One step administrative parameters setting
• Outreach services
• Digital media archive system

• Z 39.50 server (minimum version 3 and bath profile level compliant)
• Fund accounting
• Inter library loan

• Z 39.50 OPAC and staff client
• Bills and fines
• Multimedia files

• Z 39.50 copy cataloguing client
• Interoperability and crosswalk

• MARC 21 bibliographic and authority record import/export utility

• LMS must provide continuous backup in suitable media (as per the choice of libraries) so that all transactions can be recovered to the point of failure

• LMS must be compliant with the following standards:
  • Z 39.2 or ISO 2709 information interchange format
  • Z39.50 information retrieval service (client and server version 3)
  • MARC 21, UNICODE (UTF-8 OR UTF-16)
  • EDIFACT (EDI standard)
  • IEEE 802.2 and 802.3 Ethernet
  • Z39.71 holdings statements
  • HTTP, TCP/IP, Telnet, FTP, SMTP

• The LMS should be based on web-centric architecture and extend support for a range of multi-user and multitasking operating systems and RDBMSs

• The LMS must be compliant with UNICODE standard for multilingual support and RFID for inventory management and self-issue/return facility

• Vendor/Developing group should provide training to enable library staff to become familiar with system functions and operation, should supply full and current system documentation in hard copy and in machine-readable form suitable for online distribution and the LMS should include extensive online help for users and staff

• LMS must support multiple hardware architecture in terms of server, network infrastructure, PC-workstations and peripheral devices

• LMS must be supported with regular maintenance and on-call service, periodical software upgrades, continuous R & D, trouble-shooting of third-party software such as database package and the library automation package, distribution of problem fixes/patches and emergency services for system failures and disaster recoveries

• The package must provide security to prevent accidental or unauthorised modification of records through the establishment of access privileges unique to each user on the system and restriction of specific functions to specific users

• LMS should provide graphical user interface including, but not limited to, extensive online help, user self-service and personalisation features. The software should be supported with PC-based alternative that will allow circulation to continue in the event of system failure, communication failure and downtime required for maintenance.
6.4.2 Functional Requirements

These are the minimum essential features to be supported by each functional unit or module of any modern LMS:

Authority Control

The LMS must have the following capabilities:

- Support for MARC authority format for personal, corporate and topical name headings in a name authority file; title, uniform title and series entries in a title authority file and subject headings in a subject authority file
- Provision for generation of SEE, SEE ALSO references and NT-BT-RT relationships network from authority records and link these references to matching access points in OPAC;
- Must allow any bibliographic field to be authority controlled, should include facilities to search, retrieve, and display print and global editing of authority records by authorised operators; and
- Must include provision for multiple thesauri with the ability to produce a list of all citations with authority file violations.

Bibliographic Control

The master bibliographic record of the LMS should extend support for:

- MARC 21 bibliographic and authority record formats;
- MARC record loader that can accept records input from various sources and from various media like tape diskette or over network;
- Global editing utility that find and replace data within specified fields;
- Data format validation during input of bibliographic information;
- MARC 21 format for holding and display of holdings on the basis of ANSI Z39.44 serials holdings display format;
- Import and export of bibliographic data through Z39.50 complaint catalogue; and
- Interoperability and crosswalk through incorporation of XML, RDF and metadata schemas (e.g. Dublin Core Metadata).

Online Public Access Catalogue (OPAC)

- OPAC must be fully integrated with other modules and accessible through web-based client
- OPAC should provide browse indexes for author, title, and series and browse index combining all four indexes
- It should allow combined, specific and field level searching for all formats along with phrase searching, nested searching and truncated searching
- It must enable searching by using Boolean operators (OR, XOR, NOT, AND), positional operators (SAME, WITH, NEAR, ADJ) and relational operators (‘greater than’, ‘less than’, ‘equal to’, etc.) within and across all fields
- It should provide facility to see processing status (fully catalogued, in process, lost, withdrawn etc.) and circulation status (in transit, reserve, recalled, on-hold etc.)
- OPAC should support full, brief, standard and customized display of records including relevancy ranking of search results
OPAC should also support bulletin board, information desk, gateway services (to access external databases) and patron self-service options (e.g. holds, renewals etc.)

OPAC must track users’ preference and interests, organised into a list of favourites. These favourites shall be included in a user’s personal online account

**Circulation Control**

The circulation control activities of any modern LMS must be supported with the following facilities:

- Entry of borrower and item identification by scanner, RFID reader or keyboard entry;
- A template for users registration and automatic display of patron data;
- Automatic blocks for membership expiration, exceeding loan threshold, renewal threshold and fine threshold, placement of hold on any title or item in the database;
- Automatic calculation of loan period in hours, days, weeks or months;
- Generation of notices/reminders to users of overdue items and printing of gatepass for issued items. Automatic calculation of fines and other charges, recording of payment and generation of receipts;
- Generation of variety of pre-defined and user defined reports and usage statistics; and
- Fully operational interlibrary loan module, patron initiated transaction and mechanised inventory control (barcode, RFID, smart card etc.).

**Acquisition Control**

A fully integrated acquisition module of any modern LMS should support the following activities/functions:

- All traditional acquisition activities like pre-order searching, ordering, claiming, cancellation of order, receipt processing, processing payment, fund accounting, vendor accounting, currency control, statistics and report compilation, etc. Linkage between acquisitions, cataloguing and circulation modules must be seamless;
- Accommodation of a variety of materials, including but not limited to monograph, series, serials, newspapers, cumulative indexes, loose leaf materials, supplements, reports and statutes, musical scores, electronic resources, etc;
- Processing of a variety of materials, including but not limited to print, microfilm, microfiche, film, videotape, audiocassette, CD-ROM, magnetic tape, DVD-ROM, etc.;
- Recording, storing and display of bibliographic information, acquisition type (order, gift, approval etc.), status (ordered, received, etc.), invoice and accounting information, vendor information, requestor information, subject code, etc.;
- Budget-based fund accounting with categorised fund allocation;
- Generation of vendor performance statistics and other reports;
Accommodation of different order types such as firm order, prepayment, exchange, membership, gift, on approval, blanket order, standing order, subscription, continuation, deposit account, etc; and

- Production of various customised and predefined reports as MIS activities.

**Serials Control**

- The module should have all the basic capabilities like ordering, check-in, claiming, routing, vouchering, fund accounting, union listing, bindery preparation and report generation.

- It should provide the ability to search for serials records by title, ISSN, publisher, vendor, purchase order, uniform title, editor, conference title, keywords etc.

- Serials control module should have provision for article indexing, online acquisition, e-journal directory service and recording of holding information.

- It should support both predictive and non-predictive mode of check-in and auto-generation of claims for non-receipted issues.

- The module should support routing of journal issues and production of various lists and reports.

**Digital Media Archive System (DMA)**

The aim of DMA subsystem is to support search, retrieval and viewing of multiple media formats from client machines by using a web browser. It should be able to provide the following facilities:

- To browse and search (full text and metadata based) contents of text and images in ASCII, HTML, SGML, PDF, TIFF, JPEG, GIF, BMP, PCX, DCX etc. formats, audio and video clips and streaming audio and video;

- To link itself with library OPAC through electronic access field (MARC/UNIMARC 856 field);

- To receive and register published documents from an electronic document management system;

- To help a user to import one or more files from the user’s system and associate them with a metadata schema within the archive;

- To support metadata harvesting by using Open Archive Initiative (OAI)/ Protocol for Metadata Harvesting (PMH);

- To extend support for various Document Object Identifier (DOI) schemes; and

- To accommodate remote document submission system.

**System Administration**

The administrator or super user should control the overall administration of LMS through a highly secured module for managing the following activities:

- Access control for individual user, for each module and for each function;

- System security to prevent unauthorised access to databases;

- Standard implementation and setting of system parameters; and

- Keep a log of each transaction, which alters the database.
Self Check Exercise

3) What is digital media archiving?

**Note:**

i) Write your answer in the space given below.

ii) Check your answer with the answers given at the end of the Unit.

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6.5 IMPLEMENTATION OF LIBRARY AUTOMATION SOFTWARE

Library automation is a complex process and should be planned astutely. The entire process of library automation may be divided into the following steps:

- Software selection
- Hardware selection
- Site preparation
- General training
- Customisation
- Defining procedures for
- Bibliographical data entry
- Administrative data entry
- Financial data entry
- Commissioning

It is quite obvious that implementation of these steps requires background study or analysis of the library system. It is a precondition to utilise library automation package for effective results. A library will not be able to take full advantage of automation until and unless its manual functions are streamlined and justified. Therefore, the procedures and tasks (see Unit 05 of this block) followed in different sections should be analysed in terms of the following factors:

- Special features of the library system
- Local variations (their validity and usefulness) and available manpower
- Limitations of the existing system
- Nature and objective of the library
- Total number of collection
- Annual acquisition and procedures followed for acquisition
- Number of periodicals scrutinised
- Number of users and their categories
- Number of daily transactions (issue/return/reservation)
- Availability of multilingual documents
- Need of information services (CAS/SDI, etc.)
- Future plan (in terms of networking and consortia)

Library managers must develop an implementation plan for the library automation project on the basis of above facts, prior to the installation of any equipment and the LMS. The plan shall be incorporated upon written approval of the authority. The plan must include, but is not limited to, the following aspects:
Self Check Exercise

4) Identify factors to be considered for successful implementation of library automation.

Note: i) Write your answer in the space given below.
ii) Check your answer with the answers given at the end of the Unit.

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6.6 LIBRARY AUTOMATION SOFTWARE PACKAGES AVAILABLE IN INDIA

The automation of library activities in India started in full swing with the introduction of CDS/ISIS. The CDS/ISIS is a menu-driven generalised information storage and retrieval system designed by a team of experts under UNESCO/PGI programme. It is specifically meant for the structured non-numerical databases. In India, NISSAT with the help of other professional bodies organised a number of training courses on application of CDS/ISIS (DOS & Windows versions) in information organisation activities. As a result, a large pool of trained manpower developed in the country. Partially, some organisations developed their own LMSs e.g. DESIDOC developed DLMS (Defence Library Management System), INSDOC came out with CATMAN (Catalogue Management) and SANJAY was developed by DESIDOC under NISSAT project by augmenting CDS/ISIS (Version 2.3) for library management activities. The LMSs presently available in India may be ranked in 2nd, 3rd and in between 3rd and 4th generation on the basis of their features as listed in the table 6.1. As far as the origin and the application domain are concerned, the LMSs available in India may be placed under three fundamental groups – LMSs of foreign origin, LMSs developed over LMSs or textual database management systems of foreign origin and LMSs of Indian origin. This grouping may again be sharpened by dividing the packages on the basis of size of library systems i.e. large libraries, medium range libraries system and small range libraries system. The grouping of LMSs is given in table 6.2. As it is not possible to discuss every LMS listed in the table, only a few LMSs are selected from each group for discussion on the basis of their popularity and features.
### Software Packages: Features

#### Table 6.2: Grouping of LMSs Available in India

<table>
<thead>
<tr>
<th>Origin</th>
<th>Application Domain</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMSs of foreign origin</td>
<td>Large System</td>
<td>Medium Range System</td>
</tr>
<tr>
<td>Alice for WINDOWS BASISplus &amp; TECHLIB plus VIRTUAL ILS</td>
<td>KOHA</td>
<td>Not Available</td>
</tr>
<tr>
<td>LMSs developed over LMS of foreign origin</td>
<td>NG-TLMS.NET (over TLMS package)</td>
<td>WINSANJAY (Over CDS/ISIS)</td>
</tr>
<tr>
<td>LMSs of Indian origin</td>
<td>LIBSUITE</td>
<td>AUTOLIB</td>
</tr>
<tr>
<td></td>
<td>LIBSYS</td>
<td>DLMS</td>
</tr>
<tr>
<td></td>
<td>MECSYS</td>
<td>GRANTHALAYA</td>
</tr>
<tr>
<td></td>
<td>NEWGENLIB</td>
<td>Kryger Library Manager</td>
</tr>
<tr>
<td></td>
<td>NEXLIB</td>
<td>LIBRA</td>
</tr>
<tr>
<td></td>
<td>SLIM 21</td>
<td>LIBRARIAN</td>
</tr>
<tr>
<td></td>
<td>SOUL</td>
<td>LISTPLUS</td>
</tr>
<tr>
<td></td>
<td>SUCHIKA</td>
<td>NITLIB</td>
</tr>
<tr>
<td></td>
<td>TULIPS</td>
<td>NIRMALS</td>
</tr>
<tr>
<td></td>
<td>ULYSIS</td>
<td>SLIM ++</td>
</tr>
<tr>
<td></td>
<td>WILISYS</td>
<td></td>
</tr>
</tbody>
</table>

#### 6.6.1 Sofware of Foreign Origin

This group includes library automation packages developed by foreign or multinational vendors and distributed in India either through approved agents or value-added resellers. The discussion covers four most popular packages of foreign origin.

**ALICE FOR WINDOWS**

This LMS developed by Softlink International, Australia, is a global software package and is marketed worldwide through a number of agencies based in America, Australia, Britain, Iceland, India, Malaysia, New Zealand and Singapore. This software is marketed under the name of Embla in Iceland, Alice elsewhere in Europe, OASIS in South East Asia and Australia and Annie in America and other parts of the world. Recently Softlink International decided to call the software *Alice for Windows* all over the world to maintain consistency in nomenclature. The main features of Alice are as follows:

- It has four distinct versions – Public library version, Special library version, Academic library version and School library version
- The package is modular and modules are grouped into one of the three sets:
  - Standard Set: Includes Management; Reports and Utilities; Circulation; OPAC
  - Advanced Set: In addition to Standard Set it includes Acquisition; Periodicals; Journal Indexing; Multimedia; Web Inquiry
  - Special Set: In addition to Standard and Advanced set it includes Reservation; Interlibrary loan; Patron self checking; Rapid retrospective conversion; Multilingual features; Self circulation; Union catalogue
- The LMS is backed by a number of support services which include onsite training programmes, continued R&D, feedback system through user groups, free newsletters, etc.
- Besides traditional library materials, it can be used to manage slides, audio and videocassettes, paper clippings, maps, charts, electronic documents and www sites.
Location of documents in library could also be seen with the help of the library map. It is possible to maintain consistency in recording of items through the use of authority files. Alice has a capacity of holding 99 lakhs records.

- It supports a total of eleven search criteria to search the database from any machine (UNIX/MAC/Apple, etc.) through Internet or Intranet. It helps to generate customized reports in addition to 800 preformatted reports available with Standard Set.

- It supports barcode technology and has in built communication function. As special features, the LMS provides data protection functions, rapid retro-conversion facility and online tutorial and help system.

**BASISPLUS AND TECHLIBPLUS**

BASISplus and TECHLIBplus are products of Information Dimensions Inc. (IDI), USA and National Informatics Centre (NIC), New Delhi. NIC is the value-added reseller of the packages in India. BASISplus is a client-server relational database system for text and mixed object documents. It adheres to the fundamental principles of open systems including interoperability, portability and scalability. The database engine provides user authentication, document access control, concurrency control, deadlock protection and recovery. The features of the LMS are as below:

- Relational DBMS
- Client-server architecture
- Active data dictionary
- Enhanced security feature
- Complete backup and restore capabilities
- Power search facility
- Full text retrieval
- Mixed object management
- Thesaurus and controlled vocabulary
- Screen customisation
- Document converters
- Immediate and Deferred updating (online and batch)
- Content based retrieval
- Component-level retrieval and image management
- Networking (LAN & WAN)
- Seamless Internet support
- Open Application Programming Interface (API) to support client access to server databases
- GUI based easy user interface for retrieval, display and data entry
- Intelligent search assistance and thesaurus manager
- Allows user to import and export many word processor file formats

TECHLIBplus is a comprehensive library automation package developed over BASISplus and customised to perform all the operations and activities of a fully electronic library. TECHLIBplus supports OPAC, Catalogue maintenance, Circulation, Serials management, Acquisition, Processing and MARC cataloguing. The LMS provides direct access to information in Current Contents.

**KOHA**

Koha is an integrated library management system that was originally developed by Katipo Communications Limited of Wellington, New Zealand for the Horowhenua Library Trust (HLT), a regional library system located in Levin near Wellington. In 1999, Katipo proposed developing a new system for HLT using open source tools (Perl, MySQL, and Apache) that would run under Linux and use Telnet to communicate with the branches. The software was in production on 3 January 2000, and released under the GPL for other people to use in July 2000. There has been a high level of interest in Koha internationally, and it is currently being used in New Zealand, Australia, Canada, United States, India, Thailand, United Kingdom, and France. Many of the libraries presently using Koha are small and medium sized, mainly school, college, public and special libraries. Koha has just been implemented at the Nelsonville Public Library in Ohio. The Koha project has attracted
the attention of the developers in a number of different countries, with release Version 1.2.2 being coordinated from Canada and the current stable release, Version 2.0.0 (available both for Linux and Windows), from France. The major features of Koha are:

- **General**: Free to download, no license fees, fast, web centric, fully customisable, environmental friendly (one can recycle those old PCs), establishing an international community of users and developers giving libraries the freedom to do it themselves or work directly with the system builders, generating an international spirit of cooperation and collaboration, easy staff training, supports both Windows and Linux platform, uses freeware companions like Apache as web server, MySQL as backend RDBMS and PERL as scripting language, supports web OPAC and web interface for staff, branches access main server via ordinary phone lines and modems, can run on PC grade or server grade hardware

- **Circulation**: Issues (including rentals), renewals, returns and fines; uses barcode scanners or keyboard; can generate a list of over dues for a phone reminder system

- **Acquisitions**: Multiple book budgets and suppliers, real time budget information

- **Catalogue updates fast and slick**, support for MARC 21 and UNIMARC

- **Searching by keyword, author, title, subject, class number or combinations and customised search interface to suit need of individual libraries**

- **Memberships - One-stop-shop with all member information on one page**

- **User-driven reservation facility from OPAC interface** (Do-it-yourself reserves in the Library or via the Internet)

- **OPAC in the library or via the Internet and stock rotation through branch libraries**

- **Work in progress**: Z39.50 searching, virtual bookshelves, French and German versions, NCIP self checking, port to other operating systems so that it will run natively, new themes, additional book information (e.g., covers), web based reports, Mozilla chromed OPAC integrated with Greenstone Digital Library System, integration with Internet “gateway” system and bill to patron card, printing spine labels

- **In most cases, Koha users either undertake the development themselves and contribute the changes back to the project, or they commission a developer to undertake specific enhancements**

- **The Koha project uses a number of channels to allow members of its community to communicate with each other — there is a general mailing list, as well as separate ones for developers, Windows users, French-speaking Koha users/developers, and German-speaking Koha users/developers. In addition, the developers use Internet Relay Chat (IRC) for real-time scheduled meetings and conversations**

- **Allows multilingual cataloguing and supports Unicode**

- **Incorporated Functional Requirements for Bibliographic Records (FRBR) partially**

**VIRTUA ILS**

Virtua ILS (Integrated Library System) is a sophisticated, internationalised library automation solution that addresses the full spectrum of library activities. This LMS is designed and developed by VTLS Inc., Virginia, USA. It uses off-the-Shelf UNIX hardware and the Oracle RDBMS to guarantee continued availability and support. The important features of this world-class software are enumerated below:

- **It is a fully parameterised software i.e., libraries can configure the setting to achieve maximum flexibility**
• Supports national and international standards for data interchange
• Basic system includes modules for OPAC, circulation, reserves, cataloguing, acquisition, serials control and reporting
• Basic system may be supplemented by companion products like RFID, MARC data processing suite, ILL manager and patron self-check system
• Provides support for excellent security options at different levels of access
• Supports UNICODE and thereby enables the input and display of different languages in their native scripts. In fact, Virtua ILS ensures a true multi-lingual catalogue database
• Helps in designing web-enabled digital media archiving and supports development of digital library database (delivery options include CD-ROM, DLT, DVD and DAT)
• Provides ‘security bit’ enabled RFID solution to serve both inventory and theft deterrence functions
• Provides comprehensive customisation parameters (over 1000) for global settings and each subsystem (OPAC, cataloguing, circulation, acquisition, serials control, etc.)
• Provides extensive and precise control over user activities and helps creation of rich and customised web interface for various collection components for each patron class
• Ensures management of multiple libraries or branches across a library
• Supports multilingual authority control, and networked multimedia database management and seamless access to multiple databases through Z39.50 client
• Incorporated FRBR model in the design of bibliographic databases

6.6.2 Softwares Developed over Foreign Packages

This group includes automation packages in which some applications are built on the top of either foreign automation packages or general text retrieval packages. The discussion here covers three automation packages of which two are based on CDS/ISIS.

LAMP

Library Automation and Management Package (LAMP) is a freeware and available for downloading from Internet at no cost. The package, developed jointly by Netherlands Library Association, Pakistan-Library Association and UNESCO, is based on CDS/ISIS (version 3.07). This MS-DOS-based package is well suited for small libraries like school and college libraries. The package contains five main modules with sub-modules under each. Facilities are grouped under each sub-module. The features of LAMP include the following:

• Supports creation of authority files for books and serials (supplier authority, name authority, subject authority, etc.)
• Supports use of LCSH subject headings in subject authority file
• The Acquisition module supports all the major tasks related to books and serials acquisition like - creation of budget, purchase order authority file and purchase
order data entry; Generation of purchase order; receiving of books and serials; display of order status; reminders to suppliers; Payment and reordering

- Cataloguing module supports data entry for monographs and serials, catalogue card generation, creation of bibliographies, Binding and write off functions

- Circulation Indu has the facilities like creation of member database, edit/updating of member database, Issue and return of books and serials, renewal and reservation, checking of availability of documents and checking of outstanding documents, generation of statistics on issued items and library members

- Supports a number of other utilities like a generation of gate pass, shelf-card, accession registers, production of various statistical reports, global editing and replacement, etc.

NG-TLMS.net

NG-TLMS.net is state of the art library automation software based on TLMS (Total Library Management Service). TLMS has developed in Germany by TRANCE group. The route of development for this LMS is TLMS -> NGTLMS -> NGTLMS.net. NG-TLMS.net is designed on the top of TLMS by WebOPAC Applications Pvt. Ltd. It is SQL-backed client-server system, based on Microsoft’s .NET platform. It supports CCF, USMARC, Indian UNIMARC (as recommended by Central Secretariat Library, New Delhi) and Z39.50. The NG-TLMS.net supports the following activities and facilities:

- Printing of accession register; AACR II card generation; article scan management; authority files creation; auto cataloguing from web sites; auto export & import; Auto keyword generation; automatic barcode generation; letterhead creation; dropdown matching, etc.

- Barcode based issue & return and serials control; auto status generation for progress of processing of documents; bulletin board facility; Kardex generation for serials control; complete Intranet support; automatic claim generation for overdue and missing journal issues

- RTF, Dial-up networking, e mail and printing of gate pass; ID card generation; arrival list generation; multi-lingual support, web access of OPAC; power search facility; Fine calculation and receipt generation; reservation of books; retrospective data conversion; SDI service; search refining; security enhancement; statistics & graphs; stock verification

- UNIMARC input sheet generation; UNIMARC cataloguing; virtual library creation; Z39.50 client & server; UNICODE support (all languages of the world are supported)

- Web centric architecture i.e, requires only installation on server. Client uses browser to access all information

- No restrictions on the number of records; acquisition module includes accounting software and is optional; basic software covers all areas e.g., OPAC, cataloguing and circulation; all Indian Languages supported

- Includes facilities for - WebOPAC, Internet and Intranet via browser, union cataloguing supported in distributed and replication environments, US MARC 21, UNIMARC, CCF and Z39.50 and can be installed by relatively less experienced computer users.

WINSANJAY

This LMS is originated from SANJAY. SANJAY is based on CDS/ISIS (version 2.3). It was developed by DESIDOC under a NISSAT project to meet the requirements of library management activities. It includes a set of 35 Pascal programs and 25 special menus. The features of WINSANJAY are as follows –
Windows-based and more user friendly than WINISIS and CDS/ISIS for library house keeping operations. Suitable for medium range libraries.

Effective interlinking of databases (it is a great achievement because WINISIS or CDS/ISIS does not support relational database design model). Interlinks book databases, member databases, vendor databases and budget databases.

Maintenance module restricts the access right to a limited set of users and thereby provides security measures and user module helps library staff to carry out daily routine in circulation, acquisition and online catalogue functions.

6.6.3 Softwares of Indian Origin

This group includes packages designed and developed by Indian vendors and software agents. The features of nine automation packages are discussed here. Packages are selected for discussion on the basis of their customer base and popularity and arranged alphabetically.

AUTOLIB

Autolib is fully integrated multi-user software on Windows environment, designed to automate various activities of university libraries, college libraries, public libraries and special libraries. The software is developed by AutoLib Software Systems, Chennai and the product range includes the following LMS:

- MS-Access with VB version
- MS-Access with VB & W version
- MS-SQL server with VB version
- MS-SQL server with VB & Web version
- MS-SQL server with VB (public library version)

This LMS is module based system and designed and developed by a team of library and information specialists, system analysts, software professionals, network specialists and database designers. The features of AutoLib are given below:

General features: Module based; user friendly; GUI environment; based on client server architecture, uses Visual Basic 6.0 as front end and MS-SQL V.7.0 RDBMS as back end; uses TSQL query Language, module level security; Z39.50 protocol support; export/import of data in ISO 2709 format, cataloguing of digital resources, implementation of AACR, CCF, Dublin Core, TCP/IP and dial-up network support, web based reports, menu based operations, incorporated mandatory fields of CCF, powerful search facility/Query builder, printing various reports in several formats, Simple data entry, User ID and password protection, Online help/documentation, Continuous product upgradation, Customer support & maintenance.

Minimum Hardware & Software Requirements: Server configuration- Pentium II/III 64 MB RAM/4.2 GB HD, 32x CD-Drive/1.44 FDD, network accessories, SVGA monitor, Windows NT Server 4.0 and SQL Server 7.0. Client configuration - Pentium II with 32 MB RAM/4.2 GB HD Windows NT workstation/Windows 9x.


Functional features: 1) Database Management – Data entry/Updating of database for user, author, publishers, suppliers, member, book, journal issues & back volumes, article report, thesis, standard, non-book materials, budget, subject, department etc.; 2) OPAC – Powerful and versatile search facility, simple search for beginners, query builders for advanced users, Query windows for complicated search, Boolean search, field level search (single field/multiple fields, author / title / keyword / subject, accession No / class No., journal name / article name etc); 3) Circulation – Transaction, Issue, return, renewal of books, Journals, back volumes, recall, reservation, cancellation,
reminders, reports); 4) Serials Control - Subscription of new journals, Renewal of journals, receipts of new issues, Reminders for missing issues, Invoice processing, Payments, browsing issues, Reports generation, 5) Acquisition Control - Duplicate checking, Indent processing for new books, Book ordering, Reminders, Receipts of books, Invoice processing, payment, Budget management; 6) System Administration module - User ID & encrypted password protection, Module level Security, Budget management, Stock verification, Global updating, Fixing due dates, Overdue charges etc., Holiday maintenance, Reports, New additions, Catalogue (main/author/title), Accession register/bibliography, List of books by author/title/publisher/year, subject/call number (by any order), Books by unique titles, Frequently issued books, frequently accessed books, Books issued/returned/reserved, Receipt for fine amount/ deposit/ loss of book, etc, List of user/publisher/supplier/departments, No-due certificates, stock verification report, Budget details, Orders, Journal list, Journal subscription/order report/missing issues; 7) Article Indexing – provides for creating journal article database, Allows to create author index and keyword index, Searching and retrieval of journal articles, Allows to create index and abstracts, Allows to publish CAS bulletin, Allows to generate contents pages; 8) Digital Library module - cataloguing multimedia digital resources such as text, images, audio file, video clippings, etc. Allows to catalogue based on Dublin Core standard, Also provides for handling various file formats such as .bmp, .jpeg, pdf, .doc, .avi, etc.

E-GRANTHALAYA

This LMS was developed by National Informatics Centre (NIC), Bangalore centre to suit the requirements of small and medium sized libraries. It is an easy-to-use software package and supports all the routine library operations. The general and special features of the LMS are as follows:

- The package includes functional modules for administration, serials control, acquisition, circulation, OPAC, reports and index
- Generates customised reports and statistics of library usage
- OPAC allows simple and advance search option, supports web-enabled searching
- The package has bilingual capabilities and can be customised to suit all Indian languages supported by ISM 2000 developed by C-DAC, provides options to control access through login and password and supports quit-in privileges for users and staff
- Supports both standalone and networked operation mode. Recommended server configuration is Pentium III processor, 128 MB RAM and 4.3 GB Hard disk
- Requires Windows NT/Windows 2000 for server and Windows 98/XP/2000 for client machines and uses MS SQL server as backend database
- Requires ISM2000/Leap office 2000 as bilingual tool

GRANTHALAYA

This CUI based (DOS and UNIX) modular LMS was developed in FoxPro by INSDOC (now NISCAIR) for medium range libraries. It includes all the modules required for day-to-day library operations. The package has seven modules – Library administration; Query; Circulation; Acquisition; Serials Control; Technical Processing and Data Administration. The salient features of the LMS are:

- Based on object oriented design
- Supports CCF and ISO 2709 for import & export
- Supports Boolean operators and range searching
- Provides online help through screen messages
- Generates a dictionary for various data elements for easy searching
LIBSUITE

This LMS, developed by SOFT-AID Computer Ltd., Pune, is based on web-centric architecture and designed to work with different media. LIBSUITE is based on three-tier web-centric architecture in which server machine uses Windows NT/2000 and Internet Information Server (IIS) – as web server. The database server relies on Oracle 8i and clients use web interface for accessing the server through Internet or Intranet. LIBSUITE extensively uses latest technologies like Active Server Pages (ASP) and Component Object Modeling (COM). The web-centric architecture ensures that any machine with a web browser can be a client. It also ensures working independent of operating systems in client machines. The significant features are:

- It provides all the standard modules and supports customised report generation and standard protocols like Z 39.50
- The package bundles the fully featured modules – Acquisition, Cataloguing, Circulation, Queries, Serials Control, setup and maintenance
- Cataloguing module, apart from supporting regular activities manages multi-format materials, generates entire status i.e., total number of books, number of books issued and number of books on the shelf.
- Circulation module supports all the required operations including ILL and generation of photograph of the member in circulation, panel
- System administration module supports controls over the access, creation of authority entries and setting of parameters for cataloguing, circulation etc.
- Supports stock verification and global addition and deletion
- Acquisition module supports all media and production of accession register
- Web-centric architecture ensures use of any machine as client as it does not require the installation of client-side software
- Provides easy user interface and ensures seamless navigation through Internet and Intranet and ensures login and password-based access as security measure
- Includes various utilities like calculator and calendar

LIBSYS

LIBSYS is a fully integrated multi-user LMS based on client-server model and supports open system architecture, web-based access and GUI. This indigenous software package is designed and developed by LibSys Corporation, New Delhi. LIBSYS has seven basic modules – Acquisition; Cataloguing; Circulation; Serials; OPAC; Web-OPAC and Article Indexing. The leading features of different LIBSYS products such as LIBSYS 4.0, LS-Premia, LS-Digital, LSmart and LSEase are enumerated below:

- Based on client-server model and TCP/IP for communication and networking
- Provides ANSI Z39.50 compliant web access for making the server accessible through Internet/Intranet
- Supports web-OPAC for accessing bibliographic databases through Internet/Intranet
- Supports standard bibliographic formats like MARC 21, UNIMARC, CCF, etc.
- Includes images and multimedia interfaces with LIBSYS search engine
- Supports barcode technology for membership card production and circulation
- Offers SDI, CAS, fine calculation, e-mail reminders, etc. and utilities
Software Packages: Features

- Provides flexibility in choosing operating platforms (UNIX, Windows NT, Novell NetWare) and backend RDBMS (SQL server, Oracle)

- Supports Web-OPAC through PERL/CGI access mechanism

- Offers a range of products suitable for different types of libraries e.g. LSEase is an affordable solution for small and medium sized libraries.

- Provides RFID technology (in cooperation with TAGSYS – the largest smart card solution provider) for inventory management and for smart card technology integration for identification of individuals

- LSPremia provides full UNICODE support and management of multi-site libraries

- Offers digital resource management system through LS-Digital suite (It supports resource structure definition, scanning, PDF conversion, multimedia database management and metadata based searching and retrieval)

NEWGENLIB

NewGenLib is the result of collaboration between a charitable trust called Kesavan Institute of Information and Knowledge Management (KIIKM), Hyderabad and Venus Solutions Pvt. Ltd. The features of this LMS are:

- Completely web based and adheres to international standards, supports web services and allows networking of unlimited number of libraries, database and operating system independent and uses open-source, n-tier, and Java-based technologies for scalability, reliability and efficiency

- Includes seven modules: Cataloguing, Circulation, Acquisition, Serials management, OPAC, Network Configuration, Administration and Setup. The package is available as single user (small library) version, multiuser-single library LAN/Intranet version, Multiuser-single library Web version, Multiuser-multi-library consortium version

- NewGenLib adheres to international standards like MARC21, ISO2709 (communication format), and AACR-2R. Cataloguing databases is based on well proven database design to adhere to MARC and also supports Unicode 3.0 and UTF-16 encoding format by which it can support all the possible languages (if available in unicode 3.0 code charts)

- Supports functionalities like Import of MARC data from sources such as OCLC and freely available web-based resources, extensive use of setup parameters in configuring the software to suit specific needs, e.g., in management of fines, Multi-user and multiple security levels, automated email facility integrated into different functions of the software to ensure efficient communication between library and users, vendors etc., module-specific querying in all modules

- Acquisition supports - online requests by users, firm orders, on-approval purchases, standing orders, solicited gifts, unsolicited gifts, exchange-triggered acquisitions, web service interfaces to supply sources such as amazon.com, Management information reporting to enable better decisions in acquisitions management

- Cataloguing supports data-entry using MARC tags, fields, sub-fields, etc., or simple label and form-based data-entry; Import of MARC records from sources such as OCLC or from free MARC download sites on the web; access to authority files during data entry and catalogue database searching, catalogue record attachments enabling access to related data, e.g., multimedia, web-based resources, scanned images, and full text digital documents, Provision of a search engine to search full text documents, Plug-ins for specialized thesauri, Automatic validation etc.
Network functionalities support sharing of hardware, server and application software between the host and one or more associate libraries. It helps users of branch libraries - to download metadata or the full text of records, where records are available, into their desktops; in acquisition of new publications from the host library, To access their circulation records, To access electronic journals across all the libraries in the network, To improve services to both the end user and the library staff

OPAC module supports - browser-based access to the library's catalogue database; Extensive search, retrieval, display, print, download and formatting options for patrons (customized, text format (brief), text format (Full), MARC tagged, ISO 2709, MARC-XML, Dublin core) Patrons can request new additions, access the circulation data, make reservations and go to the web via the OPAC. Patrons can trigger interlibrary loans, interact with library staff via instant messages/email

Circulation, apart from traditional functions, supports setting up of a wide range of circulation options, fines, user privileges, etc.; needed in different library environments, Rapid charging, discharging, renewal and reservation operations; built-in traps for delinquent users, reservations, etc.; on-the-fly circulation, Interlibrary transactions, binding management, MIS support for better management of collection and assistance in stock verification

Serials Control module includes facilities like Integrated management of serials subscriptions, registration, cataloguing and binding, rapid registration of incoming serials issues using a kardex-like interface, Batch and on-demand claiming for missing issues, support for union catalogues, ?MIS reporting for better serials management.

NEXLIB

This window-based LMS was designed and developed by NexEvolve Logic Solutions Pvt. Ltd. It provides a simple point-and-click navigation interface backed by a powerful database engine capable of maintaining millions of records. Nexlib provides all the basic utilities required for the management of libraries, namely, Acquisition, Cataloguing, Circulation, Serials Control and OPAC. The important features of NexLib are as follows:

- Acquisition module is fully integrated with the cataloguing module. It can manage a variety of library materials and also fund accounting
- Cataloguing module helps to define location of items by floor, shelf number etc.
- The entire circulation task can be carried out from one screen
- Provides facility to create unlimited number of user types and member data can be transferred from any existing user information system
- OPAC can be accessed through any standard web browser
- Generates over 50 pre-defined reports related to library MIS
- Ensures easy-to-use library staff interfaces
- Full-featured serials control with the support for variety of formats and advanced search option for OPAC
- Digital Media Archive (DMA) module for the management of full text articles, newspaper reports, images, etc.
- DMA allows incorporation of standard metadata schemas and metadata-based retrieval.
- NexLib is a platform-specific LMS and depends on Microsoft products. The hardware and third party software requirements are as follows: Sever should be Pentium III or
higher with minimum of 256 MB RAM and preinstalled with windows 2000 sever. Client machine should be Pentium II or higher with 128 MB RAM and preinstalled with windows 98/NT/2000/XP.

- Follows client/sever architecture and security of library database access is based on Windows NT model
- Supports MS Access, MSSQL or Oracle 8i as backend RDBMS and uses Visual Basic (VB) as scripting language.

**SLIM 21**

SLIM (System for Library Information Management), a software suite from Algorhythms Consultants Pvt. Ltd., Pune is a module-based LMS that offers wide range of functionality for library management. SLIM 21 is the latest product of the series that succeeded SLIM, SLIM++, SLIMEX and SLIMLX. SLIM 21 supports multiple operating systems and backend databases. The relevant features of SLIM 21 are as follows

- SLIM21 is a module-based system. The basic modules are Acquisition, Cataloguing, Circulation, Serials Control, OPAC and Article Indexing.
- Enterprise module of SLIM21 supports usage statistics, current awareness service (CAS Publish), web aware OPAC (WAOPAC), web proposals for new books, interlibrary loan (ILL) and selective dissemination of information (SDI)
- Supports export/import through MARC/CCF/ISO-2709 standards and downloading of bibliographic data from online databases through DB Bridge module and Z39.50
- Generates customized reports on screen/printers/RTF or as text/PDF/HTML files with auto e-mailing facility
- Unicode based LMS that supports multi-script sequencing for Indian scripts
- Generates shelving order for documents as per colon classification, supports smart card/RFID based circulation and touch chip (biometric) interface for user authenticity
- Creates library map for easy location of items
- Provides user-friendly online help and reference manual
- Supports digital library environment and transformation of bibliographic data into XML, XHTML and DCMES
- Supports both standalone and network architecture. Minimum requirement for sever machine is P-4 processor and 256 MB RAM with Windows XP/2000 as OS and SQL sever as backend RDBMS. Client machine may be any P-2 machine with window 9x/2000/ME/XP or NT workstation.

**SOUL**

The story of SOUL (Software for University Libraries) started with the development of ILMS (Integrated Library Management Software) by INFLIBNET in collaboration with DESIDOC. Two versions of ILMS (DOS and UNIX) were developed for university libraries in India. But with the introduction of GUI-based system and other revolutionary changes in the field of computer software, INFLIBNET decided to develop a state-of-the-art, user-friendly, Window-based system that will contain all the features/facilities available with other LMSs in the market. As a result INFLIBNET came out with a LMS called ‘SOUL’. The package was first demonstrated in February 1999 during CALIBER-99 at Nagpur. SOUL uses RDBMS on Windows NT operating system as backend to store and retrieve data. The SOUL has six modules – Acquisition; Cataloguing; Circulation;
Serials Control; OPAC and Administration. The modules have further been divided into sub-modules to take care of various functions normally handled by the university libraries. The features of SOUL are:

- Window-based user-friendly system with extensive help messages at affordable cost
- Multi-user software with no limitation for simultaneous access
- Client-server architecture-based system allowing scalability to users
- User-friendly OPAC with web access facility
- Uses RDBMS to organise data
-Available in two versions – The university library version and the college library version
- Supports bibliographic standards like CCF and AACR II and ISO 2709 for export & import facility
- Provides facility to create, view & print records in regional languages
- Supports LAN & WAN environment

Self Check Exercise

5) Compare features of any two LMSs of Indian origin.

Note: i) Write your answer in the space given below.
ii) Check your answer with the answers given at the end of the Unit.

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6.7 EVALUATION OF LIBRARY AUTOMATION SOFTWARE

The selection of library management software is a complex and time-consuming one. Apart from thorough knowledge of the library system, sub-systems, procedures, activities and tasks, it requires the knowledge of LMS features and trends in the development of ICT. The selection process should be based on seven basic steps – Evaluation, Comparison, Demonstration of package, Feedback from authority, staff & users, Preliminary selection, Modification and Customisation and Final selection. The process of evaluation should be based on some predefined criteria. After evaluation against checklist, the LMS should be compared with other packages on the basis of services, utilities and features.

6.7.1 Criteria for Evaluation

The following factors should be taken into consideration at the time of evaluation of any library automation package

Vendor validity: The reputation of software development group or the vendor is very important. The following questions should be raised to judge the validity -

a) Is the vendor also the software developer, or is the vendor a distributor or agent for the software developer?
b) Is there an international presence or is the company localised?

c) How long has the software developer been in the library systems industry?

d) How long has the library software you are interested in been in the market?

e) Who uses this software? (Look for someone in close proximity and contact him or her with questions. If possible, make an on-site visit to see the product in action.)

**Services Availability Checklist:** The services and utilities of any LMS should be checked for the availability of following core, enhanced and value-added services–

- **Core services:** Acquisition, Cataloguing, Circulation, OPAC, Serials control, Bibliographic format support, Data exchange format support, Article indexing, Retro-conversion, Standard reports and System administration
- **Enhanced services:** Customised report generation, GUI-based user interface, Reservation facility, Interlibrary loan module, Multi-lingual support, Union catalogue, Authority file support and controlled vocabulary, Online help, Online tutorial, Power search facility, Internet support, Intranet support, Web access OPAC, Multimedia interface, Barcode support and Backup utility
- **Value-added services:** Patron self service through RFID and Smart card (self-circulation, self reservation, etc.), Online user training/orientation, Stock verification facility, Members photo ID card generation, Barcode generation, Fine calculation & receipt generation, Gate pass generation, Bulletin board services & e-mail reports, Electronic SDI, CAS support, Digital media archiving support

**Functional Checklist:** The following general features are part of software module testing, and each should be tested or conducted during the evaluation process:

- Searching Capabilities (All modules)
- Data Entry and Editing (All modules)
- Bibliographic/Item File and Maintenance
- Bibliographic Interface Software
- Authority Control
- Inventory (Circulation)
- Check-out (Circulation)
- Renewal (Circulation)
- Circulation/Management Reports (Circulation)
- Check-in (Circulation)
- Z39.50 Server
- Inter-Library Loan
- Web Accessibility
- Integrated Archiving
- Fines and Fees (Circulation)
- Notice Production (Circulation)
- Holds (Circulation)
- Recalls (Circulation)
- Patron File (Circulation)
- Reserves (Circulation)
- Report Writer
- Acquisitions
- Serials
- Electronic Databases
- Gateways
- Network Operations
- Self-Registration
- Statistics Generation
- Export and Import of data
- Fund Accounting

**Data conversion and backup utility:** The ability of the package in terms of support for data conversion from other library systems and adherence to the international bibliographic
data standards and protocols should be checked extensively. In this age of shared cataloguing systems and web integration, the LMS should also support metadata schemas and interoperability issues like XML, RDF and OAI/PMH. Backup facility in suitable media is also to be checked in view of data recovery at the time of need.

Training, Documentation and Customer support: The vendor must provide the following:

- Adequate training without fees for supervisor and operators:
  - To manage and operate the system on a day-to-day basis
  - To run file backup operations, software utilities and cataloguing utilities
  - To troubleshoot and solve simple problems and load software enhancements received from the vendor

- Complete documentation (in hard copy and machine-readable form) must be available with the package along with regular documentation updates and release notes available for local printing or downloading via www.

- The package must have support from the software vendor for hardware and software maintenance, data conversion, emergency and on-call support and disaster management.

**Hardware and Third Party Software Requirements:** The vendor should provide a complete list of hardware requirements (processor type and RAM) for server and client machines, operating system requirements and backend RDBMS (with version details) requirements. Evaluation should be based on total cost for minimum hardware and third party software requirements of the package.

**Performance testing:** Any LMS should be evaluated by checking some performance testing like transaction throughput capacity and response time, hardware functionality, module functionality, conversion testing, database loading, index building, etc.

### 6.7.2 Comparison of Automation Packages

A comparative study of LMSs selected on the basis of abovementioned checkpoints may be done by taking into account five aspects – hardware requirements, intrinsic features of packages, available services and facilities, customer support services and price.

- **Hardware and backend software requirement for LMSs:** Any LMS is application software, which requires some system software and hardware support for proper functioning. Thus, the selection of LMS should be done on the basis of careful analysis of the basic hardware and software requirements for the package.

- **Intrinsic features of LMSs:** The factors like data storage techniques, programming language(s) used in the development of software, database structure, file organisation etc., must also be taken into consideration for the comparative study because these factors will determine very important issues of maintenance, upgradation and customisation in future.

- **Services and facilities available with LMSs:** The suitability and superiority of any LMS depends on the available services, facilities and coverage of library/information activities in various modules. The whole range of services available in selected LMSs may be divided into three groups – Core services, Enhanced services and Value added services, as stated earlier

  - **Core Services:** These are the basic services necessary for day-to-day library activities and must be available with LMSs. These services may be tabulated for the comparative study as follows:
Table 6.3: Core Services in a Library

<table>
<thead>
<tr>
<th>SL. No.</th>
<th>Core Services</th>
<th>Score (1 presence of service, 0 absence of service)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Acquisition</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Cataloguing</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Circulation</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>OPAC</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Serials Control</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Bibliographic Format Support</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Data Exchange Format Support</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Article Indexing</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Retroconversion</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Standard Reports/Administration</td>
<td></td>
</tr>
</tbody>
</table>

Total Score

- **Enhanced Services**: These are the additional set of services, which will make the work of a librarian easy, smooth and seamless, and at the same time these will help users in efficient information retrieval, cross-domain searching and easy navigation.

Table 6.4: Enhanced Services in a Library

<table>
<thead>
<tr>
<th>SL. No.</th>
<th>Enhanced Services</th>
<th>Score (1 presence of service, 0 absence of service)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Customised Report Generation</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>GUI-based User Interface and Colour</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Reservation Facility</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Interlibrary Loan Module</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Multilingual Support</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Union Catalogue</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Authority File Support and Controlled Vocabulary</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Online Help</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Online Tutorial</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Power Search Facility</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Internet Support</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Intranet Support</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Web Access OPAC</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Multimedia Interface</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Barcode Support / RFID Support</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Backup in suitable media</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Z 39.50 Client and Server (Target)</td>
<td></td>
</tr>
</tbody>
</table>

Total Score

- **Value Added Services**: These are the essential work and services of library management and generally not included within the scope of a LMS. But with the development in hardware, software and connectivity, LMSs are presently trying to provide software solution for this type of work and services.
Table 6.5: Value-Added Services in a Library

<table>
<thead>
<tr>
<th>SL. No.</th>
<th>Value Added Services</th>
<th>Score (1 presence of service, 0 absence of service)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Patron Self-Service (Self-Circulation, Self Reservation, etc.)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Online User Training/Orientation</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Stock Verification Facility (RFID)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Members Photo ID Card Generation</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Barcode Generation</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Fine Calculation &amp; Receipt Generation</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Gate Pass Generation</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Bulletin Board Services &amp; E Mail Reports</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Electronic SDI, CAS &amp; CAL Support</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Digital Camera Support</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total Score</strong></td>
<td></td>
</tr>
</tbody>
</table>

- **Customer Support Services**: The support services from the software developers/agent at the right time and at the right place is a critical factor to be kept in mind at the time of selection of any LMS.

Table 6.6: Customer Support Services in a Library

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Customer Support Services</th>
<th>Score (1 presence of service, 0 absence of service)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>On Call &amp; On Site Support</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Continued R &amp; D and Software Updating</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Live Internet Support and Updates</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Training</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>User Group and Newsletter Services</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total Score</strong></td>
<td></td>
</tr>
</tbody>
</table>

- **Price**: Last but not least, we have to take the price of the packages also into consideration for cost-benefit analysis of available services in the short-listed LMSs. This factor plays an important role in our country because financial crunch is a regular feature in Indian libraries and information centres. As a general trend, commercial LMSs are costlier than the packages developed by government organisations. The price of the software rises with the number of value-added services and enhanced services incorporated in the software. In general, the pricing model of commercial LMSs may be divided into three options – Basic version (Price range: Rs. 10,000/- to 1,00,000/-), Standard version (Price range: Rs. 1,00,000/- to 5,00,000/-) and Full version (Price range: Rs. 5,00,000 onwards). The basic version supports limited collection size and does not have networking features. The standard version supports unlimited collection size and limited number of network users. The full version supports unlimited collection size and unlimited users. Moreover, commercial LMS developers also claim additional charges for customisation, onsite training,
data conversion (from other DBMS), software updates (after warranty period) and post warranty annual maintenance charges.

Self Check Exercise

6) Discuss the process of evaluation for LMSs.

Note: i) Write your answer in the space given below.
   ii) Check your answer with the answers given at the end of the Unit.

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6.8 TRENDS AND FUTURE DIRECTIONS

The rapid developments of ICT have changed the libraries over the last few decades. The library systems all over the world are going through a process of transformation to address the effects and implications of technological change. In response to the needs of the hour, library automation packages are gradually upgraded to satisfy diversified demands of library authority, staff and users by incorporating various epoch-making features. Some of these features are selected for discussion here on the basis of their importance and utilities in library management.

Unicode: Unicode enables the input and display of different languages of the world in their native scripts. Unicode compliant LMSs are able to dynamically change language at any point without affecting other system users. For example, a librarian could catalogue a record in English, and then change languages to enter record in Hindi, Bengali, Tamil, Marathi, etc. Unicode is a character representation standard like ASCII. ASCII is one byte (8 bits) code and can represent only $2^8$ i.e., 256 characters, whereas as Unicode is two byte code (16 bits) and can represent $2^{16}$ i.e., around 65,000 characters. As a result Unicode standard can represent all the scripts of the world including some obsolete scripts like Bramhi and Kharosti. Unicode provides two encoding formats – UTF-16 (default) and UTF-8 and the present standard (Unicode 4.0) can represent 50,000 characters. A fully functional multi-lingual system requires the Unicode support by operating system, programming languages, application software like DBMS and word processors. Unicode support for LMS is essential in a multilingual country like India.

Z39.50 Information Retrieval Protocol: The growth of shared cataloguing and cooperative cataloguing initiatives allow capturing of bibliographic data from remote library servers over the Internet. It reduces unit cost of cataloguing and saves a lot of time for individual libraries. However, the major problem is of variation in software and hardware. Library professionals have to learn the specific features of each system. The more the electronic resources grow, the more will be the confusion on how to access information from diverse databases. ANSI/NISO Z39.50 standard was developed to share the bibliographical information electronically and to overcome the problems of database searching with different search languages. Z39.50 is a session-oriented program-to-program open communication protocol based on client-server computing model. LMS incorporated with Z39.50 copy-cataloguing client (called origin in the standard) submits a search request to any Z39.50 server (called target), which then processes the request
and returns the result in desired standard. LMS will then place the captured record in the catalogue editor for manipulation.

**Web-centric Architecture:** Web-centric LMSs allow web-based access for staff and users and thereby ensures searching, browsing, data entry and system administration from anywhere anytime against user authentication. In such a system, there is no requirement to install client-side software in client computers. Any machine with standard web browser may be used as client for accessing library database. This architecture applies Common Gateway Interface (CGI) and Hypertext Transfer Protocol (HTTP) to ensure platform-independent access to library services. It also helps to overcome space and time barriers.

**Integrated Access Interface:** Integrated access interface refers to the ability of LMSs to combine multitude of resources and media type in a single and seamless search mechanism. Such interface should support hypermedia environment to include the following facilities services:

- Library catalogue
- Collection acquired in digital form
- Collection digitized in-house
- E-journals and e-books
- Purchase a datasets on CD ROMs
- Subject gateways
- Other library’s OPAC
- Bulletin board, Listserv & discussion forum
- Information desk
- Community information
- Manuscripts and local history collection

**FRBR-based Bibliographic Data Model:** FRBR stands for Functional Requirements for Bibliographic Records. It is a conceptual model, proposed and designed by IFLA (International Federation for Library Associations and Institutions for the management of bibliographic databases. The model uses entity-analysis techniques to identify entity, attributes and relationships in the bibliographic universe. It also identifies the relevance of each attribute and relationship to the generic tasks performed by users of bibliographic data. Packages are incorporating FRBR model for the design of central catalogue database (See Unit 6 under Block 2 of MLIS 03).

**Interoperability and Crosswalk:** Interoperability means the ability of multiple systems (with different hardware and software platforms and data structure interface) to exchange data with minimal loss of content functionality. A crosswalk is a mapping of the elements, semantics and syntax from one metadata schema to those of another. It allows metadata created by one community to be used by another group that employs a different metadata standard. Interoperability and crosswalk ensure exchange of bibliographic data among heterogeneous systems across the globe. LMSs are now supporting various standards and protocols like Z39.50, OAI/PMH, METS (Metadata Encoding and Transmission Standard) and MARC-XML to achieve interoperability.

**RFID and Smart Card Based Inventory Control:** Radio Frequency Identification (RFID) is the technology that is slated to replace barcodes in library applications. The RFID tags are placed in books and usually covered with the sticker. RFID reader and antenna are often integrated into patron self-checkout machines or inventory readers. The reader powers the antenna to generate RF field to decode information stored on the
chip. Reader sends information to the central server, which in turn communicates with the library automation software. LMSs are incorporating RFID technology for performing self-issue and return, stock verification, theft detection, identification of misplaced books and inventory counts. RFID compliant LMS increases staff productivity and ensures foolproof security. Smart card technology is used in libraries to manage public access resources. It makes the process user-friendly for librarians as well as for patrons. It supports self-checkout, payment of fees and fines and use of public access resources through using one smart card by patrons. The system also provides excellent privacy, security options and personalisation of services for library users. RFID solution works through four parts:

- **RFID Tags** — Flexible, paper-thin smart labels that are applied directly to library documents. RFID tag contains a tiny chip, which is both readable and writable and can store information to identify items in library collection. In library applications, it also stores a security bit and if needed, information to support sorting systems.

- **Antenna** — A conduit between RFID tags and the coupler. RFID antennas emit radio waves that activate RFID tags as they pass through the activation field. After a tag is activated, it can send information to or receive information from the coupler.

- **Coupler** — The link between RFID tags and the PC. The coupler can send information in two directions: It can read information from a tag and send it to the PC (read mode), or it can read information from the PC and send it to an RFID tag (write mode).

- **PC** — The link between the coupler and the library automation system. Library automation vendors have already developed software that runs on PC to provide an interface between the RFID hardware and library automation system.

![Fig. 6.2: RFID Components](image)

**Open Source Solutions**: Open Source Software (OSS) is software for which the source code is freely available. It means that anyone can access the source code and make changes. Such facilities are not available with proprietary or closed source programs. Some examples of open source software are — Linux operating system, Mozilla web browser, MySQL RDBMS, Apache web server and PERL. The open source movement has its roots in the 1970s and is continuing to grow in popularity. A number of integrated library automation packages are available as OSS for downloading and use in libraries all over the world, such as KOHA, MyLibrary, Avantika, etc. Generally, these packages are based on LAMP architecture i.e., Linux operating system, Apache web server MySQL RDBMS and PERL/PHP as scripting language. Many libraries, faced with budgetary crunches and the resultant lack of technological resources, have opted for open source solutions. The advantages of using OSS for library management are:

- Open source systems, when licensed in the typical “general license” manner, cost nothing (or next to nothing) to use - whether they have one or one thousand users. Thus use of OSS offers substantial cost savings for library institutions.
Open source product support is not locked in to a single vendor. The community of developers for a particular open source product tends to be a powerful support structure because of the pride in ownership. Also, anyone can go into business to provide support for software for which the very source code is freely available. Thus, even if a library buys an open source system from one vendor, it might choose to buy technical support from another company or to arrange for technical support from a third-party at the time of purchase. On top of this flexibility, any library with technical staff capable of understanding source code might find that its own staff might provide better internal support because the staff could have a better understanding of how the systems work.

The entire library community might share the responsibility of solving information systems accessibility issues and OSS can be highly customized to meet individual library needs.

Self Check Exercise

7) What are the uses of RFID in automated libraries?

Note: i) Write your answer in the space given below.

ii) Check your answer with the answers given at the end of the Unit.

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6.9 SUMMARY

Automation helps to greatly improve the efficiency of the library operations and services through the capabilities extended by ICT in general and LMSs in particular. The process of library automation centres on the automation package or the library management software. Modern packages are integrated in nature and offer all the facilities essential for day-to-day library management. Automation packages available in India are basically of three types – packages of foreign origin, foreign LHS packages on which applications are developed, and packages developed in India. These packages are modular in structure and most of them support all the housekeeping operations, OPAC, Web-OPAC, digital media archiving, Z39.50 based copy cataloguing and modern data capture devices like RFID, smart card, etc. The process of selection of LMS should be based on some well-defined criteria because implementation of LMS is a big investment in terms of money, time and manpower. The concept of computer-based solutions to the range of increasingly difficult problems that libraries were experiencing became potentially attractive to library professionals. ICT seemed to offer librarians the prospect of more efficient processing, improved services to library users, saving money and facilitating resource sharing and inter library cooperation.

6.10 ANSWERS TO SELF CHECK EXERCISES

1) The process of development of library automation packages is characterised by four distinct phases or generations. Automation packages of different generations may be compared against some well-defined criteria. The packages belonging to 3rd and 4th generation share many common features such as use of backend RDBMS, multi-
vendor portability, support for import and export of data, graphical user interface and support for unlimited number of documents and users. Apart from all these features, a 4th generation LMS also facilitates multi-lingual support through Unicode, web architecture, multimedia databases and platform-independent access.

2) Library housekeeping operations were highly labour intensive and basically routine clerical chores performed slowly and expensively by human beings, until recently. But automation of housekeeping operations is quite helpful for minimizing human clerical routines and thereby making library staff more productive. LMS may be viewed as an intelligent tool in this regard. A library automation package acts as an integrated solution tool to perform related activities in housekeeping such as receiving suggestions, ordering and acquisition, processing, circulation, serials control, ILL, etc. Packages generally follow modular organization of related housekeeping tasks and offer single window control panel for setting up parameters and creation of master databases.

3) Digital media archiving supports storing and controlled indexing of locally digitized resources available in different forms and formats. It allows easy and integrated access to full text resources from client machines. The advantages of such a system include – full text and field level searching OPAC integrated access remote submission of digital documents personalized information environment; single interface for local and global resources, and so on.

4) Library automation is a complex job and the following factors should be taken into account before implementing automation of a library – objectives of the library, analysis of the existing system, number of users & staff, number of books, bound volumes of periodicals & other documents, number of currently subscribed journals, circulation workload, available financial and human resources and future plan of the library.

5) Library automation packages of Indian origin are quite matured now. These packages cover all the essential library services along with various modern aspects of library automation like Z39.50 copy cataloguing, interoperability & cross-walk, RFID support, Unicode support etc. A comparative study of the features of two Indian namely LMSs SOUL and LibSys, in terms of the essential enhanced and value added services other relevant factors and features, reveals that both the packages cover all the core services related to library management. In the area of enhanced services, LibSys supports Z39.50 copy cataloguing, Unicode, RFID, Web-OPAC and web-centric architecture. These facilities are not available with SOUL. The customer support of LibSys is also better than SOUL but SOUL is available at affordable cost whereas LibSys products are priced exorbitantly.

6) Selection of a library automation package is a complex task. The process of selection should start with evaluation of packages against some well-defined checklists or criteria. These criteria should include – vendor viability (to judge reputation, customer base of the software and post installation services); availability services (to determine coverage in terms of core services, enhanced services and value added services); utility of the facilities under each module) availability of effective training and documentation (manual) including to check availability of staff training, manuals and online updates as bundled offer); Hardware and third party software requirements (to know the configuration requirements for server and client machines, operating system and RDBMS) and the throughput and operational response time of the software.

7) RFID based circulation is meant for the self-issue and self-return facility in an automated library. Apart from self-issue facility, it also supports stock verification, theft detection, and identification of misplaced books and inventory counts.
### 6.11 KEYWORDS

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authority Record</td>
<td>A collection of information about one name, uniform title, or topical term heading. An authority record can contain the established form of heading, see from references, see also from references, and notes.</td>
</tr>
<tr>
<td>FRBR</td>
<td>A conceptual data model for bibliographic database design and management. The model, proposed by IFLA in 1998, is based on entity-analysis techniques.</td>
</tr>
<tr>
<td>Integrated Library System:</td>
<td>An automated library system in which data entered in one module by other modules can be to eliminate data redundancy.</td>
</tr>
<tr>
<td>ISO-2709</td>
<td>An international standard for bibliographic information interchange on magnetic tape, developed in 1981. Most of the content designator schemes are based on this standard.</td>
</tr>
<tr>
<td>Master Database</td>
<td>A main file of information that acts as the core database. Entries made once in the master file are available for data entry work in related files.</td>
</tr>
<tr>
<td>Module</td>
<td>Functions specific to a particular system capability such as the online public access catalog, cataloging, acquisition, serial control, circulation, etc.</td>
</tr>
<tr>
<td>Open Source Software</td>
<td>Open source software is typically created and maintained by developers crossing institutional and national boundaries, collaborating by using internet-based communications and development tools. The products are usually free or sometimes through a license (GPL).</td>
</tr>
<tr>
<td>RFID</td>
<td>RFID stands for Radio Frequency IDentification. RFID system comprises three components: a tag, a reader and an antenna. The tag is paper-thin chip, which stores vital bibliographic data. Reader decodes the information contained in the chip and sends to the server through antenna. This technology is now used extensively by LMSs for patron self-checking function.</td>
</tr>
<tr>
<td>Tag 856</td>
<td>A field in UNIMARC and MARC 21 bibliographic format to accommodate electronic location and access related to a bibliographical item. The field is optional and repeatable.</td>
</tr>
<tr>
<td>Third party Software</td>
<td>These are products manufactured or developed by a corporate entity independent from vendor and provided by vendor on a non-exclusive licensing or other distribution agreement with the third party manufacturer.</td>
</tr>
<tr>
<td>Unicode</td>
<td>Unicode is a two byte oriented code that can represent a total of $2^{16}$ characters i.e, 65,536 characters. This standard is designed by Unicode Consortium and offers an ideal solution to deal with multilingual processing work.</td>
</tr>
</tbody>
</table>
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