### CHAPTER- 3

INTEGRATED LIBRARY SOFTWARE: CONCEPTS

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3.0 Introduction

The purpose of this chapter is to introduce the concept of library automation, integrated library software and related aspects. An attempt has also been made to give an account of developments taking place in integrated library software, standards and protocols related to it. The library automation software have been explained in detail, more emphasis has been given only to describe the software features.

3.1 Meaning of Library Automation

Library automation is the general term that is used when information communications, technologies (ICT) are used to replace manual systems in the library. Modernization of library housekeeping operations mainly by computerization is known as 'Library Automation'. The term 'Library Automation' in the past was used to refer to the mechanization of the traditional library operations like acquisition, serial control, and cataloguing and circulation control. Today, it is used to refer computerization of not only traditional library activities but also such related activities as information organization, information storage, retrieval and usage.

Integrated Library Systems were known as automation systems or automated systems in the 1970s and early 1980s. Before the advent of computers, libraries frequently used a card catalog to index its holdings. Computers were used to automate the card catalog, thus the term automation system. Since the late 1980s, windows and multi-tasking modules allowed modules to be integrated. Instead of having to open up separate applications, library staff could now use a single application with multiple functional modules. As the Internet grew, ILS vendors offered more functionality related to
the Internet. Major ILS systems now offer web-based portals where library users can log in to view their account, renew their books, and be authenticated to use online databases.

An automated library system usually consists of a number of functional modules, such as acquisitions, circulation, cataloging, serials, and an OPAC (Online Public Access Catalog). An "integrated" library system is an automated system, as described above, in which all of the functional modules share a common bibliographic database.

The National Library of Medicine used the term "integrated" in referring to a system in which all automated library functions are processed against a single, master bibliographic file (Goldstein & Dick, 1980). Genaway (1984) expanded the definition and described the integrated online library system (IOLS) as "a library system that uses a common machine-readable database and has two or more subsystems operational and accessible online" (p. 4).

3.1.1 Terminology

Integrated Library Software and Integrated Library System are encompassing terms. Similarly Integrated Library Management Systems (ILMS) and Integrated Online Library System (IOLS) are closely related terms. Integrated Library Software once used to be primarily as a bibliographic storage and retrieval system for catalog, circulation, serial, and acquisitions records. Integrated online library systems today are considered part of the "knowledge" or "information" software network that manages an institution's internal and external database resources. This trend presents information professionals with new challenges.
Integrated Library Software is an integrated group of computer programs that automates multiple library operations viz. Acquisition, Catalog, Circulation, Serials Control and Reference Service.

3.1.2 Advantages of an Integrated System

An integrated system is superior in several ways to one which is not integrated.

- The duplication of effort to create and maintain multiple copies of bibliographic records is eliminated in an integrated system.

- Opportunities for errors are reduced when records are entered only once, and changes are automatically propagated throughout the system.

- Library staff and patrons can have access to all pertinent information at one location.

In an integrated system, a patron can view a bibliographic record in the online catalog and also see that the book has been checked out and when it is due back to the library. Privacy of borrowers can be protected by preventing patrons from viewing borrower information. Also, patrons can tell by looking at the online catalog, in an integrated system, that a book has been ordered, but not yet received. In a system which is not integrated, that information would be available to library staff only through the acquisitions module.

3.1.3 Trends in Library Automation Software

The development of library systems needs to be considered in the context of trends, strategies and technical issues within the wider information environment. For the library, the fundamental challenge is integration, and in
particular designing ways of navigating the wide range of resources using cross-searching and linking tools.

The first generation Library Management Systems (LMSs) were module based systems with no or very little integration between modules. Circulation module & cataloguing module was the priority issue for these systems and were developed to run on specific hardware platform and proprietary operating systems.

The second generation LMSs become portable between various platforms with the introduction of UNIX and DOS (Novel Netware) based systems. The LMSs of this generation offer links between systems for specific function and are command driven or menu driven systems.

The third generation LMSs are fully integrated systems based upon relational database structures. They embodied a range of standards, which were 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.

The fourth generation LMSs are based on client-server architecture and facilitate access to other servers over the Internet. These systems allow accessing multiple sources from one multimedia interface.

Thus the progress of LMSs through the generations provides us an effective and straightforward user interface which supports access to multiple sources and services from one multimedia interface. Moreover, the latest LMSs allow customized report generation and to manipulate data and investigate various scenarios and therefore they have all the potentials to be a decision
support tool. The present generation LMSs are becoming web based models and features.

3.2 Standards and Protocols for Integrated Library Software

The library and information sector is in the midst of an era of rapid change. Developments in technology and the associated social changes are presenting new challenges and opening new possibilities. One of the focal areas of current development in information technology is increased interoperability. Integrated Library Management Systems (ILMS) development is no exception. The procurement of a new IMLS is a rare opportunity to take on some of these challenges and realise some of these possibilities.

The following are some of the major standards, protocols and features which are considered to be core and emerging ILMS functionalities.

3.2.1 MARC

The MARC 21 formats are standards for the representation and communication of bibliographic and related information in machine-readable form. A MARC record involves three elements: the record structure, the content designation, and the data content of the record. The MARC 21 formats are communication formats, primarily designed to provide specifications for the exchange of bibliographic and related information between systems. They are widely used in a variety of exchange and processing environments. As communication formats, they do not mandate internal storage or display formats to be used by individual systems (MARC 21, 2006).

MAchine-Readable Cataloguing (MARC) is a standard format for the storage and exchange of bibliographic records. Designed by the Library of
Congress in the late 1960s, MARC allowed libraries to convert their card catalogs into a digital format. All MARC Standards conform to ISO 2709:1996 Information and documentation, “Format for Information Exchange.” The advantages of having computerized card catalogs were soon realized, and now various versions of MARC are being used by all types of libraries around the world to provide computerized access to their collections. Despite international cooperation, differing versions of the MARC standard evolved, including UKMARC, INTERMARC, and USMARC, which diverged owing to different national cataloguing practices and requirements.

The Library of Congress and the National Library of Canada announced the harmonization of the USMARC and CAN/MARC formats in early 1999 under the name MARC 21. MARC 21 has also been selected as the strategic format for the British Library and now it has been accepted well world over.

3.2.2 Z39.50

Z39.50 is a client server protocol for searching and retrieving information from remote computer databases. It is covered by ANSI/NISO standard Z39.50, and ISO standard 23950. The standard's maintenance agency is the Library of Congress. Z39.50 is widely used in library environments and is often incorporated into integrated library systems and personal Bibliographic Reference software. Interlibrary catalogue searches for interlibrary loan are often implemented with Z39.50 queries.

One of the early difficulties in making use of networked information was the need to understand the specific organization of information in a collection of interest. The requirement for a common search protocol that
would solve this problem was apparent as libraries sought to share networked resources. The standard Z39.50 was developed as a client/server-based protocol for searching and retrieving information from any remote database (Z39.50, 2006).

Z39.50 (also known internationally as ISO 23950) was developed in the late 1980s and early 1990s. It defines a strict protocol for searching and retrieving remote MARC-record based bibliographic records.

The Z39.50 standard – Version 3 – was updated and approved by NISO in 2002. The standard describes 18 different functions that Z39.50 applications must support, including searching, browsing, retrieval, sorting, authentication, etc. It also outlines searching options and attributes. Any library desiring to access another library's Z39.50-accessible database must be aware of the attributes and capabilities of the target library's Z39.50 server.

Based on the MARC standard for bibliographic records, Z39.50 standardises the basic search and retrieval functions, which created many opportunities: extended services for ordering documents, updating databases and storing searches can be defined and controlled via Z39.50, and many other library processes such as Inter-Library Loan can become “open”. Vendors have been able to develop many tools to exploit the value of stored information utilizing this standard.

3.2.3 Unicode

Unicode is an industry standard designed to allow text and symbols from all of the writing systems of the world to be consistently represented and
manipulated by computers. Unicode characters can be encoded by using any of several schemes termed Unicode Transformation Formats (UTF).

The Unicode Consortium has as its ambitious goal the eventual replacement of existing character encoding schemes with Unicode, as many of the existing schemes are limited in size and scope, and are incompatible with multilingual environments. Its success in unifying character sets has led to its widespread and predominant use in the internationalization and localization of computer software. The standard has been implemented in many recent technologies, including XML, the Java programming language, and modern operating systems (Unicode, 2006).

3.2.4 NCIP – National Circulation Interchange Protocol

This standard will define the various transactions needed to support circulation activities among independent library systems. Circulation activities include patron and item inquiry and update transactions, such as hold or reserve, check-out, renew and check-in. The new protocol which is expected to support the circulation of printed and electronic materials, will facilitate direct patron borrowing, remote patron authentication, on-line payment and controlled access to electronic documents.

The NISO Standards Committee will base its work on the Standard Interchange Protocol (SIP) developed by 3M to support self-checkout systems. The 3M SIP supports a significant portion of the inquiry and update transactions to be defined in this Protocol. In addition, the 3M SIP is in wide use by a variety of libraries and self-checkout vendors around the world. Moving from this de facto base to a national consensus standard will facilitate the development of open systems required in today's rapidly evolving information environment.
The official version of the standard was published in early 2003, and ever since then, library system vendors as well as the developers of related software clients have been analyzing the standard and planning its implementation in their products. Because NCIP is such a new standard, no library systems vendor has yet fully implemented it. Vendors are working on their NCIP-based products and are testing them with each other. Some ambiguities and omissions in the standard have become evident as a result of testing and early trials (Circulation Interchange, 2006).

3.2.5 Dublin Core

An important emerging descriptive metadata standard for images and other multimedia objects is Dublin Core, a group of 15 items of information designed to be simple to understand and use. Dublin Core was designed to provide a very widely accepted mechanism to allow discovery, but with the option for different communities of users to adapt and customize it by adding more fields of particular importance to the community. In this way, the same base standard can be used for a wide variety of purposes and business models (Dublin Core, 2006).

3.2.6 XML

Short for Extensible Markup Language, a specification developed by the World Wide Web Consortium (W3C). XML is a pared-down version of SGML (ISO 8879), designed especially for Web documents. It allows designers to create their own customized tags, enabling the definition, transmission, validation, and interpretation of data between applications and between organizations. XML is also playing an increasingly important role in the
exchange of a wide variety of data on the Web and elsewhere (Extensible Markup Language, 2006).

3.2.7 Open Archives Initiative

The Open Archives Initiative (OAI) grew out of the "e-print" community, which promotes and maintains web-accessible collections of scholarly papers. The goal of these e-print collections was to reduce the cycle times for refereeing and publishing scholarly works, making them freely and quickly accessible to the academic community. The initial goal of the OAI was to develop interoperability frameworks to allow shared or federated access to e-print archives. The concepts in the OAI interoperability framework, however, have broader applications in opening up access to a range of digital content.

The OAI architecture defines a mechanism for "harvesting" or exporting XML (Extensible Markup Language)-formatted metadata in repositories on demand. This is a different path from the distributed search methodology of Z39.50 information retrieval. This was meant to correct some difficulties encountered in the implementation of Z39.50; for example, different servers interpreting queries in different ways partly due to a lack of specificity in the standard, performance constraints, and scaling problems (Open Archives Initiative, 2006).

OAI-PMH - is an Open Archives Initiative-Protocol for Metadata Harvesting - an application-independent interoperability framework. OAI (Open Archives Initiative Protocol for Metadata Harvesting) is a protocol developed by the Open Archives Initiative. It is used to harvest the metadata descriptions of the records in an archive so that services can be built by using metadata from many archives.
3.2.8 Open URL

Open Uniform Resource Locater (URL) is a specific type of reference linking process that packages metadata and identifiers that describe information objects, and points to a specific institution’s link resolution server or “resolver.” The resolver can accept this packaged data, combine it with institutional information, and turn the data into actual links. Using the information in the OpenURL, the resolver creates a menu of local services that is delivered to the end user. This “context sensitivity” enables links to be based on what is available at each individual institution. What started, as a single-vendor proprietary service became a multiple-vendor NISO standard in 2002 (Crossref.org, 2006).

3.2.9 Encoded Archival Description

Development of the Encoded Archival Description (EAD) standard began in 1993 with a project at the Library of the University of California, Berkeley. The goal of the project was to investigate the desirability and feasibility of developing an encoding standard for machine-readable finding aids such as inventories, registers, indices, and other documents created by archives, libraries, museums and manuscript repositories. The project grew from the need to include information beyond what was provided by MARC records. Participation increased and a prototype standard was released in 1996. Work on EAD continues. As a potential international standard, EAD is maintained in the Network Development and MARC Standards Office of the Library of Congress in partnership with the Society of American Archivists. Encoded Archival Description is the SGML/XML metadata format used by archives, manuscript libraries and museums to encode finding aids (EAD, 2006).
3.2.10 Metadata Encoding and Transmission Standard

An important emerging standard for interoperability of digital collections is the Metadata Encoding and Transmission Standard (METS), which provides a uniform framework for managing and transmitting digital objects. The Making of America II project (MOA2) developed an encoding format for descriptive, administrative and structural metadata for textual and image-based works. Supported by the Digital Library Federation and the Library of Congress, METS builds upon the work of MOA2. It provides a format for encoding metadata necessary for both management of digital library objects within a repository and exchange of such objects between repositories (or between repositories and their users). Leading academic and research libraries are citing METS as an important standard for digital library interoperability and seem to be rallying behind this standard (METS, 2006).

3.2.11 Links to E-Learning and Digital Asset Management

Most universities and colleges are adopting a multi-faceted strategy with digital content. That is, they are becoming users, developers and distribution channels for diverse content types. The Open Course Ware (OCW) initiative reflects a growing trend towards collaborative content creation and dissemination.

The implications of the Web as a channel for inter-university content collaboration are quite significant. Making this inter-university content exchange happen will require a significant investment in digital assets creation and rights management.
3.2.12 Portal

A portal is a personalized and customized gateway designed for useful and comprehensive access to information, people and processes. Portal content can include a wide variety of features, information, tools, and communication devices. A portal has many characteristics, but essentially just one concept – that of integration. Relevant information is consolidated together into one cohesive page, or set of frames, as a set of channels.

Any library portal would either have to be a vertical niche portal, or a university's top-level portal, or one of many university portals. Most portal users want library information, such as the catalog, access to electronic journals and licensed databases, the books they need to return, library floor plans, e-reserves, and may be even the lists of new acquisitions that match their profile.

3.2.13 Federated Search

Federated searching is a process that allows users to search across a number of information resources simultaneously. It is sometimes referred to as multi-searching, meta searching, broadcast searching, integrated searching, portal searching, consolidated searching, distributed searching or cross-database searching. The advantage of this sort of searching is that it removes some of the complexity of searching different databases with different interfaces and search commands. With a well-configured federated search tool, users would not need to know which database to select. They would simply choose a discipline area and enter their search terms. They would then be presented with integrated results from a range of databases, catalogues, websites, etc.
3.2.14 Integrating Access to Electronic Resources

Integrated Catalog provides a seamless links to electronic resources, cataloging to the table of contents level, one-stop shopping, enriched subject headings, metadata fields. The provision of electronic access to information is a priority in the academic library sector, and the advantages of information delivery over the network to desktops throughout the campus and beyond are clear. Increasingly, users are demanding a shift from conventional means of library provision to the "virtual library" which never closes. Twenty-four-hour access to information resources, in combination with the development of self-services, is one way to achieve this ideal. Information Services in the present era of libraries has embarked on a number of projects to meet the increasing demands of the users for better access. This is consistent with one of the fundamental strategic aims of Information Services to provide access rather than holdings.

The standards and protocols and the concepts presented above play a major role in integrated library systems owing to the emergence of internet and electronic resources.

3.3 Integrated Library Software Used in Indian University Libraries

Computerising Indian libraries has been a rather slow process until recently, which is largely because of the lack of trained manpower and availability of suitable cost effective library automation software. The automation routines and information services were initiated in the early 1960s. INSDOC, Delhi and DRTC, Bangalore were in the forefront with regard to carrying out experiments in application of computers in the libraries. Since the late 1980s computerisation has gained momentum. Libraries of BARC, IIT,
TIFR Mumbai had started using computers in their activities. In the late 1990s the situation has changed completely, more and more library professionals getting trained in computer application. NISSAT and Library Networks are also played a major role in carrying out experiments in application of computers in the libraries. To facilitate the modernization and to promote resource sharing among the libraries and information centers attached to these academic institutions, the University Grants Commission established Information and Library Network (INFLIBNET) during 1991. One of the major objectives of INFLIBNET Programme is to modernize libraries and information centers (Patel and Krishan Kumar, 2001).

The automation of libraries and their networking have become a very important task of today for effective resource sharing among libraries. Thus there is a need of good hardware and software which libraries can use for automating their day-to-day functions, creating databases of their holdings and providing access to the users online. In India many software are available for these activities and many libraries have automated their various functions. Some of these are integrated packages covering many functions while others concentrate on specific functions including cataloguing and management of information. The library management software which are being used by the university libraries selected for this study are described below.

3.3.1 CDS/ISIS

CDS/ISIS (Computerized Documentation System/Integrated set of Information System), developed by UNESCO is a menu-driven generalized information storage and retrieval system designed specifically for the structured non-numerical databases (CDS/ISIS Unesco Portal, 2005). CDS/ISIS is not a
turnkey tool for automating the libraries. However, it provides a set of tools, which can be used to develop library automation package. Many library automation packages have been developed using CDS/ISIS. SANJAY is one such application, developed by NISSAT in collaboration with DESIDOC. CDS/ISIS is available from the national distributors of respective countries.

The automation of library activities started in India with the introduction of CDS/ISIS. NISSAT, a national distributor of CDS/ISIS organized with the help of other professional bodies a number of training courses on application of this software in information activities. As a result, a large pool of trained manpower developed all over the country. Some organizations from the experience of use of CDS/ISIS, MINISIS etc. developed their own LMSs e.g. DESIDOC developed DLMS (Defence Library Management System), INSDOC came with CATMAN (Catalogue Management) and SANJAY was developed by DESIDOC under NISSAT project by augmenting CDS/ISIS (Ver. 2.3) for library management activities.

Although CDS/ISIS (Computerized Documentation System/Integrated set of Information System) is not a full-fledged integrated library software, it has been extensively used by many libraries prior to venturing into the integrated library software. A number of libraries in India are still using CDS/ISIS. The range of ISIS users includes all types of libraries. More than 5,000 libraries are licensed users worldwide.

The software is highly useful and fast in creating bibliographical databases for information storage and retrieval. But, the menus provided in the package are not sufficient for housekeeping operations and other services such as acquisition and circulation. However, the software allows creation of
additional menus and writing programmes for all these activities through Pascal turbo language. Data can be exchanged according to international standard ISO 2709. It can be run on local area networks and well elaborated documentation is available. Its latest version 3.071 was released in December 1995 and later an updated version was also released. Various journals and list serves on internet publish regular columns on the development in CDS/ISIS. Earlier many universities and institutions offered regular courses on CDS/ISIS, and hundreds of librarians have now become trained users. Initially INFLIBNET Centre also promoted this software by training professionals from university libraries to automate their libraries.

In the beginning, CDS/ISIS was created as a multi-lingual software, providing integrated facilities for the development of local linguistic versions. Thus, although UNESCO distributes only the English, French and Spanish versions of the package, user-developed versions exist virtually in all languages, including special versions which UNESCO helped in developing, for Arabic, Chinese and Korean. A Windows interface between CDS/ISIS and IDAMS, the UNESCO software for statistical analysis, has also been developed.

WinISIS is a Windows version of the CDS/ISIS system. The first Window version was distributed for testing in May 1995 and the first WinISIS version officially realized was version 1.31 launched in November 1998. The latest version is 1.5 (build 3) and the updated versions are also released in time to time.

3.3.2 LibSys

LibSys is an integrated library software developed by InfoTek Consultants Pvt. Ltd., New Delhi. Its continuous growth for the last 15 years, has
made LibSys a de facto standard for libraries in India. Its acceptance in global market further has strengthened its popularity across the country as the most field proven library system in a wide spectrum of libraries with unmatchable depth in functionality and features.

With an open system architecture (3-tier) since its inception and its continuous transition from a host multi-user system to Client-Server implementation and finally a total web-based solution, LibSys makes an advanced multidimensional library system (LibSys, 2006).

LibSys handles Indian languages and scripts using ISM Publisher and GIST of C-DAC. There is an additional 'Unicode' support in LibSys that facilitates handling of both International and Indian languages and scripts. Additionally, it provide for analytical indexing of journals, and an advanced user-friendly OPAC interface to access all library materials through a web browser as well as Windows based OPAC.

When it comes to choosing a suitable platform for LibSys implementation - there are many possibilities such as WINDOWS (NT/2000/XP), UNIX (various flavours) and LINUX, giving a feel of open system for expandability and cross migration in future. Besides its own proprietary database handling capabilities, any preferred industry standard RDBMS such as SQL Server, ORACLE, MySQL etc. can be used as a back-end.

For a modern library having Electronic Surveillance Gate based security system installed, the LSmart interface in LibSys supports various self check-out counters, Book drops stations, etc. based on RFID or any other advance technology.
Adherence of LibSys to standards such as MARC and Z39.50 makes it suitable for cooperative networking and resource sharing. As LibSys can handle digital contents along with various multimedia files and electronic resources, implementation of a virtual library is a distinct possibility. As an Integrated Library Management Software LibSys has all the traditional as well as modern housekeeping operations. Its advanced programming features guarantee maximum productivity, ease of use, security, optimum functionality, and top performance.

3.3.3 Troodon

Comtek Services Private Limited has developed Troodon, a user-friendly an integrated multi-user and retrieval software package for library automation covering Library operations as per standard procedures such as Online Public Access Catalog (OPAC), Circulation control, Acquisition control, Serials control and Data maintenance. Troodon is an integrated package linking all the relevant functions in the library.

It has been designed to suit the government of India library procedures and financial rules of the government and so is ideally suitable for the government libraries. Troodon is user-friendly multi-user and multitasking. The package is developed to work on DOS, Windows 95/Windows NT and UNIX also. The package is user friendly and can be operated by library staff without much prior knowledge of computer operations. Some of the special features of the Troodon software are that it is a Multi-user, Multi-lingual package; Web enabled to work perfectly on intranet/internet; GUI Based (Graphical User Interface) and also compatible with Barcode technology and Multimedia. It uses
Common Communication Format (CCF) to facilitate resource sharing among libraries. Troodon 3.0 is the latest version (Brochure Troodon, 2005).

3.3.4 SLIM

SLIM library management software is a product of Algorhythms Consultants Pvt. Ltd. Pune, established in 1989. The software is constantly upgraded to remain in the forefront of technological developments in the field of IT and to cater to the changing scenarios in managing libraries. SLIM++ is a 32-bit application developed on the Windows platform. This software comes in various modules, and each one of them can get integrated with the other modules at any given point of time. This software comes with an unlimited multi user license.

The latest product - SLIM21, a product on Microsoft Dot Net technology, offers remarkable features to serve the requirements of a digital library. It provides for inclusion or exclusion of the metadata elements that are used in the creation of the catalogue entry. The cataloguing of digital items is done by using exactly what the library chooses. It provides initial versions of data entry formats for various types of items. Libraries can build their own formats by modifying these. It covers, and extends if required, the popular Dublin Core format.

SLIM21 provides for data entry and storage in Unicode. It is an integrated, multi-user, multi-tasking library information software for the Windows environment. Cataloguing adheres to popular international standards and it is designed and developed in modules to take care of complete functionality required for automating libraries. It supports to configure software for library by selecting one or more of these standard and add-on modules. It is available in standalone as well as in network version. Informatics (India)
Limited, Bangalore is the authorised distributor of Algorhythms, Pune in India (SLIM++, 2006).

3.3.5 Techlib Plus

Basis TechLib Plus is an integrated library software developed by Information Dimensions, USA. Basis TechLib is Open Text's upgrade of the character cell product TechlibPlus, an integrated library software that was introduced to the library community in 1989 by Information Dimensions (IDI). BASIS is a robust document collection and high performance search and retrieval solution designed for specialized archive and information center solutions (Basis Techlib, 2005).

Techlib is an integrated library management solution for traditional and digital collections that provides libraries with an infrastructure to manage digital documents, Internet resources, and multimedia along with print materials. Techlib is a fully Web-based, integrated application for managing library resources - including traditional and digital collections - and automating daily library operations. It includes modules for cataloging, circulation, serials control and acquisitions fully integrated with the tools necessary to meet the rapidly changing requirements of the digital library. Techlib is available standalone or integrated with Livelink to extend collaboration capabilities to the library catalog.

Basis Techlib (the interface used by library staff for cataloging, circulation, etc.) uses three-tier system architecture to deliver the integrated library system to the desktop. Components of the system include the BASIS Techlib database, the interface developed by using the Microsoft Active
Platform (Active Server Pages (ASP)) and the browser. In addition, Microsoft Access and Seagate's Crystal Reports are used for report production.

3.3.6 SOUL

SOUL (Software for University Libraries) is developed by INFLIBNET Centre, Ahmedabad. One of the objectives of the INFLIBNET Centre was to develop a Library Management Software for automating the university libraries. Keeping in view the latest trends in Information Technology, it has developed a Windows based Library Management Software called "SOUL", which provides total solution for Library Automation of university libraries in India (SOUL, 2006).

Keeping in mind the fact that university libraries are complex entities, having large collections and serving a huge clientele, the software has the flexibility. The SOUL works on Windows platform and it needs MS-SQL as the backend software. SOUL is designed using Client-Server Architecture, which imparts extra strength to storage capacity, multiple access to single database, various levels of security, back up, and storage facilities etc. This software has been designed after a comprehensive study of different library related functions practiced in university libraries.

This user-friendly software is quite easy to work with. The software comprises all the necessary house keeping operations such as Acquisitions, Catalogue, Circulation, OPAC, Serial Control and Administration modules. The in-built network feature of the software will allow multiple libraries of the same university to function together as well as have access to the distributed databases installed at various university libraries and union catalogue mounted at INFLIBNET by using a network.
SOUL handles Indian languages/scripts by using ISM Publisher and GIST of C-DAC. It adheres to all international standards such as MARC 21, ISBD, ISDS, AACR2, Language Codes ISO 639:1988, Country Codes ISO 3166, ISO 2709 format, etc for data input and other functions. It has inbuilt Barcode software also to generate and print barcodes for items and members.

3.3.7 VTLS

Visionary Technology in Library Solutions (VTLS), Virginia, USA based company developed a comprehensive integrated library automation software. VTLS has brought out a number of products now VALET is a popular library management software better known as digital library software. It has Virtua a integrated library management software. It has been developed on Windows and Unix platforms. In addition to the standard ILS modules, acquisitions, cataloging, circulation, and serials control, VTLS will provide a number of customized solutions to manage library better. It has features such as InfoStation (Web based); Ad Hoc Profiler (parameterization tool); Z39.50 OPAC; Interlibrary Loan (ILL); 3M Self-Check Interface; etc. (VTLS Inc., 2006).

3.3.8 ADLIB

ADLIB software is developed by Adlib Information Systems, Netherland. Most of the library functions can be carried out by using this integrated library software. The software has all the usual housekeeping operations. Web interface of catalogue is also possible. Primarily developed on DOS and Unix platforms now it is also available on Windows platform (ADLIB Information Systems, 2005).
The salient features of the library software are:

- Has extremely user friendly interface with very good search facilities
- Has excellent and powerful data input feature with online help and validation during data operation to ensure high quality of the database.
- Acquisitions management – tracking vendor files, budget, order, receiving, claiming, etc.
- Circulation control – check in/out, reserves, holds processing, etc.
- Serials control – check-in, routing, claiming, binding, etc.
- ILL management, Unicode, MARC interface, Z39.50, etc.

### 3.3.9 Librarian

LIBRARYAN, a library management software, is developed by Soft-AID Computers (P) Ltd, Pune. It is a complete Library Management Software capable to manage all the functionalities of the library house keeping operations and information services. Suitable for all kind of college libraries and other academic resource centers. Other than books software can also be used to manage CDs, DVDs, Flip Charts, Drawings, Scan Documents, X-Ray Reports and any other present and future medias (*Brochure on Librarian Software, 2004*).

LIBRARYAN Software can also be used by the Music / Movie Libraries and associations to manage stock and circulation of their collections. Its salient Features are:

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- Boolean Search facility
- Supports AACR-2
- Supports Multi-Users Environment and Multi-Location Web Interface
- Web Interface: Access to free e-journals and e-books through the software
- Multimedia Resource Management (Embedded)
- Link Menu facility, i.e. LIBRARIAN Software links with other applications like MS-WORD.
- Circulation Module with member/borrower profile and lending rules
- Budget Management Module handles total library budgeting
- SDI Service
- Object-Integration like Audio/Videocassette, CD, Flip Charts, Posters can be entered and can be searched through keywords
- In-built Barcode software and printing
- Around 50 types of reports available, which covers all the reporting part of a library administration and management
- Cataloging, Circulation, Serials management, etc.

3.3.10 NewGenLib

New generation in library automation is popularly known as NewGenLib which is a web-based library automation and information retrieval system is developed by a charitable trust called Kesavan Institute of Information and Knowledge Management (KIIKM) set up at Hyderabad (NewGenLib, 2006).
NewGenLib leverages the World Wide Web to build library and information networks by using international standards. It is an Integrated library automation system developed on the technology by using the n-tier client-server architecture that uses the J2EE Application server for efficient transaction processing and database management. It uses Java and XML messaging between client and server, and is both operating system and database independent. It has Applet-based presentation layer with support for Java Web Start. Specially designed for use not only in single libraries but also to cater to hierarchical as well as distributed networks of libraries.

Functional modules of NewGenLib include Acquisitions, Cataloguing, Circulation, Serials Control and OPAC all of which use a single integrated database making for non-redundant data storage, efficient transaction processing and searching. Context-sensitive help is provided in all modules. It provides support to the full range of the MARC-21 format. Unicode 3.0 is compliant with virtual keyboards for multilingual input, query formulation and output. The transformation format used is UTF-16 covering several scripts, including those of Indian languages. Email and instant messaging integrated in the different modules of the software to ensure efficient communication between library and users, vendors. All modules of NewGenLib run on the Web, on an Intranet, or in a VPN (Virtual Private Network) in n-tier client-server server mode.

3.3.11 Nirmals

The software is developed by Nirmal Institute of Computer Enterprise, Tiruchirapalli, Tamil Nadu. Nirmals Software is a complete Library Management Software capable to manage all the functionalities of the library housekeeping operations and dissemination of information to the library
clientele. The software is suitable for small and big libraries including schools, colleges, universities, etc. It works on Client/Server windows based RDBMS software (Nirmals, 2006).

Nirmals Software can also be used by Libraries to manage stock taking, circulation of their collections and other traditional housekeeping operations. The following are some of the salient features:

- Supports Unicode (Multilingual)
- Supports Multi-Users Environment and Multi-Location Web Interface
- Web Interface: Access to free e-journals and e-books through the software
- Nirmals Software follows and allows to standards such as MARC 21, ISBD, ISDS, AACR2, ISBN, Language Codes ISO 639:1988, Country Codes ISO 3166, ISO 2709 format for data input
- It represents 140 universally recognised languages through Unicode UTF-8 without giving room for language barriers.
- It supports all standard search features including user interactive module for search called Boolean Search
- SDI Service and In-built Barcode software and printing
- Various kinds of reports, which covers all the reporting part of a library administration and management are available.
3.3.12 In-house Developed Library Management Software

In-house software are developed by many institutions because of the non-availability of a good library management software. Mostly, in the beginning, institutions tried to incorporate the database creation and catalog module. Libraries used the software like dBASE, FoxPro and even some are with Oracle also. Later libraries tried to automate Circulations module also. Many libraries tried to automate entire library housekeeping operations, but in many cases fragmented applications were available as in catalog, circulation, etc. In-house systems require staff expertise in programming and developing software that most libraries do not have. Staff expertise is also needed not only in the development stage but also in the installation, configuration and maintenance of the system. Another common problem is the absence of proper documentation that will provide the programmers, who may have to enhance in the future the system, the necessary information. Technological developments, such as client/server architectures and standardized protocols helped the library automation software development firms brought out the software in reasonable cost and with a good number of applications.

3.4 Trends in Integrated Library Software

The face of the integrated library systems industry has dramatically changed. Once used primarily as a bibliographic storage and retrieval system for catalog, circulation, serial, and acquisitions records, integrated online library systems are today considered part of the "knowledge" or "information" software network that manages an institution's internal and external database resources. This trend presents information professionals with new challenges.
Integrated library systems are also affected by rapidly changing technology. Periodic updates for library systems do not necessarily enhance the functions of existing systems or system resources. Current information technology requires a software that allows easy integration with local network resources and is designed to accommodate a library’s constantly changing needs and services.

The Internet has had a dramatic impact on the tools which libraries use to index, supply, and deliver information. Intranets have an equal impact, a fact unfortunately not always recognized by information professionals and vendors.

3.4.1 Future Trends in Integrated Library Systems

The definition of an integrated system has begun to change from a system which shares bibliographic records among local functions and modules to a system which exchanges information with many other systems outside of the library. Technological developments, such as client/server architectures and standardized protocols for passing information from one system to another, facilitate this integration of outside information sources into local systems. For example, an online ordering system might allow a librarian to search a publisher's bibliographic database, select records of books to be purchased, and download those records from the publisher's database into the library catalog. Also, some libraries with expanded integrated systems offer patrons access, through their local OPACs, to other bibliographic and non-bibliographic databases both inside and outside the library and to OPACs of other libraries.

Features are also needed in addition to the traditional integrated library software such as Digital Library System, Link Resolver, Metasearch interface, Content Management System, Electronic Resource Management, etc.
3.4.2 The Open Source Software Movement

Open source software is a software the source code of which is made freely available for inspection, modification and incorporation in other software, as distinct from being a closely guarded trade secret of owner companies (Schlumpf, 1999). The licences typically specify that applications and source code are free to use, modify and distribute, so long as these modifications, uses and redistributions are similarly licensed (Chudnov, 1999).

In the last few years open source has entered the mainstream software market, with the widespread adoption of packages such as Linux (operating system), mySQL (relational database), PHP, Perl, Python (scripting and programming languages), Apache Web Server, and the Zope content management system. Its effects have begun to be felt in the library automation marketplace as open source projects develop within the library community.

It is claimed by its advocates that the open source approach has the advantage of giving libraries direct control over the technology they use; systems librarians can have a direct role in developing the software and can focus on functional enhancements which are of local value but which would not be viable commercially for a mainstream supplier. These can then be shared with the library community, compensating for the relatively small size of the library systems market (Mickey, 2001). Development of open source products is generally rapid and more responsive to users compared with that of commercial software. The open source system has the advantage of promoting software quality and reliability through peer review. Where adequate technical resources exist, it has the advantage of relatively low cost.
A number of experimental library systems are in existence: Avanti, OSDLS/ PYTHEAS, Koha, FSLP and Open Book. Schlumpf (1999) believes that these have the potential to compete seriously with commercial systems. However, these are relatively small-scale projects, and it is unlikely that there could ever exist a group of potential software developers sufficiently large and well resourced to make them viable. There are some important efforts underway, including the Evergreen ILS being developed for the Georgia PINES consortium. If that project turns out to be a great success, it could bolster interest in open source ILS opportunities (Breeding, 2002b). Open source software abounds in other parts of the library automation scene. It is more likely that libraries will develop more specialised open source applications which are interoperable with, but additional to, commercial systems; successful examples to date include Prospero (an e-mail ILL tool), Jake (a reference tool for medical journals), SWISH-E (a Web indexing tool), Free Reserves (course reserve and management software) and XMLMARC (a utility for converting MARC records to XML (Mickey, 2001). Many of the commercial automation systems rely on open source components such as the YAZ Z39.50 toolkit from Index Data, the Apache Web server, Apache Tomcat, Apache Axis, and Linux, to mention just a few. The open source DSpace and Fedora institutional repository platforms have gained very high levels of use in libraries.

3.4.3 Application Service Providers

The ASP concept is still relatively new to the library systems market. Application Service Providers (ASPs) are Internet-based services that allow one to rent software or services on a per-use or subscription basis. The software and data sit on the ASP's server and are accessed via a simple Web connection, available to anyone within the customer organisation (Dzurinko, 2000). In the
library context, a library ASP hosts a library's database at a central location, manages the system application software, and provides hardware and software support for the application. The library's PC acts as a thin client, i.e. provides access to the system software via a Web browser through the library's firewall. Data content and integrity remain under the control of the library; hardware and software maintenance and support lie with the supplier. Initial system purchase price is paid over the period stated in the library-supplier contract.

The ASP approach is likely to offer considerable advantages, particularly where local IT support or library systems expertise is limited, and where there are no extensive requirements for customisation. Migration to an ASP-based system is reported to be very rapid compared with conventional migration (Dzurinko, 2000). A high speed Internet connection is essential, and the terms and conditions of the contract need to be specified in considerable detail. Security is also an important issue; a secure ASP has considerable security advantages over a locally hosted system, whereas an insecure one is a considerable liability (Stein, 2001).

3.5 Conclusion

The library and information sector is in the midst of an era of rapid change. Developments in technology and the associated social changes are presenting new challenges and opening new possibilities. The available products are mature in terms of basic functionality, but the library software development has entered a volatile, confusing and yet interesting phase; the major developments in library technology now appear to be taking place in the areas which are outside the scope of integrated library systems as conventionally
understood. It is evident that the library systems development are driven by
Internet trends (Richardson and Hopkins, 2004).

Presently many good software packages are available for library
automation in India. It is observed from the literature that there have been
spectacular developments in the field of library automation all over India.
However librarians should be prepared to meet the new challenges. They should
have adequate understanding about the hardware and software options available.
All libraries and information centres should use standard software packages for
automation and database creation to facilitate exchange of bibliographic records
between groups of libraries. There is continuous need for further improvement of
the existing library software or development of new suitable software for
meeting the future needs of libraries’ automation because users in future will
prefer to use networked information or resources at national and international
levels through LANs, WANs, Intranet and Internet.
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