Enhancing Network Applications in a University Library : A Case Study

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Absract

Information and communication technology is transforming the society, education, business and the economy. The Library managers must understand these changes in order to position their organizations to flourish in the networked environment to provide effective information services to the users. In the Local Area Network(LAN) world, an attempt has been made to describe the network establishment in Gulbarga University Library and their experiences to enhance the techno-based services to the users. Besides, network architecture with optical fiber, hardware and software requirements for the effective implementation of LAN in the library are explained in detail. Further explores steps taken to establish CD-ROM databases; Internet Lab in accessing electronic resources under UGC Infonet, status of DBMS, library web page and Institutional productivity. Future plan for establishment of Learning Resource Centre, Provision of video camera, retrospective bar coding of collections and touch screen in the library are highlighted.

Keywords: Library Automation, Digital Library, Networking, IT based Services

0.   Introduction

'Without vision, the people perish' we read in the Bible, and in turbulent times, vision becomes ever more important. The enormous changes being forced upon librarians as they seek to harness the possibilities of electronic information without being overwhelmed by its quantity, variety and transience make it imperative that we have a clear vision of the future we are trying to create. As librarians we are forced to ask ourselves whether we are to pursue the technological imperative to its logical conclusion, so aiming to become the masters of cyberspace (Brophy, 1997). The outlook and taste of users have changed enormously and they become more information conscious than ever before, demanding the need-based information timely to meet their nascent needs. This could be achieved by adopting Information and Communication Technology in library by making best use of it in extending timely needs of users.

In the contemporary environment, characterized by rapid technological developments and the proliferation of information resources, information literacy empowers users to access and use resources more effectively and efficiently. It is the first and foremost duty and obligation on the part of Information Managers to make provision for Information access by optimizing the information technology through enhancing network applications especially in a university set up. In this new networked information age 'we are seeing the emergence of a web of inter-organizational trust relationships in support of … information access, implemented and expedited through new authentication and access management systems (Lynch, 1999).

In India, academic and research Libraries have made a significant investment in the information technology gadgets and associated technologies for network establishment in library to provide technology based services to the users and automate the in-house activities. A matter of concern has been how best the Library and Information Service Managers can exert significant influence as experts in locating, identifying, organizing, maintaining, compiling, and providing access and evaluating information resources using network skills to enhance efficiency and build the image of librarianship for survival and visibility.

An attempt has been made in this paper to notify the significance of network applications in a university library and examines strategy adopted for establishment of Local Area Network in the Gulbarga University Library to improve the information access to the user community by incorporating the strong technological applications.

1.   Information Technology in Indian Universities : A Scenario

Advancement of technologies such as dramatic increase of digital storage media, the convergence of telecommunication and broadcasting, the availability of wealth of resources accessible through internet and reducing cost of computers with multimedia and Internet capabilities will certainly have major influence to support information needs of library users. There are also an exponential growth rate of electronic publications either online or in CD-ROMs. The emergence of Internet and its worldwide Webs expose libraries to the wealth of global information resources available in major libraries and institutions worldwide.

Thus, it is an established fact that, Information technology promotes equity, quality based education and information content at their fingertips. The extent of Information technology being used in Indian universities is depicted in below table (Shafi, Z. 2002*)

Table - Availability of IT in Indian Universities

Category	Universities					Total
	Conventional	**Deemed**	**Non-Agricultural**	**Agricultural**	**Open**	
Computers						
>1000	1	-	1	-	1	3
500-999	1	1	1	1	-	4
250-499	11	2	-	1	-	14
50-249	13	3	5	8	-	29
<50	6	2	5	5	2	20
LAN	18	6	11	12	1	48
Internet	24	6	11	12	1	54

Information about the availability of IT infrastructure in Indian universities is shown up to 2001, but there has been tremendous spurt in adoption of IT in Indian academic and research library from 2002-2004, which is a good sign for the university libraries to strengthen their infrastructure to meet the growing information needs of user community.

2.   Gulbarga University Library : A Pioneering Center of Excellence

Gulbarga University Library is the heart of the university catering to the academic and research information needs of the user community has now established Local Area Network (LAN) comprising of twenty computer systems using SQL Server with dedicated library software SOUL (Software for University Libraries). This has facilitated the staff to execute their routine library activities using computers, avoiding manual processing mainly viz. Purchase of Books/ Journals/ electronic materials, placing orders, renewal, issue/ return of documents and rendering e-services i.e. searching library catalogues, bibliographical services, Current Awareness services, Content Alert services and monitoring of the work in progress of the library in-house activities and services.

2.1 Client Server Network

A well-planned Client/server technology creates a powerful environment that offered for storing and managing data has been established in the library. The server receives the structured requests from the clients, processes them, and sends the requested information back over the network to the client. This network is the most efficient way to provide:

- ✍ Database access and management for applications such as spreadsheets, accounting, communications, and document management.
- ✍ Network management.
- ✍ Centralized file storage

Because the file services and the data are on the back-end server, the servers are easier to secure and maintain in one location. Data is more secure in a client/server environment because it can be placed in a secure area away from users. The data is also more as the multi user operating system used is Windows 2000 Advance Server to prevent unauthorized access to files.

The SOUL (Software for University Libraries), a dedicated library software is being used in the library for executing library activities and services with SQL 7.0 version, as a database server referred as the server back end.

The database query is sent from the client, but processed on the server and the results are sent across the network back to the client, which involves:

1. The request is translated into SQL.
2. The SQL request is sent over the network to the server.
3. The database server carries out a search on the computer where the data exists.
4. The requested records are returned to the client.
5. The data is presented to the user.

2.2 Ensuring Hardware and Software Compatibility

In today's computer industry, hundreds of manufacturers develop hardware and software and evaluating and selecting hardware and software is a major part of planning for network implementation. Keeping in view of future up-gradation and compatible, the following hardware and software's have been procured for the library.

IT Infrastructure in the Library	
Hardware's	**Quantity**
HP TC 2120 Main Server Hyper Threading Support @ 3 Ghz	1
Computers Systems	41
Compaq P-IV Hyper Threading Support - 20	
PCS P-IV - 10	
HCL P-III - 10	
P-I - 1	
Scanners	2
Switches (24, 16, 8 Port)	4
Printers	10

Software's	
SOUL (Library Automation Software)	1
SQL 7.0 version	1
Windows Advance Server 2000	1
MS-Office 2003	1
Data Protection and recovery	4
McAfee Firewall	1

2.3   Network Architecture Layout

The establishment of LAN architecture layout in the library (Figure 1) depicts that, E-Cat 6 cable has been used with D-Link switches to connect various nodes in the library. The load time for SOUL operation is about 4 seconds, which has lead to enhance the speed of access in the first floor by drawing Optical Fiber Cable instead of E-Cat6 cable, is the significance of this LAN network established in the library. The LAN Server is housed in CD-ROM Lab and necessary provision for OPAC Nodes at the entrance (3 Nos.), Reading Hall (2 Nos.) and Serials Control (2 Nos.) have been made in the library, with only searching options opened for the users. While Internet server is connected through V-SAT drawn from the Computer Centre of the university through Optical Fiber Cable for accessing e-resources under UGC Infonet.
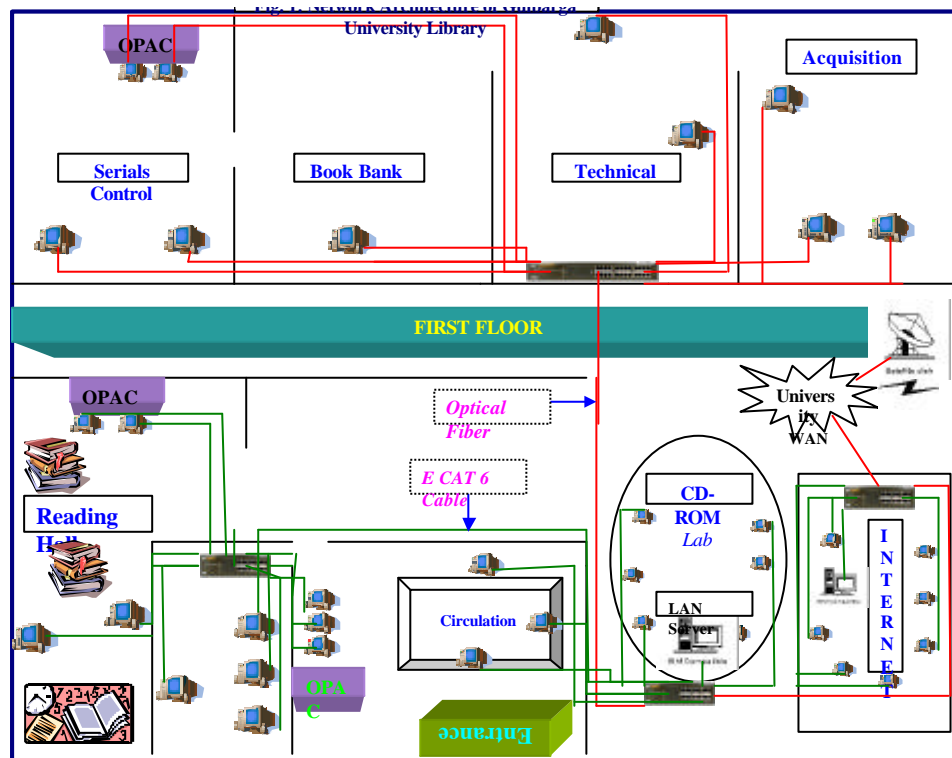

Figure 1. Network Architecture of Gulbarga University Library

After implementing security for the network's physical components, the administrator ensured that the network resources would be safe from both unauthorized access and accidental or deliberate damage. Policies for assigning permissions and rights to network resources and access library modules of SOUL are at the heart of securing the network (Figure 2). The two security models have evolved for keeping data and hardware resources safe in the library are by using password-protected shares and access permissions depending upon the nature of their work in the library.
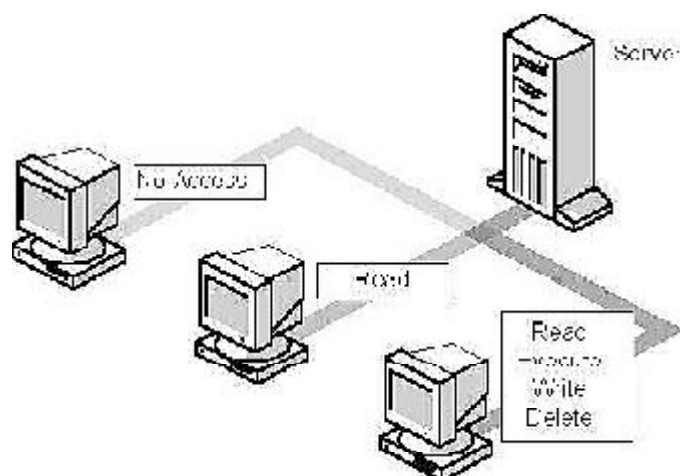

Figure – 2: Access Rights of Server

In this networking environment there must be assurance that sensitive data will remain private to secure sensitive information and to protect network operations from deliberate or unintentional damage. The major threats to the security of data on a network are unauthorized access and electronic tampering. The options available to protect the software at Windows Advance Server 2000 and specialized Data Protection and recovery software and McAfee firewall have been used for the safety of data. This is in addition to the regular backup of the data in CD-ROM. However, for the OPAC nodes kept for the users are prone to corrupt frequently has been monitored by security options and system restore utility tools available from Windows operating system.

2.4   Database Management System

Although, the library has started its automation a decade ago using CDS/ISIS, the retrospective conversion is now being switched over to SOUL. As on date, the Books collection in e-format is about 1,02,000 records with up-to-date Theses (5600) and Serials holdings (425) available in SOUL is open for Public Access Catalogue in the library for the user community.

The library has explored all the modules of SOUL including Circulation section for issue and return of books. This e-service has been started this year, by taking initially a few departments i.e. Library and Information Science, Mathematics, Statistics, Physics, Applied Electronics, Chemistry, Biotechnology, Computer Science and Management Studies comprising of faculty and research scholars. A well-documented plan has been worked out before implementing automation in Circulation unit, working out for privileges of issue/return and the type of users.

2.5   Access to CD-ROM Databases

CD-ROM technology has been established under networked environment to promote the concept of Digital Library. It is one of the pioneer libraries in the country to adopt this latest technology using CD NET Tower for multi-user access. At present, following sixteen national and international databases have been subscribed in various disciplines. The CD-ROM service is not only extended to in-house users of the University but also to the distant users from all over the country at a large scale. Even library undertakes literature search on behalf of users and send the same through e-mail or on floppy.

Sr. No.	Databases	Sr. No.	Databases
1	MathSci 1940+	9	Biological Abstracts 1992+
2	Sociofile 1974+	10	Biotech. Abstracts 1982+
3	Econlit 1969+	11	LISA Plus 1969+
4	ERIC 1966+	12	Psych-Info 1872+
5	Cross Culture 1989+	13	Georef 1785+
6	Dissertation Abstracts International 1861	14	INSPEC 1989+
7	ABI/INFORM 1989+	15	CABSAC 1973+
8	IBID 1993+	16	Supreme Court Case Finder Online 1950+

2.6   Internet Computing Center: E-Journals under UGC Infonet Program

The Internet users Lab has been established under networked environ with 16 computers using V-SAT under UGC Infonet program. Gulbarga University is now provided the facility to access 1200 scholarly journals on the Internet from Springer and Kluwer Publishers 1200 journals in full-text covering all areas of learning, which can be accessed at http://www.springerlink.com and http://www.kluweronline.com and other scientific journals and databases. Thus, the Internet has been the most important source of information for the teaching and research community as an instrumental tool; research tool and communication tool that extend the content of the curriculum enrich classroom discourse, remote communication and enhance learning opportunity. To achieve this, VSAT connectivity of UGC Infonet has been commissioned in Central Computer Center of the university, which in turn, the library has made sincere efforts to lay 6 Core Out door Optical Fiber Cable to the library premises.

2.7   Library Home Page

The library web site has been designed providing comprehensive information about the library activities and services, which is accessible at http://www.gulbargauniversity.kar.nic.in/library.htm. Efforts were made to customize the home page to provide need-based information pertaining to local and immediate needs, even for general users. It provides complete history of the region and address including telephone numbers of educational institutions, Government offices, NET Papers, Syllabus, R & D projects, research publications of the university, alumni details etc.

2.8   Institutional Repository Research Productivity:

Establishing a Central Research Database (Full Text) of the University shall provide a complete and crystal clear of the academic and research progress of the scientific community in the form of publications and help in monitoring the ongoing and completed research projects undertaken by the faculty members

and research scholars. This Institutional Repository Database includes the university productivity i.e. research publications (Full text), educational programs, Instructional materials of the faculty. This service has just begun by using D-Space under Linux environ. The teaching instructional material of Law department is now made available along with few research publications of Science and Social Science departments. The research publications have been scanned and provided a link to the Meta elements of D-Space software. Emphasis on scientometrics and bibliometric studies will be established which would help in measuring the productivity and impact of research and teaching. Efforts are on to complete the task revealing the mirror of research trend of Gulbarga University.

3.   Issues and Prospects

The job of library does not end itself by establishing techno-environment, but at the same time, the outlook of user community's use, education, training and evaluation is of utmost importance to serve the purpose.

3.1   Establishing LAN in the Library

LAN establishment has been the effort for the last five years that has yielded fruits now and as such efforts should be made unless and until our demand is met. As management (administrative) support is very much required to execute the network application for building up strong IT infrastructure in building their image by carrying out innovative task to the satisfaction of user needs and aspirations.

Technical infrastructure including hardware and software selection is of utmost importance, which needs to be selected based on the compatibility of library software used and making provision for future flexibility. This has to be carried out in consultation with National documentation centers and software engineers.

3.2   Maintenance of Network

One of the major challenges faced today by the library managers in university library environ, is to ensure proper maintenance of network, so that the regular in-house and services are not affected. This calls for expertise knowledge and support through regular Annual Maintenance Contract (AMC) to the genuine System engineers to attend the complaint timely. As users have a tendency to experiment all sorts of their work on the computers and so also by the staff, monitoring and assigning user and staff rights has to be streamlined.

3.3   Limitations of Library Software

No software is perfect, but needs to be exploited for in-house activities and services of the university library. The SOUL is being used quite effectively in the library with the active support of INFLIBNET, staff in implementing various modules including Circulation and Web OPAC. The customization is required especially for the

- ✍ Retrieval of documents based on 'Type of Material',
- ✍ Editing of work based on time period
- ✍ Under the Main Menu of OPAC module, Separate sub menu is required for the collections i.e. Theses, Reports, Book-Bank, Reserve Collections, Special Collections, CD-ROM Databases
- ✍ Customized Bar Code Label comprising of university emblem
- ✍ Security options and load time of access.

The scientists from INFLIBNET, Ahmedabad is in the process to attend these requirements to overcome the limitations.

3.4   Mass Literacy to overcome inhibitions

Users information bent of mind has been the driving force for the automation of library activities and services. The library has really contributed and supported the user community in building confidence to use computers and thereby overcome inhibitions of technology to create mass literacy of technology. The OPAC (Online Public Access Catalogue) nodes meant for users has stimulated them to use computers for searching catalogue and thereby the concept of literacy has generated in the campus, besides extending Internet and CD-ROM and IT based services to the clienteles.

In this direction, Gulbarga University has actively coordinated in organizing a five-day Information Technology (IT) exhibition, with use of Internet as its main theme, to coincide with the Rajyotsava Day celebrations on 1st November 2004, with the support from Karnataka State Government. This is to provide an opportunity for students of high schools and higher secondary schools in the rural areas to have their first glimpse of computers and get basic training on the Internet facility and improve their knowledge by downloading the latest information available on the net. A notable feature of the training programme was that the manual in the computers screen was in Kannada to help the students studying in the Kannada medium.

Figure –3: IT Exhibition at Gulbarga University

3.5   Education and Training

Besides, on site education and training to use OPAC, CD-ROM Search and Internet access, regular user orientation programme is being organized to the freshers of the university, which includes online demonstration and practical visit to the labs of the library. Also need based programmes on Information search skills/ strategies and Communication skills (written/oral) are organized.

4.   Future Plan

4.1   Learning Resource Center

The long-term goal of the university library has been the realization of the concept of digital library to accomplish the objective of universal access unrestricted by time and place in order to harness the ICT for enhancing the quality of teaching and research. In this direction, the University Grants Commission, New Delhi, India has already sanctioned Rs. 1 Crore for extension of library building towards establishment of Learning Resource Center in our university library. At the heart of Learning Resource Center's philosophy is the management and provision of information to meet the needs of users – students, research scholars, faculty members and external clients in the IT based environment. Each student of Gulbarga University at the center of the learning world with every resource they need would be made available by the just push of a button.

4.2   Retrospective Bar-coding of Books

Bar coding of books is on the cards has to be immediately taken up by generating subject-wise bar code labels generated from the SOUL software. This is planned to go to racks physically and paste the bar code labels and also monitor in the circulation section, in addition to the fixing of labels for the new books.

4.3   Provisions of Video camera in the Library

It is a privilege and a history in the country that, Gulbarga University Library is one of the few university libraries that has carried out stock verification in toto after 24 years of its establishment. A sense of monitoring over the user activities in the reading section of the library and proper maintenance of documents and to avoid theft and cutting of pages of books in the library by making provisions of Video Camera in the library. This also will help in proper monitoring of library staff on duty in the library.

4.4   Touch Screen Technology

Although, OPAC is open for the users for searching information in the library using mouse, but, the library plans to implement touch screen technology for browsing collections of the library avoiding mouse with fingertips on the screen.

5.   Conclusion

As the change is the very essence of life, in the fast changing, confusing, information over-loaded world, the Libraries as intermediaries will have to operate in complex technology rich world for extending quality services to the user community. The Library managers have to play prime role in life long learning and community informatics in timely providing the society with state of art features to access the benefits of today's technology for survival and to build the image of librarianship in the best interest of the user community.

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