DESIGN, IMPLEMENTATION AND MANAGEMENT OF OPEN – SOURCE SOFTWARE BASED LIS PORTAL–SETUP

by

Shukla Paraj *
Dr. Anand P Singh**
Paliwal Suresh **
Jagdish Kumar**

This paper highlights the setup of Library and Information Services (LIS) portal of IARI Library and the associated multifeatured services. Use of open – source and freely downloadable software for implementation of various services like WebMail, software archives, online publishing and access of library databases, online access to CD-ROM databases, access to e-journals, user-level web publishing and search facility is discussed.

Keywords: Open Source Software – Library and Information Services, Fortal – Setup – Library and Information Service, IARI - Library

* Division of Agricultural Chemicals, Indian Agricultural Research Institute, New Delhi – 110 012
**Computer Section, IARI Library, Indian Agricultural Research Institute, New Delhi – 110 012

0   Introduction

The Indian Agricultural Research Institute (IARI) Library is the heart of the Institute. For the last 97 years, the Library has expanded to meet the ever growing needs of the scientific and student community of the Institute and of the country as a whole. It has assumed the *de facto* status of National Agricultural Library of India and has been regarded as one of the 10 best agrobiological libraries of the world.

Fig. 1. IARI Library

The IARI library was established as an organ of the Institute at Pusa (Bihar) in 1905 with a small collection of 5,000 publications donated by the Department of Agriculture, Govt. of India. After the devastating earth-quake in 1934, the Institute was shifted with the Library to its present campus in New Delhi, where it was inaugurated in 1936 by Lord Linlithgow, the then Viceroy and Governor of India.

The Library today houses over 6,00,000 highly specialised research publications on agriculture and related sciences consisting of books, monographs, reference materials, journals, advances and annual reviews, abstracting and indexing journals, translated periodicals, statistical and data publications, bulletins (series publications), reports, pamphlets, reprints, news clippings, post-graduate theses of IARI and ICAR research fellowship theses. The collection gets enriched annually at the rate of 8,000 to 9,000 documents. The Library has 10,500 serial files, and 4,000 current serials are being procured from 80 countries through subscription, gifts and exchanges.

Library and information service (LIS) portal for IARI library was a long due. To fill this lacuna, a model setup was conceived which would incur minimal costs and demand no extra resources, without sacrificing the quality. This paper highlights completion of first phase of the portal development.

Thulasi and Rajashekar (1999) enlisted few of the several reasons for developing a LIS portal.

- ?? To promote the use of the library,
- ?? To furnish information regarding library and its activities,
- ?? To make the information services available online,
- ?? To give links to relevant sites that may be of interest to the users,
- ?? To collect feedback/input from users through dynamic web pages and
- ?? To host administrative and procedural manuals and guidelines.

Once we are convinced of the utility of such portal website, we need to look into the aspects of its development. Keeping in mind the very purpose of IARI LIS portal website development and our target audience (agricultural scientists, students, library professionals, academicians and other information seekers), we first formulated the information sources and services to be provided. Subsequently, we developed a comprehensive website structure, erected with logical and intuitive navigational links.

Fig. 2. IARI LIS Portal

Then the content of each web page, including home page was created/generated and/or acquired and processed. Beta hosting of the website was followed by many typographical and hyperlink corrections, editing, re-editing and re-drawing. After testing each link and service, we finally launched the first phase of LIS portal website (accessible at http://pardoo.iari.ernet.in/).

In the following sections we wish to briefly narrate the individual components of our success story.

The usage of open-source software has increased manifolds since the operating system, LINUX, became popular amongst the Unix users. Born as Internet operating system, Linux has also penetrated into the Microsoft Windows operating system users' domain by offering power of Unix and user-friendliness of Windows. Since then internet is flooded with sites offering free downloads of open-source software for Linux and few flavours of Unix as well, catering to almost every possible field of computer application, including word-processing, photo-editing, programming, etc. The source-code of open-source software is available for free downloads. This offers an opportunity to users to freely edit the source-code and thus customize the software to suit their needs. A typical case, for example, is of Hollywood film-makers who have edited the source-code of Linux and customized the operating system to suit the needs of film-making, thus saving the hefty costs of employing SGI WORKSTATIONS for the same work. Since Linux embodies power, stability and security features of Unix OS and is eternally configurable, it has become hugely popular as the OS of choice for Servers. The software needed for setting up various kinds of services like, mail, ftp, etc. is either bundled with Linux OS or can be freely downloaded from Internet.

1   Mail Solution

Easy availability, accessibility, low cost, speed and numerous useful features like MIME facilitated attachments, encryption, and speaking/talking facility has popularized e-mail amongst masses. Also, apart from being a faster mode of communication as compared to surface mail, e-mail has found application in various areas of library and information services like acquisition, circulation, reference, documentation, administration, etc (Siwatch, 1999; Upadhye et al., 2000).

1.1   A Case Study

At IARI library, the previous mail server setup was based on IRIX 6.5 operating system using 'uucp'. The mail client software 'X-Mail' was deployed with MS-DOS based Novell Netware. Thus the user called the NetWare client for sending and/or reading the mails. The sent mails were handed-over to Unix host which were sent further to the main server at DOE, Govt. of India, server for delivery to the addressee. For receiving the mails similar route was used.

Some of the inherent disadvantages of this system were:
1. Continuous problem of viruses since the setup was MS-DOS based forcing the system to malfunction or be non-functional every now and then.
2. Setup was complex and unstable due to compatibility issues arising out of involvement of three systems namely, MS-DOS, Novell Netware and Unix (IRIX 6.5).
3. IARI mail setup was accessible only from within the IARI Intranet and thus was a serious handicap.
4. Novell Netware based client software offered limited features and a primitive user interface (lacking use of mouse).
5. User-level security features were lacking.

To overcome all the above-mentioned problems and incorporate new useful features, Linux was employed as a viable mail solution. Sendmail software which is a part of RedHat Linux distribution was configured as a 'Mail Transport Agent'. Keeping in mind the dedicated Internet connection to IARI Intranet, the server was configured with SMTP, to impart web-accessibility and speed to the mail server. POP and IMAP were not used. Along with mail server, a DNS and DHCP services were also initiated on a separate machine (again based on RedHat Linux) to facilitate the mail routing. With this, server setup was complete.

For our need of a good mail client, we did not use Microsoft tools like Outlook Express and Outlook and other popular mail clients like Eudora Mail, since the POP and IMAP were not employed and also because majority of the mail viruses are written for Microsoft tools. Therefore, we sifted from Internet, another open-source complete intranet software solution called "OCS", designed by Obsidian Systems, South Africa (http://www.obsidian.co.za/ocs/).
This software is quite stable and needed customization to suit our needs. We edited the source-code and customized it not only as our mail client but also as notice board, appointment diary, calendar, chat client, web-page editor and viewer.

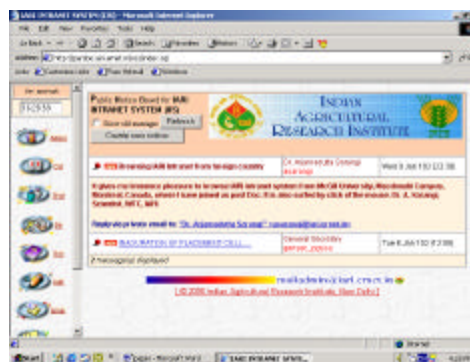**Fig. 3. IARI Web Mail**   **Fig. 4. Web Mail User Interface**

In addition to the World Wide Web based mail access solution, we configured a remote login facility on our mail server which enables our users to access their mails from anywhere in the world by logging in through secure shell client (protocol used is SSH 2). In this way, we dispensed with insecure telnet utility. Numerous mail clients, inbuilt or installed, like PINE, 'mail', 'elm', etc. were configured for our users.

2   Software Archives

In any network, various software are needed for numerous purposes and users need to either download them from internet or arrange for CDs. This not only wastes time but also other resources like bandwidth. Keeping this in mind we conceived an archive of open-source/freely downloadable software commonly used by our Intranet users.

2.1   A Case Study

IARI Intranet has developed into a full-fledged network of library and information services. With more and more understanding and exposure, our users started doing hefty downloads of free utilities. This usurped all our bandwidth. Thus, a software archive was configured on a RedHat based Linux machine with 'Anonymous FTP' service. In this archive, we kept all the commonly required open-source software, antivirus updates and many free utilities available on Internet. While we took care not to offer any proprietary software with copyright objections, we offered our users the latest versions of all the software. This facilitated not only the faster downloads but kept our intranet up-to-date and bandwidth free.
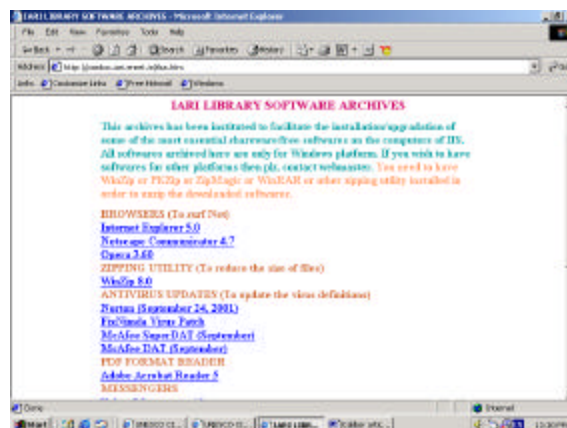

Fig. 5. Software Archives

Worth mentioning is the fact that we did not enable the access to our Anonymous FTP server from outside our Intranet.

3.   Online Publishing of Library databases and universal access to them using JAVAISIS and Bireme's WWWISIS software

Obviously, the library databases, unless published on internet/intranet will be limited to the local users. Few open-source/freely downloadable solutions are available on Internet for

publishing the library databases. We bring you a case study of IARI library where we successfully implemented the above said.

3.1   A Case Study

Digitisation of library catalogue was started in the year 1992 in CCF format using CDS/ISIS software which is developed by UNESCO and distributed and promoted in India by NISSAT. Today library is using CDS/ISIS for windows ver 1.4, August 2001 for creation, updating and printing from various databases (Table 1).

Table 1: Indigenous databases

Name of Database	Number of Records	Web Access using JAVAISIS
Books	75,661	✍
Bulletin	35,972	✍
Thesis	10,206	✍
Journals	2,728	✍
Serials	10,500	✍
BIA*	521	✍

Bibliography of Indian Agriculture

For publishing these databases on Internet, an interactive, multithreading, multilingual, TCP/IP, client-server Java application, JAVAISIS was used in conjunction with BIREME's WWWISIS software. Both the applications can be downloaded from Internet as one package (http://web.tiscali.it/javaisis/ and http://www.bireme.br/wwwisis1.htm). JAVA-ISIS allows to access and manage remote databases on several platforms (Windows, Linux/Unix, Macintosh).

The JAVAISIS package consists of two distinct software:

JAVAISIS Server: allows sharing CDS/ISIS data bases through a TCP/IP network (Internet, Intranet or Extranet);

JAVAISIS Client: the interface to access the databases shared through the Server. It provides management facilities such as browsing and searching.

The major features of JAVAISIS include:
   - ??   Sharing databases through a TCP/IP network;
   - ??   Retrieving records by their content, through the sophisticated CDS/ISIS search language;
   - ??   Displaying the records or portions thereof according to your requirements;
   - ??   Creating and modifying records in a given data base;
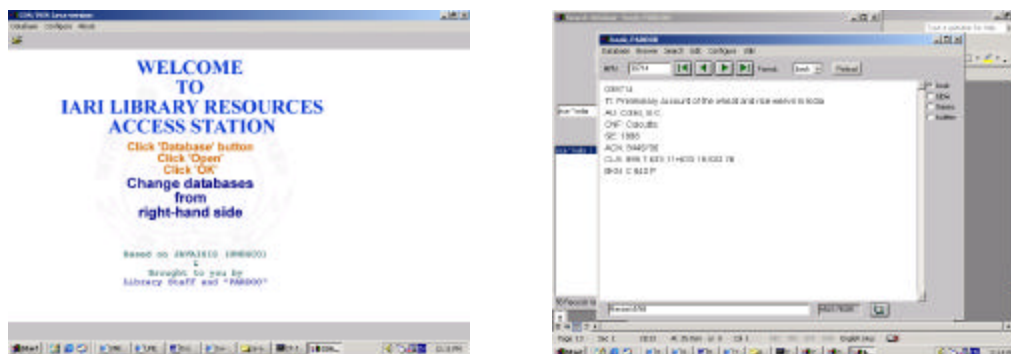   - ??   Importing and exporting records using the ISO2709 format.

Fig. 6. JAVAISIS Interface

Familiar search interface and functions due to ditto similarity of JAVAISIS to CDS/ISIS, it was decided to implement it on our Intranet. Since JAVAISIS and 'WWWISIS' both are available for Linux platform, we downloaded the required software, installed and finally configured the server. WWWISIS documentation is comprehensive and users need to scan it for the installation procedure, initially. At few junctures though, documentation is not sufficient.

JAVAISIS client is also available for Linux platform but since most of our users work on windows platform, therefore it was decided to offer JAVAISIS client software for windows platform.
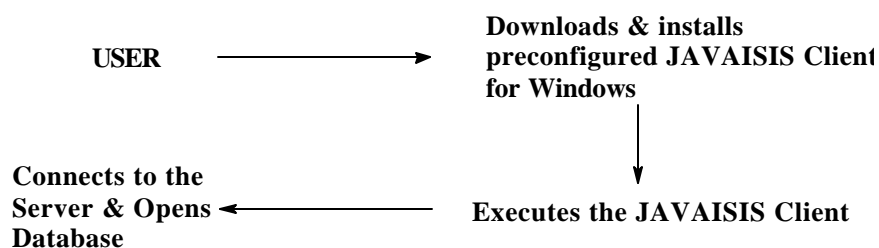

Fig. 7. The Flow chart depicting JAVAISIS installation at user's end

We wish to highlight a peculiarity which is not documented. JAVAISIS client available for Windows 95, 98, Me is different from the one for Windows NT. There is none available for Windows 2000. The client for Windows NT works for Windows 2000 perfectly well but it requires some tweaking.

We configured the three clients beforehand and packaged them individually as Zip executables for automated installation thus avoiding configuration at user's end. We further placed these packaged clients on our web server for ready downloads. Kindly note that since the published library databases are accessible from anywhere in the world therefore we placed the client packages on the web server and not on our Anonymous FTP server as from the latter only Intranet users can download the software.

4   Online Access to CD-ROM databases

The method of literature search has been revolutionized with the advent of CD-ROM technology. Unlike earlier, when search for the literature was a very tedious job and often remained incomplete, database distribution in CD-ROMs offer a fast and reliable way of searching the complete literature over a particular topic. The aim of library to make the CD-ROM based databases available to maximum number of users is fulfilled with the help of network implementation. Of the several possibilities, two sanest and obvious ones are:

Establish a network with the facility of browsing through multiple CD-ROMS, e.g. CD-Net (CD-ROM tower based solution).

Establish a database server and link to the Intranet/Internet with the contents of CD-ROMs copied to the hard disk drive of the server with the help of appropriate software (Hard disk based solution).

Incidentally, IARI Library has established both kinds of solutions, but has finally singled out the hard disk based solution as a fast, reliable, hassle-free method of offering the database search services. We bring you the case study of how we implemented this solution.

4.1   ERL - Powerful Networking Technology for Libraries

SilverPlatter provides libraries with a powerful networking solutions through its flexible client/server technology, ERL (Electronic Reference Library). Designed as a versatile TCP/IP networking solution, it runs on a variety of platforms including: Windows NT, Solaris, and LINUX. The ERL database server provides powerful and flexible access to over 200 SilverPlatter databases.

4.2   Advantages for Network Administrators

- ?? Scaleable – supporting anywhere from 10 to 10,000 users in high-traffic environments.
- ?? Easily supports hundreds of databases across multiple servers.
- ?? Seamlessly supports any combination of local, remote, multi-campus, and consortia-wide access needs.
- ?? Secure access through IP filtering and user name and password controlled by the administrator.
- ?? Powerful web-based administration with easy menu management, flexible usage statistics, and streamlined user authentication.
- ?? Automatic data transfers for weekly database updates through QuikData, ensuring all information is current and up-to-date.

4.3   Powerful Administration Functionality

The administration component of ERL enables administrators to easily manage even the most complex network environment. The enhanced administration interface can be accessed from any location allowing administrators to quickly:

- ?? create and maintain IP address filtering.
- ?? track, view and report on usage statistics.
- ?? structure database menus, and more.

4.4   Benefits for Librarians and Patrons

- ?? Powerful access to an extensive range of high-quality electronic reference information.
- ?? Seamless navigation to full text via SilverLinker.
- ?? Current awareness tools such as SDIs, Alerts, and Save Search Histories.
- ?? Flexible Local Holdings Options for displaying library holdings information within retrieved records.
- ?? Intuitive and sophisticated searching for both novice and expert users.
- ?? Integrated searching through your library's Z39.50 user interface.

4.5   A Case study

Previously, a hardware/software combined solution, CD-Net, from Meridian Data Inc., having 28 SCSI – based CDROM drive tower and PC running a special search software, Silverplatter Information Retrieval System (PC SPIRS), was employed. This compact unit accessed the CD-ROM drives *via* the SCSI interface directly at a very high speed. A Novell Netware 3.12 based small LAN, using IPX protocol, was established in a client-server networking mode on BUS topology, having above-mentioned PC as dedicated network – file server and 10 dumb terminals (PC 286 without HDD). Search software was not needed to be installed on the individual terminals. This small LAN was then connected to the IARI intranet to make databases available over IARI campus LAN.

Table-2 List of CD-ROM based databases subscribed by IARI Library

Sl. No.	Title	Coverage	Network accessibility
1.	CAB	1972 – till date	✍
2.	CABSAC	1973 – 1998	✍
3.	AGRIS	1975 – till date	✍
4.	AGRICOLA	1970 – till date	✍
5.	Biotechnology Abstracts	1982 - till date	✍
6.	Zoological Records	1978 – till date	✍
CAB Spectrum Databases			
1.	Ag. Econ CD	1973-1996	✍
2.	CabPest CD	1973-1996	✍
3.	Crop CD	1973-1996	✍
4.	Hort CD	1973-1996	✍
5.	EconLit CD	1973-1996	✍
6.	Plant Gene CD	1973-1996	✍
7.	Soil CD	1973-1996	✍

While this setup was flexible, comparatively inexpensive at the time of its implementation and efficient, it had several crippling disadvantages.

4.5.1 Disadvantages

- ?? LAN using coaxial cable was slower.
- ?? When complex search strings were executed, it resulted in system hang.
- ?? Novell based LAN was more prone to virus attacks.
- ?? Damage to the CDs due to repeated and heavy usage.

- ?? Choice of selecting databases was limited to 5 CDs at a time and that too from a single set of database, e.g. either from AGRIS or CAB not from both databases simultaneously.
- ?? Slow search, print and downloading.
- ?? No options of SDI, integrated e-mail and usage statistics was available.
- ?? No linkages to online full text article of Journal publisher.
- ?? Not more than 28 CDs could be searched at any one point of time.

Considering all above disadvantages, library opted for LINUX based ERL solution using WebSPIRS search Interface using 10/100 mbps switch and Cat 5 structured cabling.
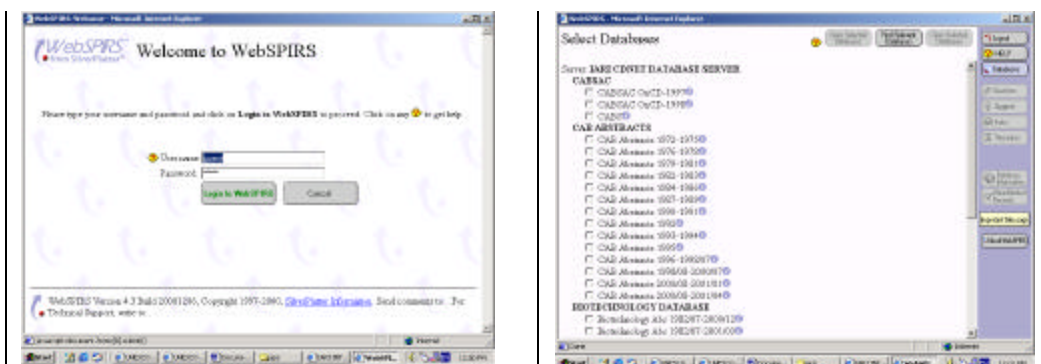

Fig. 8 WebSPIRS

4.5.2 Advantages of ERL
- ?? Ultra fast access as the database is searched from hard disk drive (HDD).
- ?? It eliminated all disadvantages of CD-Net, i.e. fast access without hangs even with complex queries, no viruses, no damage of CDs, no limitation of database selection, i.e. multiple or all databases even from multiple sets can be searched simultaneously, SDI, integrated e-mail, user's log, usage statistics and using sliverlinkers availability of full text article from publishers site.

5   Access to E-Journals and their Abstracts

Since IARI library did not have any website/webpage previously, the users remained deprived of several online services and resources. With the LIS portal setup, appropriate links were provided to access the E-Journals (full text and abstracts).

6   User Web Pages

All intranet users were provided space on the web server to publish their publications and any other information. Web server security was given high priority while configuring it for user's access and uploads thus minimizing the tampering into other's accounts/directories. Pages are regularly monitored to check the publishing of objectionable content. Template for user's web page is also provided.

7   Search Facility

The portal was made searchable by implementation of another open-source software freely downloadable from internet, HtDig (http://www.htdig.org/). It is a complete World Wide Web indexing and searching system for a domain or intranet and is not meant to replace the need for powerful internet-wide search systems like Lycos, Infoseek, Google and AltaVista. Instead it is meant to cover the search needs for a single company, campus, or even a particular sub section of a web site. It can easily span several web servers. The type of different web servers doesn't matter as long as they understand common protocols like HTTP. It was developed at San Diego State University (http://www.sdsu.edu/) as a way to search the various web servers on the campus network.

8 Implementations in second phase of LIS portal development of IARI library

?? Online publishing and access to WWWISIS based library databases, thus providing the web interface through HTML forms.

?? Online publishing and access to MySQL/PHP based database solutions

?? Improving the user's web page template

?? Initiation of majordomo based 'Mailing list' service based on agriculture to our users.

9 Acknowledgements

10 References

1. SIWATCH (A S) and Kaul (H K) ed. E-mail services: Need for libraries and information centres. *Library and Information Networking NACLIN 1999.* p 107 – 125.

2. THULASI (K) and RAJASHEKAR (T B). Kaul (H K) ed. Web resources for Internet use in Libraries. *Library and Information Networking NACLIN 1999*. p 73 – 91.

3. UPADHYE (R P) et al. Kaul (H K) ed. E-mail: A tool for exchange of information in libraries. *Library and Information Networking NACLIN 2000.* p 300 – 309.