



Automation and networking of public libraries in India using the *e-Granthalaya* software from the National Informatics Centre

Automation and
networking

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Abstract

Purpose – To describe the development of the library management system, *e-Granthalaya*, for public libraries in India. This is an initiative of the Indian government's National Informatics Centre (NIC). The paper outlines the challenges and the potential of a full-scale deployment of this software at a national level.

Design/methodology/approach – The project is being implemented in various phases depending on the funds, infrastructure and willingness of the various state governments and library authorities. This case study provides an understanding of the challenges confronted by the NIC in the scale and scope of the deployment of *e-Granthalaya*. The national effort towards a "single window access" is constructively undertaken with an infrastructure deployment phase followed by a services integration phase: both of these are undertaken in tandem with local conditions and technological developments.

Findings – The proposed end-product is a web-based online library service connecting public libraries in India and integrating library services in a "single window access". The authors conclude that there is a need for greater orchestration of funding provision, acquisitions of systems, data entry of catalogues, hosting and so on.

Research limitations/implications – The project will be useful as a model for the automation, networking and federating of resources for other groups of libraries in India.

Originality/value – The paper is a case study of design, development and implementation of the *e-Granthalaya* software in India's public libraries.

Keywords Library automation, India, Networking, Public libraries

Paper type Case study

1. Introduction

India is a country of various casts, colours, creeds and culture. Libraries in India share this diversity in the range of their collections and also in the ways they are governed and managed, their geographical locations, the languages used, the services offered and the expectations of their users. Broadly speaking, public libraries in India are lagging behind others in the world in the provision of adequate facilities, automation of back-end operations, collection development and access, and in the use of ICT for housekeeping operations as well as for user services.

The authors gratefully acknowledge Dr N. Vijayaditya, Director General, NIC who gave approval to publish the case study in an international journal. The authors also acknowledge the moral support and guidance received from Sh.M. Moni, Deputy Director General, NIC, to undertake this and similar projects to automate the Indian libraries with *e-Granthalaya* whenever requests come from Government libraries.



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This is partly due to the lack of willingness of library staff who are looking after the libraries; the non-supportive attitude of the top management; inadequate funds from bodies such as the state and central governments; frequent changes in the technology; and a lack of demand for services from the library users.

In India nowadays there are various digital library projects being carried out in different institutions. More information can be found at the website of the Digital Library of India (<http://dli.iit.ac.in/>). Many of these projects have been started in isolation and are not connected and integrated with the online catalogues of the resources being digitised. The right and integrated approach for the overall development of libraries in India should involve the following:

- Automation of the housekeeping operations, catalogues and the library services – and availability of online catalogues and a National Union Catalogue (i.e. bibliographic data).
- Digitisation of the copyrighted materials in the individual libraries in India and availability of Indian digital libraries (i.e. full-text data).
- Subscription to the external digital libraries from publishers/vendors – e-journals, e-books, e-databases, etc. (i.e. mainly full-text data).
- Development of state/regional/national “Digital repositories” of the scholarly writings from Indian citizens (i.e. full-text data).
- Integration of all the above products for “single window access” by the people of India.

Therefore, it becomes clear that the first step which needs to be taken in the Indian context is the data entry of the collections housed in libraries across the country – so that a state/regional/national union catalogue of libraries’ holdings can become available for “single window access”.

However, the size of the task impedes an approach using commercial software only and so staff at the National Informatics Centre (NIC – <http://home.nic.in>) have developed the *e-Granthalaya* software. This software is for library automation and the networking of the Indian libraries through the Ministry of Communications and Information Technology Library Consortium (<http://mcitconsortium.nic.in>) and is being distributed free of charge to the libraries under the e-Governance programme of NIC.

2. Public libraries in India

Public libraries in India are established throughout the country and are located in state capitals, district headquarters, *talukas* as well as village levels. (A *taluka* is an administrative unit in between a district and a village, and could be compared to a county in non-Asian countries.) There is one State Central Library (SCL) in every state, and then district libraries (DL) in each district and taluka/village libraries (VL) in many villages, resulting in a three-tier structure. Public libraries are mainly supported by central and state governments and are generally under the care of the Department of Arts, Culture or Education, with the exception of a few states where a separate ministry or department exists for public libraries. Table I shows the penetration of public libraries in India.

The development of the public libraries in any state is the responsibility of the respective state government. The Public Libraries Act has been incorporated in only 12 states. Library legislation in these states ensures that adequate funds and other resources are available for public libraries. The distribution of public libraries across the Indian states is shown in Table II.

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| Demography of India | Number | Public libraries | Number | % Covered |
|------------------------------|---------|--------------------|--------|-----------|
| States and union territories | 35 | SCLs | 28 | 80 |
| Districts | 592 | District libraries | 451 | 76 |
| Talukas | 3,987 | Taluka libraries | 501 | 12.5 |
| Villages | 587,226 | Rural libraries | 28,820 | 4.9 |

Source: Ghosh (2005); Das and Lal (2005)

Table I.
Public libraries in India

| S.N. | State | SCL | RL | DL | ML | BRL | BLL | SDL | TL/VL/GPL/CL | LL | Year of LL |
|------|-------------------|-----|----|-----|----|-------|-----|-----|--------------|----|------------|
| 1. | Andhra Pradesh | 1 | 6 | 23 | 4 | 1,448 | 576 | | 355 + 1,238 | Y | 1955 |
| 2. | Arunachal Pradesh | 1 | | 13 | | 2 | 24 | 2 | 45 | N | |
| 3. | Assam | 1 | | 23 | | 3 | | 14 | | N | |
| 4. | Bihar | 1 | | 16 | | | | 11 | | N | |
| 5. | Chhatisgarh | | | | | | | | | N | |
| 6. | Delhi | 1 | | | | 176 | | | | N | |
| 7. | Goa | 1 | | | | | | | 5 + 64 | Y | 1994 |
| 8. | Gujarat | 3 | | 18 | | | | | 45 + 6,902 | Y | |
| 9. | Haryana | | | 12 | | | | | 1,241 + 35 | Y | 1989 |
| 10. | Himachal Pradesh | 1 | | | | | | | | N | |
| 11. | Jammu & Kashmir | 2 | | 14 | | | 81 | | 51 | N | |
| 12. | Jharkhand | | | | | | | | | N | |
| 13. | Karnataka | 1# | | 27# | 14 | 354# | | | 3,500 + 84 | Y | 1965 |
| 14. | Kerala | 1 | | | | | | | | Y | 1989 |
| 15. | Madhya Pradesh | 1 | 5 | 42 | | | | | 15,800 | N | |
| 16. | Maharashtra | 1 | | 17 | | | | 6 | 6,584 | Y | 1967 |
| 17. | Manipur | 1 | | 5 | | | | | | Y | 1988 |
| 18. | Meghalaya | 1 | | | 7 | | | | | N | |
| 19. | Mizoram | 1 | | 2 | | | | 2 | 700 | Y | 1993 |
| 20. | Nagaland | 1 | | 7 | | | | | 108 | N | |
| 21. | Orissa | 1 | | 13 | | | | 4 | | N | |
| 22. | Punjab | 2 | | 14 | | | | | 97 | N | |
| 23. | Rajasthan | 1 | | 31 | | | | 6 | | N | |
| 24. | Sikkim | | | | | | | | | N | |
| 25. | Tamil Nadu | 1 | | 29 | 3 | 1,535 | | | 505 | Y | 1948 |
| 26. | Tripura | 1 | | 4 | 1 | | 10 | 14 | 200 + 704 | N | |
| 27. | Uttar Pradesh | 1 | | 69 | | | | | | Y | 2006 |
| 28. | Uttaranchal | | | | | | | | | Y | 2005 |
| 29. | West Bengal | 1 | | | 22 | | | 120 | 2,276 | Y | 1979 |

Notes: SCL - State Central Libraries; DL - District Libraries; RL- Regional Libraries; ML- Mobile Libraries; BRL- Branch Libraries; BLL- Block Level Libraries; VL- Village Libraries; GPL=Gram Panchayat Libraries; SDL=Sub-divisional Libraries; CL=Circle Libraries; TL= Taluka Libraries; LL = Library Legislation

Source: Mangla *et al.* (2001); Kumber (2004)

Table II.
Distribution of public libraries across Indian states

3. Present scenario of library automation in India

The existence of a library system in India is as old as the country itself. Libraries in India have a long history, starting with the chained libraries of the earlier times to the present day, hybrid, digital and virtual libraries using technology for provision of information through various media. Although there is no official data regarding the number of libraries in India, it is estimated to be about 70,000 libraries as indicated in Table III. Breakdown by type of library.

As far as the current status of computerisation in Indian libraries is concerned, there is no official data. However, many studies have been conducted. For instance, Majumdar (2005) reported that 5% of libraries did not use computers and those that do have library automation. In public libraries there has been continuous work of the Raja Rammohan Roy Library Foundation (http://rrrlf.nic.in), which was established by the Government for the development of public libraries. Bhattacharjee (2002) wrote in 2002:

The national communication infrastructure for modernization is missing. This needs to be introduced. Public libraries which have, so far, had no access to computer facilities and those working in public libraries (in India) are familiar with the technology, but users are not able to have access to such facilities

He also mentioned that:

- out of 28 SCLs only seven libraries (25 per cent) have facilities for various activities;
- among the 29 states in India only four (14 per cent) have library technology;

Library type

Public libraries
Science & Technology libraries
Social Science libraries
Government libraries
Humanities libraries
Academic libraries
– School libraries
– College libraries
– University libraries
– Deemed universities
– Open universities
Private/Industrial libraries
National libraries

Table III.
Number of libraries in
India

Source: Kaul (2005); Chakravarti and Singh (2005)

- four out of six Union Territories (66 per cent) had utilised technology in the SCLs; and
- no public library had a website for accessing its OPAC over the

Now NIC is making efforts to automate all the public libraries in phases using the *e-Granthalaya* software which it has developed. In the first phase, the SCLs will be computerised, then the second phase will cover the block level, the third, and final phase will involve the remainder of the public library levels. This deployment involves education, installation, training and

The authors of this paper are organising a series of one-day seminars in collaboration with state authorities. During each seminar, a demonstration of the software, discussion on the implementation and requirements of the systems, etc. The seminars are aimed at library management and state government representatives as well as the relevant ministry/department. For this project efforts are being made to install the software in the public libraries in collaboration with the RRRLF. At the end of (September 2006) the software has been implemented in the following states:

- SCL, Assam Government, Guwahati;
- SCL, Meghalaya Government, Shillong;
- SCL, Andhra Pradesh, Hyderabad; and
- SCL, Karnataka State Government, Bangalore.

4. National Informatics Centre (NIC)

NIC (www.nic.in) is the premier institute of information technology in India, set up by the Government of India in 1976, under the Department of Information Technology (www.mit.gov.in/) and the Ministry of Communications and Information Technology (www.moc.gov.in/). At present NIC is providing a network through its satellite-based communications network, known as NICNET, to provide e-governance support to the Central Government, State Governments, Union Territory (UT) Administrations, Districts and other Government bodies. It offers ICT services including a nationwide communications network for planning, improvement in government services and wider transparency to central and local governments. NIC assists in implementing ICT projects, in collaboration with Central and State Governments, in the areas of:

- centrally sponsored schemes and central sector schemes;
- state sector and state sponsored projects; and
- district administration sponsored projects.

NIC endeavours to ensure that the latest technology in all areas of ICT is made available to its users.

NIC is also engaged in providing financial and technical support for modernisation projects being undertaken in India. One example of this is the Developing Library Network project (<http://delnet.nic.in>). NIC has extensive experience in designing and developing library application software. In 1998 NIC was distributing the Basis Plus/Techlib Plus™ software.

collaboration with the American company Inform later acquired by the OpenText Corporation (www. authors have decided to design and develop their o that local requirements can be met to support the general and public libraries in particular. As a res mcitconsortium.nic.in) software came to be de networking of Indian libraries.

5. *e-Granthalaya*: a digital agenda for libra

The *e-Granthalaya* software was the product o engineers and library experts at NIC, who kept i libraries. It is a library management softwar operations as well as user services. The software technology and runs on a Windows platform in c network or on a stand-alone system. It requires a com/sql) as a back-end solution, in order to store t successive versions of the software have been relea is under development and is due to be releas multilingual features to support a range of langua developed in collaboration with the Microsoft Co and will consist of a central database for a gro web-based data entry modules, and a common se from distributed databases using the SRW (Se search engine.

The *e-Granthalaya* software is being distribute libraries, including public libraries in India, under addition, NIC also provides technical support, trai free of charge. At the time of writing (September 2 the software have been completed as shown in T:

Table IV.
Versions of *e-Granthalaya*
software

| VER. | Operating environment | Design envin |
|------|-----------------------|--------------|
| 1.0 | Windows Forms based | Visual Basic |
| 2.0 | Windows Forms based | Visual Basic |
| 3.0 | Windows Forms based | VB.Net/Sma |
| 4.0 | Web Forms based | ASP.Net/Un |

Table V.
Number of installations
of *e-Granthalaya* software
by year

| Year |
|-------|
| 2002 |
| 2003 |
| 2004 |
| 2005 |
| 2006 |
| Total |

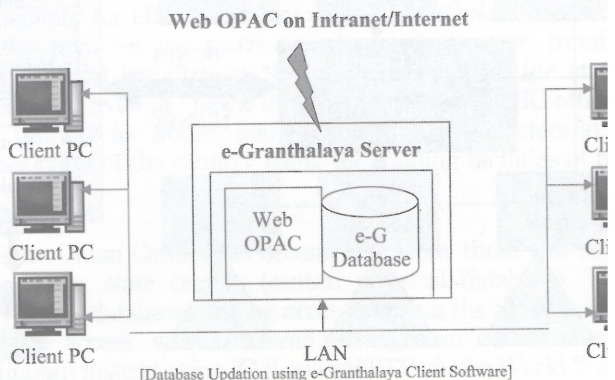
6. Architecture of *e-Granthalaya*

So far, most of the installations of *e-Granthalaya* have been carried out as stand-alone systems or in a network environment within an individual client/server set-up. The data entry modules are installed on the client and the Web OPAC interface is installed on the central server. The centralised database updating system was provided for, it is bound to a network connection. The current version of *e-Granthalaya* (i.e. Ver.2.0) is a web-based data entry system, however, it does provide web-based catalogues as well as member account information.

At present the software is being implemented in the SCLs in client/server mode, a central physical database being created for each SCL individually. The Web OPAC interface which gives access to the catalogues of the respective SCL. This is shown diagrammatically in Figure 1.

However, this is far from the ideal of a "single window access". A regional/national union catalogue of all public libraries NIC would require web-based data entry modules for *e-Granthalaya*, so that all the public libraries at the next tier under the SCL level can update the central physical database through their respective SCLs. We have recently developed this kit (*e-Granthalaya*, version 3.0) with technological/architectural support from Microsoft Corporation as project partner. The data entry modules have been developed in VB.NET while the OPAC module is in ASP. The features are listed below:

- data entry modules – Windows Form based;
- Unicode support;
- support for many Indian languages;
- web-based OPAC;
- zero touch deployment automatically from server PC (Click-Once);
- Library Management Console – based on "Smart Client Update";
- common/central database for clusters of libraries across the country;
- "Single Window Access" of union catalogues from many libraries through a single SRW client and server software (based on XML technology).



The central physical database in each SCL will contain documents along with the holdings information of a state. Thus, the electronic catalogue of each state i.e. the State Catalogue will become available to the people of the state, while the virtual catalogue (virtual) will become available for "single window access" to all Union Catalogues. The "single window access" of all Union Catalogues will be achieved using a SRW (Search/Retrieve Web Service) on the Simple Object Access Protocol (SOAP) architecture and Web Services concept which will be hosted on the NIC centre in New Delhi. Figure 2 depicts the architecture of the virtual library and Figure 3 shows a diagram of the virtual Nation

7. Resource management

The multi-phased implementation of the *e-Granthalaya* in India requires proper planning, smart administrative resource management. Therefore, to achieve the best results, the following are being adopted.

7.1 Funding

The foundation infrastructure needs to be laid in order for the *e-Granthalaya* software can be installed. For this, a plan for purchasing and putting in place the requisite hardware, software, connectivity and so on. Public library authorities/Regulatory Authorities are asked to support these requirements in all the SCLs. To support the client computers with internal LAN set-up and one server.

Apart from the core supporting ICT infrastructure, the existing library collections be converted to a digital format. This aspect of the project is being

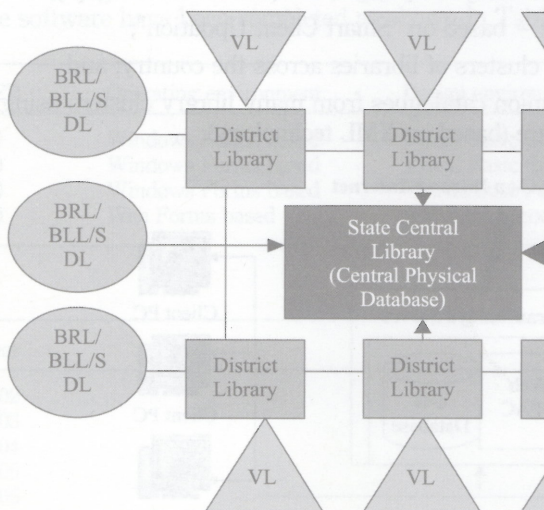
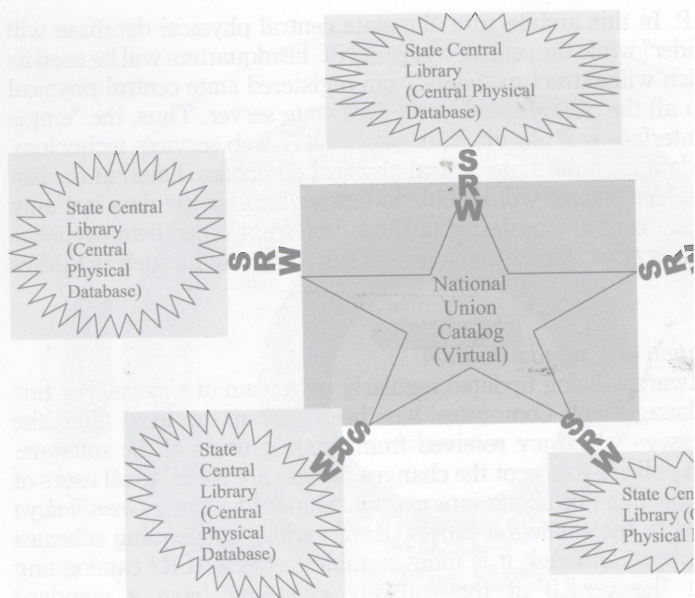


Figure 2.
e-Granthalaya architecture
in a web-based
environment



e-Granthalaya is crucial and requires outsourcing if the library contains 10,000 titles. Some of the SCLs are entering the data in-house while other libraries with fewer staff are exploring ways to outsource the job. The authors are also making an effort to secure funds from various sources such as the Central Ministry of Culture which is the top "body" for the project and the newly set up "National Knowledge Commission" of the Government of India (<http://pmindia.nic.in/speech/content.asp?id=159>) and, respectively, the State Knowledge Commissions which are responsible for these libraries in each state. The authors are making this project a national mission to automate and network libraries in India.

7.2 Implementation and training

The responsibility for effectively deploying *e-Granthalaya* has been assigned to the National Information Commission (NIC) and this involves the provision of proper support, training and maintenance following the initial installation. NIC has offices in all the state headquarters, and even at "block level" in some states. NIC is providing exhaustive training for library staff in the NIC headquarters and in various other parts of the country using the training facilities available at the state level.

7.3 Web hosting

Once the State Union Catalogues become available, these will be hosted on servers in all the state centres (central physical database). The National Union Catalogue (virtual database) will be accessed using the SRW-based "single window access" where text and messages are conveyed not by a URL, but instead using XML over HTTP via the World Wide Web.

recommendation SOAP. In this architecture, the state become the "data provider" while the central server at NIC "service provider" which will extract metadata from the databases that exist in all the SCLs hosted at the NIC "single window access" web interface will use the XML-based interface to extract/harvest the data from the state central physical phase the "service provider" centre will be able to extract from *e-Granthalaya* state central physical databases and other databases developed using other library management software (www.libsys.co.in).

7.4 Upgrading, localisation and standardisation

The *e-Granthalaya* software is being updated regularly for the purpose a Change Management Committee has been set up to handle change/modifications issues which are received from the NIC. NIC has enacted certain policies to accept the changes in the software, also changes must be as per international standards. The software can accommodate the catalogue entries using the standards prevalent in Indian libraries, although it is more suitable for standards. At present the ver.2.0 of the software has an import/export interface, this utility has been added in the ver.3.0) to allow the exchange of data in MARC21 as well.

7.5 Project duration

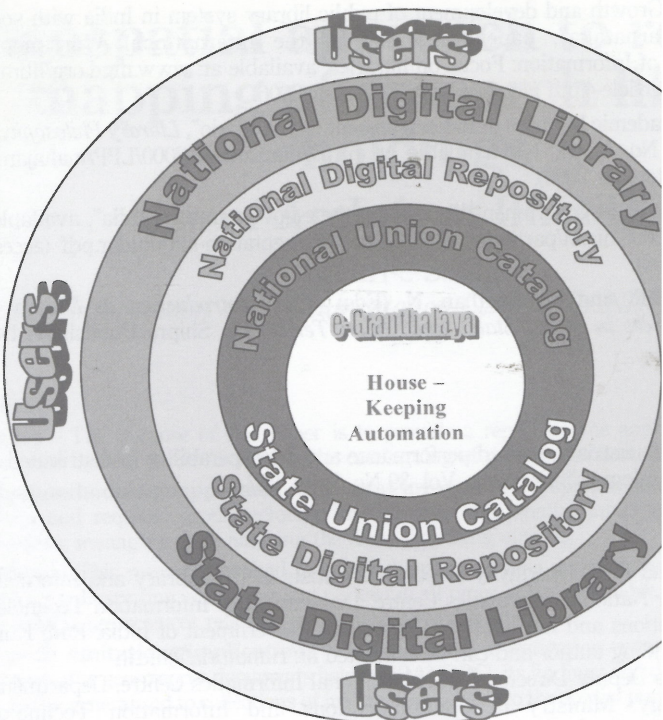
This project is scheduled to be completed by 2010, by which time it will be implemented in all public libraries where the system requirements are adequately met. Data entry will be the responsibility of the libraries while NIC is providing the software, support, training and documentation.

7.6 Future plan

This is an ongoing project, and will continue until the library system becomes well modernised, computerised and a part of the national infrastructure for providing a "single window access" to the electronic resources and other services such as the National Digital Repository, etc. as shown in Figure 4 in a later phase.

8. Conclusion

The first phase in providing online library services from the state is to make available the library catalogues in electronic form and make union catalogues accessible over an intranet or the internet. Other e-services such as the "state/national digital repository" of copyrighted materials available in individual libraries, of subscribed data from commercial vendors and other e-repositories of Indian scholarly writings. The final phase is to provide e-services for "single window access" for the people of the state to become "Community Knowledge Centres" and can provide



development of the country. To achieve this status, the public library and non-government agencies like NIC, RRRLF, National Knowledge Commission, Ministry of Culture, State and Central Governments, etc. must work in an integrated manner and must provide support to the project.

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