Migrating the Libraries of Rural Educational Institutions to Cloud: An Indian Perspective

Somesh Kumar
National Informatics Centre
Ministry of Communications and Information Technology
(Govt.of India)
somesh.kumar@nic.in

ABSTRACT

Most of the educational institutions of rural India have paucity of resources in comparison to those in urban areas. The condition of libraries is particularly dismal because of non-availability of quality and up-to-date reading materials. An effective strategy is required to resolve this problem. The Cloud technology can be one of the most appropriate and affordable options to strengthen the library services because of prompt availability of content by this technique. Freedom from complexities of installation and maintenance of software and other backend infrastructure is another advantage. This endeavor would also automate various in-house library activities, whatever, and minimize expenses towards collection or subscription. Government of India has taken substantial steps in strengthening libraries of higher level academic institutions and universities by providing study and research material digitally in shared mode by establishing high speed data networks. However, a lot still needs to be done through ICT to cover rural institutions, especially in interior regions. Expanding proposed OFC based high bandwidth internet services to villages and fast growth in the use of computers and other internet enabled low cost devices among rural youth would make the effort quite efficacious not only in improving the service quality of libraries but also to bridge the social digital gap.

Keywords: *Cloud Computing, Rural Educational Institution, National Knowledge Network, SWAN.*

INTRODUCTION

The advancement in information and communication technology has taken a great leap in the last couple of decades. There was a period when mainframe computers were used for data processing and punched cards as input media. Then the time of mini and micro-computers arrived and communication with computers using keyboards started. This was followed by desktops or Personal Computer which gave immense power to us for data storage and processing. This trend still continues along with advent of new and more powerful processors at regular intervals. On the other hand the advancement in internet technologies during 1990s provided a unique architecture for information storage, processing and retrieval. In fact, the internet has vastly impacted human lifestyle. However, the divide between have and have-nots of internet benefits also continued to grow concurrently in several parts of the world for various reasons. The grid or distributed computing, a special feature of internet, paved the way for processing and analysis of huge data on multiple, high end servers at different locations simultaneously. This technology, however, had some constraints as it involved cost and other infrastructure related issues. In grid computing, it is the 'computing' power which is availed by user. When the requirement of scaling up or down of the resources such as software, hardware, bandwidth or migrating to other platform was felt due to technical reasons, the existing grid computing appeared to lack a great deal. Although the users had the option to scale these if system is placed at their own premises yet it involved additional money, space and human resource. It is further observed that most of the available computer resources are underutilized as far as their data processing or storage capability is concerned. Advancement in processors also required rapid upgrade of existing computers making the previous ones obsolete. Apart from this, the purchase, installation, licensing issues and the maintenance of software are other issues which incur regular expenses when installed in-house. Cloud computing provided an effective solution to all these problems.

In cloud computing the required resources are owned by service provider and user receives the services according to needs through internet. The scalability of the resources is quick and payment as per the use. The user has freedom to stop or add services at any stage requesting the vendor. As bandwidth is also scalable, unexpected changes in data size do not affect output speed. The cloud works as IaaS (infrastructure as a service), PaaS (platform as a service) and SaaS

(software as a service). IaaS includes all kinds of hardware including processing power, storage, network infrastructure etc. The backend platform related services are provided in PaaS whereas the software related services are dealt with SaaS. The main attribute of the cloud computing is availability of application software and processing power as per requirement and billed according to their consumption without restriction of time and place via any internet connected devise owned by user. In specific words, the cloud computing involves on-demand network access to a shared pool of configurable computing resources (Corrado, E.M. and Moulaison, H.L., 2012). The user has not to worry about how these elastic resources are received or what are the complexities related to their safety, security, availability, maintenance etc. The cost being on pay-per-use basis results into saving of money which may be diverted for other purposes. As library activities are automated using cloud resources, the library staff is also left with more time for house keeping, skill development and other useful works.

The present paper mainly discusses the use and feasibility of cloud based libraries in higher secondary (plus two or equivalent) and college (graduation and above) level educational institutions in rural areas. As a major section of student community or information seeking genre of our country lives in countryside, any technology adopted for libraries must have features to cater to their needs on priority. Otherwise the digital divide will keep on persisting. Libraries also have the onus of addressing the needs of other sections of society comprising elderly people, farmers, entrepreneurs, etc. apart from students, researchers and academic professionals.

LIBRARY AUTOMATION IN THE CLOUD AND GLOBALIZATION

The use of information technology in libraries commenced over two decades ago and got momentum by the end of last century when prices of computer hardware started coming down (Husain, S. and Ansari, M.A., 2007). The library activities may be categorized as acquisition of books, cataloguing, circulation, serial control, article indexing etc. Developing the database of holdings for OPAC using bibliographic standard formats is one of the most important parts in the library automation process. Creation of database of library patrons is another vital work. There are many software available in the market for library automation depending upon services required. This entire exercise virtually transforms all the manual processes of library into computerized form and use of bar code readers eliminates the paper work to great extent.

An automated library may be migrated to cloud from where the information regarding the availability of books, journals, documents, etc. may be shared by patrons of multiple institutions through any internet enabled devise at any time, anywhere in collaborative manner, forming a consortium. The modules for library house-keeping activities greatly simplify and reduce the work of associated staff. There are vendors who provide services to migrate the library to cloud with appropriate data security along with necessary software modules to support library staff, students and teachers (Parakh, S., 2011).

The enormous bandwidth available to internet now has made the flow of information round the globe instantaneous giving an unprecedented opportunity for knowledge acquisition, analysis and dissemination promptly. Libraries in advanced countries are maintaining databases of knowledge resources in digital form though they are used mainly by local applications, not accessible in shareable form using different applications by others (Goldner, M. and Pace, A., 2011). Most of these databases may be utilized more efficiently if accessible in shared manner using advantages of cloud computing technologies by interlinking. The students, teachers and researchers need latest literature on their subjects of study, expect wide range of books, research journals, magazines, serials or documents in digital form available anywhere in the world and in the format compatible to devices such as PCs, laptops, tablets, Apple iPhones, iPads, iPods, Amazon Kindles, Nooks, Sony Readers, etc. (Thomas, L.C., 2012).

The term globalization is defined precisely as the phenomenon involving integration of economies, cultures, government policies, political activities, education, etc. at international level (Ogunsola, L.A., 2005). In other words this is a process of sharing of information on social activities, business, financial and other academic matters according to wants of people globally for their benefit. When any information or data is stored in the cloud server it becomes convenient for all to share these without much effort or manual involvement. Patrons around the globe may read or download the e-material from internet irrespective of whether these are stored in their own library's premises or elsewhere on foreign land and thus participate in globalization process. Increasing popularity of e-readers, smart phones, tablets and other handheld devises among youth make the globalization of library through cloud more relevant. Efforts by manufacturers to make these mobile appliances more efficient for e-reading and by publishers and other institutions to digitize maximum content compatible to them are, therefore, continuing.

MIGRATING LIBRARIES OF RURAL EDUCATIONAL INSTITUTIONS TO CLOUD AND THE REQUIRED APPROACH

The educational institutions in rural areas are lacking the availability of latest and quality study material for their students, teachers and other staff members. On

the other hand, the members of urban institutions have easy access to variety of latest books of different authors. The budget for adding new editions of books to collections in rural institutions is either absent or is insufficient in most of the cases, less say about other support books, periodicals or magazines. This 'facility gap' between rural and urban clientele needs to be removed for inclusive development. If libraries of these institutions are migrated to cloud, packed with study materials on different subjects, the aforementioned problem may be overcome to great extent.

Government of India has made provisions for computers in the schools and colleges for providing knowledge of information technology and its use among students and staff. These computers may be used for information capture and dissemination if connected to cloud library with required authorization. The infrastructure created for state wide area networks (SWANs) up to sub-divisions and blocks of the district may be used to provide landline or wireless connectivity to schools or colleges which are close to points of presence (POPs). Other places where connectivity through SWAN is not possible broadband internet services may be provided. The mobile telepnony may also be used by students or library staff to connect computers, mobile and other e-reading devises to access or download the e-content. This will, in due course, result into inclusive enhancement of the consciousness and world knowledge of citizens which is in reality a measure of level of integration of nation with global affairs (Benedict, A.O., 2008). Emphasis has also been given by Government of India on the propagation of emerging scientific and technological development in its 11nth five year plan (Social Sector, Vol-2, Planning Commission) and this effort will be a major step in this regard.

The main prerequisite for successful library in cloud requires that content like books, journals, serials, magazines etc. are hosted in digital form on internet servers to the optimum level and allowed to be shared. The services of a standard web enabled software on the remote server to search and retrieve the e-content with download permission and basic infrastructure to perform all these processes from a client in library should also exist. The software, if it is user friendly and its GUI based interface is self-explanatory, would require an elementary training initially to the library staff or teachers volunteering to perform the house keeping work and it will not be a difficult task. In this way the government may establish basic joint use libraries (Gupta, K.D., 2009) in almost all the capable secondary schools and colleges in rural area. This has become imperative now, as the technology has advanced enough to enable libraries to broaden their coverage and sustain this culture.

Institutions or schools may fix their own schedule or policies with respect to working hours of library depending upon the nature of the clients. As the content is available through internet on 24x7 basis, it may operate for extra time for public and necessary arrangements to segregate the students and community members may be made by library officials. Division of time and segregation of clientele would maintain the sereneness and originality of the libraries. It is financially not feasible if libraries for students and general users are established separately as the requirement of basic minimum infrastructure and human resource for this would multiply. Adding computers to existing system is easier than setting up an independent complete system.

The library must have customized content of diverse nature in text, graphic and multimedia form stored on CDs, DVDs and other media or ready to be downloaded from cloud depending upon the need of local people. Matters related to entertainment, agriculture, horticulture, veterinary, health, sports etc. would be readily available to people by this arrangement. Apart from this, information related to local administrative activities regarding development, budgetary provisions, and other state services may also be retrieved by community members with the help of library personnel. The popularity of tablets among youth may be used by them for reading e-books, etc. on their own. The tablets or notebooks may be provided to suitable and earnest persons at subsidized prices to encourage them to participate in collective knowledge development. As far as software is concerned, any standard system already used and proven for cloud libraries as well as in-house activities may be customized and deployed.

EXTENDING THE REACH OF NATIONAL KNOWLEDGE NETWORK AND OTHER LIBRARY NETWORKS TO RURAL AREAS

A cloud based library is of great use for higher level educational institutions, universities, research & development (R & D) laboratories and other knowledge based organizations. As the growth of intellect depends upon the quality of education and results into broadening of vision, increased reasoning capability and productivity of the persons, we must take a concerted approach to strengthen rural infrastructure also for perceptible knowledge growth (Vyas, S.D., 1997).

The libraries of academic institutions in India, barring the cases of universities and institutions of national level, lack adequate funds and other infrastructure to replenish their collection timely to provide quality and latest information to patrons. Furthermore, the purchase of books or subscription of research journals, serials, etc. by different institutions individually comes out to be exorbitant and may be avoided if proper sharing of the learning material by institutions is ensured. Therefore, creating a regional repository and sharing it among institutions through a private cloud is

also an ad-hoc alternative. Government has already established National Knowledge Network (NKN) to connect the research laboratories, universities and other institutions of higher learning, including professional institutions of the country with ultra-high speed internet connectivity. The formation of INFLIBNET center and other library networks was also a major step in dissemination of knowledge (Karn, S.K. and Das, B.K., 2009). The N-LIST program launched in 2010 envisaging electronic access to large number of e-books by universities and colleges is another initiative for providing benefits of information and communication technology (ICT) to researchers and students of higher education (Annual Report, INFLIBNET 2009-10). However, these facilities are still not adequately available in rural areas and appropriate concrete steps by government are required to address this issue.

CAPACITY BUILDING: REINFORCING THE SYSTEM

The capacity building of library staff is of utmost importance when traditional system is finally transformed to automated cloud based system. This will be easier if standard and uniform access management tools are deployed for user community and library officials. The librarians, especially of colleges or higher level institutions, need to refurbish themselves according to new paradigm. This requires adequate technical skill of staff to work in web environment and meet the user expectations. They need to be creative, innovative, ready to learn new methodologies, be competent to enable users to interact with e-resources and have sound communication skills (Kumar, M., 2009). These qualities become more vital when users are from rural background. They must realize the fact that they are now facilitator of knowledge, integral part of the system and have great responsibility to advance this culture forward (Krishnan, N. and Das, C.K., 2012). This requires a proper training to them in due course which may be imparted by outsourcing it to private agencies or by local government institutions like District Institute of Education & Training (DIET). The Common Service Centers (CSC) envisages under National e-Governance Plan (NeGP) of government of India and other service centers like *lokvani kendras* in Uttar Pradesh may also assist in this task. The video conferencing services of National Informatics Centre (NIC) at district may be used for centralized training to selected staff that may perform as trainers for others subsequently.

CONCLUSION

According to a survey approximately 36 per cent universities and 48 per cent colleges of India are located in rural areas (All India Survey on Higher Education: 2010-11). The quality of education in these institutions needs to be strengthened and brought to the level of urban areas where resources to cater the requirements of students, teachers and other academicians are easily and promptly available. Since teacher-student ratio is still low and appropriate library facilities are not satisfactory, shifting our focus towards internet based library and using a shared pool of knowledge is a feasible alternative for quality education (Gupta, D. and Gupta, N., 2012). This effort will further be effective to avoid flow of students towards the colleges or universities located in cities, already overburdened with large number of students enrolled. Moreover, it would also set up a place similar to public library in the vicinity where local people may visit if they wish to read or download books, news articles, magazines etc. and store them on their own media for future reading.

The existence of technology and availability of affordable hardware infrastructure presents an opportunity to migrate the libraries of rural educational institutions from traditional system to cloud based. However, in early phase or till need is felt the hybrid nature may be maintained. The initiative taken by government to prepare union catalogue and set up educational networks, etc. for higher academic institutions and universities is a significant step though its coverage needs to be spread furthermore and ensured to all. The efforts of some academic and research institutions and private business houses to disseminate information of selected sectors may also play a contributing role in parallel (Singh, N., 2007).

Growing awareness of technology among people and steady increase in number of internet users would enhance the requirement of digital content of diverse nature and in multilingual form. Therefore, effective steps for creation of quality digital content of the liking of local community in their language is must for the success of rural libraries. For this purpose, local talented people also need to be encouraged to create their own content to be digitized and moved to cloud for others. Some selected institutions can coordinate this. The other barriers such as of inconsistent power supply and network accessibility are easy to overcome once a beginning is made. India has made remarkable advancement in the field of ICT and we should ensure that all reaps its benefits.

Note: The views expressed in the paper are solely of author.

REFERENCES

1. All India Survey on Higher Education: 2010-11 (2012), Provisional, *Government of India, Ministry of HRD, Deptt.of Higher Education*, 8.

2. Annual Report: 2009-10, (2010), Information and Library Network Centre, Ahmedabad, Gujarat, India.

3. Benedict, A.O. (2008), Globalization and African Libraries: The Challenge of Self-Discover in a Digital

World, *World Library and Information Congress: 74th IFLA General Conference and Council 1-14 August 2008, Quebec, Canada*, Accessed on Sept. 18, 2012 from http:// archive.ifla.org/IV/ifla74/papers/ 115-Oladele-en.pdf, 7.

4. Corrado, E.M. and Moulaison, H.L. (2012, March 5), The Library Cloud Pros and Cons, *The Digital Shift*, 38, Accessed on Sept. 18, 2012 from http://www.thedigitalshift.com/2012/03/ software/the-library-cloud-pros-and-cons/.

5. Eleventh Five Year Plan (2007-2012) Social Sector Vol-2, *Planning Commission, Govt.of India,* Education, 9.

6. Goldner, M. and Pace, A. (2011), Libraries and Cloud Computing, Special Libraries Association, Accessed on Sept. 07, 2012 from http://www.sla.org/PDFs/2011ContribPaperGoldnerPace.pdf.

7. Gupta, K.D. (2009), Towards an Inclusive Knowledge Society: Role of Joint Use Libraries in Indian Academic and Public Library Sectors, *International Conference on Academic Libraries – 2009*, Accessed on Sept. 18, 2012 from http://crl.du.ac.in/ical09/papers/index_files/ical-80_228_484_4_RV.pdf.

8. Gupta, D. and Gupta, N. (2012), Higher Education in India: Structure, Statistics and Challenges, *Journal of Education and Practice,*3(2), 17-21.

9. Husain, S. and Ansari, M.A. (2007), Library automation software packages in India: A study of the cataloguing modules of Alice for Windows, Libsys and Virtua, *Annals of Library and Information Studies,* 54, 146-151.

10. Karn, S.K. and Das, B.K. (2009), Information and Library Network (INFLIBNET):: A Boon for Higher Education in India, *International Conference on Academic Libraries – 2009*, Accessed on Sept. 07, 2012 from http://crl.du.ac.in/ical09/papers/ index_files/ical-123_175_374_2_RV.pdf

11. Krishnan, N. and Das, C.K. (2012), Globalization and Challenges in Library Management in thw 21st Century : An Appraisal of the University Library Systems in India and the USA, *Challenges in Library Management System (CLMS 2012),* 381-385.

12. Kumar, M. (2009), Academic Libraries in Electronic Environment: Paradigm Shift, *International Conference on Academic Libraries – 2009*, Accessed on Sept. 07, 2012 from http://crl.du.ac.in/ ical09/ papers/index_files/ical-16_182_384_3_RV.pdf.

13. Ogunsola, L.A. (2005), Nigerian University Libraries and the Challabges of Globalization: The Way Forward, *J. Soc. Sci.,* 10(3) 199-205.

14. Parekh, S. (2011, Nov.2), Library Automation in the Cloud: cybrarian (http:// www.cybrarian.in) is easy to use and easy on the budget, *CR2 Technologies Ltd.*, Accessed on Sept. 18, 2012 from http://www.cr2.in/ pdf/whitepapers/Automation in the Cloud Cloud-based Library Automation.pdf.

15. Singh, N. (2007), Bridging the Digital Divide in India: Some Challenges and Opportunities, Accessed on Sept. 18, 2012 from http://unpan1.un.org/intradoc/groups/public/documents/un-dpadm/unpan042671.pdf.

16. Thomas, L.C. (2012, March 19), Product Watch: A Look at Four Mobile Offerings, *The Digital Shift,* 20, Accessed on Sept. 18, 2012 from http://www.thedigitalshift.com/2012/03/ mobile/ mobile-services/

17. Vyas, S.D. (1997), Library Automation and Networking in India: Problems and Prospects, *World Libraries*, 8(1), 27-35. Accessed on Sept. 18, 2012 from http://www.worlib.org/vol08no1/ vyas_v08n1.shtml.