Preface

INTRODUCTION

Web technologies, e-publishing, and Open Access have reinforced libraries to reach beyond any physical, political or social barrier. Modern libraries are converting gradually to digital libraries. Cloud computing and server virtualization technology is a boon for libraries as it provides a common platform for all. Another major advantage is easy information storage and resource sharing being made possible on a single and efficient system that saves cost and time. Virtualization Technology is being adopted by many players in the industry. In the year 2012, when I was preparing for a research paper on cloud computing for an international conference, I searched for books and articles on this topic. I realized that very few books existed on this topic. This motivated me to develop a complete reference book based on the virtualization concept for libraries. I am thankful to IGI Global for accepting my book proposal. From then on it was challenge to assemble ideas from many experts from various parts of the world into one single book.

This book aims to provide relevant theoretical and practical information and the latest research findings in the area of virtualization of libraries. The chapters of this book are conceived by experts in this field and users of this technology. The authors have used their experience to present information which will be a useful asset to our target readers and professionals who are interested in improving their understanding in this area and who are inclined towards using this technology in their libraries to provide cloud-based information services to their patrons.

SPECIAL FEATURES

What makes this book unique is the unity in diversity. It is a collection of thoughts and ideas by not one but several authors from various walks of life. In an attempt to give a complete reference on Cloud Computing and Virtualization Technologies in Libraries, authors have been invited to present their contribution in form of chapters for this book. Hence it includes experts, researchers, IT educationists, IT professionals, Cloud professionals and LIS professionals, all forming an intelligent rainbow of knowledge. The International Review and Editorial team has put in a great effort to develop a quality product for the beginners and practitioners in the Cloud area.

This book focuses on the latest innovation of information technology and application of the Internet, which is ‘Cloud Computing’ and its application to virtualization of libraries. The reader, going through the chapters diligently, breezes through the entire concept of cloud computing and its application to the digital world of libraries. Starting its voyage with the definition and introduction of cloud computing,
the book cruises along steadily through thicker clouds of knowledge. These clouds contain a variety of information viz. need of digital libraries, their architecture, application and implementation of cloud computing in digital libraries, issues and challenges faced in this process, green economic and secure libraries on cloud, digital preservation in cloud computing environment, different cloud libraries models, case studies, role and responsibilities of a future cloud librarian, open source in the cloud, various platforms available, their comparative studies, cloud library security, and finally recognizing the limitations and concerns associated with it. A person reading through the book not only familiarizes himself with the concept of cloud computing and virtualization of libraries, but also gets an insight on how digital libraries are valuable to the society.

**STRUCTURE OF THE BOOK**

Different chapters in the book are compiled in such a way that a person beginning to read with even the faintest idea of the digital library concept ends up acquiring a whole world of knowledge about the structure, benefits and challenges associated with it. The book is equipped with tremendous information. It also contains case studies, models and architecture of digital libraries and enriches the readers with valuable information, preparing them to face their respective professional fields with enthusiasm to implement the latest technology harnessed to benefit the inquisitive human mind. The book also gives food for thought to critics in this area, enabling them to think twice about the issues, concerns and limitations which need to be tackled with great care in order to optimize the benefits of cloud computing to virtualization of libraries in this frenzied world of innovations and technological advancements.

This reference book is a compilation of nineteen chapters, each one dedicated to different facet of cloud computing and virtualization technologies in libraries.

Chapter One introduces the Digital Library to the reader and gives information about its requirement in the global world. It explains the digitization process, recent trends and research activities, cloud computing, its types and methodology. It also describes the application of cloud computing in libraries with example of cloud in academic library in India, Library of Congress and OCLC. The chapter points out the change in the role of library and information professionals from a “book lending” person to a recognized “intermediary” between information and its users.

Chapter Two focuses on the need of digital information management and issues related to it. Digital preservation faces the problem of obsolescence and requires special concern. This chapter aims to identify the projects under process for digital preservation. It also describes the digital preservation techniques such as migration, emulation, Open Archival Information System, Metadata Harvesting and current trends of cloud computing in digital preservation and international efforts towards it with examples.

Chapter Three emphasizes that libraries and archives play a critical role in organizing, preserving, and providing access to the cultural and historical resources of society. It states that in a relatively stable world of printed, hand-written, and mechanically reproduced information, repositories have managed to preserve a rich array of scholarly communications, documentary evidence, and useful information for specialized scholars and for the general public. Finally it explains why the absence of a clear consensus about effective strategies and methods for digital preservation and the paucity of data on the resource implications of various proposed strategies serve as deterrents to concrete actions by institutions.
Chapter Four discusses how cloud computing, today’s widely acclaimed phenomenon, creates a new business environment in libraries and has much to offer to the library world. It changes the way of thinking about library technology and shows great impact on librarianship since the technological environment is changing. As part of the evolution of technologies, libraries must be prepared for the new paradigm shift, and empower themselves to stay ahead in the game. This chapter focuses mainly on models of cloud computing, type of cloud suitable for information centers, opportunity and risk in developing cloud services and impact of cloud computing on information centers.

Chapter Five elaborates on how libraries and information centers can enhance their resources infrastructure with minimum cost, make effective systems and provide better services to the user community at minimum cost and time. Its aim is to explain how librarians, information professionals, computer science professionals & knowledge workers apply cloud computing technology in the libraries and information centre management. It explains the application of cloud computing in libraries and information centre. In the end it describes some real examples like Dura Space, OCLC, Library Thing, Chronopolis Project, Library Cloud and Seer Suite where Libraries are adopting Cloud Computing. It also discusses how resource scalability will have a direct impact on reducing the organizational capital and its operational cost and how integration of Libraries with Cloud computing will make the Library System greener.

Chapter Six presents a case study of application of cloud computing in NIT’s in India with special reference to VNIT. Making the decision to use cloud-based services means balancing the elements of cost, risk, and benefit to decide whether those services help advance the mission of the library as well as institute. RECs/NITs Libraries can take advantage of the cloud in numerous ways, such as data sharing including discovery tools, current status of research, and software as service which depends on the cloud, email systems and social networking etc. The chapter recommends a road for globalizing Regional Engineering Colleges/National Institutes/Technology and Research Centers libraries in India.

Chapter Seven analyzes the current situation and existing problems of cloud computing in academic libraries. On this basis, with combination of cloud computing, SaaS, Web2.0, SOA and other technologies, this chapter proposes a CALIS-based cloud service strategy and the corresponding cloud library services platform (i.e., Nebula platform) model. The model is suitable for constructing a large-scale distributed network of public digital library services. The chapter further discusses problems faced by academic libraries and development efforts to overcome that problem. It also proposes to improve current user service model with cloud computing.

Chapter Eight, an attempt has been made to give an overview of cloud computing technology and its advantages to the modern world. It also states its connection with libraries, the models in which libraries can deploy this technology for providing services and augment the productivity of library staff. It believes that with the introduction of cloud computing, libraries can certainly offer more effective, more professional and user-centric services.

Chapter Nine discusses in brief the applications of the cloud and server virtualization technologies in libraries along with information on common concepts, current examples of cloud libraries, open source platforms available, the proposed university cloud library model and cloud library access model. It emphasizes that technology is advancing at a phenomenal rate, but it needs to be harnessed in the most efficient way. It realizes that cloud computing, resulting in cloud libraries will provide a great leap forward in providing access to large quantity of information to users.
Chapter Ten looks towards expansion of University libraries in the sub-Saharan region using cloud computing technologies. It was in view of this deficit that the University of Namibia’s (UNAM) University Library electronic Identities Authentication (UL-eIDA) system was conceived to build a cloud computing security framework model suitable for the sub-Saharan region. The UL-eIDA was intended to provide security in the cloud computing system. It employed security measures that utilized UL-eIDA card, firewalls, virtualization and VLAN configurations, DFUL-eIDA encryption mechanism and dynamic trust zone all worked in synergy to make the system forceful enough to combat security threats at any level.

Chapter Eleven looks into Open Source which has a strong position in the Cloud and for a good reason. The chapter discusses that commercial providers of the Cloud will have to adhere to the same standards, while hoping to add their strong ‘warranty-based’ service and reputation, an aspect in which Open Source still seems to lag a bit behind, at least in customer’s perception. The chapter further illustrates that if libraries need more ‘control’ over their Cloud-environments, they can still go for the options – available in all FOSS-products that build their own Cloud. This is the only approach in which libraries would get in touch with the platforms themselves. Moreover it discusses advantages of open source for cloud, main contenders and distributed storage technology.

Chapter Twelve focuses on how library can optimize their IT budget through a strategic initiative in the form of ‘On Demand’ testing. The chapter describes requirements of Testbed Platform and Cloud Testing. It further states that the continuous changes in Library environment forces the Library to innovate and optimize their Library process, resulting in continuous changes in the software applications that support the Library processes. ‘Testing as a Service’ - a new paradigm of Cloud based ‘On Demand’ testing service can help Library to address this challenge in library. The Chapter describes the features of AMAZON EC2, S3, EBS and their limitations along with their security models.

Chapter Thirteen discusses the history, technology, benefits, and initiatives and mainly compares the Amazon Web Services (AWS) and Online Computer Library Centre (OCLC) cloud service players. It describes their services and Web, mobile and social applications.

The objective of Chapter Fourteen is to investigate and design reference architecture to Digital Library systems using cloud computing with scalability in mind. The proposed reference architecture is called as cloud oriented reference architecture of the digital library system, that is, CORADLS. This architecture accelerates the library users to get easy, efficient, faster and reliable services in the digital environment. Here the end user does not have to worry about the resource or disk space in cloud computing. This chapter describes the issue of scalability in the domain of Digital Library.

Chapter Fifteen designs a Service-Oriented Reference Architecture for Digital Library System (SORADLS) using Web Service technology. SOA has enormous benefits that digital libraries could use. The developers and information professionals must carefully and consciously learn, understand and apply the principles, requirements and techniques of SOA in order to see its full benefits. The proposed SORADLS explained with examples and different modules like personalization, Registration, Notification, Security, Caching and Storage with workflow of SORADLS in future research directions.

Chapter Sixteen discusses measures to provide security of data in a Cloud environment. ECC or RSA algorithms are discussed for security in a Cloud environment. ECC itself is a very secure algorithm for encryption. The advantage with this model is, it is not only free from linear and differential cryptanalysis but also free from chosen cipher text attacks. Thus the given model supports the important properties like authentication, security and confidentiality and resistance against chosen cipher text attacks at less computing resources when compared to algorithm like RSA.
Chapter Seventeen states how cloud storage users, service providers and tools are considered as major components of the service architecture. Green computing and green production technology are utilizing minimum resources and maximum production in an eco-friendly way. This chapter discusses various architecture, service providers, models of service, certifications, billing models, security issues, solutions to security issues and eco-friendly economic storage. The information in this chapter will help towards making data centre more economic, eco-friendly and secure to store ever growing data in a reliable environment acceptable by future generations and nature as a whole.

Chapter Eighteen presents a snapshot of what is happening in the arena of cloud libraries. It presents the features, its promises, components, users and the services, infrastructure, information sources and retrieval strategies in the Cloud. Further, it presents a Cloud strategic planning model for its realization in libraries. It points out to the lack of focus on the implication of cloud computing in a library setting. With the technological changes and a shift from library mission and services by being involved in traditional IT practices, there is an urgency to leverage library services on Cloud platform. This chapter is a self-conscious attempt in filling some of the gaps.

Chapter Nineteen addresses the limitations of digital libraries and concerns related to them. It brings forth issues concerning digital libraries and the challenges, current and ahead. Implications of such issues must be addressed constructively in time at several conceptual and factual levels in the context of a set of values that are ethically and scientifically acceptable by individuals from all walks of life worldwide. Therefore, identifying pitfalls and shortcomings in strategies and policies that govern developing technologies can help prevent issues and problems that can rear their heads at some later stage. Explosion of information should be harnessed in such a fashion that difference between the desired information and what is accessible could be minimized. This chapter gives a microscopic view of the issues related to various dimensions of digital libraries and cloud computing in a much systemized way and looks keenly at ways to tackle challenges lying ahead.

**TARGET AUDIENCE**

The target audience of this book will be professionals, students, and researchers working in the field of information and knowledge management in various disciplines, such as library, information and communication sciences, Cloud professionals, administrative sciences and management, education, computer science, and information technology. Moreover, the book will provide insight and support executives concerned with the cloud library management and development in different types of information and work communities and environments.

There is an emerging need for an easy-to-use resource guide to help LIS, Computer, IT and Cloud professionals to communicate, understand and implement the Cloud computing and Virtualization technology in their area. I am thankful to IGI Global for accepting my proposal on this topic and for giving me a chance to create a complete reference book on Cloud computing and virtualization technologies in libraries with the help of our contributors and editorial board members and reviewers who are experts in this area.

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