

Cloud Computing in University Libraries

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Introduction

Use of cloud computing is increased in various sectors of jobs. Therefore job offers are increased in a number of sectors. Technology is changing in day to day life so use of resources is decreased and work time is reduced. Cloud computing is one among these technological changes. Cloud computing is used by companies of technology as well as companies using networking systems. In any system less hardware is used for data storage than internet storage. Internet storage is more used in today's technological world so that the stored data is accessed anywhere. For example Google Drive is used to save file and the file can be accessed anywhere by ID-login.

Cloud computing is used more and more for data storage. By cloud computing, difficulties in hardware maintenance and up gradation are solved easily. Cloud software engineer and cloud architect are there in Software Company and IT companies. A number of qualified jobs are there, like cloud network engineer, cloud consultant, cloud business analyst, cloud project manager, and cloud network architect, with good salary packages all around in various job sectors. Understanding of cloud computing is very essential for the library science professionals to store important data through internet. Internet is basic condition for having a cloud service. Cloud is a metaphor used for internet only. When we have large data in libraries we need to store through various mechanisms like sometimes hard disc, through library's computer and sometimes through a server if data is large. Again we take need to save these data or take back up for future use and to prevent damage. On daily basis we take back up through some device manually which takes time, device and of course not to forget these duty. There are every chances of device damage and we keep those data through server, which is a virtual space for data storage. For maintaining a server we need to have money, expertise, and of course the maintenance engineer. It is possible only when we have money and data is relatively less large. If data goes higher and higher then difficulty arises to maintain it with less money and expertise. So keeping data online and even large data is possible with virtual rather bigger server, may be of your own or service created by someone else. The storage data is expanded further and further and much data by as many clients can be stored through these cloud service provided by big corporate or private or government as service providers. In this case you need to pay only whenever you want take the service and pay on demand only. So cloud computing is an internet-based service for storage facility and the service with its different types and categories are called cloud service. These technologies are used by even government agencies and many organizations through the help of

cloud service provider. We library people can understand from these technologies that our large library data can be stored, used, saved and updated somewhere else through this technology and service provided by others.

Modern technological innovations and solutions are responsible for the change in the information throughout the world. Cloud computing is modifying the information as other technologies have done in the old times.

Cloud computing is helping in the efficient and effective use and sharing of information service. It has gained new and attractive paths of the creation, diffusion, utilization, and sharing of information, knowledge and mental property in libraries. Management difficulties are decreased by cloud computing.

Quantitative information, knowledge as well as communication are there in the libraries. Parliament libraries provide services to the Parliament staff according to their duties. Libraries in higher education institutes provide knowledge for management, preservation, organization, distribution and utilization of information to strengthen research, learning, teaching, community services and scholarly communication.

Libraries help the clients for the availability of their needed information resources as required in the relevant format. The new library is seen beyond the walls of the library building by the applications of digitization as well as technology like cloud computing, mobile phones, social computing, and Web-based solutions.

Now the cloud computing is for the displacement of the architecture of client server and changing the sending of information services and librarians have a leadership role for its implementation.

In libraries, cloud service has an important role in the management of information services, due to poor economic conditions of organizations. Libraries act as “agents of change” should be for implementation of modern and smart technological solutions to enhance and strengthen the sending of services to its patrons. It provides an up-to-date service of the cloud computing in the utilization, management, and sharing of information, knowledge as well as mental assets in libraries and for the generation of online communities for scholarly participation, collaboration and communication.

Background

Cloud computing is a technology and it is for you to gain the experience to get benefit of it in its various forms to change your organization into a more effective, efficient as well as a provider of responsive service to the business.

Cloud computing is for providing an increase of services via various systems with huge data centers as well as strong servers that are for Web-applications. This is for creating, integrating and diffusing the resources with services using scattered computers on the internet. Software applications, resources and information are shared on public cloud services for the availability to the clients. The contemporary environment of knowledge is taking systems of innovative business by the use of technological solutions like cloud computing, artificial intelligence, data mining, cloud enterprise resource planning and geographical information. Cloud computing is a Web-based solution that provides fast and quality information services to the clients around the world. Cloud computing provides measurable, network-based, brief information technology infrastructure place and applications

like on-demand services that are paid by utilization.

Structural make up of Cloud computing

“ Cloud computing is a center point for the most highly impactful technologies such as mobile Internet, automation of knowledge work, the Internet of things(IoT), and big data(Rimal &Lumb,2017,p.5).”Cloud computing is arising as the new information and communications technology with the greatest impact since the World Wide Web is in existence. The structure of cloud computing is the make-up of systems of the software systems for *cloud computing*. It has many *cloud components* with one another over programming of application interfaces of Web-centered services. The “cloud” is the combination of networked characters with on-demand services to serve computing resources like storage, networks, servers, services and applications. Cloud computing structure has two key components like the *front end* and the *back end*. The front end is looked by the computer user with network, computer as well as applications to reach the cloud through user interface like the Web browser. The back end is the “cloud” having network, computers, servers as well as data storage tools. Cloud computing includes four types of clouds like public, private, community and hybrid.

Cloud computing services

“The usage patterns of cloud computing change with the size and profitability of the company(Wang, Ranjan, Chen, Benatallah,2017,p.39).”

Cloud computing services are categorized as-

1. Software-as-a-Service (SaaS);
2. Platform-as-a-Service (PaaS); and
3. Infrastructure-as-a-Service (IaaS).

SaaS gives applications and related services by the service provider to the customers via the internet. It is based on the demands and needs of the users. It is business purchase software. PaaS gives services related with the deployment, hosting services, testing environment, development, creation and maintenance of software and Web-based applications. Own code is written by the end users and the code is uploaded by the PaaS provider and presented to the Web.

IaaS gives storage and computing power on measurable, elastic or flexible basis. IaaS is the alternative for outsourcing. It is a Hardware-as-a-Service or utility.

Cloud computing usages

Customers pay for the physical infrastructure than owning the system. They outsource cloud services. Various internet-centered companies have large storage database capacities. Need is to rent out the extra space and storage of resources. The organizations must be in a level to give the essential software, infrastructure and platform applications. The client deals with the service provider. The customers use resources like a service and

pay on the resources consumed.

Opportunities in libraries

The information is in a static position of change and revolution. The knowledge society leads to the commoditization of knowledge for the society in the market. The information environment is featured by the explosion of information. Technological trends are stressing information centers to form online communities. Cloud computing has numerous open source applications, components and modules.

University libraries must change their traditional practices. New management and technological activities are needed in information related works. Various internet-centered organizations are joined in many activities for promoting the cloud computing model in libraries. Yahoo, Google and IBM are funding universities for research in cloud computing. The companies give hardware, software as well as services to universities. Cloud computing is popular in business establishments. Cloud computing has benefits joined with technology. Services are conducted and delivered by libraries as well as business organizations using this model of computing. Cloud computing is for handling and supporting the services in libraries. Cloud computing can improve use and sharing of information in libraries. Payment is based on consumed services. Via consortium, datacenters can be developed; superior technological solutions can be acquired as well as professional expertise can be seen in the libraries.

The cloud creates online communities, as well as virtual communication and collaboration with customers. Scholarly communication, sharing of information and storage, intellectual records and knowledge are available by cloud computing. Virtual communities of information professionals are created by cloud computing. Social interaction, friendly environment and collaboration are possible in libraries by cloud computing. Web 2.0 gives information services to customers via presentation, online scholarly communication, collaboration and discussion. Cloud computing in any library gives information services for teaching, research and community services.

Advantages

Cloud computing gives need based services. It makes the information technology systems smarter. The service provider gives all services with licensing, upgrading, installation and the management of systems. Such organizations with cloud computing gives various services like infrastructure, servers, applications, networks, and platforms. Information professionals handle services with less costs. Technological changes are adopted by libraries and information centers to provide information services. Virtual communities are created by information professionals via social software systems like blogs, wikis, podcasts, Face book, Twitter, Skype and Web conferencing to give services on 24/7-hours. Scholarly communication, collaboration, participation and discussion are created by the virtual information environment. A service provider also gives the infrastructure for handling, managing and supporting combined library systems. Cloud computing gives information services, technological solutions and client needs for information professionals.

Web-to application-based systems are arisen to bring modern ways services. Outsourcing services are seen

without owning the information infrastructure. Outsourcing is for delivering cost-effective services. Customers pay only for what is utilized, like pay for electricity and water.

Cloud computing is based on flexible, measurable, and elastic principles. Its services are based on user requirements. Cloud computing gives the centralization for the technological infrastructure as well as resources on the internet. The sharing is for various organizations giving use of resources. Cloud services are developed by library consortia. Innovative services are facilitated by cloud computing. Purchase, installation as well as maintenance for computing infrastructure issues are minimized for information professionals to focus on information services for the clients. Cloud services give proper security. Cloud service providers assure that proper security services are maintained.

Objections

Cloud computing is affected by various factors like security issues. Services are compromised. Traditional information is easily available by cloud computing. As a break down is seen to the system, the damages are risky for the organizations. Outsourced data as well resources are unsafe. Various organizations are not interested to adopt cloud computing because of privacy of data. As the system fails, it affects all resources as well as services and operations of the organization. Cloud computing services are within the reach of the internet-centered business organizations like Google, IBM, Amazon, Safaricom, MTN Business and Biashara. Number of Cloud services has issues like regulations for use and access, policies, and appropriate rules. Connectivity services are critical and lack of connectivity gives certain local functions to continue.

Summing up

In the face of the present hard economic situation and limited financial budget, cloud computing is the best management and technological practice to help libraries. Libraries and other information centers should adopt and embrace cloud services in the delivery of services to their clients. This paper provides a roadmap into the possibility of using cloud computing to handle and support information services in an ever-increasing digital economy. Across the world, cloud computing has created a new business paradigm of a virtual information environment that can lead to the maximum utilization and sharing of resources and services. Libraries need to understand and weigh the underlying features, benefits and challenges of cloud computing. Despite any drawbacks, cloud services offer attractive opportunities for organizations and service providers leading to innovation and the satisfaction of users.

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