

Transforming Academic Library: The Impact of Cloud Technology on Information Access and Management

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ABSTRACT

Academic libraries consistently embrace advanced technologies pertinent to current technology and traditional services. Their motive is to provide information that can be used in teaching and research for longer. Cloud computing is a technology that libraries and other institutions currently use to manage their online information resources. The study highlighted the various services where cloud technology can be employed in academic libraries. The major objective of the study is to identify the benefits and applications of cloud technology for library services. A wide range of literature has been collected and reviewed to furnish all relevant information for the study. The study strongly encouraged the use of cloud technology because of its numerous benefits, including the ability to reach a huge number of people for library services. Cloud technology enables both library users and professionals to access and administer library resources at anytime from any location. The library profession is developing further as a result of the rise of online publications, e-libraries, internet usage, online-based library applications, and consortium implementation.

Keywords: *Cloud Technology, Academic Library, Library Services, Users, Information Access and Management.*

1. INTRODUCTION

Currently, we live in the information age, where ICT takes the form of industry services like banking, transportation, and education that improve their operations. Similarly, ICT is the key to the growth of information centers and libraries for the collection, storage, organization, processing, and analysis of information. Cross-linking services between libraries was the extent of library networking before the Internet. In this day and age, libraries rely on cloud-based services and solutions, including the potential to access electronic resources such as journals and books, measure usage reports, maintain institutional repositories, provide e-learning materials, and operate library management systems. Cloud technology is considered the most significant contemporary approach that helps libraries overcome storage worries and financial challenges and improve service quality.

Cloud computing is the method of delivering hosted services such as data storage, servers, databases, networking and software over the internet. A cloud service provider manages the actual servers that store the data. In cloud

computing, digital assets, particularly data storage and processing power, are made available on-demand and are not directly managed by the user. Usually, only utilized cloud services are charged for, which helps scale the infrastructure as business needs change, reduce functional expenses, and manage the infrastructure more effectively. Various businesses, like Amazon, Google, Microsoft, and others, are creating cloud computing platforms and expanding their services at a faster rate to serve a greater number of users.

2. OBJECTIVES

- ✓ To identify the various areas in which cloud technology can be implemented in libraries.
- ✓ To highlight existing cloud computing applications utilized in the library and information sciences.
- ✓ To review the existing literature on cloud computing in library and information science.
- ✓ To find out the benefits of cloud technology in libraries.

3. LITERATURE REVIEW

According to (Mir, 2024) library automation has altogether transformed how libraries offer resources, and services, and interact with users. The author discusses automated library systems, their benefits for efficiency and user experience, and the matters that libraries should contemplate when putting them in place and maintaining them. In this paper, he seeks to explain how library automation is likely to revolutionize the way libraries operate in the future.

(Saidu and Sharma, 2023) A digital library may be more productive and adaptable when resources are dynamically allocated. The cloud will also continue to develop as a backbone for the future internet, which will be connected to a web of services.

(Munavalli, 2023) Currently, libraries are experiencing a phase where user demands are increasing dramatically while budgets are decreasing radically. In such cases, web collaboration and cloud computing are two fundamental concepts that are managing creative breakthroughs in libraries by enhancing their collaboration and computing abilities. Most academic libraries will, shortly, offer their patrons significant access to their resources by using cloud computing.

(Sujatha and Ambia, 2023) Cloud computing reshapes libraries and information centers in terms of how libraries are funded and used. A well-designed library and information center deliver more possibilities for outsourced vendors and IT service providers. Service providers must be aware that security is a primary concern for most organizations.

4. Types of Cloud Computing

Cloud hosting can be broadly classified into three types: Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS) and Software-as-a-Service (SaaS). Clouds can also be categorized depending on the deployment model: private clouds, public clouds, or hybrid clouds.

4.1 Service Model

4.1.1 Infrastructure-as-a-Service IaaS refers to a cloud service provider managing the physical servers, data storage, virtualization, and network via an internet connection. The service provider takes on the liability of handling data storage, hardware, , hard drives, networking, servers, maintenance, outages, and hardware issues, whereas the user takes charge of things like the operating system, applications, and middleware.

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4.1.2 Platform-as-a-Service: PaaS means that while an external cloud service provider provides and manages the platform's hardware and application software, the user is still in charge of the programs and data that run and depend on it. PaaS, which is mostly used by developers and programmers, provide users with a shared cloud platform for application development and management without requiring them to create and manage the infrastructure that is often involved in the process.

4.1.3 Software-as-a-Service: It is a service that gives users access to an application that is managed by a service provider. SaaS apps are usually mobile apps or online apps that users can access using a web browser. The user connects to the cloud apps via a dashboard or API, and software upgrades, bug patches, and other routine software maintenance are done by the service provider.

4.2 Deployment Model

4.2.1 Private Cloud: In a private cloud, computer services are provided via a private IT network exclusively for the use of one organization. It is also known as an internal, enterprise, or corporate cloud, is often maintained by internal staff and is inaccessible to outside organizations. Private cloud computing provides control, security, and customization in addition to all the advantages of a public cloud, like self-service, scalability, and elasticity.

4.2.2 Public cloud: It refers to computing services provided via the internet by third-party companies. The services provided by public clouds are accessible to anybody who wishes to use or pay for them, unlike private clouds. These services may be provided for free or pay-per-use, with users only needing to pay for the bandwidth, storage, or CPU cycles that they use.

4.2.3 Hybrid cloud:

They blend the attributes of both public and private clouds. In hybrid cloud architecture; one only pays for the amenity they temporarily utilize instead of buying and maintaining something they may not use for a long time. In short, a hybrid cloud provides all of the advantages of a public cloud without the security dangers.

Further, cloud computing can be divided into front-end and back-end levels. The front-end layer is the one that users interact with. Through cloud computing software, this layer gives users access to data stored in the cloud. The back-end layer is composed of hardware and software, including computers, servers, central servers, and databases. This layer is the primary component of the cloud and it is solely in charge of safely storing data. The middleware, which functions as a bridge between the database and applications, is a segment of software used by the central servers to guarantee flawless connectivity between devices connected via cloud computing.

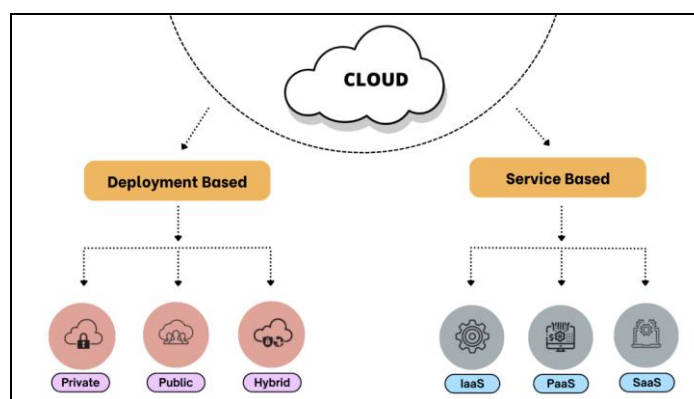


Fig.1: Types of Cloud Computing.

5. Utilization of Cloud Technology in Academic Libraries

5.1 Library Websites: Cloud services can enhance and manage resource usage according to the requirements of the library on their websites. It ensures that patrons are free to access library websites easily from anywhere by using devices such as laptops, desktops, tablets, and mobile phones through responsive web design. They also provide many interactive features such as Live Chat, Virtual reference services, and search functionalities that enhance the users' engagement with the library and give satisfaction with the services.

5.2 Digital Archives: The adoption of cloud technology forms a major part of digital libraries to revolutionize the delivery of library services and upgrade the possibility of access, high expandability, and opportunities for convergence. Thus, it enables users to access library resources at their convenience and from any site with an online connection. Library services such as those provided via the cloud are non-place-bound, so users around the globe are provided with the same services. This means that libraries can grow their collections, whether in paper or digital format, without worrying about the infrastructure, as is seen in cloud computing, where resources for storage and access can be easily adapted to suit the users' demands and advancements in the use of resources in computers. It has also become possible to recommend appropriate resources depending on users' preferences and past activities in a given library. Thus, by providing a meaningful and simple-to-use digital library interface, libraries can enhance the ease of use for both new patrons and inexperienced users. The libraries' user demographics, frequency of usage of resources, popular inputs, and query searches make it possible for libraries to collect and analyze usage data using cloud-based analytics tools. A few of the commonly familiar and adopted digital library software are DSpace, Greenstone, E-Print, Fedora Commons, GSDL, OPUS, and many more. They play a big part in the preservation of library collections by recording and saving digital versions of these ephemeral expressions for future generations.

5.3 Library Management Systems: Cloud-based services are attracting more and more libraries for their management systems because of their low cost, manageability, and flexibility. Library professionals can easily manage their system, and with an internet connection, users can browse their library catalog from any location. This is helpful, especially when managing multiple library branches. Cloud-based systems enable libraries to come together on consortiums, resource sharing, and interlibrary loans more competently. Several cloud-based platforms provide mobile-friendly user interfaces or dedicated apps. The storage capacities must not be a concern for library professionals as they are scalable as per the requirements and can handle a varying number of libraries, from small to large academic libraries. The updating, maintenance, and troubleshooting of library management software are handled by the service provider, guaranteeing that the library always has access to the latest security patches and features. Cloud-based library management software is evolving, offering libraries more advanced tools to manage their collections, assist users, and perform efficient operations. Ex Libris Alma, SirsiDynix Symphony, Koha, OCLC WorldShare Management Services (WMS), Library.Solution, Destiny Library Manager, BiblioCommons, TLC CARLX, ProQuest Ex LibrisLeganto, and Sagebrush are cloud-based library management software systems for different types of libraries, from academic and public libraries to schools and special libraries.

5.4 Remote and Distance Learning: Cloud computing has a vital role in strengthening remote and distance learning in academic libraries. It enables libraries to host e-books, e-journals, and other e-resource platforms that can be accessed remotely from any location, as long as they are connected to the Internet. It provides users with a flexible way to interact with the library resources through the use of various electronic devices, such as laptops, tablets, and smartphones. Cloud services can help library professionals customize their services to improve the user

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experience and locate areas for improvement. EZproxy, OpenAthens, Shibboleth, and many more are the platforms where the library provides remote access to its e-resources from an off-campus location.

5.5 Staff Attendance: Cloud can easily customize features according to library attendance policies and requirements of all sizes, from small to large libraries. It can offer mobile-based systems with geolocation features to ensure that staff are giving their attendance from an authorized location. A cloud solution has made generating reports and tracking attendance effortless because all the data is saved in a single central database. It uses biometric scanners, RFID readers, and mobile apps for documenting attendance by incorporating time-tracking systems. It offers a unified platform for supervising staff data with human resource management systems like payroll, leave, and performance, and has the potential to automatically determine the working time and overtime.

5.6 Cloud based patrons' entry/exit: Cloud technology can aid the library in keeping digital records of its patrons visiting the library. Patrons can check in and check out of the library by using their mobile apps or web portal linked provided by the library. As a result, the library can determine the peak time of patron usage by analyzing the data from entry and exit logs.

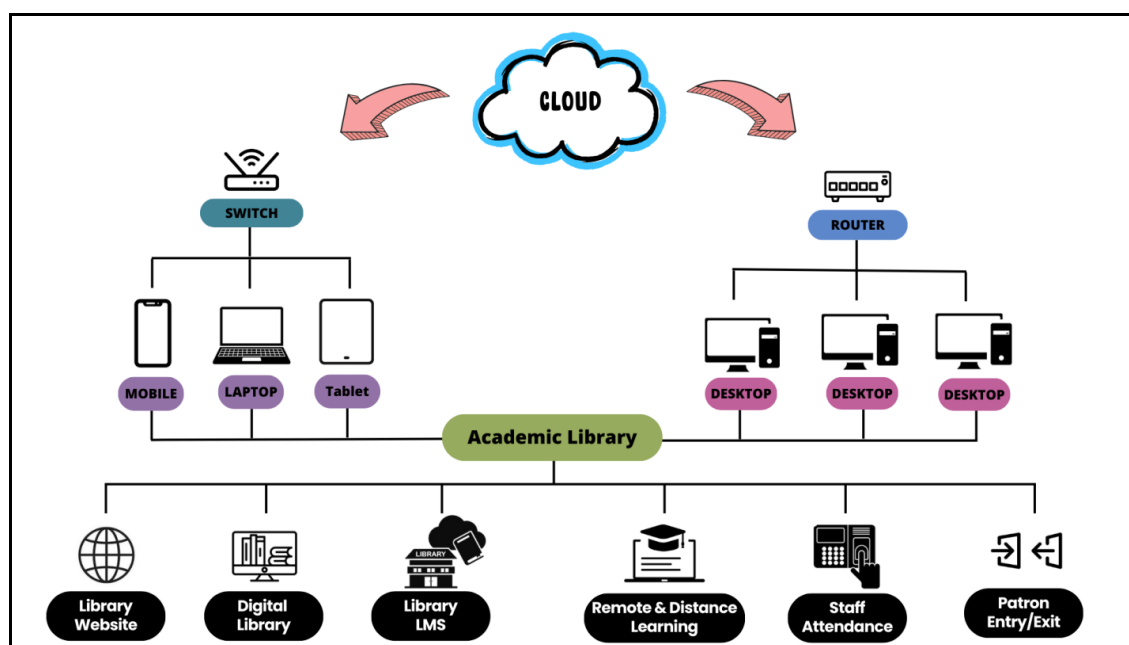


Fig.2: Utilization of Cloud Technology in Academic Library.

6. Benefits of Cloud Technology in Libraries

6.1 Scalability: Libraries may adjust resources depending on demand without any physical investment in infrastructure. This flexibility allows library professionals to conform to changing user needs without compelling them to incur significant capital expenditures. **Cost-effectiveness:** Cloud services are on a pay-as-you-go basis, meaning that libraries just have to pay for what they really use. Using cloud infrastructure can be cheaper for libraries than using on-premises infrastructure since no hardware and software licenses need to be purchased and maintained.

6.2 Accessibility: The use of cloud-based library services makes resources accessible through remote locations with internet connections, this holds significance for patrons who cannot visit the libraries, such as those from rural areas and people with disabilities.

6.3 Collaboration: The unified platform provided by cloud technology among library professionals and their clients encourages a participatory mode of work. This allows more productive collaboration between library professionals to create a better user experience because users can easily share information or work on projects together.

6.4 Data management: Academic libraries can keep their collections secure and maintain integrity with the aid of integrated data management tools available in many cloud services, like encryption of data and automatic backup systems. Moreover, patron usage trends and preferences could be obtained from analytic solutions based in the cloud, allowing customization of library services.

6.5 Integration: Cloud-based library systems can positively integrate with other third-party applications and services, such as digital repositories, academic databases and learning management systems. Interoperability enables libraries to provide a more seamless and integrated user experience, increase staff and patron efficiency, and improves resource availability.

RESULT AND DISCUSSION

From this study, it has become visible that cloud computing is the utmost innovative development that can satisfy the demands of the patrons to explore library resources from any device from any location. Therefore, the deployment of cloud-based services in libraries is crucial to disseminate authentic and quick information delivery services, especially in digital libraries, social networking, and information communication technology. Considering the ever-changing technological landscape, library professionals should not instill a sense of technophobia and instead master the art of IoT to satisfy users' e-service needs.

CONCLUSION

Academic libraries should take advantage of the technical development that is pertinent in the field of library and information science to provide quality e-services to save the time of the users in a meaningful way. Libraries are transiting through an era where users needs are increasing rapidly due to virtual access to the library's e-resources. The cost-effectiveness and the ability of cloud technology can help institutions keep up with the growing demand for online resources and make them available with multiple accesses altogether.

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