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SYSTEMATIC REVIEW ON CLOUD COMPUTING APPLICATION IN LIBRARIES

Rohankar Ashwini Sureshrao, Dr. Aslam Khan
Department of Library & Information Science, Mansarovar Global University, Sehore, M.P., India.

ABSTRACT:
Cloud computing is made up of the words "cloud" and "computing". A cloud is just a collection of connected computers that can be either network servers or personal PCs. Cloud computing is available to library users; if library data is kept in the cloud, users can quickly obtain the needed data from a variety of sources.An electronic library is a repository for written, printed, and other types of printed information, as well as audio and visual assets. Information retrieval systems and housekeeping tasks are dealt with in an electronic library.Digital and virtual libraries are not the same thing. Electronics must be present in all virtual libraries, although not all electronic libraries must be virtual.In this article, systematic review on cloud computing application in libraries has been discussed.
Keywords: Cloud, Computing, Libraries

INTRODUCTION:

The necessary information and data are readily available online and can be accessed with just one click nowadays, the work has become considerably easier, more convenient, and more reasonably priced. Today, the internet offers a huge selection of books and journals on a variety of topics. Collecting material about the study subject that has been published worldwide, both old and new, is the first and most important phase in the review of the literature.

RELATED REVIEW OF LITERATURE:

According to Alhomdy, Sharaf, et al. (2021), the spread of the COVID-19 coronavirus resulted in a global lockdown and the activation of emergency procedures by governments. Social seclusion appears to be the only viable method of virus containment at the present, as the total number of positive cases worldwide has surpassed the 97.46 million threshold. As a result, businesses encounter challenges and find it challenging to address the current difficulty of remote working. Numerous of us have had to adopt new working methods as a result of COVID-19's unique impact. The requirement for access to essential applications and the infrastructure's scalability have led to the emergence of cloud computing as a supporting technology. Cloud technology played a significant role in the fight against the epidemic, and it has become a godsend for governments and organizations in many spheres of life, including education, health, business, communication, remote monitoring, and more. As a result, this study discusses the advantages, traits, and uses of cloud computing and outlines how the cloud enhances quality of life throughout the world during COVID-19. It demonstrates how cloud computing aids nations in their fight against COVID-19 in the fields of health, education, and business. It gathers data by disseminating an online survey to a wide range of individuals from academic and non-academic backgrounds in various locations throughout the globe in the ICT and education sectors. The outcomes demonstrated that cloud computing can be useful during an outbreak.

According to Swaminathan KSM (2020), the manuscript is utilized to shed light on how academic library systems use cloud computing and its application, impact, and future possibilities for academic libraries. There is a new IT service technology that many companies and organizations are implementing. This essay offers a quick introduction to cloud computing and how academic libraries can use it. Virtually limitless on-demand computing resources are available to us thanks to cloud computing. This article offers some fundamental guidance on how to select and assess Cloud services for academic libraries. The internet has long been referred to as the "cloud." This usage originally originated from its frequent depiction as the outline of a cloud in network diagrams, which was used to show the transfer of data through carrier backbones that owned the cloud to an endpoint location on the other side of the cloud. In

consumer-oriented applications like financial portfolios, personalized information delivery, data storage, or the powering of large, immersive computer games, cloud computing is an application of traditional supercomputing, or high-performance computing power, which is typically used by military and research facilities.

According to Pradipsinh Chudasma, Atul Bhatt, and Dharmendra Trivedi (2019), the goal of this article is to ascertain the level of knowledge and usage of cloud computing services and technologies among library staff and patrons, in particular in university libraries in Gujarat, India. 15 senior library professionals and 210 library users, including postgraduate students, researchers, and faculty from the respective university, participated in a thorough survey that was piloted using a structured set of questionnaires. According to a study, cloud technology is known to 78.57% of library patrons and 80% of library employees. For cloud computing, they use several devices, with 65.71% of library patrons utilizing laptops and 31.41% using smartphones, tablets, and iPads. The majority of professional library staff members utilize desktop computers and agree that cloud computing is quite helpful for offering library services. Maximum 96% of respondents used Gmail, 52.44% used YouTube for video services, and 65.78% used Google Drive for file storage and sharing. The use of the online presentation and event calendar by library staff has decreased. For data import and export purposes related to acquisition and technical work, they use cloud technology. 73.33% of library staff members said that employing cloud technology has improved library services, and 66.67% of them are satisfied with how existing cloud technology is being used in university libraries. Additionally, it appears that the majority of librarians agree that modern cloud technology in university libraries requires a certain level of training. The study's recommendations for improving library services in university libraries using the most effective use of the cloud technology now available.

The cloud computing technology (ICT), according to Nitasha Gandotra, Nidhi Tyagi, and Swati Tiwari (2019), has emerged as a boon for libraries and is providing a variety of chances and services for libraries to connect their services with clouds. ICT has compelled libraries and librarians to modify how their information retrieval systems operate and are processed. Libraries are advancing to an advanced level known as cloud computing in this digital age. Libraries in cloud computing don't need software, operating systems, or applications as long as they stay within the service provider's stated parameters. A new significance in computing is provided by cloud computing, which transforms how we create, scale, update, manage, and pay for programs and the infrastructure that supports them. This paper aims to emphasize fundamental information concerning cloud computing, including its varieties, deployment techniques, and advantages. Second, it covers cloud computing projects for libraries as well as its advantages in the field of LIS (Library Information Science).

A survey of cloud computing technologies used by a library professional who attended Kerala University Library was undertaken in Sudhier& Seena (2018). He used questionnaires to conduct a survey of 102 library professionals and found that 42.16% of them had some knowledge about cloud computing. Most librarians used Gmail, Facebook, Google Docs, and other services. Cloud service models are not widely known among library professionals. The average skill level for adopting cloud computing technologies is 14.71% among librarians.

In his research on cloud computing and libraries, Bhardwaj (2018) covered in-depth cloud computing, its various kinds, security concerns, and obstacles. He also mentioned examples of cloud-based library services such as World Cat, Polaris, Scribed, the Discovery Service, Google Scholar, OCLC, etc. Cloud computing is divided into three categories: application installation, storage space, and connectivity.

The NIST Cloud Multiple Tenancy Model, the CSA Cloud Risk Accumulation Model, the Cloud Cube Model of the Jerico Forum, and the Multi Cloud Database Model were only a few of the distributed computing security models that Prasanth (2017) mentioned. For the protection and privacy of sensitive data, it is also advised to accept the Jerico forum's cloud cube model and the multi-cloud database model.

For the identified user with user authentication, Darak (2017) studied Kerberos, biometric fingerprint, and iris authentication. Different authentication models, as well as their benefits and drawbacks for cloud computing security and access management, were also covered.

The advantages of cloud computing in e-libraries, challenges with digital libraries, the architecture for e-libraries, and the function of cloud computing in e-libraries were all highlighted by Dastagiri and Kumar (2017). As a result of new technology, such as cloud computing, institutions are migrating their digital libraries to the cloud, which will help lower costs for infrastructure and IT staff.

The issues with building and developing a digital library utilizing cloud computing technology were highlighted by Pohreliuk, Rusyn, and Kowalik (2017), who also offered a fix. The benefits and drawbacks of the current virtual libraries are discussed, along with potential solutions. They talked about a few instances of cloud-based digital libraries.

Hundu and Mamman (2017) discussed cloud computing initiatives for libraries such as OCLC WMS, Ex Libris, Dura Cloud, Polaris, and Liblime. They also discussed the impact of cloud computing on libraries and came to the conclusion that cloud computing saves money, lowers the cost of library collections, and alters the working style of library professionals.

Diaby & Rad (2017) gave an evaluation, a brief definition of cloud computing, its characteristics, and various cloud models with their unique properties. With very little upfront expenditure, cloud technology enables institutions to manage resources and satisfy customer demand.

Khan and Alam (2017) discussed cloud computing milestones, significant virtualization in the cloud, benefits, and various cloud computing models, as well as many factors to take into account when choosing cloud-based services for academic institutions. Together, teachers and students can collaborate online by leveraging cloud computing.

In a survey on web 2.0 technologies done by Patel and Bhatt (2017), it was discovered that 66.7% of Gujarat's top institute libraries offered RSS, OPAC 2.0, IM, and Web 2.0 social bookmarking and tagging services, and 33.33% utilized blogs, Google Docs, and YouTube. Wikis were not part of any libraries' offerings. Additionally, they outline Web 2.0 tools and the types of Web 2.0 library services offered by various libraries.

The shortcomings of the old educational system, cloud computing features and models, the advantages of cloud computing in higher education, and commercial cloud suppliers including Microsoft Azure, Google Cloud Platform, and Amazon Web Services were emphasized by Singh &Baheti (2017). The advancement of society and the country is significantly influenced by higher education. To reduce infrastructure costs and maintain a financial crisis that affects every institution, higher education should incorporate new technology. Cloud computing is one such approach.

A suggested cloud computing model for Nigerian tertiary institutions was made by Yusuf, Orobor, and Sambo (2017). They use a PaaS and SaaS strategy to manage and provide services for virtual libraries. In managing and maintaining a virtual library of Nigerian tertiary institutions, the suggested methodology delivers cost savings. It provides constant access to the library's materials. They also talked about the implementation of the virtual library in the cloud and open source software.

The description of cloud computing, its models, and applications in libraries, including the creation of digital repositories, the search of library data and academic content, the development of community power, data storage, and library automation software, was provided by Oak (2017). She cites other clouds as examples, including OCLC, Amazon, Google, Kindle, Duraspace, and OALSTER. She wrapped up by discussing the current state of Indian libraries, cloud-based services that had limited success because there weren't many reputable cloud service providers, and the technical expertise of library staff.

Bhandari, Gupta, and Das (2016) examined cloud computing's use of cryptographic approaches for message integrity, sender and receiver authentication, and data confidentiality. The proposed framework for data security, data storage, data classification, indexing construction, encryption procedures, HMAC, data retrieval, etc. was also presented.

Sharma & Sharma (2016) provided an overview of the cloud computing concept, including its deployment and service models, characteristics, and cloud layer architecture, including virtualization, networking, operating systems, and application layers. They also discussed issues with data access control and integrity, data loss, data location, data privacy, provider-level issues, infected applications, network

security, DNS attacks, network sniffing, and SQL injection attacks. They also discussed challenges with cloud security, such as authentication, access control, service management, policy integration, and security issues. Data recovery, a DOS attack, a trust issue, etc.

Angeline, Fiorenza, and Devahema (2016) talked about the challenges of cloud computing and security. How we ensured the security, privacy, and dependability of our data while a cloud vendor processed it. Data protection, security risk reduction, and security risk were also covered. Cloud computing faces difficulties with cost, charging, and security. Cost-saving cloud computing raises security concerns, though.

Nwogbaga&Nwoyibe (2016) compared cloud computing to traditional computing, looking at its platform, storage, infrastructure, clients, services, and applications. One of the newest technologies, cloud computing, allows us to use internet infrastructure to keep our data safe and secure in the cloud. Additionally, they described the characteristics of cloud computing, its advantages and disadvantages, and its business model.

Various computing systems, including distributed computing, cluster computing, utility computing, grid computing, and cloud computing, were described by Sood, Kour, and Kumar (2016). Parallel computing, grid-based utility computing, and cloud computing are all subtypes of distributed computing. Cloud computing offers the highest quality services at the lowest cost. There are two types of cloud computing: location-based and service-based. Cluster computing is used to manage groups of computers on a single computer.

Nisal (2016) completed a case study of the University of Pune's development of a cloud-based exam paper. She researched cloud computing implementation and security using a case study approach. For email, calendar, and contacts all in one location, Bharti Vidyapeeth uses cloud computing. Telfair Country School uses a cloud-based 2X remote solution for virtual desktops. She also completed a case study on the use of cloud computing for the businesses Razorfish, D-Link, and KPMG. Cloud computing offers on-demand, time-saving, and money-saving services.

Pandey & Kushwaha (2016) looked into a number of cloud computing characteristics, cloud models, and issues with digital libraries, such as cloud computing awareness and permission recognition. They also talked about improving the user service model for unified search and integrated consulting real-time access in university libraries, as well as exploring the present user service model for WWW, BBS, FTP, and email in the digital libraries of universities.

Srivastava and Verma (2015) provided an overview of cloud computing's fundamentals as well as its features, advantages, various forms, prerequisites, and applications in the field of libraries. Budget, space, the expansion of information, changes in user demand, educated IT staff, resource sharing, rising costs, energy, etc. are some of the issues. As a result, the library must implement cloud computing. They also examined legal challenges, a distinct cloud model, government procurement laws, and data security as they pertain to cloud computing. Cloud computing offers better library services and hope for libraries without the financial wherewithal to make infrastructure investments. Access to library materials is quick and simple thanks to cloud computing.

Sethi (2015) investigated cloud computing in libraries' definition, traits, service models, deployment models, advantages, and risk factors. Private information becomes public after cloud computing adoption, so libraries have taken care of it. Cloud computing's primary risk factors are privacy and security. All risk-based libraries should consider cloud computing because the license agreement with the cloud provider does not guarantee the future and the terms and conditions of the cloud service provider may change in the future.

Sharma, Sharma, and Pandey (2015) examined the origins of cloud computing and provided real-world examples of its application, including OCLC, Wordcat, Library Thing, Reed Elsevier, Amazon, Kindle, Seersuite, Duracloud, Polaris, and Ex Libris. Also include Meghraj, CVRS of INFLIBNET, OJAS, Shodhgangotri, the Union Catalogue of INFLIBNET/DELNET, and Knibus as applications of cloud computing in Indian libraries.

A study on the effects of cloud computing on library practices and services was conducted by Bonde (2015). The study covered the maximum efficacy of cloud computing, its benefits and drawbacks, cloud library software, cloud providers, etc. In comparison to traditional computing, cloud computing tools and approaches are more efficient and affordable. Additionally, she discusses the necessity of cloud computing in libraries. The newest and most rapidly developing technology, cloud computing, makes collections more visible and accessible, encourages libraries to employ information, and is both efficient and affordable.

Pandya and Chudasma (2015) provided examples of cloud computing and analyzed the user services currently provided by Nirma University libraries. These services included Google Apps, the World Wide Web, RSS, Remote Access, Web OPAC, CAS, and SDI. Future cloud-based services for libraries' patrons included collaborative online databases, CVRS, blogs, SMS, online e-learning, online repositories, Wikis, social streaming, and virtual libraries, among others.

Cloud computing concerns such as data loss, data breaches, account theft, insecure APIs, service attacks, cloud service abuse, and vulnerabilities were highlighted by Yuvraj (2015). A lock-in period, loss of governance, compliance issues, supply chain failure, isolation failure, jurisdiction risk, and data protection risk are just a few examples of the various risks associated with the cloud. He recommends the open-source cloud security tools OSSEC, Snort, cryptsync, and crypton for all risks and threats.

According to Gupta (2015), cloud computing is a flexible new technology that libraries can use that is greener, more effective, quicker, cheaper, and free from issues about maintaining and updating IT infrastructure. The library uses resources efficiently and addresses library concerns, serving as an example of a novel infrastructure and environment made possible by cloud computing. Applications for cloud computing are widespread and are still developing in libraries. Along with explaining cloud computing, he also discusses related systems and ideas, including the client-server model, automated computing, grid computing, utility computing, mainframe computing, peer-to-peer, etc.

The fundamental ideas of cloud computing, cloud architecture, virtual machines, operating system services, business system services, and services-oriented architectures were expressed by Pathak & Pal (2015). They also talk about standards and protocols, cloud computing's socio-technical aspects, advantages, and downsides.

The focus of Alam et al. (2015) study is on cloud computing fundamentals, cloud computing traits, cloud computing models, cloud computing open source resources, cloud management tools, etc. SaaS and utility computing are combined in cloud computing. A platform for computing is provided by open-source cloud resources.

Verma, Kumar, and John (2015) discussed the history of cloud computing as well as its definition, traits, and resources, including ECP, Zoho, Cloudera, Joyent, Global Nimbus, and others. They also talked about the benefits and drawbacks of cloud computing for health science libraries and came to a conclusion about IIM's online courses.

According to Chand and Singh (2014), cloud computing lowers ownership costs and complexity. When an enterprise uses cloud computing, it spends less on hardware, software licenses, and information technology infrastructure. The use of cloud computing in libraries can be seen in data search, file storage, academic material search, web hosting, library automation, and other areas. Cloud services are customized and adaptable. The discipline of library and information science can greatly benefit from cloud computing.

CONCLUSION:

A systematic review of the literature was chosen as the method for this investigation. Searching, examining, and analyzing the existing research resources in relation to the particular study issue is what is meant by a systematic literature review. A comprehensive literature review has the advantages of providing information about the study, the research gap, and its reliability. The systematic literature review's biggest drawback is its length.

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