

Application of Cloud Computing Services for Information Access in the National Open University of Nigeria Libraries

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Abstract

The study tends to investigate application of cloud computing services for information access in the national open university of Nigeria libraries in Nigeria, research question such as what potential the adoption of cloud computing has had on information access and use in NOUN library were raised. The survey research method was adopted. This method focuses on population of the universe in which data collected from the said population are used for intensive study and analysis, a sample from a subset of population or universe is carefully selected to represent the characteristic of the population. The population under study consists of ICT staff of NOUN Library which has a sample size of 24 representing 25% of the population. Data collected was analyzed using both descriptive and analytical statistics. The use of descriptive statistics is mainly to analyze our tables, and this was incorporating the use of frequency distribution table and percentage distribution rate of the respondents. The finding indicates that Cloud computing paradigm is independent of location and can be accessed on any media having network connectivity. "With cloud computing information is not stranded on individual machine and conclusion and recommendations were made that National Open University of Nigeria Library should implement community and hybrid cloud deployment models to take advantage of all the services it provides and to eliminate the fear typically associated with sensitive file leakage, lost, or crashed software, malfunction or malware associated with laptops or desktops.

Keywords: Application, Cloud Computing Services, Information Access, Libraries, National Open University of Nigeria

Introduction

Cloud computing is the delivery of computing services-including servers, storage, databases, networking, software, analytics, and intelligence-over the Internet ("the cloud") to offer faster innovation, flexible resources, and economies of scale. The development and delivery of information systems and services may change because of cloud computing. This gives Library the chance to increase its influence. Anyone with internet access is presumably

regularly using a cloud computing service of some kind. They interact with the cloud environment whether they are using Google's Gmail, managing their images on Flickr, or utilizing Bing to browse the web. The intriguing thing about cloud computing, as Wainaina (2020) noted, is that it was initially driven by the public through services like Facebook and Flickr rather than as a technology for business enterprises.

According to Zhu (2017) in his findings discovered that libraries could use cloud computing services to increase computing performance, storage capacity, accessibility for everyone, and cost savings. This can benefit libraries by lowering the fixed and maintenance costs associated with their IT investments in hardware, software, and computer services. Libraries may avoid financial waste, better monitor staff activity, and technological annoyances like computer viruses, system failures, and data loss with cloud computing.

The usage of cloud computing in libraries will probably have a big impact on library services. On the other side, cloud computing takes a far more abstract framework. The hardware on which the service is kept doesn't really matter to the users. The location of the server and data in the cloud is unimportant; one is just aware that they are there, delivery of services and resources can be done quickly thanks to automation and virtualization.

Wada (2018) claims that cloud computing is a highly scalable platform that offers non-expert users' instant access to hardware and software over the internet as well as simple maintenance. It depends on technologies like virtualization, programming techniques like multi-tenancy and/or scalability, load balancing, and maximum performance to ensure that resources are made available quickly and readily.

Today's information and its usage are becoming more and more crucial to living quality, as well as to chances for social change and economic progress. Information sourcing, organization, storage, dissemination, and retrieval are the basis of our contemporary society. People, businesses, and communities rely on knowledge to make well-informed decisions. According to Goldner and Birch (2016) explained that growing number of decisions in today's complex world depend on making well-informed decisions. It is feasible to access cloud-based services because cloud computing includes spreading quickly and easily over a network, where a program or application may execute on several connected machines at once. According to Geoffrey's research (2017) noted that most cloud computing infrastructures are composed of thousands of generic PCs grouped together. Individual computer blades can be added to boost capacity using clustering and virtualization technologies.

Cloud computing is a very fault tolerant technology because even when one component fails, the cluster can just work around it. Thus, the main goal of cloud architecture is to enable the seamless collaboration of numerous independent computers. To contend with the barrage of information available in today's world, a medium, an institution, such as library needs to be put in place for proper acquisition, processing, documenting, retrieving, and disseminating of

information for use. Due of the cluster's ability to function even when a single component fails, cloud computing is a particular fault tolerant technology. Thus, enabling the smooth collaboration of several independent computers is the primary objective of cloud architecture.

From print books to non-print sources like Compact Disc (CD), Diskettes, Magnetic tapes, CD ROMS, hard disks, punched paper tapes, internet publications, zip disks, educational video and transparencies, books on cassettes, microform publications, electric publications, and machine-readable tape, the mode of information storage and transmission has undergone many radical changes. As Furht and Escalante (2019) predicted in their findings, there will be instantaneous and seamless communication and commerce around the world from almost any device imaginable in the future. This computing technology is known as cloud computing technology.

A server that is linked to a communication network, such as the internet, an intranet, a local area network, or a wide area network, is referred to as being in the "cloud" in order for any user with access rights to use the server's processing power and resources to run an application, store data, or perform any other computing task from anywhere in the world without constantly using a personal computer (PC). Cloud-based services are consequently available wherever with internet connectivity. End users with little to no technical knowledge can access cloud-based applications through a web browser on any device, including PCs, smart phones, iPhones, and iPads, even while the business software and user data are stored up on servers in a remote place. Instead of having these services and resources on local servers, nodes, or personal devices, cloud computing technology enables sharing, resources, and services through the internet.

Cloud-based services are really delivered by virtual servers or hardware that are emulated by software operating on one or more real machines, despite appearing to be offered by real servers or hardware. Such virtual services or automation can be moved around and scaled up and down without affecting the utility to the customer because they do not physically exist. According to the research of Bansode and Pujar (2017), a technology that enables convenient, on-demand network access to a shared pool of configurable computing resources that can be quickly provisioned and released with little management effort or service provider interaction can be considered a model.

Libraries and businesses today rely on technology to provide services and achieve their stated corporate goals. Al-Issa, Ottom, and Tamrawi claim that customers want a quick and seamless digital experience right now (2019). People increasingly expect speedy product and service delivery combined with a pleasant user experience from every firm thanks to companies like Amazon and Apple. This technical strategy, according to Armbrust (2020), offers opportunities for businesses to lower their overall technology expenses, improve the

performance of widely used services, support geographically dispersed customers, and increase reliability.

With cloud computing, it is possible to use local servers and hardware without having to purchase and maintain it. It turns infrastructure into a service rather than something that must be acquired, maintained, and controlled. By using the cloud, one can only pay for what they use instead of purchasing extra capacity that is never used. The term is "pay-as-you-go," even if there may be a low basic charge. An increased reliance on cloud computing can also drastically reduce employee costs related to technology. Again, by converting to software-as-a-service or another licensing rather than purchasing permanent licenses, many businesses can save a lot of money. This is since software as a service frequently has a fixed monthly or annual membership fee, among other factors.

Additionally, cloud computing boosts the efficiency of frequently utilized services; this method is renowned for its adaptability and device-location independence. Cloud infrastructure resources allow for the expansion of IT infrastructure during periods of high demand, but they also let users to access systems via a web browser from anywhere, using any device. 2019; Abdelaziz & Alhelali). The academic, industrial, governmental, and military sectors' interest in cloud computing technologies has significantly increased in recent years. It has been frequently utilized in recent years to handle storage and computational challenges in several fields. For educational organizations, cloud infrastructure can increase computational effectiveness, storage capacity, universal accessibility, and cost effectiveness.

By lowering the fixed and maintenance costs associated with ICT investments in hardware, software, and computer services, it can benefit institutions. Abdelaziz, & Alhelali, 2019) noted that cloud computing offers many advantages to e-learning solutions by directly supplying the infrastructure, platform, and educational services through cloud providers as well as by utilizing virtualization, centralized data storage, and facilities for data access monitoring.

In the findings of Abdallah (2020) who explained that the use of cloud computing in higher education must be analyzed both from the benefits point of view as well as from that of the risks and limitations. After the analysis, one or more models of cloud computing may be chosen to be used. Although there are benefits and risks to cloud computing, the benefits can be enhanced, and the risks greatly reduced if educational institutions take care and vigilance in selecting cloud computing providers and in monitoring the relationship to ensure that the provider is adequately protecting the data.

According to Oyelekan, the Federal Ministry of Education and its agencies are attempting to integrate ICT into the Nigerian educational system through the National Open University of Nigeria (NOUN) (2008). The Open and Distance Learning (ODL) institution NOUN was formally revived on April 12th, 2001. It offers its services online as an ODL. For

lectures and notes, for instance, NOUN uses a learning management system called ILEARN. It also runs the Information Gateway, a digital library that provides multimedia tutorials.

The capacity to locate, obtain, and successfully utilise information is known as information access. Advancement in social, political, and economic spheres depends on having access to information. Information has traditionally been delivered in several generally accessible media, frequently through public libraries. Given these difficulties in automating library resources, the National Open University of Nigeria Library decided to embrace cloud computing for resource provision and management. More significantly, the institution's focus is on open and distance learning. This means that education is largely online and virtual. Most of the resources are therefore digital and online. The 108 study centers that make up the National Open University of Nigeria are dispersed around the country, in contrast to conventional universities that have their teaching and learning activities concentrated in one location. As a result, to offer its users access and services, the library must establish a platform where access must be unrestricted and not location specific.

Statement of the Problem

The ability of library automation to sustain and even expand robust and fully functional online services and collections while keeping up with the rapid pace of technical development often depends on a small number of adequately skilled employees. It is overextended in both ways, clearly having detrimental effects. Library automation tends to take a more ad hoc approach to development work to meet the most urgent demands because it lacks the resources to develop core system components like search and retrieval tools, user interfaces and user profiling services, user authentication and authorization services that work across individual collections and services. "Libraries by their nature and function are involved in sourcing, acquiring, organizing, documenting, and disseminating information.

Despite being viable in the short term, the strategy threatens severely to undermine a position over which the library exerts only a tenuous hold—that of the trusted provider of high-quality information services. When necessary, this information needs to be easily and affordably made available. According to Breeding, cloud computing technology generally enables a library to concentrate its technology budget and employees less on tasks that need essential but routine support for library operations and more on developing strategic or creative services. Cloud computing is an IT effort to assist libraries in carrying out their duties quickly, accurately, and virtually.

In his research, Abdallah (2020) found that cloud architecture gives libraries the chance to switch from needing to own and run their own servers to power their main automation application to acquiring identical capabilities through web-based services.

In the findings of Abdallah (2020) commented that although the concept of data storage and resource management has already been altered by the usage of the cloud in the commercial environment, it is still not widely used in the field of libraries.

Consequently, it is important to do research of this kind to integrate cloud computing into the realm of library computation to boost productivity and efficiency in library services. Based on the above, the researcher tends to investigate the application of cloud computing services for information access in the National Open University of Nigeria Libraries.

Purpose of the Study

1. Determine the potentials of cloud computing service for information access in NOUN libraries in Nigeria.

Research Question

1. What are the potentials of cloud computing service for information access in NOUN libraries in Nigeria.

Statement of Hypothesis

H₀₁: The potentials of cloud computing service for information access in NOUN libraries in Nigeria is not statistically significant.

Methodology

This study adopted descriptive survey research design. This design was chosen because it allows the researcher to collect data or information from sampled elements to provide generalised descriptive and/or inferred results for quick decision making. It was also chosen because data collected can be qualitative and quantitative, it gives a holistic understanding of a research topic. The population for this study was two thousand, eight hundred and eighty-three (2,883) librarians from the National Universities Commission (NUC) approved federal university libraries that formed the research setting of this study. The breakdown of the research population shows the professional librarians and the ICT heads charged with the administration of cloud computing services in their various ICT units in federal university libraries in Nigeria.

The sample size for this study was three hundred and forty (340) Professional librarians and Head of ICT units drawn from the two thousand, eight hundred and eighty-three (2,883) librarians in the six (6) federal university libraries in Nigeria that constituted the study setting. The sample size was the outcome of the multistage sampling technique employed for this study. Firstly, the researcher used stratified sampling technique to carefully zone the university libraries into six (6) geopolitical zones to allow unbiased selection of federal university libraries

used as research setting. Secondly, from each stratum of the six (6) geopolitical zones in Nigeria, one federal university library was selected using a simple random sampling technique.

The instruments used were questionnaires and direct interviews. The questionnaire was generated in line with the research questions in simple and clear grammar to enable the respondent to understand and respond to the research questions. Data collected was analyzed using both descriptive and analytical statistics. The use of descriptive statistics is mainly to analyze tables, and this incorporates the use of frequency distribution table and percentage distribution rate of the respondents. While analytical statistics tool of Chi-Square will be used to test the stated hypothesis of the study.

Results and Findings

Rate of Returns/Responses

The representative samples the size of this study, which is 24, arrived at using stratified and simple random sampling technique. The rate of returns is 91.67% (22 out of 24 respondents). This is considered adequate for comprehensive analysis and inference. The rate of returns and response is calculated from table 1 below which contains the number of questionnaires administered, retrieved, and duly completed by NOUN Librarians.

Table 1: Determination of Rates of Returns/Responses

Number of Questionnaire	Retrieved Questionnaire	Completed Questionnaire
24	22	22
Total	22	22

Source: Researcher's Survey, 2022

Rate of return= $\frac{\text{Total of number questionnaire retrieved}}{\text{Total sample drawn or number of questionnaires.}}$ x 100

Total sample drawn or number of questionnaires.

$$= \frac{22}{24} \times \frac{100}{1} = 91.67\%$$

Rate of response = $\frac{\text{Total number of questionnaires competed}}{\text{Total sample drawn/ number of questionnaires.}}$ x 100

Total sample drawn/ number of questionnaires.

$$= \frac{22}{24} \times 100 = 91.67\%$$

Information on Potentials for the National Open University of Nigeria Library via the Application of Cloud Computing Services.

This Section Focuses on the Core aspect of our Research which is the Information on Potentials for the National Open University of Nigeria Library via the Application of Cloud Computing Services.

Hypothesis1: The potential of cloud computing service for information access in NOUN libraries is not statistically significant.

Table 2: Summary of chi-square Table on the potentials of cloud computing service for information access in NOUN libraries in Nigeria

Response	Frequency	Cumulative Frequency	Percentage (%)
Yes	22	-	100.00
No	0	100	0.00
Total	22	100	100.00

Source: Researcher's Survey, 2022

The Table 2 shows that all the 22 respondents representing 100% affirm that they potentials of cloud computing service for information access in NOUN libraries has help in simplify the IT based services and the respondents further agrees that the adoption of cloud computing in NOUN Library. As a follow-up to the above findings, the researcher also tries to find out if NOUN Library feels safe storing data online, and the respondents, further agreed with the option YES that they feel safe storing data online.

Below is the analysis:

Cloud based library services are available in NOUN library.

Response	O	E	O-E	(O-E) ²	(O-E) ² /E
Yes	28	14	14	196	14
No	0	14	-14	196	14
Total	28	28	0	-	28 = χ^2

Source: Researcher's Survey, 2017

From Table 2, the test statistics for comparing observing and expected frequencies is χ^2 defined as follows:

$$\chi^2 = \sum_{i=1}^K \frac{(O - E)^2}{E}$$

Where O = Observed Value

E = Expected Value

K = Number of categories, grouping

A 95% degree of confidence or 0.5 level of significance is used to test our null hypothesis. Thus, the critical value of χ^2 (x) is 3.841.

i.e., at 1 degree of freedom

2
cv

which is obtained as $df = C - 1$

$$df = (R-1) (C-1)$$

R = number of rows

C = number of columns

In our work $df = 1$

Therefore, since table shows the calculated value of χ^2 to be 28 while our tabulated value is 3.841, we accept our null hypothesis.

Discussion of Findings

The rationales for the adoption of cloud computing in NOUN library is to provide information to its students who are spread across the country and to equally make the information accessible and not location specific. The information services provided using cloud computing in NOUN library are- digital library/ repositories, searching library data, searching scholarly content, file sharing, building community power and library automation.

Conclusion

The National Open University of Nigeria's libraries can expand its collections and relevance in the current information age. Cloud computing is one path for this eventual transformation. It can transform libraries' future and help them in a variety of ways. The findings of this analysis show that the librarians at the National Open University of Nigeria are engaged in several cloud computing activities. They exhibit a strong desire to implement cloud

computing in libraries. Consumers are using a range of devices to access cloud computing resources, regardless of their age or level of computer proficiency.

Recommendations

1. The National Open University of Nigeria Library should use community and hybrid cloud deployment models so that it can take advantage of all the services it offers and get rid of the worry that is typically associated with sensitive file leakage, lost or crashed software, malfunction, or malware associated with laptops or desktops.
2. Since it has the potential to affect their future, NOUN libraries need to be aware that the service is truly an open, service-oriented design. As a result, rather than having to manage software and servers, libraries will be able to use their internal technological expertise to develop innovative uses of cloud services in their local setting.

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