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Using cloud computing in the field of libraries

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Nadia Salem Emhemed ali
Jadu College of science and technology
Nadiasal.84.ga@gmail.com

Abstract:
Now a day's Technology is growing fast, Cloud computing is a new technology model for IT services; which many businesses and institutes are adopting. The main goal of cloud computing serves is to bring system scalability. It is as a way of changing the current processes; therefor a step towards cloud technology for library would enable finding what users want without going to the library. Libraries could increase or decrease the resources in the cloud according to their users' needs at a lower cost; and the libraries should use cloud-computing technologies to quickly respond to the diverse needs of all users. So the study attempts to answer several questions such as: What is cloud computing and what are its types? How can cloud computing help libraries? How can we benefit from cloud computing technology in the field of libraries? Then to achieve the objectives of the study and answer the questions raised; the study used the descriptive and analytical approach, addressing the concept of the cloud computing and its forms and types; and how it will be advantageous in the field of libraries, based on the existing intellectual production, despite its scarcity .

Keywords: Cloud Computing, Libraries, Information Technology, Cloud Computing Models.

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استخدام الحوسبة السحابية في مجال المكتبات

نادية سالم امحمد علي
كلية العلوم والتقنية جادو
Nadiasal.84.ga@gmail.com

الملخص

نتيجة لتطورات المواكبة في عالم تكنولوجيا المعلومات، تعد الحوسبة السحابية نموذجًا تكنولوجيًا جديدًا لخدمات تكنولوجيا المعلومات؛ والتي تتبناها العديد من الشركات والمؤسسات. فهي تقنية تعتمد على نقل البيانات ومساحة التخزين الخاصة بالكمبيوتر إلى السحابة، والذي بدوره يعمل كجهاز خادم يمكن الوصول إليه عبر الإنترنت. وبالتالي، تصبح برامج تكنولوجيا المعلومات منصات لخدمات المستخدمين، حيث تعتمد البنية التحتية للحوسبة السحابية على مراكز البيانات المتطورة والتي تقدم مساحات تخزين كبيرة للمستخدمين. ومن هنا تأتي اهمية ودور الحوسبة السحابية واستخدامها في مجال المكتبات. ومدى تأثيرها على تغيير وتطوير المجال المكتبي؛ فإدماج التكنولوجيا السحابية في المكتبات ستمكن المستخدمون من العثور على ما يريدون دون الذهاب إلى المكتبة. ويمكن المكتبات من زيادة أو تقليل الموارد الموجودة في السحابة وفقًا لاحتياجات مستخدميها وبتكلفة أقل؛ وبالتالي يجب على المكتبات استخدام تقنيات الحوسبة السحابية للاستجابة بسرعة للاحتياجات المتنوعة لجميع المستخدمين. لذا تهدف الدراسة إلى التعرف على الحوسبة السحابية كتقنية حديثة في مجال تكنولوجيا المعلومات، والتعرف على مدى الاستفادة من تكنولوجيا الحوسبة السحابية ونماذج تطبيقها في مجال المكتبات. وتأتي أهمية الدراسة من حداثة وأهمية تكنولوجيا الحوسبة السحابية كنموذج جديد لاستهلاك خدمات تكنولوجيا المعلومات. لذا تحاول الدراسة الإجابة على عدة أسئلة مثل: ما هي الحوسبة السحابية وما هي أنواعها؟ كيف يمكن للحوسبة السحابية أن تساعد المكتبات؟ كيف يمكننا الاستفادة من تكنولوجيا الحوسبة السحابية في مجال المكتبات؟ وماهي التحديات التي قد نواجهها عند تطبيقيها في مجال المكتبات؟ ولتحقيق أهداف الدراسة

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والإجابة عن الأسئلة المطروحة؛ استخدمت الدراسة المنهج الوصفي التحليلي، حيث تناولت مفهوم الحوسبة السحابية وأشكالها وأنواعها؛ وكيف سيكون مفيدا في مجال المكتبات.

الكلمات المفتاحية: الحوسبة السحابية، المكتبات، تقنية المعلومات، نماذج الحوسبة السحابية.

1. INTRODUCTION

Cloud computing is one of the exciting developments among the technocrats and animated librarians over the world as a technology solution as well as resource sharing venture. Today we are living in age of Digital Information. We can use Cloud computing in library section for collection of e –books, storage of data base organization processing and analysis of information and retrieval. In the field of higher education, it has become one of the strongest adopters of virtualization as it allows the organization of all resources like laboratories and libraries centrally and gives remote access to students through mobiles too. Today's Libraries and IT experts are facing new challenges in managing electronic content achieves. The adoption of technology that enables an organization to understand the meaning of every piece of information to ensure quick and appropriate access when needed is required. There is a variety of cloud-based services in the library world. The most obvious is cloud-based access to a library's book and information collections through the Online Public Access Catalog (OPAC) that is part of the library's Integrated Library System (ILS). Through OPAC user can search the information title wise, author wise, and subject wise. OPACs can be overlaid with cloud based front ends or recommender systems to make them more users friendly.

1.1 Significance of the study

The significance of the study comes from the novelty and importance of the concept of cloud computing as a modern technology that must identify its advantages And disadvantages, as well as identifying the benefits of cloud computing in libraries, And

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also to identify the challenges that could be in its implementation in the field of libraries.

1.2 Questions of the study

The study attempts to answer several questions such as :

1- What is cloud computing and what are its types؟

2- What are the service models, application and deployment models of cloud computing؟

3- How can we benefit from cloud computing technology in the library environment؟

4- What are the challenges can be facing in the application of cloud computing technology in libraries؟

1.3 Objectives of the study

The study aims to identify cloud computing as a modern technology in the field of information technology, and to identify the extent of its benefits in the field of libraries, identifying the mechanisms and models for applying cloud computing technology in the field of libraries, and the challenges could be facing in the application.

1.4 Methodology of the study

The study followed the descriptive analytical methodology on the subject of the study to identify the latest concepts, characteristics, models, and mechanisms for applying cloud computing and how the libraries university will benefit from this technology, to keep pace with the development of information technology around the world.

2. Cloud computing overview

2.1 What is cloud Computing?

Cloud computing could be a technology that permits sharing the resources and services over the web rather than having these services and resources on native servers/ nodes or personal devices (Mittal 2017). Cloud computing is outlined because the sharing and use of applications and resources, Information of a network surroundings to urge work evaded concern concerning possession and management of the network's resources and applications. Cloud computing could be a approach of providing varied services on virtual machines allotted on high of an oversized physical machine pool that resides within the cloud. It is outlined a model for

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delivering data technology services within which resources square measure retrieved from the web through web-based tools and applications, rather than a direct association to a server (Dagnaw and Tsigie, 2019).

2.2 Definition of cloud Computing

(Sanap, 2017) stated that cloud computing could be a model for enabling everyplace, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and free with marginal management effort or service supplier interaction. Cloud model consists of five essential characteristics, three service models.

2.3 Use of cloud Computing in Library

With the recent advancement in data technology, libraries became machine-controlled with the advancement followed by networks and virtual Libraries (Kalloniatis, 2016) .To increase the ability of cooperation and to make a major, unified presence on the net the library community will apply the conception of cloud computing. This approach to computing will facilitate libraries to avoid wasting time and cash whereas alter workflows such as:

1- Most library computer systems are built on pre-Web technology.
2- Systems distributed across the Net using pre-Web technology are harder and more costly to integrate.
3- Libraries store and maintain many constant knowledge lots of and thousands of times.
4-With library data scatter across distributed systems the library's Web presence is weakened.
5- With libraries running independent systems collaboration between libraries is made difficult and expensive.
6- Conformation seekers work in common Web environments and distributed systems make it difficult to get the library into their workflow.
7- Many systems are only used to 10% of their capacity. Combining systems into a cloud environment reduces the carbon footprints, making libraries greener (Thompson, 2018). These improvements can be grouped into three basic areas: technology, data and

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community. Each offers some general and some unique opportunities for libraries.

2.4 Cloud Computing Services

2.4.1 Software as a Service (SaaS)

Software package like CRM or CAD/CAM is accessed beneath cloud computing theme. Upon registration, the user is allowed to use code accessible through web and use it for his or her analysis method. The connected knowledge and work is also keep on native machines or with the service suppliers

2.4.2 Platform as a Service (PaaS)

Cloud vendors are unit corporations that supply cloud computing services and products. One amongst the services that they supply is termed PaaS. Under this, a computing platform like software package is provided to a client or user on a monthly rental basis. a number of the most important cloud computing merchandiser is Amazon, Microsoft, and Google etc. (Thompson, 2016).

2.4.3 Infrastructure as a Service (IaaS)

It is the potential provided to the user to alter process, storage, networks, and different basic computing sources wherever the user is in a position to deploy and run impulsive package, which can embody operative systems and applications .The user doesn't manage or management the underlying cloud infrastructure however has management over operative systems, storage, deployed applications, and probably restricted management of choose networking elements (Irenoa et al., 2018). Figure1 illustrates the cloud computing services model.

2.5 Cloud Computing Deployment Models

Deploying cloud computing can differ depending on requirements, basically there are four deployment models:-

- Private Cloud:- It is a cloud infrastructure deployed, maintained and operated for a specific organization. The Operation may be in-house or with a third party on the premises.
- Community Cloud:- This cloud infrastructure is shared among a number of organizations with similar interests and requirements. It helps limit the capital expenditure costs for

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its establishment as the costs are shared among the organizations. The operation may be in-house or with a third party on the premises.

- Public Cloud:- In this type of cloud infrastructure is made available to the public on a commercial basis by a vendor or service provider. This enables a consumer to develop and deploy a service in the cloud with very little cost compared to the capital expenditure requirements normally associated with other deployment options.
- Hybrid Cloud:- The cloud infrastructure consists of a number of clouds of any type. All the clouds have the ability through their interfaces to allow data and/or applications to be moved from one cloud to another. This can be a combination of private and public clouds that support the requirement to retain some data in an organization, and also the need to offer services in the cloud (Irenoa et al., 2018; Kumar, 2018; Sharma, 2016).

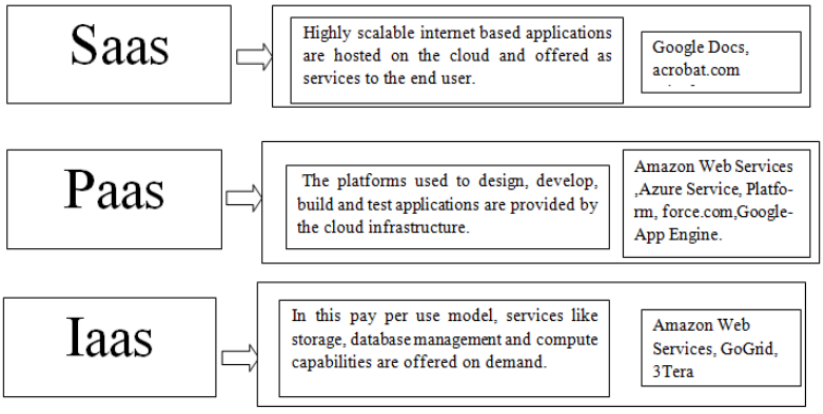

Figure No.1 Cloud Computing service model

2.6. Benefit of cloud computing application in libraries

Cloud computing is the delivery of a range of computing services over the web. It has been adopted into the mainstream very fast, due to the wide range of benefits that it offers. It simply requires an

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internet browser and a device with an internet connection. With the advent of cloud computing technology, libraries can benefit not only in software services but also a range of other benefits (Irenoa et al., 2018).

2.6.1 .Cost reduction

This turns out to be an excellent financial saver for the library. Added ability to increase or decrease hardware or software resources, and in some cases simultaneously (Goyal and Sharma, 2018). Even the billing system used by the payment model, which reduces infrastructure costs, is not a purchase of support. Initial and ongoing costs are significantly lower than traditional calculations.

2.6.2 Increase storage capacities

In recent years, Cloud providers are giving a rich infrastructure to maintaining large volumes of data, which is turning into a progressively and achievable objective for organizations (Sharma, 2016). Libraries can offer additional resources and services without the restriction of physical memory. It has more memory than the personal computers or servers available in the libraries. If necessary, memory and other operating parameters may increase or decrease.

2.6.3 User Centric

It is found that cloud computing is a user centric technology. As we know, Library users require timely information without wasting of energy. In this context, cloud computing is helpful.

2 .6.4.Broad network access

All the resources hosted on cloud network that are available for access through standard mechanisms from a wide range of devices, such as tablets, PCs, Macs and smart phones. These resources are also accessible from a wide range of locations that offer online access.

2.6.5 Disaster recovery

Cloud Computing offers a simple and efficient way in which libraries can securely store their data and then use it in the event of natural disasters, such as equipment failure or data loss (Sharma, 2016). In general, libraries do have a local backup, and in cases of fire or natural disaster, the backup will not be available. This will help to avoid the lack of doing its job through hardware failures.

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Vendors know how to distribute copies to mitigate any hardware failure.

2.6.6 Extending Users reach

Cloud technology will allow libraries to attract more clients than would be possible using traditional method. Users in their free time can access to resources without the interference of time and place. It is possible for the library to extend its influence with cloud version offered by Internet. With cloud computing services, the library overcomes the problem of time, distances and many other restrictive trends with regard to service delivery.

2 .6.7.Interaction with the library

Libraries can interact with users with cloud trades provide quick access to information in real time. For example, Digital / virtual reference will help to provide the necessary information to customers and where they have other needs, the library just a click away. Instant messages (the IM), video chat (Skype), social networks, etc. can be added to the library in their cloud portals to improve the efficiency of services.

2 .6.8.Collaboration

Cloud computing makes collaboration for resources sharing between different organizations much easier (Sahu, 2015). Libraries can use the same network, platform and tools, and the function at the same time to share the resources and services for the benefit of their customers. With cloud the different location of library community can come together virtually and contribute in real time to a given project through shared storage.

2.6.9 Enhanced service delivery

Libraries can create applications in an online environment and make available to their patrons to remove the barrier of time and place. It can build, test, and deploy web-based applications to offer services to users even outside working hours. Platform-as-a-Service model can affords by the library to maintain the required infrastructure (Sahu, 2015). Cloud services could make it much easier for the library to try out new software without necessarily purchasing the hardware required.

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2.6.10 Automatic software updates

A major benefit of cloud computing is the frequent and regular software updates. Library employees will not have to worry about upgrading the server, saving details and changes, and other "computer problems. Cloud providers provide the cloud service model, called software as a service (SaaS). They ensure library that they will serve regular software update without interrupting routine work. Updates don't require a lengthy installation of new software.

2.6.11. Advancement in Technology

It is an Internet-centric model, which can be used to run a virtual library that favor communication services and data storage. Services like One Drive, Google Drive and Drop Box increase data availability and provide new features as synchronization and collaboration (Ugwoke and Okafor, 2017); Torres et al., 2016). Cloud computing solutions are inherently built on modern technology and must be designed in accordance with technological changes. Given the explosion of mobile devices, we see how businesses and organizations that work in the cloud and can be adopted to provide services for new devices are much faster and cheaper.

2.6.12 Environmental friendliness

Cloud computing is also a more environmentally friendly practice due to cloud data centers do not need the same amount of infrastructure and space compared to the local data server. Cloud technology reduces the total number of computers, reducing the amount of carbon in the atmosphere. According to U.S. Environmental Protection Agency reported, some 1.5% of all electricity consumed in the States was due to traditional data centers (Thompson, 2018). The operational efficiency of the server can be maximized by combining cloud that reduces wasted energy.

2.6.13 Reduced and balanced staff

When library moves to cloud, there is no need to worry about expensive human resources for your IT needs. Higher costs, such as salaries of employment costs, can be avoided through the help of cloud services (Sahu, 2015). Whereas, infrastructure is prepositioned and automation, monitoring and reporting capabilities

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already are in place. Library can pay less for the needs of the staff of the providers and deploy their IT staff in other workplace, such as developing applications as well as network security approach that have the greatest potential to reduce costs in cloud computing.

3. Applications of Cloud Computing In Libraries

Libraries are shifting their services with the attachment of cloud and networking with facilities to access these services anywhere in world and anytime. The possible areas identified for cloud computing services are-:

3.1 Building Digital Library/Repositories

Every library needs a digital library to make their resources, information and services at an efficient level to ensure access via the network. Therefore, every library is having a digital librarythat developed by using any digital library software. For the cloud based digital library software used are Dspace and Fedora Commons.

3.2 Searching Library Data

OCLC is one of the best examples for making use of cloud computing for sharing libraries data. OCLC World Cat service, one of the popular services for searching library data, now is available on the cloud.

3.3 Website Hosting

Website hosting is one of the cloud computing processes as many organizations including libraries preferred to host their websites on third party service providers rather than hosting and maintaining their own servers.

3.4 Searching Scholarly Content

Knimbus, a cloud based research platform, facilitates to discover and share the scholarly content. Knimbus stands for Knowledge Cloud, which is dedicated to knowledge discovery and collaborative space for researchers and scholars. At present, Knimbus proposes a free offer to get registered to empower the libraries for dynamic searching and also for single point search interface, maximizing the usage of all e-resources; customized search across selected sources reduces noise and highlights relevant content and tools to support the complete research lifecycle. Currently, Information and Library

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Network (INFLIBNET) Centre (http://www. Inflibnetc.in) has incorporated Knimbus cloud service into its UGC INFONET Digital Library Consortium in order to search and retrieve scholarly contents attached thereto.

3.5 File Storage

To access any files on the internet, cloud computing presents a number of services such as Flicker, Dropbox, Jungle Disk, Google Doc, Sky Drive and so on. These services virtually share the files on the web and provide access anywhere and anytime without any special software and hardware.

3.6 Building Community Power

Cloud computing technology offers great opportunities for libraries to build networks among the library and information science professionals as well as other interested people including information seekers by using social networking tools. The most famous social networking services viz. Twitter and Facebook play a key role in building community power.

3.7 Library Automation

On Library Automation in Internet Computing includes all forms of computation, and the hardware and software needed. Internet computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services). These can be rapidly provisioned and released with minimal management effort or service provider interaction. For library automation purpose, Polaris provides variant cloud based services such as acquisitions, cataloging, process system‹digital contents and provision for inclusion of cutting edge technologies used in libraries and also supports various standards such as MARC21, XML, Z39.50, Unicode and so on which directly relate to library and information science area (Sahu, 2015).

4. Cloud Computing Challenges-:

Despite its growing influence, concerns regarding cloud computing still remain. In our opinion, the benefits outweigh the drawbacks and the model is worth exploring. Some common challenges are:

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4.1 Data Protection: Data Security is a crucial element that warrants scrutiny. Enterprises are reluctant to buy an assurance of business data security from vendors. They fear losing data to competition and the data confidentiality of consumers. In many instances, the actual storage location is not disclosed, adding onto the security concerns of enterprises. In the existing models, firewalls across data centers (owned by enterprises) protect this sensitive information. In the cloud model, Service providers are responsible for maintaining data security and enterprises would have to rely on them (Dutt, 2015).

4.2 Data Recovery and Availability: All business applications have Service level agreements that are stringently followed. Operational teams play a key role in management of service level agreements and runtime governance of applications. In production environments, operational teams Support Appropriate clustering and Fail over Data Replication System monitoring (Transactions monitoring, logs monitoring and others) Maintenance (Runtime Governance) Disaster recovery Capacity and performance management If, any of the above mentioned services is under-served by a cloud provider, the damage & impact could be severe.

4.3 Management Capabilities

Despite there being multiple cloud providers, the management of platform and infrastructure is still in its infancy. Features like „Autoscaling" for example, is a crucial requirement for many enterprises. There is huge potential to improve on the scalability and load balancing features provided today.

4.4 Regulatory and Compliance Restrictions

In some of the European countries, Government regulations do not allow customers personal information and other sensitive information to be physically located outside the state or country. In order to meet such requirements, cloud providers need to setup a data center or a storage site exclusively within the country to comply with regulations. Having such an infrastructure may not always be feasible and is a big challenge for cloud providers. With cloud computing, the action moves to the interface — that is, to the interface between service suppliers and multiple groups of service

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consumers. Cloud services will demand expertise in distributed services, procurement, risk assessment and service negotiation areas that many enterprises are only modestly equipped to handle.

4.5 Services

Services are available from any location.

4.6 Availability

Cloud computing can be ordered online without detailed formal contracts (Sahu, 2015).

5. Results and recommendations

5.1 Results:

1- Cloud computing have various benefits such as the reduced cost, ease of maintenance, sharing of resources, etc.

2- Cloud computing plays major roles of providing information services in various sectors.

3- Cloud computing saves a lot of IT expenses in libraries.

4- Libraries that use cloud computing applications through open source software and unified catalogs have proven remarkable success like a Scribd library.

5- The concerns of cloud computing cannot be outweighed by its advantages.

5.2Recommendations:

1- We must use cloud computing and benefit as much as possible from its distinctive applications and capabilities.

2- The need to research and do more studies in the field of cloud computing.

3- The need to benefit from the cloud-computing environment, especially for libraries.

4- We have to invest available capabilities in Arab digital library projects to move to the cloud computing stage.

6- CONCLUSION

In conclusion I fund the cloud computing is the best generation platform for Library automation. It offers a concept of data collection, data storage and data retrieval and we can use cloud computing effectively in library automation as it is cost effective,

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flexible, innovative, open access to access data anywhere, anytime as per users need. It can be used through internet. This approach to computing can help libraries to save time and money while simplifying workflows.

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