

Applications of Cloud Computing in Academic Libraries

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Abstract

All the operations of libraries as well as Library services depends upon Information and Communication Technology in the modern era of ICT. Cloud Computing has lot of applications in Academic Libraries which is described in detail in this paper. Due to financial crunch and lack of technical skills, which focused the applications of cloud computing in libraries. Cloud computing acts as a boon for academic libraries in modern era of ICT. In this paper I have described both advantages as well as disadvantages of the cloud computing in Libraries. In addition to it also described, the applications of cloud computing in academic libraries.

Keywords: Cloud computing, Applications of Cloud Computing, Academic Libraries.

1. Introduction

Basically Cloud Computing is a type of INTERNET based computing that provides shared computer processing resources and data to computers and other devices on demand. It is a model of resource sharing particularly for computer networks, servers, storage, applications and services. Cloud computing is the technology of computing, which is totally based on internet media. Using internet technology many servers shares resources in terms of offering common platform for the use of software applications, different resources including information, networking computer and devices which are attached on request with the control of electricity grid. Cloud computing remains invisible to the its users. The users or Service providers using clouds needs to pay for their resources and services rendered used in cloud computing environment. Cloud computing is not a new technology that suddenly appeared on the web but it is a new form of computing. Cloud computing is a kind of computing technology which facilitates in sharing resources and services over the internet rather the having these and resources on local servers/nodes or personal devices.

The latest technology trend in library science is use of cloud computing for various purposes and for achieving economy in library functions. Since cloud computing is a new and core area the professionals should be aware of it and also the application of cloud computing in library science. A definition for cloud computing can be given as an emerging computer paradigm where data and services reside in massively scalable data centres in the cloud and can be accessed from any connected devices over the internet. Cloud computing is a way of providing various services on virtual machines allocated on top of a large physical machine pool which resides in the cloud. Cloud computing comes into focus only when we think about what IT has always wanted a way to increase capacity or add different capabilities to the current setting on the fly without investing in new infrastructure, training new But cloud computing offers a better solution We have lots of compute power and storage capabilities residing in the distributed environment of the cloud. What cloud computing does is to harness the capabilities of these resources and make available these resources as a single entity which

can be changed to meet the current needs of the user. The basis of cloud computing is to create a set of virtual servers on the available vast resource pool and give it to the clients. Any web enabled device can be used to access the resources through the virtual servers. Based on the computing needs of the client, the infrastructure allotted to the client can be scaled up or down. From a business point of view, cloud computing is a method to address the Scalability and availability concerns for large scale applications which involves lesser Overhead. Since the resource allocated to the client can be varied based on the needs of the client and can be done without any fuss, the overhead is very low.

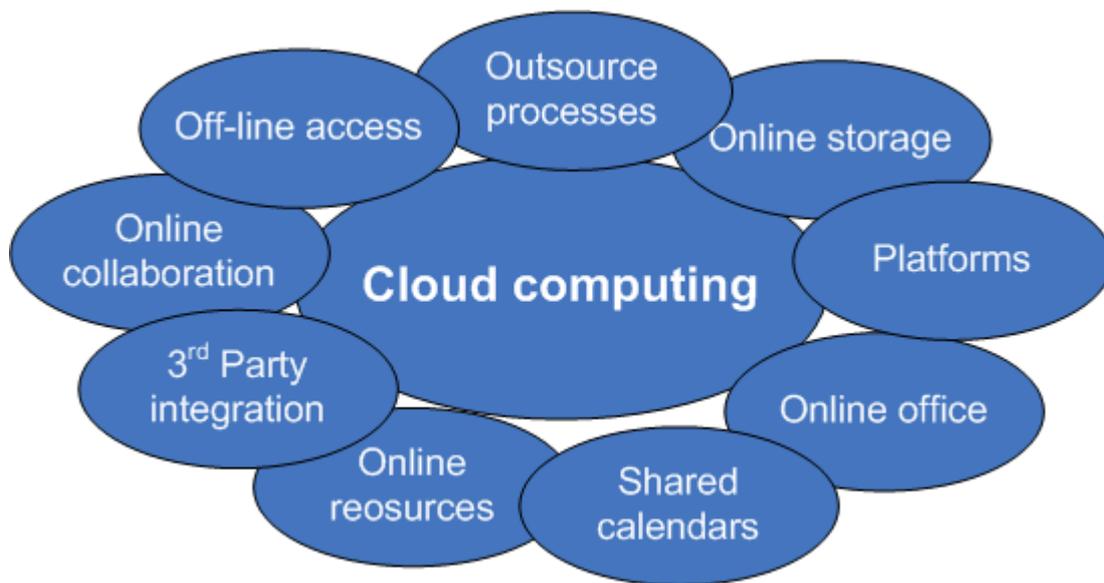


Figure 1.1: Displaying the applications of Cloud Computing

2. Characteristics of Cloud Computing

- **Self Healing:** Any application or any service running in a cloud computing environment has the property of self healing. In case of failure of the application, there is always a hot backup of the application ready to take over without disruption. There are multiple copies of the same application - each copy updating itself regularly so that at times of failure there is at least one copy of the application which can take over without even the slightest change in its running state.
- **Multi-tenancy:** With cloud computing, any application supports multi-tenancy - that is multiple tenants at the same instant of time. The system allows several customers to share the infrastructure allotted to them without any of them being aware of the sharing. This is done by virtualizing the servers on the available machine pool and then allotting the servers to multiple users. This is done in such a way that the privacy of the users or the security of their data is not compromised.
- **Linearly Scalable:** Cloud computing services are linearly scalable. The system is able to break down the workloads into pieces and service it across the infrastructure. An exact idea of linear scalability can be obtained from the fact that if one server is able to process say 1000 transactions per second, then two servers can process 2000 transactions per second.

- **Service-oriented:** Cloud computing systems are all service oriented - i.e. the systems are such that they are created out of other discrete services. Many such discrete services which are independent of each other are combined together to form this service. This allows re-use of the different services that are available and that are being created. Using the services that were just created, other such services can be created.
- **SLA Driven:** Usually businesses have agreements on the amount of services. Scalability and availability issues cause clients to break these agreements. But cloud computing services are SLA driven such that when the system experiences peaks of load, it will automatically adjust itself so as to comply with the service-level agreements. The services will create additional instances of the applications on more servers so that the load can be easily managed.
- **Virtualized:** The applications in cloud computing are fully decoupled from the underlying hardware. The cloud computing environment is a fully virtualized environment.
- **Flexible:** Another feature of the cloud computing services is that they are flexible. They can be used to serve a large variety of workload types - varying from small loads of a small consumer application to very heavy loads of a commercial application.

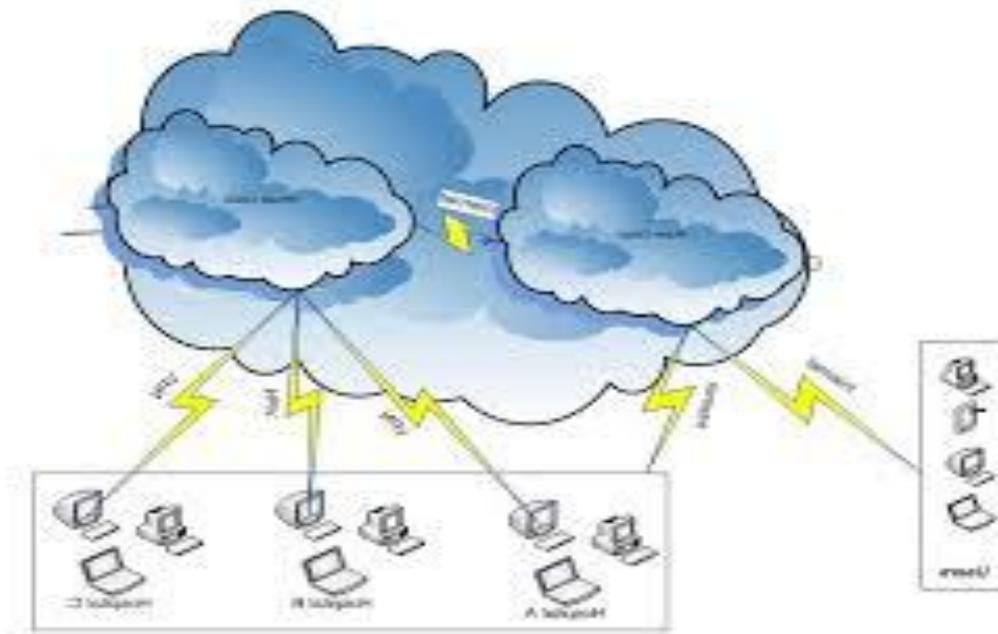


Figure 1.2: Displaying the characteristics of Cloud Computing

3. Types of Cloud Computing

- **Software as a service (SaaS):** Software package such as CRM or CAD/CAM can be accessed under cloud computing scheme. Here a customer upon registration is allowed to use software accessible through net and use it for his or his business process. The related data and work may be stored on local machines or with the service providers. SaaS services may be available on rental basis or on per use basis.

- **Platform as a Service (PaaS):** Cloud vendors are companies that offer cloud computing services and products. One of the services that they provide is called PaaS. Under this a computing platform such as operating system is provided to a customer or end user on a monthly rental basis. Some of the major cloud computing vendor is Amazon, Microsoft, and Google etc.
- **Infrastructure as a service (IaaS):** The cloud computing vendors offer infrastructure as a service. One may avail hardware services such as processors, memory, networks etc on agreed basis for specific duration and price.

4. Advantages of Cloud Computing in Libraries

There are various benefits of Cloud Computing in libraries are as follows:

- **Cost saving:** By using Cloud Computing in Libraries, lot of cost saves in the libraries. Saved cost can be used for other operations of the Library.
- **Flexibility and Innovation:** The users has great flexibility to obtain the services from which kind of clouds and it is itself a innovation. Flexibility helps to improve the Library services.
- **User Centric:** It has been observed that cloud computing is generally a user centric. As we know, Library users are always at centric position while providing library services to the users. In this context cloud computing is helpful.
- **Openness:** Such type of Cloud Computing is open that any library can participate. This concept of openness will further improve the Library services.
- **Transparency:** There is lot of transparency for participating Libraries in Cloud computing.
- **Availability any time any where:** Generally due to cloud computing services can be reached at any where and also for 7X24. This is the major benefit in the context of library services.
- **Create and Collaborate:** In Cloud Computing participating libraries can create there own services and simultaneously collaborate in participating environment.

5. Disadvantages of Cloud Computing

There are various disadvantages of Cloud Computing are as under:

- **Dependency on INTERNET:** In the Cloud computing environment, there is dependency on INTERNET. If the internet services are running smoothly then cloud computing services are running smoothly. If there is any problem in internet, cloud computing services stands to be closed.
- **Downtime:** This may be one of the worst disadvantages of cloud computing. No Cloud provider, even the very best, would claim immunity to service outages.
- **Security and Privacy:** There is no security and privacy of the data, especially when it comes to sensitive data.
- **Vulnerability to attack:** In the Cloud computing environment, every component is potentially accessible from the INTERNET. There are various chances of vulnerability of attack at anywhere in the internet environment.
- **Limited Control and flexibility:** In the cloud computer environment, there is limited control flexibility by service seekers. This environment will create monopoly of service providers.

- **Cloud computing platform dependencies:** Implicit dependency which is also known as Vendor lock-in is another disadvantages of cloud computing.
- **Cloud computing costs:** Cloud Computing- especially on a small scale and for short term projects can be a costly. The overall the price tags may be higher as expected.

6. Applications of Cloud Computing in Libraries

There are various areas of libraries where cloud computing services can be applied as under:

- **Building Digital Libraries/ Institutional Repositories:** It has been observed that the participating Libraries in Cloud computing can easily build Digital libraries/ institutional repositories by using software like DSpace, etc.
- **Searching library data:** Searching Library Data is very important service by which participating libraries can search the data from any where and at any time. For instance OCLC World Cat service for searching data which is available on clouds.
- **Hosting websites:** In the present scenario, Libraries preferred to hosting their own websites on third party service providers rather than maintaining their own servers.
- **Searching scholarly Contents:** In the present scenario, the user in Libraries usually searches their scholarly contents in cloud based services. For instance UGC Digital Library consortium of INFLIBNET is the best example.
- **File Storage:** By using cloud computing libraries can store number of useful files and these files can be shared at any time and anywhere.
- **Library Automation:** Cloud based computing is very helpful for Library Automation. Generally Application softwares required for Library automation are costlier and moreover servers required for library automation are also costlier. In cloud based computing there is no need to purchase application softwares, servers, etc.
- **Building community Power:** By using social networking sites like Facebook and twitter, etc, library professionals can build networks of professionals working in different kinds of libraries. Moreover network can also build of information seekers.

7. Cloud Computing Services

There are various services those which can offered in cloud computing to the academic libraries are as under:

- **Serial Solutions:** In cloud computing environment, serial solutions can be easily managed.
- **Delivery Customized services:** It is only due to cloud computing which focused on delivery customized services.
- **Open Infrastructure (e.g. amazon, EC2):** In cloud computing environment, open infrastructure is the major advantage.
- **Publishing (e.g. Wordpress.com, twitter, You tube):** Publishing becomes easy due to cloud computing environment.
- **Integrated library Systems:** It is only due to cloud computing, Integrated Library Systems can be possible.
- **Digital asset management:** Digital asset management can be possible only due to cloud computing.
- **Electronic resource Management Systems:** We can perform Electronic resource management Systems.

- Web-based management Systems: Web-based management systems can be formulated due to cloud computing.
- OCLC based ILS services: OCLC based ILS services can be provided in the cloud computing environment.
- Circulation, acquisition, cataloguing, search: Maximum Library operations can be performed in cloud computing environment
- Cloud based services, data collaboration e.g. Lockss: Cloud based services and data collaboration can be done in cloud based environment.

8. Conclusion

It is hereby concluded that almost in all the operations of Libraries, cloud computing can be applied. Moreover, all the library services becomes very easy to perform due to Cloud Computing. In addition to it, due to financial crunch and lack of technical expertise, cloud computing becomes more relevant in the modern environment of Information and Communication Technology.

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