ISSN 2278-3091
Volume 9, No.1, January – February 2020
International Journal of Advanced Trends in Computer Science and Engineering
Available Online at http://www.warse.org/IJATCSE/static/pdf/file/ijatcse43912020.pdf
https://doi.org/10.30534/ijatcse/2020/43912020

Cloud Computing Platform Services in the University Libraries for Digital Repository

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ABSTRACT

The purpose of this scientific article is to provide and prepare a cloud-based architecture for automation services within the university library. Cloud computing has emerged as an effective system to support the implementation of e-learning activities in the tertiary education sector especially in this context in the university library. Academics and faculty members also experience an increase in experience related to the ease in developing and enhancing their academic activities, and therefore, the use of cloud-based services in the library is intended to help academics gain constant, efficient, fast and effective access. the latest research data content based on e-resources. This scientific article provides a holistic understanding of cloud computing and digital library systems in college libraries. This paper also focuses on opportunities from developing the challenges of implementing cloud computing in the library area. This paper explains that cloud computing technology is a promising leap in service in the library area and will be more effective, professional and help library services in services that are go-green environment.

Key words : *Cloud Computing, Cloud Architecture, Library Services, Library*.

1. INTRODUCTION

In the world of modern technology, cloud computing is one of the new models of IT services. The presence of cloud computing first appeared in the third quarter of 2007 (Sun, Li, Ma, Chen, & Cynthia, 2019), and the intensity of its use today is increasing. In addition, cloud computing is also known as the third revolutionary in the IT field after the invention of computers and the internet. According to the definition described by NIST (National Institute of Standards and Technology), cloud computing is a model to enable convenient and on-demand network access to a collection of computing resources that can be configured together (eg networks, servers, storage, applications, and service) can be quickly provided and released with minimal management effort or service provider interaction (Feng & Bao, 2010).

Specifically, cloud computing is an increase in distributed computing, parallel computing, grid computing, and distributed databases. Among them; grid computing and utility computing are known as the predecessors of cloud computing. but referring to its development motivation, high-speed internet, virtualization technology, and more powerful hardware chips all play a very important role (Shaw & De Sarkar, 2019).

And the basic principle of cloud computing is to create a task that is distributed computer but not on local computers or remote servers. Thus, implementing cloud computing requires a combination of various technologies, as well as realizing the management and scheduling of virtual hardware (Part, 2010).

1.1 Cloud Computing

As explained earlier, cloud computing in this context is seen as a computing model. In this context, customers / users in this context are academics, plugging into the cloud to be able to access library resources / materials in the form of ¬e-resources. Generally, cloud computing provides services centrally with data, software, and computing available in application programming that provides an interface over the network. The basic principle of cloud computing is to make a broad set of virtual servers available to a collection of resources and provide them to clients. Any device that supports the web can be used to access resources through virtual servers Business software and data are stored on servers in remote locations and users are able to access this information through a web browser or desktop application or via a mobile phone (Serials & Sakib, 2019).

One of the key concepts of cloud computing is that processing 1,000 times the data does not need to be 1000 times more difficult. And as the amount of data increases, Cloud computing services can be used to manage loads

effectively and make processing tasks easier (Campus & Campus, 2012).

Cloud Computing can be divided into three layers depending on what is offered by various companies that offer this type of service lapisan-lapisannya adalah sebagai berikut:

(1) IaaS or infrastructure as a service;
(2) PaaS or platform as a service;
(3) SaaS or software as a service.

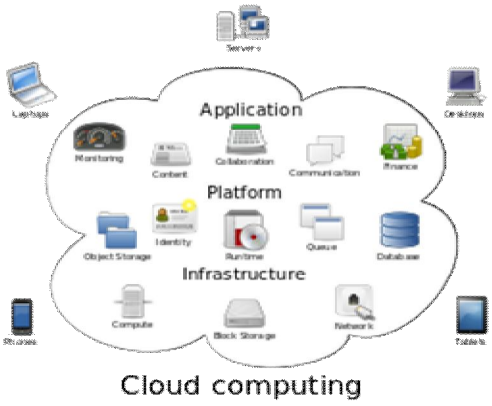

Figure 1: The Basic Principle of Cloud Computing

1.2 Deployment Models

There are various models in implementing cloud computing. Among them consist of public cloud, community cloud, hybrid cloud, and private cloud ;

- *Public Cloud*

Public cloud applications, storage and other resources are publicly available by service providers. This service is free or is offered with a user pay model. In general, public cloud service providers such as Amazon AWS, Microsoft and Google own and operate infrastructure and only offer access via the Internet (Cardoso, Moreira, & Escudero, 2018)

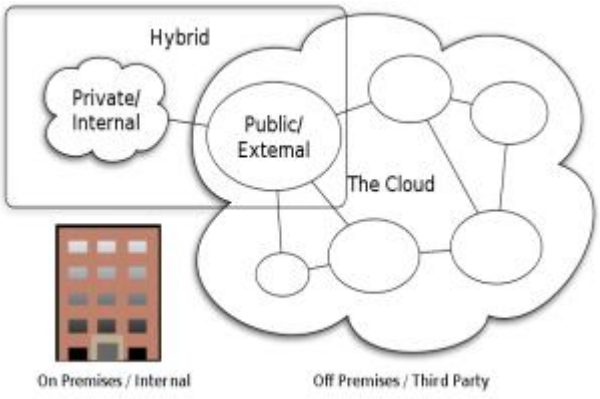

Figure 2: Public Cloud

- *Community Cloud*

Community Cloud shares infrastructure between several organizations from a particular community with similar problems (security, compliance, jurisdiction, etc.), whether managed internally or by a third party and held internally or externally. In this model, organizations and institutions share services as collaborative networks, or we can say that as a community that can be addressed internally or by third parties have the same requirements for policies such as compliance, security, mission, and IT policies (Gosavi & Shinde, 2012)

Figure 3: Community Cloud

- *Hybrid Cloud*

This model is a mixed model of the public model, private model, and community model. Meanwhile, these models maintain separate entities, they blend with standard technology that allows data and applications to be portable. By utilizing the "hybrid cloud" architecture, institutions and individuals can obtain degrees of fault tolerance combined with direct use without reliance on internet connectivity. Cloud hybrid architecture requires local and off-site resources (remote) and server-based cloud infrastructure (Cardoso et al., 2018)

Hybrid cloud does not have the flexibility, security, and certainty of internal applications. Cloud hybrid provides flexibility in home applications with fault tolerance and scalability of cloud-based services.

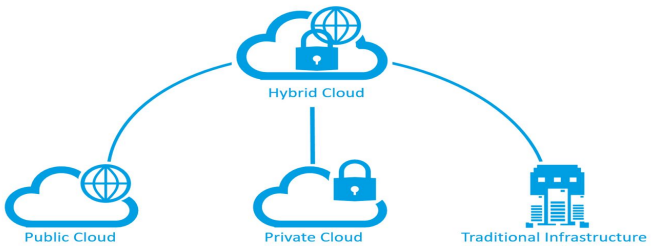

Figure 4: Hybrid Cloud

1.3. Leverage the Cloud Computing for Supplemental Storage

University libraries can use cloud-based services for file storage purposes. Generally, several libraries and similar institutions have a similar systematic infrastructure in organizing, storing their files to provide some resources for sharing with committees, work groups or between universities. The data that has been created is present in the routine course of work at a library (Arulmozhi, Karthikeyan, & Mohan, 2011).

In this article, applying the distribution of The Hadoop distributed HDFS file system. HDFS can be deployed on cheap hardware to store large amounts of data with high fault tolerance and reliability. HDFS is an open source implementation of Google's File System (GFS) With a Master-slave architecture, the HDFS cluster consists of; NameNode and some DataNodes. NameNode manages the metadata of the file system and stores the actual DataNode data. Clients contact NameNode to get file metadata, and real file I / O operations directly interact with DataNode (Sun et al., 2019). NameNode is the main control server. In charge of maintaining the namespace of the file system and coordinating client access to files. This records any changes in the namespace or property changes in the namespace itself. DataNode is responsible for the management of storage on the physical internet nodes where they are located. HDFS opens the system namespace file so users can save data in the form of files.

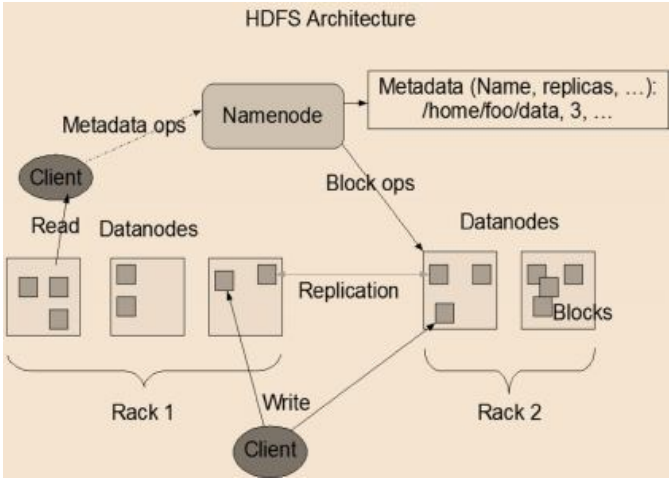

Figure 5 : HDFS Structure

In figure 5, show the structure of HDFS. For example, if a client wants to access a file, first, the client gets a list of locations where datablocks are created from the NameNode file. It is known that DataNodes from which data blocks are stored on the client, are then read directly in DataNode, NameNode does not participatein file transfer.

2. CLOUD COMPUTING SERVICES IN LIBRARIES

The library is as a center for the creation, organization and distribution of information in business activities. In general, each library has their own website for integrating library management systems. In providing access to digital collections through library collection repositories, libraries often maintain periodically related storage and backup of data and content they have. (Kumar, S Kishore and Naik, 2016).

The search for a subject related to cloud computing services placed in the library, is also a topic of major concern in the discipline of Library and Information Science.

Some libraries, usually applying SaaS and IaaS type cloud computing service models for the placement of their content on web pages, repositories, and back-up files. Using cloud computing can share servers in many ways application procedures, realize the distribution of resources, thereby also being able to reduce the quantity of servers, and in achieving its effect of reducing costs, therefore using cloud computing in the Digital library, will facilitate our work, life, and studies will certainly have a more significant efficiency (Zhu & Kuang, 2014). The model for cloud usage varies depending on the needs specified. Types of services in this context include Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS).

As a cloud superintendent, it should be composed of representatives from universities, governments, representatives and service providers, having responsibilities such as those for day-to-day operational management, providing high quality services and system security, formulations that are all coordinated and carry out supervision and sanction illegal users (Fehling, Leymann, Retter, Schupeck, & Arbitter, 2014).

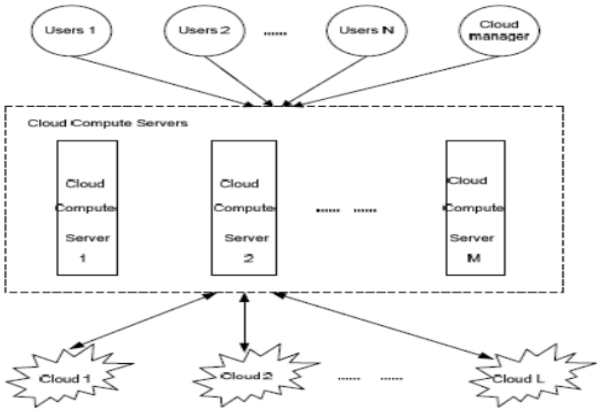

Figure 6: Cloud Computing Implementation Diagram

2.1 SaaS and IaaS Services in The Libraries

When talking about cloud computing in a library context, it is important to determine the implementation model, the infrastructure used, the platform on which the application was built and the related application. Platform Use (PaaS) refers to situations where software already exists or is already

installed. Like, when a library uses an Integrated Library System whether it's open source like Koha or Greenstone, or paid like Millennium Innovative Interfaces or SirsiDynix, library catalogs, subject catalogs, OverDrive, Googledocs, and WorldCat. Software as a Service (SaaS) can be seen in the use of LibGuides, library catalogs, WorldCat, OverDrive, aggregate gateway subjects that support the systematic integration of web-scale resource search such as SUMMON (ProQuest business), Ebsco Discovery Services, Primo Central (Ex Libris), Free and Open Source Software (FOSS), Excerpts Management software

It is quite clear that library systems use both platforms and software, sometimes there is no limit between PaaS and SaaS. Services referred to as cloud-based also include resource storage, for example, OverDrive e-books, research guides and online reference services that are ready to use. The function of the cloud application is exemplified by Google Docs or e-book reader libraries such as for general books or Safari books that are accessed with a web browser. Cloud Infrastructure (IaaS) mostly refers to space / time that users can buy to use an external server for electronic storage such as in institutional digital repositories or institutional archives. It is also an infrastructure that allows open source software to run repositories, for example, D-Space, FEDORA, Eprints, or package-hosted software such as Digital Commons, and SimpleDL (Cardoso et al., 2018).

Infrastructure as a Servive (IaaS)

Cloud-based web services that provide network infrastructure such as Virtual Machines, Virtual Storage, Disk Drives, Physical Servers, Web Servers, domain names, Email servers, Private Networks, etc. This allows the library institute to use the Operating System software and the corresponding software. This includes hosting platforms, content delivery, network storage, counting, backup and recovery, web applications, data analysis, etc. (Arulmozhi et al., 2011).

Software as a Service (SaaS)

A cloud computing service model that provides services through web access without pre-installation and software licensed for use by clients is called Software-as-Service (SaaS). An organization is not required to install software / applications on their own computers or servers in accessing them. SaaS reduces the costs of procurement, installation, maintenance and licensing of hardware and software. The SaaS offering and its working model of pay-as-you-go (flexible payment) can be stopped at any time, this will be able to provide access to more features and services on demand, while also providing automatic updates of the software itself, and reduce the pressure in operating the library, and users can access this service from anywhere with the device and anywhere using the Internet (Gao & Zhao, 2011)

SaaS tools are also known as 'Web-based', 'Requests' or 'hosted software'. Because the SaaS solution runs on hardware vendors and it is the vendor that maintains security, performance, maintenance and availability of hardware. This is the use of model software when online applications are being accessed as services on demand. Service cloud storage including Amazon, Simple Storage Service (S3), Google Cloud Service (GCS), Rackspace Cloud Files and Microsoft Azure are things to be noticed by the Library and Information Center in exploring using Cloud storage services (Gao & Zhao, 2011). Other popular PaaS and IaaS services are the Amazon web; such as EC2 and S3, Google App Engine, GCS, File RackSpace and Microsoft Azure. Cloud storage providers are generally large IT companies such as Apple, Amazon, Google, Nirvanix, Rackspace and Microsoft. Google and Microsoft are cloud storage service providers who often use their services in hosting library websites.

The SaaS and IaaS integration process requires database programming and administration skills for Iaas integration intended to developrs store and access data primarily through APIs for institutional-level applications. The use of IaaS cloud in the form of storage services includes online archives, backup, and big data (Patel, Seyfi, Tew, & Jaradat, 2011). The library uses SaaS services in almost all aspects of the library's daily work, instructions to office scheduling applications. Common SaaS services used by libraries include Gmail, Google Calendar, GoogleDocs / Drive, Drop boxes, and Knowledge Sharing services via OCLC.

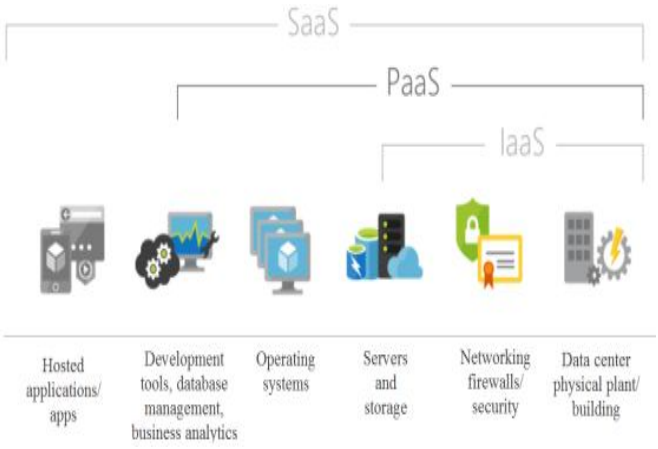

Figure 7: Cloud Computing Service Model

Platform as a Service (Paas)

This model is an environment (development environment) where development is carried out which is summarized & offered as a service, and at other higher service levels can be built. Customers have the freedom to build their own applications, which run on provider infrastructure. With management requirements and application scalability, PaaS

providers offer a combination of OS and application server standards, such as LAMP platforms (Linux, Apache, MySql and PHP), limited J2EE, Ruby etc. Google Engine, Force.com, etc. are some of the most popular PaaS (Mate, 2016). When this model operates, the user has control of the application and it is also possible to have control over the hosting environment, but cannot control the storage conditions, operating systems, networks and servers, and cloud infrastructure.

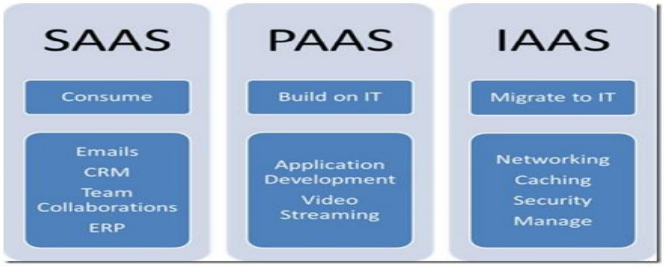

Figure 8 : *Cloud Models*

2.2 Cloud Computing Features

Scalability & Reliability
Is one of the important and core features of the cloud system. This is a very important feature of cloud services, every modification and improvement in services is very easy and fast which makes this service very scalable. One can easily add up the required bandwidth, processing speed and data storage or the number of licenses in a very short period of time. One does not need to plan for project costing, procurement, project implementation or projects more closely; but people need to make purchases to provide services to get the service in time (Pandya, 2012). A characteristic that is very much needed in cloud computing, which is able to increase its function when excessive web sites are accessed. Reliability is the ability to increase access to several sites in one service by having multiple sites, so that if one faces an error, another can take over the burden

Multi-tenancy
Being an important thing in the cloud system, where is the location code and / or data are in principle unknown and the same resources can be assigned to many users (potentially used at the same time). This affects resources, infrastructure and data / applications / services that are hosted on shared but must be made available in many isolated instances.

Data Management
The most mportant aspects in of data storage, where data is located and flexibly distributed at various sources implicitly, consistently, and also the data needs to be maintained more than the broad distribution of replicated data sources. At the same time, the system always needs to know the location of data at the time of data replication in all data centers. Because of this, data management is a cloud feature that is exceptional to the cloud environment.

Managing Cloud Sequences
Cloud computing managers work in a wide range of areas that distribute network infrastructure, so they can monitor it from all over the world. One of the biggest changes from traditional data centers to centralized and data stored, managed and managed in a cloud environment.

2.3 Cloud Computing Components

Cloud computing consists of various components. Each of these components is optimized to empower, secure and apply cloud computing. These components include:

A. Application

This service is often mistaken for an application. However, a function where software developers must focus on a case that cloud computing can definitely work. Optimization of the application of cloud computing is based on the actual coding of developers (Rawat, Kapoor, & Sushil, 2015). Through testing related to load handling, security aspects and usability aspects, the application of cloud computing can be expected to work well.

B. Platform

On a number of websites and various applications that do not use cloud computing technology, the application is directly connected to the server. In cloud computing, the application with a number of tools (the appliance / tools) will be continued to be launched to a different application called the Platform (Serials & Sakib, 2019). The platform is sometimes derived from programming languages such as Ajax (Asynchronous Javascript and XML) or Ruby on Rails. At this point, those who determine the cloud computing provider, must follow the set of programming languages that are run in the palltform. However, in general programming languages, it can be run / implemented on a variety of different platforms, a powerful application with real-time renewal capability is ensured to use cloud computing.

C. Storage

Everything that is known by an application that is able to provide services according to its function, is certain to run because of its storage. Its function is, the storage stores important data and information on how the function is implemented. Optimization of the storage is based on how the storage facility is protected from a variety of attacks from hackers and its ability to relate to back-ups (Ali Akbar, 2019). Cloud computing always has to do with aspects of consistency and accessibility of a service that can specifically require storage to be available at all times.

D. Infrastructure

Each function, services, and the availability of storage to provide the required data, is only possible if the infrastructure is optimized. Infrastructure is where in a platform capable of storing with a number of requests on storage. The infrastructure has the ability to change a load balancing and smooth management (Upadhyaya & Ahuja, 2019).

2.4. MapReduce for Distribution Data Processing

MapReduce is a computing model for data distribution, and is also the core of Hadoop. MapReduce is a framework that can decompose datasets into very small unit sizes, and each small dataset can be processed completely in parallel. MapReduce abstracts the processing of parallel computing on a large-scale cluster into two functions (Sun et al., 2019). MapReduce is responsible for the mapping and simplification stages. At the mapping stage, MapReduce divides data entered by the user into M segments, which are responsible for M Map tasks. The figure below illustrates the structure of MapReduce.

There are two types of services that are scheduled in the MapReduce framework; JobTracker and TaskTracker. The JobTracker is a master control service, one of which is responsible for scheduling and managing the TaskTracker.

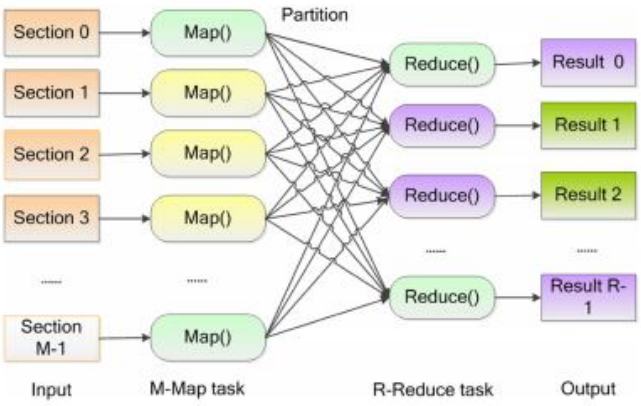

Figure 9 : Diagram structure of MapReduce

3. THE IMPLEMENTATION OF CLOUD COMPUTING IN THE UNIVERSITY LIBRARIES

Today, a number of libraries are innovating towards the use of cloud and are trying to provide network-based services. Cloud-based services mean a library where the daily operations of the apes (the library housekeeping operations) in the form of digital libraries are hosted based on a cloud-based network. In this era, a number of libraries use Google web technology consciously or not to provide services.

Previously, if someone wanted to create a document or spreadsheet, then that person used a package from Microsoft Office, however, today some libraries are processing documents using Google web technology (Google Docs). The use of various Goggle Apps and a number of other similar tools indicate a radical exchange of traditional ways of utilizing technology. In addition, the library also currently provides a number of quality services to its users to facilitate access to various resources and computer applications originating from a single platform.This is an utilization of cloud computing in the context of libraries. However, services in modern libraries will increasingly focus on the demands of users in the future. And finally the goal of the digital library is to offer comprehensive and appropriate multi-level services for its users. In the current user service model, most are WWW service models, FTP service models, BBS and Email services, etc.

3.1 Analysis Current Service Model in The University Libraries

The university libraries as the most important academic aspect and as a place of scientific research, has the duty and function to provide information services to its users. Previously, a number of libraries insisted their services were based on the resources they had, so librarians were rarely or reluctant to consider user requests for resource needs (Cardoso et al., 2018). In contrast to the present, libraries are headed towards modern libraries / digital libraries that have changed the perspective of these resources.

Usually, librarians need to collect as much information and adapt it to the needs of their users. Then the librarian will analyze the information and arrange it to suit the needs. And in the end, librarians will provide resources for library users in certain Engineering methods. And the main purpose of the digital library is to provide the right offer with various levels in each service (multi-level services). Dengan perkembangan teknologi, terutama teknologi IT dan Internet, model layanan pengguna perpustakaan universitas telah banyak berubah dibandingkan di masa lalu. Dan model layanan pengguna saat ini terutama berupa model layanan WWW, model layanan FTP, BBS dan E-mail.

A. World Wide Web Service Model

This type of service focuses on the client-server model. This model represents all types of information based on browsing systems based on HTML Language and HTTP Protocol (Goyal & Jatav, 2012). Today, WWW is a type of information service that libraries often use widely. In the university library, WWW services such as Search Query, Online Library, Network Navigation, and Network Interactive.

B. File Transfer Protocol Service Model

Implementing FTP services on the university library network system is a good type that provides convenience for users and for libraries as well. By using FTP services in the

library, users can create their own passwords, such as using their e-mail addresses, and this can allow librarians to easily get users' visit logs. Furthermore, according to users' visit logs, librarians can offer services that are appropriate for them and increase user satisfaction. Meanwhile, it's easy to learn to use FTP services. First, you only need to start the FTP client program to connect to the remote host, then you must issue a file transfer command to the remote host and after the remote host receives the command, it will respond and implement correctly.

C. Bulletin Board Service

Bulletin Board Service (BBS), is a type of electronic service system on the internet. This service is like a public blank board where all library users can write about their ideas. Through the BBS system, library users can ask and consult with librarians at any time. Usually, they get a response in a short time. Meanwhile, librarians can communicate with many users at one time through BBS. Moreover, university libraries can open lectures sessions and release announcements and provide online assistance to library users through BBS.

3.2 Cloud Computing Architecture for Library

Cloud database architecture for libraries is the main point of view for selecting cloud services. One needs to save several criteria for database evaluation, application, hardware configuration, which are available for the cloud.

Figure 10 : Library Cloud Architecture

Database and application can be loaded on the same server. The first code will be generated in the application and then the database will be created on the data storage server. After creating the administrative control node database will make a note and save it on the server. On the other hand stored data will be available on a computer network and finally the user can access the data stored in the serve in various types of formats

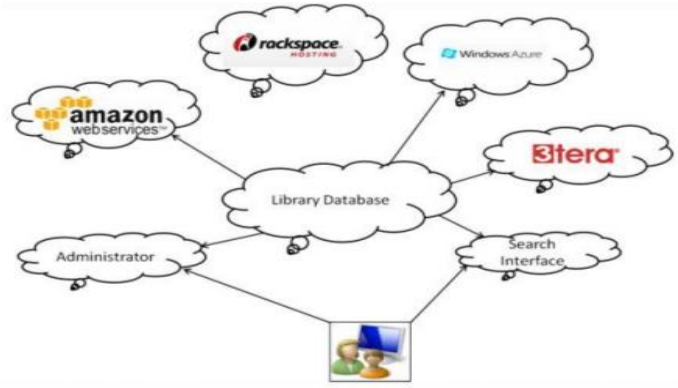

Figure 11: Cloud providers

As shown in figure 9, there are three cloud service providers that provide storage servers, applications and database related services. Data will be stored on the server of the service provider. They will assign usernames and passwords to be accessed by the application and one can manage all the work involved. They will also provide a single search platform to search from multiple databases if, the database of printed and electronic materials will be on the same server we can also use a combined search engine to search content from all databases

3.3 Applications of Cloud Computing for the Libraries

In the realm of libraries, there are several fields that enable cloud computing to be implemented, while the types of library services are:

A. Building the Repositories

In carrying out one of the functions of the university library, namely as a central repository of research materials and research results. With respect to cloud-based digital library (repository) software, Duraspace has two software tools namely Dspace and Fedora Commons but Dspace is widely used to build digital libraries / repositories relative to Fedora Commons. Cloud Dura provides a complete solution for developing digital libraries / repositories with standard interfaces and open source code for both software (Upadhyaya & Ahuja, 2019).

B. Searching Library Data

OCLC World Cat is one of the popular services for searching library data and is available in the cloud. OCLC offers a variety of services related to circulation, catalogs, acquisitions, and other library related services on the cloud platform through a web sharing management system. The web sharing management system facilitates to develop an open and collaborative platform where each library can share their resources, services, ideas and problems with the cloud library community. On the other hand, the main purpose of web-scale services is to provide cloud-based platforms, resources, and services with the value of profit and effectiveness to share information and build broad collaboration in the community.*File Storage*

To access all types of files on the internet, cloud computer in the form of various services available such as Flicker, Dropbox, Jungle Disk, Google Doc, Sky Drive and so on. This service is actually a file sharing on the web and provides access to anywhere and anytime without special software and hardware. Therefore, the library will benefit from these cloud-based services for various functions. For example, LOCKSS (Lots of Copies Keeps Stuff Safe), CLOCKSS (Controlled LOCKSS) and Portico tools are widely used for digital preservation purposes by libraries and other organizations.

D. Library Automation

For library automation, Polaris provides cloud-based variants such as acquisitions, cataloging, process systems, digital content, and provisions for the inclusion of the latest technology used in libraries and also supports various standards such as MARC21, XML, Z39.50, Unicode and so on which is directly related to the library and information in the field of science. Apart from this, today some software vendors such as Ex-Libris, OSS Labs also provide this service in the cloud and third party services that provide hosting of this service (SaaS approach) in the cloud to store many financial libraries in hardware for this purpose. . In addition to the cost-benefit, libraries are free from taking care viz. software updates, backups, and so on

4. PROPOSED CLOUD COMPUTING FOR LIBRARY

The cloud-based library system is proposed as a new model library concept. The recommended model provides a cloud platform and hardware level virtualization / server virtualization solution for deploying and managing System Oriented Archives (SOA) for libraries. Cloud computing systems provide libraries for librarians to run application suit / LMS library systems. This releases the library from system recovery management. Library that requires library management integrated with software to automate all maintenance operations in the library as needed. Most LMS software (Library Management Software) was developed to work under a client-server environment and has a web application to run an online Web public access catalog (OPAC).

Librarians need to set up an intranet network to run the client-server architecture for the LMS. Therefore, in a traditional library system, a librarian needs to manage funds for servers and software, electricity, maintenance, and also involve staff to run the system. Figure 10 provides an overview of the library automation system scheme in traditional concepts.

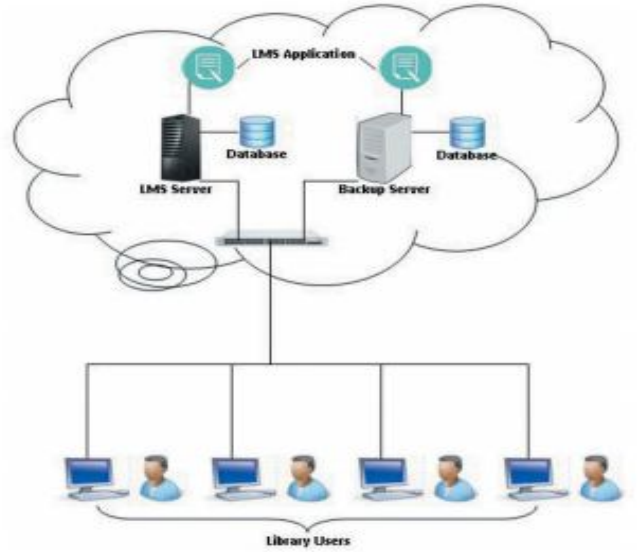

Figure 12: Traditional System of Library

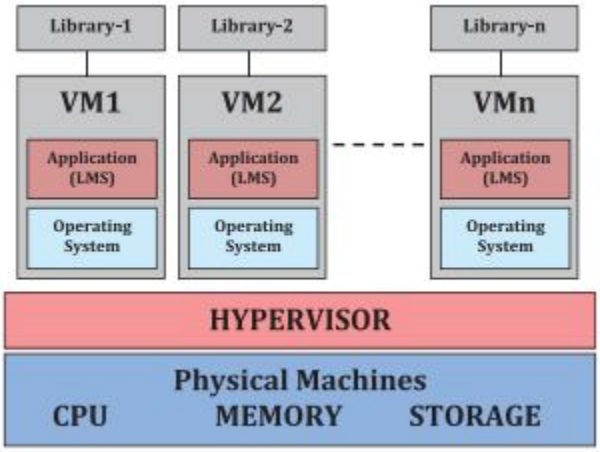

Figure 13: Library automation based on Cloud services

And in Figure 11, depicting a cloud-based library automation system scheme through a consortium approach between libraries, in this context is the university library. The consortium forms a community cloud platform for libraries under any cloud provider such as Amazon Web Services (https://aws.amazon.com/choosing-a-cloud-platform) , Google AppEngine (https://cloud.google.com) , Microsoft Azure (https://azure.microsoft.com/en-in/) , Microsoft Cloud Platform (https://www.microsoft.com/en-us/cloud-platform/default.aspx). The cloud consortium shares hardware resources, such as CPU, memory, storage, and others, among participating libraries via virtual machines (VMs) running on the hypervisor. Integrated Library Management Software, databases, and other tools and applications are installed on each VM in the cloud. Each library can get access to their LMS system through their respective VMs installed in the cloud through authentication policies set by the supervisor.

Build a cloud platform for the local library source sharing, which implements redundant hardware devices from universities that use Hadoop technology for cluster device computers in the cloud service to provide services to users. The local library source sharing system with a cloud-based platform can be divided into a storage layer, foundation management layer and application interface layer, and access it from the bottom to the top as shown in the following image.

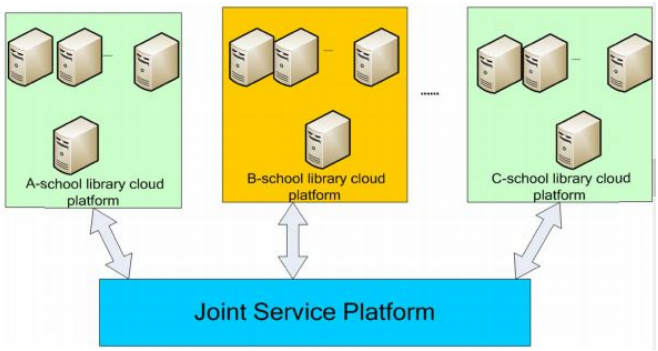

Figure 14 : Cloud Platform for Library

4.1. Resoruce Integration to Achieve Resource Sharing

In the realm of libraries, there are a variety of resources from various libraries that are integrated with one another, as well as updating the more popular version of the "information sharing space" concept. Users get the resources they want through the internet, however, if they only focus on the acquisition process, and do not have to be interrupted due to various complicated operations after the interface. While the cost of operating a library is very efficiently reduces, its efficiency increases dramatically. In the cloud computing model, data is stored centrally, making it easier to implement security monitoring. Cloud computing provides users with a safe, reliable and economical data storage center. Users no longer need to worry about data loss, virus intrusion, and other problems (Ruhela, 2018).

If a server failure occurs, the "cloud" server can quickly copy data from one server to another in only a very short time, and start a new server to provide services, so that the library can realize security services without interruption. Aside from that, cloud computing requires end user equipment that is quite affordable and easy to use. Because the cloud computing model provides strong wireless access functions, users will use the "cloud" library in various related terminals to integrate electronic resources with high content levels, thereby maximizing the role of central library resource storage.

4.2. Advantages & Disadvantages the usage of Cloud Computing in the Libraries

Advantages :

- Reduce the cost
- Innovative, Round and the clock access
- Consumption Model
- Highly Secured Infrastructure
- Flexible and resilient in disaster recovery
- Simplicity of Integration and faster provisioning of systems and applications
- Flexible
- Reduce maintenance cost

Disadvantages :

- Data loss
- Dependency
- Constant connectivity required
- Failure compliance

5. CONCLUSION

We know that the library is not just a pile of books that contain knowledge, but also a sea of knowledge. Its main purpose is to provide satisfying services for faculty members. in this new era, libraries must improve themselves continuously by adopting many new IT technologies. And entering this paper, we are trying to improve the current user service model in the university library by using Cloud Computing. Cloud computing is built based on research in virtualization, distributed computing, utility computing, newer networks, and web software services. This implies a service-oriented architecture, reducing information technology overhead for end users, high flexibility, reducing total cost of ownership, service requests and many other things.

Today, the tight competitive global market, companies must innovate and get the most out of that resources to succeed, not least at universities as Educational institutions that are able to provide quality services on a global scale. Cloud computing infrastructure is considered as the next generation, a platform that can provide this extraordinary value for an institution of any size. Cloud computing is thought to help institutions achieve more efficient use of IT hardware and software, achieve IT investment achievements and provide a means to accelerate innovation adoption.

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