PERFORMANCE ANALYSIS OF OPEN SOURCE CLOUD SOFTWARE

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Abstract **– Cloud computing is a quality of assets and services accessible through the internet. Cloud computing also offers the feature of open source software where user can set up or build up new applications. It generally delivers both, the applications and hardware as a service over the internet, and data centres which we call cloud computing. It helps to use the applications without any installations and reduces the cost. It offers the on-demand services to users. This paper provides a relative analysis of running a technology like PHP on open source cloud software and local servers and discusses the comparative behaviour of open source cloud computing like IBM Bluemix and Openshift Redhat through implementation time.**

Keywords - Cloud computing, IBM services, Models.

I. INTRODUCTION

Cloud computing is a service provider where without using a hardware and software users and clients can submit a task. In clients computer there are limited number of software's and browsers are present minimal connected to internet, services and applications based on cloud may support any type of software application services which are use today.

In the past PCs memory is the best way to store information for future access, at times users or clients are not able to access their data because of various internal damage. Cloud takes care of the issue, by giving their services. In this research we are comparing the full testing of open source cloud software's that are offered by IBM Bluemix and Openshift Redhat.

Some providers are also there for people who want cloud services. Amazon Elastic Compute Cloud 'Amazon EC2', are the web based cloud computing which makes web-scale computing simple for developers. It reduces the time essential for boost and attains new server space.

According to **[1],** Google 101 is made up of millions of low-cost servers, stores, including various copies of World Wide Web. Searching is done in a fraction of second.

For delivering of all IT-enabled services, cloud uses the internet technologies which work 'as a service" to any essential users. By using cloud we can access anything from anywhere from any computer without worrying about anything. Cloud is a new infrastructure deployment environment that gives on demand services to an organizations, end users and third party. Cloud computing is a service provider which is composed of several services

such as infrastructure, storage, platform & software. Without direct investment cloud provides a exclusive business model for companies to adopt IT services.

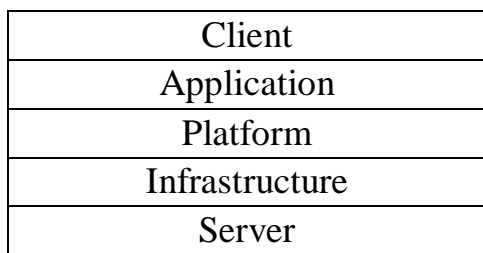| Client |
|---|
| Application |
| Platform |
| Infrastructure |
| Server |

Fig. 1 Cloud Architecture

Fig 1 shows Cloud Architecture as discussed by [1]. Fig 1 shows that there are five layers: client, application, platform, infrastructure, and server, which mainly pointed to the PAAS, SAAS, and IAAS. According to [1] and [3] third party owns the infrastructure and also acts as service provider. The architecture of the system software involves the cloud computing delivery. It provides some basics features like, on-demand selfservice, broad network access and pay as you go service. They are mainly associated through the network called internet. As per the previous research, Cloud computing is mainly divided into two parts one is front end and second is back end. Front end based on the client side and at the computer user. The back end is based on server storages.

The first part of cloud comprises of the cloud application, client computer, computer network and the application necessary for the access. Front end services like web based application and browsers. The backend services, includes several data servers and the storage systems that make the 'cloud' of computing services. Cloud is mainly about backend where data storage, backups are preferable for users.

Cloud computing is mainly based on utility computing and grid computing. Grid computing is a computing where networked computers can able to use resources and data access from other computers which are connected over the network. Utility computing is based on business model where one company pays to another company for data storage and access to applications.

Cloud computing offers the best resources like system storage, server, network equipment's and etc. it also offers the connected software's which have services like file system, operating system, applications etc. Software's services are known as a service on demand. Cloud have several service models like: -

• IaaS – it is also known as Infrastructure as a Service. It offers computer infrastructure usually a virtualization environment as a service.
Example AMAZON EBS

• PaaS – it also known as Platform as a Service, it offers the platform for the growth of new application which will run on providers infrastructures.
Example IBM Bluemix

• SaaS (Software as a Service) - Software as a Service is an on-demand software. It is a model which is used by end users which is offered by vendor, which can only be accessed by web browser.
Example Gmail is a service, Google is a provider

• MSP – it is a specialised service providers for enhancing the existing IT services like *Anti-virus*. It is also known as Managed Service Provider.

The infrastructure of the cloud computing is owned by the third party who provides Cloud Computing. It is a business model for enterprises who adopt IT services without any investment.

There is also an open source cloud called Openstack, which is based on IaaS platform. It offers the infrastructure as services for public and private cloud deployment model. Whole project is managed by the Openstack cloud foundation which was established in September 2012. NASA and Rackspace jointly worked on it. It also offers the shared resources to attain mission of protecting the Openstack software. Cloud is an on-demand computing based on internet network which gives data to computers and shared resources. Why one should use it because: -

1. It offers Up to date software.
2. Universal Access, helps users to distantly access their data via internet from everywhere (24x7).
3. Drop of costs
4. Cloud gives the Data Protection facility.
5. Flexibility, it allows users to switch applications from one to another.
6. It increased the demand for resources.
7. It offers the Data Backup characteristic and cloud computing solutions are simple to use.

II. CLOUD DEPLOYMENT MODEL

There are 4 major cloud deployments models.

1) Public:

It is provides applications, storage and other services to the common public by a provider. It is a vision to propose unlimited space and increased bandwidth. It is publically available and also known as off-premises.

Example: - *Blue cloud by IBM, Azure by Windows.*

2) Private:

This premise is also known as "Internal cloud". It is an On-Premise cloud which is owned by companies and controlled by companies for delivery of better level services. Example: - *Amazon Virtual Private Cloud (AVPC), Eucalyptus cloud platform*

3) Hybrid:

It combines the advantages of public cloud and private cloud. It provides flexibility, control and protection of multiple deployment models.
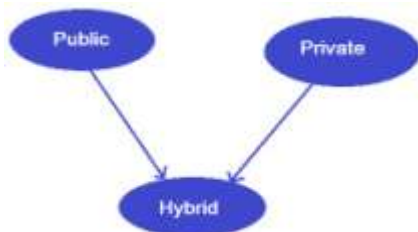

Fig 2. Hybrid cloud (combination of public and private cloud)

Hybrid cloud deployment model is a group of public and private cloud as shown in fig 2.

4) Community Model:

This model allows the cloud computing environment to be shared or managed by number of connected organizations.

III. OPEN SOURCE CLOUD ENVIRONMENT

Cloud computing has become one of the most preferred web hosting and storage options. It is considered as a future of the web hosting and storage. Cloud computing also offers the open source surroundings and services for the developers and organizations.

Paid cloud hosting services incurs price as it offers expanded services for enterprises. It follows the pay-per-use policy or model of payment. There are no wastage of resources, Customers will pay on per-use basis (IaaS), can be based on per application/user or GB memory usage (PaaS). Users are bound with the partial functionality in paid cloud services.

Example *AWS, Amazon EC2, Hewlett-Packard*

Advantages

- It offers the security from illegal access.
- Pay As You Go policy is applied.
- No wastage of extra cost and resources.

Disadvantages

- User are not able to use full functionalities.
- It needs SLA (Service Level Agreements)

Open source cloud is always free for users. It can be installed easily and all the features are available. One can arrange as various solutions on the cloud machine. User can use and transform all functionalities in open source cloud environment. Example *IBM Bluemix, Openshift Redhat*

Advantages

- Open source cloud offers flexibility and customization where user can openly access the application.
- No cost necessary
- There is an open application interface.

Disadvantages

- Labour dependency.
- Labour and knowledge cost required.

1) *IBM Bluemix:*

IBM Bluemix is an example of cloud Platform as a Service (PaaS). It was primary released in 30 June 2014. It is an Open source cloud software which is developed by IBM team in June 2014. Developer can run PHP, *Python, Node.js, JAVA* etc. IBM also offers DevOps services. It is Development and Operations, which is a development method that helps partnership and integration between developers and IT operations professionals. DevOps runs on softlayer platform.

One can easily deploy their applications on IBM Bluemix which makes it a best cloud foundry PAAS service provider. One can easily use IBM Bluemix with Naked domain of 128 MB container. Mobile Applications can also be deployed in PAAS platform. There are some Use cases which are used by some global entrepreneur program partners already working on it.

Like ePoise is using IBM Bluemix infrastructure to deploy itsNextGen, Algo Engines is a wind turbine portfolio management, Esenzit is deploying its product Evidencer. IBM Bluemix is based on Cloud Foundry and open technology and runs on softlayer technology.

2) *Openshift Redhat:*

Openshift Redhat is also a PaaS Platform service given by cloud. Openshift is same as IBM Bluemix where developers can develop software's in several languages like *Node.js, java, python, and Php*. It was initially released on May 4, 2011. It is written in Ruby and Go.

It lets developers to rapidly develop, scale, and host applications in a cloud. It has a trait of assistance, including online, on-premise, and open source project options. One can control, develop, build and arrange applications in Openshift.

Git hub should be installed, RHC command interface, and have to get SSH keys for their development of applications.

Openshift Redhat has one flaw that there is no ip-address. Openshift uses the Git and it also allows to deploy the binary packages. Red Hat is the world's leading provider of open source solutions. It also offers Hybrid as a Service also provided by Openshift. Below (fig 2) and (fig 3) shows the comparison analysis of software's.

IV. EXPERIMENT and RESULT

Key reason of this research paper is to compare the open source cloud software's against local servers like Wamp, Xamp. There are several open cloud software's provided by enterprises where one can develop new applications. But all platforms have their own implementation time. By running Php code on both cloud software and local server execution time will assess the result. According to the result IBM Bluemix is proved to be a best open source cloud software platform where it gives several features to the developers for deployment and developments.

Below are tables which will explain the evaluation analysis of software's who else is taking more or less time, executing the lines of codes. Time are given in tables in form of Microseconds.

1) IBM Bluemix:

Line of codes	WAMP	EasyPhp	IBM Bluemix
40 LOC	0.00008010864	0.000	0.00014019012
100 LOC	0.00003409386	0.000	0.00011610985
150 LOC	0.00115180016	0.003999948	0.00100803375

Table 1. Comparison analysis of IBM Bluemix

Table 1 shows the performance analysis of open source cloud software if a program of PHP runs on conventional Wamp server or on IBM cloud.
After executing diverse lines of PHP code on local and cloud environment, (table 1) shows simple PHP is faster than wamp when code running on local host. Code implementation will perform differently when it is running on online. IBM Bluemix shows the same. IBM Bluemix shows the real time execution because it is online basis.

2) Openshift Redhat:

Line of codes	WAMP	EasyPhp	Openshift Redhat
40 LOC	0.00008010864	0.0000	0.00014710426
100 LOC	0.00003409386	0.0000	0.00003099442
100 LOC	0.001151816	0.00399994850	0.00021195412

Table 2. Comparison analysis of Openshift Redhat

Table 2 shows the performance analysis of open source cloud software if a program of PHP runs on conventional Xampp server or on Open shift cloud. By comparing both the tables' result is behaving differently. IBM Bluemix and Openshift Redhat both are PAAS cloud foundry services which offers open source cloud environment and Easy deployment and scaling of applications.

When one application is deployed on online server it will give different output on local servers. Below chart representation (fig 3) also defines about the IBM Bluemix and Openshift execution time. In the above table time is given in microseconds which is a page load time. IBM Bluemix is best PAAS platform service provider because it has user defined scaling metrics, JVM Heap, Memory division, throughput, response time. It has user controlled option like breach option, statistic option, scale in and out and instance count.

Fig 4 describes the implementation or performance in graph. It is a graph representation of all tables described in the paper. It shows the table data in chart and describes the performance which shows the IBM Bluemix performs best other than the openshift and easy PHP shows fast execution time than wamp server. Fig 3 and 4 shows their representation
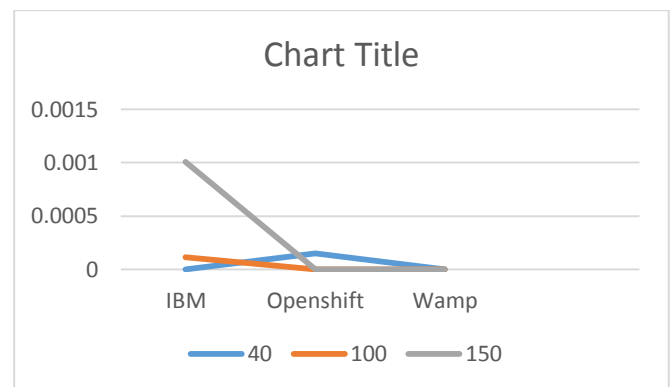

Fig3 Comparison of all software's with cloud environment

Easy PHP have excellent execution time other than wamp server. In open source cloud software, IBM Bluemix is proved to be a finest platform for progress and deployment. Openshift not provide the domain name but IBM Bluemix provide domain and other features.
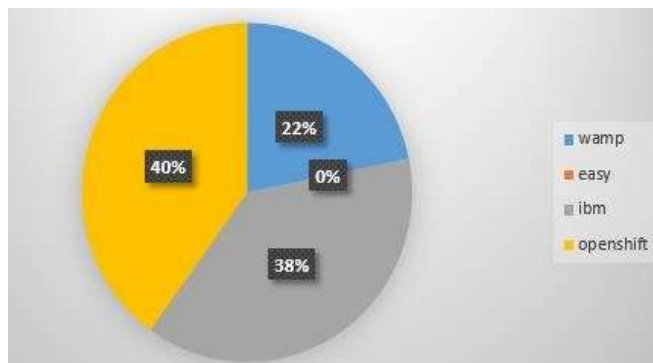
Fig 4 Comparison of all software's with cloud environment

Fig. 3 shows that as IBM Bluemix is taking less time, we can conclude that it is much better as cloud computing service provider as compare to Openshift. Fig 4 shows evaluation between cloud based software used for analysing performance.

V.   CONCLUSION

In this research paper we have studied briefly about the different cloud based models and their services. Cloud services are used by both smaller and a larger enterprise which defines the significance of cloud computing. Though there are huge advantages of cloud computing there is always a risk in user's mind of losing their data and privacy. Many companies are providing cloud based services, for performance analysis, open source cloud services which are good are IBM Bluemix and Openshift. It was concluded that IBM Bluemix is better than Openshift. Open source and paid cloud have their own advantages and disadvantages. Local servers can only be run on local servers. But by using IBM Bluemix, Open shift Redhat one can experience the cloud platform with additional functionalities. The key spotlight of this research paper is on comparison on cloud software's against local servers. Local servers have partial quality but open source cloud have unrestricted quality with paid and free trial.

VI. FUTURE WORK

Cloud computing is a fastest growing technology in today's world and it proved to be best services provider than other service providers. Open source cloud software's have bright future because enterprises are openly used cloud open source software. IBM Bluemix, Openshift Redhat, Azure are open source software's with various functionality. Open source cloud have more functions and can develop any application. IBM Bluemix and other open source cloud software are focusing on developing cloud services for big data analytics, scaling and managing applications. As future work we would like to develop an cloud based data analytics application for healthcare domain.

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