

Implementation and Testing Challenges of Cloud Computing and Comparative Study & Testing

Er. Manoj Saraswat¹ Er.A.K.Khan²

^{1,2}Asstt.Professor

^{1,2}S S College of Engineering,Udaipur, Rajasthan, India

Abstract—In SDLC, software testing plays a very important role. We test a program to see whether it contains an error of omission or commission. Cloud Computing we see as a computing model, not only a technology. In this model “customers” plug into the “cloud” to access the IT resources “on-demand”. Delivered over an Internet connection. The “cloud” replaces the company data centre or server. It merely means selling IT services on demand. Cloud computing leads an opportunity in offering testing as a service (TaaS) for SaaS and clouds. There are many issues and challenges in testing cloud and cloud application as compared to simple web and web application. In this paper we will provide view of cloud testing and service testing provided by cloud. We also gives the idea about the challenges and issues involved in cloud testing. In the end we compare the cloud based application testing with web based application testing.

Keywords:SDLC, Cloud, Testing, Services, Cloud Computing, SaaS, TaaS.

I. INTRODUCTION

Cloud computing is a technology where customer can plug in into the cloud and access the software on demand and as per his usage.

Let us take an example to give insight of a cloud working. We take a case of car verse a taxi cab. Car provides a means of transportation but we have to take care of its petrol, maintenance and garage facility. On the other hand taxi cab is a public and owned by someone else. It also provides the transportation facility on demand and we don't have to take care of its petrol, garage and maintenance. It merely means in taxi cab we pay as per its usage whereas in own car we have to take care of other things. So cloud is moreover like a taxi cab (we use as per our requirement and pay as per our demand).

Now we move toward the types of cloud computing. Generally we have three different types of cloud computing[8.1].

A. SaaS(Software as a Service) :

It is the most commonly and widely used form of cloud. In this the customers get all the applications and functions from the web browser and no need to install any application on his computer. A very little or no code is required for the working of these application. SaaS eliminate the need of Servers requirement, storage space requirement and many more for the customer. For example an online music company charges some amount for every track downloaded [8.2].

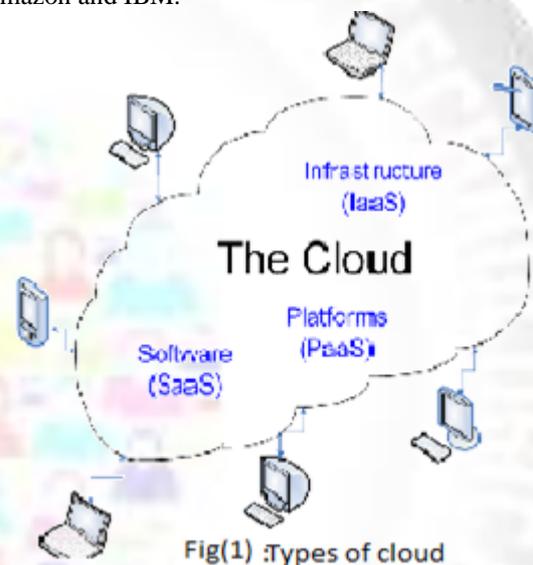
B. PaaS(Platform as a Service) :

In this the virtual servers or run time environments are provided on demand to the customer to develop their

applications. The framework for the deployment of application code along with various on demand services is available as PaaS offering. Well known examples is goggle Maps.

C. IaaS(Infrastructure as a Service) :

In this the vendor provides virtual servers, networking components, storage space or middleware on demand. IaaS is for architects where the actual hardware infrastructure is deployed on a pay per use basis. Different vendors include Amazon and IBM.



Fig(1) :Types of cloud

Figure(1) gives the overall view of all the three cloud computing types.

II. CLOUD COMPUTING IMPLEMENTATION CONCERNS AND CHALLENGES

Many companies (like Amazon, IBM) are working hardly for full flagged working of cloud. But there are many implementation concerns and challenges they are facing. Here we are discussing few of them as:

A. Data Management:

As we see cloud as big environment we face many problems related to data such as distribution of data, partitioning of data, and security of data and synchronization of data.

B. Scalability:

Our cloud should be linearly scalable to cope up with increase in linearly data processing. If “n” times more users need the resources, the time to complete the request with “n” more resources should be roughly be the same.

C. Multi-Tenancy:

Cloud generally permits multiple customer to use the same hardware at the same time, without them knowing it,

possibly causing conflict of interest among them.

D. Self-recovery:

In case of network/application/data storage failure, there will always be backup running without major delays, making the resources appear seamless to the user.

E. Security issues:

Security refers to integrity, availability and confidentiality, which possess major issues for cloud vendors. Customer would not know in which format and where his data is stored.

These are the major challenges which do not allow cloud to be expanded largely to cover the whole globe.

III. BENEFITS OF USING CLOUD COMPUTING

The key benefits of using cloud computing is that it provides the following advantages:

A. Seamlessly resource availability:

Resources are available seamlessly across the globe. Companies can make use of these resources sitting anywhere and as per his requirement.

B. Scalability:

As the company expands during a course of time they require more resources which we can easily get from the scalable cloud.

C. Low Maintenance:

As cloud is going to provide all the development, storage and networking facilities, we no need to bother about the servers and development environment maintenance.

IV. CLOUD TESTING (FUNCTIONAL AND NON-FUNCTIONAL TESTING)

Testing a cloud means verification and validation of environments, infrastructure and application that are available on demand. We generally do some functional, non-functional or performance testing on cloud. These testing assure that cloud is working fine providing all the resources well[8.4].

A. Functional Testing:

Under functional testing we test the cloud application in a very similar environment to the one in which it will be accessed when it goes live. Software Testing tools that are used for testing of conventional applications have to re-evaluated when applied to Testing application hosted in the cloud as there is a need for tools to allow test engineers to analyze the network, desktop and implications of changes within the Cloud.

Apart from the traditional testing we have to include the following other testing in the scope of the testing:

1) Availability:

Cloud offerings must be available all the time. This need to be tested as company is dependent on 3rd party cloud platform vender.

2) Accessibility:

Test whether the cloud is easily accessible to all the customer groups across the geographies. We need to see

24/7 access of application across the geographies.

3) Data Security:

We need to ensure that the potentially sensitive information which traverses the cloud is safe and secure.

4) Privacy:

In cloud it is also ensured that the privacy of application user and associated information is maintained.

5) Multi-browser support:

It is also need to test that the application provided by the cloud are able to run on multiple browser (like opera, IE, Chrome, Safari etc.).

B. Non Functional Testing:

Usually, in traditional performance testing techniques, where scalability is limited to certain number of users within the network, in cloud the applications scalability scope is much wider[8.3].

1) Performance Testing:

Performance measurement of a cloud offering is different from on-premise. The cloud should be elastic. Elasticity enables enterprises to use limited resources from the cloud application and increase the usage as required.

2) Load Testing :

Under this we test that the application/system which we are getting from the cloud are stable as the number of users count is increasing in multiples of hundreds or thousands.

3) Stress Testing:

Due to the cloud characteristics, it is imperative to identify issues as system is tested to breaking points maximum expected capacity or often beyond to 2x, 3x, nx expected usage.

4) Capacity Testing:

Being hosted in a cloud environment it is prudent to determine maximum capacity for current or future hardware, bandwidth or other needs or to validate that installed hardware and network will support expected usage scenarios.

V. ISSUES IN CLOUD TESTING

Till now we have seen, what are the different types of testing generally required for the cloud. In this section we will discuss the challenges and issues faced while testing cloud. Every cloud offering requires a traditional verification strategies. While testing the cloud we came across the following challenges[8.5].

A. Internet dependency:

Applications are not installed locally in controlled environments. This makes it harder for testers to replicate the user environment.

B. Security:

Since information travels through the Internet, testers have to perform security testing to make sure there is no data leakage when data is sent over the Internet.

C. Testing all the in-between layers:

Testing the network connection, server performance, database, and software application adds multiple layers to testing. Testers have to test the communication between the layers, test the connection between the elements, and also plan for the risks. What if the connection breaks mid-way?

What if the server is down? What if the software crashes? Testers have to test beyond what they can physically control in their environment.

D. Service Availability:

When an organization is making use of the cloud then the cloud vendors have to make sure that these services are available on demand without any delay because we are not installing these services locally. These services are hosted remotely, so they might create some issues[8.5].

E. Service Assurance:

How can cloud services provider assure timely delivery and even service availability when it doesn't control the data communication connection between the cloud service and the corporate users?

Does the data communication provider have the monitoring infrastructure in place? Does the cloud services provider have the monitoring infrastructure in place to assure the services provided? We need to get these answers while performing the cloud testing as a cloud vendor.

F. Service Efficiency:

That challenge encompasses efficiency in all aspects—from cost savings, space and power efficiency to efficient and scalable service delivery using virtualization, high-end servers and high-speed interfaces. We need to put some infrastructure in place to monitor and test that efficiency.

G. Location of client:

Whether it's location-based application logic requiring testing or the reality that applications are not stateless and require client-server affinity, location matters. Combine a narrow range of IP addresses with affinity and scalability challenges are almost certain to appear.

VI. TESTING SERVICES USING CLOUD TOOLS

Cloud testing is defined as "Testing as a service" (TaaS). Under this IT organisation make use of licenced testing tools from cloud to perform some functional and non-functional testing.

Cloud testing as a service can be available "On demand". For example we need to perform load test on some application that is installed locally. For this we can make use of Load testing tool from cloud on demand and pay for that accordingly.

ACKNOWLEDGMENT

This paper the general cloud computing overview, Implementation challenges and the challenges involved in testing the cloud. In the early stages of the cloud computing implementation, more challenges have yet to come. Also discussed some key benefits of the cloud implementation and in the end we compare cloud testing with conventional testing.

REFERENCES

- [1] <http://www.softwaretestinghelp.com/web-application-testing/>
<http://www.ibm.com/developerworks/web/library/wa-web-apptesting/>

- [2] G. Goth, "Googling test practices? Web giant's culture encourages
- [3] Process improvement," IEEE Software, vol. 25, no. 2, 92-94, 2008.
- [4] Mrs.A.Vanitha Katherine, Dr. K. Alagarsamy,"Conventional software testing vs cloud testing" International Journal Of Scientific & Engineering Research, Volume 3, Issue 9, Spetember-2012.
- [5] NehaMehrotra, —Cloud Testing Vs. testing a Cloudl, 10th Annual International Software Testing Conference, Aug 2011
- [6] <http://qa.siliconindia.com/qa-expert/Testing-in-the-Cloud-eid-78.html>