

# CLOUD TESTING –MYTHS FACTS AND CHALLENGES

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## ABSTRACT

This paper focuses on application of Cloud computing in the area of Software testing. This paper tries to answer some of the questions like Why should a Software Testing professional take a serious note of cloud computing? How does cloud computing affect software testing? This paper aims at finding answers to What, How, Who, why and where for Software Testing with respect to Cloud.

*Keywords: Testing, Cloud Testing, Cloud Testing Challenges, Answers to Cloud Testing*

## 1. INTRODUCTION

What is Cloud Testing – It is software testing using Cloud Computing.

What is not cloud Testing – It is not testing the cloud. It is not necessary to sit in the cloud to do the testing. It is not only about testing applications deployed on the cloud

What is the need – To solve some business and testing problems? It provides advantage to the business, the individual, to the team and finally it fits in the budget. Let us see how through this paper.

## 2. WHAT IS CLOUD COMPUTING?

Cloud Computing is a technology which gives computation, software, data and storage services over the network. It is not necessary for the user to know the physical location and configuration of the system which deliver these services to them. It is the use of any services offered commercially in the real time over the internet. In fact the name cloud computing could have been inspired by the symbol used to represent the internet in various flowcharts and other design diagrams

### 2.1. Cloud Computing Characteristics:

- On-demand access
- Scalability and Elasticity
- Cost Reduction
- Minimum Management effort
- Device or Location Independence

### 2.2 Deployment Models:

- **Private Clouds:** It is the implementation of the cloud services dedicated to resources of a single organization.
- **Public Clouds:** A public cloud is one of the standard cloud computing models, in which a service provider makes resources, such as applications and storage, available to the general public over the Internet. Public cloud offered services which can be get for no cost or charged based on its usages.<sup>[1]</sup>
- **Hybrid Clouds:** A hybrid cloud is a cloud computing environment where an organization provides and manages few of its resources in-house and has others externally. For example, an organization might use a public cloud service, such as Amazon Simple Storage Service (Amazon S3) for archived data but continue to maintain in-house storage for operational customer data. Ideally, the hybrid approach allows a business to take advantage of the scalability and cost-effectiveness that has been offered by public cloud computing environment without exposing mission-critical applications and data to third-party vulnerabilities.<sup>[2]</sup>
- **Community Clouds:** Community clouds can be formed by individual organizations who feel that they belong to the same community with common concerns. They can be normally

managed internally by the communities themselves or sometimes by a third party. The cost involved is obviously less than that of a public cloud. so only some of the cost savings potential of cloud computing are realized.<sup>[3]</sup>

### 2.3 Service Models

**SaaS:** Typically, Software as a Service (SaaS) is a type of cloud computing, which is a software delivery model<sup>[4]</sup>. Software and its associated data are hosted centrally (typically in the (Internet) cloud) and are typically accessed by users using a thin client, normally using a web browser over the Internet<sup>[4]</sup>. Customers are not expected to buy software licenses or additional infrastructure equipment, and are expected to only pay monthly fees (also referred to as annuity payments) for using the software<sup>[5]</sup> based on their usage.

**PaaS:** Another common type of Cloud Computing is Platform as a Service (PaaS). Cloud computing has evolved to include platforms for building and running custom applications, a concept known as “platform as a service” (or PaaS) PaaS can be considered as the next step in the SaaS model, where the on demand delivery is not simply the specific item of software required, but the users’ platform. PaaS provides the entire infrastructure needed to run applications over the Internet. It is delivered in the same way as a utility like electricity or water. Users simply “tap in” and take what they need the complexities are hidden behind the scenes. And like any other utility, PaaS is based on a metering or subscription model, so users only pay for what they use<sup>[6][7][8]</sup> again the delivery route in this model is the ‘Cloud.’

**IaaS:** This is the most basic and widely used cloud service model, cloud providers offer computers as virtual machines – raw (block) storage, firewalls, load balancers, and networks. These resources are supplied by providers on demand from their large pools installed in data centers. They also offer Local Area Networks for small and medium organizations including IP addresses. The Internet can be used for a much wider area of connectivity.<sup>[9]</sup>

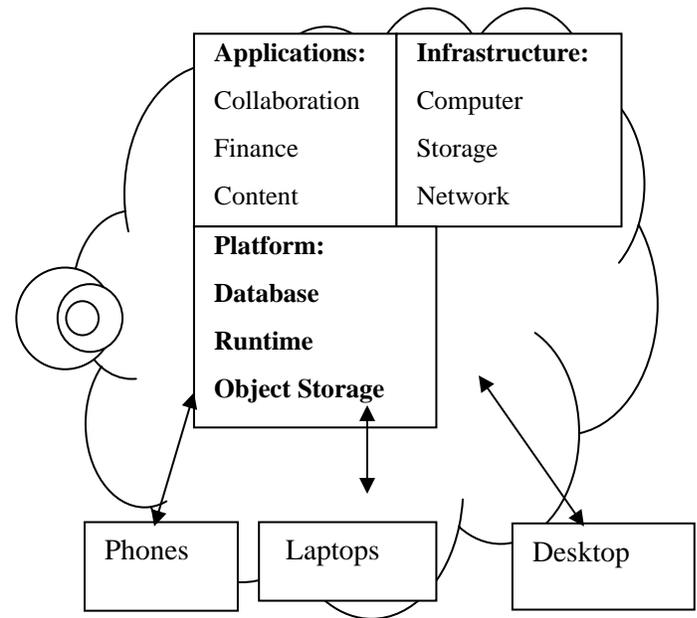


Fig 1. Cloud Services

These services can be utilized by desktops, laptops, mobile phones, servers and anything with the service accessible capabilities.

### 3. CLOUD TESTING – MYTHS AND BELIEFS

The moment buzzword “Cloud Testing” arrives many questions run through the minds of testers. We have identified the following questions after our interaction with numerous testers.

1. Is it a new type of software Testing
2. Does it change the fundamentals of software Testing?
3. Is there anything new to be learnt
4. Will it be difficult to understand and learn?
5. Do I have to learn a new scripting language or a new testing automation tool
6. What domain or technology it applies to?
7. What is the first step to do? How to start?
8. Are there any courses available which teaches Cloud Testing?

Throughout this paper we are trying to answer these questions

## 4. CURRENT SOFTWARE LANDSCAPE

### 4.1 Different Deployment Possibilities

Currently the following deployments are possible for applications in cloud

- Migrated and deployed in cloud
- Developed and deployed in cloud
- Hybrid or shared deployment

## 5. CHARACTERISTICS OF APPLICATIONS

The following are the list of characteristics which must be tested in applications which are deployed in the Cloud.

- Multi-tenancy
- Security
- Compliance
- High-performance
- On-demand access
- Scalability
- Elasticity
- Reliability
- Fast Deployment

Some of these characteristics are expected to present and also tested in applications which are not deployed in to the cloud. But the others like elasticity, on-demand access challenges testers that's why cloud testing imposes some new interesting challenges for testers and this is the actual intent of this paper.

## 6. HOW TO? WITH CLOUD TESTING

“The fundamentals of software testing will not change. There is no fundamental change in the Software Testing Life Cycle”

Cloud testing makes complete use of a tester's knowledge on test planning, Test case Design E.tc. So that all the testers can be happy about that and this is definitely a good news for all the testers. Cloud testing is not a different kind of testing. It uses the same principle as that of the software testing but just utilizing cloud. A growing debate is what will be the change in operation and manpower requirements for cloud testing. Whether to lower down the requirements of manual testing or lower down the requirements of automated testing? Can we have a different developer-tester ratio?. The answer is “Not necessary” The fact is that the same manual testing and automated testing are applied at appropriate places.

## 6.1 Changes That Cloud Test Brings

- How we test and not we test
- Where we test we test the application it originates from the cloud over the internet
- More options available to test because testers are going to test the infrastructure which is beyond their control.

## 7. CLOUD TESTING TYPES

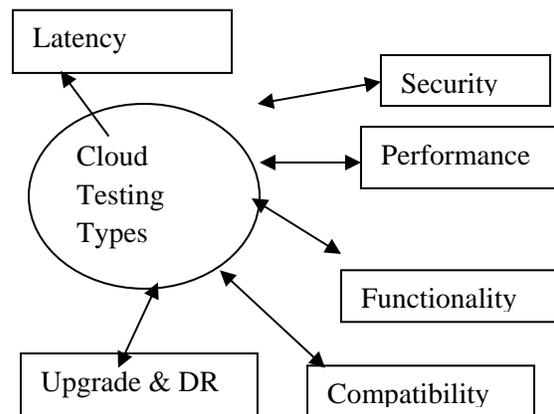


Fig II. Cloud Testing Types

### FUNCTIONAL TESTING:

Features and functionality: This can be tested against the requirements documents which are collected from the users. Applications which are deployed on the cloud can be tested for the expected features and the functionalities if present they are ready to use otherwise customization process is needed. So a series of tests should be conducted to check the functionality requirements

### MULTI-TENANCY:

The idea of multi-tenancy is one of the basic building blocks of cloud computing, it is sharing of resource by more than one tenant. It is the responsibility of the service providers to build effective network infrastructures and data architectures that are computationally efficient. High scalability is another attribute which needs to be present on these to serve to many customers who share them.

In IaaS, tenants share infrastructure resources like hardware, computer servers, and data storage devices. With SaaS, tenants are sourcing the same application (e.g., Salesforce.com), which means that data of multiple tenants are likely to be stored in the same database and may

even be shared among the same set of tables. When it comes to security, the risks with multi-tenancy must be addressed at all layers. This multi-tenant nature of cloud computing enforces additional challenges to testers.

#### **PERFORMANCE TESTING:**

The fast-paced deployment and the ease of deployment of cloud applications force the testers to test features like Response time, maxload and Scalability.

#### **SECURITY:**

The primary testing parameters in security testing are Data integrity, security standards – security is not always about hacking even unintended data is a threat to security. Since cloud computing is at an infant stage not too many standards are developed and available. Security also plays a major role in multi-tenancy where authentication, data access matters

#### **COMPATIBILITY:**

Another new testing challenge .Testers are required to test the applications deployed in the cloud with an array of different browser types, operating systems and other environmental things like firewalls. These needs to be exercised a lot

#### **NEGATIVE TESTING:**

Self Healing – We want applications deployed in the cloud has to get back functioning without human intervention when disaster occurs. We have to test all the layers in applications deployed in the cloud

#### **CONFORMANCE TO STANDARDS:**

Since applications deployed in the cloud are being used by many applications and cannot be restricted to limited usage different organizations have their own compliance standards in terms of data, applications, retention E.tc

#### **UPGRADE AND DISSASTER RECOVERY:**

An important feature which is not being stressed in cloud testing but is equally important as that of other testing efforts is upgrading the applications deployed on the cloud. How applications are tested for upgrades and another major challenge to testers is how the application deployed in the cloud recovers if some disaster occurs. What recovery procedure is followed because you don't have much control over the

infrastructure or the services provided by the cloud?

#### **LATENCY:**

Now we are purely dependent on the internet, latency plays crucial role, so latency testing is necessary. Because of the geographical zones. Latency is more specific to an application deployed on the cloud.

#### **ENDURANCE:**

Ensure High Mean time before Failure – we do not want our applications deployed in cloud to break down or face some issues. It will be embracing when thousands of customers get the same problem at the same time

#### **8. BENEFITS WITH CLOUD TESTING:**

Most of the benefits in cloud testing are similar to that of the benefits of cloud computing and some of the benefits are listed here

- Reduction in capital Expenditure:
- Resources (hardware , software , license):
- Assured availability and unlimited supply, optimal utilization – there is no over supply or under supply of resources
- Options increases – we don't rely on one option
- Pay-per use model save costs. Fast and flexible deployment
- The future is going to be Easy to indulge Testing-as-a service model

#### **9. CONCLUSION:**

Still we are in the early days of cloud testing so lots of new testing challenges are not yet been identified. We have identified some of the testing challenges based on the feedback that has been collected for this paper from testers and through our analysis on the nature and behavior of the applications which are deployed on the cloud. In days to come and as cloud computing becomes more mature, many new testing challenges will be discovered. But the basic concept of software testing will never change.

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