# Cloud based testing: need of testing in cloud infrastructures and cloud platforms

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*Abstract:* **cloud computing is delivery of service rather than product. Cloud computing in general defined as delivering of services to clients based on internet it delivers services are like resources, software, information etc. Cloud computing is a new approach of distributed computing where it uses cloud infrastructures for automatically supporting the user requirements. Testing is performed in three distinct areas of cloud they are infrastructure, platform and service. In this paper we discuss about cloud based testing and need of testing in cloud computing and methodology for testing cloud infrastructure and also migration of software testing into cloud.**

*Key words- Cloud computing; Cloud testing; Cloud infrastructure; Cloud platform.*

## I.INTRODUCTION

In recent years cloud computing has taken on significance as a new approach to distributed computing. Whenever users upload their applications cloud infrastructure within that cloud automatically manages to support the hardware requirements of the application. Cloud computing creates a major impact on the software testing and maintenance. A major impact is known as testing as a service (Taas) in clouds. In Taas cloud infrastructure provider undertakes software testing activities of a given application system in a cloud infrastructure for customers as a service based on their demands [1].
The services in cloud computing are broadly divided into three categories.

- Infrastructure as a service (Iaas),
- Platform as a service(Paas),
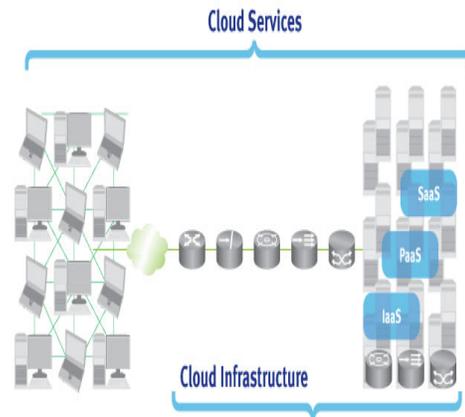- Software as a service (Saas)



Fig 1: Representation of the cloud

Iaas is one of the cloud services which is used to monitor and control the operations performed in Cloud, it controls, hardware components, storage capacity, servers and other network related components. Service providers like Google, Amazon etc owns the infrastructure, monitor it and controls based on the client needs. The client typically pays based on the usage of service. Paas contains tools for developing product. The tools consist of hardware components, operating systems, network components and storage facilities. Well known examples of cloud platforms are Google's app engine [2], Amazon's EC2 [3] and others. Users of these cloud platforms are need not to concern about the hardware requirements, load balancing tasks because these are handled by the providers. However users must depend on the cloud infrastructure which cannot be controlled. So as users depend on the infrastructure it must be more reliable to meet user expectations. To

meet the reliability and the quality the cloud infrastructures and plat forms must be tested thoroughly.

## II. CLOUD TESTING

Cloud testing is defined as it is a kind of software testing used to test the web applications which runs based on the cloud computing. Cloud testing mainly uses the cloud infrastructure for performing the testing process. Main objectives of the cloud based testing are:

- To maintain the quality and scalability of The cloud based applications which are systematically distributed in the cloud.
- To maintain security in the cloud environment and also to validate the software as a service.
- To ensure whether all services are provided by the cloud environment to the users who are using the cloud technology.
- To maintain the cost reduction during the testing process.

The reasons for using cloud computing for testing is [4]

- Cost savings
- Improving testing efficiency
- Performance testing is more realistic

## III.TYPES OF TESTING IN THE CLOUD

Generally different types of testing are performed on the cloud they are:

- Stress testing
- Performance testing
- Compatibility testing
- Functional testing
- Web browser testing
- Load testing
- Latency testing

1. Stress testing in cloud is defined as to test the stability or capabilities of the cloud under extreme conditions.
2. To measure the cloud's ability to support various applications performance testing is done.
3. Compatibility testing is one which is used to cloud environment under different operating systems. The main advantage is to verify whether the cloud environment is able to support all operating systems.
4. Generally cloud applications are run based on the internet. Different web browsers are used to run these applications to check the

compatibility of these web browsers in cloud web browser compatibility testing is done.
5. Load testing is performed to identify the cloud environment's behavior under normal and extreme conditions.
6. Latency testing is used to measure the difference between action and response time of an application in cloud environment.



Fig 2: Types of testing in cloud

Software testing is preformed in different types based on cloud environment.

- The main aim of cloud based software testing is to test the cloud environment to assess the quality based on the cloud environment capabilities to support the various applications.
- Testing is done internally in the cloud to achieve the quality or to identify the quality based on cloud infrastructure and its capabilities. Generally testing the cloud internally is done by the providers of the cloud like Google, Amazon etc.
- Testing is done to identify the quality of the services that are provided by the cloud to users.

Cloud testing id performed in the three types of cloud environment they are

- Cloud infrastructure.
- Public and Private cloud
- Hybrid cloud environment.

Main drawback of using cloud computing for testing is "security".

## IV. MIGRATION OF TESTING INTO CLOUD

Before performing testing in the cloud we must consider how testing process should be included (transferred) into the cloud [5]. Software testing is a process of assessing the product quality base on analysis and execution. When testing process is shifted into the cloud, the necessary requirements that

are involved in the traditional testing process needs to be transferred into new cloud environment. Such requirements include the test cases, test plans, testing techniques, types of testing, and test environment such as test requirements, types of tools used for testing process, etc. Therefore, a controlled and correct process needs to be followed to achieve success while transferring testing process into cloud. Transferring software testing to the cloud requires understanding types of risks that are associated while transferring process. The aim of testing should define the risks associated with cloud computing, mainly security because security is main drawback in cloud computing. Simply defining test cases and executing that test cases are not good in cloud computing. When the defined test case not able to define the good design quality attributes, it is tough to execute those test cases in a cloud environment. Whenever the test cases that do not have good quality attributes it must need re engineering because cloud computing may not support those test cases in testing process
.

## V.TESTING CLOUD INFRASTRUCTURE

Users of cloud platforms mainly depend on the cloud infrastructures. So cloud infrastructure must maintain reliability and quality. Quality is in terms of scalability, availability, reliability, adaptability, security, and accountability. While testing the infrastructure it includes the testing of Application Programming interfaces (API's).API is used by software components to communicate with each other by using API's as interface since API's are based on source code so it is used as interface by software components. In cloud computing API's are directly linked between the client code and the infrastructure it runs upon.

Cloud infrastructure testing is the testing of functions that provide services to client.API are necessary for a client code to enable proper functioning on the platform. Since APIs only run when requested by the client code, it is difficult to test them without some testing application.

To simplify the testing process and provide testers maximum control over the tests that are executed, it is necessary to build a client shell that is as minimal possible way to receive accurate results of the APIs' abilities. Here, shell is a type of software used to access the services by providing interface to users of operating systems. Once the shell is created, it needs a way to reach the APIs that are being tested. For this purpose, plug-ins is loaded, which contain a code that activates the APIs. For adding specific abilities to a

software application a set of software components such as plug-ins are used.

Plug-ins is mainly used as a method that allows a testing suite to access APIs, as well as adding or changing APIs during testing of the client infrastructures. Using of plug-ins allows for the testing framework to be developed for many services using the same language or server. More importantly, plug-ins also allow for division of coding across multiple developers to accelerate testing across a platform. Since plug-ins is independent, they can run as mini testing programs for anything (a single API, a specific method, or a class).

## VI.EXAMPLE

A. Google app engine [6]:

Google app engine often referred as GAE is a platform-as-a-service cloud computing platform developed for hosting the web applications in Google-managed data centers. Applications are sand boxed (sand box is a security mechanism for separating the running program's) and run across different servers. It allows automatic scaling of the web applications as the number of requests for the applications.

API's in Google app engine helps to access various services like storage (data store, blob store), user management, offline processing (task queue, cron), and web requests (URLFetch). A software development kit (SDK) consisting of tools to develop applications locally on the user's Linux, MacOs, and Windows client systems was also being provided. Within the SDK, a development application server simulates the supported Google App Engine APIs and allows the developed applications to be run and debugged before being deployed. The services in Google app engine are mainly supported by Java and python languages.

In Google app engine for testing framework it uses Google Web Toolkit (GWT) for creating the user interface and functional logic such as the types of plug-ins to run. Here plug-ins are loaded for data store, blob store, task queue, URLFetch was developed to test the API's in the Google app engine.
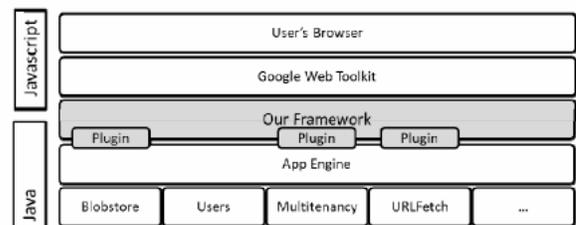


Fig3: General structure of the framework for testing app engine API's

## VII.CONCLUSION

The need of testing the cloud infrastructures and the platform was explained. When to migrate from software testing to cloud testing was suggested. An approach for testing cloud infrastructure and platforms was explained. The need of testing in the cloud was suggested. How to achieve the reliability and the quality in the cloud infrastructure was explained.

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