

Testing Methods and Tools in a Cloud Computing Environment

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Abstract- Cloud computing provides us various facilities such as it gives us ubiquitous, on-demand network access to all computing resources i.e. servers, storage, various services, web applications, networks. However because of this emerging nature of cloud computing, security is unavoidable. This paper provides a review of cloud testing. Cloud computing, a new paradigm for developing and delivering computing applications and services, has gained considerable attention in recent years. Cloud computing can impact all software life cycle stages, including the area of software testing.

TaaS (Testing as a Service) or *cloud testing*, which includes testing the cloud and testing using the cloud, is a fast developing area of research in software engineering. The paper addresses general research in cloud testing, types of cloud testing, tools.

Keywords: Cloud Computing, Testing-as-a-service, Security Testing.

I. INTRODUCTION

Organizations use the Cloud in a multiplicity of diverse service models (SaaS, PaaS, IaaS) and deployment models (Private, Public, Hybrid, and Community).[1] There are a number of security matters connected with cloud computing but these issues fall into two broad classes: security issues faced by cloud providers (organizations providing software-, platform-, or infrastructure-as-a-service via the cloud) and security issues faced by their customers (companies or organizations who host applications or store data on the cloud).[2] The obligation goes both ways, however: the provider must confirm that their infrastructure is secure and that their clients' data and applications are protected while the user must take steps to strengthen their application and use strong passwords and authentication measures.

Cloud testing is a subset of software testing in which replicated; real-world Web traffic is used to test cloud-based Web applications. Cloud testing also verifies and validates specific cloud functions, including redundancy and performance scalability. [3]

A number of small to medium-sized IT organizations have transferred to cloud solutions. [3] As a result, cloud testing has become essential to validate functional system and business requirements. In addition to cloud experience, cloud testing engineers need the information of different types of testing and tools.

II. TYPES OF TESTING

Testing in cloud is different than outmoded on premise testing where enterprise has to set up, sustain and prove the scenarios from end to end prospective in all aspects.[4] Below is some of the testing required to perform once application is moved to cloud premises.

- *System integration testing (SIT)* - Testing performed to authenticate that the cloud solution will work within the current infrastructure and environments, proving that the employment of a cloud solution does not influence any existing systems.

- *User acceptance Testing (UAT)* -Testing is done to confirm that current provided cloud solution from the vendor meets the business necessities of the organization.

- *Security Testing*-It guarantees that all sensitive and important information which are going to be stored in the cloud will be highly secure in nature. As privacy also a important area in cloud from the user point of view, it's important to verify the privacy of the application users and related information when maintained in cloud.

- *Performance testing*-This testing technique that measures the system performances in cloud. It verifies the network latency and response time, Load balancing, peak request count by hosting subscription in different data center across the globe. In addition to this, outmoded load and stress testing are required to validate business settings in the cloud model in terms of varying dynamic load and stress on the application.

- *Disaster recovery testing*-This testing verifies the time it takes to recover from disaster in different scenario (system crashes under high load/volume of data, hardware failures, system failures, Network outage, insufficient bandwidth) as per SLA. Also verifies that is there any data loss in this process and time takes to report failure.

- *Availability testing*-Cloud contribution should be available 24*7 for the enterprise or customer. It's the key responsibilities of the provider to maintain as per the SLA.

- *Scalability testing*-It ensures cloud provider is offering scale in/out functionality as per the ultimatum from the user/organization.

- *Multi tenancy Testing*-The concept of multi tenancy is to provide solution/offering from a single instance to multiple tenants(user/clients) .Cloud offering should be validated when more than one client is using the same instance in terms of security and Data

- *Interoperability Testing* -It verifies moving application from one cloud to alternate cloud provider should have the tractability to run successfully. Basically there should not be any issue if business or user is migrating from one arrangement to another one
- *Accessibility Testing* -It checks whether user groups across different geographic location are accessible to the cloud at any point of time without any delay.
- *Automation testing* -It ensures that the automation suite can be created and executed with minimal changes in the cloud.

III. STEPS

Companies simulate real world Web users by using cloud testing services that are provided by cloud service vendors such as Advaitis, Compuware, HP, Keynote Systems, Load Impact, Neotys and SOASTA. Once user states are developed and the test is designed, these service sources force cloud servers (provided by cloud platform vendors such as Amazon.com, Google, Rackspace, Microsoft, etc.) to generate web traffic that originates from around the world.[5] Once the test is complete, the cloud service providers deliver results and analytics back to corporate IT professionals through real-time control panel for a complete analysis of how their applications and the internet will perform during peak volumes.

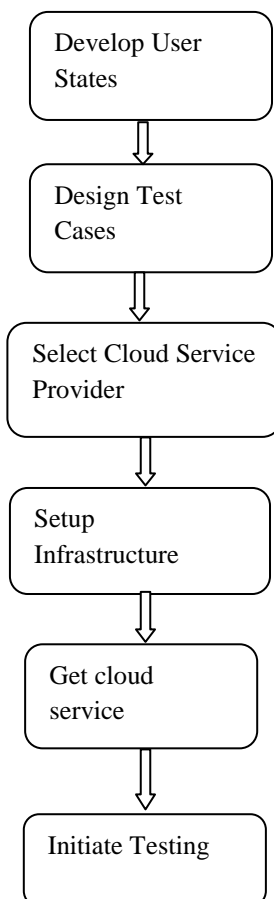


Fig 1: Steps for cloud Testing

IV. TOOLS

1. Cloud Computing Testing from SPIRENT

Spirent offers the industry's first complete cloud computing testing methodology to validate the performance, availability, security and scalability (PASS) of cloud infrastructure and services.[6] The Spirent PASS methodology includes both physical and virtual appliances specifically designed to test services and infrastructure between any points in the cloud environment.

2. AppPerfect Cloud Testing

Cloud Testing with AppPerfect supports Cloud testing for web application. Using this Cloud Testing context you can test your web applications on different browsers, hardware and operating systems combinations.[7] It can design, develop as well as execute your tests using our servers over the cloud infrastructure.

3. Automated website testing from the cloud

This testing service runs automated functional tests against website, captures screenshots, HTML component details and speed. This Cloud Testing service allows us to automate the functional and cross browser testing of websites using the industry standard Selenium framework and real browsers real operating systems.

UserReplay fixes problems by turning every end user into a tester. UserReplay records every user drive in detail.[8] Challenging journeys are automatically recognized. UserReplay offers visual replay, meaning problem journeys can be replayed and the customers problem immediately replicated. Technical data which is exchanged by client and server during the user journey is also captured, providing deep understanding of cause of each problem. This automatic replication bugs can be fixed up to 20 times quicker.

UserReplay is a Digital Customer Experience Management (CEM) solution. This means as well as finding bugs it can also identify performance problems, usability problems and confusing business logic in the application.[8]

4. Zephyr Enterprise Edition: Real-Time Test Management

Zephyr's Software-as-a-Service (SaaS) platform is now open to customers across all industry sectors.[9] Zephyr has become the on-demand Test Management Platform that achieves all aspects of the testing lifecycle, integrating various test tools and systems while providing global access, cooperation and management visibility. With Zephyr, enterprises are able to manage test resources, testing projects, releases/sprints, requirements, test cases, arrangement, test execution, defects, documents, automation, collaboration, metrics and reporting.

5. Cloud Testing with TestMaker

TestMaker runs tests on test equipment. TestMaker introduces specific commands to support automatic Cloud Testing. For example, identify a cloud testing service like Amazon EC2 in a Test Scenario. TestMaker creates the Test Nodes in EC2 instances, runs the test, retrieves the results, and takes down the EC2 instances. All in a "lights out" manner for full Cloud Test automation.[10]

6. *Cloud-Enabled Software Testing as a Service*

On-demand, flexible and pay-per-use software testing using a cloud-based test organization solution Sogeti has extended its on-demand Software Testing as a Service solution [11] with cloud-enabled provisioning of test environments and test tooling, providing a direct, available and wide-ranging turn-key testing solution. Using a vital service portal, you can select the testing service you require.

7. *CloudTest Platform by SOASTA*

CloudTest products and services provide customers with the assurance that their business-critical Web and mobile applications will function properly and steadfastly, even under extreme loads. SOASTA CloudTest offers a single, unified platform for functional and performance testing. It is designed for testing modern Web and mobile applications; CloudTest's original visual test creation environment enables rapid creation and editing of even the most complex tests.[12] By leveraging the cloud, tests can be dispersed globally, executed at any scale, and run affordably.

8. *JMeter in the Cloud*

JMeter in the Cloud is a performance & load-testing platform available as a service over the Internet. It allows you to create and execute test scripts in the cloud using the popular JMeter tool. This service enables the running of load tests (consisting of thousands of concurrent virtual users) with no setup requirements. All of the included software and hardware approaches pre-configured.[13] The user is capable to access and control the JMeter console from their own PC while all of the testing resources run from the cloud. The actual load will originate from numerous locations around the world (like US, EU, and Asia).

9. *NeoLoad Cloud Testing*

It provides On-demand load testing from outside the firewall. During the early and middle phases of load testing movements the focus is on identifying and correcting fundamental performance issues related to the application and the infrastructure. In-house testing resources assist these phases well. However, requirements can change suggestively during the final stages of load testing posing new challenges. Now, with the Neotys Cloud Platform, NeoLoad, the ideal solution for web application load testing, integrates load generation from the cloud into testing operations when and as needed. [14]

10. *Parasoft SOAtest:*

Parasoft SOAtest automates web application testing, message/protocol testing, cloud testing and security testing. Combination of Parasoft SOAtest and Parasoft Load Test ensures secure, reliable, compliant business processes and flawlessly incorporate with Parasoft language products (e.g., Parasoft Jtest) to support teams avert and detect application-layer defects from the start of the SDLC.[15] Moreover, Parasoft SOAtest integrates with Parasoft Virtualize to provide complete access to traditionally difficult or expensive to access development and test environments.

11. *Cloud-Based Cross-Browser Testing: Sauce Labs*

Sauce Labs provides browser testing services for front end expansion and quality assurance. Their Scout service lets you test your public or private web app in any browser through a VM that's run in the cloud. You need to enter a URL to test, select an OS and browser, and a virtual machine runs in the web page so you can test in that configuration on demand.[16] Scout can record and save screenshots and video of every session, and they can be shared, embedded etc. with another team, which is helpful for bug reporting.

12. *Skytap Cloud*

Skytap provides cloud automation solutions for enterprises and software dealers to improve, test, migrate, evaluate, demo, and train on new and existing applications in the cloud.[17]

13. *Software Testing in the Cloud STITC*

Software testing is an extremely challenging activity. Running large collections of test cases as part of a regression test suite can consume large time and resources, often precluding their use in an interactive setting. Customary approaches to this problem focus on reducing the number of regression tests that need to be run after a change is made to the system. The Software Testing in the Cloud (STITC) series of events follows another approach to solve the problem by leveraging the resources provided by a cloud computing infrastructure to simplify the concurrent execution of test cases. Software testing in the cloud depends on underlying technology such as distributed execution environments, service-oriented architecture (SOA), and hardware virtualization. A secondary focus of STITC is examining methods for migrating legacy testing assets to the cloud.[18]

VII. CONCLUSION

Cloud testing is a rapidly emerging area in cloud computing. This paper provides a review of various testing methods which are helpful in cloud environment. We have also given the detailed description of steps to be followed, which gives idea of testing scenario.

This paper gives you the review of various tools available in the market. According to end user's need he can choose any tool for testing in a cloud computing environment.

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