Software Testing: An Approach using Cloud Computing

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Abstract:
This is well known that every development activity requires the corresponding testing activity to ensure the quality and correctness of the software. Software testing plays an importance role to minimize the risk of failure of any developed application. Software testing requires some platforms through which the cycle of the testing get complete. These platforms or setup or we can say environment involves a big amount of cost of whole testing. Here by using cloud computing approach and services we will try to minimize the effort of testing configuration and reducing the testing cost. This paper describes the types of cloud services and their use in software testing.

Keywords*---- cloud services, testing configurations, advantages, and comparison in testing cost.*

I. INTRODUCTION TO SOFTWARE TESTING

Software testing is a process used to check and comment on the, completeness, correctness, and quality of developed computer software. It includes a set of activities conducted with the intent of finding errors in software so that it could be corrected before the product is released to the end users.
In other words, software testing is an action to verify and validate whether the actual results match the expected results and to ensure that the software system is defect free.

Software testing can be classified into two types in terms of operation basis:

- Functional testing and
- Non functional testing

Functional testing is the type in which we check or test the functionality of the software. It refers to activities that verify a specific action or function of the code. Functional test tends to check that particular feature should work properly as per given requirement. We can perform functional testing at Requirement basis and business Process basis. In Requirement basis type of testing the requirements are prioritized depending on the risk criteria and accordingly the tests are prioritized. The business Process basis functional testing performed against the business requirement of the software given by the client.

Non functional testing is the type in which we check the features other than functional testing. Non-functional testing involves testing the product's quality factors. Non-functional testing is concerned with the non-functional requirements and is designed to evaluate the readiness of a system according to several criteria not covered by functional testing. It enables the measurement and comparison of the testing of non-functional attributes of software systems. Non-functional testing is also performed at all levels like functional testing.

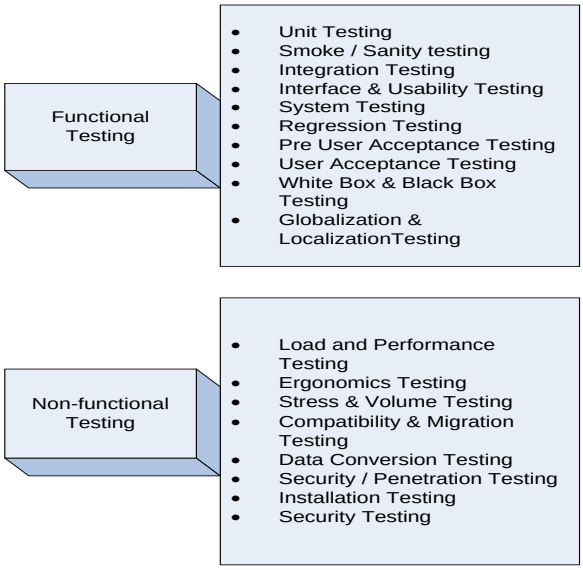

Figure 1: functional and non functional testing

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II. TESTING PREREQUISITES AND CONFIGURATION

Although testing is dependent on the project or application under test but there is various other requirement to start testing activity for any software either bespoke or off the shelf. To start testing user need to ensure that all prerequisites like creating test bed and environment is completed or not. Basically test bed is an execution environment configured for software testing. It includes networking topology, operating system requirements, hardware requirements and installation of the product under test. These requirements cover a very large part of testing cost. For example: if a company requires a performance test for their product they surly suppose to buy an automation tool first, then only they can start testing. Buying a tool is not only the task but they also had to arrange tool training for the workers and installation process to implement that tool.

In other scenarios, user may require different platforms and different database servers for different kind of applications. For example a specific application may require specifically mainframe database or oracle database with related constraints. If company requires these prerequisites for limited period of time, it becomes waste once testing completes.

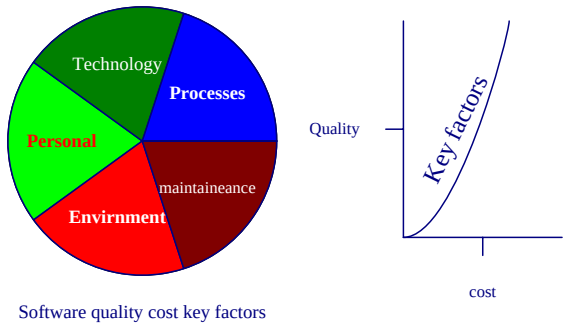

Figure 2: IT Process

III. CLOUD COMPUTING IN SOFTWARE TESTING

As we discussed earlier, testing have various prerequisites which increases the cost of the actual testing activity. We require a platform through which a company borrows its required test environment for particular period of time, pay for that period. it would help in saving the cost of the testing as company does not require to purchase that environment for life long. The managing of the testing environment would be easy and more reliable.

Types of cloud Services: cloud can be categorized mainly in three types [2].

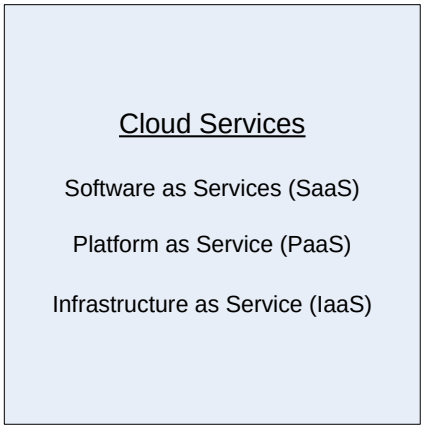

Figure 3: Cloud Services

Software as a service (Saas): In this model cloud service providers install and operate application software in the cloud and cloud users access the software from cloud clients. Users which are using the cloud does not manage and buy the cloud infrastructure and platform on which the application is running. Through this approach user does not need to install and run the application at his own machine. This helps in simplifying maintenance and support cost.

Platform as Services (PaaS): Cloud platform services or Platform as a Service, this kind of cloud computing provide development environment as a service. We can borrow a third party tools to develop our code and can sell or deliver it to our client through internet. Here, cloud eliminates the need of buying special hardware and software to develop and deploy enterprise applications. It is pay per use service like storage, database scalability etc.

Infrastructure as a Service (IaaS): This type of cloud service provides a platform virtualization environment as a service. This eliminates need of purchasing servers, software, data center space and infrastructure cost and increases security and scalability.

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Cloud Services	Users
Software as Service	CRM Financial Planning, human Resources, Word processing
Platform as Service	Google Apps, Microsoft windows Azure
Infrastructure as Service	Flexi Scale, AWS:EC2

Table 1: cloud services and their users

IV. SOFTWARE UNDER TEST AND CLOUD COMPUTING

As discussed earlier, cloud computing reduces the cost of process by providing various kind of services. When software testing comes under cloud, It can also help in reducing the testing cost and maintenance work.

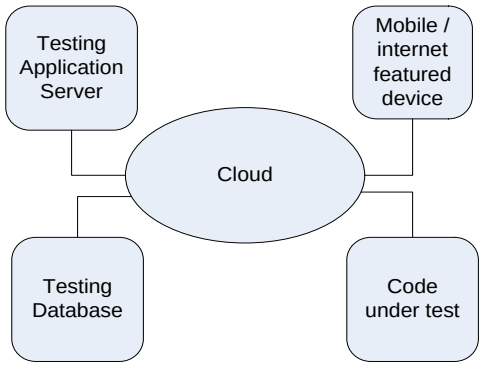

Figure 4: Testing with cloud

SaaS: If a company wants to outsource his application for testing they can contact a cloud provider and put their application on cloud and the third party outsourced for testing can access the code or application through cloud. They do not require installing the application under test on their private machine.

PaaS: This type of cloud service can also give help in software testing. User can pay for limited time or per use of the database servers and storage of their testing data. Through PaaS cloud service user can eliminate the need of purchasing heavy databases and their maintenance. Cloud provider will provide a space and once the testing process completes user can quit from the cloud services.

IaaS: when a large data center and server prerequisite comes under the testing process, cloud can provide a virtual space or data center for their users so that the requirement of arranging data center eliminates.

Cost (Appox % of total cost)	Requirement	Environment Setup	Execution Reporting
Cost w/o cloud	25	30	65
Cost with cloud	25	15	65
Difference in cost	Total cost without cloud = 100% Total cost with cloud approach = 85 % Decrease in total cost with cloud =15 %		

Table 2: comparison in total testing cost with/ without cloud approach (while using PaaS)

V. ADVANTAGES OF USING CLOUD COMPUTING IN TESTING

a) Less management work: As the user in borrowing the service/ platform/ infrastructure from the cloud service provider, there is no need to deploy employees in managerial work for code deployment, data space, test servers etc. hence the operating of the project becomes less complex and containing less man power and work practice.

b) Cost effective: when a user borrows any service/ platform/ infrastructure from the cloud, it is contracted for particular period of time. In other users user is paying only for the period for which he is using the cloud services. Hence the overall cost reduces because user does not need to buy the infrastructure or platform. So testing with cloud is cost effective also.

c) Independent work environment: As testing is performing for the application which are on cloud, there is less dependency of office setup or team setup because user can access the application under test through internet. Location base issues also eliminates with cloud assistance.

VI. CONCLUSIONS:

In this paper we have discussed the operational type of software testing, testing prerequisite and configurations, cloud computing and their services. We also described the how can use cloud computing

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in software testing and how we can reduce the testing cost by using cloud approach. However testing with cloud has issues regarding security of data and in future we can expect that user would be able to perform testing activities without any major issues.

VII. FUTURE WORK:

Here we described that cloud approach in software testing reduces the amount of effort and environment cost, if we start the borrowing of the environment and infrastructure for IT services, it would be major step in saving the time, work, resources and would help in saving the overall cost of any IT business operation.

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