PERFORMANCE, SCALABILITY AND RELIABILITYIS- SUES IN WEB APPLICATIONS

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Abstract- Web Applications are widely called the building blocks of typical service oriented applications. Per- formance of such an application system is principally dependent upon the components of web applications. the standard of web application comes under non-functional testing. There are many quality attributes like perfor- mance, scalability, reliability, usability, accessibility and security. Among these attributes, PSR is that the fore- most significant and commonly used attributes considered in practice. However, there are just some empirical studies conducted on these three attributes.

Purpose – the first purpose of this paper is to present a comprehensive strategy for performance, reliability and scalability (PSR) testing of multi-tier web applications.

Design/methodology/approach – The strategy for PSR testing is presented primarily through examination of the intangible content within the PSR testing field. The paper also draws on relevant recent work conducted within the realm of software performance evaluation.

Findings – The study revealed that appropriate testing procedures are critical for the success of web-based mul- ti-tier applications. However, there was little academic work that collectively focused on PSR testing issues. This paper provides step-by-step testing procedures to verify that web-based applications are functioning wellto satisfy user demands.

Research limitations/implications – Given the rapid changes in technology and business environments, more applied research are needed within the realm of PSR testing to verify the successful functioning of web-based applications. For future studies, structured interviews or case-study methods would use to present the views of online companies.

Originality/value – This paper provides a comprehensive strategy and thus the suggested steps for managers and technical personnel to verify that the multi-tier, web-based applications are effective, scalable and reliable.

Index Terms— Web Applications, Performance, Reliability & Scalability Testing, Testing Tools.
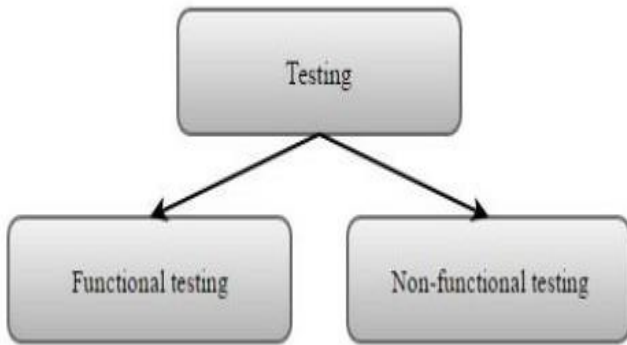
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INTRODUCTION

Cloud computing is very effective approach to devel- op efficient software applications with less cost. Cloud services are provided by service providers and being managed by them. Most of the time service providers are failed to offer the best services such as availability, performance and scalability which are highly in de- mand by clients these days.

Web testing is the name given to software testing that focuses on web applications. Complete testing of a web based system before going live can help address issues before the system is revealed to the public. The testing phase is a significant activity which ensures software quality and reliability. There are two types of testing that can be done for web applications:

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Functional testing: Functional testing mainly concentrates on validating the functional requirements of web applications. These requirements are focused on the activities and interactions the software shall sup- port in order to fulfil the users' requirements. Func- tional testing consists of three approaches: white box testing, black box testing and grey box testing.

Non-functional testing: Non-functional testing main- ly concentrates on validating non-functional require- ments of web applications. Even though functional testing is important, quality testing is a must criterion to be considered in a competitive market. The core functionality is important, but without quality, func- tionality of the system is less concerned by the users. So the focus of the research is more shifted towards non-functional parameters testing. Testing non- functional attributes mainly depend on the runtime environment of an application.

**Figure: Multi-tier configuration for web-based ap-
plications**

PERFORMANCE, RELIABILITY AND SCALABILITY ISSUES

Reliability of an internet application is decreased be- cause of downtime of server or sometimes because of application bugs. Downtime is unavailability of the server it occurs because of low scalability and effect the performance of the online application. the opposite issue is failure cause which is that the divergence of the output of web application and expected output by the user. Another is that the issue of application failure arise because of the bad programming which can lead the online application fail and rejected by the user.
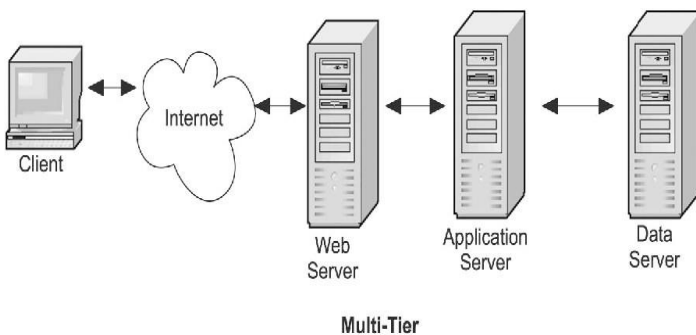
Performance and scalability of any web application is very granted. If application is taking longer then ac- ceptable or expected time by increasing number of us- ers or requests, it's said to be non-performing, non- scalable or degraded. to stop application unreliability, the security measures should be adapted to develop a product which have good performance and scalability level.

For example in Online Transaction Process like online shopping, when the quantity of online customers are increased it effect the performance of the online appli- cation. It shows that the online isn't as scalable be- cause it must be. When it provide the unwanted per- formance it'll be rejected by the user and it lead the applying to the failure.
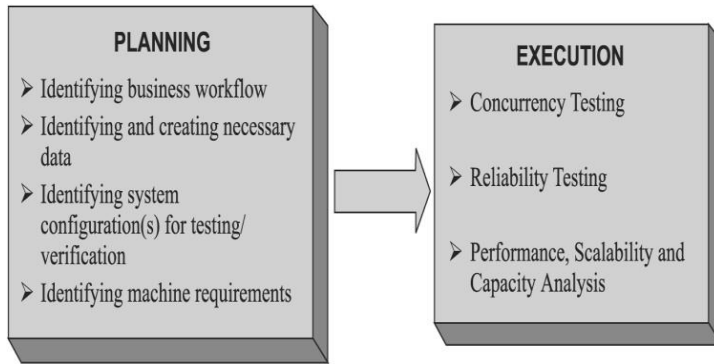
Planning the PSR Testing:

The objective of any performance testing process is to simulate a production environment. This entails the subsequent issues:

(1) Production scenarios: The testing environment ide- ally should be as near the particular environment where the software would be used. this permits the generation of important metrics, which estimate the performance limits of the software.

(2) Production-type loading conditions: The end-users don't equally utilize all functions of software. the way within which the software and its various modules would be used determines the general efficiency and ensures if the merchandise is capable of meeting the necessities. The test plan should take that into consid- eration while determining the suitable testing load to be used for various usage levels, etc.

PLANNING

➢ Identifying business workflow
➢ Identifying and creating necessary data
➢ Identifying system configuration(s) for testing/ verification
➢ Identifying machine requirements

EXECUTION

➢ Concurrency Testing

➢ Reliability Testing

➢ Performance, Scalability and Capacity Analysis

Hence, the steps involved during this planning phase of PSR testing and verification are:

• identifying business workflow;

• identifying and creating necessary data;

• identifying system configuration(s) for testing/verification; and

• identifying machine requirements (type of machine, characteristics).

PSR testing execution

Adopting a method to encompass all the kinds of test- ing isn't only a cumbersome activity but is additionally complex because it is tough to limit the testing process to short release cycles. We present the subsequent test- ing processes which will be adopted to hide the broad area of performance benchmarking:

(1) Concurrency testing:

• under nominal end-user load utilizing a maximum of fifty percent of machine CPU power;

• and individual workflow tests.

(2) Reliability testing:

• under real-time production-like environment cover- ing key product workflow;

• test encompassing all end-user workflow; and

• to cover reliability testing and cargo testing.

(3) Performance, scalability and capacity analysis:

• measure product performance under different loading conditions;

•.measure product performance on a system by scaling machine resources – processors on a machine, number of machines; and

• to cover volume and stress testing additionally to performance and scalability testing.

Strategy to beat potential problems: a decent strategy to accomplish concurrency

testing is to figure through the subsequent issues sys- tematically:

(1) Define real-time/production system scenarios that require to be validated.

(2) Define the sort of information that has to represent the real-world performance requirements, as an exam- ple, number of users, number of products, number of product attributes.

(3) Create test data needed to support the above work- flow.

(4) Automate the end-user workflow and include pa- rameters within the script for flexibility and to support differing types of information.

(5) Verify that the workflow may be consistently ac- customed produce same result using the merchandise installation/configuration.

Reliability testing

Reliability testing is that the process of validating, that the merchandise configured to simulate
the customer's production system is capable of sus- taining continued stress and cargo
applied through a set of end-user actions which will or might not be predictable for
coincidence, with a suitable level of degradation.

Performance, scalability and capacity analysis

Performance may be defined because the end-user re- sponsiveness of system under various
loading conditions. Most of the merchandise related issues may well be resolved if reliability
tests are conducted on the workflow as those who need performance benchmarking.
Capacity of a unit of production system may be de- termined by monitoring requests per
second (RPS), requests per page and number of active users.

CONCLUSION

The study was conducted in order to identify the met- rics, tools and challenges that exist while testing the PSR attributes of web applications. there is little aca- demic study that collectively focuses on web sites reli- ability, scalability and performance issues. This paper contributes to the literature by providing a comprehen- sive discussion of the planning and execution strate- gies that can be

adopted for testing of multi-tier web-based applications. The
PSR issues related to

multi-tier web-based applications are also presented. An avenue for further research for academics would be to survey firms to investigate in depth the actual practices of firms' PSR testing methods. A study that looks into the factors that limit PSR testing by firms and lessons learnt through PSR testing processes would benefit firms that face challenges in this area. It is shown that in future the reliability testing would be mandatory element of every web application devel- opment process to make it reliable. It is being plan to develop tools to measure the reliability of web appli- cation. Every hard work should lead us to a more ef- fective and operational strategy to achieve and main- tain high reliability for Web applications.

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