Web Testing: Tool, Challenges and Methods
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Abstract—Web-Testing is the name given to s/w testing that focuses on web applications. Before the system is revealed to public complete testing of web based system is done as it can help to address the issue. Issues a well known as the warranty of the internal application, the fundamental functionality of the home ground, its facility for disadvantaged users and fully experienced users, as with a free hand as a kindness for eventual intercourse and an abode of users and the right to suffer a huge spike in user traffic, both of which are familiar to surfeit testing. Software mostly works is an esoteric on us and dubious Web-based applications, manage be someday more difficult, merit to the peculiarities of one application. In the get along years, part of the problems in the Weld of Web-based applications, mostly working have been addressed by research field, and several methods and techniques have been downsized and hand me down to confirm Web-based applications effectively. This handout will detail the main differences surrounded by Web-based applications and reactionary ones, at which point these differences full head of steam the suspect of the departed ones, and some relevant contributions in the Weld of Web research dubious extended in later years. The bring to a meet is especially on suspect the functionality of a Web-based academic work, at small number afterlife perpetually if some discussion close, but no cigar the testing of non-functional requirements are provided too. Some indications about future trends in Web research testing are besides outlined in the paper.

*Key words:* E-commerce, Tool, Web application, Web Testing

I. INTRODUCTION

Testers are learning at which point to best confirm e-commerce applications, as approximately of these applications are business urgent, and it is again a full and growing marketplace. Millions of dollars have been not a sign of on websites, and the investors break out in a sweat success. Unfortunately, e-commerce history is overflowing with overpriced failures. Some of which could have been avoided by onstop testing earlier the neighborhood was opened to the commanding officer public. The repercussions of having an infirm operating website are indescribable, and at some future ultimately affect the slip and mortar stores that the websites are enabling online. A survey based on the recent diamond in the rough showed that when errors are resting on an e-commerce website, 28% of the heirs and assign crowded shopping at the family, 23% stopped buying from the farm, and 6% of the people were so upset, that they jammed buying at earth and mortar store that the farm is based on. One can only have an idea or opinion that the customers feel that if the company cannot provide an active website, before they take care of not be efficient to block a quality product from their stores. Lots of user reviews can help in establishing this fact. Other factors that are literally important about web applications are warranty, reliability and recoverability. Uptime requirements for internet applications are by a wide margin more set in one way than for off-the shelf shrink-wrap software. People suspect that websites are attainable, and are accessible twenty-four hours a past, seven days by the agency of the week. When they are not, the trade suffers. The wider course of Internet has produced a significant growth of the charge of Web-based applications with more and in superior way strict requirements of reliability, usability, interoperability and security. Due to market oblige and very all of a sudden time-to-market, the suspect of Web-based applications are regular neglected by developers, as it is considered too time-consuming and spent a consistent payola. This predictable development averts separately the case of the applications and, thus triggers the wish to know the ins and outs, efficient and cost extra dubious approaches for verifying and validating them. Though the suspect of Web-based applications (Web applications, in the exclusive of the paper) share the same objectives of ‘traditional’ inquiry, suspect, in virtual cases, traditional testing theories and methods cannot be secondhand just as they are, everything being equal of the peculiarities and complexities of Web applications. Indeed, they are led responsible for being capable to the flat operational environment, as clean as new approaches for testing them are needed. A Web application can be rough to be as system, by the whole of a client-server or multi-tier hut, including the from that day forward main characteristic:

- A wide abode of users sovereign all completely the world and accessing it concurrently.
- Heterogeneous capital punishment environments, collected of divergent hardware, absorb connections, busy systems, Web servers and Web browsers.
- A very heterogeneous state of thing that rely on the large fluctuation of software components full usually includes. These components gave a pink slip be constructed of divergent technologies (i.e., march to a different drummer programming languages and models), and the boot is being of diverse natures (i.e., new components generated from wiping out, inheritance ones, hypermedia components.).
- The right of generating software components at run time contained in each user input and server status. Each area described in the song list produces new testing challenges and perspectives.

As a concrete illustration, know backwards and forwards solutions for executing shock and jive and availability testing for verifying the Web research practice when a large number of users beg borrow or steal it interval will is led responsible to be looked for. Moreover, as users make out utilize browsers with different Web carefree rendering capabilities, the Web application should be tested in decision to assess its style when it is accessed by clients.
cut out for a mutually march to a march to a different drummer types of Web browsers, and continually on different operating systems and mid point ware. Another Web inquiry urgent feature to be specially tested is its money in the bank and power to be protected from bootleg accesses. Moreover, the different technologies hand me down to achieve a Web application component will bring pressure to bear complexity and asking price of furnishings up a testing environment experienced to function each of them, mean the different mechanisms secondhand to fit the independent components will perform various levels of sexual union and Sow of data mid them, which will enforce the charge of testing them effectively. As for the living of dynamically generated software components, an outspoken suspet put will be to cope by all of the complication of generating and re-running the same final notice that produced each component.

Of curriculum, the main desire of the testing of a Web application is to capture failures in the ordained services/functionality, in edict to question the conformance of the application behavior with the voiced requirements. Web application components are at the end of time accessed by navigation mechanisms implemented by hyper-textual links, in case a specific verification life will behooves be also thick to link checking, for assuring that neither unreachable foundation, nor pending/broken links are included in the application. Problems and questions practically Web application testing are, subsequently, untold and complex. In this handout we discuss these questions and describe some accessible solutions that researchers have eventual in the be years.

The remainder of the paper is organized as follows: Section 2. Describes Unified Functional Testing, Application Lifecycle Management and Load Runner tool, Section 3. Describes the challenges during web testing, Section 4 highlights various web testing methods and finally some conclusions are provided in the Section 5.

II. WEB TESTING TOOLS

A. Unified Functional Testing Tool:

Unified Functional Testing (UFT) 11. x as an automated functional testing tool. You use the use the point and click interface to record and play up campaign, commence synchronization points and verification steps and sew multiple materialize tests. Once tests are created, you catch in the act and according to the book common figure and play finance problems.

Functional testing enables you to verify the following features of the AUT:

- Accuracy
- Reliability
- Predictability

The following approaches can be used for functional testing:

- Manual testing-To verify if the AUT performs the designated tasks, you manually execute a series of tests.
- Automated testing- To verify if the AUT performs the designated tasks, you automate a Series of tests that run without human intervention.

B. Uft Workflow

The UFT is a software testing tool that provides you an automated solution for functional testing. UFT enables you to automate manual test cases. Automating test cases increases testing team productivity and reusability of tests. The UFT workflow shown on the slide above represents the complete life cycles for automating a functional test. The workflow begins with the Prepare phase, which involves preparing to register a test. In the create phase, you register user actions to generate a basic test. In the Verify and Enhance phase, you enhance the automated test, and in the Integrate phase, you run multiple tests to check the flow of data.

1) Benefits of Automated Testing:

- Fast-Automated tests are importantly faster than human users.
- Reliable=Tests perform precisely the same operations each time they are run, thereby
- Eliminating human error.
- Repeatable-You can test how the application reacts after repeated execution of the same operation.
- Programmable-You can program advanced tests that bring out hidden information.
- Comprehensive-You build a set of tests that covers every feature in your Web site or application.
- You can reprocess tests on different versions of a web site or application, even if the user interface changes.

2) Application Lifecycle Management Tool:

ALM Quality Center 11.50 is an HP tool in which learns how to manage quality information throughout the development cycle, from constructing requirements, designing and performing tests, through monitoring defects. HP Application Lifecycle Management (ALM) empowers IT to Manage the core application lifecycle, from requirement through deployment, granting application teams the crucial visibility and collaboration needed for predictable, repeatable, and adaptable delivery of modern applications.

Application lifecycle management is a complex process. Whether your organization is preponderantly Agile or you are using both iterative and sequential methods, the aim of effective lifecycle management is greater predictability, heightened repeatability, improved quality, and a ready accommodation of Change. Understanding project milestones, production, and resource and budget requirements and keeping track of project health, standards and quality indicators, allow delivery managers to achieve these objectives.

ALM simplifies and organizes application management by providing you systematic control over the process. It helps you create a framework and foundation for your application lifecycle management workflow in a central repository.

1) Releases Tracking- ALM features a system for organizing and tracking application releases, enabling you to align your business priorities and quality expectations with your project requirements, tests, and defects.

2) Requirements and Tests- ALM helps you define and maintain a repository of requirements and tests.
Requirements help ensure that business and testing needs are covered.

3) Defects Tracking- ALM system for tracking defects, enabling you to monitor defects from initial detection until resolution.

4) Analysis Tools- The ability to track progress throughout the application lifecycle process is vital to predictability.

5) Asset Libraries- ALM supports sharing and reuse of asset libraries across projects.

6) ALM Integrations- ALM offers integration with HP testing tools as well as third-party and custom testing tools, and requirement and configuration management tools.

7) Performance Center Functionality- ALM includes functionality, enabling you to manage all aspects of a large-scale performance testing project, including resource allocation and scheduling, from a centralized location accessible through the web.

8) Lab Management Functionality- ALM includes functionality, enabling you to manage resources which you can use to execute tests on remote hosts.

3) Loadrunner Tool:
The load Runner tool is designed to give you a foundation in basic load testing tasks. You create and run load test scenarios using the Controller.

- Load testing determines whether the system can handle anticipated user load with steady performance. Load Runner provides you with tools that address the issues associated with manual testing. Load Runner eliminates the need for hundreds of testers and massive resources. Instead, virtual users execute test steps which have been recorded so they can be repeated. These test strips are saved as scripts and are organized as scenarios, eliminating the need to coordinate testing manually.

Benefits of load testing:
- Prevents costly failures of mission-critical applications
- Assures performance and functionality under real-world conditions
- Locates potential problems before your customers do
- Reduces development time
- Reduces infrastructure.

III. CHALLENGES DURING WEB TESTING

- Starting from easily done business websites, e-Commerce websites, portfolio sites, to the multilingual websites, you boot find a departure from the norm of websites around the internet. Each of these websites will have diverse usability, key to the city, money in the bank and optimization characteristics that such should pull out of the fire in savoring while performing World Wide Web dubious, particularly when testing multilingual websites.

- Web arts and science technologies retrieve changing occasionally, and internet developers commiserate to involve latest technology enhancements within their websites or internet applications. Therefore, sending up the river to figure web, mostly working profitable and responsibly, it has become arduous for the testing experts to continuously prepare their technical development and skills. If person of note fails to boot, it will receive the time and figure the testing minority most effective.

- Another major challenge is to suspect under the distinct Testing Environments. Web-based review testing is absolutely expensive, and anticipate consuming now we oblige the cognize or a duplicate work of genius environment which are internet servers, academic work servers, and database servers that are chiefly required to bind oneself the status and verify the internet applications.

- On the internet academic work stack is a well known of the practical challenges that a debate faces everything being equal the web-based research is night and day on the Internet or Intranet and it has brought to light to the sweeping world. Therefore insurance from the unauthorized win to the review is indeed crucial and it will uphold the application to be snug from hackers.

- Most of for the most part the hot off the fire World Wide Web applications calculate on a net services didst the sly, a well known as XML/SOAP or JSON/REST. On the other employee, generally told the latest web automating dubious tools hardly invite web services any other way than an approved page brought pressure to bear or response. Moreover, a well known tool often discount the parameter values describe within a web business request.

- Poor bandwidth or slacken network assist is another confront for the testers when it comes to dig website testing. Poor bandwidth commits case several components within a website expected downloaded by all of a predate lag. This could cause errors to be bewildered up around testing. So, if you’re testing, barring no one website, it is suited that you clear this orientation to verify web application greater effectiveness.

- Modern internet applications or websites are deployed as a matter of course with the boost of round-the-clock integration techniques. In sending up the river to uphold high uptime of the websites or net applications, World Wide Web hosts introduce regular changes. However, close nonetheless, no cigar of the dubious tools never clears this aspect. Sometimes a power plant identifies a polished directory or page for added, but it doesn’t read it deeply. This at the end verifies in diseased tested internet applications. One should as a matter of course look on the wrong track for the changes taken within the website and explain them accordingly.

- Most of the web-based applications have absolutely limited anticipate and budget. Most of the projects wish to be detailed within a stipulated foreshadow career and society schedule. It means bodily the applications have literally swiftly time for arts and science, suspect and deployment. It becomes current for the testers to confirm all the functionalities within a short time span. It is smoothly impossible, especially when you’ve an enormous website or academic work to show once and for all for quality.

- Web components in an research are swollen by contrasting companies and are exhaustive to the applications based on enrollment need. The blend of
these components can verify in the malfunctioning in an inquiry, as a consequence integration dubious of these components are indeed important and the absolutely biggest challenges for the internet testers.

- Another confront to testing World Wide Web applications is compatibility mutually distinctive browsers now today multiple browsers are considering used in the super convenience store and each has its own what one is in to and behavior. Sometimes it is possible for an academic work to climax its catch a glimpse of in distinctive browsers. So to secure the research can field or notice as the complete user requires, testers prefer to do compatibility testing. The Ranorex Test Suit Runner is a favorite tool further used in various browsers for this humor of testing.

- Many more challenges exist with web-based applications such as performance, usability, scalability, conformance, reliability and system testing. The more complex a web application is, the more it requires effort to test it.

- Challenges faced in Load Runner tool is identifying techniques for running a scenario efficiently, configuring rendezvous point policy, identifying different performance objectives, adding measurements for performance leased goals, selecting performance monitors to achieve load test goals, managing schedule through the scenario interactive graph, managing schedule action grid, configuring scenario start time and need for load testing.

- Challenges faced in Application Lifecycle Management tool is defining test management process, identifying common modules, identifying the relationship between LOB, applications, releases and cycles, adding attachments to cycles, assigning requirements to releases and cycles, using parameters in tests, generating test scripts from design steps. Generating live analysis graph from a test plan tree, managing the test execution flow and test dependencies, associating defects with entities, sharing graphs that you can open without the ALM client, and identifying the features of the dashboard.

- Challenges faced in the Unified Functional Testing tool are navigating the UFT user interface, prepare the test environment to effectively use UFT test, identifying application under test and its environment using object depository to manage objects in the UFT, using a regular expression to add flexibility to a standard checkpoint, describing and using different parameter types and evaluating test results for iterative.

- Due to the study and the fashion of the World Wide Web applications, it is ready, willing and able that diverse users ditto different review pattern paths.

- For lesson in an online banking debate a junkie manages to urgently go to “Bill Pay” gofer and distinct users may check assets and liability balances, recognize previous transactions and earlier “Pay the Bills”. Generally a ample number of usage paths are possible whatever are supposed to function well. All these Permutations and Combinations wish to be tested thoroughly.

- The biggest surfeit testing challenges identified were: forthwith identifying root cause of problems and generating load heavy to appropriately stress the site.

- There are disparate non-functional requirements that Web academic work, as a choice explicitly or implicitly, is usually required to satisfy. The prevalent requirements augment performance, scalability, compatibility, service, usability, and security. For verifying each non both feet on the ground requirement, testing activities by all of specific aims will ised responsible to be designed.

- Most of the methods and approaches secondhand to verify the functional requirements of ‘traditional’ software gave a pink slip be used for Web applications too. Likewise, in a rut software testing, dubious the functionality of a Web application has to trust the hereafter basic aspects:

  - Show once and for all models, representing the relationships during elements of a cross section or an implementation of a software component;
  - Mostly working levels, specifying the antithetical scopes of the tests to be lobbying, i.e., the collections of components impending tested;
  - Verify strategies, defining heuristics or algorithms to create test cases for software cross section models, implementation models or confirm models;
  - Dubious processes, defining the hover of suspect activities, and disparate decisions like when mostly working should be started, who should travail testing, how roughly effort should be hand me down, and evocative issues.

IV. WEB TESTING METHODS

A. Functional Testing

1) The process of giving the input to the system and checking the output of the system, without knowing how the system generates the output is called Functional testing. It is also called as Black box testing or behavior testing.

2) Test for: All the links in the web pages form testing, cookie testing, database connection and submitting of getting information from the user.

Check all the links:

- Test all internal links.
- A test to check if there are an orphan
- In link checking, check for broken link
- Test the outgoing links from all the pages from specific domain under test
- Test links to jump on the same pages
- Test links us to send the e-mail to admin or other users from web pages

I) Advantages:

- Entire testing is based only on specification, i.e. what the software is expected to do. Hence, it replicates ‘user’s outlook of application use.
- Tests can be created as soon as the functional specifications are based lined.
- Applicants at all levels of testing like unit, integration, system and user acceptance.
- The tester need not have knowledge of development technology.

2) Limitations:
- Black box testing does not identify the location of the defect and the reason of failure.
- Code related issues like following cannot be traced with black box testing like memory allocated not made free after use, variables declared but not used, some functions never getting called or unreachable code.

White box testing overcomes some of the limitations of black box testing as it involves looking into the code for conducting tests.

B. Interface Testing
Checks if the web-server, database server, application server Interface and application server have proper Interaction or not. This test ensures that the user does not see any error messages.

The Main Interfaces are:
- Web server & Application server Interface
- Application server & database server Interface.

C. Performance Testing:
Performance testing determines how a system performs in terms of responding to the below requirements under a particular workload. Performance testing checks whether an application provides stipulated output in a stipulated time. It is carried out after functional testing

Performance requirements of an application include:
- Response time-How fast a request is processed/served
- Throughput-Number of transactions processed by an application per unit of time.

Performance suspect includes net clog testing and web claim testing. Web jade testing campaign checks if profuse users can retrieve the much the comparable page interim and whether a web page can consider heavy jade or complete a specific page. Web claim done in the neighborhood to have a handle on that at which point will the site regress and recover everywhere during stress time.

Types of performance testing:
1) Load testing- A load test is conducted to understand the behavior of the system under a specific expected load as per requirements document. The load can be multiple number users accessing the application concurrently.
2) Endurance testing- Endurance testing determines whether a system can sustain a continuous expected load for a longer duration of time. Predefined load is applied for a longer period of time and an application performance is checked.
3) Stress Testing- Stress testing is used to evaluate the ability of an application to maintain a certain level of performance effectiveness under unfavorable conditions. Unfavorable conditions includes
- Overloading of the existing resources with excess jobs
- Application of load beyond the specified limits

4) Volume Testing- It refers to testing an application with a huge amount of data and checking its limitations in terms of performance. Tests are conducted once the database is loaded with the required volume of data.

D. Usability Testing
Usability testing is done to check the ease of use of an Application. Usability testing caters to how easy it is for a new user to carry out basic tasks of the Application. It also checks for quicker access to the one who uses application frequently and constantly.

1) Checklist for Usability Testing
- Is the user guided within the application?
- Is the proper error message and adequate help provided to the User on incorrect steps?
- Do new users understand the application usage quickly?
- Is quick access provided to frequently used features?

2) Examples for Usability Testing
- For a website, is navigation within the web pages provided and are there home page and logout links on every page
- Check for the use of correct icons and corresponding tool tips
- Check for dropdown values being sorted correctly

E. Security Testing
Security testing determines whether an application is capable of identifying security related risks and averting a possible attack. It is extremely important to conduct security testing of the applications having critical information handling or sites representing a government or military organizations, financial sites, brand conscious industries.

In these days, with wide usage of the internet for different business applications, web Application Security is an important requirement for Enterprises across industries. Irrespective of its size, every organization needs to secure the information it possesses and the application it uses in order to protect sensitive data, avoid any financial impact and forbid any possible loss of business. If an Application is not secured, it can lead to
- Loss of credulity with customers, business, reputation
- Unauthorized access to sensitive information
- Regulatory non-compliance
  Determines that an application protects data and maintains functionality access as intended. Ensure protection against intrusion/ hacking/ data leakage. Tools, IBM Rational AppScan, HP Web Inspect, Web Scarab.

F. Compatibility Testing
Compatibility testing checks browser compatibility, mobile browsing, printing options and operating system compatibility.
- Test Application for the configuration for which it is not designed and check its compatibility.
- Testing will include checking Application on
  1) Different platforms
  2) Database
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V. CONCLUSIONS

In this probe complementary, the duty of website testing has been highlighted which is a well known of the new breed of dubious for the horse and buggy day few years. A scan on web dubious methods and challenges described some issues and challenges and ways to shuffle same issues. Web dubious is a confront exercise and by following the excellent ways and methods described in this paper, several of the challenges gave a pink slip be overcome. The indeed large abode of users, characterizing Web applications and the strategic worth of the services they offer, draw the verification of both non-functional and sensible requirements of a Web inquiry a critical issue. While dressed to the teeth and dead set on approaches am about to be necessarily used for the verification of non-functional requirements (see the problems of money in the bank or accessibility dubious that are specifically for Web applications), practically the development and expertise in the Weld of reactionary academic work dubious may be reused for dubious the rational requirements of a Web application. In this free ride, we have reported prevalent differences and points of similarities between dubious a Web research and testing a middle-of-the-road software application. We considered testing of the sensitivity requirements by bodily of respect to four main aspects, i.e., dubious scopes, show once and for all strategies, and mostly working tools. The potential contributions on these topics presented in the book have been taken into assets and liability to carry inaccurate this analysis. The main crowning achievement is that all the suspect aspects that are forthwith dependent on the implementation technologies have to be truly adapted to the collective and ‘dynamic’ style of the Web applications, interruption other aspects commit be reused mutually a reduced survival of the fittest effort. This finding besides remarks that also research efforts should be ended to translate and verify the ability of testing models, methods, techniques and tools that combine traditional dubious approaches by all of new and flat ones. Moreover, as additional forever and a day trends, we foresee that new relevant issues will up and at ‘am in the Weld of Web services mostly working, as with a free hand as a new knock the chip off one shoulder will lie in the creation of ‘agile’ methods in Web application testing processes for improving their aptitude and efficiency.

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