Exploration on Web Testing of Website

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Abstract. As an important measure on quality assurance for web applications of website, web testing has been paid more attention in software testing recently. Based on the analysis of website and its application characteristics, from the view of affecting the quality of web applications, testing activities from the five aspects on functionality testing, performance testing, usability testing, compatibility testing and security testing are explored to assure the quality on web applications of website. Finally, further researches on comprehensive and adequate testing of the web service composition with some test techniques under the background of service-oriented technology and cloud computing technology, and how to combine exploratory testing with testing activities of functionality testing and usability testing effectively in web testing are expected in the paper.

1. Introduction

Web testing is the name given to software testing that focuses on web applications [1]. Because the software based on web and its applications exist on the network, and they are generally interacted with different operating systems, hardware platforms, and all kinds of background applications. Therefore, web testing has a great challenge in the field of software testing.

Website is a special software system in web. If there are quality problems in its application on web page, it will shake the confidence of end users to use the software, and even decrease the public image on software development enterprise. Affecting the quality factors on web application are the following [2, 3], which are shown as Table 1.

| Quality Factor | Test Description |
|----------------|------------------|
| content        | The correctness of content information representation, the consistency of content objects that presented and other related objects. |
| function       | Consistency of user requirements for web applications. |
| structure      | Make sure to release the corresponding functions for web applications correctly. |
| usability      | Users can easily learn and apply the corresponding functions. |
| navigability   | Make sure there are no errors in navigation between pages. |
| performance    | The system ensures that all functions can be implemented normally when responding to multiple user interactions and processing limit loads in network environment. |
| compatibility  | Testing for compatibility with different hardware platforms, network environments, and other software applications. |
| interoperability | Testing for normal interaction with other applications or databases. |
| security       | Testing of the software for security vulnerabilities. |
| configuration  | Testing web applications for working well in a variety of complex software and hardware environments. |
A website testing process is put forward in [4], that a website is needed to pass three test phases of producer testing (to verify whether the pages and sub-pages in website can be shown normally, and functions of each page for displaying can be consistent with user requirements), comprehensive testing (to verify whether the content of text, picture, sound and animation in a website page can be fully displayed beautiful), release testing (to detect whether there are errors or abnormal conditions when the website is deployed to server). However, the testing process above is much simple and the completed test procedure is not existed yet. The quality of the website and its applications will affect the use of customers. In the current era of commodity competition, the importance of web testing of website has great value. On one hand, the website has a lot of features that are not obvious, and these functions make its application become more complicated. On the other hand, some commercial websites are often oriented different application fields, and a series of field-oriented test activities need to be added according to the characteristics of the application field, so that web testing of website involves many different software test methods and technologies. Therefore, we try to explore and research the some effective and meaningful test method for web testing of website, and put forward the further work in this paper.

2. Test Strategy and Test Activities on Web Testing

Most of the websites for their applications are based on web browsers as the user interface, and main processing operations on the server side of the implementation. Different platforms of machines, different types of operating systems and a wide variety of application software are combined to form a heterogeneous and complex working environment, compatibility test for web applications should be considered in web testing [5]. Additionally, websites have a large number of users and support remote browsing. The ways in information collection are diverse, based on a conventional test practice, security testing, usability testing, installation testing, etc. are also indispensable from the user's perspective in web testing. So, testing activities from the five aspects should be executed to assure the quality on web applications.

2.1. Functionality Testing

Each individual function that is provided by the website for the user requirements need to be tested, and the reference standard is the document for software requirement specification. In functionality testing, the following sub-test items are included by black-box test method, and it is shown as Table 2.

| Test Item  | Test target |
|-----------|-------------|
| text      | Whether the texts are displayed correct and normal in a web page or for different resolutions in web page. |
| image     | Test if the image is displayed separately and if the image is displayed with the text normally. When the users use the forms to perform relevant information operations, the completeness of the submission operation is tested and the correctness of the submitted information to the server is verified. Test whether the page of the website which is linked is existed, whether it can jump correctly to the required page, and whether there are isolated pages. |
| form      | Whether cookies can save information according to the user's predetermined settings and whether the preservation of certain information (such as password) is secure. |
| hyperlink | Testing for the data consistency and find whether output errors are existed. Testing for exceptions in combining different script development languages with HTML. Based on a deep understanding of the users requirements, try to test some normal or abnormal operations that the users may perform. |
2.2. Performance Testing

The performance testing of the website is mainly conducted in three aspects: connection speed testing, load testing, and stress testing [6]. It can be implemented by means of testing automation, and there are many automation test tools which can be selected.

In performance testing, the following sub-test items are included by test automation, on the basis of [6], which is shown as Table 3.

Table 3. Test items in performance testing.

| Test Item   | Test target                                                                 |
|-------------|-----------------------------------------------------------------------------|
| load        | To measure the performance of a website at a certain load level to ensure that the website can be worked within the range of multi-user concurrency requirements. |
| stress      | After the website is released, the system's limitations and failure recovery capabilities are tested in actual network environment. |
| connection speed | Testing of pages for opening response speed in a website. |

2.3. Usability Testing

Usability testing is to evaluate whether the user feels convenient when using the software. At present, it is mainly done by manual testing. As a website, testing of GUI and navigation are the two test items in web testing, which are shown as Table 4.

Table 4. Test items in usability testing.

| Test Item | Test target                                                                 |
|-----------|-----------------------------------------------------------------------------|
| GUI       | Testing for the aesthetic of the elements (such as picture, animation, border, colour, font, background, button, etc.) in a web application page. For example, verify that if the style of all page fonts are consistent, if the background colour of the page matches the font colour. Whether navigation in each page is intuitive and can be responded to the main functions of the website directly [7]. Whether the style on navigation is consistent with other menus, displays, etc., and the navigation link is correct [7]. Whether different navigation bars can achieve the same purpose. Whether the sub-navigation page can normally return to the top-level page [7]. |
| navigation|                                                                                   |

2.4. Compatibility Testing

Compatibility testing is implemented before the website is released, to verify the applications can be run on different machines that are used by users. Additionally, various operating systems, browsers, video settings, etc. should be tested too. However, for some complex websites, combinatorial test of various settings is suggested to practice.

2.5. Security Testing

Cyber security issues are becoming increasingly important, especially for websites with interactive information and those conducting e-commerce activities [6]. In this paper, as the reference of [6, 7, 8], test items in security test for website are summarized, which is shown as Table 5.
Table 5. Test items in security testing.

| Test Item      | Test target                                                                                                                                 |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| user login     | To test the website is sensitive to the capital or lowercase style of user login information, whether it has limits on the number of inputs or not [9]. Whether the page could be opened directly without logging in to the system by browse, Whether there is a limit to overtime for website access. |
| session        | Test if relevant information is written into the log file and whether it is traceable or not.                                                                                                     |
| log file       | Detect the correctness of the password settings and the completeness of the information in the condom socket [9]. Test whether the directory settings for each page of the website are correct. For example, whether there are corresponding pages for index.html format under each directory, whether all page contents can be displayed under a certain directory, and so on. |
| encryption     |                                                                                                                                                                                                         |
| directory setting |                                                                                                                                                                                                     |

3. Further Research

As service-oriented technology and cloud computing technology continue to mature, and especially the Service-Oriented Architecture (SOA) continues to improve and proliferate, content on web services have become widely used [10]. Many atomic web services are combined in accordance with certain rules and business logic to provide more powerful services. In further research, in my opinion, two aspects on web testing of website should be focused on. Firstly, to ensure the quality of the web service composition, comprehensive and adequate testing of the web service composition and some test techniques are required to research, such as test case generation techniques, regression testing techniques, test execution and measurement methods in web service composition testing [10]. Secondly, how to combine exploratory testing and its test idea with functionality testing and usability testing effectively to detect some errors which are tended to ignore by users in actual environment, and it is also the further work in the future.

4. Conclusion

Web testing has many characteristics that are same with traditional software testing on one hand, but some difference is still existed between them on the other hand. Under the background of service-oriented technology and cloud computing technology, web applications on website are complex and changeable. It is still a long-term and arduous task to formulate a perfect test plan for various types of web applications, and it needs constant exploration and research.

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