

Web Application Testing

Instructor: <Name>

Objectives

After the course, student can catch:

- What should be tested in web application testing ? How to test ?
- Common defects in testing web application
- Tips in web application testing
- Usage of Web Link Validator tool
- And more ...

❖ Duration: *2 hours*



Agenda

1. Web application testing - What and How ?
2. Standards to discover Common defects in testing web application
3. Tips in web application testing
4. Introduction Web Link Validator tool

1. Web application testing What and How ?

Beside tests like other software application testing, when doing Web application testing, you should specially add cases mentioned in these following tests:

1. Functionality testing
2. Usability testing
3. Interface testing
4. Compatibility testing
5. Performance testing
6. Security testing

Chú ý:

3. Interface testing ở đây không phải là GUI testing. Đọc slide Interface testing để nắm chi tiết.
5. Trong Performance testing có thể có những loại như: performance test, load test, stress test, volume test. Các slide sau có đề cập đến. Ngoài ra, sinh viên có thể search thêm trên internet hoặc tham khảo tài liệu ISTQB để nắm vững và phân biệt các loại test này.

1. Web application testing Functionality testing

- Check all the links:
 - Out going the links from the pages
 - All internal links
 - Links jumping on the same pages
 - Links used to send the email from web pages
 - Check if there are any orphan pages
 - Check for broken link



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- Orphan page: An orphaned page is a page without any incoming links. This means that, unless you know that the page exists, you are not likely to come across it in the space during the natural course of navigation. Xem thêm tại <https://confluence.atlassian.com/display/DOC/Managing+Orphaned+Pages>

- Broken links are links which do not have any hyper link or invalid link associated to it. It can redirect to no where. That's why called as broken link.

1. Web application testing

Functionality testing

- Test forms in all pages:
 - Check all the validation on each field
 - Default values on fields
 - Valid and invalid inputted data
 - Check max length of fields on UI and corresponding fields in DB
 - Check ALT text
 - Try resizing the browser's window to see if strange wrapping occurs around the forms/pages

The form consists of four input fields with asterisks: Name, Email, Phone, and Message. Below the fields is a 'SEND' button. To the right of the form is a sidebar titled 'Get in touch' containing contact details: phone number (+40 751 250 710), email (contact@pointzero.ro), and address (Inovator Street, 17-19 A / 33, Cluj-Napoca 400757, Romania).

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Default value. Ví dụ, như vào trang chuyển khoản của một trang internet banking thì giá trị mặc định của tài khoản gốc sẽ là số tài khoản của user đang login.

Check max length of fields on UI and corresponding fields in DB. Ví dụ, requirement yêu cầu user name tối đa 50 ký tự, UI cho phép nhập tối đa 50 ký tự nhưng database, field Username chỉ cho phép lưu tối đa 20 ký tự.

ALT Text: Thuộc tính alt (alternate text) giúp người xem nhìn thấy các ký tự thay thế khi trình duyệt không tìm thấy đường dẫn của ảnh, trình duyệt không hiển thị ảnh hoặc ảnh đó không thể hiển thị. Nó là thuộc tính mà các nhà thiết kế web sử dụng để thiết kế website.

Xem thêm: http://en.wikipedia.org/wiki/Wikipedia:Alternative_text_for_images

http://webdesign.about.com/od/accessibility/a/great_alt_text.htm

Try resizing the browser's window to see if strange wrapping occurs around the forms/pages. Xác định screen resolution app should work và test app với các screen solution đó.

1. Web application testing

Functionality testing

- Validate your HTML/CSS
 - Validate HTML and CSS for syntax errors
- Database testing
 - Check for data integrity and errors while you edit, delete, modify the forms or do any DB related functionality.

Validate your HTML/CSS:

If you are optimizing your site for Search engines then HTML/CSS validation is very important. Mainly validate the site for HTML syntax errors. Check if site is crawlable to different search engines. Có thể tham khảo **The W3C HTML validator** tại http://www.w3.org/wiki/Validating_your_HTML

Database testing:

Data consistency is very important in web application. Check for data integrity and errors while you edit, delete, modify the forms or do any DB related functionality.

Check if all the database queries are executing correctly, data is retrieved correctly and also updated correctly. More on database testing could be load on DB, we will address this in web load or performance testing below

1. Web application testing

Usability testing

- Test for navigation:
 - Web site should be easy to use
 - Instructions should be provided clearly
 - Check if the provided instructions are correct means whether they satisfy purpose
 - Main menu should be provided on each page. It should be consistent
- Content checking
- Other user information for user help



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Test for navigation:

Navigation means how the user surfs the web pages, different controls like buttons, boxes or how user using the links on the pages to surf different pages.

Content checking:

Content should be logical and easy to understand. Check for spelling errors. Use of dark colors annoys users and should not be used in site theme. You can follow some standards that are used for web page and content building. These are common accepted standards like as I mentioned above about annoying colors, fonts, frames etc.

Content should be meaningful. All the anchor text links should be working properly. Images should be placed properly with proper sizes.

These are some basic standards that should be followed in web development. Your task is to validate all for UI testing

Other user information for user help:

Like search option, sitemap, help files etc. Sitemap should be present with all the links in web sites with proper tree view of navigation. Check for all links on the sitemap.

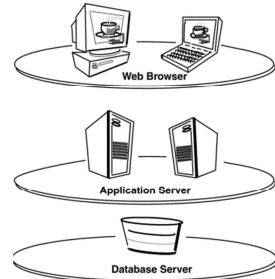
“Search in the site” option will help users to find content pages they are looking for easily and quickly. These are all optional items and if present should be validated.

1. Web application testing

Interface testing

- Check:

- If database or web server returns any error message for any query by application server then application server should catch and display these error messages appropriately to users
- What happens if user interrupts any transaction in-between?
- What happens if connection to web server is reset in between?



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Interface Testing:

The main interfaces are:

Web server and application server interface

Application server and Database server interface.

Check if all the interactions between these servers are executed properly.
Errors are handled properly.

- If database or web server returns any error message for any query by application server then application server should catch and display these error messages appropriately to users. Ví dụ, xem <http://stackoverflow.com/questions/19692530/how-display-error-message-without-error-page-when-database-error-occurred-in-code>. Thay vì hiển thị lỗi 1451 thì hệ thống nên hiển thị “an error occurred during query”.

- What happens if user interrupts any transaction in-between? Ví dụ, một transaction chuyển tiền từ tài khoản này sang tài khoản khác. Nếu có lỗi xảy ra ở giữa transaction, mọi dữ liệu phải được rollback lại trạng thái cũ.

- What happens if connection to web server is reset in between? Điều gì sẽ xảy ra nếu đứt kết nối giữa các tầng? Hệ thống đã xử lý chưa, xử lý như thế nào? Có bắt hết các trường hợp lỗi chưa?

1. Web application testing Compatibility testing

- Browser compatibility:

- Test web application on different browsers with different versions.



- Operating system compatibility:

- Test your web application on different operating systems with different OS flavors.



Browser compatibility:

Some applications are very dependent on browsers. Different browsers have different configurations and settings that your web page should be compatible with. Your web site coding should be cross browser platform compatible. If you are using java scripts or AJAX calls for UI functionality, performing security checks or validations then give more stress on browser compatibility testing of your web application.

OS compatibility:

Some functionality in your web application is may not be compatible with all operating systems. All new technologies used in web development like graphics designs, interface calls like different API's may not be available in all Operating Systems.

Notes:

Ngày nay, chỉ cần test tính tương thích của web site trên các loại browser là đủ, không cần thiết phải test trên nhiều Os.

1. Web application testing Compatibility testing

- **Mobile browsing**

- Test your web pages on mobile browsers



- **Printing options**

- Make sure fonts, page alignment, page graphics getting printed properly

Mobile browsing:

This is new technology age. So in future Mobile browsing will rock. Test your web pages on mobile browsers. Compatibility issues may be there on mobile.

Printing options:

If you are giving page-printing options then make sure fonts, page alignment, page graphics getting printed properly. Pages should be fit to paper size or as per the size mentioned in printing option.

1. Web application testing Performance testing

- Load testing
 - Site should handle many simultaneous user requests
 - Large input data from users?
 - Simultaneous connection to DB
 - Heavy load on specific pages
- Stress testing

Web stress testing is performed to break the site by giving stress and checked how system reacts to stress and how system recovers from crashes



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Performance Testing: Web application should sustain to heavy load. Test application performance on different internet connection speed. **Về tổng quan, Performance testing có 4 loại: Performance testing, Load testing, Stress testing, Volume testing. Ở slide này giới thiệu 2/4 loại.**

Load testing test if many concurrent users are accessing or requesting the same page. Can system sustain in peak load times? Ví dụ, một trang internet banking của một ngân hàng có số lượng khách hàng truy cập đồng thời có thể lên đến 1000, thì tester cần làm load test cho trang đó với số lượng concurrent users = 1000.

Stress testing: Generally stress means stretching the system beyond its specification limits. Stress is generally given on input fields, login and sign up areas. Cùng ví dụ trên, tester sẽ đẩy số lượng concurrent user lên 1500, 2000,... đến khi trang bị crash để biết được giới hạn của trang và cũng để kiểm tra behavior của hệ thống khi bị crash, số liệu tiền bạc, giao dịch có bị lỗi gì không.

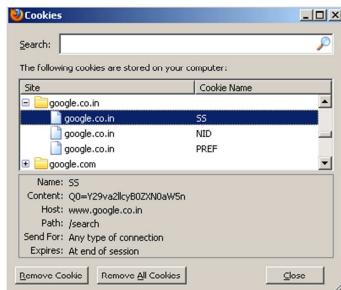
In web performance testing web site functionality on different operating systems, different hardware platforms is checked for software, hardware memory leakage errors

Performance testing: cùng ví dụ trên, ví dụ chức năng xem lịch sử giao dịch. Ví dụ, nếu khách hàng query lịch sử giao dịch trong vòng 1 năm nua thi hâ thắna nân hiän thi kât nua chỉ 3.5s chí khânn nhái sau 10

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1. Web application testing Security testing

- Cookies testing:
 - Test if the cookies are encrypted before writing to user machine
 - Check for login sessions and user starts after session end
 - Check effect on application security by deleting the cookies



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Cookies testing:

Cookies are small files stored on user machine. These are basically used to maintain the session mainly login sessions. Test the application by enabling or disabling the cookies in your browser options. Test if the cookies are encrypted before writing to user machine. If you are testing the session cookies (i.e. cookies expire after the sessions ends) check for login sessions and user stats after session end. Check effect on application security by deleting the cookies.

Other reference at <http://www.techquicky.com/concept/website-cookie-testing-part/>

1. Web application testing Security testing

- Others Security Testing:

- Test by pasting internal url directly into browser address bar without login. Internal pages should not open.
- If you are logged in using username and password and browsing internal pages then try changing url options directly. Access should denied for this user to view others stats
- All transactions, error messages, security breach attempts should get logged in log files somewhere on web server



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Others Security Testing: có rất nhiều loại, nhưng thời gian hạn hู่. Sinh viên vè nhà tìm hiểu thêm.

Dưới đây là một số ý tham khảo, giải thích thêm cho các ý trên slide.

- Test by pasting internal url directly into browser address bar without login. Internal pages should not open.
- If you are logged in using username and password and browsing internal pages then try changing url options directly. I.e. If you are checking some publisher site statistics with publisher site ID= 123. Try directly changing the url site ID parameter to different site ID which is not related to logged in user. Access should denied for this user to view others stats.
- Try some invalid inputs in input fields like login username, password, input text boxes. Check the system reaction on all invalid inputs.
- Web directories or files should not be accessible directly unless given download option.
- Test the CAPTCHA for automated scripts logins.
- Test if SSL is used for security measures. If used proper message should get displayed when user switch from non-secure http:// pages to secure https:// pages and vice versa.
- All transactions, error messages, security breach attempts should get logged in log files somewhere on web server.

2. Standards to discover Common defects

- Alignment of fields, texts, number:
 - All texts should be left-justified
 - All numeric fields are right-justified
 - The fields are vertically left or right aligned.
- Data in combo box/ list box:
 - Data in combo box/ list box should be sorted ascending or descending
 - Each entry in the list can be accessed via appropriate key / hot key combinations
 - Using Alt+Down key combination to drop down combo box (*Alt+Down doesn't run in Netscape 6*)

2. Standards to discover Common defects

- Layouts in all pages:
 - All windows and dialog boxes should have a consistent look and feel.
 - Following items should be the same:
 - Font of text, Color and Background
 - Header and footer
 - Size of Logo
 - Date format, decimal format
 - Symbol for mandatory fields
 - The height of buttons and the distances between them
 - Data in combo box/ list box should be sorted ascending or descending
 - Each entry in the list can be accessed via appropriate key / hot key combinations

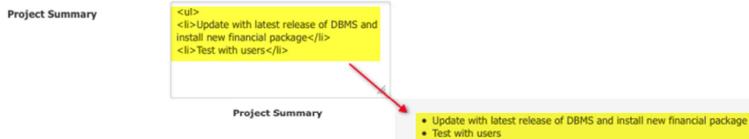
2. Standards to discover Common defects

- Can move between fields by using Tab key and Shift+Tab keys:
 - Users can use Tab key to move to next enterable fields and Shift + Tab keys to previous enterable fields.
 - All read-only fields are avoided in the TAB sequence
 - All disabled fields are avoided in the TAB sequence



2. Standards to discover Common defects

- Cursor location:
 - The cursor is located in the first enterable field when the screen is opened.
 - After an error message occurs, the focus should return to the error field.
- Error by input HTML tags, char ‘:
 - Should prevent errors when user inputs HTML tags or char ' in text fields. HTML tags can destroy the layout



2. Standards to discover Common defects

- Start date is greater than End date:
 - The logic of date should be checked, user can't type Start date greater than End date, or From date is greater than To date...
- Input constraints:
 - Can't submit form with empty mandatory fields
 - Can't input blank space instead of values in mandatory fields and submit.
 - Can't input more characters in field than max allowed size.

2. Standards to discover Common defects

- Users can't return to Web application after logout:
 - Users can't back to previous page after logout by clicking "Back" button in Toolbars.
 - When users logout, they cannot back to web application, and must input username and password again to login
- Multiple users:
 - The application should support many concurrent users as required.



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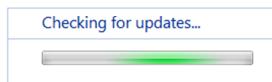
2. Standards to discover Common defects

- Different browsers:
 - The layout in all required browsers should be consistent
Ex: in Netscape, the alignment, the distances, positions of images
... should be correct as in IE
- Images with links have blue borders:
 - Should hide the color of border of the image.
- Show HTML error page:
 - Should display application's error handle page when an error occurs.



2. Standards to discover Common defects

- Using mouse and keyboard:
 - In general, everything can be done using both the mouse and the keyboard.
 - For functions which take much time to run, status of mouse should be changed to "busy" or progress bar should be shown



- All links should be checked:
 - Links should be checked to make sure correct destination.

Progress bar bên trái thường dùng trong Win app. Progress bar bên phải thường dùng trong Web application.

2. Standards to discover Common defects

- Should check invalid data when submit:
 - In addition to valid data, you should check invalid cases to make sure system under test handles these cases
- Default and Cancel button:
 - There should be a button or menu in the page to allow users cancel and return to previous page
 - Each dialog/ window must have default focus button.



2. Standards to discover Common defects

- Big work-load:
 - The application should support big work-load as required. If not, the system is hung when the number of records is big
- Response time to open a page:
 - Response time to open a page is more than required. Default value of response time for Web application is 3-5 seconds

Big-work load: Refer to Volume test.

3. Web application testing Tips

- Web site login security:
 - Use pair bellow:
Username: ' or 1=1--
Password: any
- Refresh:
 - In a window, try to click on any control you see while system is being refreshed
 - Try to click a button many times consecutively
 - After an action is finished, press F5
 - **Demo:** *Demo-refresh.wmv*

Ý 1: tham khảo thêm SQL Injection.

For ex: www.w3schools.com/sql/sql_injection.asp



Nội dung của demo video:

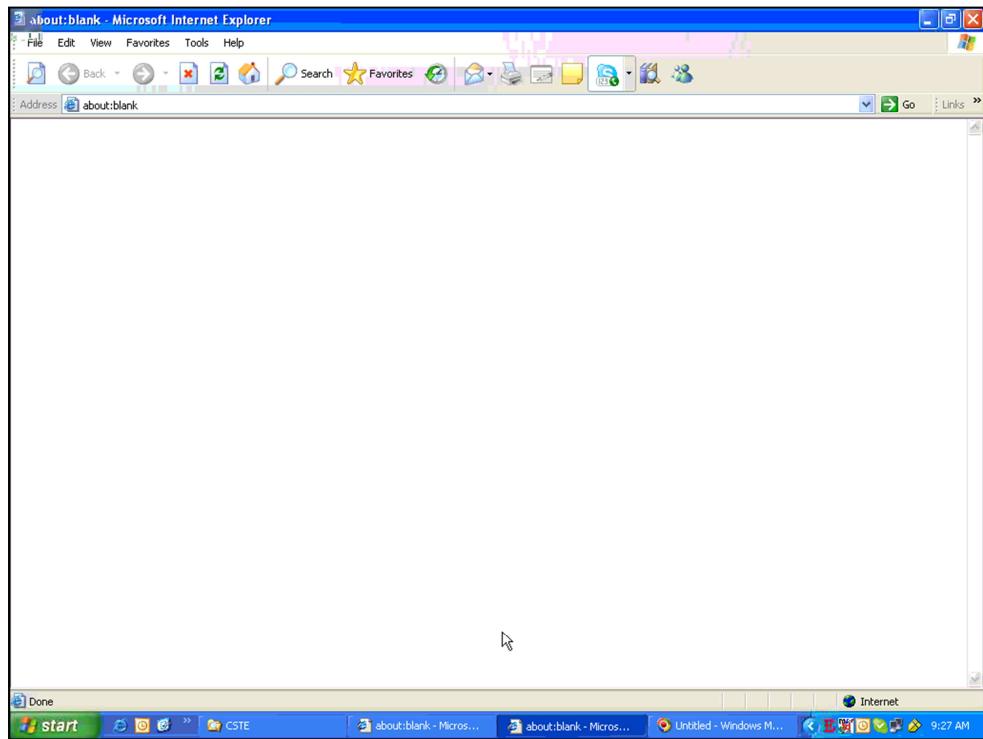
- Show audit trail hiện tại của một dữ liệu
- Update một thuộc tính của dữ liệu đó “Problem statement” và click “Save”
- Check lại audit trail → Hệ thống đã log action “save”
- Press F5 → Hệ thống hiện ra cảnh báo. (Chú ý nội dung của cảnh báo).
- Click “Retry” trên cảnh báo.
- Check lại audit trail → Theo thông tin audit trail thì hệ thống lại thực hiện action “Save” một lần nữa. Đây là lỗi.

3. Web application testing Tips

- Concurrent access:
 - Two users access to a page and save data at the same time
 - Expect: System allows only a user save data and prompt for other that data has been modified.
 - **Demo: Demo-concurrence access.wmv**

Ví dụ về concurrent access: 2 người cùng vào update cùng một tài khoản ngân hàng có balance (số dư) là 5000\$. Người A update tăng số dư lên 6000. Người B giảm số dư còn 3000. Cả 2 cùng submit một lúc. Chuyên gì sẽ xảy ra? Kết quả cuối cùng là gì?

Mong đợi ở đây là chỉ 1 update tại một thời điểm. Với con người thì hành động có vẻ start cùng submit, nhưng với máy là hành động tuần tự. Request update nào tới trước sẽ xử lý trước. Request còn lại sẽ không được thực hiện và nhận được cảnh báo “dữ liệu đã thay đổi bởi ai đó. Vui lòng tải lại dữ liệu...”.



Video duration: 9 mins

Nội dung của demo video:

- Log in hệ thống bằng user Nguyen Nhu Anh. Chọn một record, chọn edit record đó. Nhập thông tin cập nhật cho thuộc tính ‘What is problem?’: “Nguyen Nhu Anh update” xong để đó.
- Open một browser windows thứ 2, log in hệ thống bằng user Vu Manh Mr Thang. Chọn cùng record mà user Nguyen Nhu Anh đã chọn, update cùng thuộc tính ‘What is problem?’: “Vu Manh Thang update”. Click Save button. Sau đó kiểm tra Audit trail → Hệ thống đã log action “save” của user Vu Manh Thang.
- Quay lại browser windows đầu tiên – của user Nguyen Nhu Anh, click Save button → Hệ thống hiện cảnh báo, nội dung cảnh báo rất đúng. Nhưng khi kiểm tra lại audit trail thì hệ thống vẫn lưu action ‘Save’ của user Nguyen Nhu Anh. Check lại thông tin trong cùng session ‘What is problem?’ thì lại là “Nguyen Nhu Anh update”. Nhưng khi mở record đó trong new session (new windows) thì thông tin ‘What is problem?’ lại là “Vu Manh Thang update” trong khi audit trail thì Nguyen Nhu Anh lại là người lưu sau cùng. → Rất conflict trong msg và action cũng như dữ liệu show cho người dùng.

3. Web application testing Tips

- Know Third-Party Apps:

There are many third-party applications that can be embedded on our app and with end users, these are part of our app:

- Live chat
- Search plug-ins
- Embedded videos or audio players
- Blogs, forums and message boards
- ...

Khi app có link với một third-party app: cần test integration between our app – third-party app để make sure là nó hoạt động như mong đợi.

4. Web Link Validator tool

- What is Web Link Validator tool?
 - The software performs a thorough analysis of Web site pages and includes the following checks:
 - finds broken links (including those using JavaScript and Flash)
 - orphaned files
 - HTML coding and spelling errors
 - slow-loading
 - outdated and small-sized pages
 - switch between pages



4. Web Link Validator tool

- Features of Web Link Validator:
 - Ability to check over 100,000 links to files, HTTP, HTTPS and FTP resources
 - Support for JavaScript and Macromedia Flash (.SWF files) hyperlinks
 - Alternative Internet Explorer-based verification engine
 - Finding spelling errors with the built-in spell checker
 - Ability to create page rules to confirm the presence or absence of specific display text, scripting, forms, etc.

4. Web Link Validator tool

- Download this tool:
<http://www.relsoftware.com/wlv/downloads/>
- Example: report is delivered by Web Link Validator tool
- **Demo: Web Link Validator - Report.htm**



References

- Reference:

<http://www.softwaretestinghelp.com/web-application-testing/>
<http://www.ibm.com/developerworks/downloads/r/appscan/>

- Recommended readings

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