



ENHANCING SOFTWARE QUALITY

COMPATIBILITY TESTING – A MUST DO OF THE WEB APPS

PREPARED BY : PREMALATHA.S & KOKILA.E

TABLE OF CONTENT

1 THE NEED.....2

2 THE IMPACT.....2

3 THE IMPORTANCE3

4 COMPATIBILITY TESTING - THE CHECKLIST5

5 THE STRATEGY6

5.1 TEST RESOURCE MANAGEMENT..... 6

5.2 COMPATIBILITY TARGETING 6

5.3 PLANNING 6

5.3.1 Define scope, vision, objectives of compatibility platforms..... 6

5.3.2 Define & manage the process to investigate and prioritize the environment to be tested . 6

5.3.3 Test Scheduling..... 7

5.3.4 Virtualization technologies..... 7

5.4 TESTING 7

5.5 COMMUNICATION 8

5.6 REPORTING 8

6 METRICS9

6.1 MAXIMUM HITS 9

6.2 COMPATIBILITY TEST COVERAGE 9

6.3 COMPATIBILITY ISSUES LOGGED TO RATIO 9

7 FOLLOW-UP9

8 CHALLENGES 11

9 BENEFITS 11

10 COMPATIBILITY TESTING – THE ROAD AHEAD 12

1 The Need

Today's technology driven business demands a software application to work with diverse array of hardware configurations, operating systems, web browsers and browser versions.

As QA experts, we need to thoroughly analyse the compatibility issues and come up with decision making results, thereby figuring out necessary alterations/additions required to make the application compatible with the computing environment.

Compatibility testing process involves creating hardware and software configurations, designing and running tests in real environments to ensure that application is compatible with various hardware, operating system, databases and browser versions.

This paper focuses on the browser compatibilities on different operating systems with the supported java versions.

2 The Impact

Web sites reflect the company's professional image. If the site renders improperly or not at all, the company's reputation can be tarnished. Over the years, there have been various reports and studies about the importance and need for an ever-expanding menu of features and functions — an element that has never been given its just due regarding the importance of web site performance and its effect on the customer experience, actions and satisfaction of users.

When software is not compatible with latest hardware devices, then there is no point in hardware up gradation. Because the main reason for upgrading hardware is to make the work faster and more efficiently than before.

- When software is not compatible with different browsers & browser versions, users will lose the feel of reliability in the software for further use.
- When software is not compatible with latest peripherals, customer may experience serious damage to hardware.
- When software is not compatible with different database versions, this may cause interoperability issues which results in existing feature behaves differently in the new environment.
- When software is not compatible with network, user may experience performance and bandwidth issues.

Sales and support of a new software product can be seriously complicated by compatibility problems that emerge when the product enters into the market. The main challenges are the negative client feedback and high cost of customer support due to incompatibility between the product and other popular software applications and operating systems already used by the clients.

In contrast, a professional looking site will make visitors feel more comfortable, stay longer and browse more pages. And because of this increased credibility, they are more likely to purchase the products and services that they are looking for from the vendor. The answer to the problem is a comprehensive compatibility testing.

The consequences for financial service firms with underperforming sites are higher channel costs, lost sales and a decrease in user willingness to recommend.

The impact of poor web site performance is large. Fifty per cent of online brokers who are conducting a transaction would use the phone or branch if they could not conduct their transactions online. Twenty-nine percent of online US adults researching a financial product would meanwhile go to a competitor's site if they were unable to efficiently view content at a financial service web site.

The ultimate effect of poor performance is a decrease in willingness to recommend a firm, with 48% of online bankers and brokers saying that poor performance had an impact or significant impact on their likeliness to recommend a firm's services to a friend or family member.

3 The Importance

Compatibility testing can help developers understand the criteria that their system/application needs to attain and fulfil, in order to get accepted by intended users who are already using some OS, network, software and hardware etc.

It also helps the users to find out which system will better fit in the existing setup they are using. Also, helps in figuring out necessary changes/modifications/additions required to make the system/application compatible with the computing environment.

To determine where we should focus in our testing effort, let's look at the OS, browser market share.

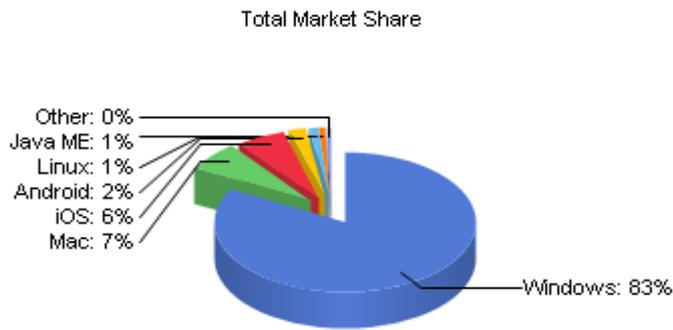


Fig. 1 Usage share of Operating Systems. August, 2012

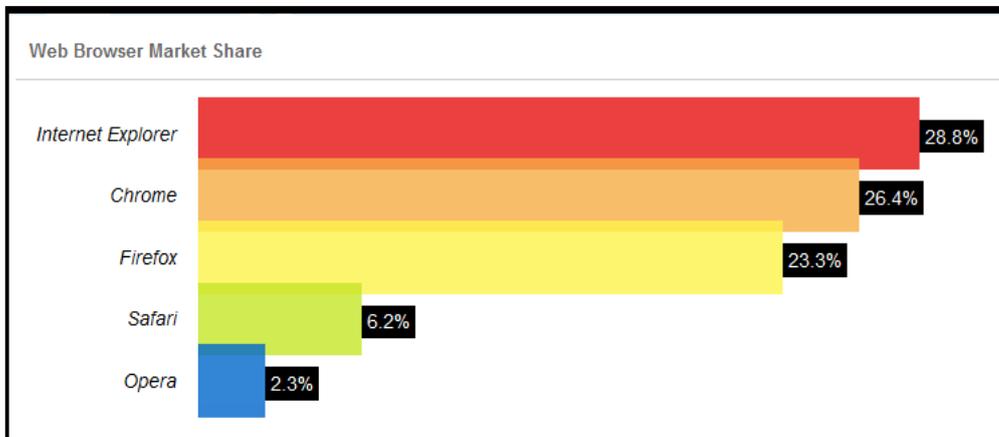


Fig. 2 Top 5 popular browsers with high market share

Source: http://en.wikipedia.org/wiki/Usage_share_of_web_browsers

With the given statistics it is clear how crucial is to ensure the applications to be compatible on the top OS and browsers.

Generally a browser should be tested if it meets one of the following criteria:

- It is used by a significant portion of sites users and is in common, widespread usage.
- It is the default browser on the latest version of Windows or Mac OS X.
- It is a newly released browser which is expected to quickly gain a significant portion of browser market share, e.g. the latest IE, Firefox or Google Chrome.
- After reviewing the data against those criteria, the browsers are selected for inclusion for testing most sites.

4 Compatibility Testing - The checklist

Compatibility testing should ensure that

- Users have the same visual experience irrespective of the browsers through which they view the web application.
- In terms of functionality, the application must behave and respond the same way across different browsers.

To decide what we need to test we need to understand what is likely to break. The current batch of web browsers has a set of commonly known bugs and differences. If you understand these differences, you can go a long way to understanding why pages render differently in different browsers. Internet explorer has a large number of CSS layout issues and rendering bugs

What do we test really in compatibility testing? The following attributes (but not limited to) are validated:

- Add, remove, update items
- Applets
- Copyrights
- CTRL operations
- Drop-down menu links
- Drop-down controls selections
- Expand/shrink folders (or menus)
- Font style and sizes
- Form data submission
- Images render correctly
- JavaScript
- Login, logout, file upload and download functions
- Menu links and page body links
- Mouse hover and cursor changing verifications
- Page layout and positioning
- Radio buttons, checkboxes, text area, text editable
- Select all, copy and paste
- Submit button handling (including error handling)
- Tab selections and corresponding descriptions

5 The Strategy

1. Test Resource management
2. Compatibility targeting
3. Planning
4. Testing
5. Communication
6. Reporting

5.1 Test Resource management

Track of all browsers, platforms and plugins present in the enterprise environment, with appropriate system details and contact information for personnel responsible for testing and support.

5.2 Compatibility targeting

Identify platforms that are critical to the business flow of the organization based on monitoring of the data in the major OS and browsers and their trends. Create a list of core, critical platforms and browsers to be tested for each deployment.

5.3 Planning

Test Planning, Setup & Scheduling

5.3.1 Define scope, vision, objectives of compatibility platforms

Plan, establish a goal and set the testing requirements clearly. Understand the end user requirements and select the system configurations accordingly. Detailed test reports including test execution and defect tracking reports should be prepared. Identify the important content in the application to be tested and prioritize the testing activities. Use analytical risk-based testing strategies to achieve objectives.

5.3.2 Define & manage the process to investigate and prioritize the environment to be tested

This can be obtained through mobile market share or from business preference to conduct the test.

Based on the customer requirement, the stable version of browser and OS is to be tested and analysed from the given platforms/browsers. The success of compatibility testing lies on the factor that in which OS/browser the user gets a good user experience with majority of the features of the website is fully explored.

Conduct surveys to collect information about most widely used browsers and software's. Strategy for selecting the test platforms is based on monitoring of the newly released OS, browsers and jre versions. Prioritization is also based on the market shares of the OS and browsers from the recent surveys.

5.3.3 Test Scheduling

Create compatibility testing schedules that permit enough time to fully test the core functionalities before each deployment milestone.

5.3.4 Virtualization technologies

In cross-browser compatibility testing, it is necessary to have several environments set. Although having virtual machines is a good choice, it often becomes a hassle to switch between environments. There are some helpful tools that can reduce all this configuration work.

A complete test lab with the virtual machines is setup. Mac machines with the required setup done and set ready for execution. The test scripts are exported from QC and the test suite is prepared for execution.

Virtualized desktop users have the ease of mobility - they can access their desktop from anywhere by logging in as a unique user. Users can then perform the same tasks and use the same applications that would be accessible on their normal workstation.

Tasks such as plugin updates and patch management can be remotely applied only once to effect changes to multiple virtualized desktops. It offers greater workplace efficiency, lower costs and increased scalability.

5.4 Testing

The testing phase includes the tests that the team runs as well as limited pilot deployments.

- It would be ideal to start the execution by testing the product in a combination which has more priority. Because it is easier to debug and resolve issue in one combination, this will help resolve compatibility issues in a systematic way.
- Check end to end functionality in all platforms at least once.
- Regress entire test suite in all combination

The following attributes are checked in the java based application

- Java script errors
- Links
- Page layout in different resolutions
- All images and alignment
- Page styles
- Date formats
- Imports from different file formats
- Exports to different file formats

Defects found in these areas are logged and screenshots are attached. The defects are linked to multiple combinations of OS and browsers if it appears in those.

5.5 Communication

Frequently communicate schedule and testing status with the test team and stakeholders.

Clearly communicate testing configurations and goals with testers.

During the test engagements, customer is updated with progress at every stage and finally at the completion of testing a comprehensive test report that includes all tested configurations and details of all the bugs and incompatibilities discovered is provided.

Categories of defects found can be broadly categorized into three categories namely functional defects, browser issues and test case defects. Any further clarifications on the issues are clarified and immediately addressed in the next release.

A progress status report on the compatibility matrix is prepared and shared with the client.

5.6 Reporting

Test results are recorded and dashboard created with accurate compatibility data.

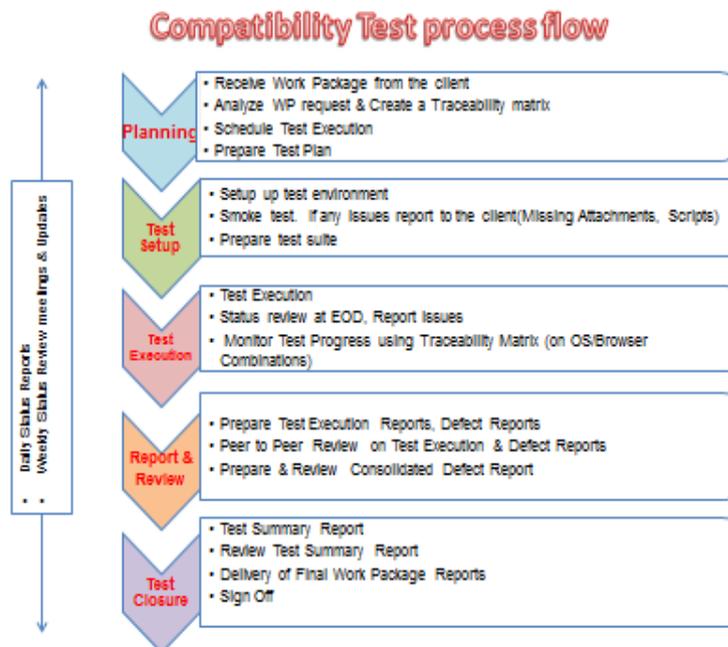


Fig 3. Compatibility Test Process Flow

6 Metrics

A few of the metrics that are derived from the compatibility testing process is furnished below.

Value addition that the compatibility testing gives is based on the derived metrics.

6.1 Maximum Hits

This metrics is to evaluate which browser is the most popular among users. This metrics is used to decide on prioritization of testing on different combinations. Firefox has 801m; Chrome has 622m and IE has 1.82b hits. So Priority Links of Firefox can be calculated as $\frac{\text{\#Hits of Firefox}}{\text{Total \#Hits}} = \frac{801}{801+622+1820} = 0.246$

6.2 Compatibility Test Coverage

This metrics is an indication of the compatibility completeness of the testing. We do spend time more on tier 1 combination and also perform devote little time on tier 2 combination. This actually gives exact information on which OS-Browser combination are under testing and how much have been completed.

6.3 Compatibility issues logged to ratio

Not all issues logged as compatibility problem is not converted into defects. There may be JavaScript or layout problem in few OS-Browser combinations. Depending on the customers, sometimes bad layout or harmless JavaScript error is acceptable as long as the page functions. So it is important for the team to know the customer focus and quality of issues they logged.

Inferences (based on the test results of our case study)

- Application is faster in Firefox compared to other browsers
- Performance of the application has improved tremendously which helps in faster execution
- Testing in Windows 8 developer edition/ IE 10 Beta brought out more bugs as in IE6
- Application is more stable in Firefox 3.6 & higher versions, IE latest versions and Safari
- Java applets are not supported in Chrome. Some features of the application throws UI issues.

7 Follow-up

From our compatibility testing assignment, the customer has fine-tuned the application and addressed the browser issues.

All the functionality issues are addressed and the success story continues for the latest releases of browsers, OS and java plugins.

COMPATIBILITY TESTING | 2014

– A MUST DO OF THE WEB APPS

After reviewing the data against those criteria, the following browsers are suggested for inclusion for testing most sites:

| Browser | Reason for inclusion in test matrix |
|------------------------|---|
| Internet Explorer 8.x | Most common browser in use today. |
| Internet Explorer 7.x | Second most common browser in use today. |
| Firefox 14.0 | Latest version of Firefox |
| Safari 5.x | Default browser on Mac OS X. |
| iPhone & iPad | Uses webkit, the largest single mobile browser. |
| Google Chrome (latest) | Chrome has significant, rising market share |

Table1. Suggestions for test matrix

If your sites are developed on Macs, you can almost guarantee there will be issues in internet explorer. If your site is developed on Windows, the opposite applies and Safari, Chrome, Firefox and IE6 will probably be broken.

Compatibility testing plays a crucial role for the customer satisfaction and improving the market share of the web applications. It's a **but a vital contributor to the business, focused on improving business value and performance.**

Here below we have a list of tools that helps us in our compatibility testing.

| Tool Name | Description |
|---------------|--|
| Browser Shots | <ul style="list-style-type: none">• One of the best web – based tool to check cross browser compatibility issues of a website• Supports Firefox, IE, Opera, Safari on Windows and Firefox, Konqueror, Opera on Linux and Firefox, Safari on MacOS |
| Litmus | <ul style="list-style-type: none">• Provides cross-browser testing solutions• Makes testing possible with 24 browsers |

| | |
|--------------------|--|
| Browser Photo | <ul style="list-style-type: none">• A commercial web-based tool from Net Mechanic which allows testing on 24 browsers across different platforms• It also catches HTML errors which may cause incorrect rendering across browsers |
| Cloud Testing | <ul style="list-style-type: none">• A commercial web – based cross browser testing tool.• Allows testing the website in IE (6, 7 & 8), Firefox (2.0, 3.0 & 3.5), Google Chrome (2.0 & 3.0) and Opera (9.6 & 10). |
| Adobe Browser Labs | <ul style="list-style-type: none">• A commercial web – based tool from Adobe which allows getting cross – browser screenshots for your website |

8 Challenges

To have a smoother testing process compatibility testing should

- Good knowledge on the different OS and browsers
- Setting up of virtual machine environments
- Hardware setup for all type of configurations
- Always in the learning to observe the latest releases of browsers, OS and java environments
- Network bandwidth to accommodate the setup
- Sufficient testing time allocation
- Diversity in the available browsers and end-user computer configurations including hardware as well as software makes choosing the test set difficult
- Differences in the available bandwidth and connectivity speed
- Resource availability and procurement is a challenge as it depends on the scale of the application under test

9 Benefits

- Minimum investment in test infrastructure
- Access to expert technical resource

- Quick turnaround time service delivery
- Flexible and cost effective service
- Significant reduction in time taken per testing iteration. Savings in manpower & associated costs, owing to reduced manual testing efforts (potentially up to 70%)
- Improved regression test coverage within short time frame
- Ensure the chosen technology is highly responsive to your business (low or zero latency enterprise)
- Ensure technology's compatibility in the existing process, people and infrastructure
- Vendor neutral solution validation, simulation and “Business + Technology” compatibility tests and checks
- Reduce project delivery times and development and maintenance costs through effectiveness and efficiency
- Improve ROI through creation and reuse of enterprise assets
- Lower total technology cost of ownership by leveraging technology investments across multiple projects

10 Compatibility Testing – The Road Ahead

As the technology is changing rapidly, the application designers believe to give the best features and functionalities to the applications. Users have different platforms and browsers. Hence to avoid loss of business and reputation it is very important to pay attention to cross browser issues.

Our compatibility framework is based on proven testing methodologies and experience, powered with framework comes with the following features:

- Ready to deploy framework for Compatibility testing
- Create and execute automated tests for compatibility testing
- Leverages free ware open source tools
- Jump start kits enables faster time to market
- Automated, Re-usable Framework to reduce your Compatibility Testing overheads
 - Comprehensive, pre-built library of commonly used scripts & functions
 - Automated tools to compare webpage layouts, text, images and other UI controls across multiple end-user device configurations
- Proactive monitoring of end-user device configurations
 - New releases and service packs for OS, Internet browsers and other run-time controls

COMPATIBILITY TESTING | 2014

– A MUST DO OF THE WEB APPS

- Seamless updates to compatibility matrix to ensure high quality service delivery

| Key Levers | With Compatibility Framework | Value Additions |
|------------------------------------|------------------------------|--|
| Delivery Cycle | Reduced by 30% | <ul style="list-style-type: none">• Streamlined process cycle time• Ensures high quality service delivery |
| Test Execution Phase | Faster by 20% | Automated, Re-usable Framework Execute Automated Tests |
| Quality Control / Defect Detection | Increased by 25% | Jump Start Kits - Known failure patterns across different OS/Browser combinations |
| Reporting | Faster by 40% | Proactive monitoring of end-user device configurations |
| Testing ROI | 50-60% Savings | Reduces your Compatibility Testing overheads |

COMPATIBILITY TESTING | 2014

– A MUST DO OF THE WEB APPS

About Indium:

Indium Software is exclusively focused independent software testing services firm since 1999. Over the years, Indium mastered objective methods that minimize the risk of failure of applications and software products. With a global headcount of over 300 employees, Indium works for a mix of marquee Enterprise and ISV clients spread across the globe. Indium is aggressively pursuing the Social, Mobile & Cloud agenda to make these the core of our next wave of service specialization.

Contact us:

USA - Indium Software Inc.

Corporate Office California

Suite 210, 1250 Oakmead Parkway
Sunnyvale, CA - 94085.
Phone: +1(408) 501-8844
Fax: +1(408) 501-8808

Atlanta

Crown Office Suites,
1870 The Exchange, Suite 100,
Atlanta, Georgia 30339. USA
Phone: +1(770) 989-7302,
+1(678) 608-0809

INDIA - Indium Software (India) Limited

Global Delivery Headquarters Chennai

VDS House
41, 2nd Floor
Cathedral Road
Chennai - 600 086.
Phone: +91-44-2811 6330
Fax: +91-44-4210 4033

Prince Arcade Building
22-A, 3rd floor
Cathedral Road
Chennai – 600 086.
Phone: +91-44-4347 7200

Steeple Reach,
Old No. 25, New No. 39,
Cathedral Road, Chennai –
600 086.
Phone: +91-44-4347 7122

Bengaluru

Salarpuria Adonis, 2nd Floor
Binnamangala, 3/1, Old Madras Road
Kadranapalya, Indira Nagar
Bengaluru – 560 038.
Phone: +91-80-6784 7500

New Delhi

F-1/5 Okhla Industrial Area,
Phase-I,
New Delhi – 110 020.
Phone: +91-11-6613 0400

Sales Inquiries

americas.sales@indiumsoft.com
apac.sales@indiumsoft.com
emea.sales@indiumsoft.com
india.sales@indiumsoft.com
sales@indiumsoft.com

General Enquiries

careers@indiumsoft.com
info@indiumsoft.com