# DOCUMENTED APPROACH FOR CROSS BROWSER COMPATIBILITY

# INDEX


| Sr No | Topic Name |
|---|---|
| **1** | **Introduction to Cross Browser Compatibility Testing** |
| | 1.1 Definitions |
| | 1.2 History |
| | 1.3 Browser and Operating Systems |
| **2** | **Importance of Cross Browser Compatibility Testing** |
| **3** | **Challenges & Issues in Cross Browser Compatibility Testing** |
| | 3.1 Challenges in Cross Browser Compatibility Testing |
| | 3.2 Issues in Cross Browser Compatibility Testing |
| **4** | **Approach towards Cross Browser Compatibility Testing** |
| | 4.1 Goal of Cross Browser Compatibility Testing |
| | 4.2 Analysis for Cross Browser Compatibility Testing |
| | 4.3 Time to start Cross Browser Compatibility Testing |
| | 4.4 Points to be considered for Cross Browser Compatibility Testing |
| | 4.5 Browser and Platform Statistics |
| | 4.6 Methodology for Cross Browser Compatibility Testing |
| | 4.7 Checklist for Cross Browser Compatibility Testing |
| **5** | **Reports** |
| **6** | **Conclusion** |
| **7** | **Reference** |

# 1. INTRODUCTION :-

Web applications are playing an ever increasing role in our daily lives. From entertainment to business workflow and from commerce and banking to social interaction, web applications are rapidly becoming a feasible, when not the dominant option for conducting such activities. Web applications are typically accessed through a web browser. Currently, users have the choice of using several web browsers, with the implicit expectation that web applications will behave consistently across all different browsers. Unfortunately, this is often not the case. Web applications can differ in look, feel, and functionality when run in different browsers. We call such differences, which may range from minor cosmetic differences to crucial functional flaws. A good Web site is more than just something to look at, it is functional interactive and flawless. As technologies are becoming smart so we need to be smarter enough to utilize them. With the rapid evolution of web technologies, the complexity of web applications has also grown up. Specially making a web application that works well with cross browser is a great challenge. Clearly, cross-browser means something works with all versions of all browsers to have existed since the web began. By this paper we have pointed out some reasons why applications behave or appear differently in different browsers because if you know the cause, you can get a solution.

## 1.1 Definitions :

**1) Browser**

Browser is software application where we can retrieve, read, display the data on the World Wide Web. Browser works as Client which runs on the computer. There are different browsers in the market like IE, Chrome, Opera, FF, and Apple Safari. Every browser has their own different version, Font type, Font size, different plugin. Internet users have wider choice of browsers when it comes to surfing the net.

**2) Browser compatibility**

Browser compatibility testing is process by which we test user experience with a web application or website. Usually we want to make sure that users have the same visual experience irrespective of type of browsers through which they view the web application.

In terms of functionality, look and feel, the application must behave and respond the same way across different browsers.

**3) Cross Browser Compatibility**

The term Cross Browser refers to the ability for a website, web application or a HTML construct to support all the web browsers. It is a support that allows a website or web application to be properly rendered by all browsers. The unique challenge of achieving this goal lies in the nature of the medium itself. Basically, Browser Compatibility Testing can be verified for the following areas, Page Layout, Navigation, Color & Graphics, Multimedia (Audio & Video), Content Presentation, Functionality and Accessibility.

## 1.2 History :

### 1) Background

The history of cross-browser is involved with the history of the "browser wars" in the late 1990s between Netscape Navigator and Microsoft Internet Explorer as well as with that of JavaScript and JScript, the first scripting languages to be implemented in the web browsers. Netscape Navigator was the most widely used web browser at that time and Microsoft had licensed Mosaic to create Internet Explorer 1.0. New versions of Netscape Navigator and Internet Explorer were released at a rapid pace over the following few years. Due to the intense competition in the web browser market, the development of these browsers was fast-paced and new features were added without any coordination between vendors. The introduction of new features often took priority over bug fixes, resulting in unstable browsers, fickle web standards compliance, frequent crashes and many security holes.

### 2) Creation of W3C and Web Standardization

The World Wide Web Consortium (W3C), founded in 1994 to promote open standards for the World Wide Web, pulled Netscape and Microsoft together with other companies to develop a standard for browser scripting languages called "ECMAScript". The first version of the standard was published in 1997. After the standardization of ECMAScript, W3C began work on the standardization of Document Object Model (DOM). By 2005, large parts of W3C DOM were well-supported by common ECMAScript-enabled browsers, including Microsoft Internet Explorer, Opera, Safari and Gecko-based browsers (like Firefox, SeaMonkey and Camino).

### 3) This Century

In the early part of the century, practices such as browser sniffing were deemed unusable for cross-browser scripting.The term "multi-browser" was coined to describe applications that relied on browser sniffing or made otherwise invalid assumptions about run-time environments, which at the time were almost invariably Web browsers. The term "cross-browser" took on its currently accepted meaning at this time as applications that once worked in Internet Explorer 4 and Netscape Navigator 4 and had since become unusable in modern browsers could not reasonably be described as "cross-browser". Colloquially, such multi-browser applications, as well as frameworks and libraries are still referred to as cross-browser.

## 1.3 Browser & Operating Systems :

**Most Used Browsers:**

| Sr No | Browsers |
|---|---|
| 1 | IE7,8,9 |
| 2 | Mozilla |
| 3 | Google chrome |
| 4 | Safari |
| 5 | Mini opera (mobile sites) |

**Most Used Operating Systems :**

| Sr No | Operating Systems |
|---|---|
| 1 | Windows XP |
| 2 | Windows vista |
| 3 | Windows 7 |
| 4 | Mac |
| 5 | Linux |
| 6 | Android |
| 7 | iOS (iPhone OS) |
| 8 | Blackberry |

## 2. IMPORTANCE OF CROSS BROWSER COMPATIBILITY TESTING :-

Nowadays Web site do critical part in internet whether web site is shopping site or it can be a company site. It is the mirror image for the company and it is mirror image for the shopping portal. If the site has browser display problem in major browsers which are used by customers/users then end user, customer will not visit the site and they might be loose interest of your site. So for that there should not be any browser related issue because visitor can use any browser and version of the browser which he/she would like to be use. The data about current browser usage varies depending on the source and the region, but in general, Internet Explorer, Firefox, Chrome, Safari, and Opera makes up most of the market share, with Firefox dominating the market. Firefox has over 42.9% market share, Internet Explorer 8 has 24.3% and Chrome having 25.6%. Successfully leveraging the ability of the web to reach a wide audience is complicated by the varied web client configurations used to interact with web content. That's why we have a scope to go for Browser Compatibility Testing and provide the solutions for the web client configuration compatibility issues.

# 3. CHALLENGE & ISSUES IN CROSS BROWSER COMPATIBILITY TESTING :

## 3.1 Challenge:

As we know it is not easy to test our web application on unreasonable number of browsers because complexity and hence the time and cost of testing a web application is directly proportional to the number of browsers on which the application is going to be tested. Decide number of browsers to be considering for cross browser testing.

$$C= (B* O + A) * T$$

where,
C=Complexity
A=Third party components
B=Different Browsers used for AUT
O= Number of OS
T= Types of testing Performed

## 3.2 Issues:

The Cross Browser Compatibility problem is almost as old as the web browser itself. There are several reasons for its genesis and growth in recent years. The major causes for browser compatibility issues are,

1. Multiple Browsers – Internet Explorer, Opera, Firefox, Safari
2. Different Browser Versions – Internet Explorer (6, 7, 8), Firefox (6.2, 7.0), etc
3. Different Computer Platforms – Windows, Mac, Linux, etc
4. Different Screen Sizes – From 800x600 pixels to 1024x768 pixels
5. Different Font Sizes
6. HTML Errors – Mistakes that break your pages
7. Browser Bugs – Little known errors cause big problems

Cross browser compatibility is widely recognized as an important issue among web developers but hardly ever addressed directly during the software development process. Typically web applications are developed with a single target client-side configuration in view and manually tested for a few more, as an afterthought.

# 4. APPROACH :-

## 4.1 Goal of Cross Browser Compatibility Testing :

The goal of browser compatibility testing is to ensure that the site renders without error on the target web browsers. Some minor rendering differences are expected from browser to browser, or within different versions of the same browser. Also ensure all the design and functionality is working fine.

## 4.2 Analysis for Cross Browser Compatibility Testing :

Depending on different aspects of the software process (like the number of developers working on the project and how much time is left on the project) there should be an analysis of the issues that are critical to the site versus the time needed to fix them and if they represent an obstacle to desired behaviors. This analysis is required to make sure critical issues are solved sooner than irrelevant bugs that might take more time to be fixed.

## 4.3 Time to start Cross Browser Compatibility Testing :

As a best practice, it is useful to choose just one browser/platform and make all the testing on it during the development process. This browser should be the same as the one used by the development team. It is recommended that browser compatibility testing stage be executed at the end of the development process for two reasons:

**a)** Most of the development process will be finished, including resolved bugs. Consequently, there's a major probability that some issues will not be related to a specific browser but to the site itself.

**b)** Work schedule is better structured. It will be easier to focus on testing a site using Chrome for Mac for 5 hours and then Internet Explorer 8 for Win7 for another 5 hours than to focus on testing one functionality in each platform every time a new module is released.

## 4.4 Points to be considered while Cross Browser Compatibility Testing :

There are many elements that will not change across browsers (like images size, fonts color, texts padding and pages background). However, there are many other elements that will need more attention:

**a)** Font size and font style: some browsers overwrite these properties

**b)** Special characters with HTML character encoding

**c)** Controls alignment: bullets, radio buttons and checkboxes might not be correctly aligned

**d)** Information submitted to the database: if there are forms that interact with the database, it is necessary to verify that the information is correctly stored

**e)** HTML5 video format: users must be aware that depending on the player or plugin used, not all the browsers are able to play all the existing video formats. For example, Internet Explorer 9 will only play .mp4 videos and Firefox 9 will allow only .webm videos while Chrome will be more flexible (.mp4, .webm, .ogv and other video formats). This is an issue that should be taken care of by the development team and the QA team.

**f)** Text alignment: some dropdown items will look good in Internet Explorer while in Safari they might appear too close to the upper margin.

**g)** Plugins developed by external sites: some jQuery plugins might not work correctly, like print functionalities in IE8 or carousel rotation when playing videos.

**h)** CMS compatibility: be sure to know the browsers that the Content Management System supports and focus mostly on that browser versus other ones.

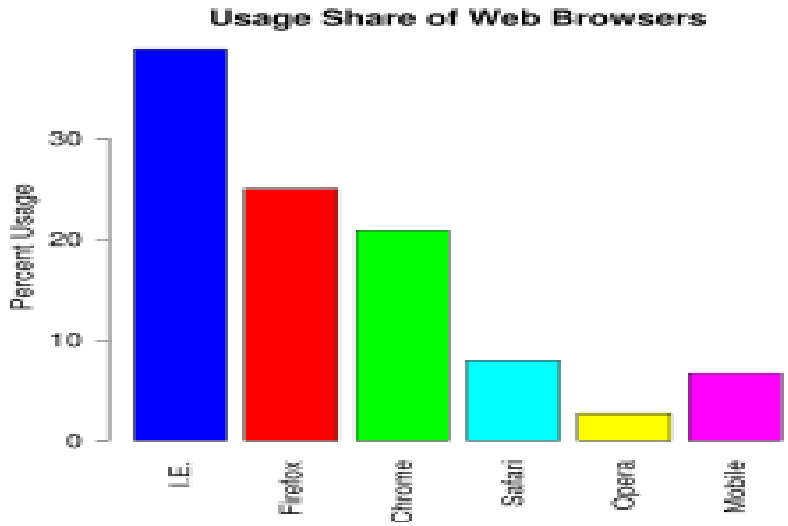
## 4.5 Browsers & Platforms Statistics :

The browser and platform selection should be specified during the Requirements Gathering process, this way the whole development team, QA team, and client will be aware of which browsers will be used from the beginning of the software development process. This is the time in the process where you should do research on the most used browsers in order to make a suggestion on which ones should be tested.

To determine where you should focus your testing effort, let's look at the browser market share.

### 1. Browser Statistics and Trends:

Statistics are important information. From the statistics below, you can read the long term trends of browser usage. We see that Google Chrome, Firefox, and Internet Explorer are the most popular browsers today.

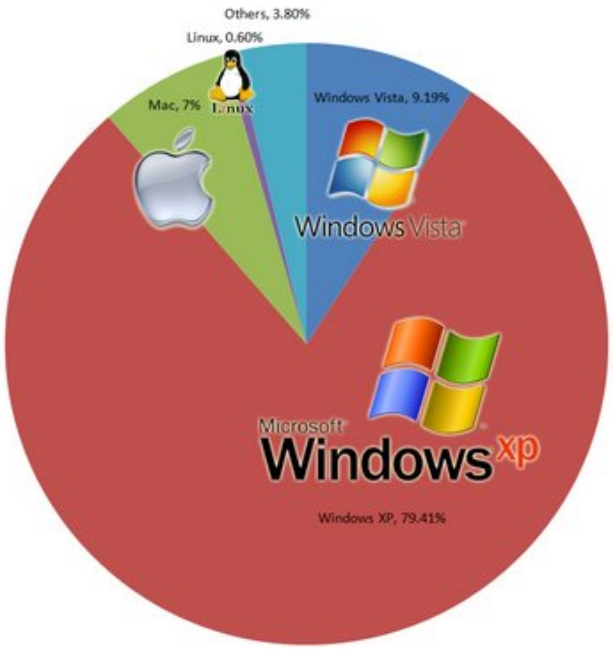


**Browser Statistics :**

| 2012 | IE | Firefox | Chrome | Safari | Opera |
|---|---|---|---|---|---|
| **October** | 16.1 % | 31.8 % | 44.9 % | 4.3 % | 2.0 % |
| **September** | 16.4 % | 32.2 % | 44.1 % | 4.2 % | 2.1 % |
| **August** | 16.2 % | 32.8 % | 43.7 % | 4.0 % | 2.2 % |
| **July** | 16.3 % | 33.7 % | 42.9 % | 3.9 % | 2.1 % |
| **June** | 16.7 % | 34.4 % | 41.7 % | 4.1 % | 2.2 % |
| **May** | 18.1 % | 35.2 % | 39.3 % | 4.3 % | 2.2 % |
| **April** | 18.3 % | 35.8 % | 38.3 % | 4.5 % | 2.3 % |
| **March** | 18.9 % | 36.3 % | 37.3 % | 4.4 % | 2.3 % |
| **February** | 19.5 % | 36.6 % | 36.3 % | 4.5 % | 2.3 % |
| **January** | 20.1 % | 37.1 % | 35.3 % | 4.3 % | 2.4 % |

## 2. OS Platform Statistics and Trends :

Statistics are important information. From the statistics below, you can read the long term trends of operating system usage. We see that Windows 7 and Windows XP are the most popular operating systems.



**OS Platform Statistics :**

| 2012 | Win7 | Vista | NT* | WinXP | Linux | Mac | Mobile |
|---|---|---|---|---|---|---|---|
| **October** | 56.8% | 3.0% | 1.8% | 22.1% | 4.8% | 9.2% | 1.8% |
| **September** | 55.7% | 3.1% | 1.5% | 23.6% | 4.7% | 8.9% | 1.8% |
| **August** | 54.5% | 3.2% | 1.3% | 24.8% | 5.0% | 8.7% | 1.8% |
| **July** | 53.8% | 3.4% | 1.2% | 26.1% | 4.9% | 8.2% | 1.7% |
| **June** | 53.2% | 3.7% | 1.1% | 26.2% | 5.0% | 8.6% | 1.6% |
| **May** | 52.3% | 3.9% | 1.1% | 26.8% | 4.9% | 9.0% | 1.6% |
| **April** | 51.3% | 4.2% | 1.0% | 27.3% | 4.9% | 9.3% | 1.5% |
| **March** | 49.9% | 4.3% | 1.0% | 28.9% | 4.9% | 8.9% | 1.4% |
| **February** | 48.7% | 4.5% | 0.8% | 30.0% | 5.0% | 9.1% | 1.3% |
| **January** | 47.1% | 4.8% | 0.9% | 31.4% | 4.9% | 9.0% | 1.3% |

Generally a browser should be tested if it meets one of the following criteria:
1. It is used by a significant portion of a sites users, and is in common, widespread usage.
2. It is the default browser on the latest version of Windows or Mac OS X.
3. 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 following browsers are suggested for inclusion for testing most sites:

**Browser : Reason for inclusion in test matrix**

| | |
|---|---|
| Internet Explorer 9 | Most common browser in use today. |
| Internet Explorer 8 | Second most common browser in use today. |
| Firefox 16.0.2 | Latest version of Firefox |
| Safari 5.x | Default browser on Mac OS X. |
| iPhone & iPad | Uses webkit, the largest single mobile browser. |
| Google Chrome 23.0.1271.95 | Chrome has significant, rising market share |

## 4.6 Methodology for Cross Browser Compatibility Testing :

We wish it were easy to cure browser display problems, but fixing them takes time. Read the following steps to learn what you can do to make it easier.

**1. Set a Goal :**

It's hard to build a Web page that displays perfectly on every version of every browser running on every compute, And doing so may require to leave out features that you really, really want to have on your Web page. Building a Web page that's compatible with Version 1.0 of every browser would mean building a blank page filled with plain text.

So the first step to solving browser compatibility problems is to determine which browsers really matter to you.

**2. Avoid the Cutting Edge :**

The Web is hip; it's hot and exciting; it's radical. So many Web designers feel they have to build cutting-edge features into their Web page. That's a bad idea, because cutting-edge features are rife with browser compatibility problems, not to mention the impact they have on your page load time.

Web designers typically go through three stages of maturity: (1) I'm just learning; (2) I know it all, and I'm going to prove it by filling my site with cutting-edge features; (3) I've been burned by browser display problems, and only use what's compatible.

**3. Pay Attention to Browser Compatibility Report :**

HTML errors are the leading cause of browser display problems. Making sure your Web pages are error free is one of the most important steps to solve browser display problems. That means running an HTML validator, like HTML Toolbox, over every page in the site.

**4. Validate the Pages :**

Next to HTML errors, compatibility problems are the leading cause of browser display errors. We've already warned you about including cutting-edge features in your site, but compatibility dangers extend to all aspects of HTML.

HTML Toolbox includes a Browser Compatibility report that will identify HTML tags and attributes that aren't compatible with the three most recent versions of Netscape Navigator and Internet Explorer. Check the report and avoid HTML tags that aren't compatible.

## 4.7 Checklist :

| Sr No | Features |
|---|---|
| 1 | Application Functionality |
| 2 | HTML or XHTML validation |
| 3 | Page validations with and without JavaScript enabled |
| 4 | Ajax and JQuery functionality |
| 5 | Font size validation - Verify the fonts are usable in different browsers |
| 6 | Page layout in different resolutions |
| 7 | Check image display correctly, All images and alignment |
| 8 | Header and footer sections |
| 9 | Page content alignment to center, LHS or RHS |
| 10 | Page styles |
| 11 | Date formats |
| 12 | Special characters with HTML character encoding |
| 13 | Page zoom-in and zoom-out functionality |
| 14 | Different Operating Systems like Windows, Linux and Mac |
| 15 | Ajax and JQuery functionality |
| 16 | Test if any animated GUI |
| 17 | Check the Video setting Like (Screen resolution –Text, alignment, font etc.) |
| 18 | Check html validation, CSS validation are done by using different tools |
| 19 | Check Page content alignment to centre, LHS or RHS |
| 20 | check for the design throughout the website by referring the design document in all browser |

## 5. REPORTS :

**Maintain test status :**

We maintain our testing status for browser compatibility with the following format of tables :

**Browsers Against Application pages :**

| Browsers / App. Pages | IE9 | Mozilla | Safari | Chrome | Mini opera |
|---|---|---|---|---|---|
| **Page 1** | X | | | X | N/A |
| **Page 2** | | X | | | |
| **Page 3** | | | | X | |
| **Page 4** | X | | X | | X |
| **Page 5....** | | X | | | |

**Browsers against OS :**

| Browser / OS | IE9 | Mozilla | Safari | Chrome | Mini opera |
|---|---|---|---|---|---|
| **Windows XP** | N/A | | X | | N/A |
| **MAC** | N/A | | | X | |
| **Windows 7** | X | X | | | |
| **Linux** | X | | X | | X |

## 6. CONCLUSION :

As the technology is changing rapidly, the application designers believe to give the best features and functionalities to the applications. But most of the applications are not stand alone. Users have different platforms and browsers. Designers cannot assume that their application will run fine and display and work for all the browsers without cross browser testing. Hence to avoid loss of business and reputation it is very important to pay attention to cross browser issues. In this paper we have pointed out a few important concerns regarding this. As if we know the problem it is easy to plan out the areas that should be cross verified. Indeed it is hard to find out compatibility of your application for each existing browser. Hence the cross browser testing indeed a good way in this respect. Only then users will be able to get unbiased what the applications can deliver them.

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