Cross Browser Testing Using Automated Test Tools

Bhavnesh Kaalra[1]

Research Scholar of Singhania University[1]
[1]School of CS & IT – Singhania University
Distt. Jhunjhunu – Rajasthan, India

Dr. K. Gowthaman[2]

Deputy Director (T&D) [2], [2]Inter University Consortium
Indira Gandhi National Open University
Delhi, India

Abstract— **In today's world, one of the critical factors in every business success is its visibility in internet market. The need of an hour for every business is to have their respective website available (which could be an ecommerce website).**

It becomes difficult for web designers to ensure that the website will work flawlessly when rendered in latest browsers. Similarly it is also challenging for software testers to test the website in all the browsers. Through this paper we tried to explore various open-source and paid automated solutions for cross browser testing, available in the market. We did a critical comparison among the tools to see their usefulness and drawn conclusion. The study proves that cross browser testing becomes effective when automated tools were deployed during cross browser testing.

Keywords- Browser Compatibility; Web Compatibility; Browser Compatibility manual testing methods; Browser Compatibility automated testing methods

I. INTRODUCTION

Internet has reached billions of homes and as per the global internet report; there are 2.8 billion internet users worldwide [1]. Seeing the growing penetration of internet in day-to-day use, an establishment couldn't afford to miss the train. As more and more people are moving towards internet so is the trust going up. People prefer to do online shopping and other activities like hotel / air tickets / railway tickets booking, pay electricity, gas, water charges, credit card bills, and other types of bills, online banking etc. So, it becomes important for establishments (that sell products / services) to show their online presence over the internet to be in the race.

Another aspect of internet usage is the operating systems and softwares. Two software major giants – Microsoft® and Apple® keeps on launching new operating systems in the market. With the introduction of operating systems, there are other software organizations as well who are busy in introducing web browsers in the market. In fact the competition is really tough in terms of browser market.

There are many web browsers in the market, however currently five web browsers tops the chart. They are – Chrome, Internet Explorer, Firefox, Safari and Opera [2] [3]. Now coming back to the establishments, those are keen to be visible in the internet market place, in order for them to be visible in internet community; they have to have their own website displaying their products and/or services. The next challenge for a web designer is to design a web site that supports multiple browsers (at least top five) and multiple versions of each web browser.

This appears to be practically an inevitable challenge since the end user may or may not upgrade the latest version of the browser as it is launched. Consider a case where some users would be using Internet Explorer version 6 while some other version 7 or version 8 or version 9 or version 11. Some users would be fond of using Firefox browser versions whereas some other would be in favor of Chrome. So even if a web designer considers the website to support these top five browsers and a minimum of 4 different versions, it makes the combination as 20. That means while designing a website, a web designer has to make sure that the designed website's coding should support 20 different browsers. Similar challenge is with website tester since he has to test the website in 20 different browser versions.

The goal of our work in this paper is to explore open-source and commercial automated test solutions that support cross browser testing, compare them and highlight the features of the tools. Highlight the advantages that each tool provides and finally suggest the most effective and efficient cross browser testing tools.

II. CROSS BROWSER ISSUES IN WEBSITES

Let's now talk about some of the cross browser issues a web site faces when being rendered onto different browsers. Each browser parses the website code differently from each other. In other words, Internet Explorer will render a website differently than Firefox or Safari. This leads to the common question "Why does my website not look good in Internet Explorer but fine in FireFox?" [4].

- **Web objects distorted**

While viewing the website in different browsers, users have experienced the distortion of web objects – Menu items, web tables, drop downs, logos etc. Some user's experienced different font size altogether on different browsers, whereas another group of users faced background color scheme change in different browsers.

One user reported that the logo ticker in Firefox is not dropped down like it would be in Google Chrome [5].

**Fig 1:** Webpage in Google Chrome Vs in Firefox [5]
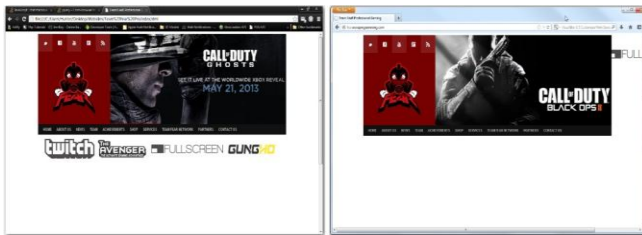
- **Cascading Style Sheets (CSS3) Cross Browser Issues [6]**

Since CSS3 is still in development, browsers such as certain versions of Internet Explorer don't support certain styles which can cause dramatic design differences depending on which browser the website is being viewed in.

   o **Box Shadows, Text Shadows and Rounded Corners** - Box shadows, text shadows and rounded corners are supported in Firefox and Chrome. Although the box shadow and rounded corner properties are now supported in IE9 and IE10, many people still use IE8 and previous versions which do not. Text shadows are supported in IE10 only.

Fig. 2: Round Corner Boxes Firefox Vs Chrome Vs IE8 [6]
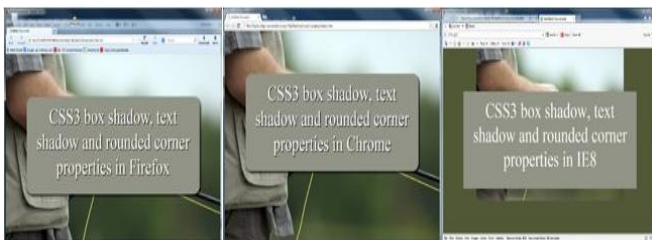
   o **Gradients** - Gradients are supported in Firefox and Chrome. Although gradients are now supported in IE10, versions 9 and previous do not.

Fig. 3: Gradient property in Firefox Vs Chrome Vs IE8 [6]

   o **Opacity** - Opacity is supported in Firefox and Chrome. Although this property is now supported in IE9 and IE10, versions 8 and previous do not.

Fig. 4: Opacity property in Firefox Vs Chrome Vs IE8 [6]

   o **Background Size** - The cover option for background size allows you to have a smaller background image that stretches to fit the screen. In this example an image with a width of 800px stretches to fit a 1920px wide screen. This element is supported in Firefox, Chrome and IE9-10, but not in Internet Explorer versions 8 and previous.

Fig. 5: Background cover property in Firefox Vs Chrome Vs IE8 [6]

- **JavaScript related Cross browser issues**

One of the web designers reported an issue that the simple Jquery ticker (using a pre-made JavaScript) to display tweets and other things works fine with Firefox, Chrome, IE9/10 but not with IE8 and older versions [7].

While JavaScript is heavily supported in the more popular browsers, there are plenty of users utilizing browsers

that do not support it. There can also be handheld devices not able to read JavaScript content [8].

- **Language support related Cross browser issues**

It is often observed that browsers face challenges in rendering non-English language web sites due to the extended character set used by these languages. In some instances, junk characters are being replaced with the actual language characters whereas in some instances a special character (?) or a blank space is being displayed.

- **Elements Not Correctly Positioned [8]**

This appears to be another frustrating issue for web designers. For example: vanishing backgrounds, shadows and borders etc. These are Z-index issues where target elements must have 'positive:absolute' or 'positive:relative' characteristics. These elements may not work when its set to 'position:static'.

- **Lack of Valid HTML / CSS [8]**

Web site is all about HTML and CSS standards while coding. High percentage of issues is either because of incorrect HTML coding or because of incorrect implementation of CSS.

The more a web designer understands about HTML and CSS, the greater chances of knowing when and why something isn't working.

- **Frames [8]**

Unexpected problems with frames are one of most common browser compatibility issues. It is very common that the frames distort very easily when subject to lower resolutions.

Finally, in this section we tried to highlight some cross browser issues which are easily visible while surfing the websites on different browsers and their respective browser versions. The issue list mentioned above is just an idea of what kind of cross browser issues appear when a website is rendered in different browsers. The list is just a tip of iceberg in the area of cross browser issues. More cross browser issues could be found on the internet in various blogs, and other discussion forums. In next section, we will try to explore various open-source and commercial automated test tools that are freely available and can help a software tester in performing cross browser testing.

III. CROSS BROWSER AUTOMATED TEST TOOLS EVALUATION

When it comes to verifying a website in a given list of browsers, it becomes challenging for a software tester due to following reasons:
- All web pages are to be verified one-by-one on all the browsers which is a time consuming activity. E.g. To

verify a website with 50 pages on 5 different browsers would require 250 (50 * 5) web pages to be verified by a software tester.
- Since software tester would be working on one machine, only one web page can be verified at any point-of-time. Software tester has to work on 5 machines if he wants to verify the same web page on 5 different browsers, which is not a cost-effective solution.
- Since the verification is to be done manually by carefully glancing at the web pages, it becomes very easy for a software tester to lose focus and miss out potential cross browser issues when the number of web pages for verification grows.

Instead, we tried to explore some automated solutions that can overcome the problems listed above. We found out certain tools that help in cross-browser testing. These tools helps speed up testing and proves reliable while reporting issues. Some of the tools are:

- IETester tool [9]
- Microsoft® Expression Web SuperPreview® tool [10]
- BrowserStack tool [11]
- BrowserShots tool [12]
- BrowserBite tool [13]
- CrossBrowserTesting tool [14]

Let's see the functionality of each tool one-by-one, in brief.

- **IETester Tool**

As the name suggests, this cross browser testing tool supports Internet Explorer versions. IETester is a free web browser that allows you to have the rendering and JavaScript engines of IE10, IE9, IE8, IE7 IE 6 and IE5.5 on Windows 8 desktop, Windows 7, Vista and XP, as well as the installed IE in the same process [15].

Home page of IETester has tool buttons, one each for an IE version. A user can either click on browser version specific tool button to launch the window or can simply click on "All IE Versions" tool button to pick and choose the browser versions.

The tool provides the software tester with flexibility of comparing the web page in different IE versions side-by-side. Additionally it provides an option to debug the code within the tool itself.

However the limitation with the tool is that it only supports IE versions and will not fit in a scenario where cross browser testing is to be performed on non-IE browsers also like Firefox, Chrome, Safari etc.

Fig. 6: IETester rendering a website in IE9 (as first tab) and IE10 (as second tab)
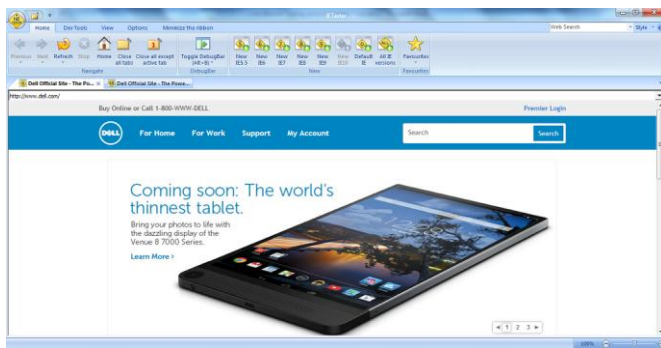
- **Microsoft® Expression Web SuperPreview® tool**

The tool developed by Microsoft® is again an Internet Explorer versions specific tool i.e. the software tester can render the website in Internet Explorer versions only. However the advantage of the tool over IETester is that the web page on two or more versions of Internet Explorer can be compared side-by-side. Some more features of the tool are:

- **Work on public URLs:** SuperPreview can work both on public URLs and on development pages as well (note: Adobe claims Browserlab will eventually work on local pages) [16].
- **Advanced Debugging Options:** SuperPreview not only views cross-browser anomalies, it also helps in figuring out what page elements are causing problems. SuperPreview provides tools that let users interrogate page elements thru the HTML DOM (document object model) to determine the source of incompatibilities [16].
- **Side-by-Side View & Overlay View:** SuperPreview provides different views for easy comparison of the web page from different browser versions. Side-by-side view helps in easy comparison whereas Overlay view can help verify the layout and web objects positioning in the web page [16].

Fig. 7: SuperPreview rendering a website in IE8 (as first tab) and IE9 (as second tab)

- **BrowserStack Tool**

Now-a-days cross browser testing is not limited only to desktop machines, i.e. Windows and Mac operating systems alone. It has grown to mobile and hand-held platforms as well like Android, Opera Mobile, iOS, Windows mobile etc.

The above two tools, IETester & SuperPreview are limited to Internet Explorer versions and if the cross browser testing involves non-IE browsers then other cross browser tools have to be evaluated.

One such tool is BrowserStack. The benefit of BrowserStack is that by paying a very minimal license fees, one can have access to 300+ browsers on different operating systems and devices. The browsers are available as a cloud solution and one need not install any additional software or hardware to access BrowserStack. BrowserStack can be accessed through any browser as a website and within the very same browser it provides the required browser window to test the web pages for rendering issues.

11 different types of operating systems are supported, where four are windows, four are Mac and three are mobile operating systems respectively.

The tool also integrates with selenium scripts. That means a software tester can upload automated test scripts for cross browser testing. Another feature is the desktop resolution, which can also be set up during testing.

**Fig. 8:** BrowserStack Tool window and the supported browsers on Win 7
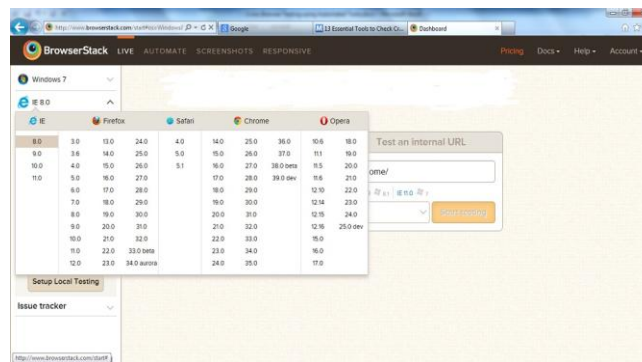
- **BrowserShots Tool**

BrowserShots tool works in slightly different way as compared to BrowserStack tool. In BrowserStack tool, the web page is displayed immediately in the required browser once the web page URL is submitted however in BrowserShots tool, one has to specify the web page URL and then select the browsers on which the rendering is to be verified and then submit the request. It works in asynchronous mode and provides the screenshots (as files) at later point of time. The provided files are auto-saved unlike BrowserStack screenshots where one has to manually save the results. It also supports various options to choose from, including screen size, color depth, JavaScript, Java and Flash.

The limitation of this tool is that it doesn't support any versions of Internet Explorer and Mac – Safari browser.

Fig. 9: BrowserShots Tool window and the supported browsers
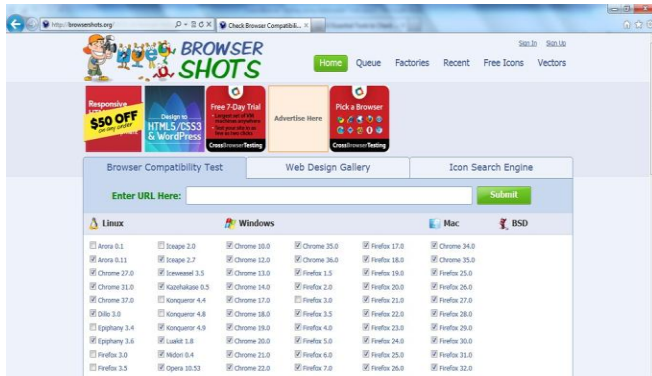
- **BrowserBite tool**

Similar to BrowserShots tool, this tool also generates multiple screenshots of a web page in different browsers (selected) and then displays the same within the window as smaller windows. One can select any one browser result and clicking on the same enlarges the window. The advantage of this tool is that it provides the option to highlight the cross browser issues which the tool has detected.

**Fig. 10:** Browserbite Tool window and the results of a test
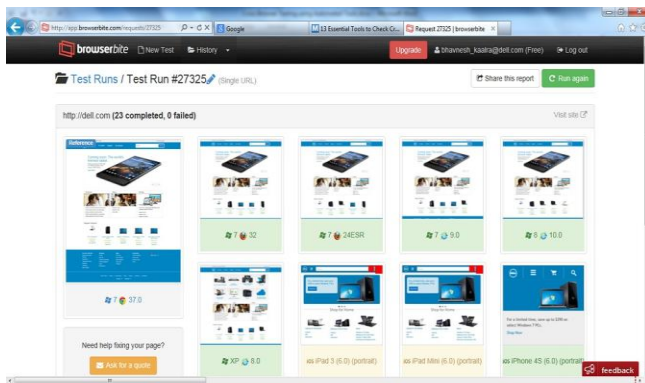
- **CrossBrowserTesting tool**

CrossBrowserTesting tool combines the functionality of BrowserStack and BrowserShots / Browserbite tools. Software tester can verify a web page rendering either on a single browser manually or automatically on the selected browsers. It also provides the integration with the selenium scripts. Software tester can interactively verify the web page layout and test AJAX, HTML Forms, JavaScript and Flash. Another good feature of the tool is that one browser result can be marked as base result and rest of the results can be

compared against this result. The differences can be marked as cross browser compatibility issues.

Fig. 11: CrossBrowserTesting Tool window
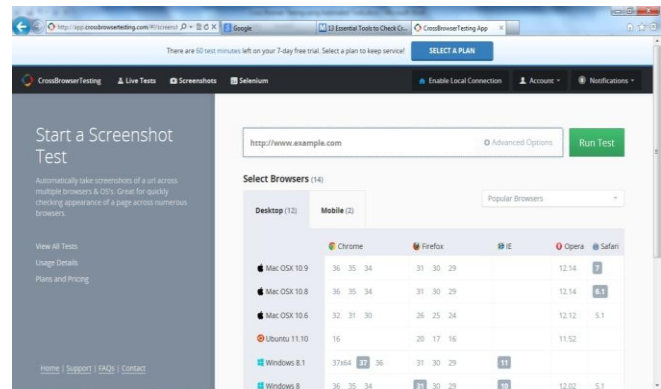

IV. CONCLUSION & FUTURE SCOPE

The tools evaluated in the previous section are not the only available tools in the market. In fact there are other advanced tools as well that provides a spider crawling feature. The feature helps navigating the web site code automatically by just providing the home URL and then listing out code related issues as well. Users are advised to explore other available tools in the market before shortlisting any tool for the compatibility testing.

The above six tools were shortlisted based on the following two parameters:

- For the sake of simplicity
- Be focused on rendering issues of a website

A compatibility issue detected by the tool:

Fig. 12: Rendering issue detected in IE9 in SuperPreview Tool
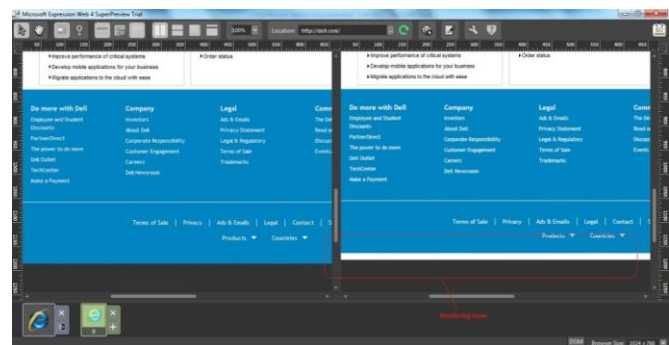
On comparing the above six tools, we found that the selection of tool is based on the cross browser testing requirements. Say if the target browsers are the various versions of Internet Explorer alone then IETester or SuperPreview can be employed. However if the cross browser testing is required on all top five browsers and their

versions then BrowserStack can be employed as it has 300+ browsers. If a side-by-side comparison is the need of cross-browser testing (requirement could be image / graphic comparison) then Browserbite or SuperPreview or CrossBrowserTesting tool can be used. Different features like screen resolution, screen size, color depth, JavaScript, Java, Flash etc. could also be used while using the respective cross browser testing tools.

References

[1] Global Internet Report 2014. Internet Society. http://www.internetsociety.org/sites/default/files/Global_Internet_Report_2014_0.pdf, pp. 19. May 2014

[2] Browser Statistics and Trends, W3Schools.com 2014. http://www.w3schools.com/browsers/browsers_stats.asp

[3] Usage share of web browsers. From Wikipedia, the free encyclopedia 2014. http://en.wikipedia.org/wiki/Usage_share_of_web_browsers

[4] Cross Browser Compatibility problems, inmotion 2014. http://www.inmotionhosting.com/support/website/browser-issues/cross-browser-compatibility

[5] Cross-browser Issue. Stackoverflow 2013. http://stackoverflow.com/questions/17768525/cross-browser-issue. Jul 2013.

[6] CSS3 Cross Browser Issues & How To Fix Them, Glendale Designs 2013. http://www.glendaledesigns.com/css3-cross-browser-issues/. Sep 2013.

[7] Javascript Cross browser Issue. Stackoverflow 2012. http://stackoverflow.com/questions/9644539/javascript-cross-browser-issue. Mar 2012.

[8] 5 Most Common Browser Compatibility Issues. BrowseEmAll 2014. http://www.browseemall.com/Articles/post/2014/04/24/5-Most-Common-Browser-Compatibility-Issues.aspx. Apr 2014.

[9] IETester. http://ietester.en.softonic.com/. 2014

[10] Microsoft - Expression Web SuperPreview. http://www.microsoft.com/en-in/download/details.aspx?id=2020. 2014

[11] BrowserStack - Live, Web-Based Browser Testing. http://www.browserstack.com/. 2014

[12] BrowserShots – Browser Compatibility Testing. http://browsershots.org/. 2014

[13] Browserbite - Automatic cross browser testing. http://browserbite.com/. 2014

[14] CrossBrowserTesting. http://crossbrowsertesting.com/. 2014

[15] Browser Compatibility Check for Internet Explorer Versions from 5.5 to 10. DEBUGBAR – The most Advanced Web Development Tool For IE. http://www.my-debugbar.com/wiki/IETester/HomePage. 2014

[16] Steven Guttman 2014. What's Super About SuperPreview? Microsoft Expression. http://msdn.microsoft.com/en-us/expression/ee307358.aspx