Browser Performance Tests

We put the latest web browsers head-to-head to try to find out which one is best!
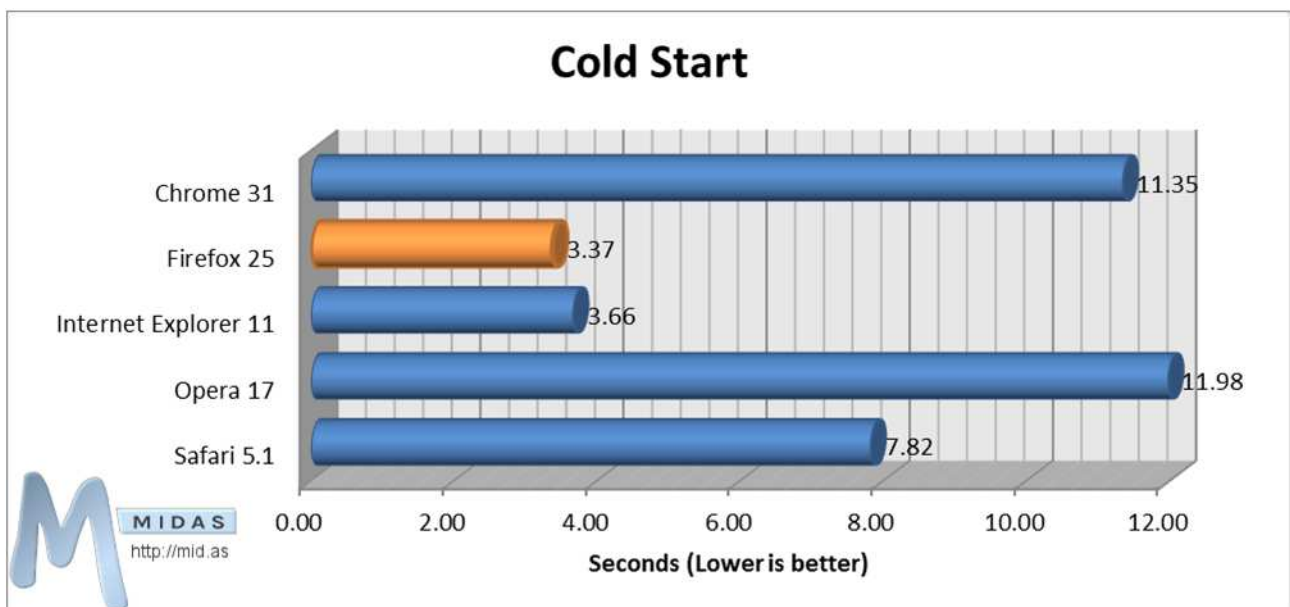
Browsers Tested

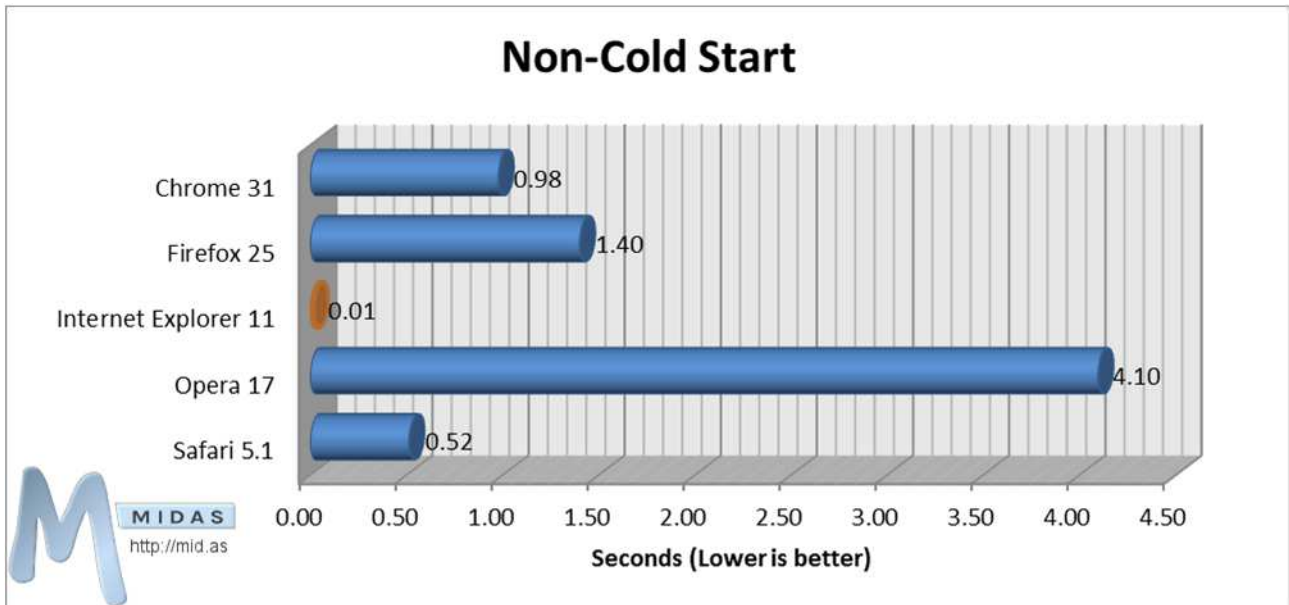| Google Chrome 31	Mozilla Firefox 25	Internet Explorer 11	Opera 17	Apple Safari 5.1

The Tests

We broadly tested four key areas of browser performance: Speed, Memory Usage, Compliance with standards, and Javascript Performance.
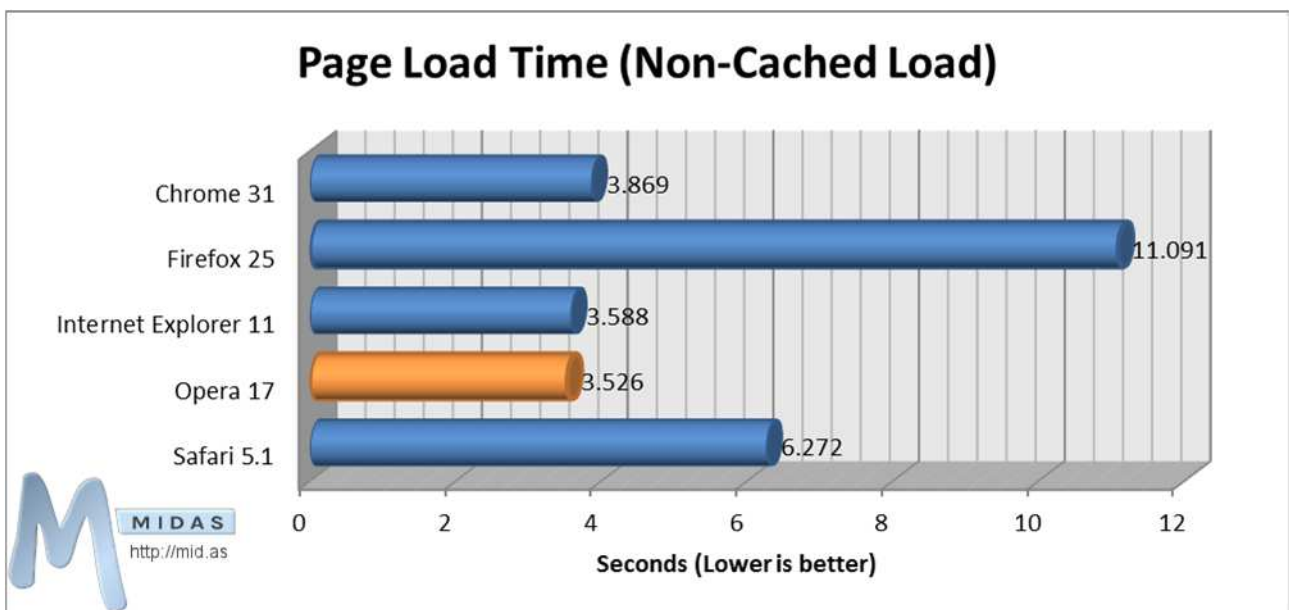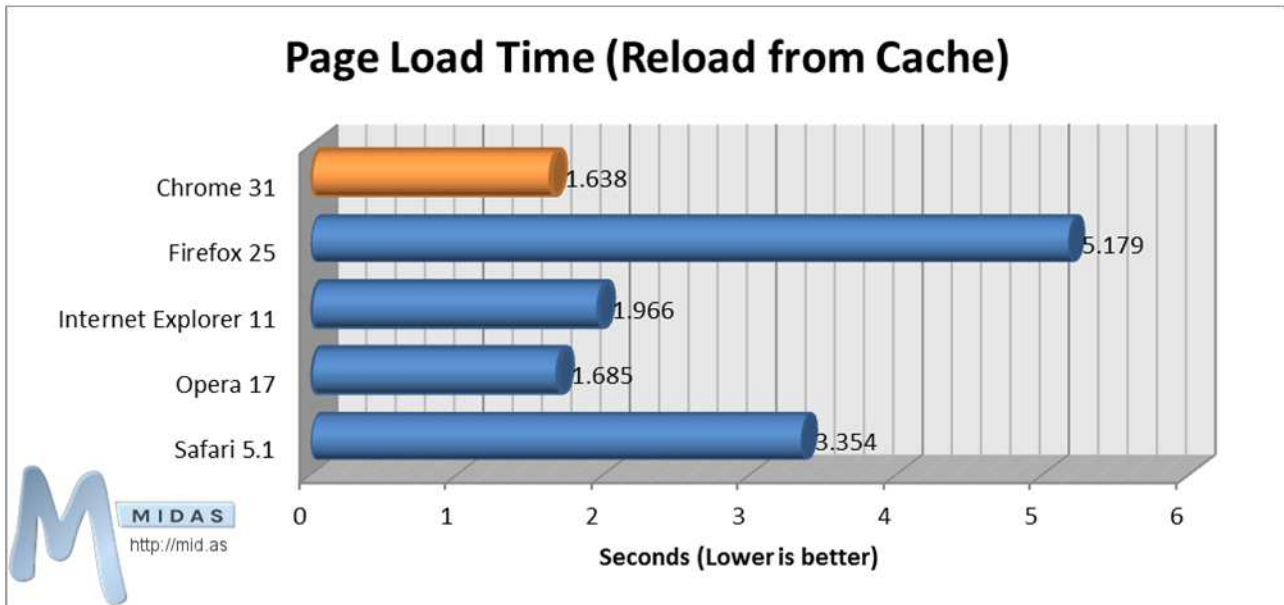
1. Speed

The "Cold Start" test measures the time taken to load up the browser upon its first run after a computer reboot. This is measured from the point at which the browser is executed until the point at which its user interface (UI) is ready to accept input.

Non-Cold Start

Chrome 31 — 0.98
Firefox 25 — 1.40
Internet Explorer 11 — 0.01
Opera 17 — 4.10
Safari 5.1 — 0.52

0.00 0.50 1.00 1.50 2.00 2.50 3.00 3.50 4.00 4.50

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Seconds (Lower is better)

The "Non-Cold Start" test measures the time taken to load up the browser on second and subsequent runs after its first run after a reboot. This is measured from the point at which the browser is executed until the point at which the user interface (UI) is ready to accept input.
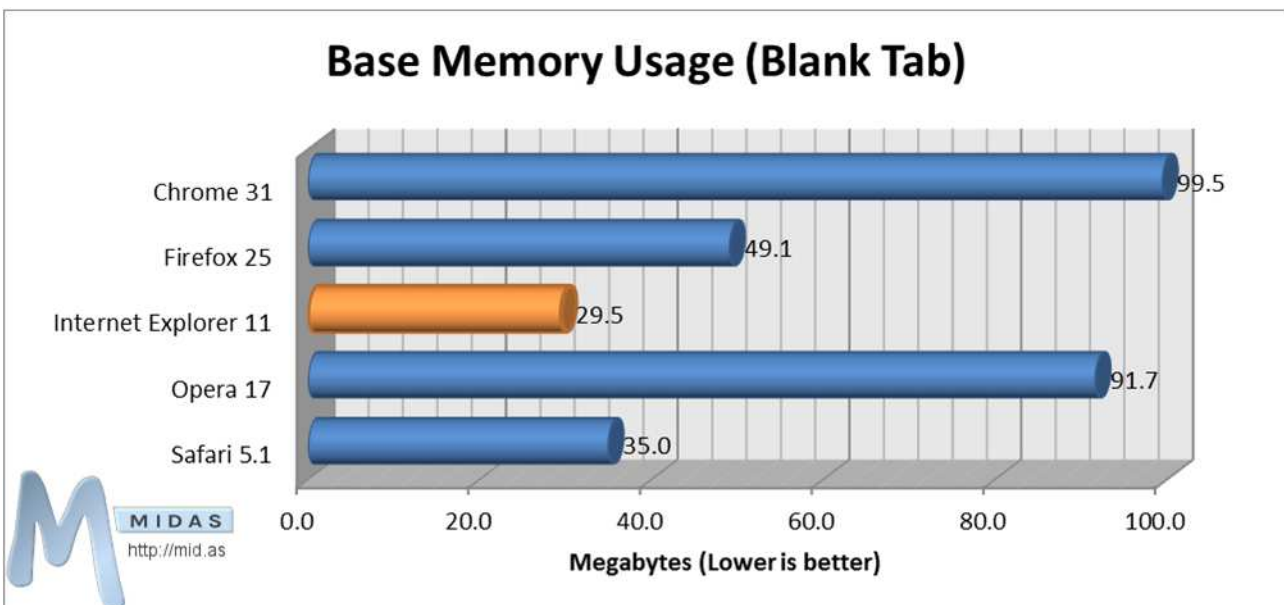
Page Load Time (Non-Cached Load)

Chrome 31 — 3.869
Firefox 25 — 11.091
Internet Explorer 11 — 3.588
Opera 17 — 3.526
Safari 5.1 — 6.272

0 2 4 6 8 10 12

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Seconds (Lower is better)

With the browser open, an empty cache, and showing a blank page (about:blank), the "Page Load Time (No-Cached Load)" test measures the time taken to completely load a complex webpage. This is measured from the point at which the "Enter" key is pressed on the URL in the browser's address bar until the point at which the test webpage has fully loaded (as reported by an "onLoad" event on the test webpage).

Page Load Time (Reload from Cache)

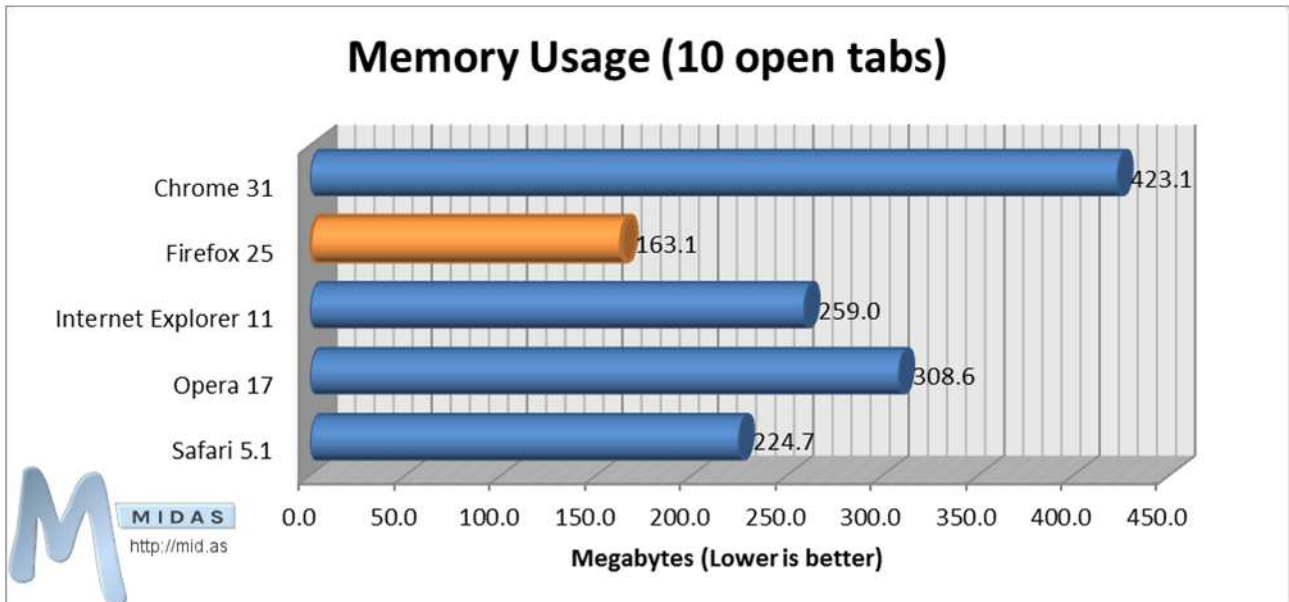| Browser	Seconds
Chrome 31	1.638
Firefox 25	5.179
Internet Explorer 11	1.966
Opera 17	1.685
Safari 5.1	3.354

Seconds (Lower is better)

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With the browser open, and the test webpage already loaded in a single tab, the "Page Load Time (Reload from Cache)" test measures the time taken to reload a complex webpage. This is measured from the point at which the F5 key (refresh) is pressed until the point at which the test webpage has fully reloaded (as reported by an "onLoad" event on the test webpage).
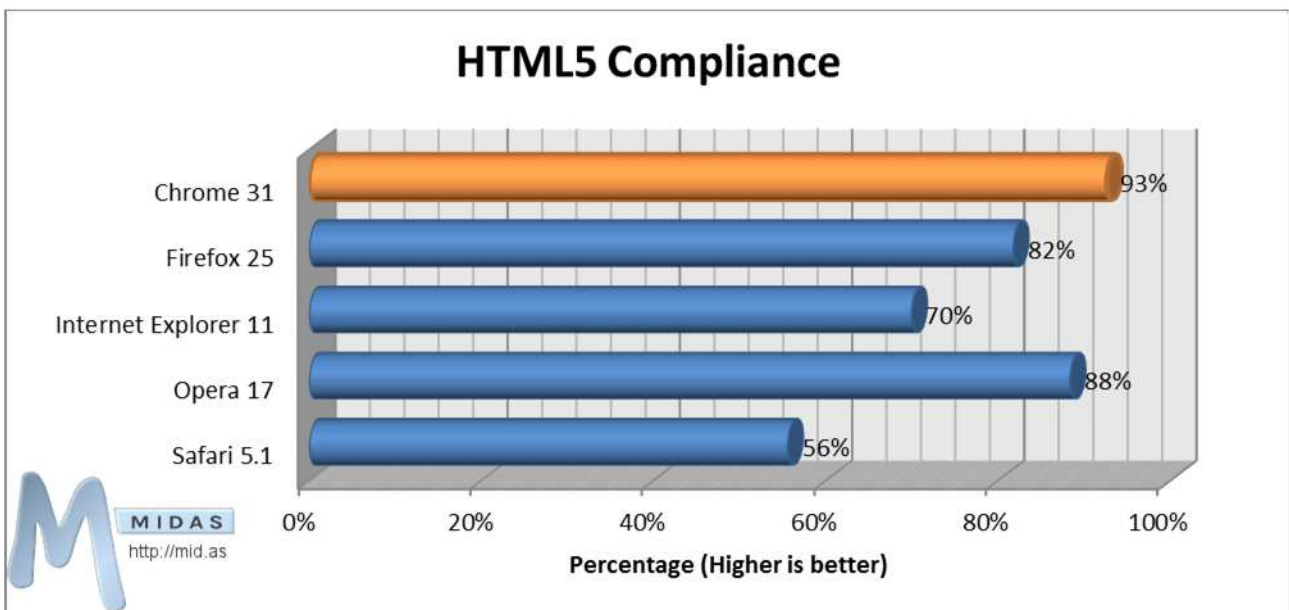
2: Memory Usage

Base Memory Usage (Blank Tab)

Browser	Megabytes
Chrome 31	99.5
Firefox 25	49.1
Internet Explorer 11	29.5
Opera 17	91.7
Safari 5.1	35.0

Megabytes (Lower is better)

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The "Base Memory Usage (Blank Tab)" test measures the amount of memory used by the browser with just a single blank (about:blank) tab open.

Memory Usage (10 open tabs)

| Browser	Megabytes (Lower is better)
Chrome 31	423.1
Firefox 25	163.1
Internet Explorer 11	259.0
Opera 17	308.6
Safari 5.1	224.7

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The "Memory Usage (10 open tabs)" test measures the amount of memory used by the browser with 10 tabs open, each displaying the home page of a popular website.

3: Compliance

HTML5 Compliance

Browser	Percentage (Higher is better)
Chrome 31	93%
Firefox 25	82%
Internet Explorer 11	70%
Opera 17	88%
Safari 5.1	56%

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The "HTML5 Compliance" test measures how well each browser conforms to the current state of the HTML5 specification.
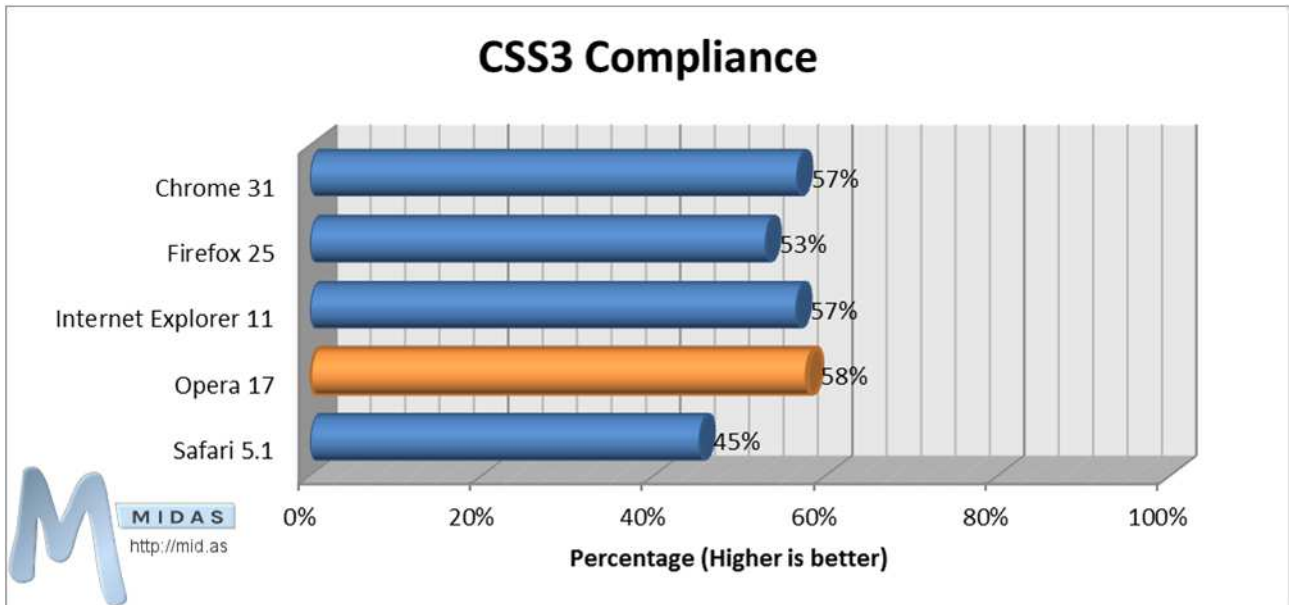
CSS3 Compliance

The "CSS3 Compliance" test measures how well each browser conforms to the current state of the CSS3 specification.

4: Javascript Performance

There are a number of different Javascript Performance Benchmark tests available today, all of which give quite different results. We've included our results from 6 of the most popular Benchmark Tests below:
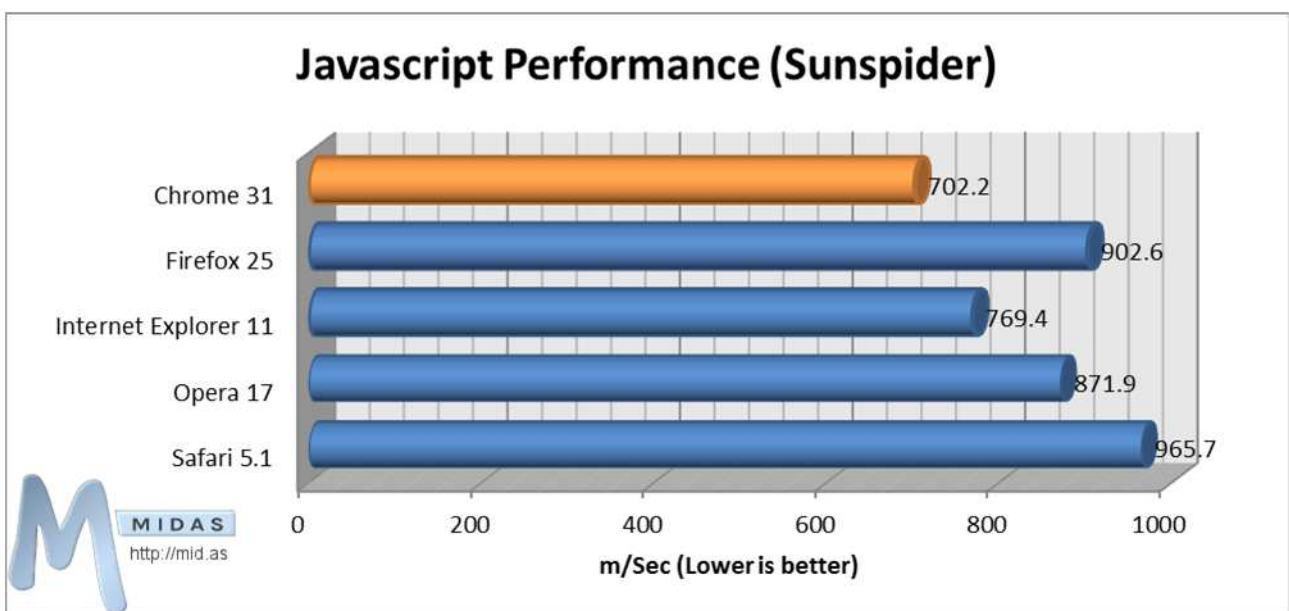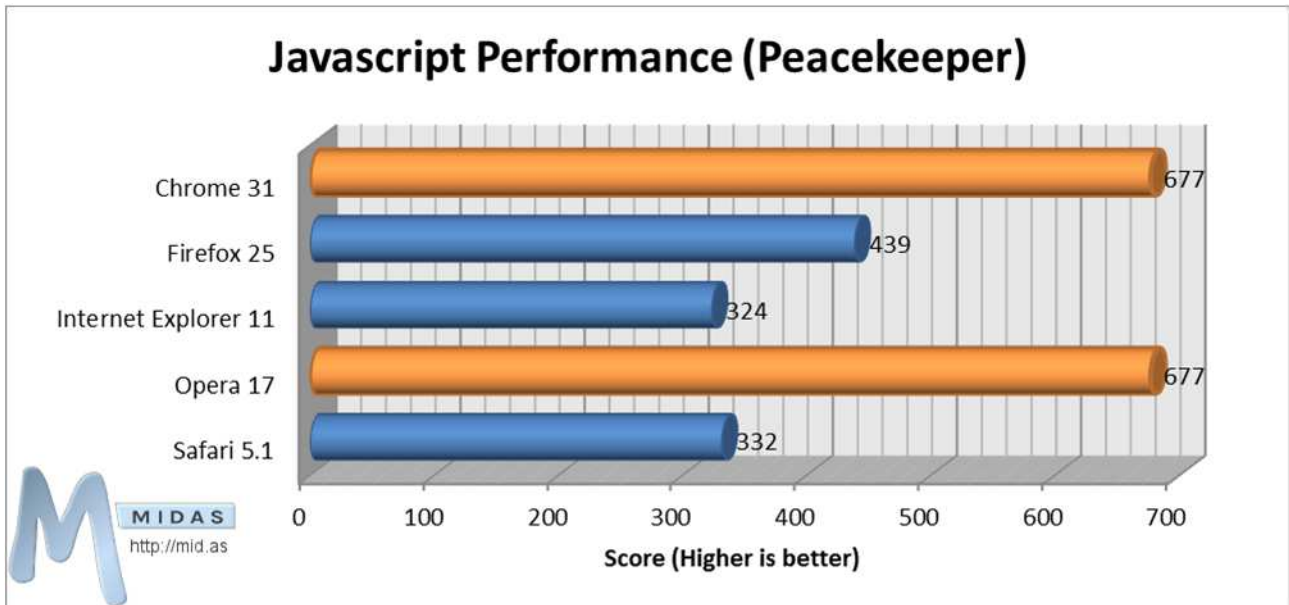

"Sunspider" is possibly the most well known of the Javascript performance benchmark test. Originally developed by Apple's WebKit, unlike the other Javascript benchmark tests below, the lower the "Sunspider" score, the better the browser's Javascript performance.

Javascript Performance (Dromaeo)

	Runs/s (Higher is better)
Chrome 31	465.84
Firefox 25	355.51
Internet Explorer 11	245.48
Opera 17	417.56
Safari 5.1	238.36

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http://mid.as
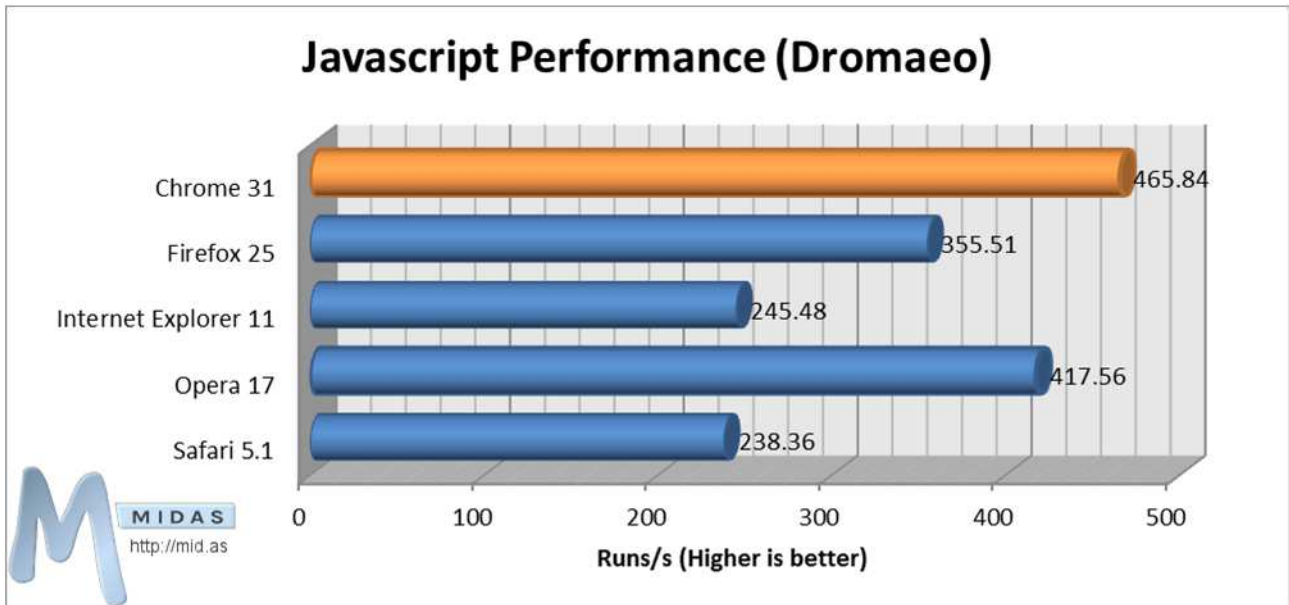
"Dromaeo" is a Javascript performance test suite developed by Mozilla, who also develop Firefox, however we do not believe that this test suite is in any way biased towards their own browser.
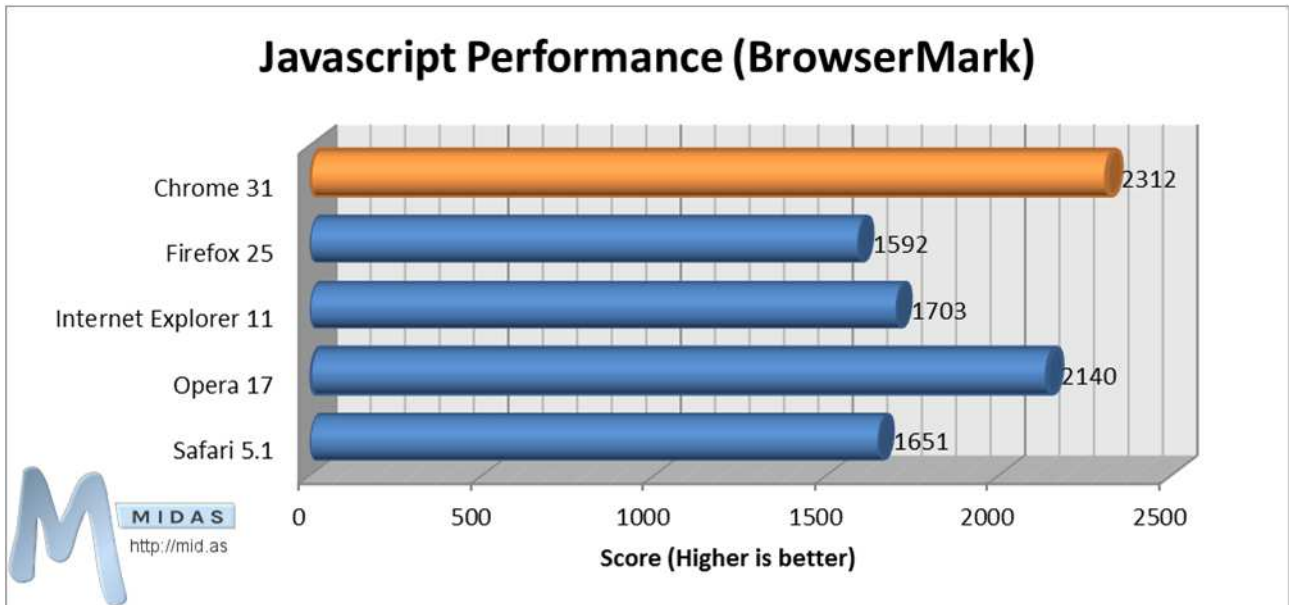
Javascript Performance (Speed-Battle)

	Score (Higher is better)
Chrome 31	166.65
Firefox 25	170.3
Internet Explorer 11	127.4
Opera 17	135.92
Safari 5.1	66.37

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"Speed Battle" is another online Javascript performance test

"Peacekeeper" is another online Javascript performance test suite.
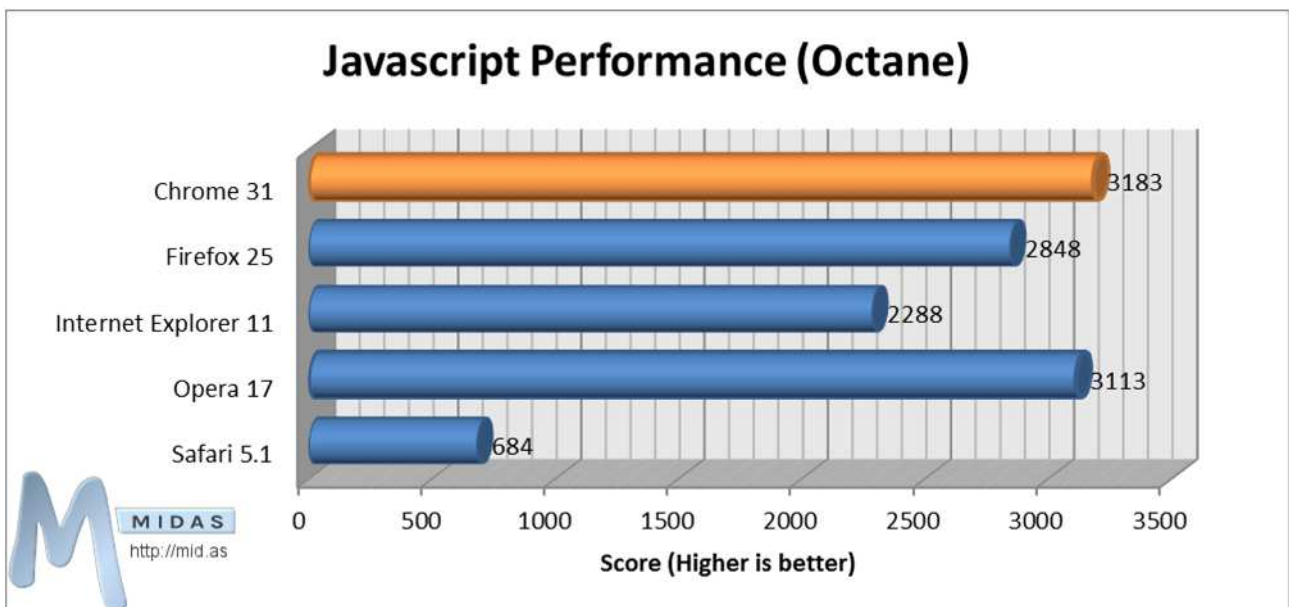
"Octane" is a new benchmark that measures a browser's JavaScript engine's performance by running a suite of tests representative of today's complex and demanding web applications. Octane's goal is to measure the performance of JavaScript code found in large, real-world web applications, and is developed by Google.
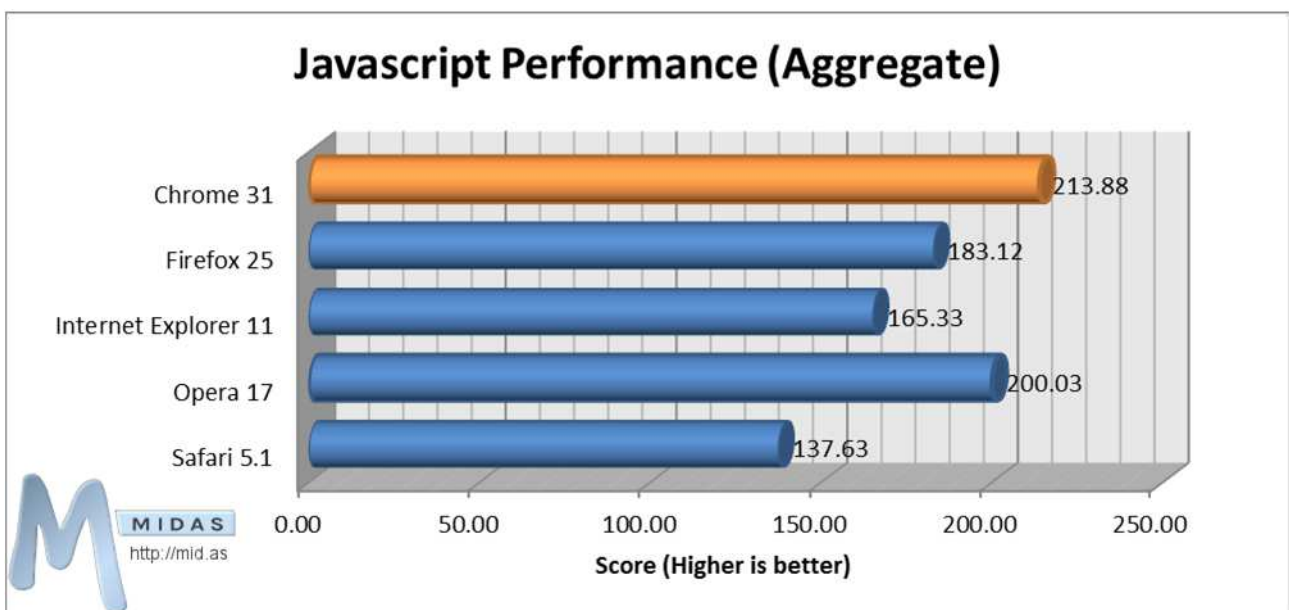
Javascript Performance (BrowserMark)

Browser	Score
Chrome 31	2312
Firefox 25	1592
Internet Explorer 11	1703
Opera 17	2140
Safari 5.1	1651

Score (Higher is better)

"Browser Mark" is another online Javascript performance test suite, focusing on real life performance measurement.

As can be seen, there's some difference between the results 6 Javascript Performance tests with certain browsers performing better in some tests than others.

However, it's likely that browser developers "write to the test" (essentially ensuring that they score highly in a particular test) – particularly in the benchmark tests developed by the browser vendors themselves. For example Google's Chrome browser outperforms other browsers in Google's "Octane" benchmark.

Therefore, to give a truer representation of each browser's Javascript performance, we've aggregated the results from the 6 above Javascript Benchmark Tests to obtain what we hope is a more accurate "score" for each browser's Javascript performance:

Javascript Performance (Aggregate)

Browser	Score
Chrome 31	213.88
Firefox 25	183.12
Internet Explorer 11	165.33
Opera 17	200.03
Safari 5.1	137.63

Score (Higher is better)

Summary

TEST	WINNER	RUNNER UP
Speed: Cold Start	Firefox	Internet Explorer
Speed: Non-Cold Start	Internet Explorer	Safari
Speed: Page Load Time (Non-Cached Load)	Opera	Internet Explorer
Speed: Page Load Time (Reload from Cache)	Chrome	Opera
Memory Usage: Base Memory	Internet Explorer	Safari
Memory Usage: 10 open tabs	Firefox	Safari
Compliance: HTML5	Chrome	Opera
Compliance: CSS3	Opera	Chrome
Javascript Performance (Sunspider)	Chrome	Internet Explorer
Javascript Performance (Dromaeo)	Chrome	Opera
Javascript Performance (Speed-Battle)	Firefox	Chrome
Javascript Performance (Peacekeeper)	Opera Chrome	Firefox
Javascript Performance (Octane)	Chrome	Opera
Javascript Performance (Browser Mark)	Chrome	Opera
Javascript Performance (Aggregate)	Chrome	Opera

Results

1st Place	2nd Place	3rd Place	4th Place	5th Place
Google Chrome 31	Opera 17	Internet Explorer 11	Mozilla Firefox 25	Apple Safari 5.1

The above overall positions were derived based upon the sum of the positions that each browser finished in in each of our tests. For example, in our HTML 5 compliance test, Chrome came first and so was assigned 1 point, Safari came 5th and so was assigned 5 points. Browsers were then ranked according to the lowest number of points to give the 1st-5th places above (1st being the best)

Analysis

Google Chrome

When we last tested the five major browsers back in November 2012, Chrome came first in 8 out of 13 our tests, making it a clear winner!

A year later, and Chrome is still going strong, coming top in 8 out of 15 tests, and second in a further two tests.

Where Chrome still doesn't perform quite as well is when it comes to its memory usage, using well over 3 times as much memory with a single blank tab open than Internet Explorer 11.

Mozilla Firefox

We were a little surprised that Firefox only came top in 3 out of 15 tests, and only once came runner up. To Firefox's credit, its main strength still seems to be in its memory usage. With 10 websites open in separate tabs, the amount of memory used was less than half that of Chrome with the same ten sites open.

Internet Explorer

We were pleasantly surprised by the improvement of Internet Explorer 11 over previous versions as well as other browsers.

IE11 came top in a couple of our tests, and runner up in a further three.

Where IE11 appears to have improved most over earlier versions of Microsoft's browser in is the length of time taken to load and pages (either from a server, or from the cache) as well as start/restart the browser itself. In our tests, starting IE11 took just 0.01463 seconds! – some 280x quicker than Opera started.

That said, in general Internet Explorer 11 still has a way to go to come up to par with the other major browsers in terms of HTML 5 compliance.

Opera

A lot has changed with Opera since we last tested browsers twelve months ago. Since then, Opera have switched from using their own "Presto" layout rendering engine to instead using the same engine as Chrome.

Whilst this change has been received with mixed reviews by Opera users, with some unhappy that many of Opera's original features were dropped, our test results actually show that the "new" Opera is a browser to be reckoned with, out performing Internet Explorer 11, Firefox 25 and Safari 5 in our tests.

Opera 17 came top in 3 out of our 15 tests, and runner up in 6.

The browser also scored highly on HTML5/CSS3 compliance and in our aggregated Javascript performance tests, however, Opera's memory usage was fairly high, second only to Chrome. Opera 17 was slow to start, however, once running it loaded and rendered web pages swiftly.

Safari

Our browsers tests were performed on a Windows machine (test specifics are included at the end of this report). Whilst the latest version of Safari is 7, Apple took the decision after the release of Safari 5.1 to no longer continue developing Safari for Windows users – a mistake in our view! Therefore, the most recent version of Safari available to Windows users is 5.1.7, which was used in our testing.

Given that Safari 5.1.7 is now the oldest of the 5 browsers tested, it follows that is doesn't perform as well as its peers.

However, surprisingly, it did come runner up in both our memory tests as well as our non-cold start test.

Conclusions – From a Developers Perspective

From our perspective, as developers of a leading web-based room scheduling solution (http://mid.as/), perhaps the most important factors in determining which browser is "best" are compliance with the latest HTML5 and CSS3 standards. As we work hard to ensure our software works well in all the major browsers, this is where having universal standards between browsers becomes so important. In theory, a website (or in our case, a web app), should look and behave the same regardless of the browser being used, which should in theory happen if all browsers complied 100% with standards! Chrome 31 currently comes the closest to the HTML 5 standard with 93% compliance, but as can be seen, CSS3 compliance still has a long way to go for all browsers, with the winning browser in the CSS3 compliance test (Opera 17) only achieving 58% compliance.

Speed (page load time) and Javascript Performance are also important factors for us, as we want our web app to be as fast and responsive as possible. Opera 17 and Chrome 25 loaded pages faster in our tests, with Internet Explorer 11 following close behind. As for performance, both Chrome 25 and Opera 17 outperformed other browsers in our aggregated Javascript performance test scores.

A few surprising finds:
- Microsoft have made some significant steps forward with Internet Explorer 11 over earlier incarnations of their browser.
- Opera 17 performed better than expected
- Firefox 25 performed worse than expected, finishing an overall 4th place in our tests.

MIDAS, our popular Browser-Based Room Scheduling Software is currently supported in all browser versions we've tested here. Find out more at http://mid.as/

Conclusions – So which browser should I use then!?

- If you work with lots of browser tabs open at once, and/or the amount of available memory on your system is limited, Firefox 25 would seem a good choice of browser to use, as this used the less memory than other browsers under the same conditions.

- If you regularly open and close your browser, Internet Explorer 11 or Firefox 25 would seem a good choice as these browsers start up quickly. If, however, you tend to keep your browser running most of the time, Opera 17 would be a better choice, as even though its start-up time is considerably longer, initial page load times are the quickest of all the browsers we tested

- If you're still using an earlier version of Internet Explorer – it's certainly worth upgrading to IE11, or if that's not possible (for example, if you're using Windows XP, you won't be able to update your Internet Explorer past version 8!), maybe it's time to try a different browser!?

- At the end of the day, use the browser that you feel most comfortable with! ...BUT make sure you keep it up-to-date, and don't ignore the competition – if you do, you risk being left behind as other browsers overtake yours in terms of their speed, security, memory usage, standard compliance, and performance!

- In recent years, browsers such as Internet Explorer and Opera have been somewhat overlooked by many regular internet users – but if you've not used these browsers for years having previously dismissed them – a lot has changed, and it's certainly worth giving them a second look again now!

Test Specifics

Browsers Tested:
Chrome 31.0.1650.48 m
Firefox 25.0
Internet Explorer 11.0.9600.16428
Opera 17 (Build 1652)
Safari 5.1.7 (7534.57.2)

Browser tests were performed on an Intel® Atom™ CPU D525 @ 1.80GHz system, with 4GB Ram, running Windows Home Server 2011 SP1 (Windows Server 2008 R2) 64-bit. Each browser was a clean install, using default install and browsers settings, and with no extensions/addons installed or enabled.

Speed tests were measured using Rob Keir's millisecond timer (http://keir.net/timer.html) and PassMark AppTimer v1.0 (http://www.passmark.com). Each speed test was performed 10 times for each browser, and the results averaged to provide the data presented in this report.

Compliance Tests:
HTML5: http://html5test.com
CSS3: http://css3test.com

Javascript Performance Tests:
http://dromaeo.com
http://speed-battle.com
http://www.webkit.org/perf/sunspider/sunspider.html
http://peacekeeper.futuremark.com
https://developers.google.com/octane/
http://browsermark.rightware.com/

Memory usage was measured 60 seconds after tabs had finished loading and was measured through the Windows Task Manager. Memory usage includes all associated processes running with the browser (for example, running Safari spawns both "Safari.exe" and "WebKit2WebProcess.exe" processes, the memory usage of both is taken into account)

The 10 sites open in tabs when measuring memory usage (10 open tabs) were:
http://mid.as
http://news.bbc.co.uk
http://facebook.com
http://twitter.com
http://google.co.uk
http://youtube.com
http://wikipedia.org
http://linkedin.com
http://bing.com
http://amazon.co.uk

Report Date: 13 November 2013

For all the very latest web browser news, check out our blog:
http://blog.mid.as/