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Getting Started with Firebug 1.5

By Chandan Luthra & Deepak Mittal

ABOUT FIREBUG

Firebug is a free and open-source tool, available as a Mozilla Firefox extension, which allows debugging, editing and monitoring of any website's CSS, HTML, DOM and JavaScript. It allows performance analysis of a website and has a JavaScript console for logging errors and watching values. Firebug has many other tools to enhance the productivity of today's web developer. Firebug provides all the tools that a web-developer needs to analyze, debug and monitor JavaScript, CSS, HTML and Ajax. Firebug includes a debugger, error console, command line, and a variety of useful inspectors.

Hot Tip Please note that though Firebug allows you to make changes to the source code of your web page, but the changes are done to the copy of the HTML code which has been sent to the browser by the server. Any changes that are done to the code are done in the copy which is with the browser and not in the code which is on the server.

INSTALLATION

Firebug is developed as a Firefox addon and can be installed on Firefox like all other add-ons. In order to make Firebug work for non-Firefox browsers, there is a JavaScript "Firebug Lite" from Firebug which makes available a large set of Firebug features. Based on your browser version, you can install the corresponding Firebug version.

Firebug Version	Browser Version
Firebug 1.6 alpha	Firefox 3.6 and Firefox 3.7
Firebug 1.5	Firefox 3.5 and Firefox 3.6
Firebug 1.4	Firefox 3.0 and Firefox 3.5
Firebug 1.3	Firefox 2.0 and Firefox 3.0
Firebug Lite	IE, Safari and Opera

To install Firebug on Firefox, visit http://getfirebug.com and click the "Install Firebug on Firefox" button.

To use Firebug Lite on non Firefox browsers, visit http://getfirebug.com/firebuglite, copy the JavaScript from there and include it in your HTML code.

INSPECTING PAGE ELEMENTS

This is the first and main step for investigating an HTML element.

- Click on the "inspect" button to get into the Firebug's inspection mode.
- Move your cursor on the page component/section that you want to inspect.
- Click on the page component/section to investigate it.

There is another easy and fast way to inspect an element. Just right click on the page component/section and select "Inspect Element" from the context menu. You can also directly select a DOM node under the HTML tab to view its style, layout, & DOM attributes.

JAVASCRIPT PROFILING

Type the following code in an HTML file, save it and open it up with Firebug enabled Firefox (if Firebug is not enabled then press F12 key to activate it):

```
<html>
<head><title>Firebug</title>
<script>
function bar(){
        console.profile('Measuring time');
        foo();
        console.profileEnd();
}
function foo(){
        loop(1000);loop(100000);loop(10000);
}
function loop(count){
        for(var i=0;i<count;i++){}
}
</script></head><body>
Click this button to profile JavaScript
<input type="button" value="Start" onclick="bar();"/>
</body></html>
```

Click on the button to start the JavaScript profiler. You will see a table generated in the Firebug's Console panel. Description and purpose of the columns:

Function: This column shows the name of each function.

Call: Shows the count of how many times a particular function has been invoked. (3 times for loop() function in our case.)

Percent: Shows the time consuming of each function in percentage.

Own Time: Shows the duration of own script in a particular function. For example foo() function has none of its own code. Instead, it is just calling other functions. So, its own execution time will be ~0ms. If you want to see some values for that column, add some looping in this function.

Time: Shows the duration of execution from start point of a function to the end point of a function. For example foo() has no code. So, its own execution time is approx ~0ms, but we call other functions in that function. So, the total execution time of other functions is 4.491ms. So, it shows 4.54ms in that column which is equal to own time taken by 3 loop() function + own time of foo().

Avg: Shows the average execution time of a particular function. If you are calling a function one time only, you won't see the differences. If you are calling more than one time, you will see the differences. The formula for calculating the average is:

Avg = Own time / Call

Min and Max columns: Shows the minimum execution time of a particular function. In our example, we call loop() for 3 times. When we passed 1000 as a parameter, it probably took only a few millisecond (let's say 0.045ms.) and when, we passed 100000 to that function, it took much longer than first time (let's say 4.036ms). So, in that case, 0.045ms will be shown in Min column and 4.036ms will be shown in Max column.

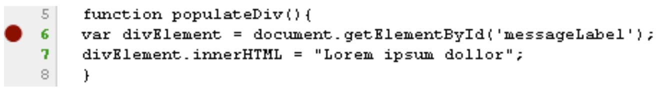
File: Shows the file name of file with line number where the function is located

JAVASCRIPT DEBUGGING

Firebug allows you to insert break points and step debug the JS code.

```
<html>
<head><title>Javascript Debugging</title>
<script>
         function populateDiv(){
         var divElement = document.
getElementById('messageLabel');
         divElement.innerHTML = "Lorem ipsum dollor";
         }
</script></head>
<body>
<div id="messageLabel"></div>
<input type="button" value="Click Me!"
onclick="populateDiv();" />
</body></html>
```

Now, under the Firebug's "Script" tab, move your mouse pointer on the line number as shown in the image and click to insert a breakpoint.

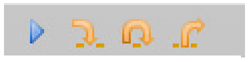


```
function populateDiv(){
var divElement = document.getElementById('messageLabel');
divElement.innerHTML = "Lorem ipsum dollor";
}
```

Hot Tip To verify that you have inserted a break point, you can see the list of breakpoints in the "Breakpoints" panel on the right side of "Script" tab.

Click on the "Click Me!" button to start the execution. You will notice that JS execution is paused at the breakpoint that you set.

You can now step debug the JavaScript by pressing one of these buttons (Continue, Step Over, Step Into and Step Out) under the "Script" tab.

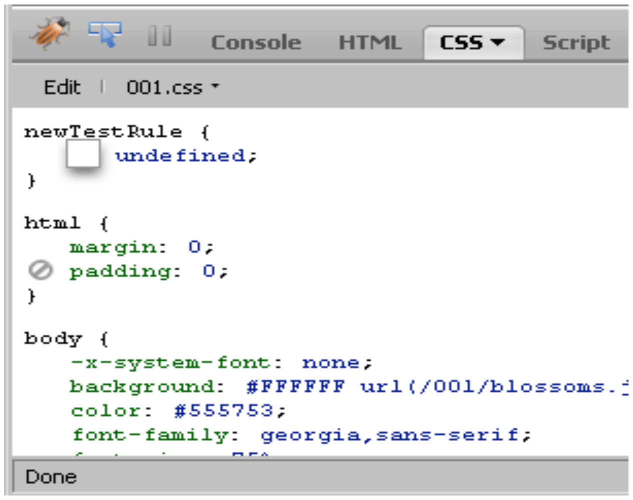


- **Continue (F8):** Allows you to resume the script execution once it has been stopped via another breakpoint.
- **Step Over (F10):** Allows you to step over the function call.
- **Step Into (F11):** Allows you to step into the body of the another function.
- **Step Out:** Allows you to resume the script execution and will stop at next breakpoint.

TWEAK CSS ON THE FLY

Through Firebug, you can add, remove and change the CSS properties of inspected elements. This is a most useful feature of Firebug through which one can fix the UI issues rapidly and easily. You can watch the live demo of the changes that you are making in the CSS tab. If you want to add the 'color' property of an inspected element:

- 'Double-click' on the 'Style' panel of HTML tab. A little text editor will appear and type 'color' followed by a 'TAB' key.
- Now the tiny text editor moves to the right side of the 'color' property asking you to enter the value (color code) for the property. Provide a value to it and press enter to see the magic.



```
newTestRule {
      undefined;
}

html {
   margin: 0;
   padding: 0;
}

body {
   -x-system-font: none;
   background: #FFFFFF url(/001/blossoms.
   color: #555753;
   font-family: georgia,sans-serif;
```

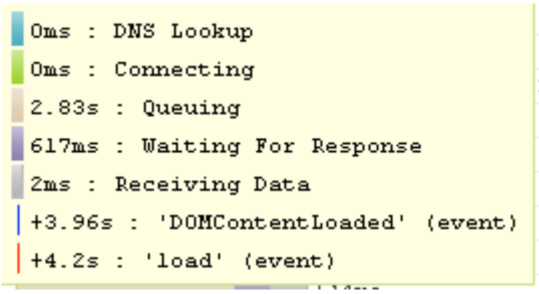
Hot Tip Apart from JS auto code-completion, Firebug provides an auto-complete feature for CSS properties too.

To disable a CSS rule, move the mouse pointer near to the CSS rule. Click on the 'do-not' 🚫 icon that appears on the left side of the rule.

To change a specific CSS rule, simply click on the rule, a text editor will appear asking you for the new property or value.

NETWORK MONITORING

Firebug also allows monitoring web pages of your application. A web app might appear to be slow to an end user due to Network latency, Order in which the files are loaded, Number of concurrent request made to server or Browser caching. Firebug's Net panel allows you to monitor each and every file and request (XHR or HTTP). It generates a colorful graph accordingly on the basis of cycle of a request. Following image is an example of a request:

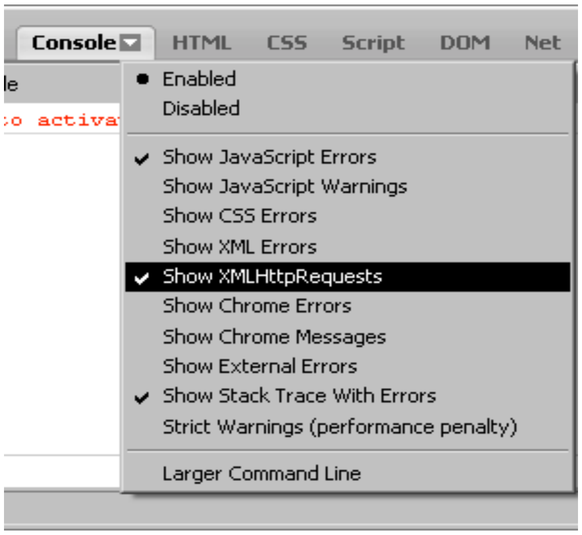


```
0ms : DNS Lookup
0ms : Connecting
2.83s : Queuing
617ms : Waiting For Response
2ms : Receiving Data
+3.96s : 'DOMContentLoaded' (event)
+4.2s : 'load' (event)
```

Color	Description
Green	Time for DNS Lookup
Light Green	Time to connect to the server
Light Brown	Time for which the request had to wait in the queue
Purple	Time waiting for a response from the server
Dark Grey	Request was sent to server, request served by the server and not from browser cache
Light Grey	Request was sent to the server, "304 Not Modified" received from server, response loaded from the browser cache

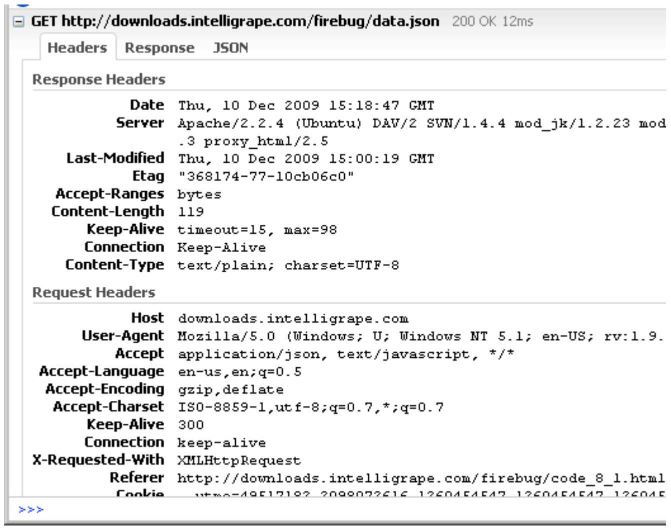
TRACKING XmlHttpRequest

Enabling "Show XMLHttpRequests" option on the Console tab, it acts like an AJAX spy.



Each XMLHttpRequest will be automatically logged to the console, where we you can inspect its response as text, JSON, or XML. This is very useful while debugging any AJAX code, and it's also quite fun to analyse how other web pages use AJAX.

You can see the headers, Response, JSON, Response/Request Headers, GET/POST call.



```
GET http://downloads.intelligrape.com/firebug/data.json   200 OK 12ms
Headers  Response  JSON

Response Headers
           Date  Thu, 10 Dec 2009 15:18:47 GMT
         Server  Apache/2.2.4 (Ubuntu) DAV/2 SVN/1.4.4 mod_jk/1.2.23 mod
                 .3 proxy_html/2.5
  Last-Modified  Thu, 10 Dec 2009 15:00:19 GMT
           Etag  "368174-77-10cb06c0"
  Accept-Ranges  bytes
 Content-Length  119
     Keep-Alive  timeout=15, max=98
     Connection  Keep-Alive
   Content-Type  text/plain; charset=UTF-8

Request Headers
           Host  downloads.intelligrape.com
     User-Agent  Mozilla/5.0 (Windows; U; Windows NT 5.1; en-US; rv:1.9.
         Accept  application/json, text/javascript, */*
Accept-Language  en-us,en;q=0.5
Accept-Encoding  gzip,deflate
 Accept-Charset  ISO-8859-1,utf-8;q=0.7,*;q=0.7
     Keep-Alive  300
     Connection  keep-alive
X-Requested-With XMLHttpRequest
        Referer  http://downloads.intelligrape.com/firebug/code_8_1.html
>>>
```

THE cd() METHOD

By default all the expressions and functions that you execute in the command line are relative to the top level window of the page. For example, you cannot invoke any function from Firebug's command line if that function is defined in an iFrame within a page. Firebug provides a solution for such situation. The cd() method allows you to change the context of the window from main window to the iFrame.

On the Firebug command use the following syntax against a page that has an iFrame

Syntax:

```
cd(window.frames[0]);
// you can also use the $, $$ or $x selectors for selecting
the iFrame elements.
```

Hot Tip When the context changes then you will be notified by FireBug.

KEYBOARD AND MOUSE SHORTCUTS

Firebug provides a lot of keyboard and mouse shortcuts in order to make working with Firebug easier and faster. As you become more experienced with Firebug, you will find yourself making more and more use of these shortcuts to accomplish common tasks instead of opening Firebug panel and then clicking on various tabs and buttons.

Global Shortcuts

Task / Operation	Shortcut
Open Firebug Panel	F12
Close Firebug Panel	F12
Open Firebug in Window	Ctrl+F12
Switch to Previous Tab	Ctrl+`

Focus Command Line	Ctrl+Shift+L
Focus Search Box	Ctrl+Shift+K
Toggle Inspect Mode	Ctrl+Shift+C
Toggle JavaScript Profiler	Ctrl+Shift+P
Re-Execute Last Command Line	Ctrl+Shift+E

HTML Tab Shortcuts

Task / Operation	Shortcut
Edit Attribute	Click on name or value
Edit Text Node	Click on text
Edit Element	Double-Click tag name
Next Node in Path	Ctrl+.
Previous Node in Path	Ctrl+,

HTML Editor Shortcuts

Task / Operation	Shortcut
Finish Editing	Return
Cancel Editing	Esc
Advance to Next Field	Tab
Advance to Previous Field	Shift+Tab

HTML Inspect Mode Shortcuts

Task / Operation	Shortcut
Cancel Inspection	Esc
Inspect Parent	Ctrl+Up
Inspect Child	Ctrl+Down
Toggle Inspection	Ctl+Shift+C

Script Tab Shortcuts

Task / Operation	Shortcut
Continue	F8OR Ctrl+/
Step Over	F10 OR Ctrl+'
Step Into	F11 OR Ctrl+;
Step Out	Shift+F11 OR Ctrl+Shift+;
Toggle Breakpoint	Click on line number
Disable Breakpoint	Shift+Click on line number
Edit Breakpoint Condition	Right-Click on line number
Run to Line	Middle-Click on line number OR Ctrl+Click on line number
Next Function on Stack	Ctrl+.
Previous Function on Stack	Ctrl+,
Focus Menu of Scripts	Ctrl+Space
Focus Watch Editor	Ctrl+Shift+N

DOM Tab Shortcuts

Task / Operation	Shortcut
Edit Property	Double-Click on empty space
Next Object in Path	Ctrl+.
Previous Object in Path	Ctrl+,

DOM and Watch Editor Shortcuts

Task / Operation	Shortcut
Finish Editing	Double-Click on empty space
Cancel Editing	Ctrl+.
Autocomplete Next Property	Ctrl+,
Autocomplete Previous Property	Shift+Tab

CSS Tab Shortcuts

Task / Operation	Shortcut
Edit Property	Click on property
Insert New Property	Double-Click on white-space
Focus Menu of Style Sheets	Ctrl+Space

CSS Editor Tab Shortcuts

Task / Operation	Shortcut
Finish Editing	Return
Cancel Editing	Esc
Advance to Next Field	Tab
Advance to Previous Field	Shift+Tab
Increase Number by One	Up
Decrease Number by One	Down
Increase Number by Ten	Page Up
Decrease Number by Ten	Page Down
Autocomplete Next Keyword	Up
Autocomplete Previous Keyword	Down

Layout Tab Shortcut

Task / Operation	Shortcut
Edit Value	Click on value

Layout Editor Shortcuts

Task / Operation	Shortcut
Finish Editing	Return
Cancel Editing	Esc
Advance to Next Field	Tab
Advance to Previous Field	Shift+Tab
Increase Number by One	Up
Decrease Number by One	Down
Increase Number by Ten	Page Up
Decrease Number by Ten	Page Down

Command Line (small) Shortcuts

Task / Operation	Shortcut
Autocomplete Next Property	Tab
Autocomplete Previous Property	Shift+Tab
Execute	Return
Inspect Result	Shift+Return
Open Result's Context Menu	Ctrl+Return

Command Line (large) Shortcut

Task / Operation	Shortcut
Execute	Ctrl+Return

CONSOLE API REFERENCE

Task / Operation	Purpose
console.log(object[, object, ...])	Writes a message to the console. You may pass as many arguments as you'd like, and they will be joined together in a space-delimited line.
console.debug(object[, object, ...])	Writes a message to the console, including a hyperlink to the line where it was called.
console.info(object[, object, ...])	Writes a message to the console with the visual "info" icon and color coding and a hyperlink to the line where it was called.
console.warn(object[, object, ...])	Writes a message to the console with the visual "warning" icon and color coding and a hyperlink to the line where it was called.
console.error(object[, object, ...])	Writes a message to the console with the visual "error" icon and color coding and a hyperlink to the line where it was called.
console.assert (expression[, object, ...])	Tests that an expression is true. If not, it will write a message to the console and throw an exception.
console.dir(object)	Prints an interactive listing of all properties of the object. This looks identical to the view that you would see in the DOM tab.
console.dirxml(node)	Prints the XML source tree of an HTML or XML element. This looks identical to the view that you would see in the HTML tab. You can click on any node to inspect it in the HTML tab.
console.trace()	Prints an interactive stack trace of JavaScript execution at the point where it is called.
console.group(object[, object, ...])	Writes a message to the console and opens a nested block to indent all future messages sent to the console. Call console.groupEnd() to close the block.
console.groupCollapsed (object[, object, ...])	Like console.group(), but the block is initially collapsed.
console.groupEnd()	Closes the most recently opened block created by a call to console.group() or console.groupEnd()
console.time(name)	Creates a new timer under the given name. Call console.timeEnd(name) with the same name to stop the timer and print the time elapsed.
console.timeEnd(name)	Stops a timer created by a call to console.time(name) and writes the time elapsed.
console.profile([title])	Turns on the JavaScript profiler. The optional argument title would contain the text to be printed in the header of the profile report.
console.profileEnd()	Turns off the JavaScript profiler and prints its report.
console.count([title])	Writes the number of times that the line of code where count was called was executed. The optional argument title will print a message in addition to the number of the count.

console.table()	Allows output of tabular data in console. E.g.
	var myTable = new Array(3);
	for (var i=0; i<3; i++)
	myTable[i] = [i+1, i+2, i+3, i+4];
	console.table(table);

COMMAND API REFERENCE

Command	Purpose
$(id)	Returns a single element with the given id.
$$(selector)	Returns an array of elements that match the given CSS selector.
$x(xpath)	Returns an array of elements that match the given XPath expression.
dir(object)	Prints an interactive listing of all properties of the object. This looks identical to the view that you would see in the DOM tab.
dirxml(node)	Prints the XML source tree of an HTML or XML element. This looks identical to the view that you would see in the HTML tab. You can click on any node to inspect it in the HTML tab.
cd(window)	By default, command line expressions are relative to the top-level window of the page. cd() allows you to use the window of a frame in the page instead.
clear()	Clears the console.
inspect (object[, tabName])	Inspects an object in the most suitable tab, or the tab identified by the optional argument tabName. The available tab names are "html", "css", "script", and "dom".
keys(object)	Returns an array containing the names of all properties of the object.
values(object)	Returns an array containing the values of all properties of the object.
debug(fn)	Adds a breakpoint on the first line of a function.
undebug(fn)	Removes the breakpoint on the first line of a function.
monitor(fn)	Turns on logging for all calls to a function.
unmonitor(fn)	Turns off logging for all calls to a function.

monitorEvents (object[, types])	Turns on logging for all events dispatched to an object. The optional argument types may specify a specific family of events to log. The most commonly used values for types are "mouse" and "key". The full list of available types includes "composition", "contextmenu", "drag", "focus", "form", "key", "load", "mouse", "mutation", "paint", "scroll", "text", "ui", and "xul".
unmonitorEvents (object[, types])	Turns off logging for all events dispatched to an object.
profile([title])	Turns on the JavaScript profiler. The optional argument title would contain the text to be printed in the header of the profile report.
profileEnd()	Turns off the JavaScript profiler and prints its report.

STRING FORMATTING

All of the console logging functions can format a string with any of the following patterns:

Symbol	Type/Purpose
%s	Formats the object as a string
%d, %i, %l, %f	Formats the object as a number
%o	Formats the object as a hyperlink to the inspector
%1.o, %2.0, etc..	Formats the object as an interactive table of its properties
%.o	Formats the object as an array of its property names
%x	Formats the object as an interactive XML markup tree
%1.x, %2.x, etc..	Formats the object as an interactive XML markup tree with n levels expanded

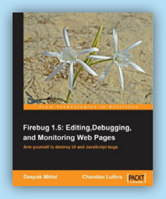
*If you need to include a real % symbol, you can escape it with a backslash like so: "\%".

ABOUT THE AUTHOR

Chandan Luthra is a Software Development Engineer with IntelliGrape Software, New Delhi, India-a company specializing in Groovy/Grails development. He is an agile and pragmatic programmer and an active participant at local open source software events, where he evangelizes Groovy, Grails, Jquery, and Firebug. Chandan is a Linux and open source enthusiast. He also involves himself in writing blogs and is an active member on various tech-related mailing lists. He has developed web applications for various industries, including entertainment, finance, media and publishing, as well as others.

Deepak Mittal is a software developer based in New Delhi, India, and he has been involved with software engineering and web programming in Java/JEE world since the late 1990s. Deepak is a Linux and open source enthusiast. He is an agile practitioner and speaks about open source, agile processes, and free software at various user group meetings and conferences. He has designed and built web applications for industries including pharmaceutical, travel, media, and publishing, as well as others. He loves to explore new technologies and has been an early-adopter of quite a few mainstream technologies of today's world.

RECOMMENDED BOOKS



With the advent of RIA (Rich Internet Applications), most web pages are driven by a combination of JavaScript, AJAX, CSS, and so on. Web developers and designers find it hard to debug and fix the issues that crop up on the client side. Firebug is a wonderful toolkit to have in your arsenal for handling all such issues. This book covers all of Firebug's features and will help you utilize its capabilities with maximum efficiency. AJAX development and debugging is not one of the easiest tasks; this book explains step-by-step, how to develop and debug AJAX components in your web page in a very easy way, thereby increasing your productivity. Topics like performance tuning of the web page are covered in detail.

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