

# DEBUGGING JAVASCRIPT LIKE A BOSS

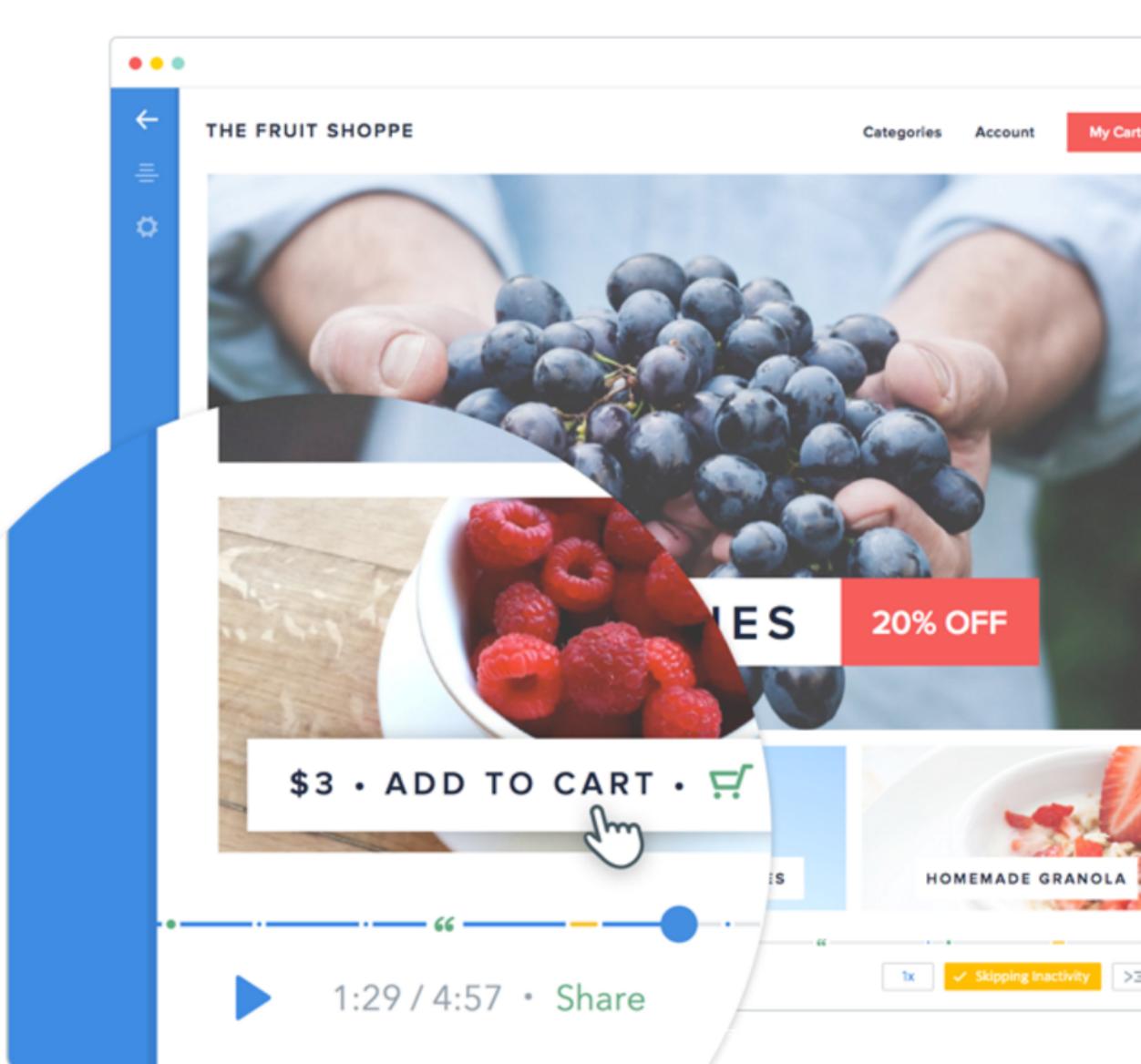
Stephanie Brubaker, FullStory



I write a *\*lot\** of UI  
code.

I work at

fullstory



A close-up shot from the movie Inception. Two men in dark suits are shown from the chest up, looking down and slightly to the right with serious expressions. The lighting is dramatic, with strong highlights on their faces and hands.

**WE NEED TO GO**

**DEEPER**



THE BEST  
DEFENSE IS A  
GOOD OFFENSE

THE BEST DEFENSE IS A GOOD OFFENSE



Don't write  
JavaScript

- # TypeScript



- Static type analysis



- Abstract classes +  
Interfaces



- Compile-time checks

- Alternatives



JSX



GWT (Java to JS)



CoffeeScript

THE BEST DEFENSE IS A GOOD OFFENSE



Use CSS to simplify  
code

THE BEST DEFENSE IS A GOOD OFFENSE



**CSS**

- USE CSS TO SIMPLIFY CODE

- Javascript:

```
<div id="myDiv"  
onmouseover="document.getElementById('myDiv')  
.style.background = 'red'"  
onmouseout="document.getElementById('myDiv')  
.style.background = ''>  
    Mouse over me!  
</div>
```

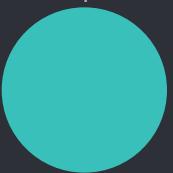
- USE CSS TO SIMPLIFY CODE

- CSS:

```
<div class="myDiv">  
    Mouse over me!  
</div>
```

```
.myDiv:hover {  
    background-color: red;  
}
```

THE BEST DEFENSE IS A GOOD OFFENSE



Optimize your  
environment

- OPTIMIZE YOUR ENVIRONMENT

- Run a compiling server

- Gulp

- Grunt

- OPTIMIZE YOUR ENVIRONMENT

- Use an IDE

- IntelliJ/WebStorm
    - Eclipse

- ...or a good editor

- Sublime

- THE BEST DEFENSE IS A GOOD OFFENSE
  - Change languages
  - Use CSS
  - Optimize your environment



DEV TOOLS ARE  
YOUR FRIEND

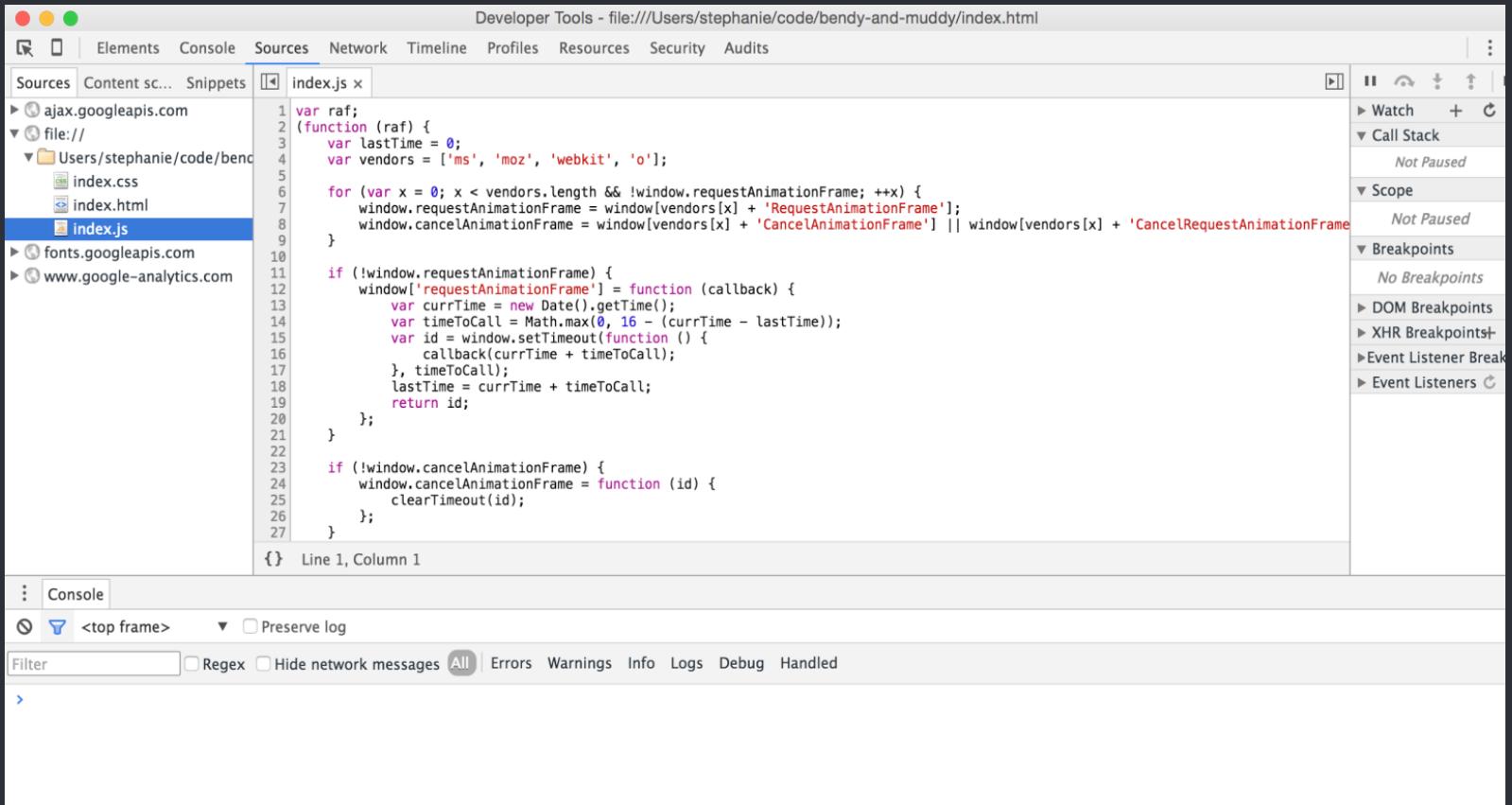
DEV TOOLS ARE YOUR FRIEND



Add source maps

# DEV TOOLS ARE YOUR FRIEND

# DEV TOOLS ARE YOUR FRIEND



The screenshot shows the Chrome Developer Tools interface with the "Sources" tab selected. The main pane displays the code for `index.js`. The code implements a polyfill for the `requestAnimationFrame` and `cancelAnimationFrame` methods. It uses vendor prefixes and setTimeout to create a requestAnimationFrame function if it doesn't exist. It also creates a cancelAnimationFrame function if it doesn't exist. The code is as follows:

```
1 var raf;
2 (function (raf) {
3     var lastTime = 0;
4     var vendors = ['ms', 'moz', 'webkit', 'o'];
5
6     for (var x = 0; x < vendors.length && !window.requestAnimationFrame; ++x) {
7         window.requestAnimationFrame = window[vendors[x] + 'RequestAnimationFrame'];
8         window.cancelAnimationFrame = window[vendors[x] + 'CancelAnimationFrame'] || window[vendors[x] + 'CancelRequestAnimationFrame'];
9     }
10
11     if (!window.requestAnimationFrame) {
12         window['requestAnimationFrame'] = function (callback) {
13             var currTime = new Date().getTime();
14             var timeToCall = Math.max(0, 16 - (currTime - lastTime));
15             var id = window.setTimeout(function () {
16                 callback(currTime + timeToCall);
17             }, timeToCall);
18             lastTime = currTime + timeToCall;
19             return id;
20         };
21     }
22
23     if (!window.cancelAnimationFrame) {
24         window.cancelAnimationFrame = function (id) {
25             clearTimeout(id);
26         };
27     }
28 }
```

The "Console" tab at the bottom shows a single entry: a right-pointing arrow.

The right sidebar contains several sections: Watch, Call Stack, Scope, Breakpoints, DOM Breakpoints, XHR Breakpoints, and Event Listener Breakpoints. The "Scope" section shows "Not Paused". The "Breakpoints" section shows "No Breakpoints".

DEV TOOLS ARE YOUR FRIEND



Use browser  
debugger

# DEV TOOLS ARE YOUR FRIEND

Developer Tools - file:///Users/stephanie/code/bendy-and-muddy/index.html

Sources | Content sc... | Snippets | index.js x

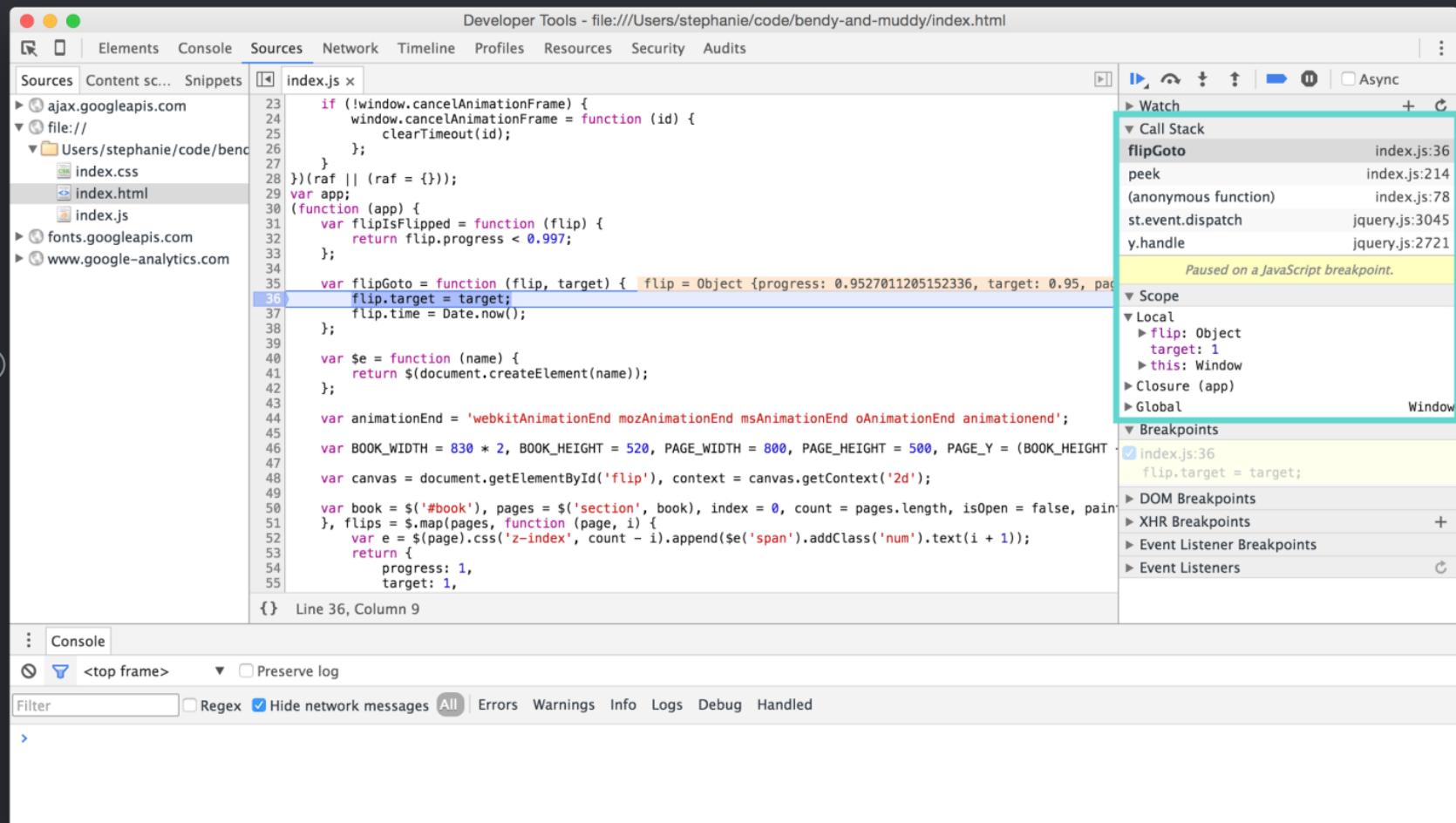
Elements Console Sources Network Timeline Profiles Resources Security Audits

ajax.googleapis.com  
file:///  
Users/stephanie/code/bendy-and-muddy  
index.css  
index.html  
index.js  
fonts.googleapis.com  
www.google-analytics.com

index.js

```
23     if (!window.cancelAnimationFrame) {
24         window.cancelAnimationFrame = function (id) {
25             clearTimeout(id);
26         };
27     })(raf || (raf = {}));
28     var app;
29     (function (app) {
30         var flipIsFlipped = function (flip) {
31             return flip.progress < 0.997;
32         };
33     });
34
35     var flipGoto = function (flip, target) { flip = Object {progress: 1, target: 1, page: st.fn.st.init[1], time: Date.now()};
36     flip.target = target;
37     flip.time = Date.now();
38 }
39
40     var $e = function (name) {
41         return $(document.createElement(name));
42     };
43
44     var animationEnd = 'webkitAnimationEnd mozAnimationEnd msAnimationEnd oAnimationEnd animationend';
45
46     var BOOK_WIDTH = 830 * 2, BOOK_HEIGHT = 520, PAGE_WIDTH = 800, PAGE_HEIGHT = 500, PAGE_Y = (BOOK_HEIGHT - BOOK_HEIGHT / 2);
47
48     var canvas = document.getElementById('flip'), context = canvas.getContext('2d');
49
50     var book = $('#book'), pages = $('section', book), index = 0, count = pages.length, isOpen = false, pain
51     }, flips = $.map(pages, function (page, i) {
52         var e = $(page).css('z-index', count - i).append($e('span').addClass('num').text(i + 1));
53         return {
54             progress: 1,
55             target: 1,
56         };
57     });
58
59     var flip = new Flip();
60     flip.start();
61
62     $(document).on(animationEnd, '.page').each(function () {
63         $(this).css('transform', 'rotateY(180deg)');
64     });
65
66     $(document).on('click', '#book .page', function () {
67         var page = $(this);
68         if (page.hasClass('open')) {
69             page.removeClass('open');
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874        } else {
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995        } else {
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997            flip.open();
998        }
999    });
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1001    $(document).on('click', '#book .page', function () {
1002        var page = $(this);
1003        if (page.hasClass('open')) {
1004            page.removeClass('open');
1005            flip.close();
1006        } else {
1007            page.addClass('open');
1008            flip.open();
1009        }
1010    });
1011
1012    $(document).on('click', '#book .page', function () {
1013        var page = $(this);
1014        if (page.hasClass('open')) {
1015            page.removeClass('open');
1016            flip.close();
1017        } else {
1018            page.addClass('open');
1019            flip.open();
1020        }
1021    });
1022
1023    $(document).on('click', '#book .page', function () {
1024        var page = $(this);
1025        if (page.hasClass('open')) {
1026            page.removeClass('open');
1027            flip.close();
1028        } else {
1029            page.addClass('open');
1030            flip.open();
1031        }
1032    });
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1064        }
1065    });
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1067    $(document).on('click', '#book .page', function () {
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1071            flip.close();
1072        } else {
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1074            flip.open();
1075        }
1076    });
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1078    $(document).on('click', '#book .page', function () {
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1082            flip.close();
1083        } else {
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1085            flip.open();
1086        }
1087    });
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1093            flip.close();
1094        } else {
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1096            flip.open();
1097        }
1098    });
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1100    $(document).on('click', '#book .page', function () {
1101        var page = $(this);
1102        if (page.hasClass('open')) {
1103            page.removeClass('open');
1104            flip.close();
1105        } else {
1106            page.addClass('open');
1107            flip.open();
1108        }
1109    });
1110
1111    $(document).on('click', '#book .page', function () {
1112        var page = $(this);
1113        if (page.hasClass('open')) {
1114            page.removeClass('open');
1115            flip.close();
1116        } else {
1117            page.addClass('open');
1118            flip.open();
1119        }
1120    });
1121
1122    $(document).on('click', '#book .page', function () {
1123        var page = $(this);
1124        if (page.hasClass('open')) {
1125            page.removeClass('open');
1126            flip.close();
1127        } else {
1128            page.addClass('open');
1129            flip.open();
1130        }
1131    });
1132
1133    $(document).on('click', '#book .page', function () {
1134        var page = $(this);
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1141        }
1142    });
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1185       }
1186    });
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1188    $(document).on('click', '#book .page', function () {
1189        var page = $(this);
1190        if (page.hasClass('open')) {
1191            page.removeClass('open');
1192            flip.close();
1193        } else {
1194            page.addClass('open');
1195            flip.open();
1196       }
1197    });
1198
1199    $(document).on('click', '#book .page', function () {
1200        var page = $(this);
1201        if (page.hasClass('open')) {
1202            page.removeClass('open');
1203            flip.close();
1204        } else {
1205            page.addClass('open');
1206            flip.open();
1207       }
1208    });
1209
1210    $(document).on('click', '#book .page', function () {
1211        var page = $(this);
1212        if (page.hasClass('open')) {
1213            page.removeClass('open');
1214            flip.close();
1215        } else {
1216            page.addClass('open');
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1218       }
1219    });
1220
1221    $(document).on('click', '#book .page', function () {
1222        var page = $(this);
1223        if (page.hasClass('open')) {
1224            page.removeClass('open');
1225            flip.close();
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1229       }
1230    });
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1232    $(document).on('click', '#book .page', function () {
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1234        if (page.hasClass('open')) {
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1295       }
1296    });
1297
1298    $(document).on('click', '#book .page', function () {
1299        var page = $(this);
1300        if (page.hasClass('open')) {
1301            page.removeClass('open');
1302            flip.close();
1303        } else {
1304            page.addClass('open');
1305            flip.open();
1306       }
1307    });
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1309    $(document).on('click', '#book .page', function () {
1310        var page = $(this);
1311        if (page.hasClass('open')) {
1312            page.removeClass('open');
1313            flip.close();
1314        } else {
1315            page.addClass('open');
1316            flip.open();
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1318    });
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1320    $(document).on('click', '#book .page', function () {
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1367            page.removeClass('open');
1368            flip.close();
1369        } else {
1370            page.addClass('open');
1371            flip.open();
1372       }
1373    });
1374
1375    $(document).on('click', '#book .page', function () {
1376        var page = $(this);
1377        if (page
```

# DEV TOOLS ARE YOUR FRIEND



# DEV TOOLS ARE YOUR FRIEND

Developer Tools - file:///Users/stephanie/code/bendy-and-muddy/index.html

Sources Content sc... Snippets index.js x

```
13     var currTime = new Date().getTime();
14     var timeToCall = Math.max(0, 16 - (currTime - lastTime));
15     var id = window.setTimeout(function () {
16         callback(currTime + timeToCall);
17     }, timeToCall);
18     lastTime = currTime + timeToCall;
19     return id;
20 }
21
22 if (!window.cancelAnimationFrame) {
23     window.cancelAnimationFrame = function (id) {
24         clearTimeout(id);
25     };
26 }
27 })(raf || (raf = {}));
28 var app;
29 (function (app) {
30     var flipIsFlipped = function (flip) {
31         return flip.progress < 0.997;
32     }
33     The breakpoint on line 32 will stop only if this expression is true:
34     flip.progress < 0.5
35     }
36     var flipGoto = function (flip, target) {
37         flip.target = target;
38         flip.time = Date.now();
39     };
40     var $e = function (name) {
41         return $(document.createElement(name));
42     };
43     var animationEnd = 'webkitAnimationEnd mozAnimationEnd msAnimationEnd oAnimationEnd animationend';
44 }
{} Line 32, Column 1
```

Watch  
flip.time: undefined

Call Stack  
Not Paused

Scope  
Not Paused

Breakpoints  
index.js:32  
return flip.progress < 0.997;

DOM Breakpoints  
div#lpages  
Subtree Modified

XHR Breakpoints

URL contains "/sessions"

Event Listener Breakpoints

Event Listeners

load  
Window      jquery.js:408

Console

<top frame> ▼ □ Preserve log

Filter  Regex  Hide network messages All Errors Warnings Info Logs Debug Handled

>

# DEV TOOLS ARE YOUR FRIEND

The screenshot shows the Google Chrome Developer Tools interface. The top navigation bar includes Elements, Console, Sources, Network, Timeline, Profiles, Resources, Security, and Audits. The Sources tab is active, displaying the file structure and code for 'index.js'.

**Sources Panel:**

- Content sc...
- Snippets
- ajax.googleapis.com
- file:///
  - Users/stephanie/code/bendy-and-muddy/
    - index.css
    - index.html
    - index.js
- fonts.googleapis.com
- www.google-analytics.com

**index.js Content:**

```
function (raf) {
  var lastTime = 0;
  var vendors = ['ms', 'moz', 'webkit', 'o'];
  for (var x = 0; x < vendors.length && !window.requestAnimationFrame; ++x) {
    window.requestAnimationFrame = window[vendors[x]] + 'RequestAnimationFrame';
    window.cancelAnimationFrame = window[vendors[x]] + 'CancelAnimationFrame' || window[vendors[x]] + 'CancelAnimationFrame';
  }
  if (!window.requestAnimationFrame) {
    window['requestAnimationFrame'] = function (callback) {
      var currTime = new Date().getTime();
      var timeToCall = Math.max(0, 16 - (currTime - lastTime));
      var id = window.setTimeout(function () {
        callback(currTime + timeToCall);
      }, timeToCall);
      lastTime = currTime + timeToCall;
      return id;
    };
  }
  if (!window.cancelAnimationFrame) {
    window.cancelAnimationFrame = function (id) {
      clearTimeout(id);
    };
  }
  raf || (raf = {}));
  app;
  function (app) {
    var flipIsFlipped = function (flip) {
      return flip.progress < 0.997;
    };
    var flipGoto = function (flip, target) {
      flip.target = target;
    };
  }
}
```

Line 37, Column 9

**Console Panel:**

- <top frame>
- Preserve log

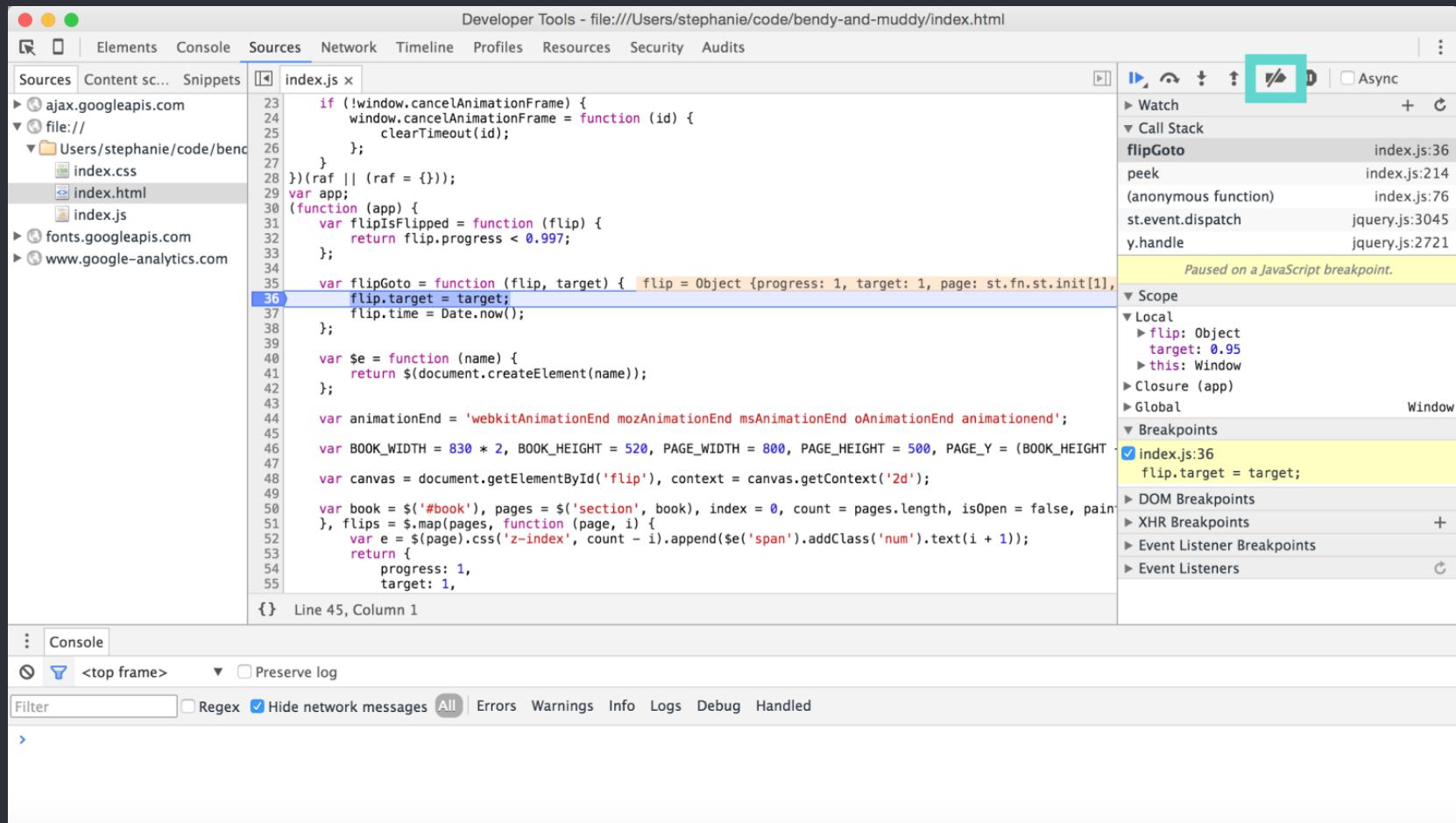
Filter   Regex  Hide network messages **All** | Errors Warnings Info Logs Debug Handled

>

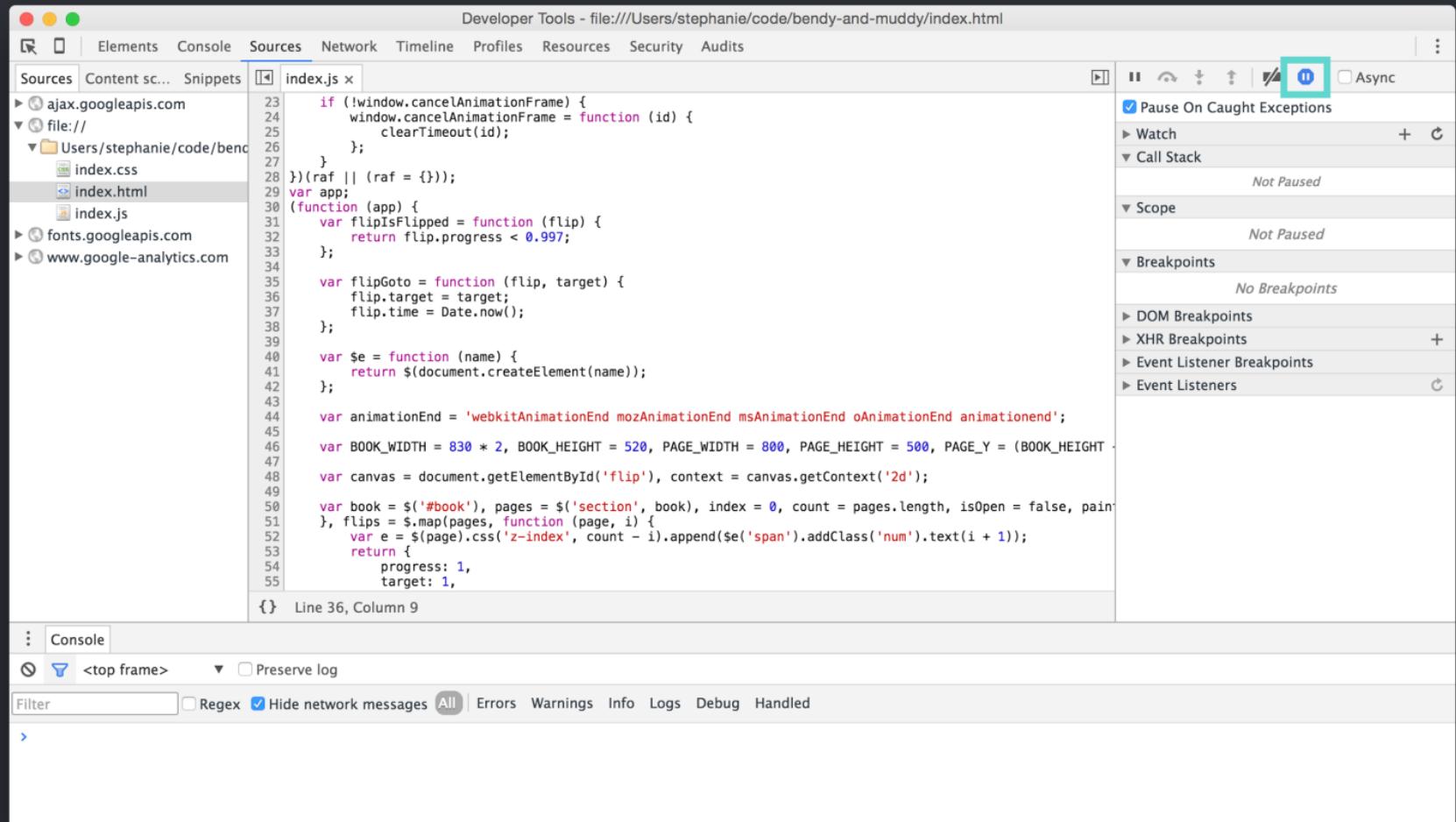
**Watch Panel:**

- Watch: flip.time: 1454897825932
- Call Stack: Not Paused
- Scope: Not Paused
- Breakpoints: No Breakpoints
- DOM Breakpoints
- XHR Breakpoints
- Event Listener Breakpoints
- Event Listeners

# DEV TOOLS ARE YOUR FRIEND



# DEV TOOLS ARE YOUR FRIEND



# DEV TOOLS ARE YOUR FRIEND

The screenshot shows the Chrome Developer Tools interface with the "Sources" tab selected. The left sidebar lists various files, with "index.js" currently open. The main pane displays the code for "index.js", which includes several functions and variable declarations. On the right side, there is a panel with several sections: "Watch" (containing a entry for "flip.time" with the value "1454897825932"), "Call Stack" (labeled "Not Paused"), "Scope" (labeled "Not Paused"), "Breakpoints" (labeled "No Breakpoints"), "DOM Breakpoints", "XHR Breakpoints", "Event Listener Breakpoints", "Event Listeners" (labeled "Not Paused"), and "load". Under "load", there is a "Window" object with properties like "useCapture", "handler", and "promise". A green box highlights the "Async" checkbox in the top right corner of the developer tools header.

```
Developer Tools - file:///Users/stephanie/code/bendy-and-muddy/index.html

Sources Content sc... Snippets index.js x
Sources Content sc... Snippets index.js x
  39 var $e = function (name) {
  40   return $(document.createElement(name));
  41 };
  42
  43 var animationEnd = 'webkitAnimationEnd mozAnimationEnd msAnimationEnd oAnimationEnd animationend';
  44
  45 var BOOK_WIDTH = 830 * 2, BOOK_HEIGHT = 520, PAGE_WIDTH = 800, PAGE_HEIGHT = 500, PAGE_Y = (BOOK_HEIGHT - PAGE_HEIGHT) / 2;
  46
  47 var canvas = document.getElementById('flip'), context = canvas.getContext('2d');
  48
  49 var book = $('#book'), pages = $('section', book), index = 0, count = pages.length, isOpen = false, pain
  50 }, flips = $.map(pages, function (page, i) {
  51   var e = $(page).css("z-index", count - i).append($e('span').addClass('num').text(i + 1));
  52   return {
  53     progress: 1,
  54     target: 1,
  55     page: e
  56   };
  57 }), cover = $('#rcover'), shadow = $('#rcover-shadow'), bookShadow = $('#book-shadow'), stacks = $('#stacks');
  58
  59 var bind = function () {
  60   pageDidChange = function () {
  61     nextButton.prop('disabled', index == count);
  62     prevButton.prop('disabled', !isOpen);
  63     closButton.prop('disabled', !isOpen);
  64   };
  65
  66   document.addEventListener('keydown', function (e) {
  67     if (e.ctrlKey && !e.shiftKey && e.keyCode == 48) {
  68       close();
  69     }
  70   }, true);
  71
  72   $('#rcover').on('click', open);
  73 }

{} Line 37, Column 9
```

Console

<top frame> ▾  Preserve log

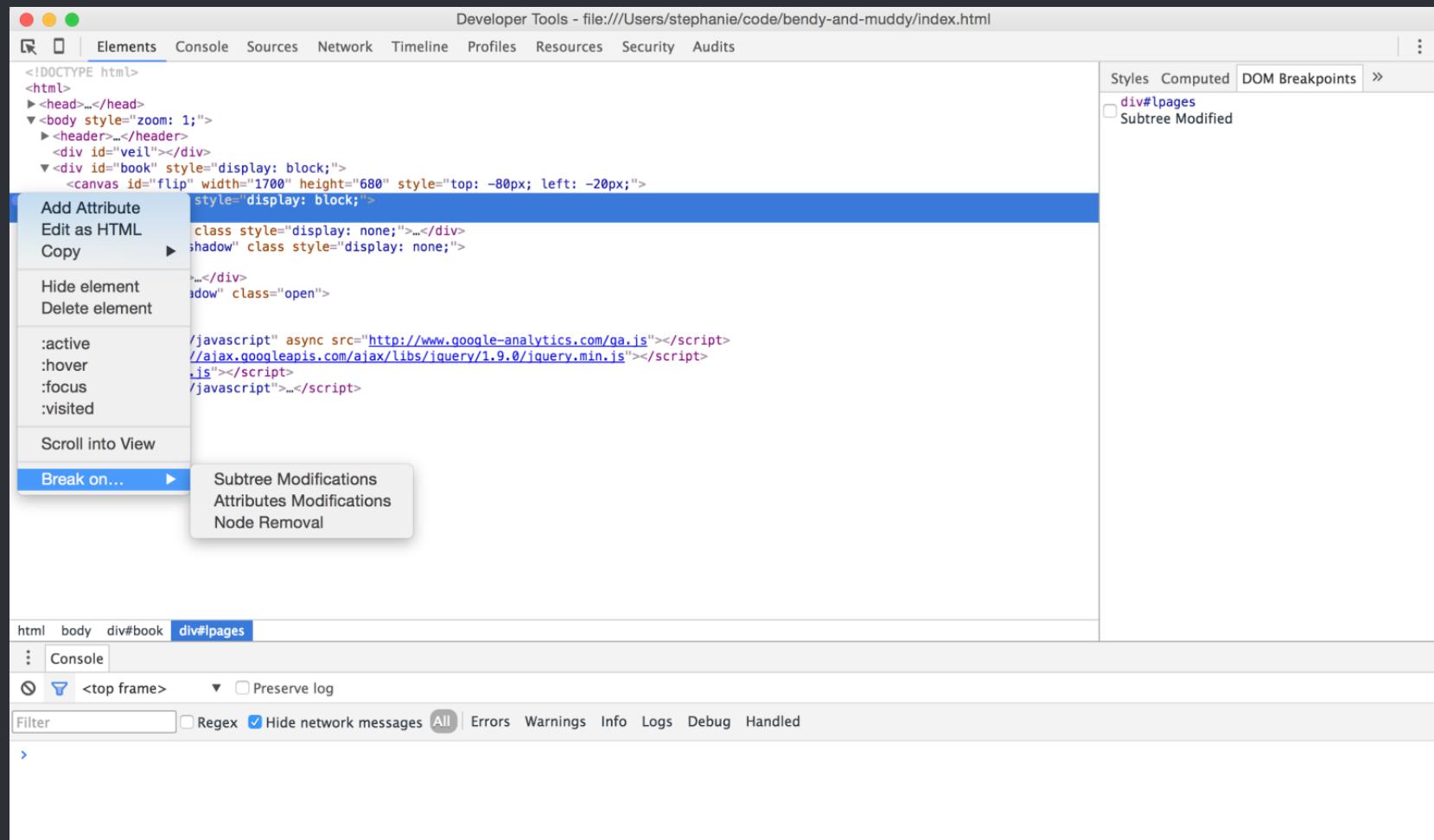
Filter  Regex  Hide network messages All Errors Warnings Info Logs Debug Handled

>

# DEV TOOLS ARE YOUR FRIEND

<i>Before</i>	<i>After</i>
<p>▼ Call Stack <input type="checkbox"/> Async</p> <p>postOnFail scripts.js:46</p> <p>jQuery.Callbacks.fire jquery.js:3047</p> <p>jQuery.Callbacks.self.fireWith jquery.js:3159</p> <p>done jquery.js:8185</p> <p>jQuery.ajaxTransport.send.callback jquery.js:8530</p> <p><i>Paused on a JavaScript breakpoint.</i></p>	<p>▼ Call Stack <input checked="" type="checkbox"/> Async</p> <p>postOnFail scripts.js:46</p> <p>jQuery.Callbacks.fire jquery.js:3047</p> <p>jQuery.Callbacks.self.fireWith jquery.js:3159</p> <p>done jquery.js:8185</p> <p>jQuery.ajaxTransport.send.callback jquery.js:8530</p> <p>XMLHttpRequest.send (async)</p> <p>jQuery.ajaxTransport.send jquery.js:8556</p> <p>jQuery.extend.ajax jquery.js:8084</p> <p>jQuery.each.jQuery.(anonymous function) jquery.js:8230</p> <p>submitData scripts.js:32</p> <p>submitHandler scripts.js:24</p> <p>jQuery.event.dispatch jquery.js:4371</p> <p>jQuery.event.add.elemData.handle jquery.js:4057</p> <p><i>Paused on a JavaScript breakpoint.</i></p>

# DEV TOOLS ARE YOUR FRIEND



# DEV TOOLS ARE YOUR FRIEND

The screenshot shows the Google Chrome Developer Tools interface. The top navigation bar includes Elements, Console, Sources, Network, Timeline, Profiles, Resources, Security, and Audits. The Sources tab is active, displaying the file structure and code for `index.js`. The code is a script for a flip book animation, defining functions like `$e`, `animationEnd`, and `bind`. The right side of the interface contains several panels: Watch, Call Stack, Scope, Breakpoints, DOM Breakpoints, XHR Breakpoints, and Event Listener Breakpoints. A large green box highlights the Event Listeners panel, which shows a list of event listeners attached to the window object. One listener for the `load` event is shown, with its handler function expanded to reveal its implementation using jQuery (`jquery.js:48`). The bottom of the interface features a Console tab, a Filter input field, and a status bar with tabs for Errors, Warnings, Info, Logs, Debug, and Handled.

```
var $e = function (name) {
    return $(document.createElement(name));
};

var animationEnd = 'webkitAnimationEnd mozAnimationEnd msAnimationEnd oAnimationEnd animationend';

var BOOK_WIDTH = 830 * 2, BOOK_HEIGHT = 520, PAGE_WIDTH = 800, PAGE_HEIGHT = 500, PAGE_Y = (BOOK_HEIGHT - PAGE_HEIGHT) / 2;

var canvas = document.getElementById('flip'), context = canvas.getContext('2d');

var book = $('#book'), pages = $('section', book), index = 0, count = pages.length, isOpen = false, pain
}, flips = $.map(pages, function (page, i) {
    var e = $(page).css('z-index', count - i).append($e('span').addClass('num').text(i + 1));
    return {
        progress: 1,
        target: 1,
        page: e
    };
}), cover = $('#rcover'), shadow = $('#rcover-shadow'), bookShadow = $('#book-shadow'), stacks = $('#stacks');

var bind = function () {
    pageDidChange = function () {
        nextButton.prop('disabled', index == count);
        prevButton.prop('disabled', !isOpen);
        closButton.prop('disabled', !isOpen);
    };

    document.addEventListener('keydown', function (e) {
        if (e.ctrlKey && !e.shiftKey && e.keyCode == 48) {
            close();
        }
    }, true);

    $('#rcover').on('click', open);
};
```

{} Line 37, Column 9

Event Listeners

load

Window

useCapture: false

handler: `function (e)`

> <function scope>

> `__proto__: function ()`

> `prototype: st.extend.ready`

> `promise: function (t)`

name: ""

length: 1

caller: (...)

arguments: (...)

# DEV TOOLS ARE YOUR FRIEND

Developer Tools - file:///Users/stephanie/code/bendy-and-muddy/index.html

Sources Content sc... Snippets index.js x

```
if (e.ctrlKey && !e.shiftKey && e.keyCode == 48) {  
    close();  
}, true);  
  
$('#rcover').on('click', open);  
$('#rpages').on('click', next).on('mouseover', function (e) {  
    peek(true);  
}).on('mouseout', function (e) {  
    peek(false);  
});  
  
var nextButton = $('#next').on('click', next);  
var prevButton = $('#prev').on('click', prev);  
var closButton = $('#clos').on('click', close);  
  
document.addEventListener('keydown', function (e) {  
    if (e.keyCode == 39) {  
        next();  
    } else if (e.keyCode == 37) {  
        prev();  
    }  
}, true);  
  
var init = function () {  
    $(canvas).attr('width', BOOK_WIDTH + CANVAS_PADDING_X * 2).attr('height', BOOK_HEIGHT + CANVAS_PADDING_Y);  
    setTimeout(function () {  
        $('#book').fadeIn(1000);  
    }, 0);  
};
```

Line 37, Column 9

Console

<top frame> ▾  Preserve log

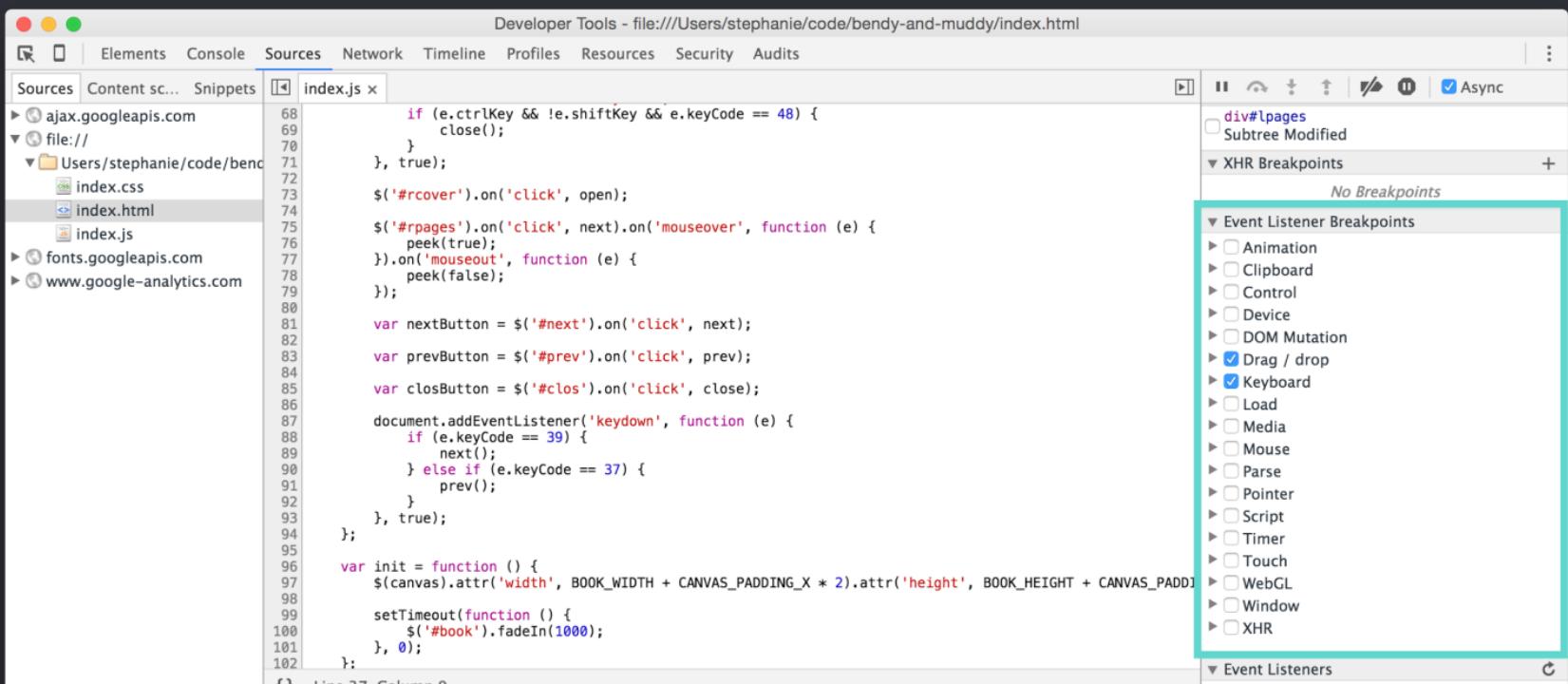
Filter  Regex  Hide network messages All Errors Warnings Info Logs Debug Handled

Event Listener Breakpoints

- Animation
- Clipboard
- Control
- Device
- DOM Mutation
- Drag / drop
- Keyboard
- Load
- Media
- Mouse
- Parse
- Pointer
- Script
- Timer
- Touch
- WebGL
- Window
- XHR

Event Listeners

load



# DEV TOOLS ARE YOUR FRIEND

The screenshot shows the Google Chrome Developer Tools interface with the "Sources" tab selected. The left sidebar lists various files, and the main pane displays the code for `index.js`. The code handles keyboard and mouse events to manage a canvas element. The right sidebar contains several panels: "Watch" (with `flip.time` set to undefined), "Call Stack" (Paused), "Scope" (Paused), "Breakpoints" (No Breakpoints), "DOM Breakpoints" (Subtree Modified), "XHR Breakpoints" (URL contains "/sessions" is checked and highlighted with a teal border), "Event Listener Breakpoints", "Event Listeners", and "load". The "Console" tab at the bottom shows a single entry: a greater than sign (>). The bottom navigation bar includes a "Filter" field, checkboxes for "Regex" and "Hide network messages", and tabs for All, Errors, Warnings, Info, Logs, Debug, and Handled.

```
if (e.ctrlKey && !e.shiftKey && e.keyCode == 48) {  
    close();  
}, true);  
});  
$('#rcover').on('click', open);  
$('#rpages').on('click', next).on('mouseover', function (e) {  
    peek(true);  
}).on('mouseout', function (e) {  
    peek(false);  
});  
  
var nextButton = $('#next').on('click', next);  
var prevButton = $('#prev').on('click', prev);  
var closButton = $('#clos').on('click', close);  
  
document.addEventListener('keydown', function (e) {  
    if (e.keyCode == 39) {  
        next();  
    } else if (e.keyCode == 37) {  
        prev();  
    }  
}, true);  
  
var init = function () {  
    $(canvas).attr('width', BOOK_WIDTH + CANVAS_PADDING_X * 2).attr('height', BOOK_HEIGHT + CANVAS_PADDING_Y);  
    setTimeout(function () {  
        $('#book').fadeIn(1000);  
    }, 0);  
};  
}); Line 37, Column 9
```

# DEV TOOLS ARE YOUR FRIEND

Developer Tools - https://staging.fullstory.com/ui/thefullstory.com/segments/everyone/people:search:((NOW%2FDAY-29DAY:NOW%2FDAY%2B1DAY):((UserEmail::=[%22stephanie@fullstor...

Elements Console Sources Network Timeline Profiles Resources Security Audits

View: All XHR JS CSS Img Media Font Doc WS Other

users

Name

- signedUpUsers.png
- mobileUsers.png
- userSegment.png
- searchUsers?limit=25&start=0&tz=America/New\_York
- searchUsers?limit=25&start=0&tz=America/New\_York

Headers

Preview Response Cookies Timing

.path: /searchUsers?limit=25&start=0&tz=America/New\_York  
:scheme: https  
accept: \*/\*  
accept-encoding: gzip, deflate  
accept-language: en-US, en;q=0.8  
content-length: 215  
content-type: application/json  
cookie: \_\_distillery=40C80E7FAEA645C18E1BEAED23F942A178F3202D; optimizelyUserId=oeu1443108800884r.1199020051598549; optimizelySegments=%7B%22344410587%22%3A%22false%22%2C%223453620602%22%3A%22gc%22%2C%223470710577%22%3A%22referral%22%7D; optimizelyBucket=\$%7B%223456562335%22%3A%22344300293%22%2C%22372860597%22%3A%223721930539%22%7D; fs\_uid=staging.fullstory.com`thefullstory.com`5065881679822848:5736232826961920`stephanie@fullstory.com`false; SACSID=AJKiyGoutShYny6xVYr45xc\_.pmR161xjVvQahmNBmhMumb-BiS7ub7SMnZzKAM1aad0\_aIRElhowXb0BsQ60212USDc6Xci91ZyNqjtxvBpbVkg0YxuEmZKmtuybgbG14wLGG658ShpJUQEJugQkmy15dTCW39ja1STxvY9kdn2dKugLrb8-ahL2-y7fgWMMmuWa4lbgv20FN70zDR\_q5YAqrvhWgszR5rhLoACoVsPv5rTbMKSLhpfy6hYR0U01pJlmohxISUpojd4UfqlgOVGc3tFM3XaqZdy3t9hmT\_ctF7m\_MYoJxFd5KPCUKW6-PIn1q0VH\_2owk\_07h-eqBgNTRYYYsWu\_M0MgcWhxIWPdkqsbzYx-66FKKZK0z0CQXw4xi5fHmwB16bjShRnDUwApLkk33foi8ixFgbEYpt0ejjT\_OEHReLnxzvbgZeqT\_qQoGENH30r1zLhfNohLLt0D8yt7NUotNpu94trdBtp\_FZPNCZ0LVznL\_6Ty5zsbuB7Fiz34caRiccL2\_61gxr-ehj2\_KFJPFMS2mLwmBDpcvS-nZe48s3-mzyz\_gt3s1qIoSOw2nZ0U6c4kPrvx7TpMKW256hJ01yXhU70mitzbCSJ9fbLcnfg5PLD34UXm-SNGsuadWDEKXJjrZj\_Ue5wCiq0X09cvCNlVRG8GnhUVRbx2jLD6AH\_MhsbcCy0\_jNBqlYQQHwmvJdS0F0ptKSiTeTgIVs; \_gat=1; visitor\_id=7312=219443070; fs\_session=1wRsYf+DawEBDVNpZ251ZFNLc3Npb24B/4B/A0AAQ0BCw0PJEluZm8B/4YARENREuHSY5kb21uZKNzAf+MAAEHmVbYtBtccBAABDUhlytYMBTTxhdHvYzQEKAAAA/5L/hQMBRK4ASAgBBUyZ0lkA0wAAhQZKzb24JDQwMSW1wBQ8MYXRvcgEeqA1PdmVycmlkZUzsyWdzAf+IAAESUGFzc3dvcmsRSZXNldEnvdW50AQQAQQUZ1lgGRXhwaXJ5Af+KAAEKUmV2YwxpZGF0ZQEQQAAEf+HBQEEdLiwAABD/iQUBAQRUaWN0NIXA3/4sDAV7zAbgCAQVOb25jAeEoAQLDc3JmVG9rZW4F7z+AQP/hAEBEHRoZW1zGxdG9ye55jb20BF3N0ZxBoYW5pZUAyGQAcAgEEAj4dAAEgAQa07H8BAQGAGaBEGAQJNigPAQAAA70dkPqAAUBAAENEQoxUXA8AC0HwbgEBBELhvQgBIAsDmjVR0qyM5r6V2jIY9nhWXULEMLZfmehnSxDgBdcAAECAUAcod04SI5SeFafCxJDHlnHN1Cn6ui7J18b7nah7enXxFYSNqx1ne6d6pWgzTw/dynS0JkxRtnY60BWduCN8/AA==; fs\_csrftoken=Cw0ANVE6rIzmvpXaMhj2eFZdqS0wtKwZGdIPE0AENw=; \_ga=GAI.2.195900543.1438099399  
csrftoken: Cw0ANVE6rIzmvpXaMhj2eFZdqS0wtKwZGdIPE0AENw=  
origin: https://staging.fullstory.com  
referer: https://staging.fullstory.com/ui/thefullstory.com/segments/everyone/people:search:((NOW%2FDAY-29DAY:NOW%2FDAY%2B1DAY):((UserEmail::=[%22stephanie@fullstory.com%22]))()  
user-agent: Mozilla/5.0 (Macintosh; Intel Mac OS X 10\_10\_5) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/48.0.2564.97 Safari/537.36

Query String Parameters

view source view URL encoded

limit: 25  
start: 0  
tz: America/New\_York

Request Payload

view source

TimeRange: {Start: "NOW/DAY-29DAY", End: "NOW/DAY+1DAY"}  
AccountTipCriteria: []  
EventCriteria: []  
EventNeverCriteria: []  
TimeRange: {Start: "NOW/DAY-29DAY", End: "NOW/DAY+1DAY"}  
End: "NOW/DAY+1DAY"  
Start: "NOW/DAY-29DAY"  
UserTipCriteria: [{Field: "UserEmail", Op: "", Value: ["stephanie@fullstory.com"]}]  
0: {Field: "UserEmail", Op: "", Value: ["stephanie@fullstory.com"]}

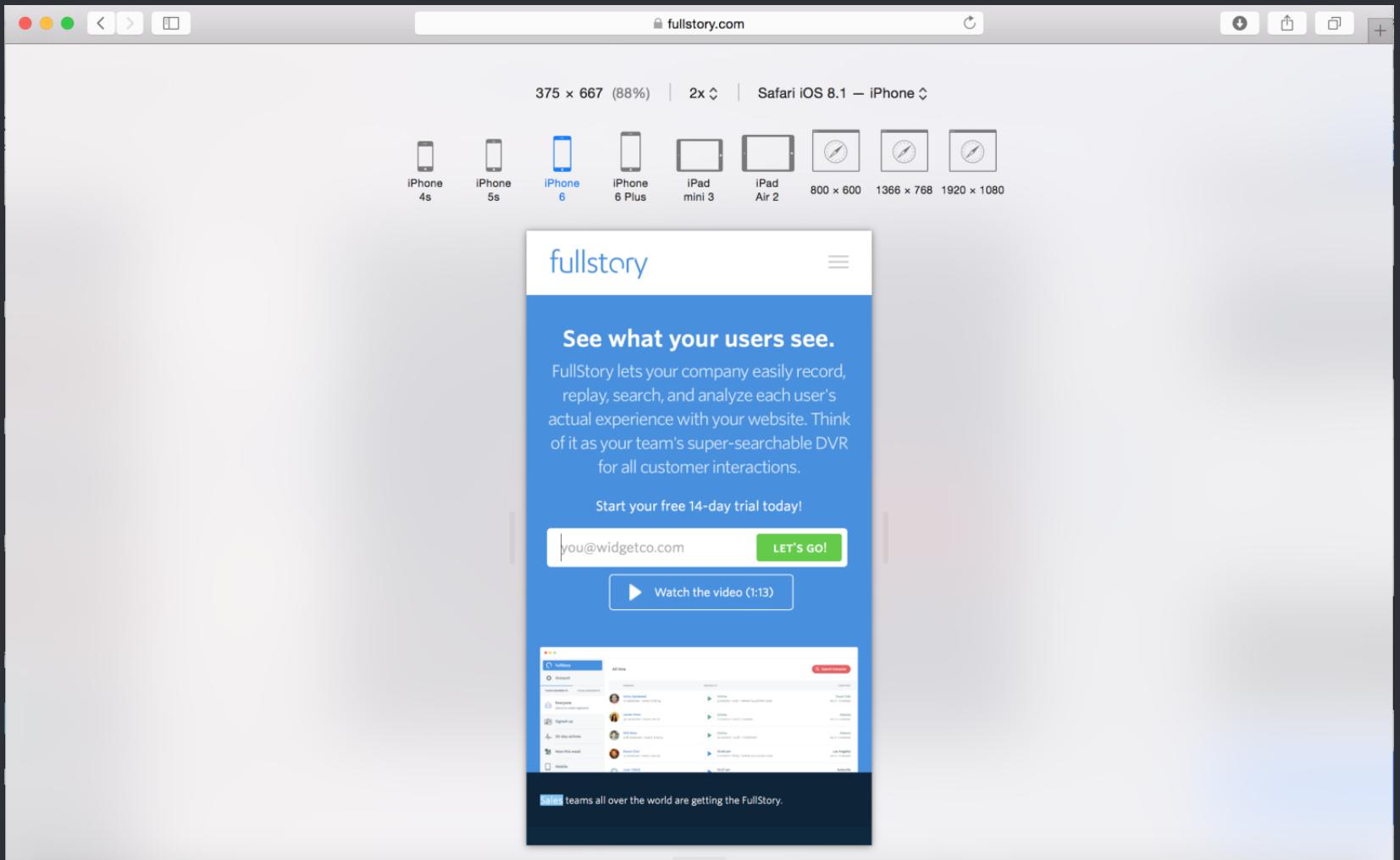
5 / 68 requests | 7.6 KB / 184 KB transferred | Finish: 3...

THE BEST DEFENSE IS A GOOD OFFENSE



Repro error  
conditions

# DEV TOOLS ARE YOUR FRIEND



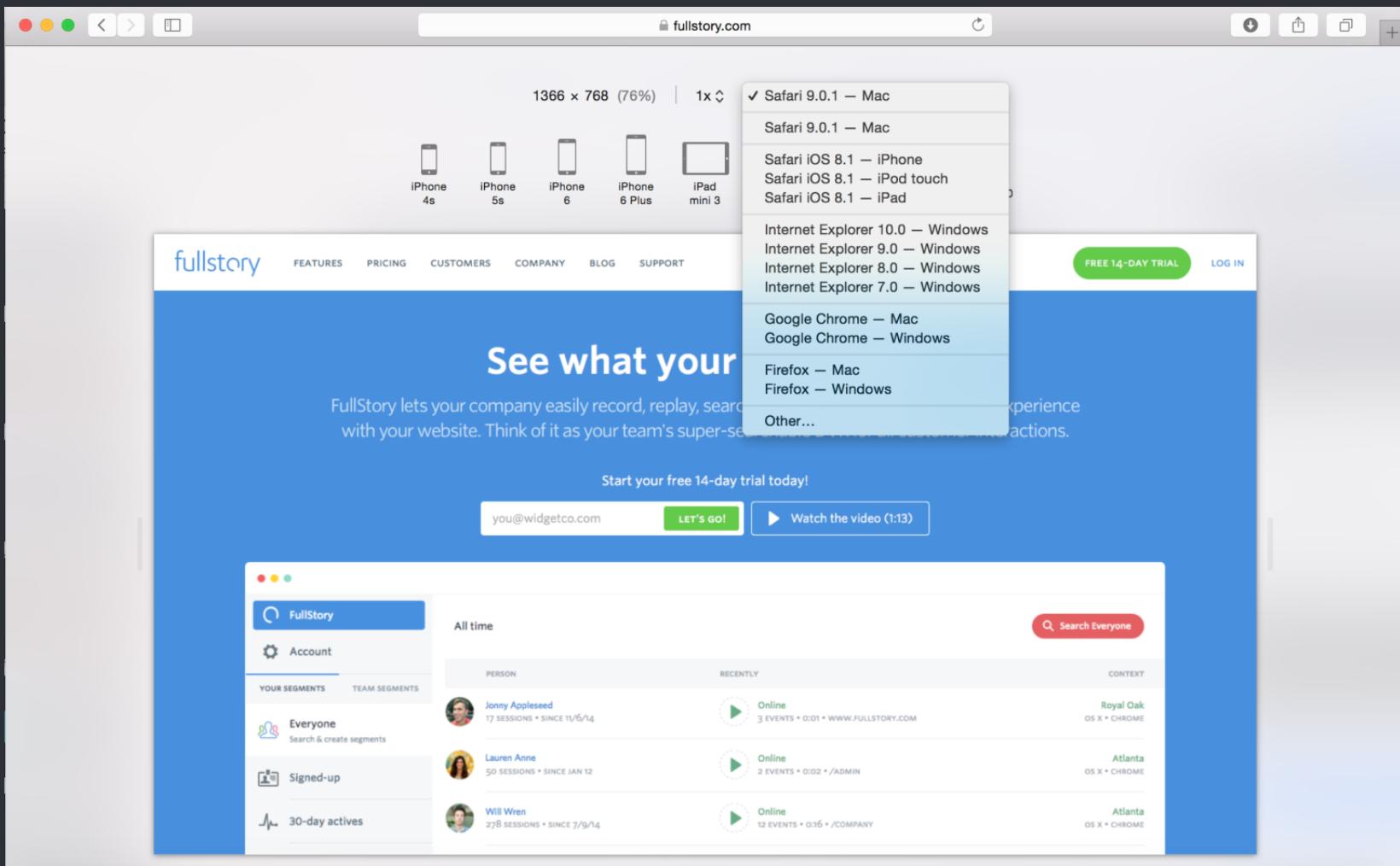
# DEV TOOLS ARE YOUR FRIEND

The screenshot shows a Mac OS X desktop with a Safari browser window open to fullstory.com. The browser's status bar indicates a resolution of 1366 x 768 (76%), a zoom level of 2x, and the browser version is Safari 9.0.1 on Mac. Below the status bar, there are icons for various devices: iPhone 4s, iPhone 5s, iPhone 6, iPhone 6 Plus, iPad mini 3, iPad Air 2, and screen resolutions 800 x 600, 1366 x 768 (highlighted in blue), and 1920 x 1080.

The main content area displays the FullStory homepage. At the top, it features the FullStory logo, navigation links for FEATURES, PRICING, CUSTOMERS, COMPANY, BLOG, and SUPPORT, a "FREE 14-DAY TRIAL" button, and a "LOG IN" link. The central message reads "See what your users see." followed by a subtext: "FullStory lets your company easily record, replay, search, and analyze each user's actual experience with your website. Think of it as your team's super-searchable DVR for all customer interactions." Below this is a call-to-action button: "Start your free 14-day trial today!" with input fields for "you@widgetco.com" and a green "LET'S GO!" button, along with a video thumbnail labeled "Watch the video (1:13)".

The bottom portion of the screenshot shows the FullStory dashboard interface. It has a sidebar with "FullStory" logo, "Account" settings, "YOUR SEGMENTS" (with "Everyone" selected), "TEAM SEGMENTS", "Signed-up", and "30-day actives". The main content area is titled "All time" and shows three segments: "PERSON" (Jonny Appleseed, 17 sessions since 11/6/14), "RECENTLY" (Online, 3 events, 0:01, www.fullstory.com, Royal Oak, OS X, Chrome), and "CONTEXT" (Atlanta, OS X, Chrome). There is also a "Search Everyone" button.

# DEV TOOLS ARE YOUR FRIEND



- DEV TOOLS ARE YOUR FRIEND
  - Add source maps
  - Use browser debugger
  - Repro error conditions



PROTECT YOUR  
INVESTMENT



MY PRECIOUS

PROTECT YOUR INVESTMENT



Create automated  
tests



# Web Automation Frameworks



Selenium/WebDriver



nightmare.js

# RAW PHANTOMJS

```
phantom.create(function (ph) {
  ph.createPage(function (page) {
    page.open('http://yahoo.com', function (status) {
      page.evaluate(function () {
        var el =
          document.querySelector('input[title="Search"]');
        el.value = 'github nightmare';
      }, function (result) {
        page.evaluate(function () {
          var el = document.querySelector('.searchsubmit');
          var event = document.createEvent('MouseEvent');
          event.initEvent('click', true, false);
          el.dispatchEvent(event);
        }, function (result) {
          ph.exit();
        });
      });
    });
  });
});
```

## WITH NIGHTMARE

```
yield Nightmare()  
  .goto('http://yahoo.com')  
  .type('input[title="Search"]', 'github nightmare')  
  .click('.searchsubmit');
```

- Test frameworks



Mocha



Jasmine

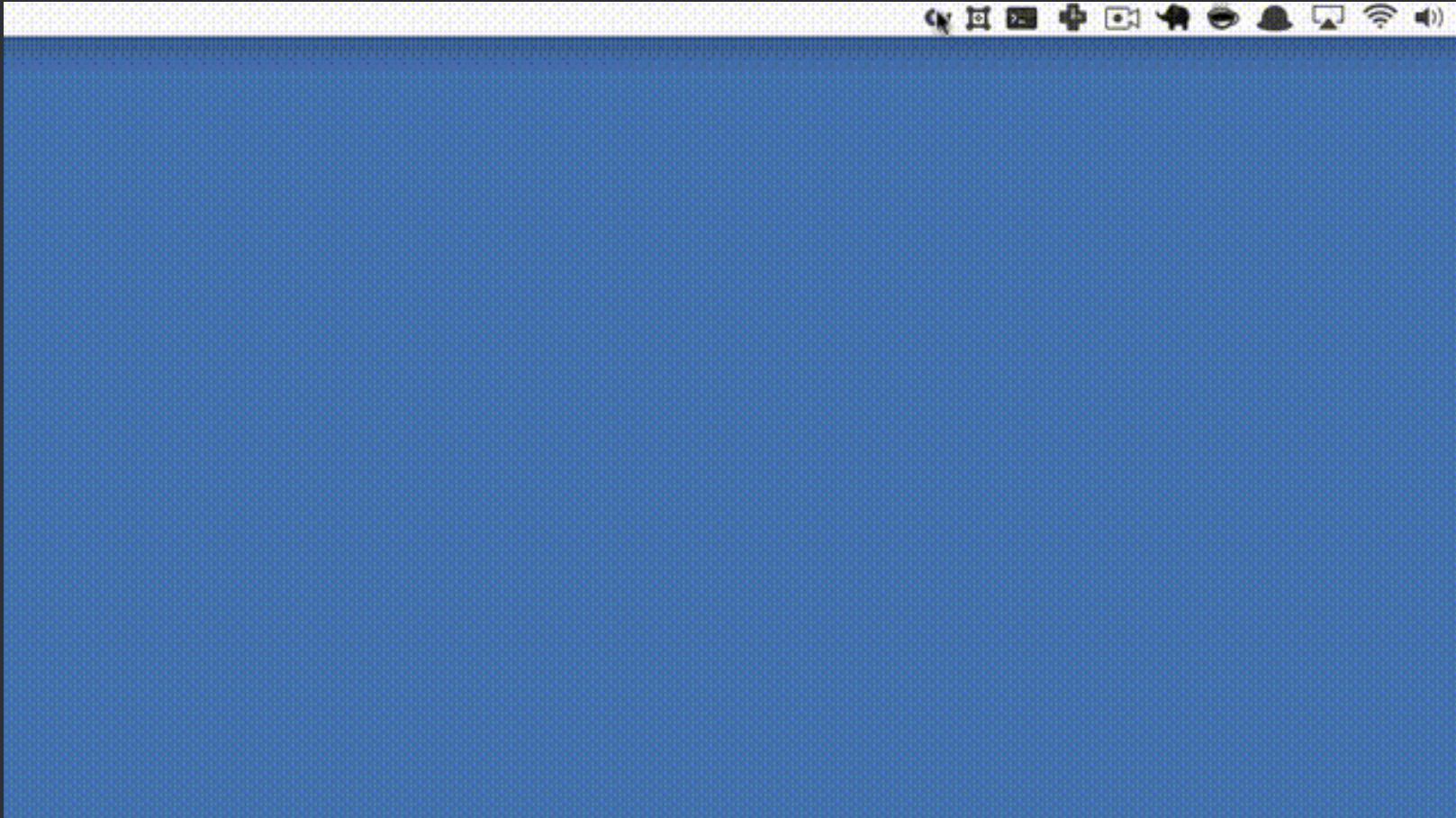


QUnit

# nightmare.js + Mocha

```
describe('Search test', function() {  
  
  it('should click on search button', function*() {  
    yield nightmare  
      .click('.refineButton')  
  });  
  
  it('should set a email userscope to jaclyn@fs', function*() {  
    yield nightmare  
      .click('.userScope > div > button')  
      .click('div.option[style*="email"]')  
      .type('.searchValue:not(.hidden)', 'jaclyn@fullstory.com')  
  });  
  
  it('should contain more than zero results', function*() {  
    var numResults = yield nightmare  
      .evaluate(function () {  
        return document.querySelector('.itemList').childNodes.length  
      });  
    numResults.should.be.at.least(1)  
  });  
});  
});
```

# CYPRESS.IO



- Build Automation



Buildbot

Jenkins

Grunt

Gulp

PROTECT YOUR INVESTMENT



Require code reviews



I Am Devloper

@iamdevloper



Follow

10 lines of code = 10 issues.

500 lines of code = "looks fine."

Code reviews.

RETWEETS

7,467

LIKES

3,605



1:58 AM - 5 Nov 2013



...

# NOT THIS

- Code Reviews FTW



Knowledge transfer



Maintain culture



Genuinely better code

- PROTECT YOUR INVESTMENT
  - Create automated tests
  - Require code reviews

- DEBUGGING JS LIKE A BOSS

- Start with a good offense

- Dev tools are your friend

- Protect your investment

**Thanks!**

• **QUESTIONS?**

@sjbrubaker  
stephanie@fullstory.com