



Esri International Developer Summit
Palm Springs, CA

Testing Tools and Patterns for JavaScript Mapping Applications

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write code
to test code.





```
function adder(a, b){  
    return a + b;  
}
```

```
//clear item filter from DOM
$('.item-attribute-filter').empty();

//-----
//TODO: Figure out how to push this into the view
//-----
//build slider for each attribute
if ( results !== null ) {
  _.each($('.item-attribute-filter'), function(item, i) {
    var id = $(item).attr('id');

    //Some numeric fields should not have filters
    var fieldsToSkip = ['objectid', 'objectid_1', 'fid', 'lat', 'lon','long','x', 'y', 'longitude', 'latitude','shape_leng', 'shape_length'];

    if(! _.contains(fieldsToSkip, id.toLowerCase()) ){
      console.log('Results for ' + id, results.stats[ id ]);
      if ( results.stats[ id ] ) {
        var min = 0, max = 0;

        //zero is falsy so we have to test for null directly
        if ( results.stats[ id ].min !== null ) {
          min = ( results.stats[ id ].min ) ? results.stats[ id ].min : 0;
          max = ( results.stats[ id ].max ) ? results.stats[ id ].max : 0;
        }
        console.log('Max: ' + max);
        if ( max > 0 ) {
          d3.select( '#'+id ).call(d3.slider()
            .axis(true)
            .min( min )
            .max( max )
            .value( [ min, max ] )
            .id( id )
            .on("slide", function(evt, value, id) {
              self._setFilter( {attribute: id, min: value[ 0 ], max: value[ 1 ]} );
            })
          );
        } else {
          $('#'+id).html( 'Insufficient statistics to filter for this attribute.' );
        }
      }
    }
  });
}
```



writing tests



```
describe("resultModel", function() {  
  it('fetches', function() {  
    expect(m.isFetched).toBe(true);  
  });  
});
```

Describe “resultModel”

it “fetches itself”

expect m.isFetched toBe true

suite

spec

assertion



“matcher”

toBeDefined, toBeNull, toEqual, toBeTruthy,
toHaveClass, toHaveBeenCalled, toContain

+100

Describe “resultModel”

beforeEach

afterEach

it “fetches itself”

expect m.isFetched toBe true

setup

teardown

create objects
fill with test
data
setup DOM

(json fixtures*)
(HTML fixtures*)

*framework dependent

Describe “resultModel”

beforeEach

afterEach

it “fetches itself”

expect m.isFetched toBe true

setup

teardown

Describe “resultModel”

beforeEach //setup

afterEach //tear down

Describe “with Criteria”

beforeEach //setup

afterEach //tear down

it “some condition”

expect true toBe true

it “some condition”

expect red toBe red

general

specific



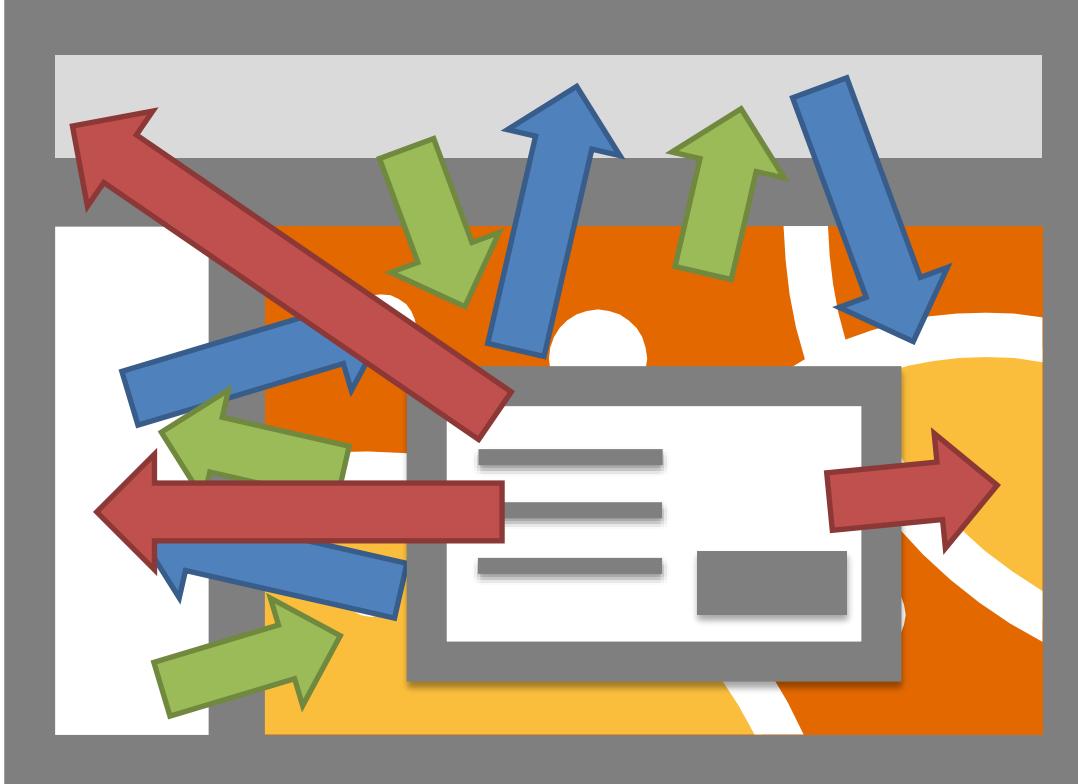


why
bother?

1. _____
2. code is correct
3. catch regression

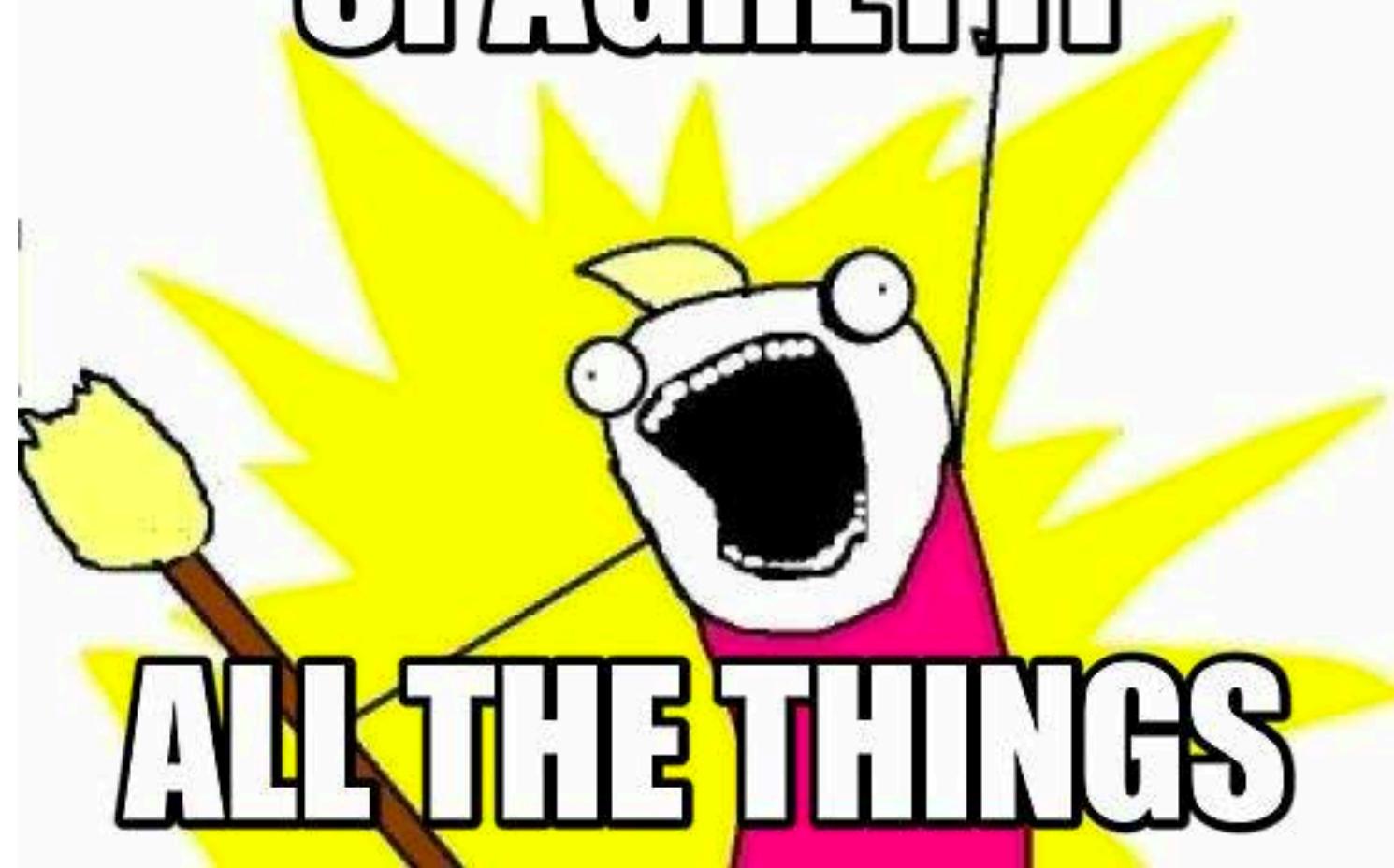
1. drive code structure
2. code is correct
3. catch regression

average application...



architecturally...

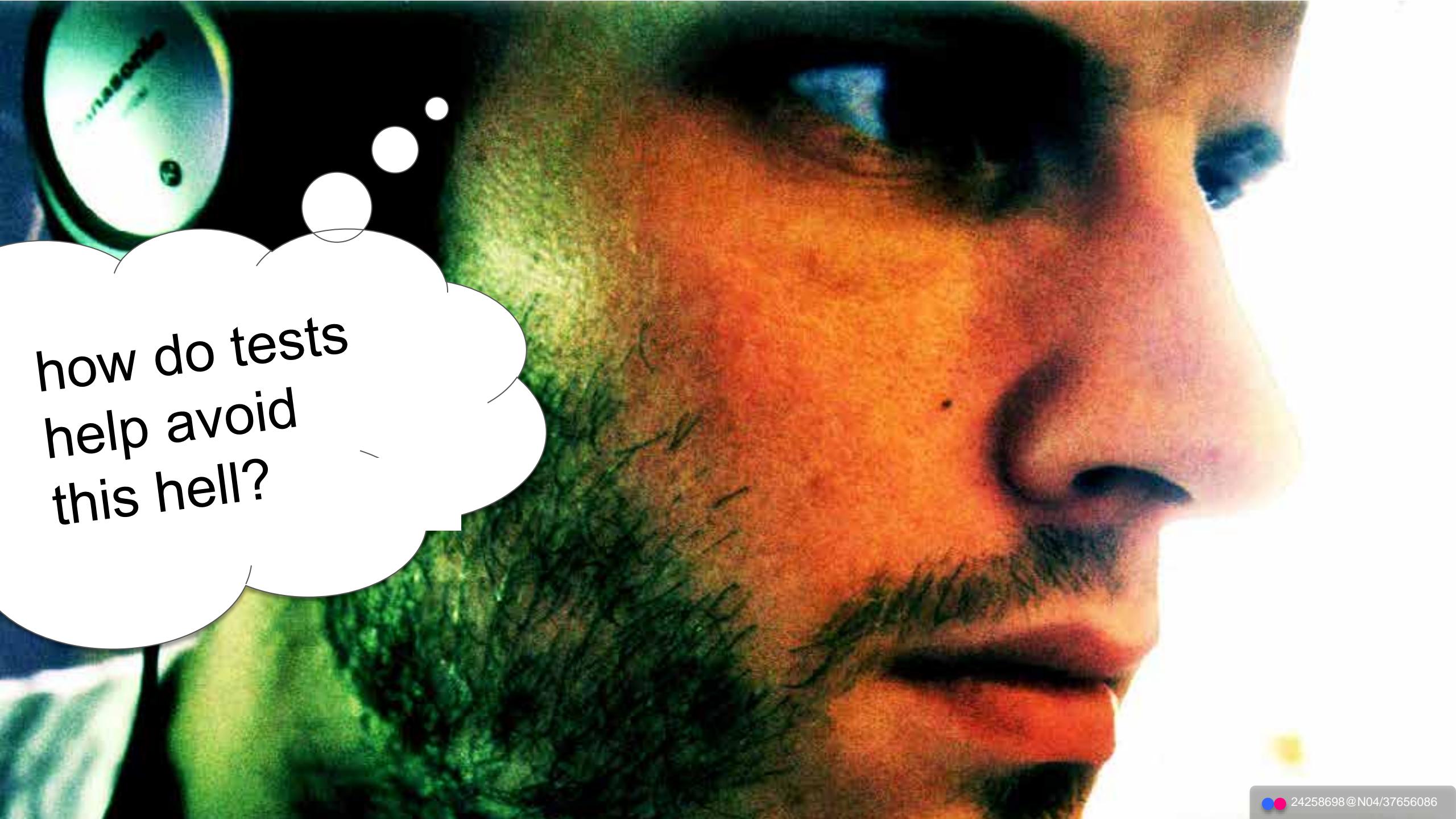
SPAGHETTI



ALL THE THINGS

you can make this work...





how do tests
help avoid
this hell?

4 rules for super tests



write
high value
tests





test only your code

test one thing at a time



refactor
ruthlessly







`$.ajax({...})`



```
$.ajax({...})
```

“success”

“error”

test our code!



```
$.ajax({...})
```

“success”

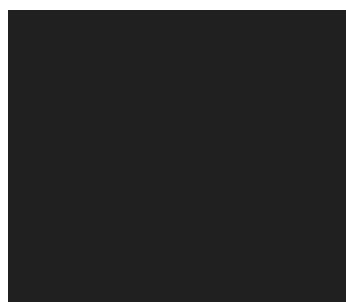
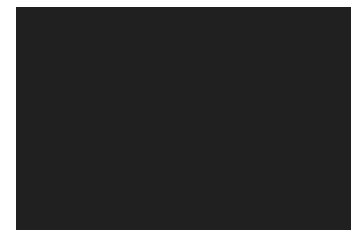
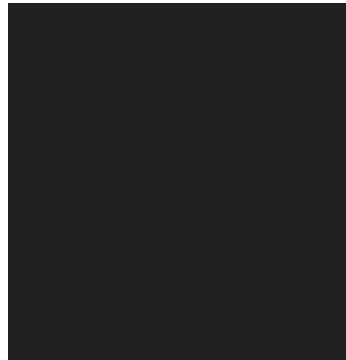
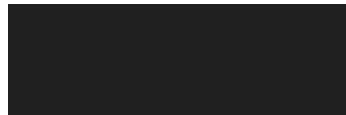
“error”



`$.ajax({...})`

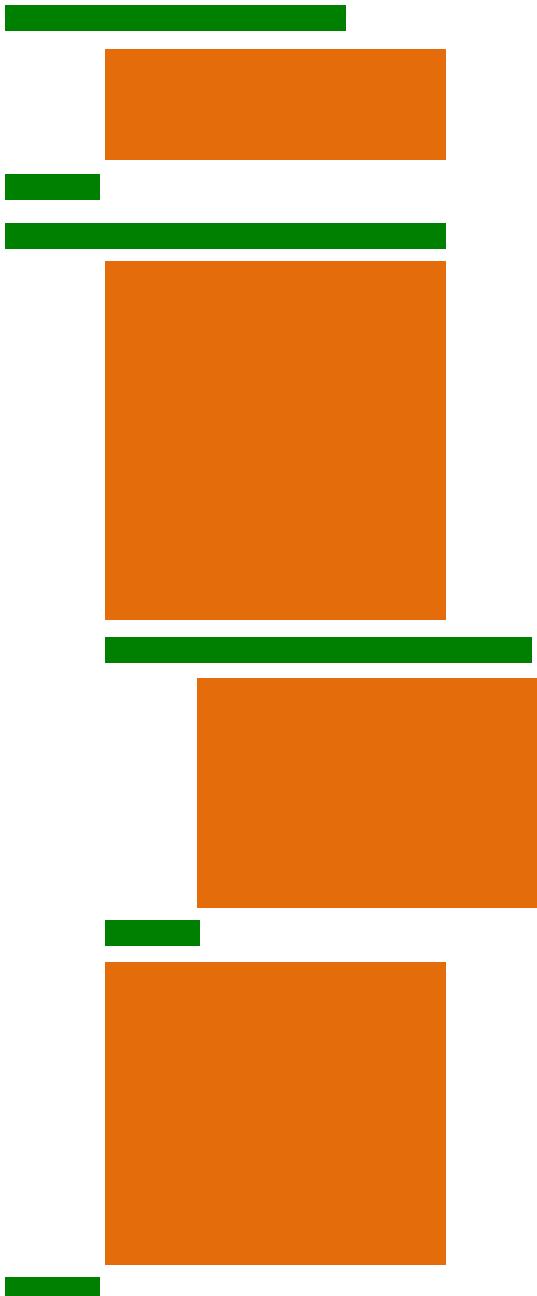
“success”

“error”



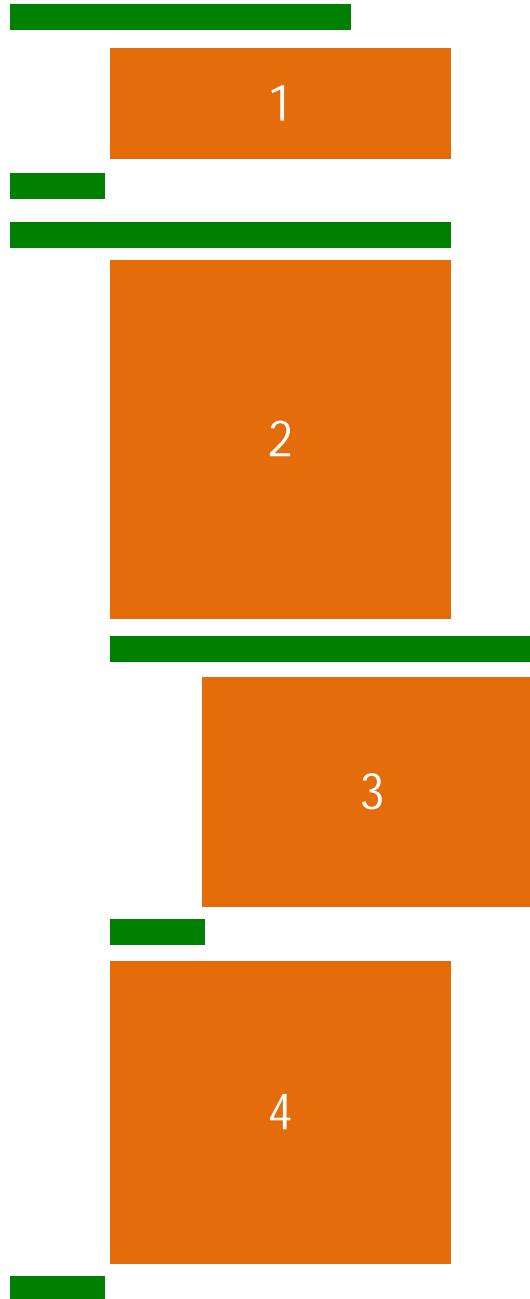


“logic”



“logic”

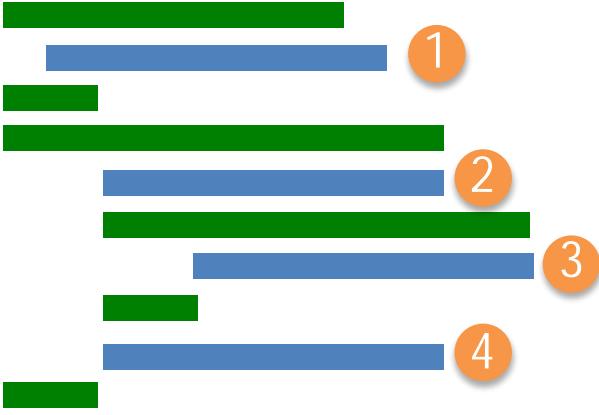
“action”



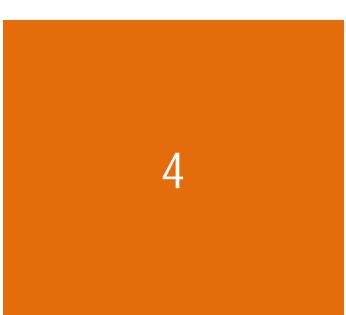
“logic”

“action”

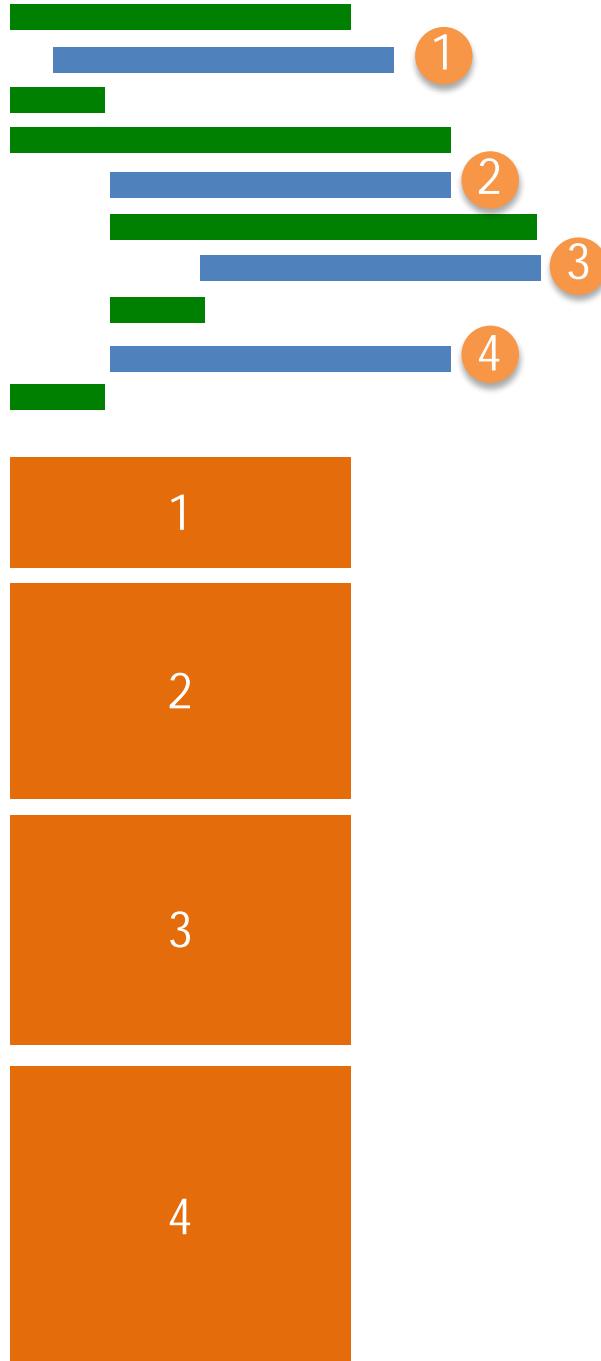
test one thing!



“logic with calls”



“action functions”



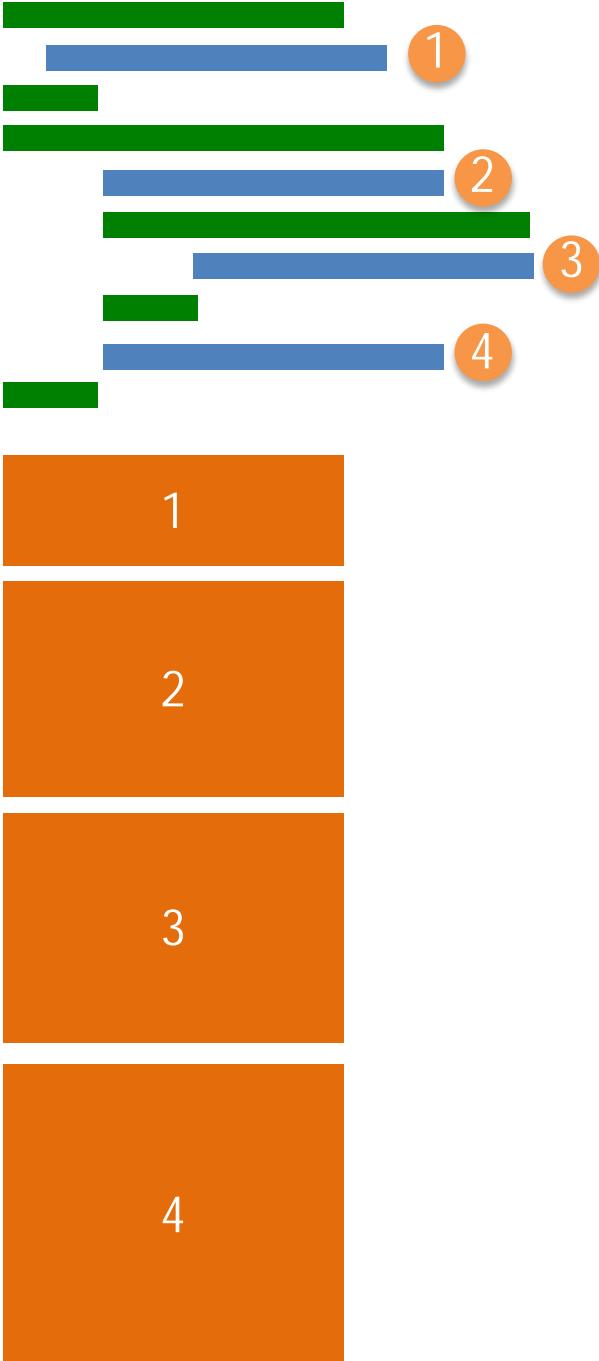
testing logic...

given a,b,c...

was fn x called with a,c?

did fn x call fn y with c?

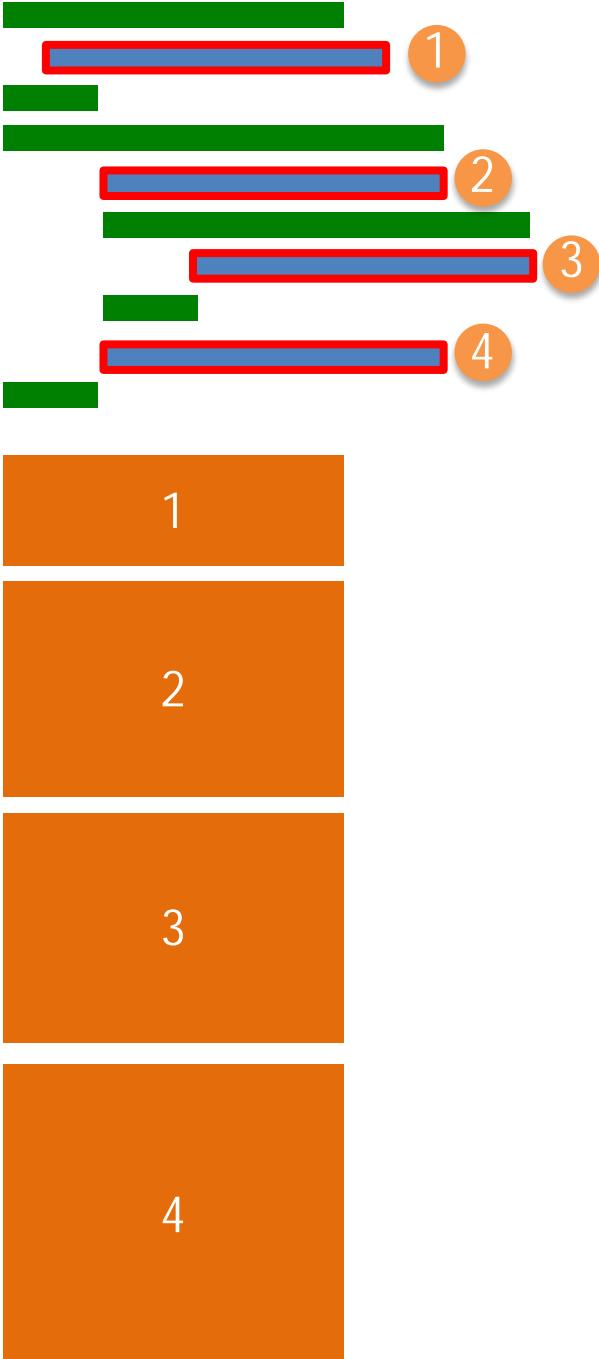
valuable tests!



testing logic

spies & fakes!





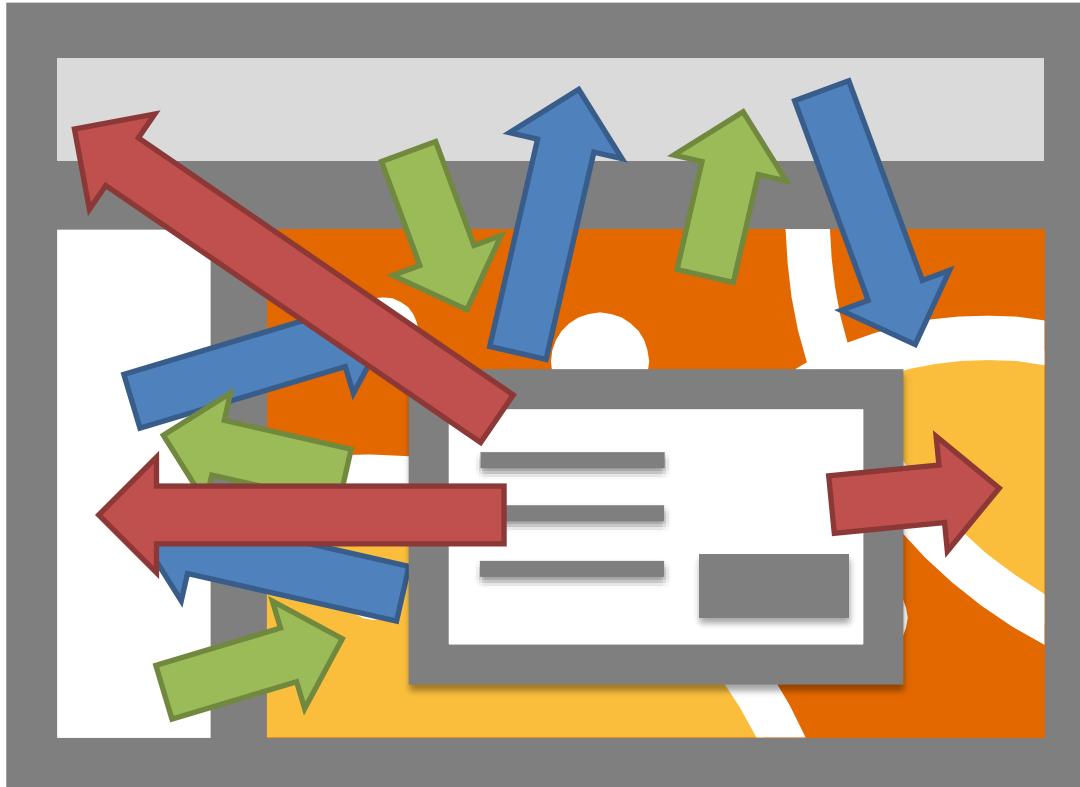
testing logic

spies & fakes!

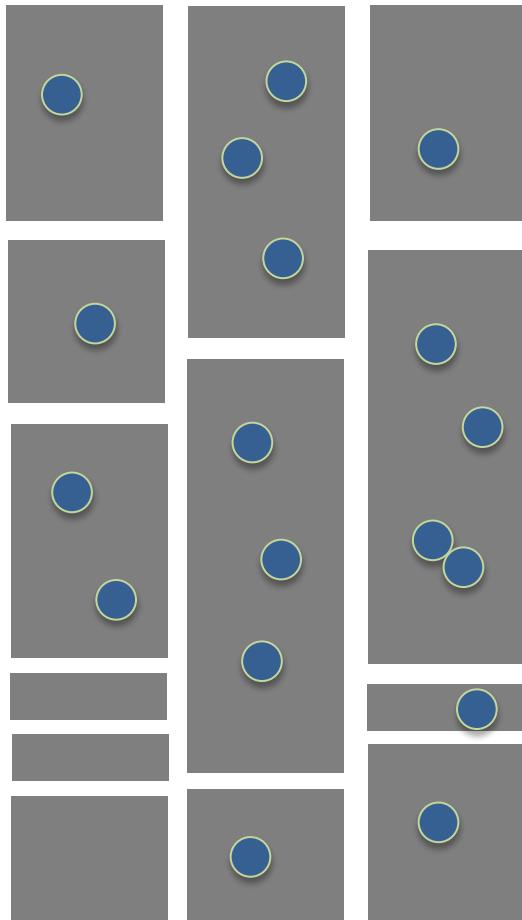




Trivial! What
about real
applications?



Use a framework



map

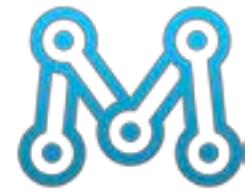


BACKBONE.JS

ember

# Sammy.js

canjs

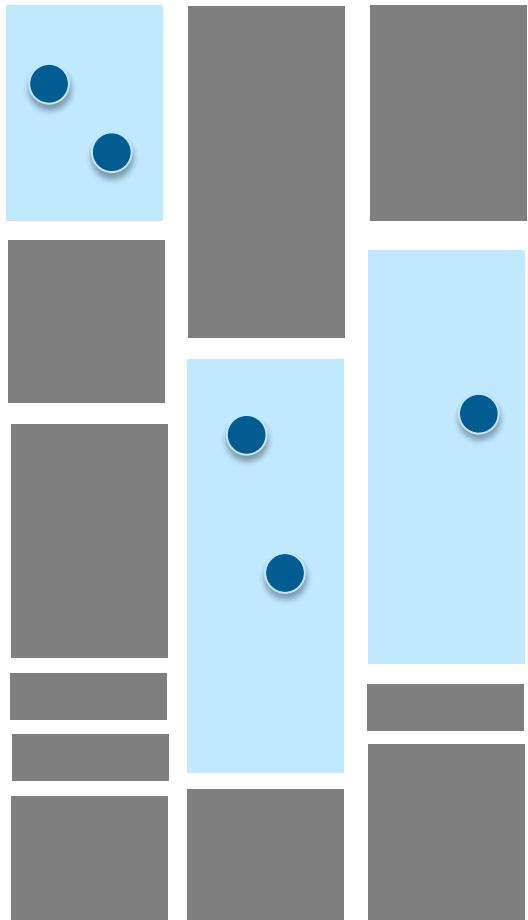

MONTAGE



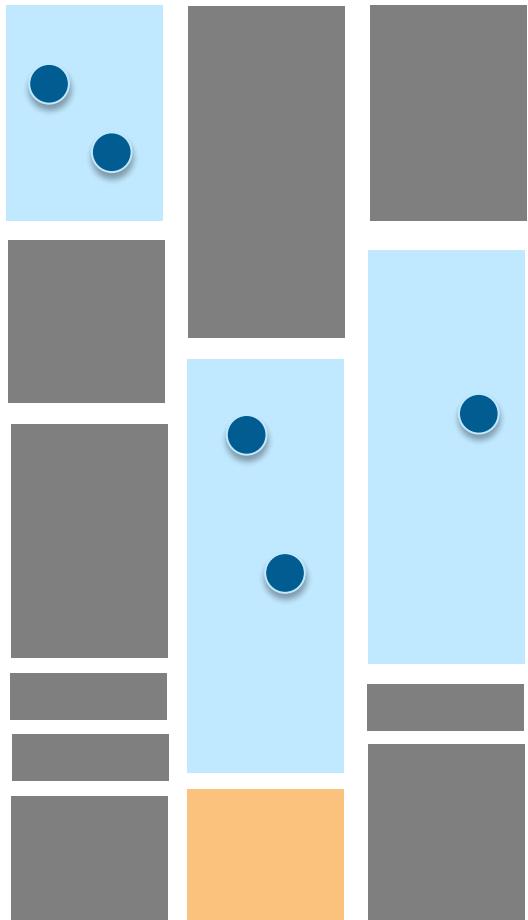
polymer


puremvc

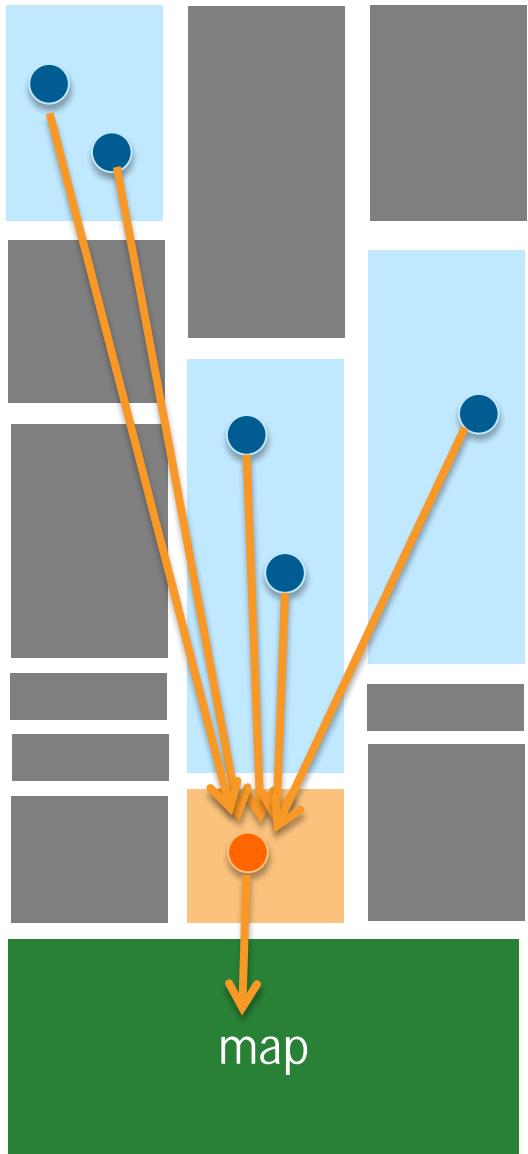
Separation of Concerns



Controllers

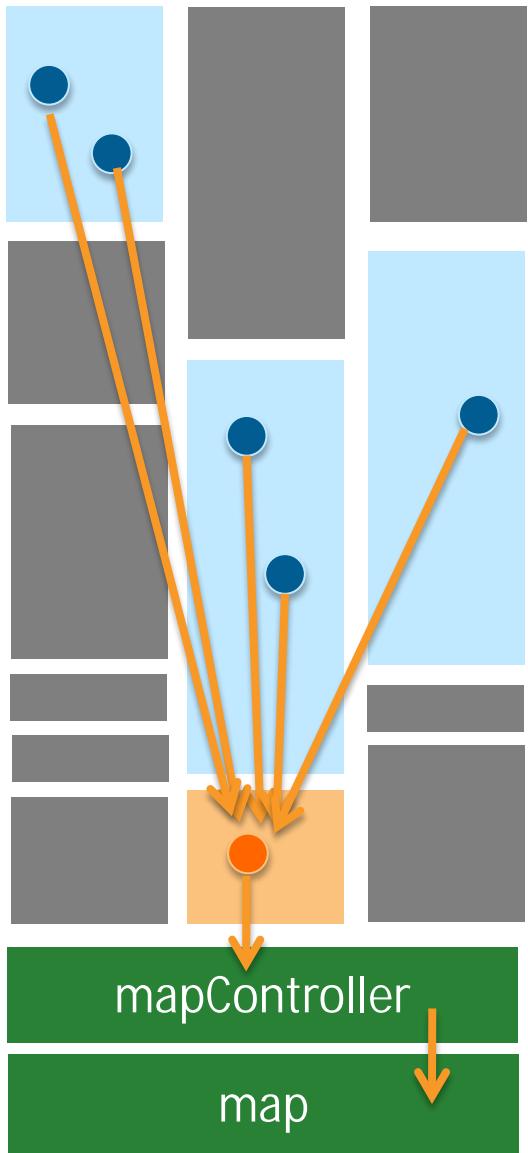


Application

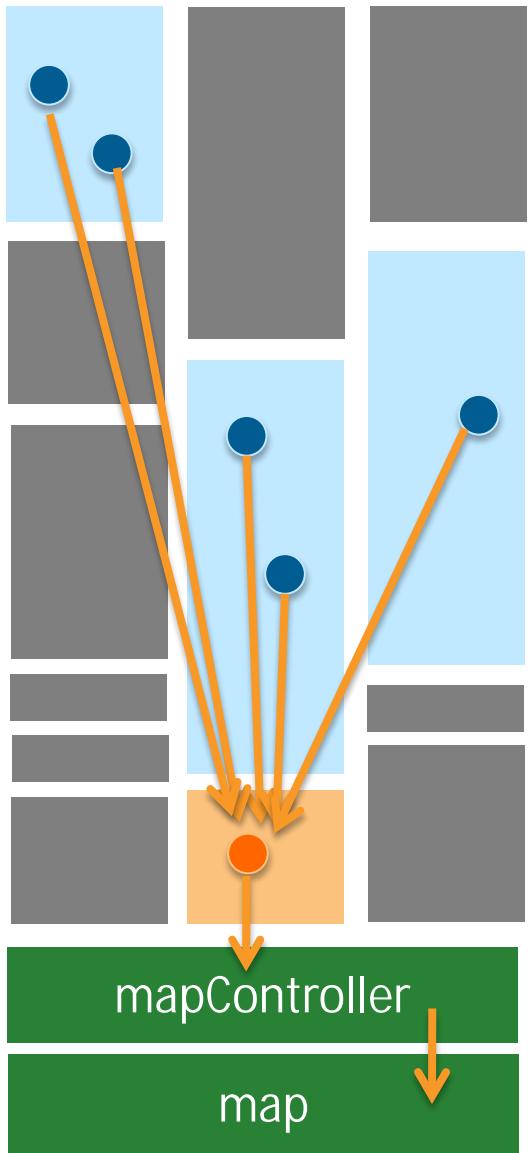


Event Bus

`App.trigger(...)`
`App.on(...)`
`App.off(...)`



Map Controller



spies & fakes!



Symbiotic Relationship

Writing tests makes your code better.

Writing tests makes you code better.

Testable code is more modular.

Testable code is more understandable.

Testable code is more robust.

Testable code is more reusable.

frameworks

A photograph of a man with light brown hair and blue eyes, wearing a plaid shirt, sitting in front of a laptop. He has a surprised or shocked expression on his face. He is surrounded by other people, some of whom are also looking at laptops. The background is dark and out of focus.

The Intern

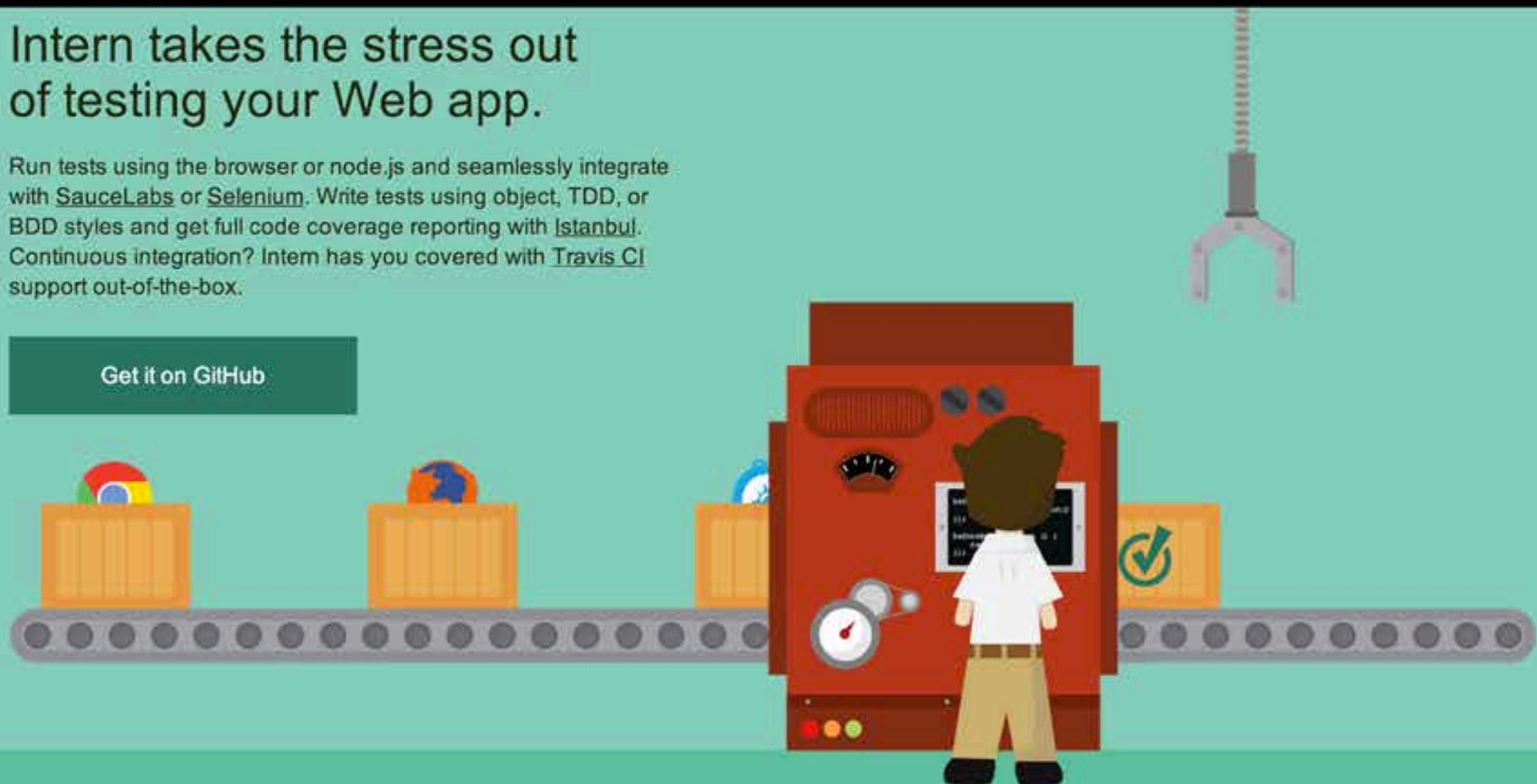
David Spriggs



**Just make the Intern do
the testing.**

Intern takes the stress out of testing your Web app.

Run tests using the browser or node.js and seamlessly integrate with [SauceLabs](#) or [Selenium](#). Write tests using object, TDD, or BDD styles and get full code coverage reporting with [Istanbul](#). Continuous integration? Intern has you covered with [Travis CI](#) support out-of-the-box.

[Get it on GitHub](#)

AMD by default

Intern uses the [Asynchronous Module Definition](#) format, so testing AMD-based applications is a breeze. (Non-AMD code can be tested just fine, too.)

Promise-based async

A test loop built with [Promises](#) makes asynchronous tests trivial to write and easy to read, with no wasteful polling and no nasty callback chains.

Code coverage

If you don't know what code runs when your tests do, how do you know what's broken? Intern gives you full statement, branch, function, and line code coverage reporting plus [lcov](#) output.

Functional testing

Mimic real user interactions from outside the JavaScript sandbox—and even test non-JavaScript Web apps—using our jQuery-like API based on the [WebDriver](#) standard.

Easy CI

Intern was designed with maintainability and continuous integration in mind. It's been tested with [Travis CI](#), and getting your own continuous integration set up is [super easy](#).

Extensibility

Intern comes with [Chai](#) but works with any assertion library that throws errors, and its [reporters](#) and [testing interfaces](#) are fully modular and easy to extend.

Grunt support

Grunt is so popular we just went ahead and baked a task [right into Intern](#), so you can use it straight-up without any third-party dependencies.

Great examples

Intern works great with any library or toolkit, and our [community-contributed examples](#) can show you how.

Truly open-source

Intern is New BSD licensed and follows the [Dojo Foundation 100-point promise](#) for the ultimate in peace-of-mind.

Feature	Intern	QUnit	Mocha	Jasmine	BusterJS	Karma
Code coverage analysis	Yes	No	Yes	No	Extension	Yes
True ¹ browser events	Yes	No	No	No	No	No
Native AMD support	Yes	No	No	No	Extension	Extension
Stand-alone ² browser support	Yes	Yes	Build required	Build required	Experimental	No
Node.js support	Yes	No ³	Yes	Yes	Yes	Yes
Any ⁴ assertion library	Yes	No	Yes	No	Yes	N/A
Default test interface	TDD, BDD, object	TDD	TDD, BDD, object	BDD	TDD, BDD	N/A
Extensible test interfaces	Yes	No	Yes	No	Yes	N/A
Extensible reporters	Yes	No	Yes	No	Yes	N/A
Asynchronous support	Promises	Globals	Callbacks	Polling	Callbacks, Promises	Callbacks
Selenium support	Yes	No	No	No	No	No
Built-in CI support	Yes	No	No	No	Yes	Yes
Built-in Sauce Labs integration	Yes	No	No	No	No	No
Built-in Travis CI integration	Yes	No	No	No	No	Yes
Grunt support	Yes	3rd party	3rd party	3rd party	3rd party	3rd party

Run tests in any environment



Browser client

Run unit tests straight from any browser—no Node.js server needed!—by navigating to the included standalone HTML page.



Node.js client

Writing server-side code? A standalone Node.js client is also included, so you can test that too.



Test auto-runner

A testing framework isn't very useful if it's difficult to test all platforms. Intern includes an automated test runner that works with [Sauce Labs](#) or your own Selenium Grid.

Write simple tests and see output quickly



Write one of these: **BDD** **TDD** **Object**

```
define([
  'intern!object',
  'intern/chai!assert',
  '../MyWidget'
], function (registerSuite, assert, MyWidget) {
  var widget;

  registerSuite({
    name: 'demo widget',

    setup: function () {
      widget = new MyWidget();
    },

    teardown: function () {
      widget.destroy();
    },

    creation: function () {
      assert(widget.children.length > 0, 'Widget should have children');
    }
  });
});
```

Run this:

```
$ intern-runner config=tests/intern
```

Get this:

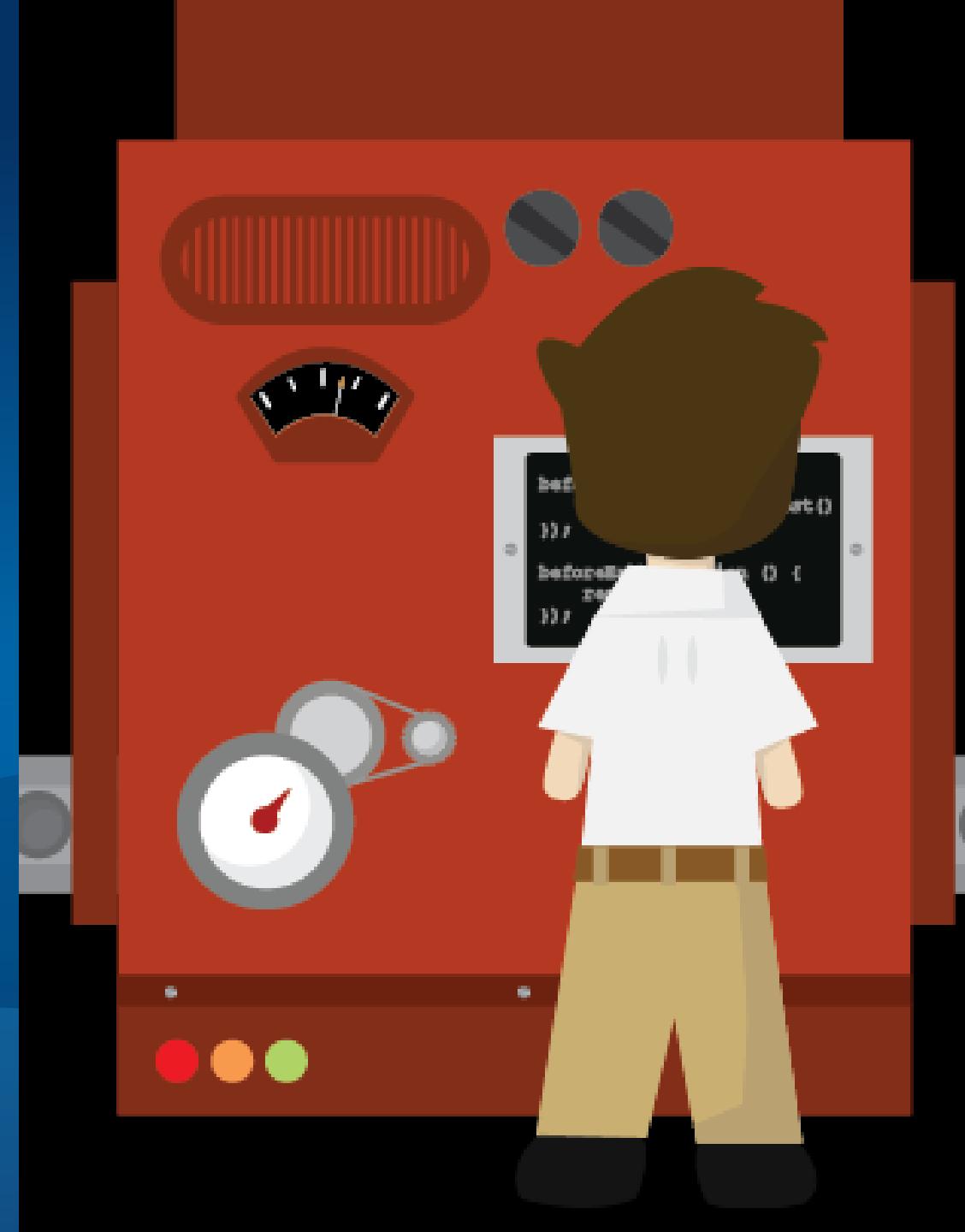
```
Opening local tunnel using Sauce Connect
Creating tunnel with Sauce Labs
Testing tunnel ready
...
Initialised firefox 19.0 on LINUX
Initialised chrome 25.0.1364.97 on LINUX
Initialised chrome 24.0.1312.57 on XP
Initialised firefox 19.0 on MAC
Initialised safari 6.0.1 on MAC
...
----- Coverage summary -----
Statements   : 87.15% ( 536/615 )
Branches     : 66.47% ( 111/167 )
Functions    : 79.55% ( 175/220 )
Lines        : 87.15% ( 536/615 )
-----
TOTAL: tested 5 platforms, 0/710 tests failed
```



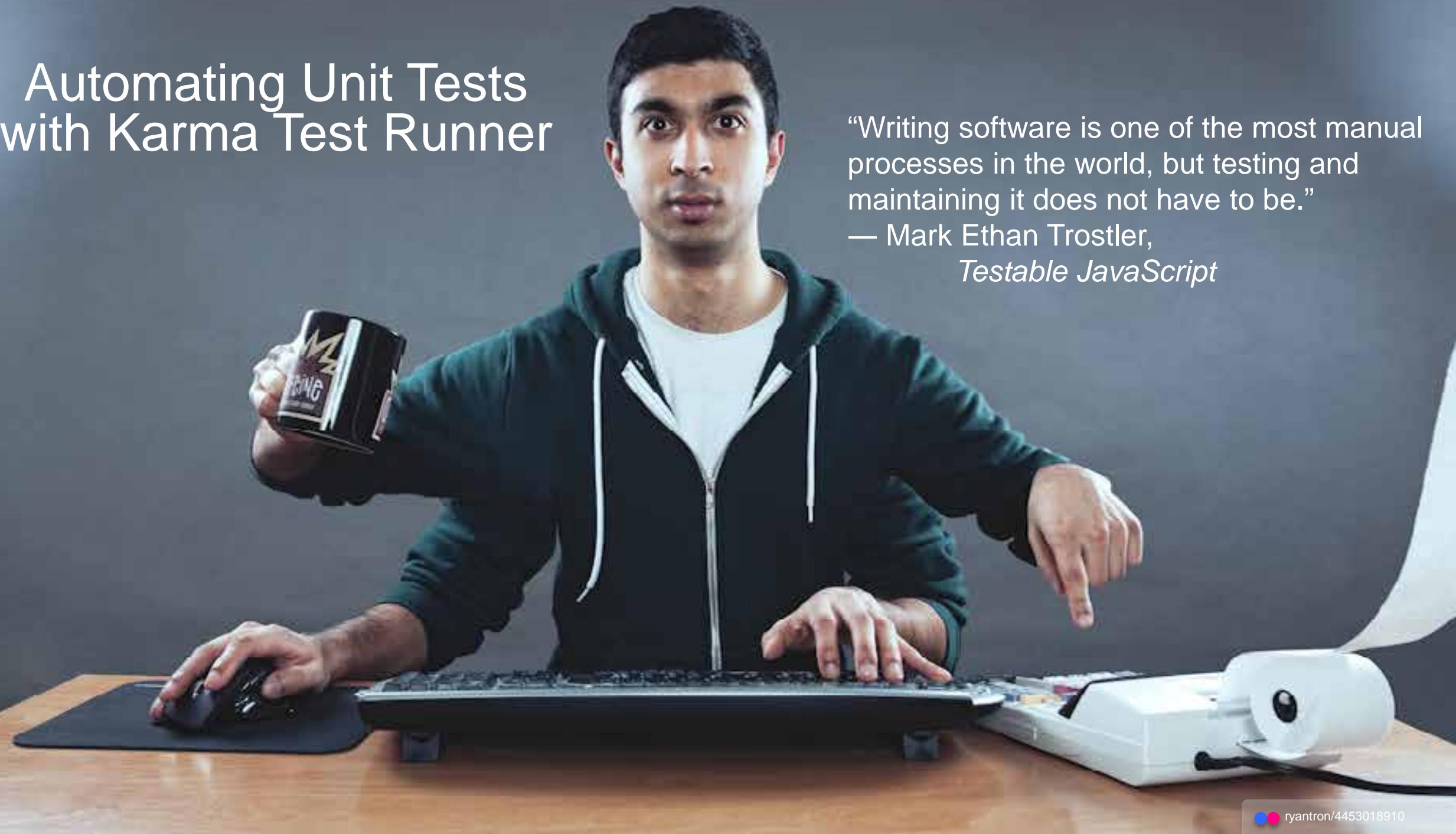
> intern

Intern Demo

David Spriggs

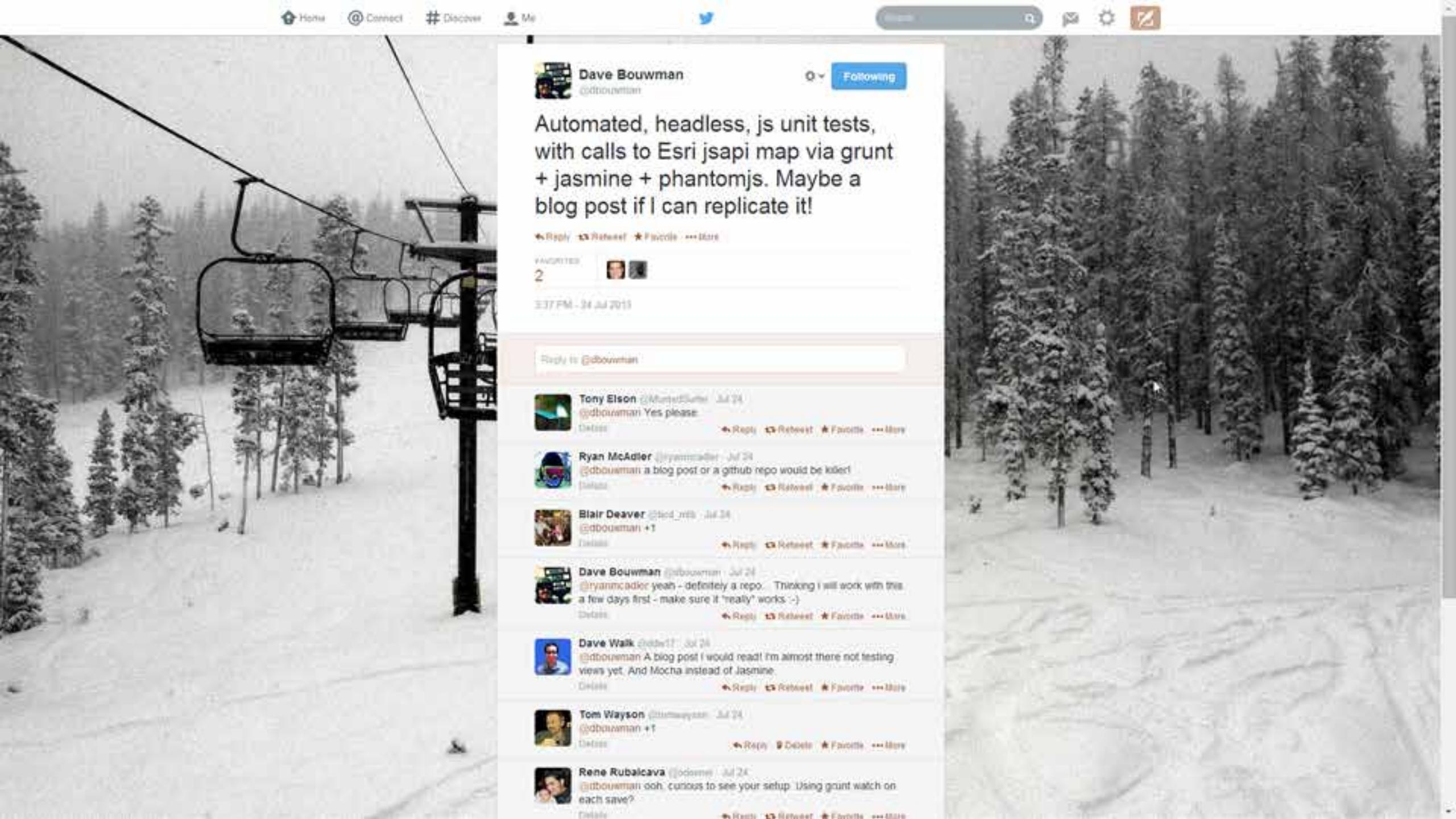


Automating Unit Tests with Karma Test Runner



“Writing software is one of the most manual processes in the world, but testing and maintaining it does not have to be.”

— Mark Ethan Trostler,
Testable JavaScript





Marionette^{is}



Jasmine

SpecRunner.html + .js
←add esri jsapi
←AMD
modules

write specs

load in browser

...tests run...

results.



Jasmine



esri

<https://github.com/tomwayson/esri-jasmine-tutorial>

A screenshot of a web browser window titled "Jasmine Spec Runner". The address bar shows the URL "code/git/esri-jasmine-tutorial/SpecRunner.html". The page content is a test report from the Jasmine framework. At the top, it says "Jasmine 2.0.0" and "1 specs, 0 failures". Below this, under the heading "map tests", are two test cases:

```
when setting layer url
  should add the layer if not already added
  should replace the layer if already added
when creating a merged polygon from geometries
  should have the same number of rings as all input polygons
```

The browser interface includes standard navigation buttons (back, forward, search) and a toolbar at the top.

Write Tests

Tests Pass

Tests Fail

Refactor

Write Code

Tests Pass



KARMA

npm

```
> npm install -g karma  
> cd my-project  
> npm install karma
```





```
> npm install karma-dojo  
> subl spec/main.js  
> karma start
```

<https://github.com/tomwayson/esri-karma-tutorial>

The screenshot shows a browser window titled 'Karma' with the URL 'localhost:9876/?id=17206415'. The page title is 'Karma v0.9.8 - connected' and it displays status messages: 'Chrome 33.0.1750 (Windows 7) is idle' and 'IE 10.0.0 (Windows 7) is idle'. Below the browser is a terminal window titled 'Console2 - karma start' with the following output:

```
C:\code\git\landscape-modeler-js 19:48:02.45  
>karma start  
INFO [karma]: Karma v0.9.8 server started at http://loc  
INFO [launcher]: Starting browser Chrome  
INFO [launcher]: Starting browser IE  
INFO [Chrome 33.0.1750 (Windows 7)]: Connected on socket  
INFO [IE 10.0.0 (Windows 7)]: Connected on socket id BMF  
.....  
Chrome 33.0.1750 (Windows 7): Executed 27 of 29 (skipped .018 secs)  
IE 10.0.0 (Windows 7): Executed 27 of 29 (skipped 2) SUCCESS  
TOTAL: 54 SUCCESS
```





Jasmine



GRUNT



automation

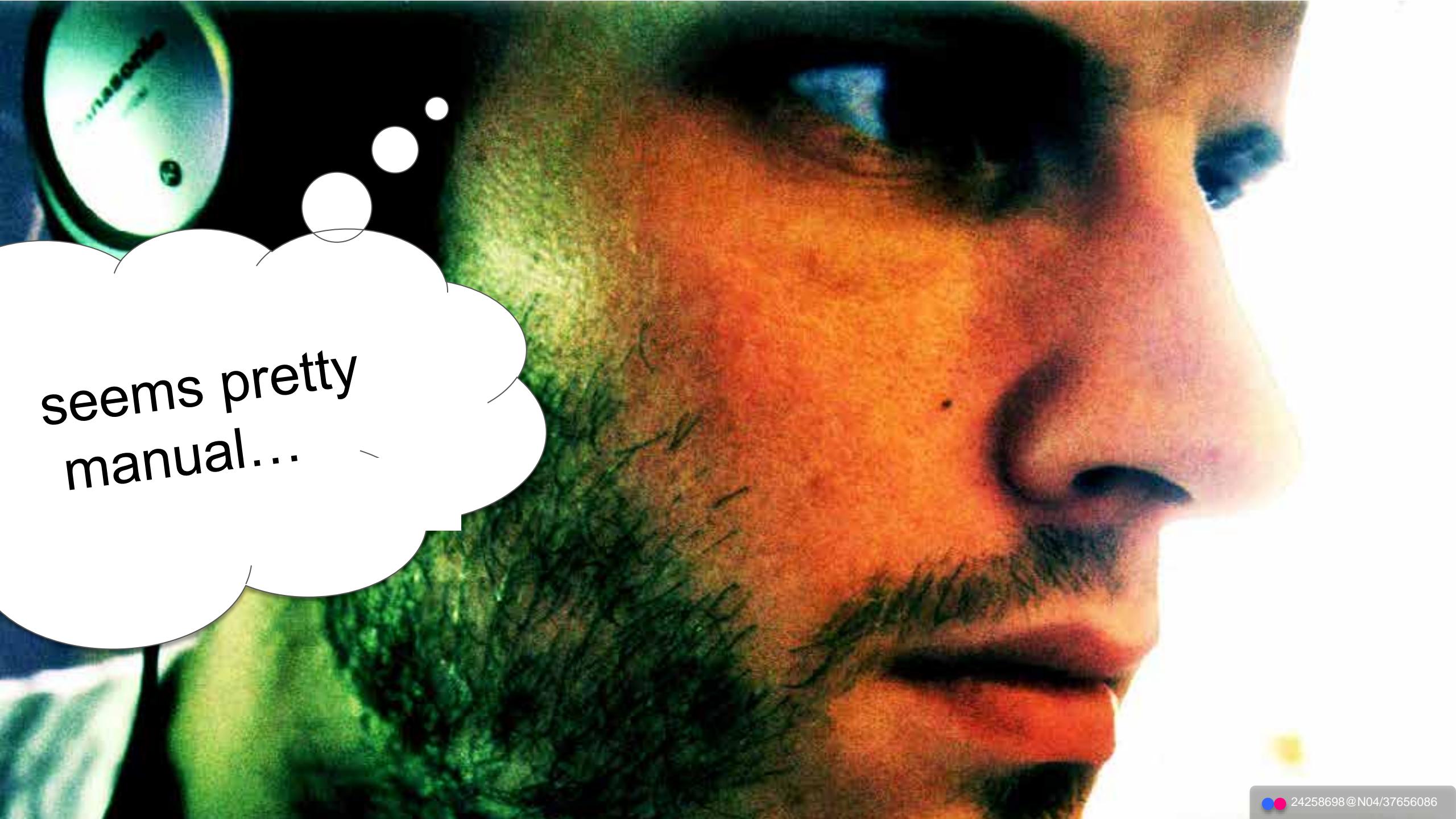


automatically...
check syntax...
run active tests...
check for regression...
report coverage...



Jasmine

SpecRunner.html
load in browser
...tests run...
results.



A close-up photograph of a person's face, showing their eyes, nose, and mouth. The person has dark hair and is looking slightly to the right. A white speech bubble is overlaid on the left side of the image, containing the text "seems pretty manual...".

seems pretty
manual...



GRUNT

node
task runner



GRUNT



YO



BOWER

productivity power-tools



watch
jshint
jasmine



Jasmine

gruntfile.js
runner tmpl
underscore.js
SpecRunner.html
load in phantom
...tests run...
results in console



active

Tests for the code you are actively working. (fail fast)



fast

Non-Map, Non-Asyn tests that run 100% locally. Used for TravisCI (builds)



all

All the test specs. Run automatically after active passes. Coverage reports

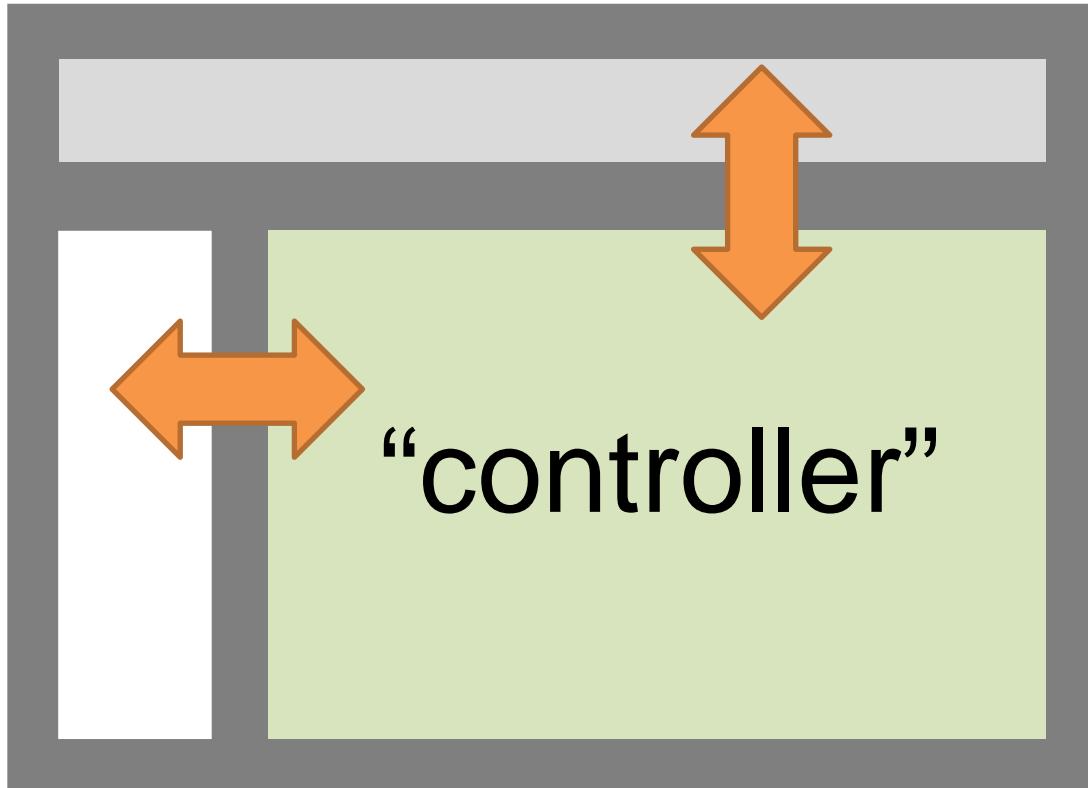


**TEST ME
THE MAPS
BOUWMAN!**

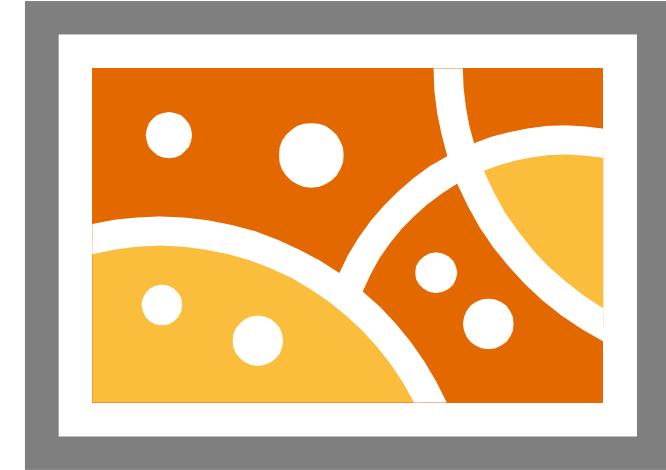
Don't Test the Map

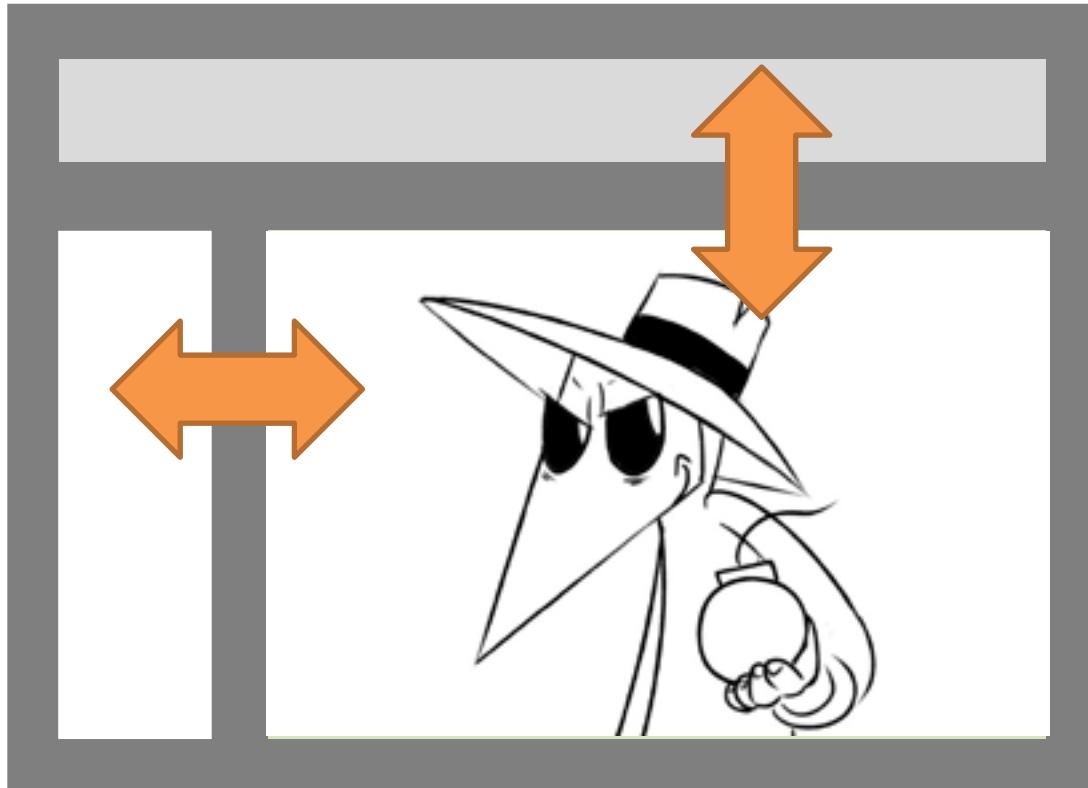


BLARG?!?



Separation of Concerns





Separation of Concerns



Test the Map Controller



Jasmine

Map Tests:
are slow(er)
usually async
need a harness
need dojo



Jasmine

gruntfile.js ← add harness
runner tmpl ← add dojo
underscore.js
SpecRunner.html
load in phantom
...tests run...
results in console

Running "watch" task

Waiting...**OK**

>> File "spec/modules/datasets/show/show_controller.spec.js" changed.

Running "jshint:files" (jshint) task

>> 189 files lint free.

Running "jasmine:active" (jasmine) task

Testing jasmine specs via phantom

.....
66 specs in 0.352s.

>> 0 failures

Running "jasmine:alltests" (jasmine) task

Testing jasmine specs via phantom

.....
.....
.....
.....
.....
..

===== Coverage summary =====

Statements : 44.24% (2013/4550)

Branches : 45.01% (866/1924)

Functions : 46.99% (569/1211)

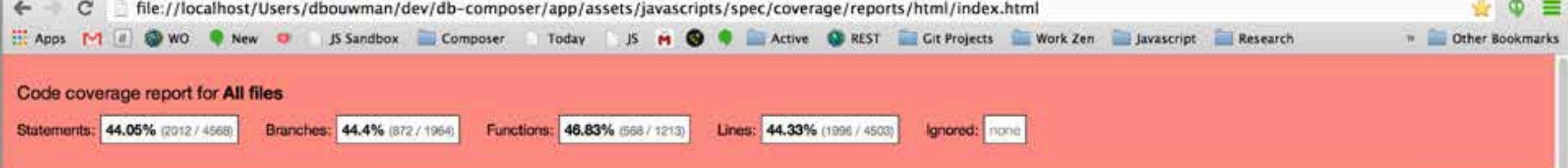
Lines : 44.47% (1997/4491)

518 specs in 17.989s.

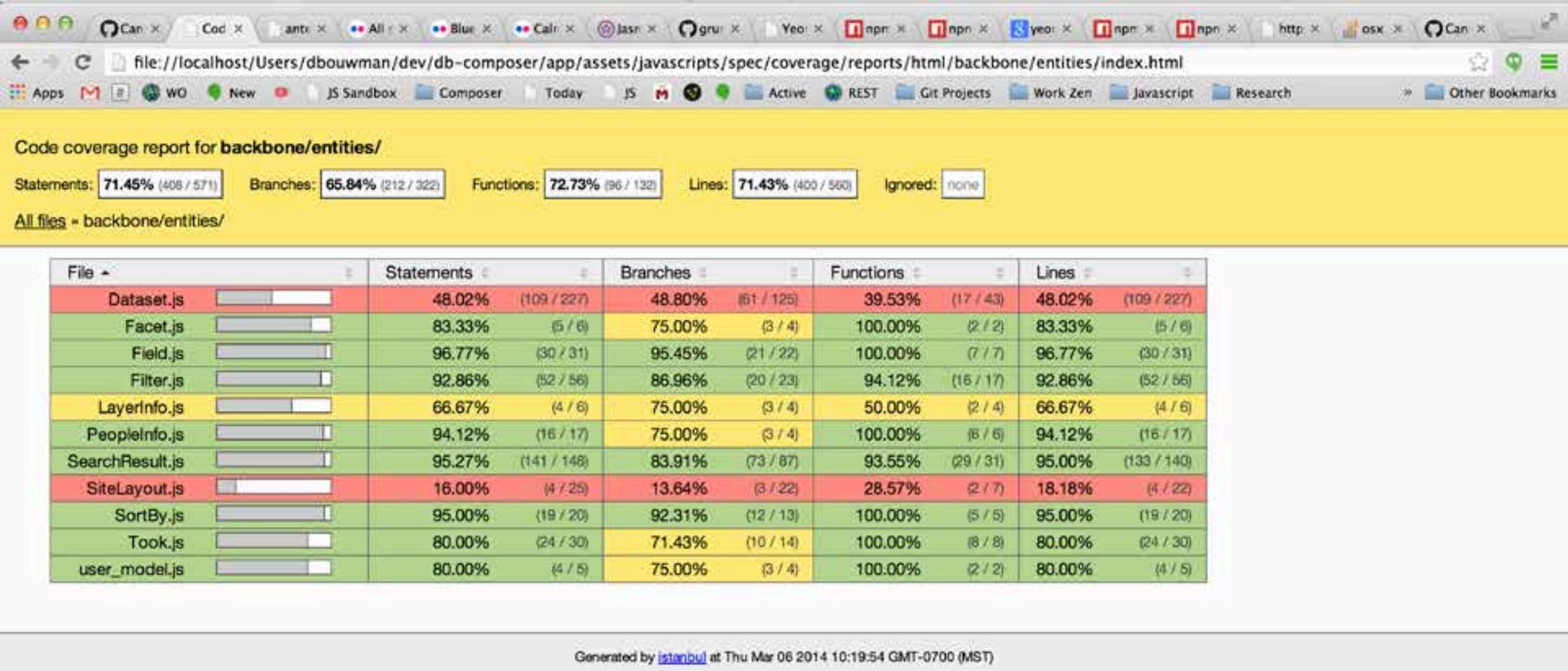
>> 0 failures

Done, without errors.

Completed in 29.87s at Thu Mar 06 2014 07:28:15 GMT-0700 (MST) - Waiting...■



File	Statements	Branches	Functions	Lines
backbone/modules/titlebar/	89.47%	(17 / 19)	75.00%	(6 / 8)
backbone/modules/header/	88.24%	(15 / 17)	75.00%	(6 / 8)
backbone/modules/datasets/search/filters/	85.71%	(18 / 21)	83.33%	(10 / 12)
backbone/components/errors/	80.00%	(8 / 10)	75.00%	(6 / 8)
backbone/modules/home/show/	79.55%	(35 / 44)	80.00%	(16 / 20)
backbone/modules/datasets/features/	75.83%	(91 / 120)	75.00%	(30 / 40)
backbone/	73.97%	(54 / 73)	59.52%	(25 / 42)
backbone/modules/datasets/features/featuredetails/	72.55%	(37 / 51)	57.14%	(8 / 14)
backbone/components/regions/	72.12%	(75 / 104)	56.82%	(25 / 44)
backbone/modules/mapbar/progress/	71.88%	(23 / 32)	75.00%	(9 / 12)
backbone/entities/	71.45%	(408 / 571)	65.84%	(212 / 322)
backbone/components/modal/	71.43%	(30 / 42)	45.45%	(10 / 22)
backbone/config/backbone/	71.43%	(5 / 7)	100.00%	(0 / 0)
backbone/modules/datasets/show/filter/	69.35%	(43 / 62)	71.88%	(23 / 32)
backbone/components/copier/	69.23%	(9 / 13)	75.00%	(3 / 4)
backbone/modules/mapbar/	68.75%	(11 / 16)	70.00%	(7 / 10)
backbone/components/homelink/	68.75%	(11 / 16)	75.00%	(6 / 8)
backbone/config/marionette/	65.94%	(91 / 138)	57.61%	(53 / 92)
backbone/modules/datasets/show/	65.33%	(98 / 150)	55.32%	(26 / 47)
backbone/modules/home/	63.64%	(7 / 11)	50.00%	(3 / 6)
backbone/modules/datasets/show/details/	62.24%	(61 / 98)	50.00%	(15 / 30)
backbone/components/locator/	61.46%	(59 / 96)	61.36%	(27 / 44)



coverage post coming soon



An aerial night photograph of a dense urban area, likely Chicago, showing a vast expanse of city lights from a high vantage point. The city is filled with numerous skyscrapers, residential buildings, and a complex network of roads and highways. The lights from the buildings and streetlights create a golden glow against the dark night sky.

where ever
you work...



TRENDING NOW

Google stock skyrockets past \$1,000 per share on mobile ad strength



LONGFORM . VIDEO . REVIEWS . TECH . SCIENCE . CULTURE . DESIGN . BUSINESS . US & WORLD . FORUMS .



PREVIOUS STORY

[HTC One Max with fingerprint scanner coming October 15th, says WSJ](#)

NEXT STORY

[Police have started busting alleged top Silk Road drug dealers](#)

POLICY & LAW US & WORLD REPORT

202

COMMENTS

Why Obama's Healthcare.gov launch was doomed to fail

Welcome to the government's latest bone-headed beta test

By Adrienne Jeffries on October 8, 2013 09:35 am [Email](#)

DON'T MISS STORIES [FOLLOW THE VERGE](#)



Like

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Healthcare.gov, a government-run e-commerce website for the Affordable Care Act, does not actually need to exist. The still-dysfunctional federal site could have offloaded all of the work to startups, which were already building more sophisticated price-comparison alternatives to the official site, just like Orbitz does for airline companies.

Healthcare.gov was supposed to be an information hub for the needs of millions of uninsured citizens who are now legally required to have a healthcare plan. The federal website ended up offering insurance directly, after 24 states ([mostly Republican](#)) refused to design their own e-commerce websites for their residents. Unfortunately, at launch, the federal and state sites crashed.

Three weeks later, Obama's signature law, the Affordable Care Act ("Obamacare"), is in danger of losing public confidence and the enrollment numbers it needs to meet its promise of cheap, quality insurance. But, it's unclear why the state and federal exchanges websites were built in the first place.

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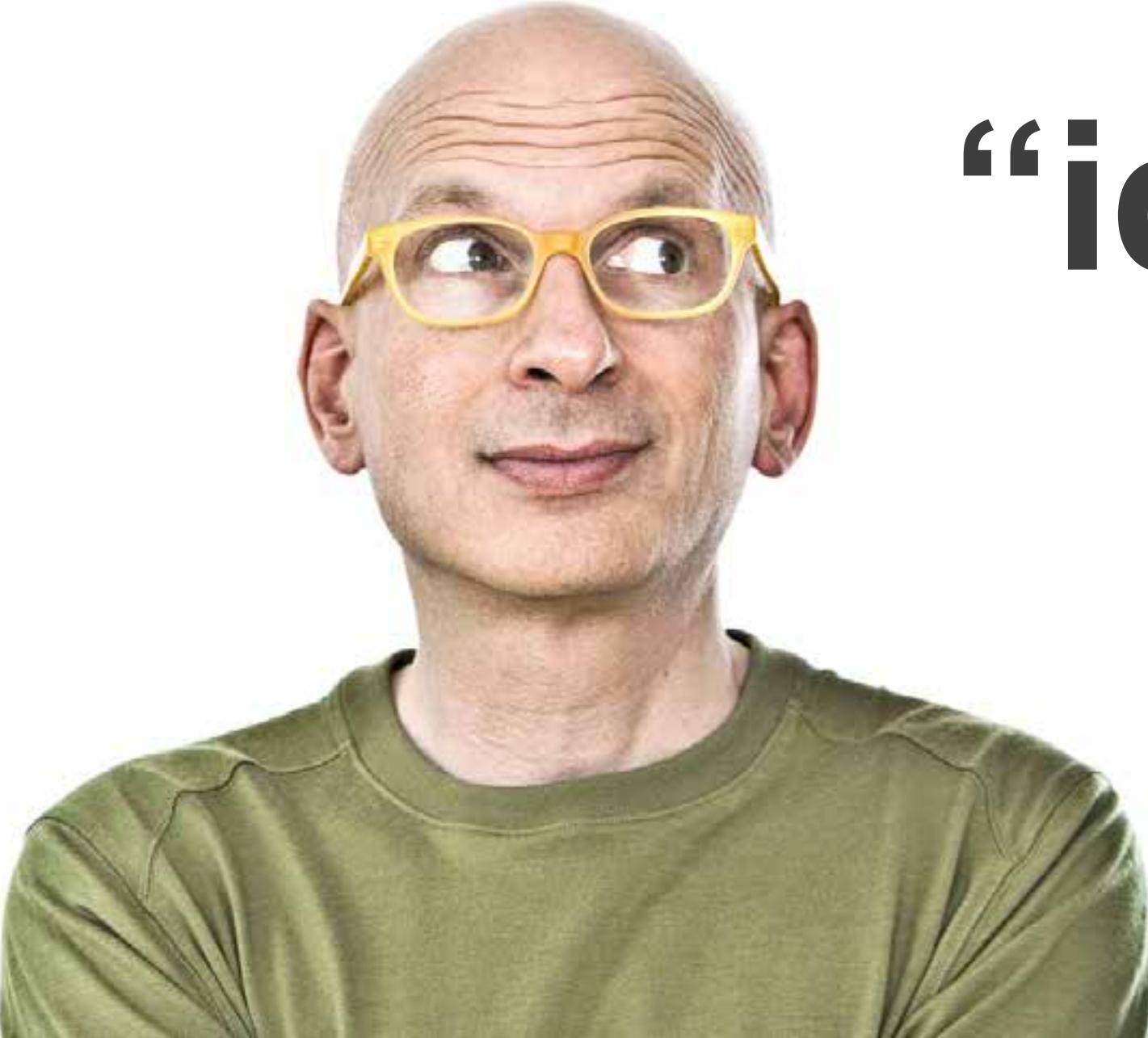
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