Stop Making Excuses and Start Testing Your JavaScript!

About Me

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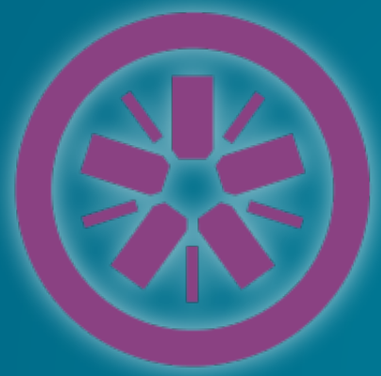
Today's Agenda

- Adding Testing to Your Project
- Solving Common Testing Issues
- Writing Testable JavaScript
- Automating Testing

Adding Testing To Your Project

Step 1: Pick Your Environment

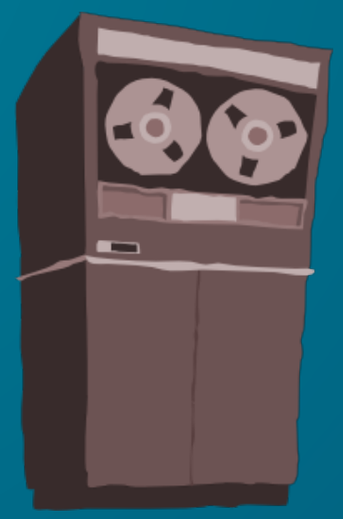
node.js™



Jasmine

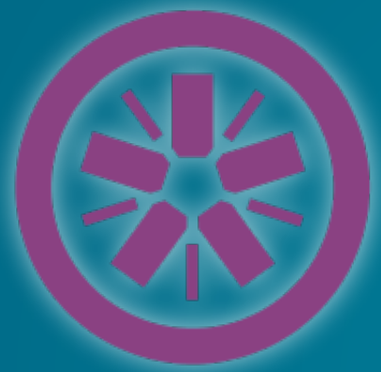
mocha

Jest



Tape

Browser



Jasmine

mocha

Jest

Step 2: Pick Your Dialect

expect

```
describe( 'adder', function(){
  it( 'should return zero when no args...',
    function(){
      expect( adder() ).to.equal( 0 );
  } );
} );
```

Jasmine

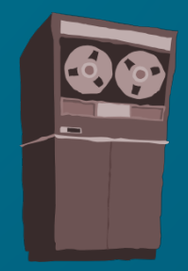
mocha + chai

should

```
describe( 'adder', function(){
  it( 'should return zero when no args...',
    function(){
      adder().should.equal( 0 );
  } );
} );
```

assert

```
//qunit
test( 'adder', function(){
  ok( adder() === 0, 'should return 0');
} );

//chai
describe( 'adder', function(){
  assert.equal( adder() , 0, 'should return 0' );
});
```



Step 3: Setup


node
JS
™

```
$> npm install -g mocha
$> npm install mocha —save-dev
$> npm install chai --save-dev
```

adder.js

```
module.exports = var adder = function(){
    var args = Array.prototype.slice.call( arguments );

    return args.reduce( function( previous, curr ){
        if( !isNaN( Number( curr ) ) ){
            return previous + curr;
        }
        else{
          return curr;
        }
    }, 0 );
};
```

adderSpec.js

```
var expect = require( 'chai' ).expect;
var adder = require( '../../src/adder' );

describe( 'adder', function(){
    it( 'should add an array of numbers',
      function(){
        expect( adder( 1,2,3) ).to.equal( 6 );
      });
});
```

adderSpec.js

```
...
describe( 'adder', function(){
    it( 'should return zero if no args are passed
in', function(){
        expect( adder( ) ).to.equal(0);
    });
})
...
```

adderSpec.js

```
...
    it( 'should skip non numbers', function(){
        expect( adder( 1,2,'a' ) ).to.equal( 3 );
    });
...
```

```
$> mocha tests/spec
```

Name of your spec directory

```
  ...

  2 passing (6ms)
  1 failing

  1) adder should skip non numbers:
     AssertionError: expected 'a3' to equal 3
      at Context.<anonymous> (/Users/ranklam/source/talks/html5devconf/2014/samples/tests/spec
/adderSpec.js:14:39)
      at callFn (/usr/local/lib/node_modules/mocha/lib/runnable.js:223:21)
      at Test.Runnable.run (/usr/local/lib/node_modules/mocha/lib/runnable.js:216:7)
      at Runner.runTest (/usr/local/lib/node_modules/mocha/lib/runner.js:374:10)
      at /usr/local/lib/node_modules/mocha/lib/runner.js:452:12
      at next (/usr/local/lib/node_modules/mocha/lib/runner.js:299:14)
      at /usr/local/lib/node_modules/mocha/lib/runner.js:309:7
      at next (/usr/local/lib/node_modules/mocha/lib/runner.js:247:23)
      at Immediate._onImmediate (/usr/local/lib/node_modules/mocha/lib/runner.js:276:5)
      at processImmediate [as _immediateCallback] (timers.js:374:17)
```

Browser

Browser

SpecRunner.html

```
<html>
<head>
  <title>Jasmine Spec Runner v2.0.0</title>
  <link rel="stylesheet" type="text/css" href="lib/jasmine-2.0.0/
jasmine.css">

  <script type="text/javascript" src="lib/jasmine-2.0.0/jasmine.js"></
script>
  <script type="text/javascript" src="lib/jasmine-2.0.0/jasmine-
html.js"></script>
  <script type="text/javascript" src="lib/jasmine-2.0.0/boot.js"></
script>

  <!-- include source files here... -->
  <script type="text/javascript" src="../src/adder.js"></script>
  <!-- include spec files here... -->
  <script type="text/javascript" src="spec/adderSpec-jasmine.js"></
script>
</head>
<body>
</body>
</html>
```

Source Files

Spec Files

Browser

Jasmine 2.0.0 finished in 0.002s

● ● x

3 specs, 1 failure raise exceptions ☐

Spec List | Failures

adder should skip non numbers

Expected 'a3' to equal 3.

stack@file:///Users/ranklam/source/talks/html5devconf/2014/samples/tests/lib/jasmine-2.0.0/jasmine.js:1293:11
buildExpectationResult@file:///Users/ranklam/source/talks/html5devconf/2014/samples/tests/lib/jasmine-2.0.0/jasmine.js:1270:1
Env/expectationResultFactory@file:///Users/ranklam/source/talks/html5devconf/2014/samples/tests/lib/jasmine-2.0.0/jasmine.js:4
Spec.prototype.addExpectationResult@file:///Users/ranklam/source/talks/html5devconf/2014/samples/tests/lib/jasmine-2.0.0/jasmi
addExpectationResult@file:///Users/ranklam/source/talks/html5devconf/2014/samples/tests/lib/jasmine-2.0.0/jasmine.js:442:9
Expectation.prototype.wrapCompare/<@file:///Users/ranklam/source/talks/html5devconf/2014/samples/tests/lib/jasmine-2.0.0/jasmi
@file:///Users/ranklam/source/talks/html5devconf/2014/samples/tests/spec/adderSpec-jasmine.js:11:9
attemptSync@file:///Users/ranklam/source/talks/html5devconf/2014/samples/tests/lib/jasmine-2.0.0/jasmine.js:1510:9
QueueRunner.prototype.run@file:///Users/ranklam/source/talks/html5devconf/2014/samples/tests/lib/jasmine-2.0.0/jasmine.js:1498
QueueRunner.prototype.execute@file:///Users/ranklam/source/talks/html5devconf/2014/samples/tests/lib/jasmine-2.0.0/jasmine.js:
Env/queueRunnerFactory@file:///Users/ranklam/source/talks/html5devconf/2014/samples/tests/lib/jasmine-2.0.0/jasmine.js:518:7
Spec.prototype.execute@file:///Users/ranklam/source/talks/html5devconf/2014/samples/tests/lib/jasmine-2.0.0/jasmine.js:309:1

Solving Common Testing Issues

I Have Methods that Call Other Methods.

Spies/Stubs/Mocks


Jasmine
Sinon.JS
RISM

Spies

```
User.prototype.addUser = function(){
    if(validateUser()){
        saveUser();
    }
    else{
        addError( 'user not valid' );
    }
};
```

Spies

```
it('should save a valid user', function(){
    var user = new User( 'Ryan','Anklam');
    spyOn(User, 'validate').and.returnValue( true );
    spyOn(User, 'save');

    user.add();

    expect(user.validate).toHaveBeenCalled();
    expect(user.save).toHaveBeenCalled();
});
```

Spies

```
it('should error for an invalid user', function(){
    var user = new User( 'Ryan','Anklam');
    spyOn(User, 'validate').andReturn( false );
    spyOn(User, 'addError');

    user.add();

    expect(user.validate).toHaveBeenCalled();
    expect(user.addError).toHaveBeenCalled();
});
```

Spies That Return Data

```
User.prototype.listUsers = function(){
    var users = this.getUsers();

    users.forEach( function( user ){
        this.addUserToList( user );
    });
};
```

Spies That Return Data

```
it('should get a list of users and add them',
   function(){
      spyOn(User, 'getUsers').and.returnValue(
          [
              {
                  firstName : 'Ryan',
                  lastName  : 'Anklam'
              }
          ]
      );
      spyOn(User, 'addUserToList');
      user.listUsers();

      expect(user.getUsers).toHaveBeenCalled();
      expect(user.addUserToList).toHaveBeenCalled();
});
```

Promises

Returns A Promise

```
getStringValue: function( req, bundle, key, context ){
  var i18n           = require("./index"),
      bundlePromise = this.getBundle( req, bundle ),
      deferred       = q.defer();

  bundlePromise.then(
      function( bundle ){
          deferred.resolve(
        bundle.get( i18n.get(key,context) ) );
      },
      function( err ){
          deferred.reject( err );
      }
  );

  return deferred.promise;
}
```

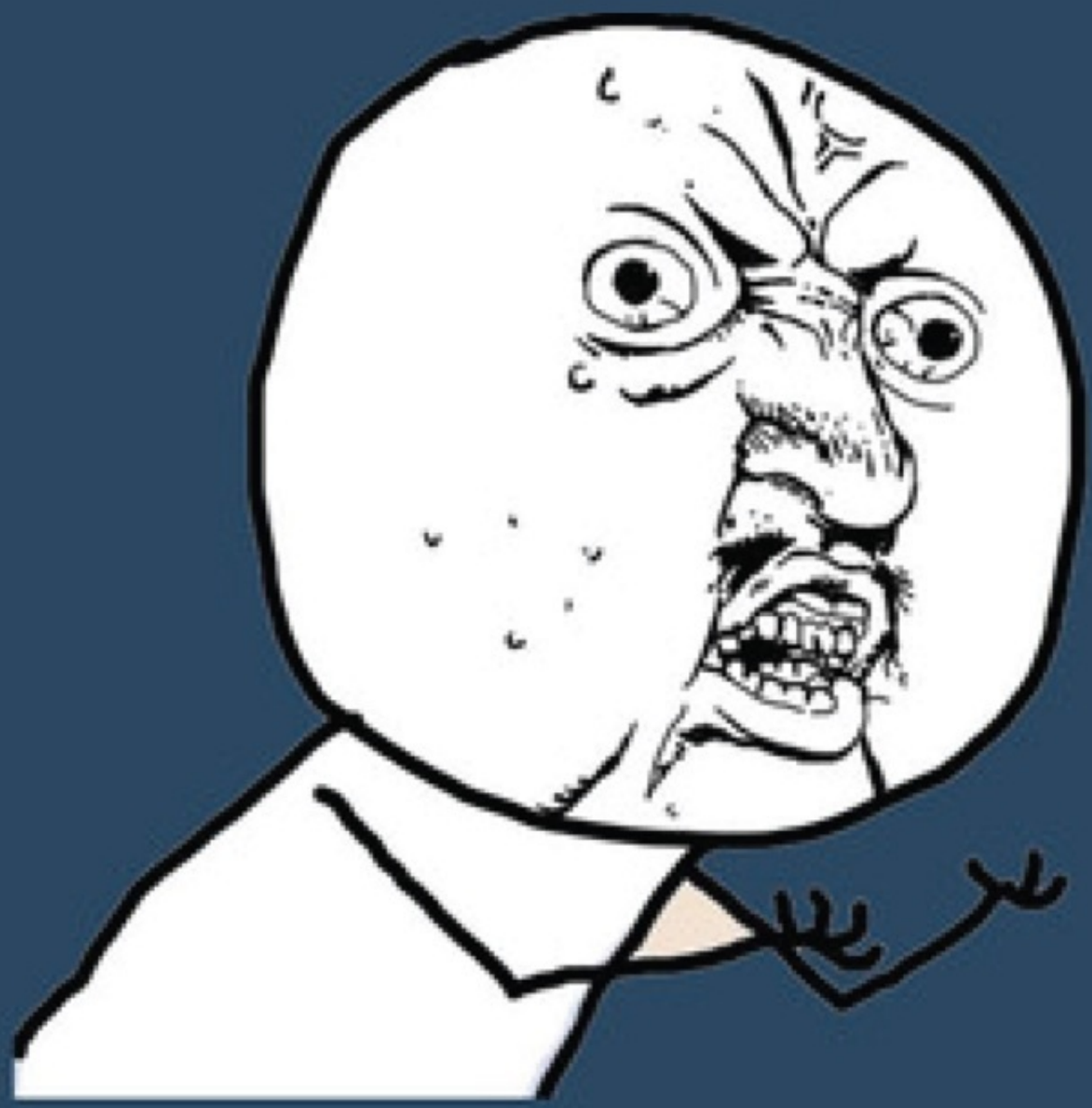
chai-as-promised FTW!

```
describe( 'getStringValue function', function(){

  it('should return a string when it finds a key',
       function (  ) {
         return expect( utils.getStringValue( 'foo.bar.baz' ) )
           .to.eventually.equal( 'Foo bar baz'] );
  });

  it('should return the key when no key is found',
     function () {
       return expect( utils.getStringValue( 'does.not.exist' ) )
         .to.eventually.equal( 'does.not.exist' );
  });
} );
```

I Need To Test the DOM

Do you REALLY need to?

Y U NO



SPY ON THE DOM

Spy On The DOM

```
function addItems( $el, items ){
  items.forEach( function( item ){
    $el.append( item );
  } );
}
```

Spy On The DOM

```
it( 'should add items', function(){
  var $el = $( '<ul/>' ),
      items = [
        { name : 'test' }
      ];
  spyOn( jQuery.fn, 'append' );

  addItems( $el, items );

  expect( jQuery.fn.append )
    .toHaveBeenCalled();
} );
```

Jasmine jQuery

https://github.com/velesin/jasmine-jquery

Create Fixtures as .html files

Load fixtures into a test

Make assertions

Jasmine jQuery

```
beforeEach( function(){
  //reset the fixture before each test
  loadFixtures('myfixture.html');
});

it( 'should convert a select to a ul', function(){
  $( '.select' ).dropdown();

  expect( '.select-list' ).toExist();
});
```

qUnit

```
<!DOCTYPE html>
<html>
  <head>
    <meta charset="utf-8">
    <title>QUnit Example</title>
    <link rel="stylesheet" href="qunit.css">
  </head>
  <body>
    <div id="qunit"></div>
    <div id="qunit-fixture"></div>
    <script src="qunit.js"></script>
    <script src="tests.js"></script>
  </body>
</html>
```

Gets reset after every test

I Have to Test Async Code

Async Test

```
function readConfig( callback ){

  fs.readFile( config.fileLocation, callback );
}
```

Async Test

```
it( 'should read the config file' ,
  function( done ){
    var callback = function( readystate ){
      expect( readystate )
          .to.equal( 'config ready' );
      done();
    }
    readConfig( callback );
} );
```

Async Test

```
asyncTest( 'should read the config file' ,
  function( ){
    var callback = function( readystate ){
      ok( readystate === 'config ready' );
      start();
    }
    readConfig( callback );
} );
```

Writing Testable JavaScript

Not Testable JavaScript

```
$(function(){
    var $list = $( '.todo-list
        $input = $( '.new-to
        todos = $.ajax(...);

    todos.forEach( function( item, index){
        $list.append( '<li class="todo-item">' + item.name +
'</li>');
    } );

$input.on( 'keyup', function( e ){
    if( e.which === 13 ){
        $list.append( '<li class="todo-item">' +
            $(this).val() + '</li>');
        $(this).val( '' );
    }
} );
```

Leaked in callback

Can't configure

Magic Data

One

Anonymous Function

Repeated Code

Anonymous Function

Refactoring

Can't configure

```
$(function(){
    var $list = $( '.todo-list' ),
        $input = $( '.new-todo' ),
        todos = $.ajax(...);

    todos.forEach( function( item, index){
      $list.append( '<li class="todo-item">' + item.name +
'</li>');
    } );

  $input.on( 'keyup', function( e ){
      if( e.which === 13 ){
        $list.append( '<li class="todo-item">' +
          $(this).val() + '</li>');
        $(this).val( '' );
      }
  } );
```

Make It A Constructor

```
var Todos = function( $list, $input ){
  this.$list = $list;
  this.$input = $input;
};
```

A Little Setup & First Test

```
describe( 'todos', function(){
    var todos;

    beforeEach( function(){
        todos = new Todos( $('<ul/>'),
          $('<input type="text" value="foobar" />')
        );
    });
} );
```

```
it('should create an instance', function(){
    expect( typeof todos).toEqual( 'object' );
});
```

Not Testable JavaScript

Magic Data

```
$(function(){
    var $list = $( '.todo-list' ),
        $input = $( '.new-todo' ),
        todos = $.ajax(...);

    todos.forEach( function( item, index){
      $list.append( '<li class="todo-item">' + item.name +
'</li>');
    } );

  $input.on( 'keyup', function( e ){
      if( e.which === 13 ){
        $list.append( '<li class="todo-item">' +
          $(this).val() + '</li>');
        $(this).val( '' );
      }
  } );
```

getData

```
Todos.prototype.getData = function( success, error ){
  $.ajax({
    ...
    success : success,
    error   : error
    ...
  });
}
```

Test getData

```
it('should have a getData fn that returns an array',
  function( done ){

    var callback = function( items ){
        expect(items instanceof Array ).toBeTruthy();
        done();
    };

    todos.getData( callback );
});
```

****Note: more tests would be to properly test this!****

Refactoring

```
$(function(){
    var $list = $( '.todo-list' ),
        $input = $( '.new-todo' ),
        todos = $.ajax(...);

    todos.forEach( function( item, index){
        $list.append( '<li class="todo-item">' + item.name +
'</li>');
    } );

  $input.on( 'keyup', function( e ){
      if( e.which === 13 ){
        $list.append( '<li class="todo-item">' +
          $(this).val() + '</li>');
        $(this).val( '' );
      }
  } );
```

Refactoring

```
$(function(){
    var $list = $( '.todo-list' ),
        $input = $( '.new-to
        todos = $.ajax(...);

    todos.forEach( function( item, index){
      $list.append( '<li class="todo-item">' + item.name +
'</li>');
    } );

  $input.on( 'keyup', function( e ){
      if( e.which === 13 ){
        $list.append( '<li class="todo-item">' +
          $(this).val() + '</li>');
        $(this).val( '' );
      }
  } );
```

One and done

Refactoring

```
$(function(){
    var $list = $( '.todo-list' ),
        $input = $( '.new-todo' ),
        todos = $.ajax(...);

    todos.forEach( function( item, index){
        $list.append( '<li class="todo-item">' + item.name +
'</li>' );
    } );

  $input.on( 'keyup', function( e ){
      if( e.which === 13 ){
        $list.append( '<li class="todo-item">' +
            $(this).val() + '</li>');
        $(this).val( '' );
      }
  } );
```

Repeated Code

addItem

```
Todos.prototype.addItem = function( name ){
  this.$list.append(
     '<li class="todo-item">' + name + '</li>'
  );
};
```

Test addItem

```
it('should have a addItem function', function(){
    expect( typeof todos.addItem ).toEqual( 'function' );
});

it('should try to add an item to the DOM', function(){
    spyOn( jQuery.fn, 'append' );

    todos.addItem( 'Learn JS Testing' );

    expect( jQuery.fn.append )
        .toHaveBeenCalledWith(
            '<li class="todo-item">Learn JS Testing</li>'
    );
});
```

addItems

```
Todos.prototype.addItems = function( items ){
  items.forEach( function( item, index){
      this.addItem( item.name );
    }, this );
};
```

Test addItems

```
it('should have a addItems function', function(){
    spyOn( todos, 'addItem' );

    todos.addItems( [{name:'foo'},{name:'bar'},{name:'baz'}] );

    expect( todos.addItem ).toHaveBeenCalledWith( 'foo' );
    expect( todos.addItem ).toHaveBeenCalledWith( 'bar' );
    expect( todos.addItem ).toHaveBeenCalledWith( 'baz' );
});
```

Not Testable JavaScript

```
$(function(){
    var $list = $( '.todo-list' ),
        $input = $( '.new-todo' ),
        todos = $.ajax(...);

    todos.forEach( function( item, index){
      $list.append( '<li class="todo-item">' + item.name +
'</li>');
    } );

  $input.on( 'keyup', function( e ){
      if( e.which === 13 ){
        $list.append( '<li class="todo-item">' +
          $(this).val() + '</li>');
        $(this).val( '' );
      }
  } );
```

Anonymous Function

handleKeyPress

```
Todos.prototype.handleKeypress = function( e ){

  if( e.which === 13 ){
    this.addItem( this.$input.val() );
    this.$input.val( '' );
  }
};
```

Test handleKeypress

```
it('should have a handleKeypress function', function(){
    expect( typeof todos.handleKeypress )
       .toEqual( 'function' );
});

it('should handle a keypress', function(){
    spyOn( todos, 'addItem' );

    todos.handleKeypress( { which: 13 } );

    expect( todos.addItem )
       .toHaveBeenCalledWith( 'foobar' );
});
```

Refactoring

Locked in callback

```
$(function(){
    var $list = $( '.todo-list' ),
        $input = $( '.new-todo' ),
        todos = $.ajax(...);

    todos.forEach( function( item, index){
      $list.append( '<li class="todo-item">' + item.name +
'</li>');
    } );

  $input.on( 'keyup', function( e ){
      if( e.which === 13 ){
        $list.append( '<li class="todo-item">' +
          $(this).val() + '</li>');
        $(this).val( '' );
      }
  } );
```

Init function

```
Todos.prototype.init = function(){
  this.$input.on( 'keyup',
        $.proxy( this.handleKeypress, this ) );

  this.getData( this.addItems );
};
```

Test Init

```
it('should have an init method', function(){
    expect( typeof todos.init ).toEqual( 'function' );
});

it('should setup a handler and additems', function(){
    spyOn( jQuery.fn, 'on' );
    spyOn( todos, 'getData' );

    todos.init();

    expect( jQuery.fn.on ).toHaveBeenCalled();
    expect( todos.getData )
       .toHaveBeenCalledWith( todos.addItems );
} );
```

A Few More Tips

- Write **maintainable** tests
- Avoid Singletons
- Use named functions instead of anonymous callbacks
- Keep your functions small

Automating Testing

The key to successful testing is making writing and running tests easy.

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Using NPM

Package.json

```
{
...
  "scripts": {
    "test": "mocha tests/spec"
  },
...
}
```

Running Build Tests

```
$> npm test
```

Using Your Build Tool

```
npm install -g grunt-cli
npm install grunt
npm install grunt-contrib-jasmine
```

gruntfile.js

```
module.exports = function(grunt) {
  grunt.initConfig({
    jasmine : {
       tests: {
         src: ['jquery.js','todos-better.js'],
          options: { specs: 'tests/spec/todoSpec.js' }
       }
    }
    watch: {
       tests: {
          files: ['**/*.js'],
          tasks: ['jasmine'],
       }
    }
});
  grunt.loadNpmTasks('grunt-contrib-jasmine', ‘watch' );
};
```

Running Build Tests

```
$> grunt jasmine
```

Testem

```
npm install -g testem
```

testem.json

```
{
  "src_files" : [
    "jquery.js",
    "todos-better.js",
    "tests/spec/todoSpec.js"
  ],
  "launch_in_dev" : [ "PhantomJS", “chrome”, “firefox” ],
  "framework" : "jasmine2"
}
```

Testem

```
$> testem
```

Questions?

Thank You

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