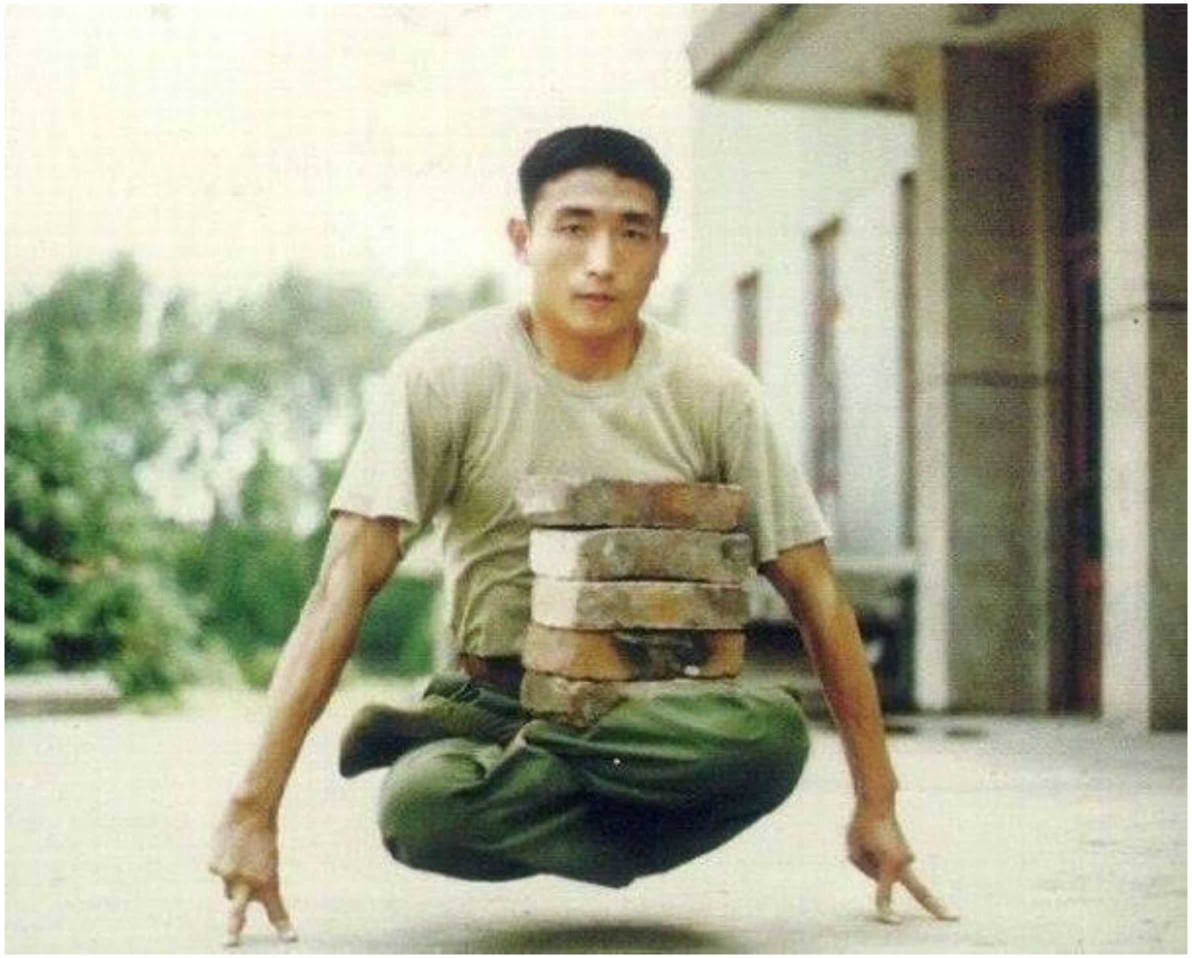
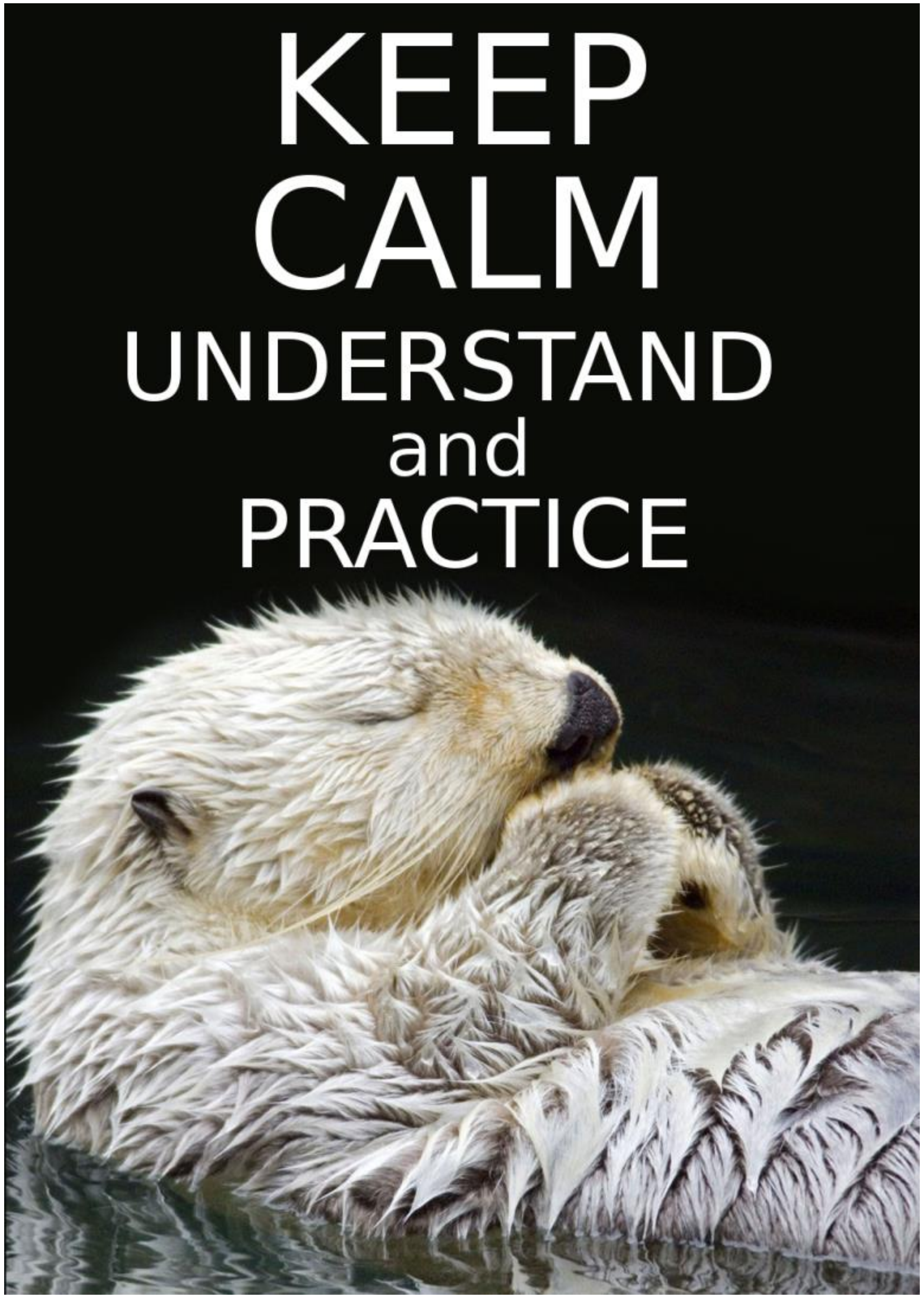
Introduction to **JavaScript** unit testing

Vladimir Alekseichenko

Good practices make life easier

Good practices are not easy




KEEP
CALM
UNDERSTAND
and
PRACTICE

Agenda

- Does it make sense to write utnit tests for JS?
- List of unit testing frameworks
  - Jasmine
  - Mocha
  - QUnit
  - Buster
- Test runners
  - Karma
  - Testem

Unit testing is cool ☺

Does it make sense to write **utnit tests** for code in **JavaScript**?

How to test it?

```
document.writeln("Hello world");
```

It’s impossible to test the **unit** tests!

```
document.wri[illegible]el[illegible]("[illegible]ello world");
```

Why?

Wrong way

Even if it's working

JavaScript

It’s an interpreted computer **programming language**.

It is a multi-paradigm language, supporting object-oriented, imperative, and functional programming styles.

http://en.wikipedia.org/wiki/JavaScript

Good practies

- SOLID
- GRASP
- IoC, DI
- Law of Demeter
- Release Reuse Equivalency Principle
- Acyclic Dependencies Principle
- Stable Dependencies Principle
- Stable Abstractions Principle
- …

Let's write good code, also in **JavaScript**

List of unit testing frameworks

- Jasmine
- Mocha
- Qunit
- Buster
- …

http://en.wikipedia.org/wiki/List_of_unit_testing_frameworks#JavaScript

Jasmine

Jasmine is a

behavior-**d**riven **d**evelopment framework for

testing **JavaScript** code.

http://pivotal.github.io/jasmine/

Jasmine

- It does not depend on any other JavaScript frameworks.
- It does not require a DOM.
- And it has a clean, obvious syntax so that you can easily write tests.

http://pivotal.github.io/jasmine/

Installation (1)

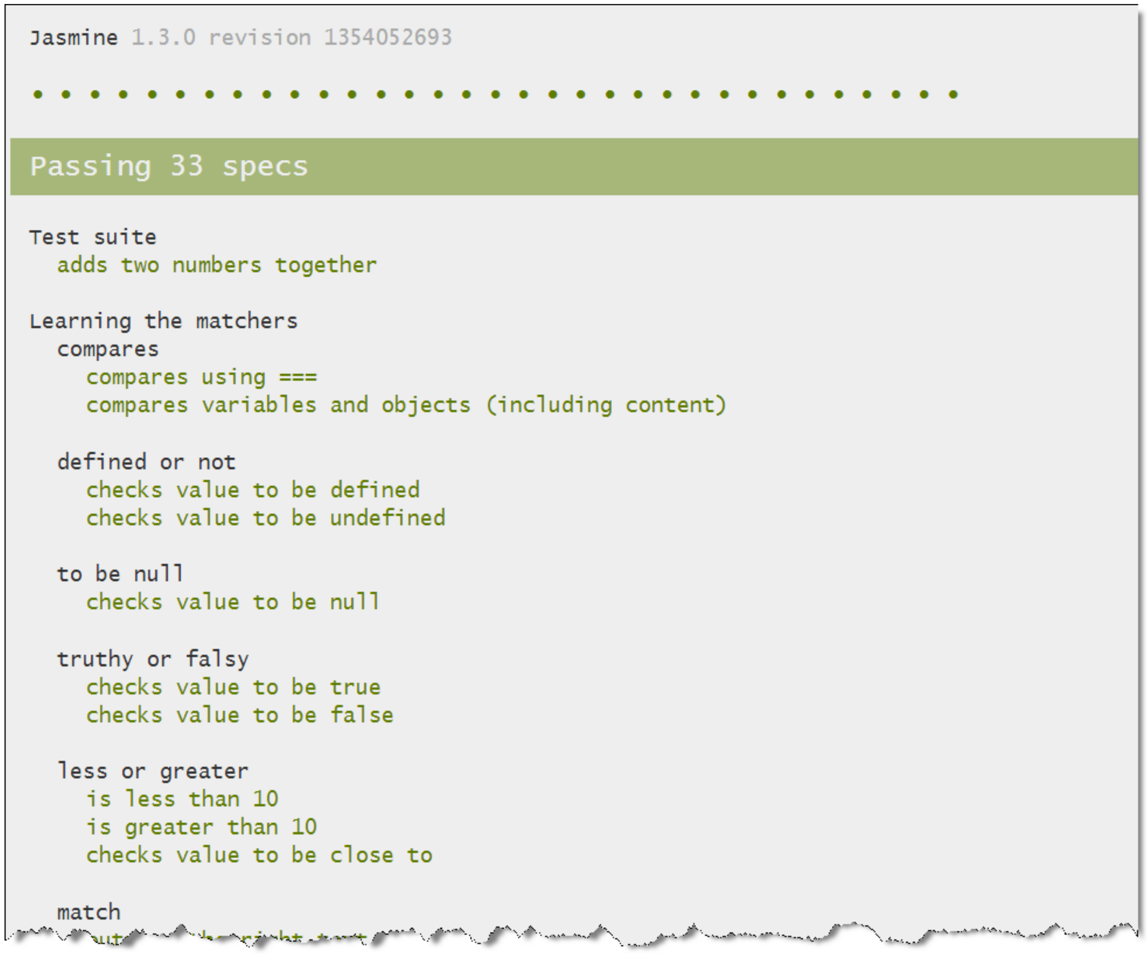
```
npm install
jasmine-node
```

Installation (2)

Download jasmine-standalone-x.x.x.zip from https://github.com/pivotal/jasmine/downloads:

- **lib**
  - **jasmine-x.x.x**
    - **jasmine.css**
    - **jasmine.js**
    - **jasmine-html.js**
- spec
  - PlaySpec.js
  - SpecHelper.js
- src
  - Player.js
  - Song.js
- **SpecRunner.html**

Report



```
Jasmine 1.3.0 revision 1354052693

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Passing 33 specs

Test suite
  adds two numbers together

Learning the matchers
  compares
    compares using ===
    compares variables and objects (including content)

  defined or not
    checks value to be defined
    checks value to be undefined

  to be null
    checks value to be null

  truthy or falsy
    checks value to be true
    checks value to be false

  less or greater
    is less than 10
    is greater than 10
    checks value to be close to

  match
    [illegible]
```

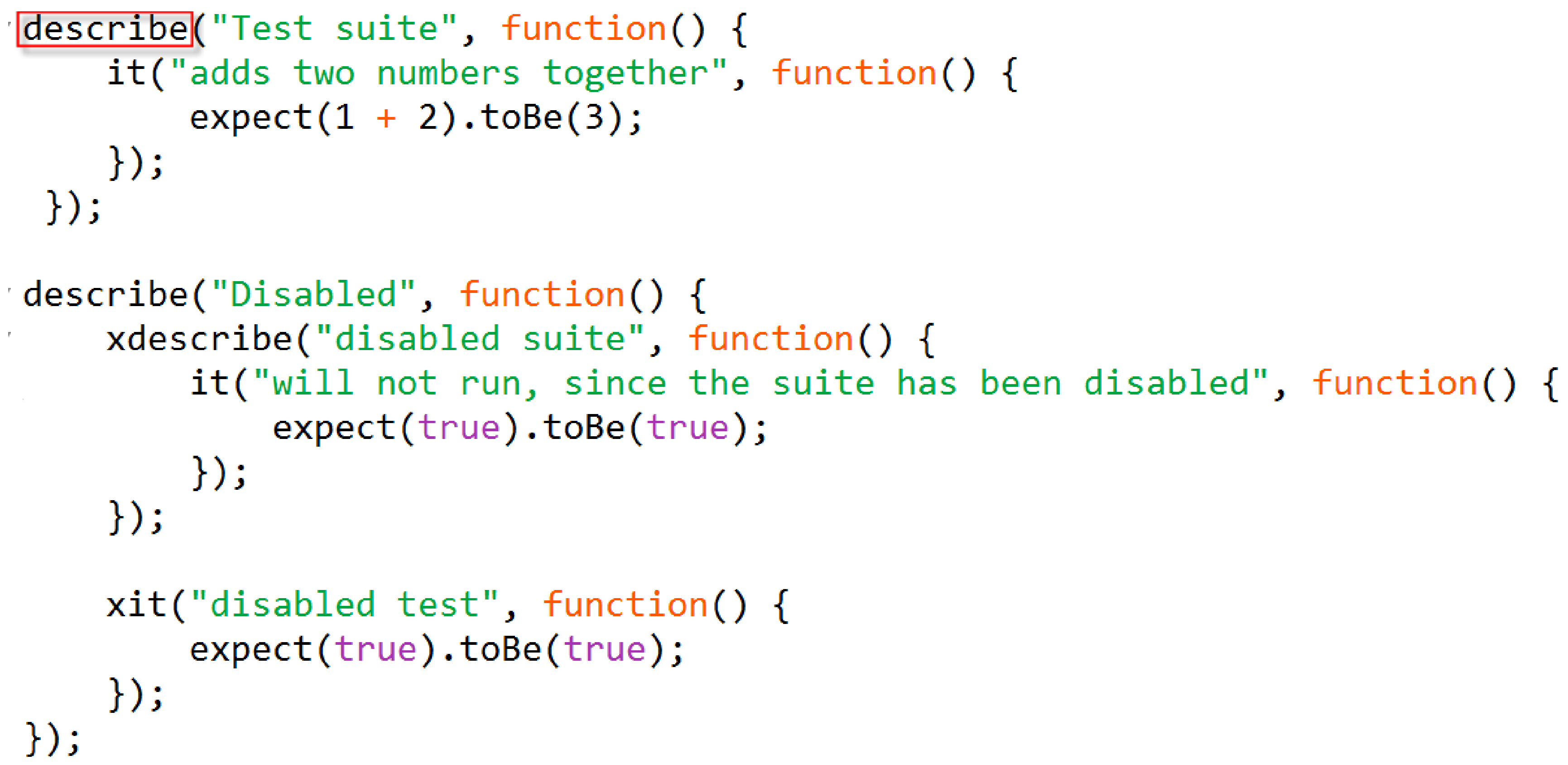
First test

```
describe("Test suite", function() {
    it("adds two numbers together", function() {
        expect(1 + 2).toBe(3);
    });
 });

describe("Disabled", function() {
    xdescribe("disabled suite", function() {
        it("will not run, since the suite has been disabled", function() {
            expect(true).toBe(true);
        });
    });

    xit("disabled test", function() {
        expect(true).toBe(true);
    });
});
```

First test – describe()



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First test – it()

```
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```
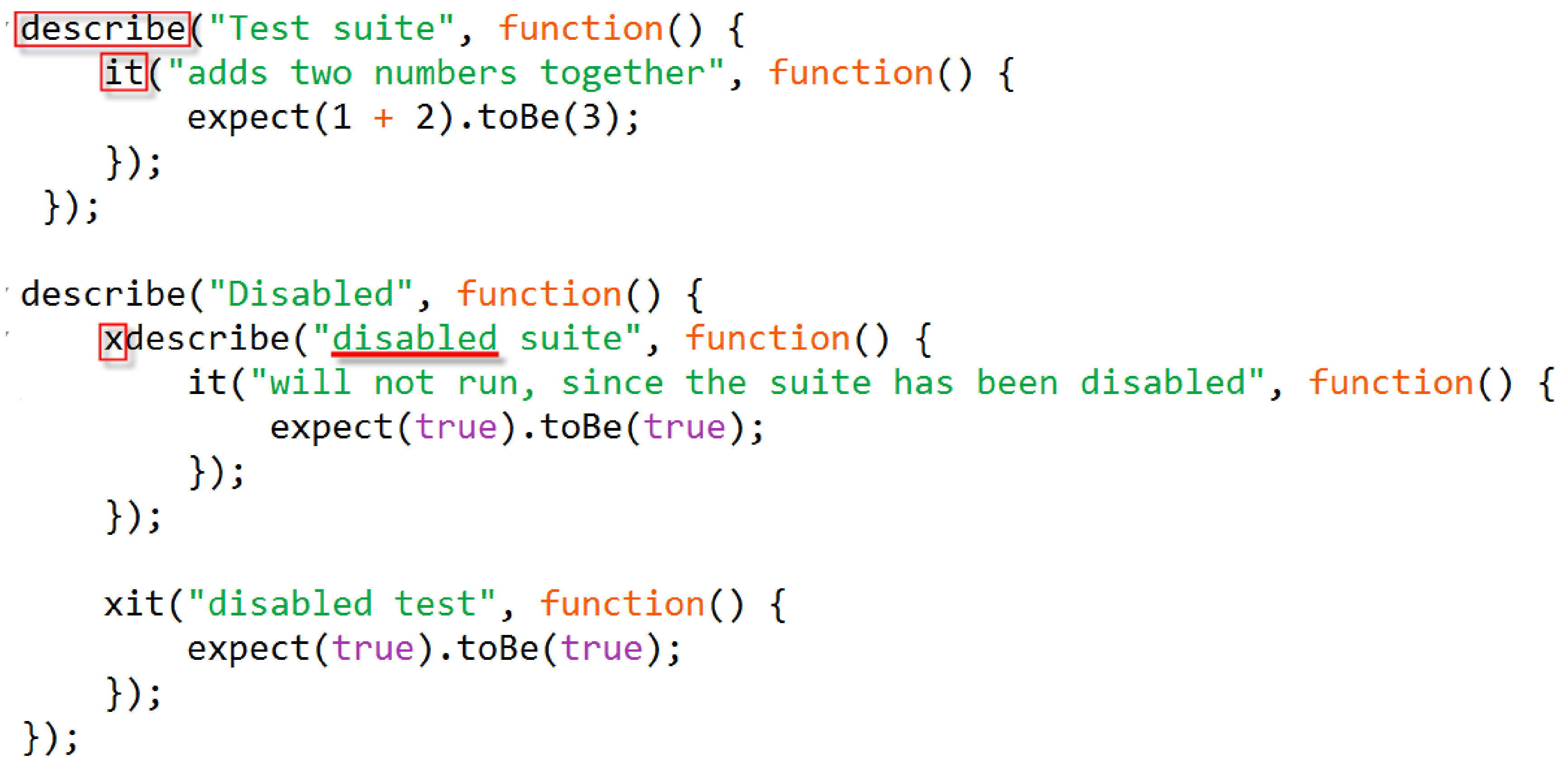

First test – xdescribe()



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```

First test – xit()

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describe("Test suite", function() {
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    });
 });

describe("Disabled", function() {
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        it("will not run, since the suite has been disabled", function() {
            expect(true).toBe(true);
        });
    });

    xit("disabled test", function() {
        expect(true).toBe(true);
    });
});
```

```
describe('defined or not', function() {
    it("checks value to be defined", function() {
      expect(window.document).toBeDefined();
    });

    it("checks value to be undefined", function() {
      expect(window.notExists).toBeUndefined();
    });
});
```

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    });
});
```

```
describe('to be null', function() {
    it("checks value to be null", function() {
      var a;
      a = null;
      return expect(a).toBeNull();
    });
});

describe('truthy or falsy', function() {
    it("checks value to be true", function() {
      expect(5 > 0).toBeTruthy();
    });

    it("checks value to be false", function() {
      expect(5 < 0).toBeFalsy();
    });
});
```

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    });

    it("checks value to be false", function() {
      expect(5 < 0).toBeFalsy();
    });
});
```

```
describe('match', function() {
    it("outputs the right text", function () {
        expect("123.34").toMatch(/\d+\.\d{2}/);
        expect("123.34").not.toMatch(/string/);
    });
});

describe('to contain', function() {
    it("should contain oranges", function () {
        expect([1, 2, 3]).toContain(2);
        expect("one two three string").toContain("two");
    });
});
```

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    });
});
```

```
describe('exception', function() {
    it("throws exception", function() {
      var func = function() {
          window.notExists.value;
      };

      expect(func).toThrow();
    });
});
```

```
describe('exception', function() {
    it("throws exception", function() {
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      };

      expect(func).toThrow();
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      };

      expect(func).toThrow();
    });
});
```

```
describe("A spec (with setup and tear-down)", function() {
    var foo;

    beforeEach(function() {
        foo = 0;
        foo += 1;
    });

    afterEach(function() {
        foo = 0;
    });

    it("is just a function, so it can contain any code", function() {
        expect(foo).toEqual(1);
    });

    it("can have more than one expectation", function() {
        expect(foo).toEqual(1);
    });
});
```

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```
describe("Asynchronous", function() {
    var a = 0;

    it("async executes code", function() {

        runs(function() {
            setTimeout(function() {
            a = 5;
          }, 100);
        });

        waitsFor(function() {
          return a === 5;
        }, "the value should be changed", 150);
    });
});
```

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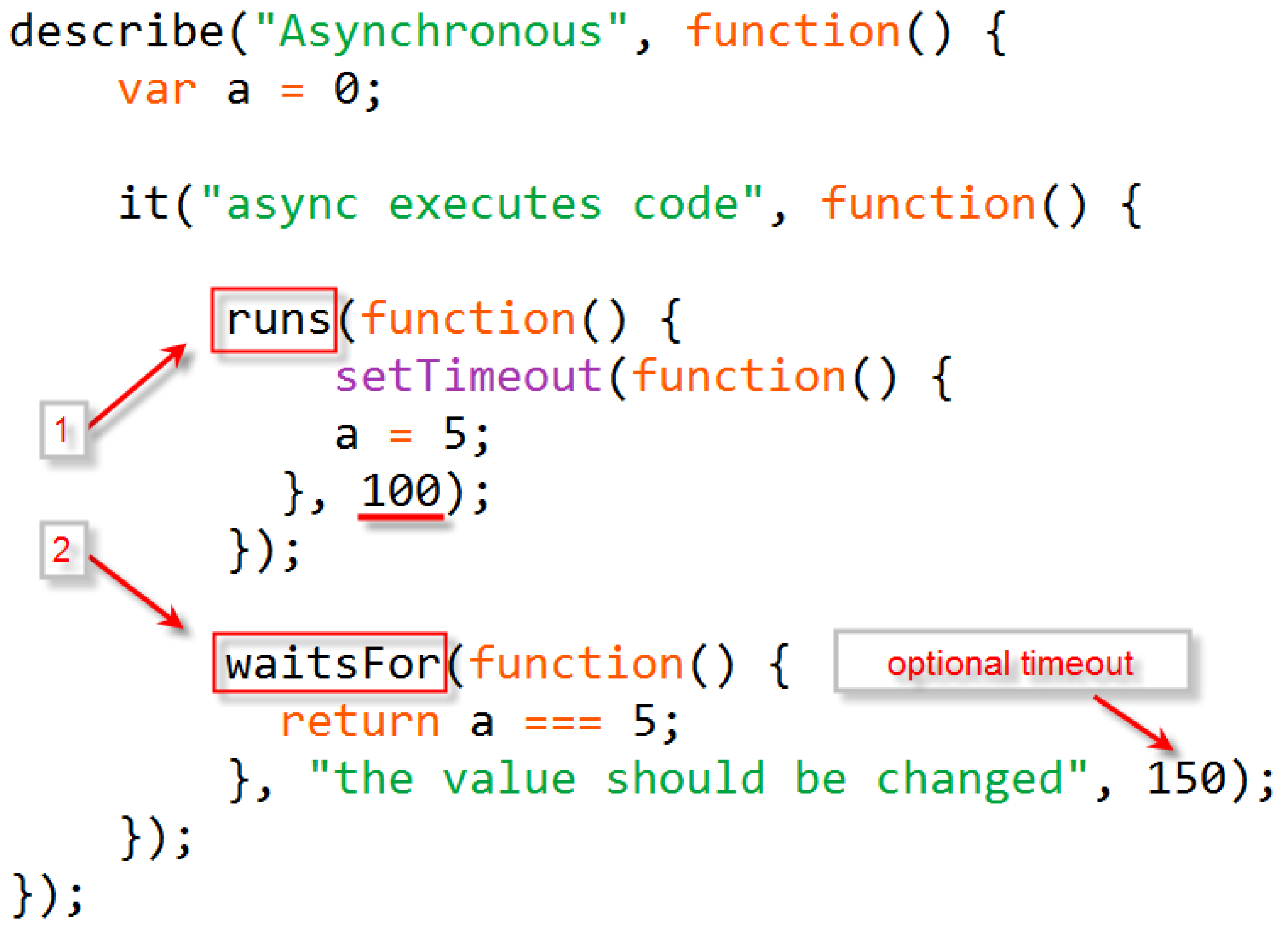

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    });
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```

```javascript
describe('Writing custom matchers', function() {
    beforeEach(function () {
        this.addMatchers({
            toBeBetween: function (rangeFloor, rangeCeiling) {
                if (rangeFloor > rangeCeiling) {
                    var temp = rangeFloor;
                    rangeFloor = rangeCeiling;
                    rangeCeiling = temp;
                }
                return this.actual > rangeFloor && this.actual < rangeCeiling;
            }
        });
    });

    it("is between 5 and 30", function () {
        expect(10).toBeBetween(5, 30);
    });
    it("is between 30 and 500", function () {
        expect(100).toBeBetween(500, 30);
    });
});
```

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SpecHelper.js

```
describe('Writing custom matchers', function() {
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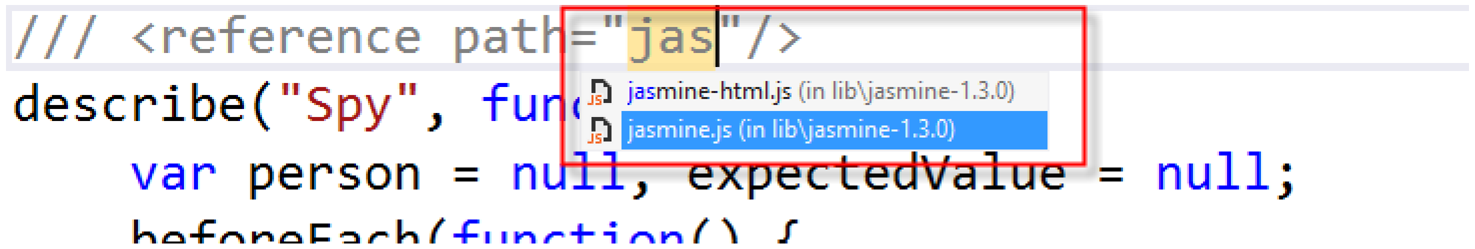
```

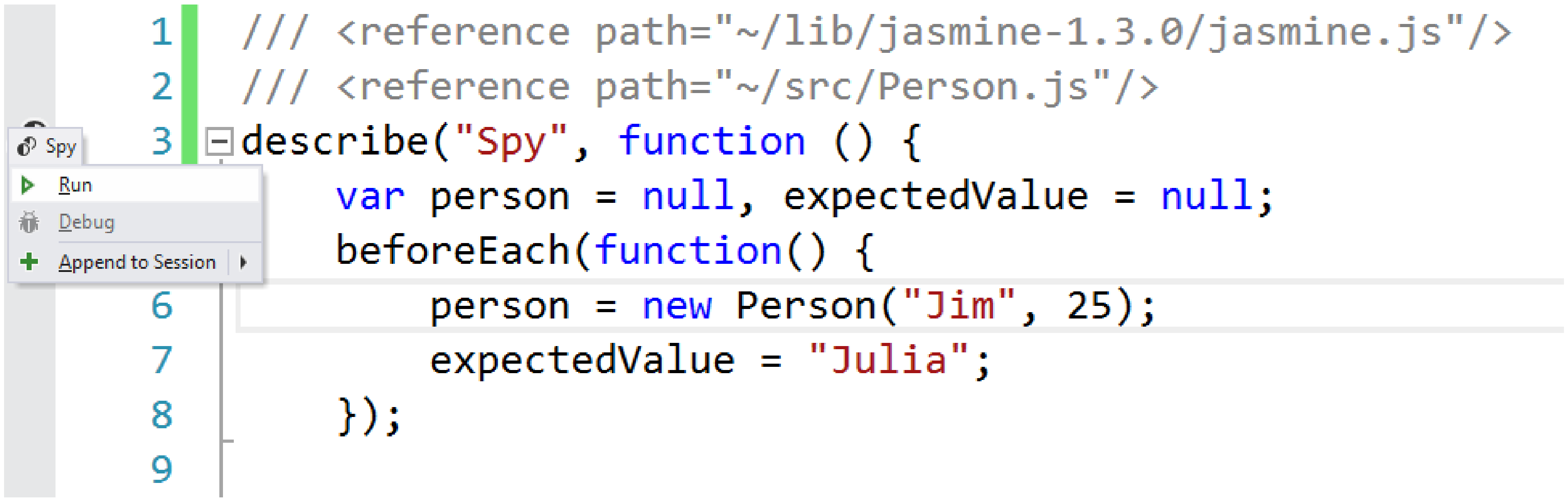
Run jasmine in R# 7



```
/// <reference path="jas"/>
describe("Spy", func
    var person = null, expectedValue = null;
```

jasmine-html.js (in lib\jasmine-1.3.0)
jasmine.js (in lib\jasmine-1.3.0)

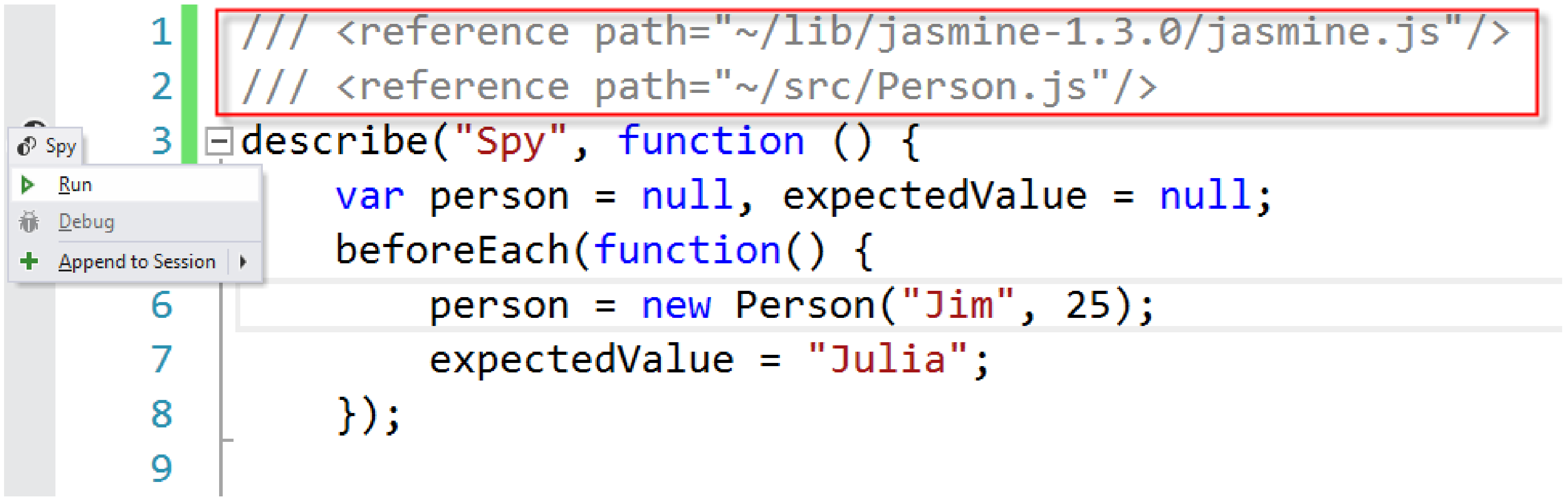
Run jasmine in R# 7



```
/// <reference path="~/lib/jasmine-1.3.0/jasmine.js"/>
/// <reference path="~/src/Person.js"/>
describe("Spy", function () {
    var person = null, expectedValue = null;
    beforeEach(function() {
        person = new Person("Jim", 25);
        expectedValue = "Julia";
    });

```

Run jasmine in R# 7



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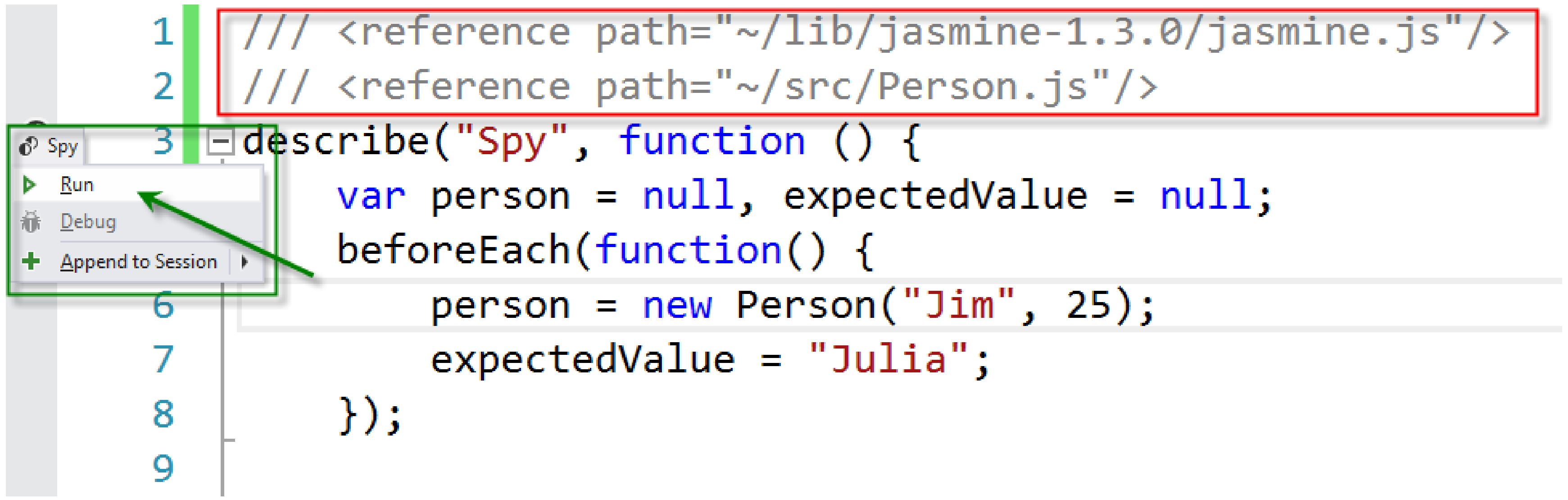

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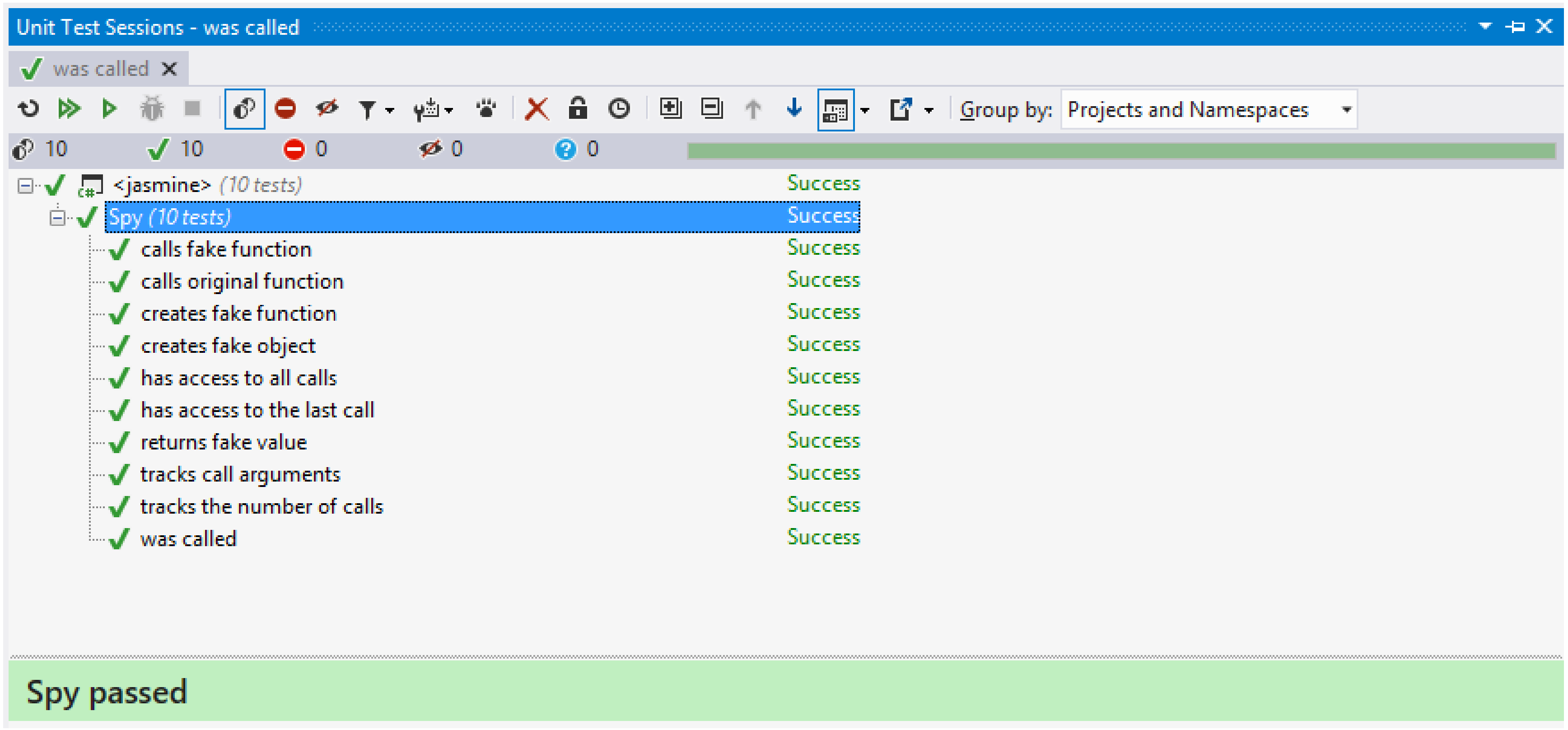


Unit Test Sessions - was called

✓ was called ✕

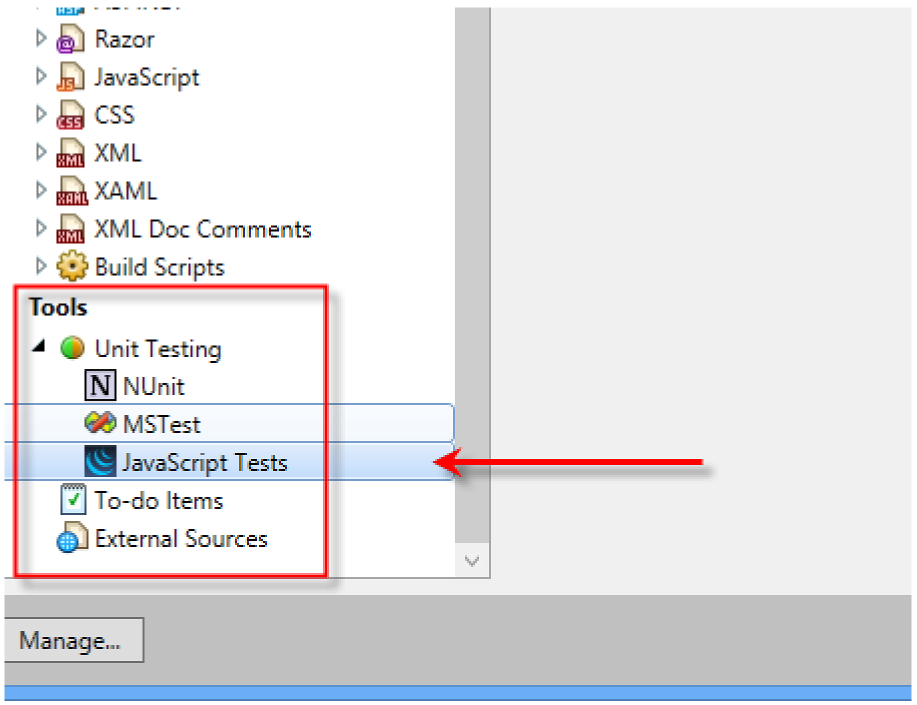
Group by: Projects and Namespaces

10 ✓ 10 0 0 0

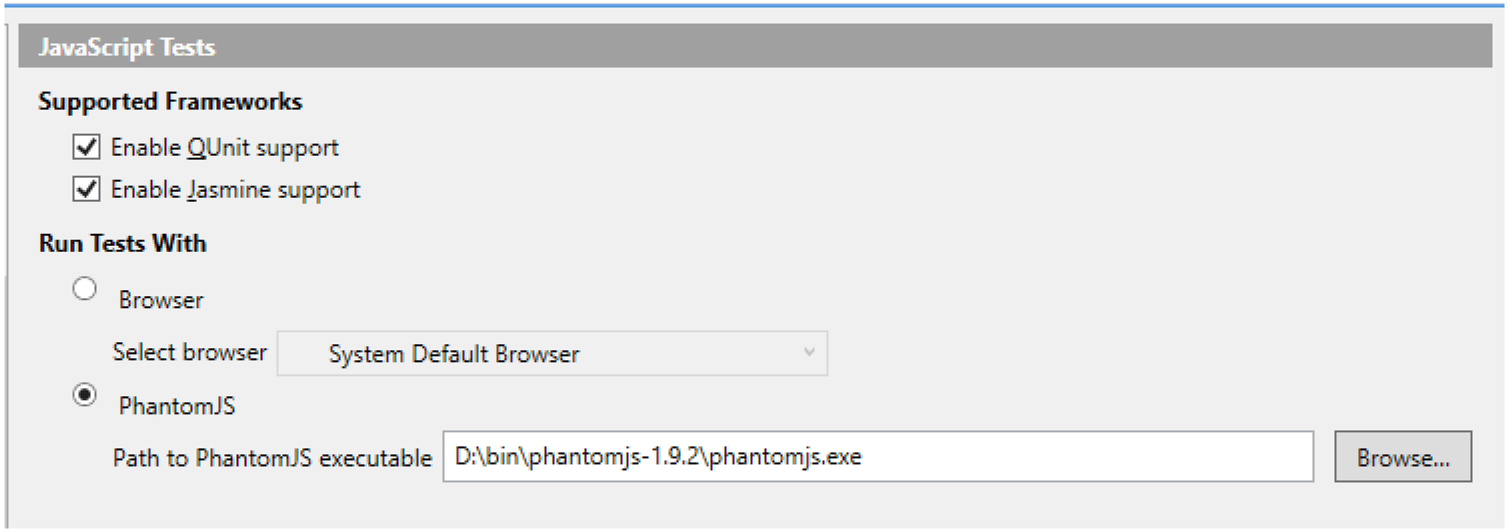
✓ <jasmine> *(10 tests)*	Success
✓ Spy *(10 tests)*	Success
✓ calls fake function	Success
✓ calls original function	Success
✓ creates fake function	Success
✓ creates fake object	Success
✓ has access to all calls	Success
✓ has access to the last call	Success
✓ returns fake value	Success
✓ tracks call arguments	Success
✓ tracks the number of calls	Success
✓ was called	Success

Spy passed

PhantomJs + Jasmine + R# 7



PhantomJs + Jasmine + R# 7



JavaScript Tests

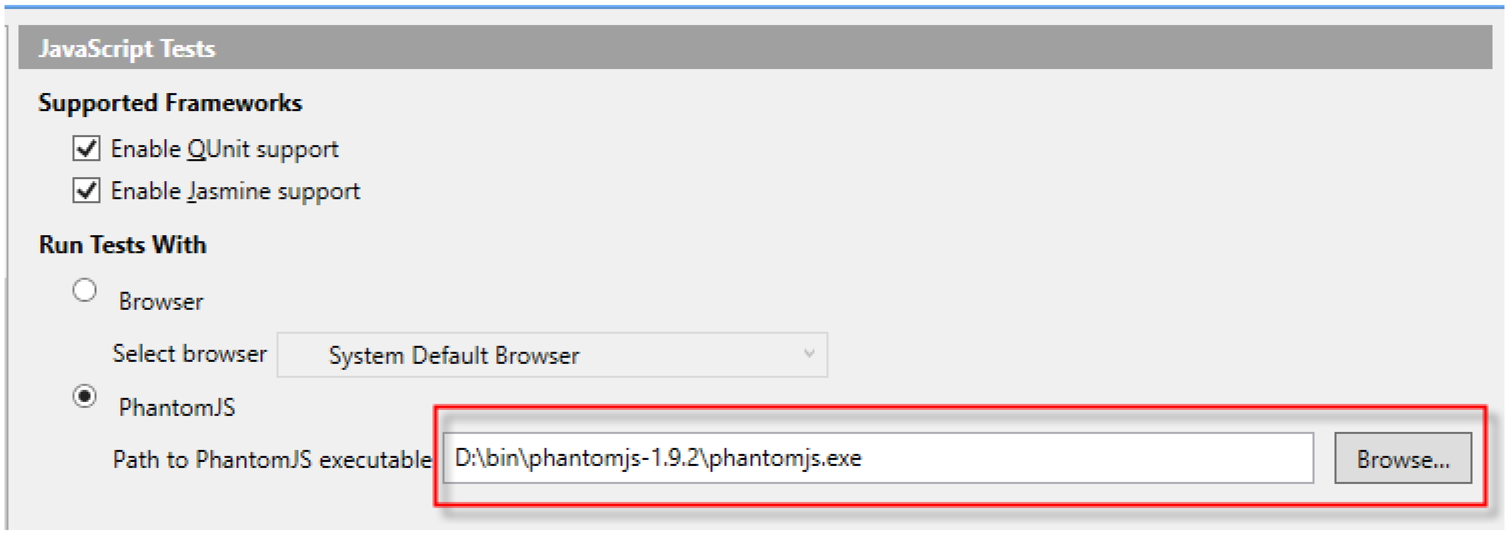
Supported Frameworks

- [✓] Enable QUnit support
- [✓] Enable Jasmine support

Run Tests With

- ○ Browser
  - Select browser: System Default Browser
- ● PhantomJS
  - Path to PhantomJS executable: D:\bin\phantomjs-1.9.2\phantomjs.exe

PhantomJs + Jasmine + R# 7



JavaScript Tests

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mocha

simple, flexible, fun

http://visionmedia.github.io/mocha/

Mocha

It’s a feature-rich JavaScript test framework running on node.js and the browser, making asynchronous testing simple and fun.

http://visionmedia.github.io/mocha/

Features

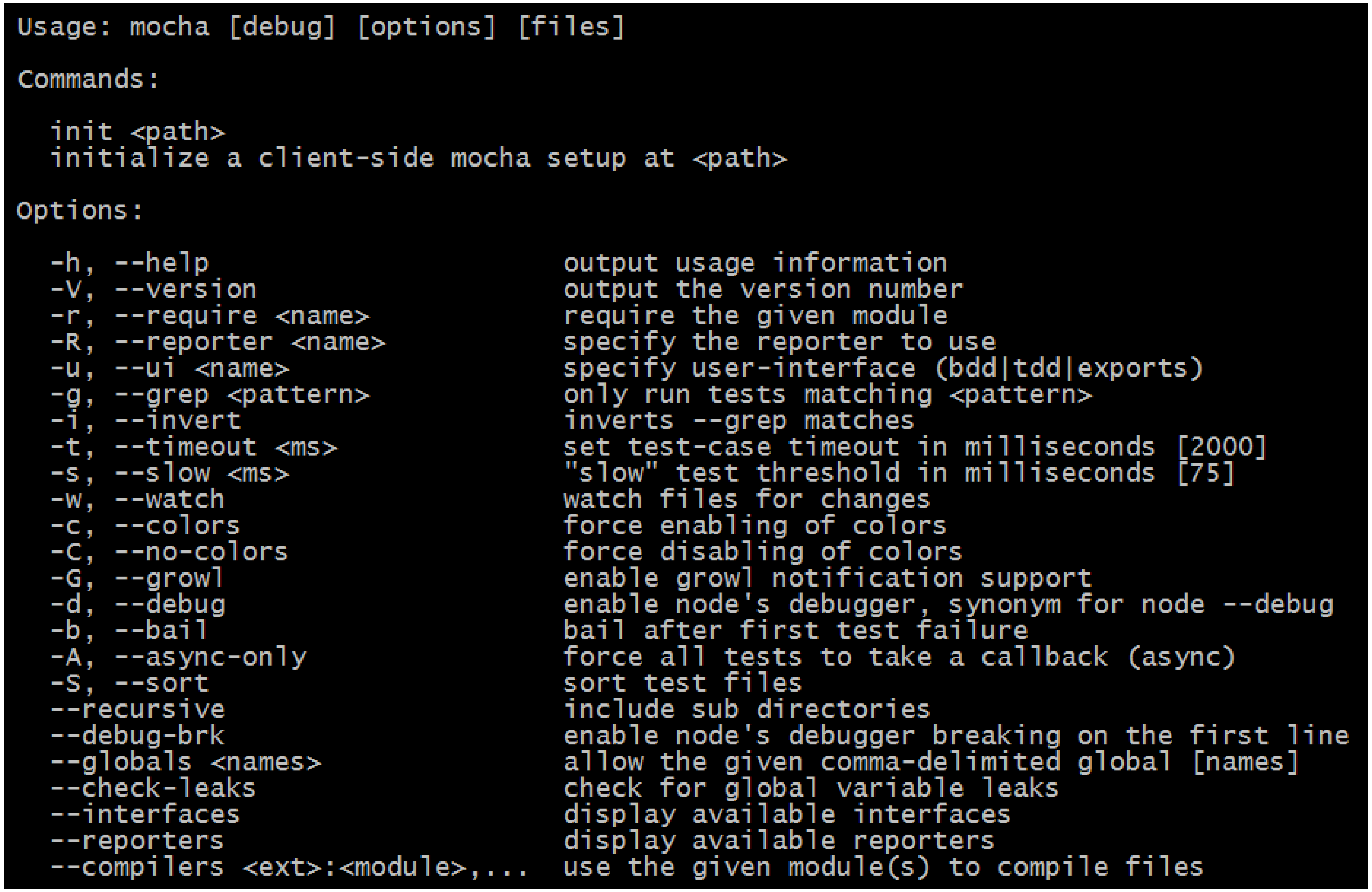
- simple async suport
- test coverage reporting
- proper exit status for CI support etc
- auto-detects and disables coloring for non-ttys
- file watcher suport
- global variable leak detection
- …

http://visionmedia.github.io/mocha/

Installation

```
npm install mocha
```

mocha --help



```
Usage: mocha [debug] [options] [files]

Commands:

  init <path>
  initialize a client-side mocha setup at <path>

Options:

  -h, --help                      output usage information
  -V, --version                   output the version number
  -r, --require <name>            require the given module
  -R, --reporter <name>           specify the reporter to use
  -u, --ui <name>                 specify user-interface (bdd|tdd|exports)
  -g, --grep <pattern>            only run tests matching <pattern>
  -i, --invert                    inverts --grep matches
  -t, --timeout <ms>              set test-case timeout in milliseconds [2000]
  -s, --slow <ms>                 "slow" test threshold in milliseconds [75]
  -w, --watch                     watch files for changes
  -c, --colors                    force enabling of colors
  -C, --no-colors                 force disabling of colors
  -G, --growl                     enable growl notification support
  -d, --debug                     enable node's debugger, synonym for node --debug
  -b, --bail                      bail after first test failure
  -A, --async-only                force all tests to take a callback (async)
  -S, --sort                      sort test files
  --recursive                     include sub directories
  --debug-brk                     enable node's debugger breaking on the first line
  --globals <names>               allow the given comma-delimited global [names]
  --check-leaks                   check for global variable leaks
  --interfaces                    display available interfaces
  --reporters                     display available reporters
  --compilers <ext>:<module>,...  use the given module(s) to compile files
```

JavaScript assertion libraries

- Should (https://github.com/visionmedia/should.js)
- Chaijs (http://chaijs.com/)
- Expect (https://github.com/LearnBoost/expect.js)
- jShould (https://github.com/eliperelman/jShould)
- YUIPort (https://github.com/gso/YUIPort)
- …

Should

It’s an expressive, readable, test framework agnostic, assertion library for node.

https://github.com/visionmedia/should.js/

Mocha + Should

```
describe('truth', function () {
    it('should be true', function () {
        true.should.be.true;
    });

    it('should not be false', function () {
        true.should.not.be.false;
    });
});
```

```
describe('truth', function () {
    it('should be true', function () {
        true.should.be.true;
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    it('should not be false', function () {
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```
describe('truth', function () {
  it('should be true', function () {
    true.should.be.true;
  });

  it('should not be false', function () {
    true.should.not.be.false;
  });
});
```

```javascript
it('equal & exactly', function() {
    (4).should.equal(4);
    'test'.should.equal('test');
    [1,2,3].should.not.equal([1,2,3]);
    (4).should.be.exactly(4);
});

it('within', function() {
    var age = 4;
    age.should.be.within(1, 100);
});

it('approximately', function() {
    (99.99).should.be.approximately(100, 0.1);
});

it('instanceof', function() {
    [].should.be.an.instanceof(Array);
    [].should.be.an.instanceOf(Array);
});
```

```
it('equal & exactly', function() {
    (4).should.equal(4);
    'test'.should.equal('test');
    [1,2,3].should.not.equal([1,2,3]);
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    age.should.be.within(1, 100);
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    (99.99).should.be.approximately(100, 0.1);
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    'test'.should.equal('test');
    [1,2,3].should.not.equal([1,2,3]);
    (4).should.be.exactly(4);
});

it('within', function() {
    var age = 4;
    age.should.be.within(1, 100);
});

it('approximately', function() {
    (99.99).should.be.approximately(100, 0.1);
});

it('instanceof', function() {
    [].should.be.an.instanceof(Array);
    [].should.be.an.instanceOf(Array);
});
```

```
it('equal & exactly', function() {
    (4).should.equal(4);
    'test'.should.equal('test');
    [1,2,3].should.not.equal([1,2,3]);
    (4).should.be.exactly(4);
});

it('within', function() {
    var age = 4;
    age.should.be.within(1, 100);
});

it('approximately', function() {
    (99.99).should.be.approximately(100, 0.1);
});

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});
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    [1,2,3].should.not.equal([1,2,3]);
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    (99.99).should.be.approximately(100, 0.1);
});

it('instanceof', function() {
    [].should.be.an.instanceof(Array);
    [].should.be.an.instanceOf(Array);
});
```

```
describe('throw', function() {
    it('assert an exception is thrown', function() {
        (function() {
            throw new Error('fail');
        }).should.throw();
    });

    it('assert an exception is not thrown', function() {
        (function() {}).should.not.throw();
    });

    it('assert exception message matches string', function() {
        (function() {
            throw new Error('fail');
        }).should.throw('fail');
    });

    it('throwError', function() {
        (function() {
          throw new Error('failed to baz');
        }).should.throwError(/^fail.*/);
    });
});
```

```
describe('throw', function() {
    it('assert an exception is thrown', function() {
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        }).should.throw();
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        }).should.throw('fail');
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        (function() {
          throw new Error('failed to baz');
        }).should.throwError(/^fail.*/);
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});
```

```
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        (function() {
            throw new Error('fail');
        }).should.throw('fail');
    });

    it('throwError', function() {
        (function() {
          throw new Error('failed to baz');
        }).should.throwError(/^fail.*/);
    });
});
```

QUnit

QUnit

It’s a powerful, easy-to-use JavaScript unit testing framework.

It's used by the jQuery, jQuery UI and jQuery Mobile projects and is capable of testing any generic JavaScript code, including itself!

http://qunitjs.com/

Installation (1)

```
npm install qunitjs
```

Installation (2)

Download two files from http://codeorigin.jquery.com/qunit/:

- qunit-x.x.x.js
- qunit-x.x.x.css

Getting started

```html
<!DOCTYPE html>
<html>
<head>
  <meta charset="utf-8">
  <title>QUnit Example</title>
  <link rel="stylesheet" href="./lib/qunit/qunit-1.12.0.css">
</head>
<body>
  <div id="qunit"></div>
  <div id="qunit-fixture"></div>
  <script src="../src/Person.js"></script>
  <script src="../src/MyException.js"></script>

  <script src="./lib/qunit/qunit-1.12.0.js"></script>

  <script src="./Assert.js"></script>
  <script src="./AsyncControl.js"></script>
  <script src="./Callbacks.js"></script>
</body>
</html>
```

Getting started

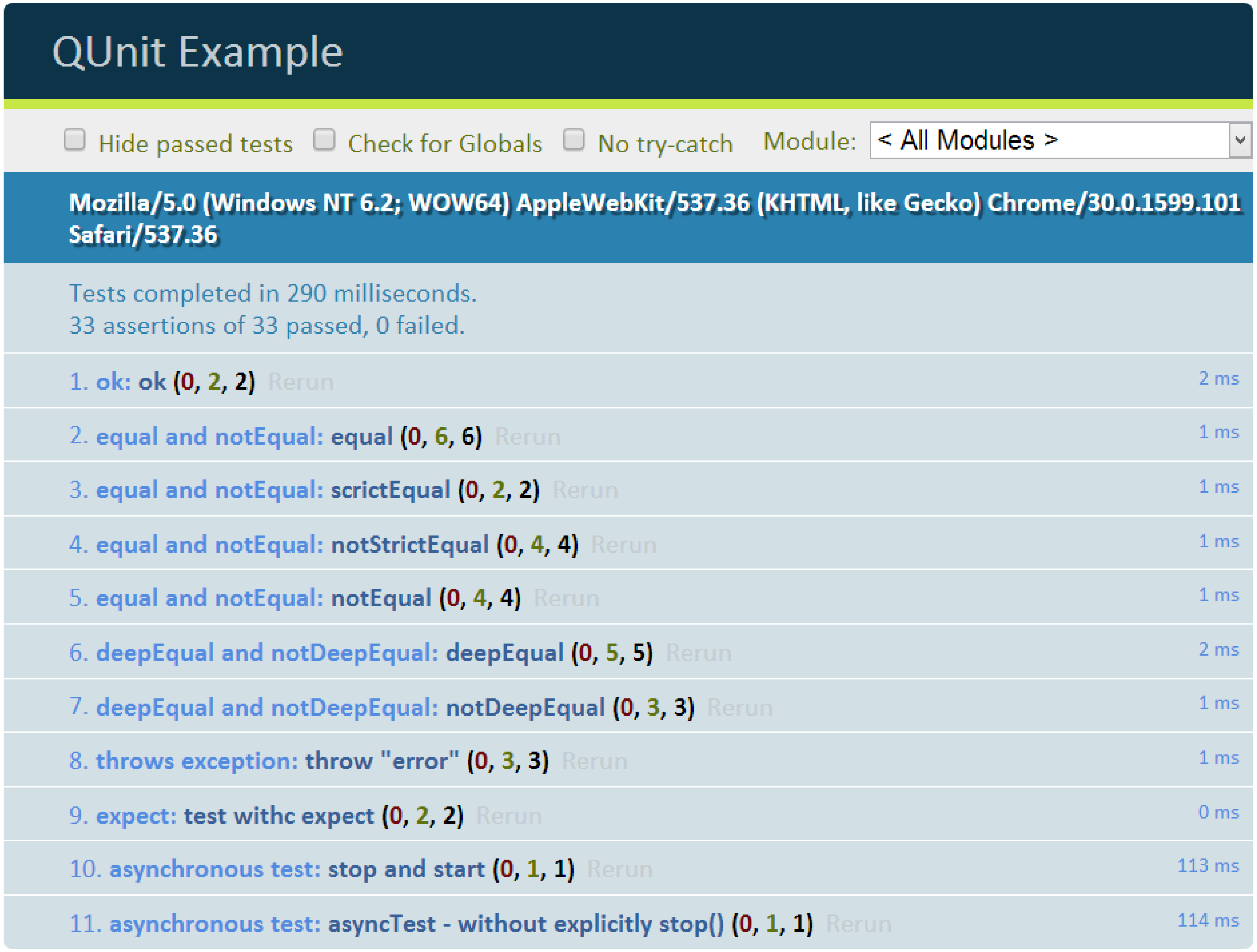
```html
<!DOCTYPE html>
<html>
<head>
  <meta charset="utf-8">
  <title>QUnit Example</title>
  <link rel="stylesheet" href="./lib/qunit/qunit-1.12.0.css">
</head>
<body>
  <div id="qunit"></div>
  <div id="qunit-fixture"></div>
  <script src="../src/Person.js"></script>
  <script src="../src/MyException.js"></script>

  <script src="./lib/qunit/qunit-1.12.0.js"></script>

  <script src="./Assert.js"></script>
  <script src="./AsyncControl.js"></script>
  <script src="./Callbacks.js"></script>
</body>
</html>
```

Getting started

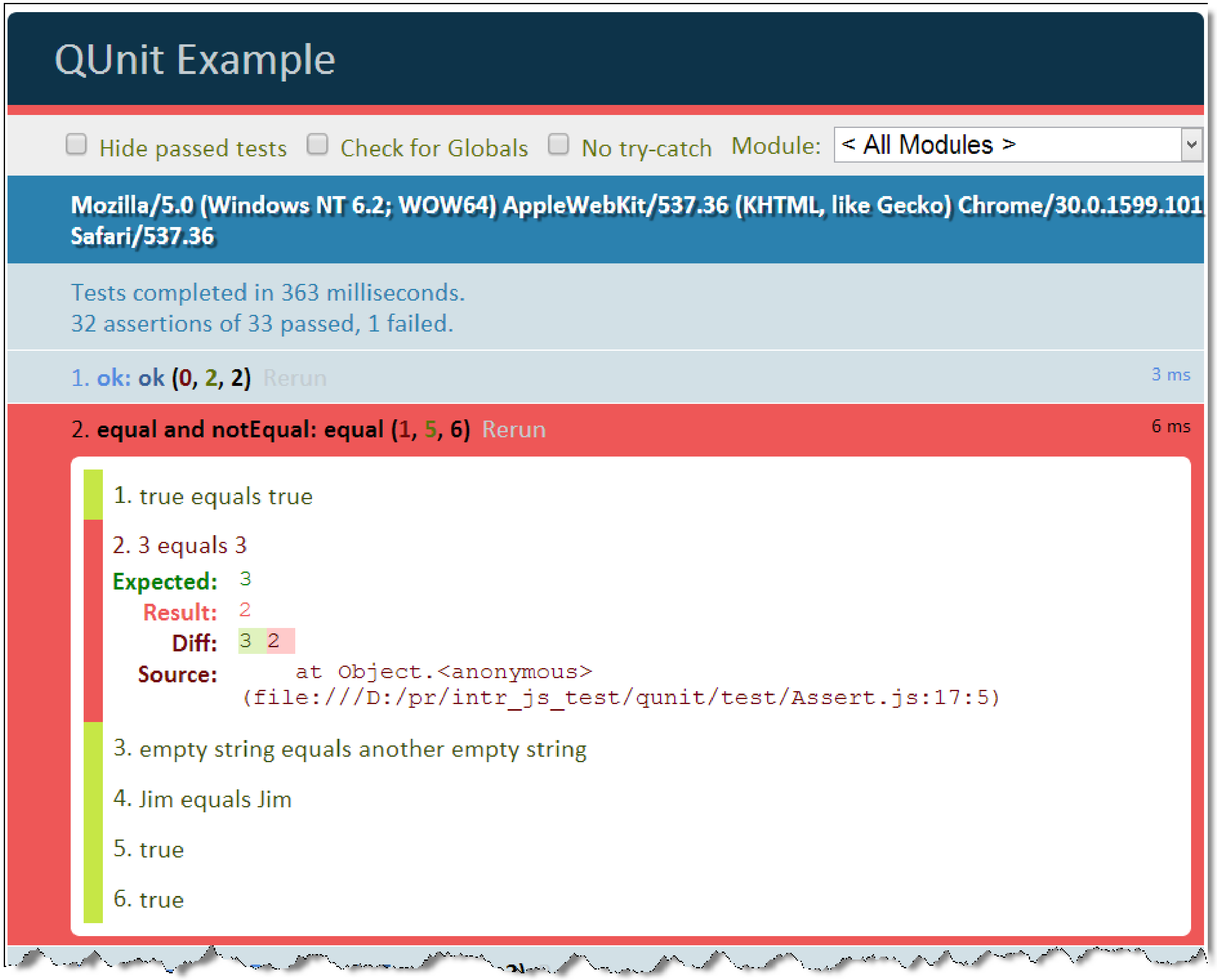
```
<!DOCTYPE html>
<html>
<head>
  <meta charset="utf-8">
  <title>QUnit Example</title>
  <link rel="stylesheet" href="./lib/qunit/qunit-1.12.0.css">
</head>
<body>
  <div id="qunit"></div>
  <div id="qunit-fixture"></div>
  <script src="../src/Person.js"></script>
  <script src="../src/MyException.js"></script>

  <script src="./lib/qunit/qunit-1.12.0.js"></script>

  <script src="./Assert.js"></script>
  <script src="./AsyncControl.js"></script>
  <script src="./Callbacks.js"></script>
</body>
</html>
```

sources

tests


QUnit Example

```
Mozilla/5.0 (Windows NT 6.2; WOW64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/30.0.1599.101
Safari/537.36

Tests completed in 290 milliseconds.
33 assertions of 33 passed, 0 failed.

1. ok: ok (0, 2, 2) Rerun                                                          2 ms
2. equal and notEqual: equal (0, 6, 6) Rerun                                       1 ms
3. equal and notEqual: scrictEqual (0, 2, 2) Rerun                                 1 ms
4. equal and notEqual: notStrictEqual (0, 4, 4) Rerun                              1 ms
5. equal and notEqual: notEqual (0, 4, 4) Rerun                                    1 ms
6. deepEqual and notDeepEqual: deepEqual (0, 5, 5) Rerun                           2 ms
7. deepEqual and notDeepEqual: notDeepEqual (0, 3, 3) Rerun                        1 ms
8. throws exception: throw "error" (0, 3, 3) Rerun                                 1 ms
9. expect: test withc expect (0, 2, 2) Rerun                                       0 ms
10. asynchronous test: stop and start (0, 1, 1) Rerun                            113 ms
11. asynchronous test: asyncTest - without explicitly stop() (0, 1, 1) Rerun     114 ms
```

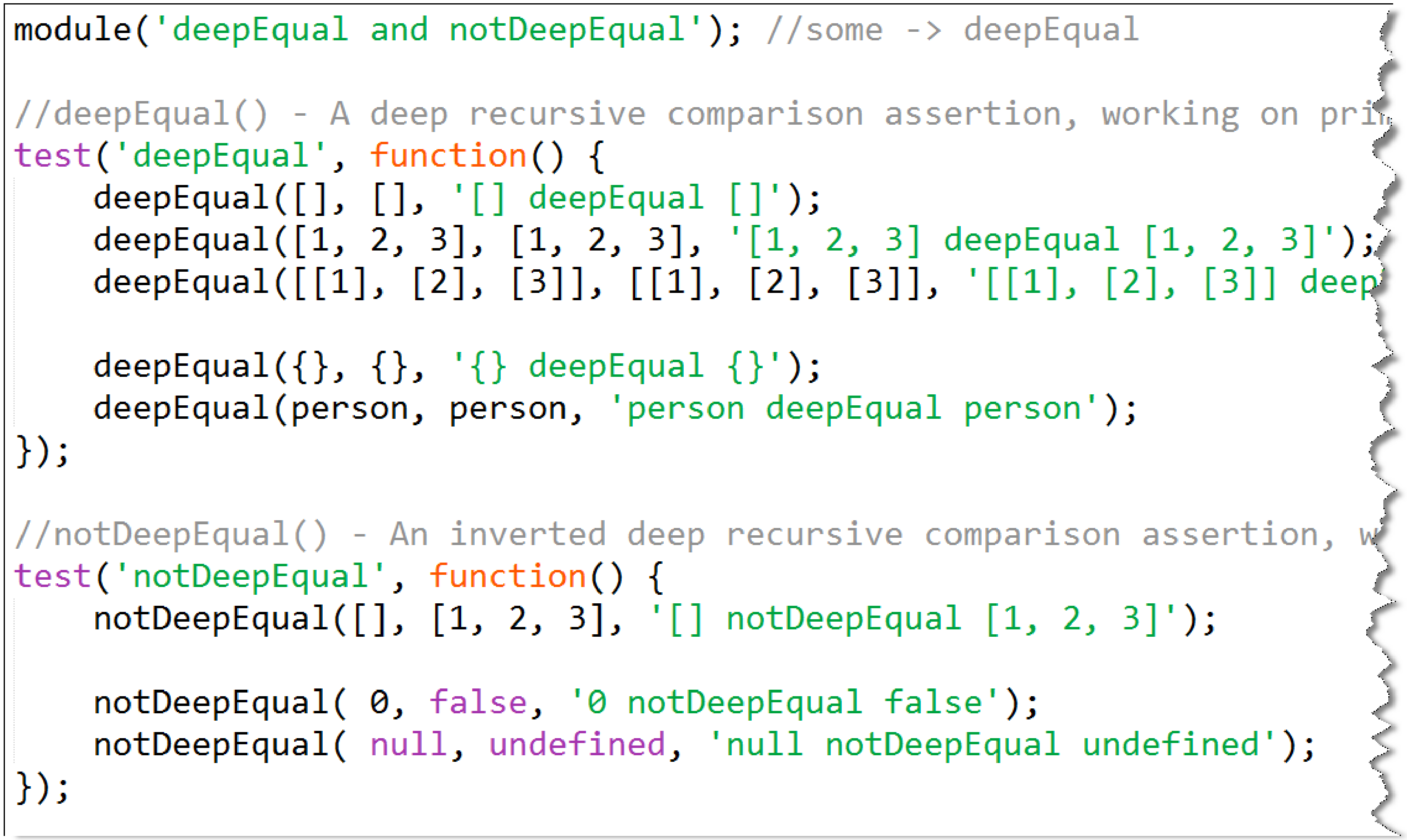


QUnit Example

```
Mozilla/5.0 (Windows NT 6.2; WOW64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/30.0.1599.101
Safari/537.36

Tests completed in 363 milliseconds.
32 assertions of 33 passed, 1 failed.

1. ok: ok (0, 2, 2) Rerun                                                     3 ms
2. equal and notEqual: equal (1, 5, 6) Rerun                                  6 ms
   1. true equals true
   2. 3 equals 3
   Expected: 3
     Result: 2
       Diff: 3 2
     Source:     at Object.<anonymous>
             (file:///D:/pr/intr_js_test/qunit/test/Assert.js:17:5)
   3. empty string equals another empty string
   4. Jim equals Jim
   5. true
   6. true
```

```
//module() - Group related tests under a single label.
module('ok');

//test() - Add a test to run.
//ok() - A boolean assertion, equivalent to CommonJS’s
test("ok", function() {
    ok(true, 'true is ok');
    ok(person != null, 'Person is not null');
});
```

```
module('equal and notEqual'); //equals -> equal
//A non-strict comparison assertion, roughly equivalent to JUnit assertEquals.
test('equal', function() {
    equal(true, true, 'true equals true');
    equal(2, 3, '3 equals 3');
    equal('', '', 'empty string equals another empty string');
    equal(person.getName(), 'Jim', 'Jim equals Jim');

    equal( 0, false, 'true');
    equal( null, undefined, 'true');
});

//strictEqual() - A strict type and value comparison assertion.
test('scrictEqual', function() {
    strictEqual(1, 1, '1 strictEqual 1');
    strictEqual('', '', 'empy string strictEqual empty string');

});
```



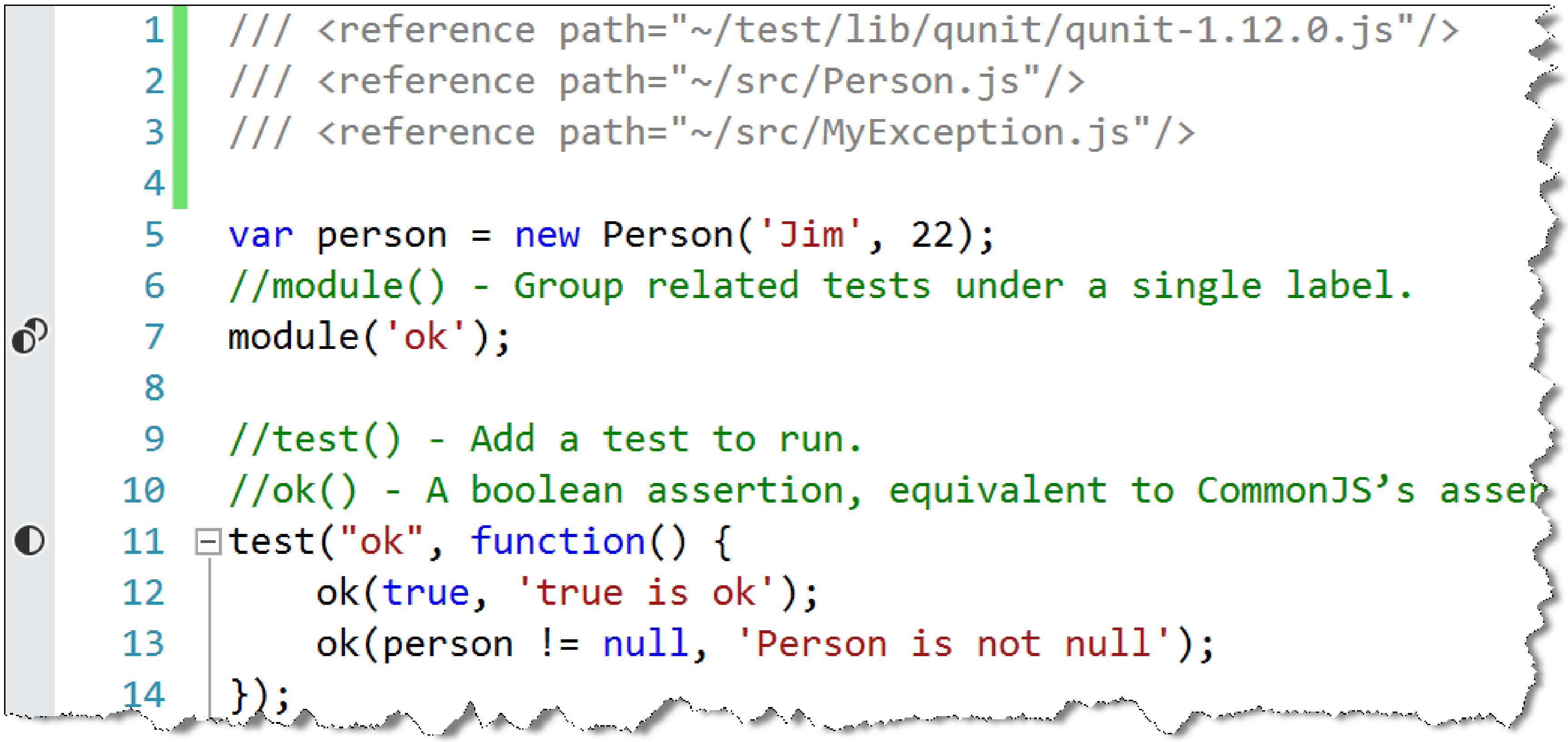
```
module('deepEqual and notDeepEqual'); //some -> deepEqual

//deepEqual() - A deep recursive comparison assertion, working on pri
test('deepEqual', function() {
    deepEqual([], [], '[] deepEqual []');
    deepEqual([1, 2, 3], [1, 2, 3], '[1, 2, 3] deepEqual [1, 2, 3]');
    deepEqual([[1], [2], [3]], [[1], [2], [3]], '[[1], [2], [3]] deep

    deepEqual({}, {}, '{} deepEqual {}');
    deepEqual(person, person, 'person deepEqual person');
});

//notDeepEqual() - An inverted deep recursive comparison assertion, w
test('notDeepEqual', function() {
    notDeepEqual([], [1, 2, 3], '[] notDeepEqual [1, 2, 3]');

    notDeepEqual( 0, false, '0 notDeepEqual false');
    notDeepEqual( null, undefined, 'null notDeepEqual undefined');
});
```

```
module('throws exception');
//Assertion to test if a callback throws an exception when run.
test('throw "error"', function() {
    var myException = new MyException('some valuable message');
    throws(
        function() { throw 'error' },
        'throws with just a message, no expected'
    );

    throws(
        function() { throw myException; },
        MyException,
        "raised error is an instance of MyException"
    );

    throws(
        function() { throw myException; },
        /message/,
        'raised error message contains "message"'
    );
});
```

```
test('stop and start', function() {
    // Pause the test first
    stop();

    setTimeout(function() {
        ok(true);

        // After the assertion has been called,
        // continue the test
        start();
    }, 100);
});
```

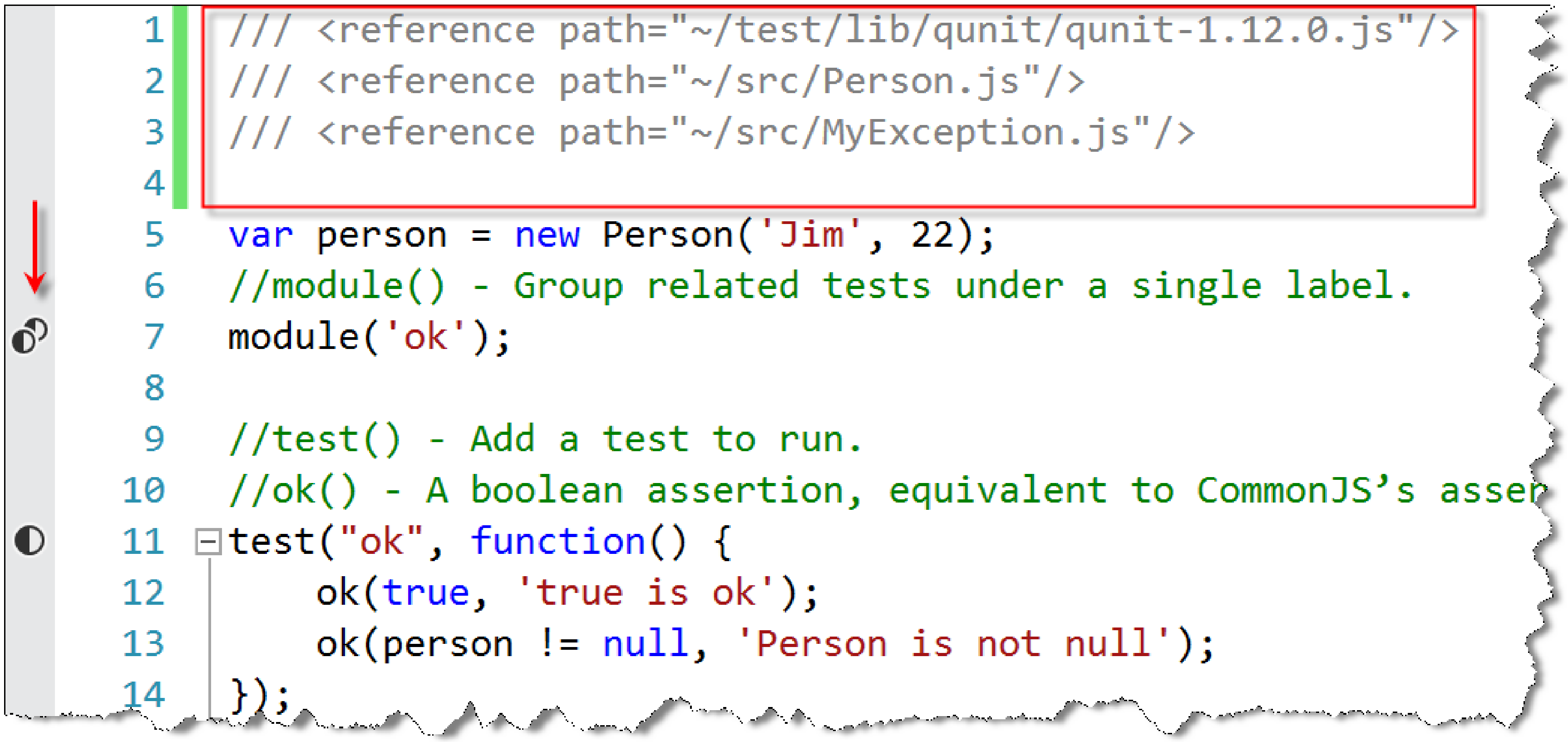
```javascript
asyncTest('asyncTest - without explicitly stop()', function() {

    setTimeout(function() {
        ok(true);

        // After the assertion has been called,
        // continue the test
        start();
    }, 100);
});
```

Run QUnit in R# 7



```
/// <reference path="~/test/lib/qunit/qunit-1.12.0.js"/>
/// <reference path="~/src/Person.js"/>
/// <reference path="~/src/MyException.js"/>

var person = new Person('Jim', 22);
//module() - Group related tests under a single label.
module('ok');

//test() - Add a test to run.
//ok() - A boolean assertion, equivalent to CommonJS's asser
test("ok", function() {
    ok(true, 'true is ok');
    ok(person != null, 'Person is not null');
});
```

Run QUnit in R# 7



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/// <reference path="~/test/lib/qunit/qunit-1.12.0.js"/>
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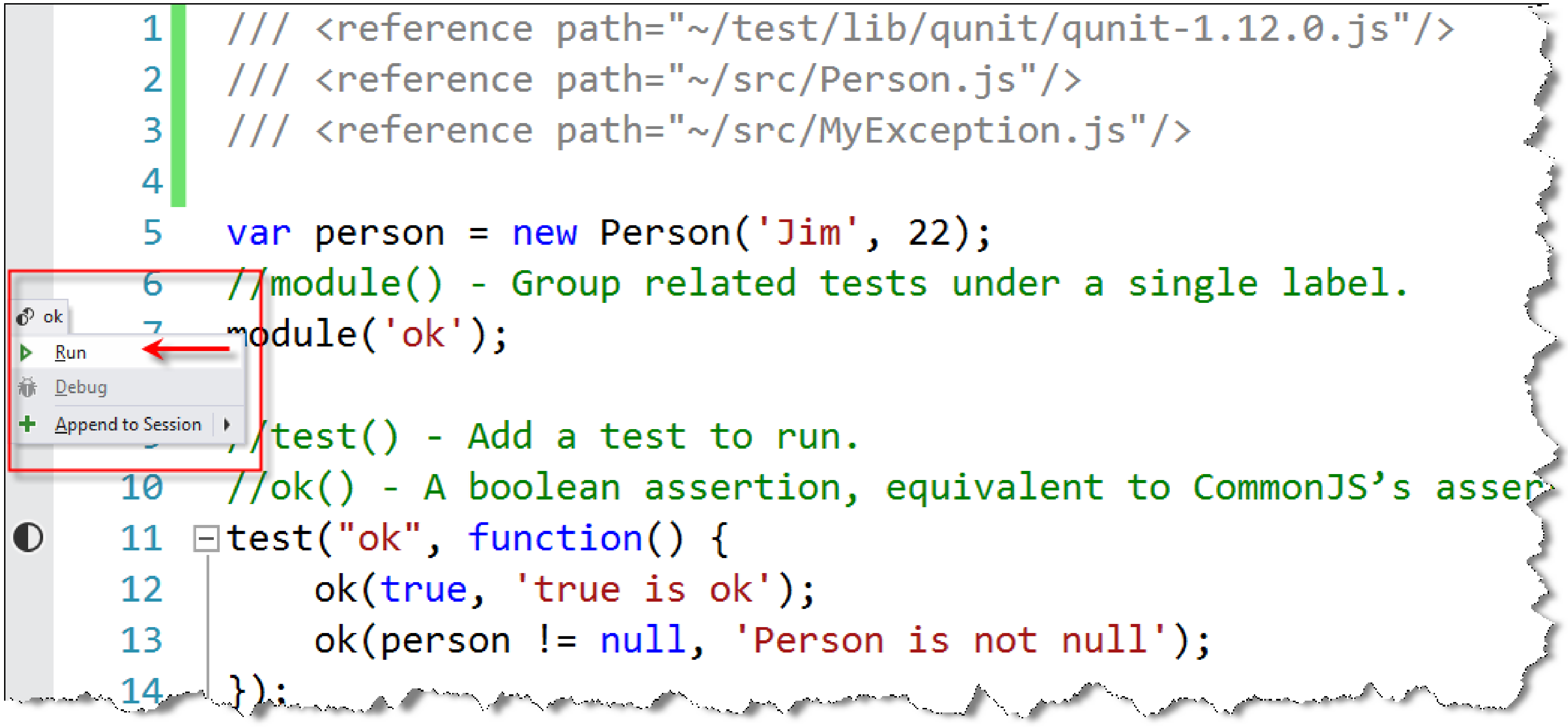
});
```

Run QUnit in R# 7



```
/// <reference path="~/test/lib/qunit/qunit-1.12.0.js"/>
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var person = new Person('Jim', 22);
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module('ok');

//test() - Add a test to run.
//ok() - A boolean assertion, equivalent to CommonJS's asser
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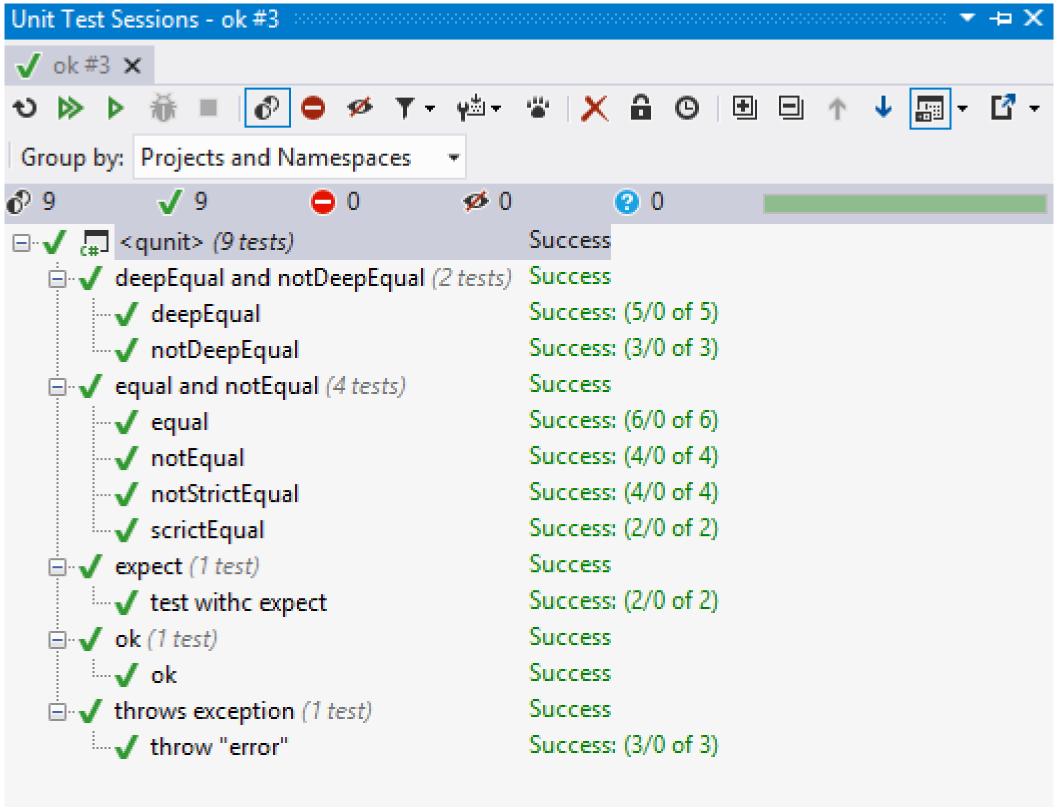
    ok(true, 'true is ok');
    ok(person != null, 'Person is not null');
});
```



Unit Test Sessions - ok #3

✓ ok #3 ✕

Group by: Projects and Namespaces

9 ✓ 9 0 0 0

```
✓ <qunit> (9 tests)                          Success
  ✓ deepEqual and notDeepEqual (2 tests)     Success
    ✓ deepEqual                              Success: (5/0 of 5)
    ✓ notDeepEqual                           Success: (3/0 of 3)
  ✓ equal and notEqual (4 tests)             Success
    ✓ equal                                  Success: (6/0 of 6)
    ✓ notEqual                               Success: (4/0 of 4)
    ✓ notStrictEqual                         Success: (4/0 of 4)
    ✓ scrictEqual                            Success: (2/0 of 2)
  ✓ expect (1 test)                          Success
    ✓ test withc expect                      Success: (2/0 of 2)
  ✓ ok (1 test)                              Success
    ✓ ok                                     Success
  ✓ throws exception (1 test)                Success
    ✓ throw "error"                          Success: (3/0 of 3)
```

buster.js

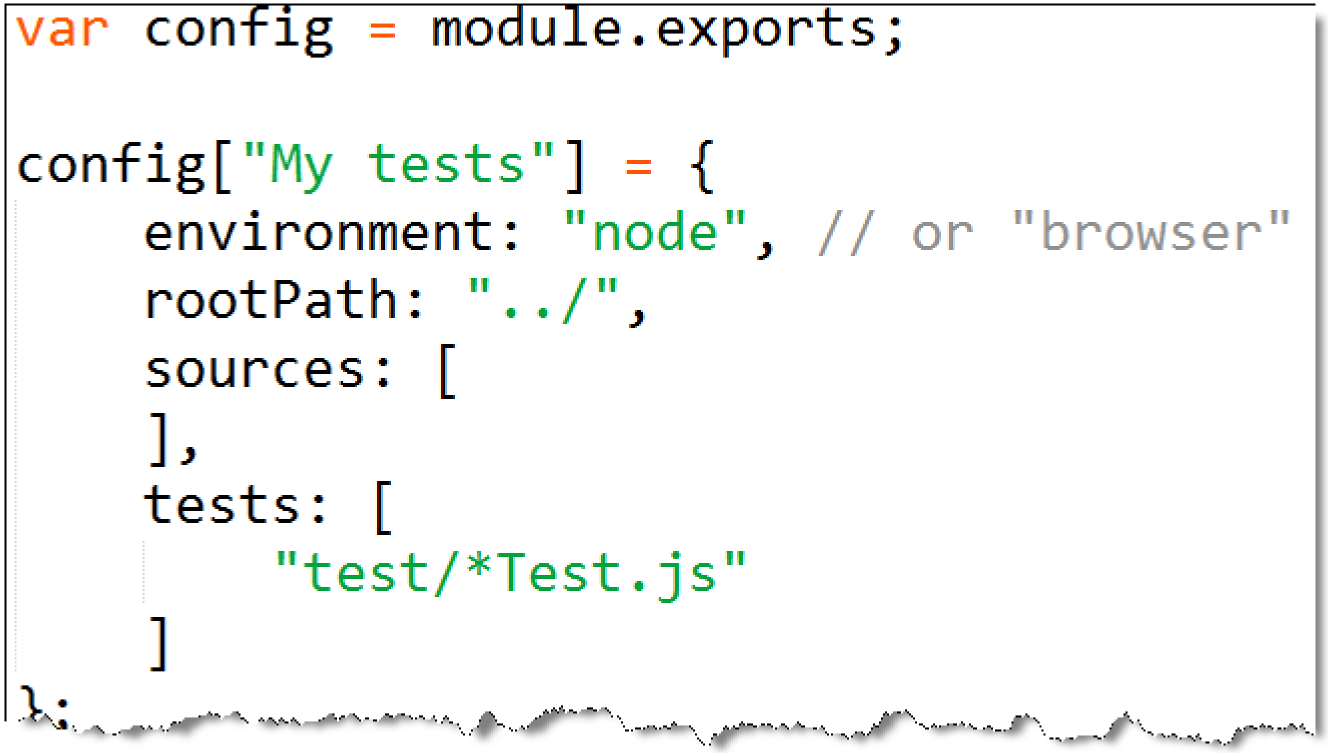
- A browser JavaScript testing toolkit
- A Node.js testing toolkit
- Flexible
- Written by you
- A set of reusable libraries
- The future

http://docs.busterjs.org/

Installation

```
npm install buster
```

Create config file



```
var config = module.exports;

config["My tests"] = {
    environment: "node", // or "browser"
    rootPath: "../",
    sources: [
    ],
    tests: [
        "test/*Test.js"
    ]
};
```

Write tests

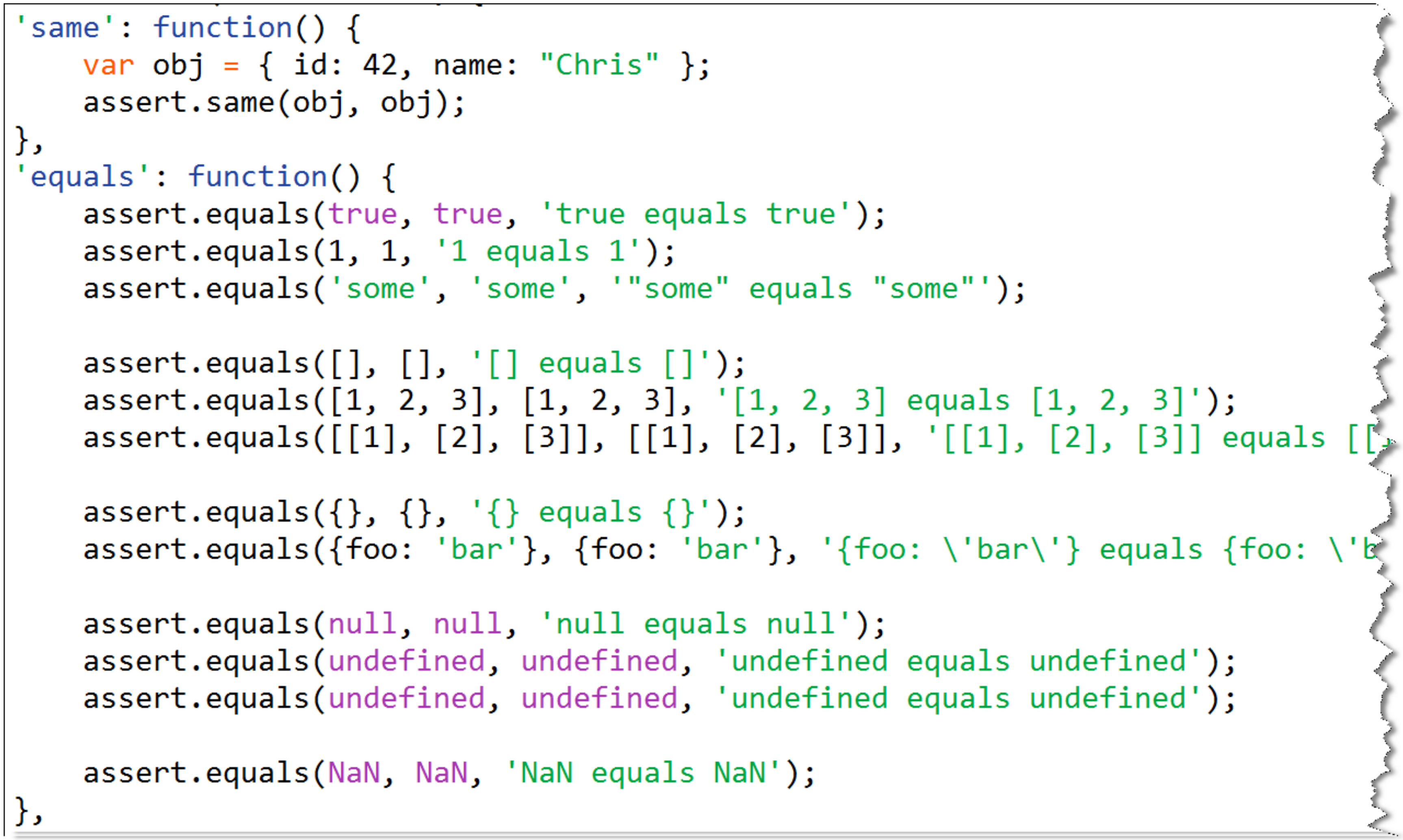
```
var buster = require('buster');
var assert = buster.assertions.assert;

buster.testCase('test', {
    'test 1': function() {
        assert.equals(2 + 3, 5);
    }
});
```

Write tests

```
var buster = require('buster');
var assert = buster.assertions.assert;

buster.testCase('test', {
    'test 1': function() {
        assert.equals(2 + 3, 5);
    }
});
```



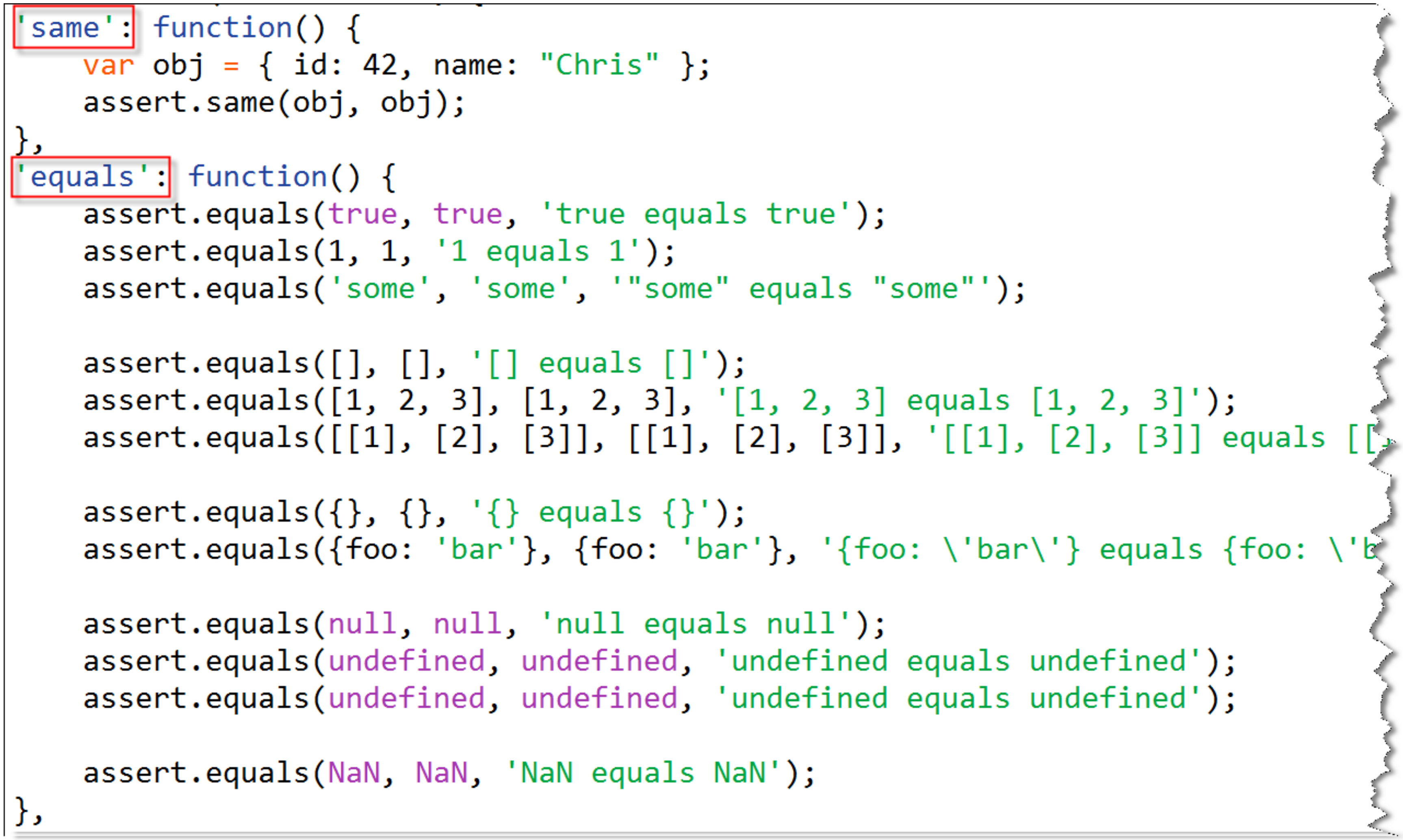
```
'same': function() {
    var obj = { id: 42, name: "Chris" };
    assert.same(obj, obj);
},
'equals': function() {
    assert.equals(true, true, 'true equals true');
    assert.equals(1, 1, '1 equals 1');
    assert.equals('some', 'some', '"some" equals "some"');

    assert.equals([], [], '[] equals []');
    assert.equals([1, 2, 3], [1, 2, 3], '[1, 2, 3] equals [1, 2, 3]');
    assert.equals([[1], [2], [3]], [[1], [2], [3]], '[[1], [2], [3]] equals [[

    assert.equals({}, {}, '{} equals {}');
    assert.equals({foo: 'bar'}, {foo: 'bar'}, '{foo: \'bar\'} equals {foo: \'b

    assert.equals(null, null, 'null equals null');
    assert.equals(undefined, undefined, 'undefined equals undefined');
    assert.equals(undefined, undefined, 'undefined equals undefined');

    assert.equals(NaN, NaN, 'NaN equals NaN');
},
```



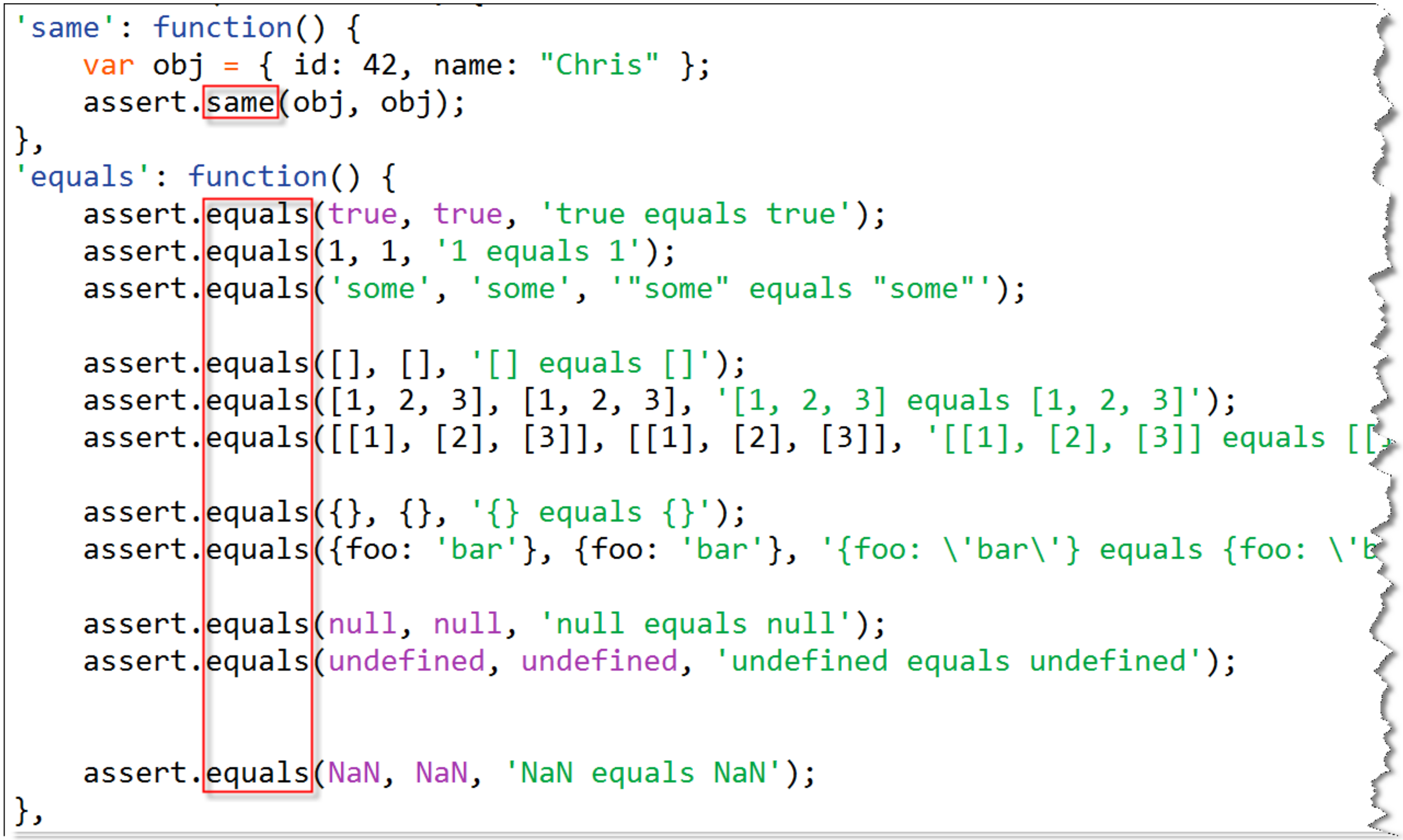
```
'same': function() {
    var obj = { id: 42, name: "Chris" };
    assert.same(obj, obj);
},
'equals': function() {
    assert.equals(true, true, 'true equals true');
    assert.equals(1, 1, '1 equals 1');
    assert.equals('some', 'some', '"some" equals "some"');

    assert.equals([], [], '[] equals []');
    assert.equals([1, 2, 3], [1, 2, 3], '[1, 2, 3] equals [1, 2, 3]');
    assert.equals([[1], [2], [3]], [[1], [2], [3]], '[[1], [2], [3]] equals [[

    assert.equals({}, {}, '{} equals {}');
    assert.equals({foo: 'bar'}, {foo: 'bar'}, '{foo: \'bar\'} equals {foo: \'b

    assert.equals(null, null, 'null equals null');
    assert.equals(undefined, undefined, 'undefined equals undefined');
    assert.equals(undefined, undefined, 'undefined equals undefined');

    assert.equals(NaN, NaN, 'NaN equals NaN');
},
```



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'same': function() {
    var obj = { id: 42, name: "Chris" };
    assert.same(obj, obj);
},
'equals': function() {
    assert.equals(true, true, 'true equals true');
    assert.equals(1, 1, '1 equals 1');
    assert.equals('some', 'some', '"some" equals "some"');

    assert.equals([], [], '[] equals []');
    assert.equals([1, 2, 3], [1, 2, 3], '[1, 2, 3] equals [1, 2, 3]');
    assert.equals([[1], [2], [3]], [[1], [2], [3]], '[[1], [2], [3]] equals [[

    assert.equals({}, {}, '{} equals {}');
    assert.equals({foo: 'bar'}, {foo: 'bar'}, '{foo: \'bar\'} equals {foo: \'b

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    assert.equals(undefined, undefined, 'undefined equals undefined');


    assert.equals(NaN, NaN, 'NaN equals NaN');
},
```
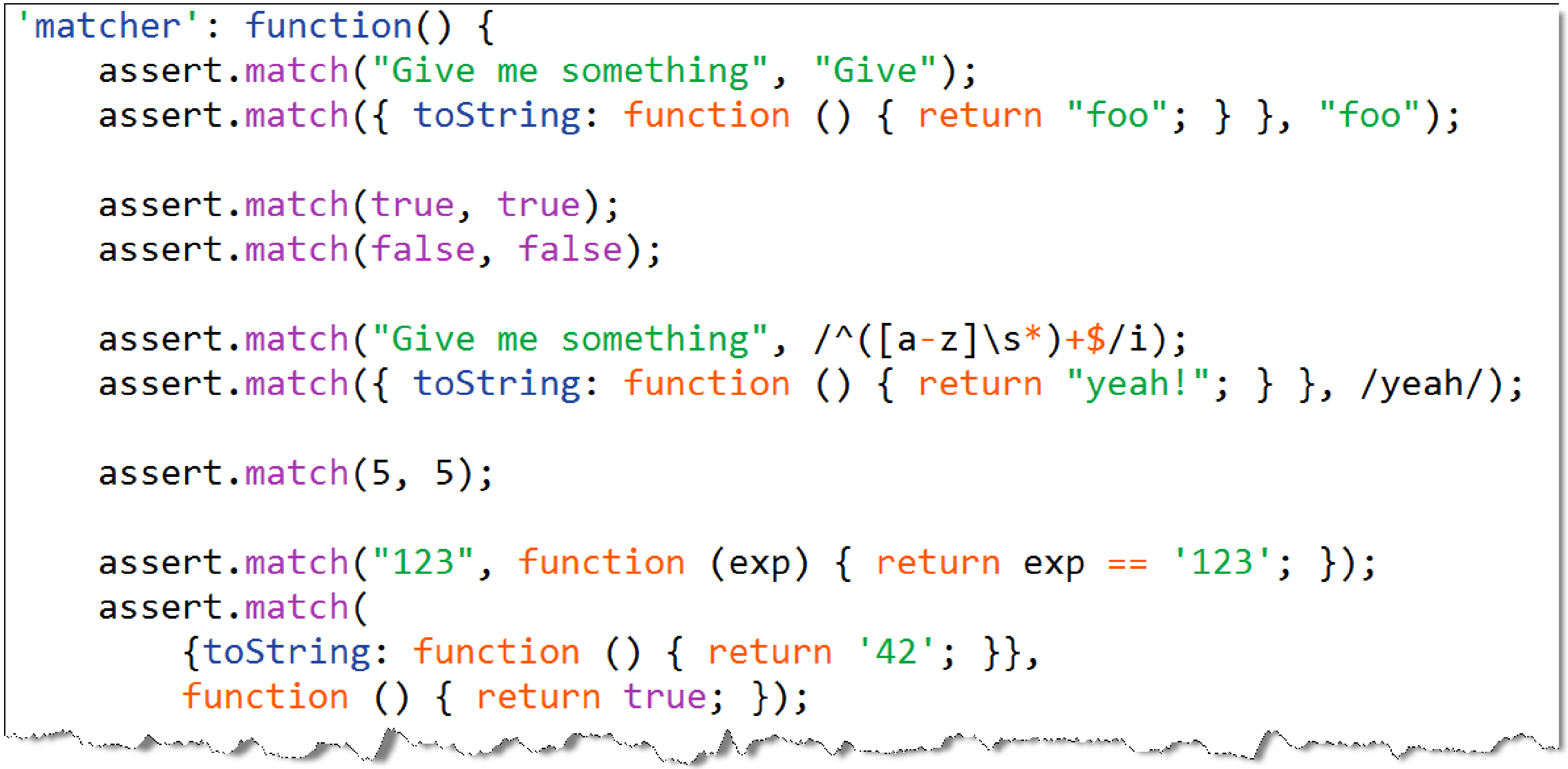
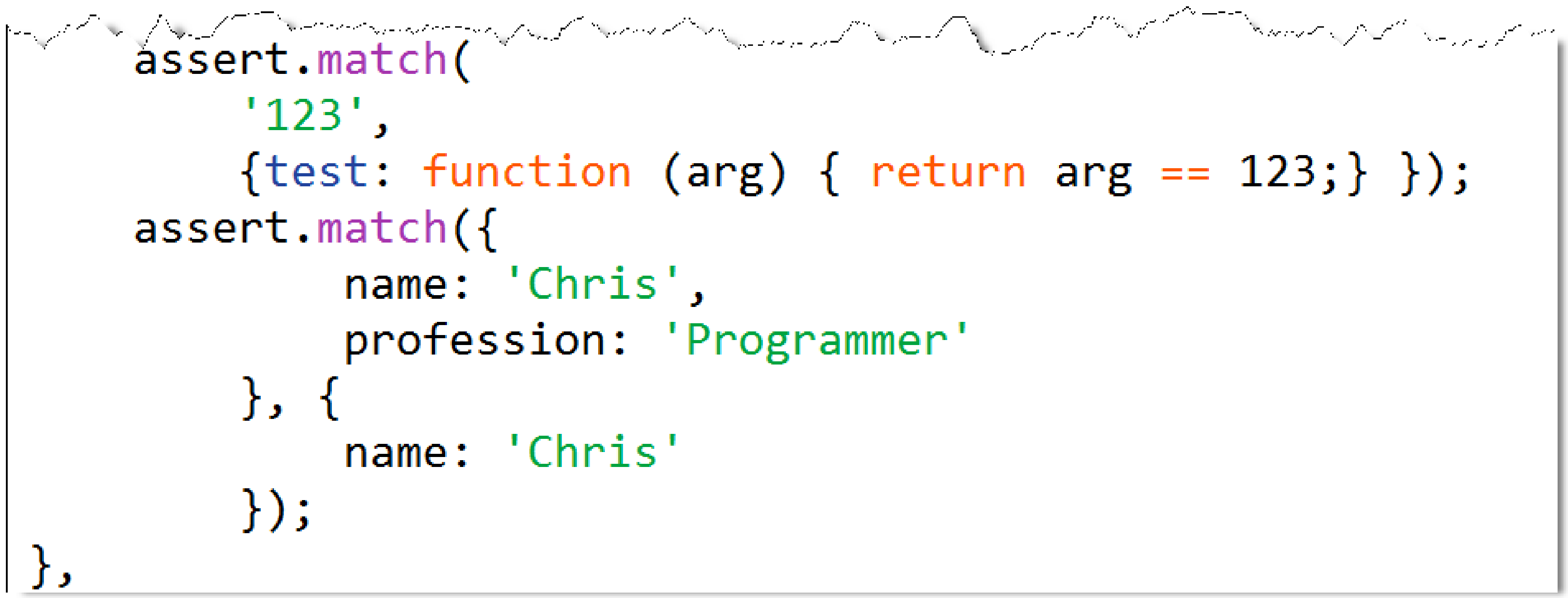



```
'matcher': function() {
    assert.match("Give me something", "Give");
    assert.match({ toString: function () { return "foo"; } }, "foo");

    assert.match(true, true);
    assert.match(false, false);

    assert.match("Give me something", /^([a-z]\s*)+$/i);
    assert.match({ toString: function () { return "yeah!"; } }, /yeah/);

    assert.match(5, 5);

    assert.match("123", function (exp) { return exp == '123'; });
    assert.match(
        {toString: function () { return '42'; }},
        function () { return true; });
```



```
    assert.match(
        '123',
        {test: function (arg) { return arg == 123;} });
    assert.match({
            name: 'Chris',
            profession: 'Programmer'
        }, {
            name: 'Chris'
        });
},
'isObject': function() {
    assert.isObject({});
    assert.isObject([1, 2, 3]);
},
'isFunction': function() {
    assert.isFunction(function () {});
},
'isTrue': function() {
    assert.isTrue(true);
    assert.isTrue(1 == true);
    assert.isTrue(null == undefined);
},
'isFalse': function() {
    assert.isFalse(false);
    assert.isFalse(1 === true);
    assert.isFalse(null === undefined);
},
'isString': function() {
    assert.isString('');
},
'isBoolean': function() {
    assert.isBoolean(true);
    assert.isBoolean(false);
},
'isNumber': function() {
    assert.isNumber(543);
},
'isNaN': function() {
    assert.isNaN(NaN);
},
'isArray': function() {
    assert.isArray([]);
    assert.isArray(Array());
},
'isArrayLike': function() {
    assert.isArrayLike([1, 2, 3]);
    assert.isArrayLike(arguments);
    assert.isArrayLike({ length: 0, splice: function() {} });
},
```

```javascript
'exception': function() {
    assert.exception(function () {
        throw new Error('Ooops!');
    });

    assert.exception(function () {
        throw new TypeError('Ooops!');
    }, 'TypeError');
},
'near': function() {
    assert.near(10.3, 10, 0.5);
    assert.near(10.5, 10, 0.5);
},
'hasPrototype': function() {
    assert.hasPrototype(function() {}, Function.prototype);
    assert.hasPrototype(function() {}, Object.prototype);
},
'contains': function() {
    assert.contains([1, 2, 3], 2);
    assert.contains('abc', 'a');
}
```

Karma

Spectacular Test Runner for JavaScript

On the AngularJS team, we rely on testing and we always seek better tools to make our life easier.

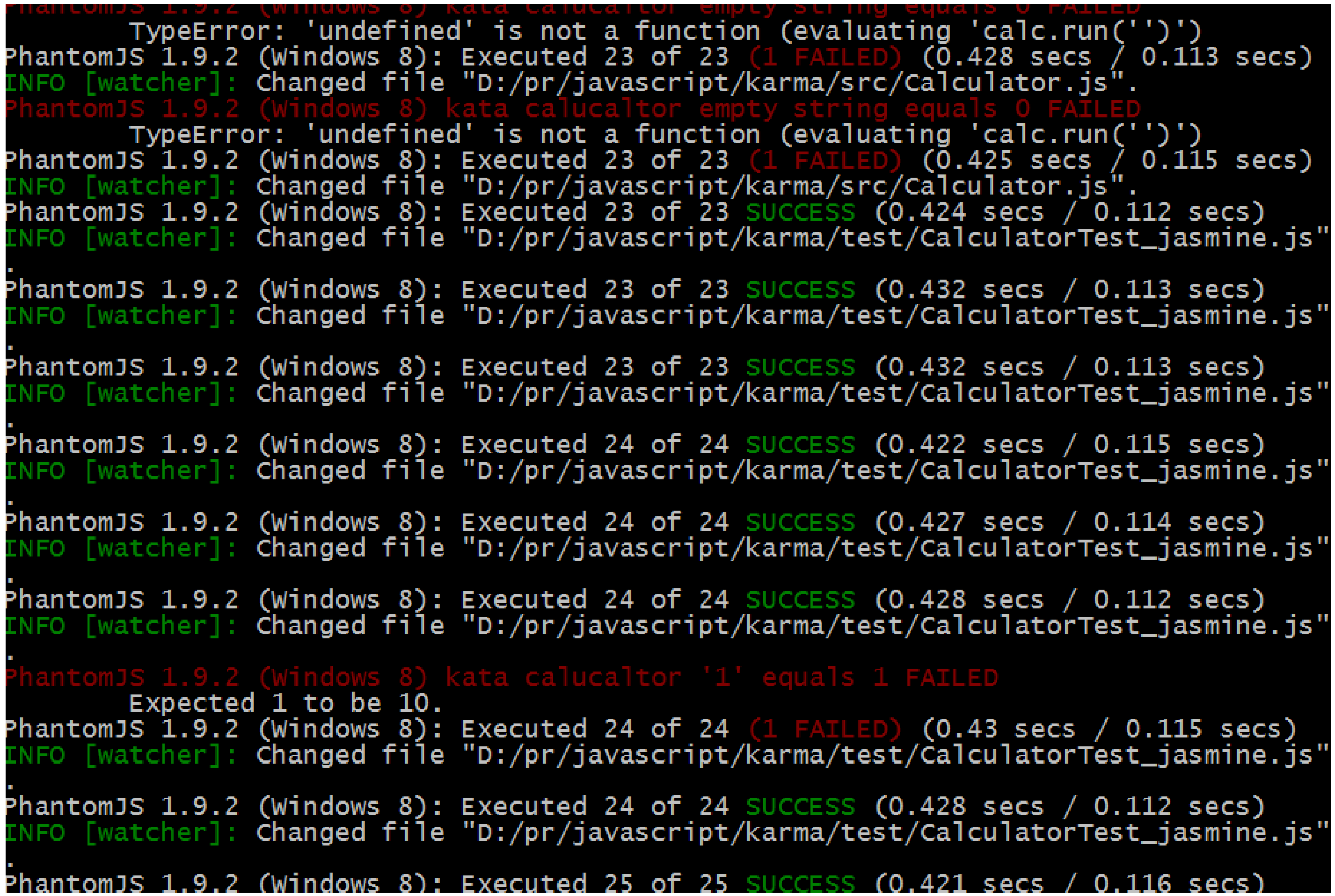
Installation

```
npm install karma
```

Create config file

```
module.exports = function(config) {
  config.set({
    basePath :  './',
    frameworks: ['jasmine'],
    files : [
      //'node_modules/should/should.js',
      //'test/*_mocha.js'
      'test/*_jasmine.js'
      //'test/*_qunit.js'
    ],
    exclude: [  ],
    reporters: ['progress'],
    port: 9876,
    colors: true,
    logLevel: config.LOG_INFO,
    autoWatch: true,
    browsers: ['PhantomJS'],
    captureTimeout: 60000,
    singleRun: false
  });
};
```

Karma



```
PhantomJS 1.9.2 (Windows 8) kata calucaltor empty string equals 0 FAILED
        TypeError: 'undefined' is not a function (evaluating 'calc.run('')')
PhantomJS 1.9.2 (Windows 8): Executed 23 of 23 (1 FAILED) (0.428 secs / 0.113 secs)
INFO [watcher]: Changed file "D:/pr/javascript/karma/src/Calculator.js".
PhantomJS 1.9.2 (Windows 8) kata calucaltor empty string equals 0 FAILED
        TypeError: 'undefined' is not a function (evaluating 'calc.run('')')
PhantomJS 1.9.2 (Windows 8): Executed 23 of 23 (1 FAILED) (0.425 secs / 0.115 secs)
INFO [watcher]: Changed file "D:/pr/javascript/karma/src/Calculator.js".
PhantomJS 1.9.2 (Windows 8): Executed 23 of 23 SUCCESS (0.424 secs / 0.112 secs)
INFO [watcher]: Changed file "D:/pr/javascript/karma/test/CalculatorTest_jasmine.js"
.
PhantomJS 1.9.2 (Windows 8): Executed 23 of 23 SUCCESS (0.432 secs / 0.113 secs)
INFO [watcher]: Changed file "D:/pr/javascript/karma/test/CalculatorTest_jasmine.js"
.
PhantomJS 1.9.2 (Windows 8): Executed 23 of 23 SUCCESS (0.432 secs / 0.113 secs)
INFO [watcher]: Changed file "D:/pr/javascript/karma/test/CalculatorTest_jasmine.js"
.
PhantomJS 1.9.2 (Windows 8): Executed 24 of 24 SUCCESS (0.422 secs / 0.115 secs)
INFO [watcher]: Changed file "D:/pr/javascript/karma/test/CalculatorTest_jasmine.js"
.
PhantomJS 1.9.2 (Windows 8): Executed 24 of 24 SUCCESS (0.427 secs / 0.114 secs)
INFO [watcher]: Changed file "D:/pr/javascript/karma/test/CalculatorTest_jasmine.js"
.
PhantomJS 1.9.2 (Windows 8): Executed 24 of 24 SUCCESS (0.428 secs / 0.112 secs)
INFO [watcher]: Changed file "D:/pr/javascript/karma/test/CalculatorTest_jasmine.js"
.
PhantomJS 1.9.2 (Windows 8) kata calucaltor '1' equals 1 FAILED
        Expected 1 to be 10.
PhantomJS 1.9.2 (Windows 8): Executed 24 of 24 (1 FAILED) (0.43 secs / 0.115 secs)
INFO [watcher]: Changed file "D:/pr/javascript/karma/test/CalculatorTest_jasmine.js"
.
PhantomJS 1.9.2 (Windows 8): Executed 24 of 24 SUCCESS (0.428 secs / 0.112 secs)
INFO [watcher]: Changed file "D:/pr/javascript/karma/test/CalculatorTest_jasmine.js"
.
PhantomJS 1.9.2 (Windows 8): Executed 25 of 25 SUCCESS (0.421 secs / 0.116 secs)
```

Testem

A test runner that makes JavaScript unit testing fun.

Unit testing in JavaScript can be tedious and painful, but Testem makes it so easy that you will actually want to write tests.

Features

- Test-framework agnostic.
  - Jasmine
  - Qunit
  - Mocha
  - Buster
- Run tests in all major browsers, Node, PhantomJS
- Two distinct use-cases
  - Test-Driven-Development
  - Continuous Integration
- …

https://github.com/airportyh/testem

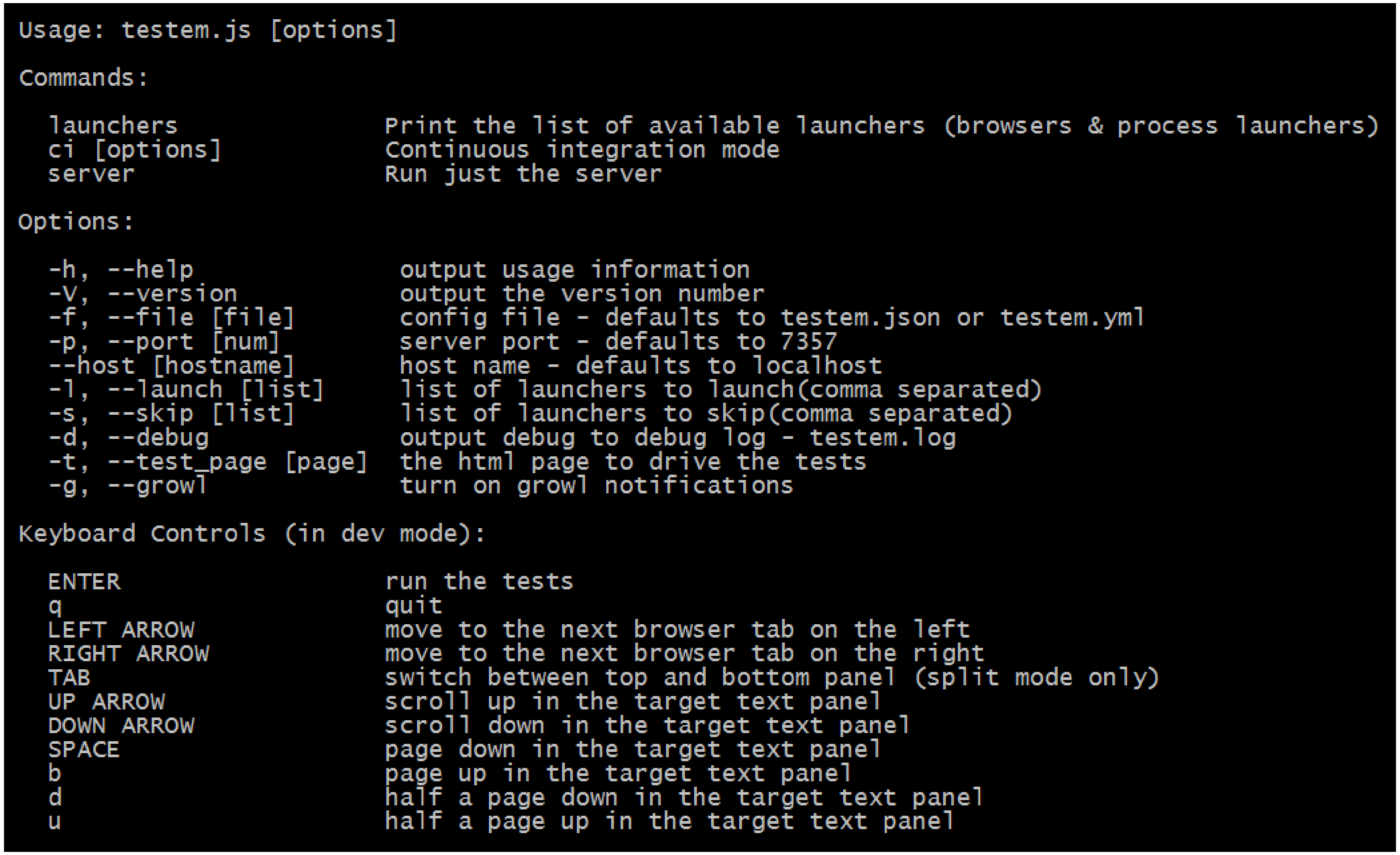
Installation

```
npm install testem
```

Create config file

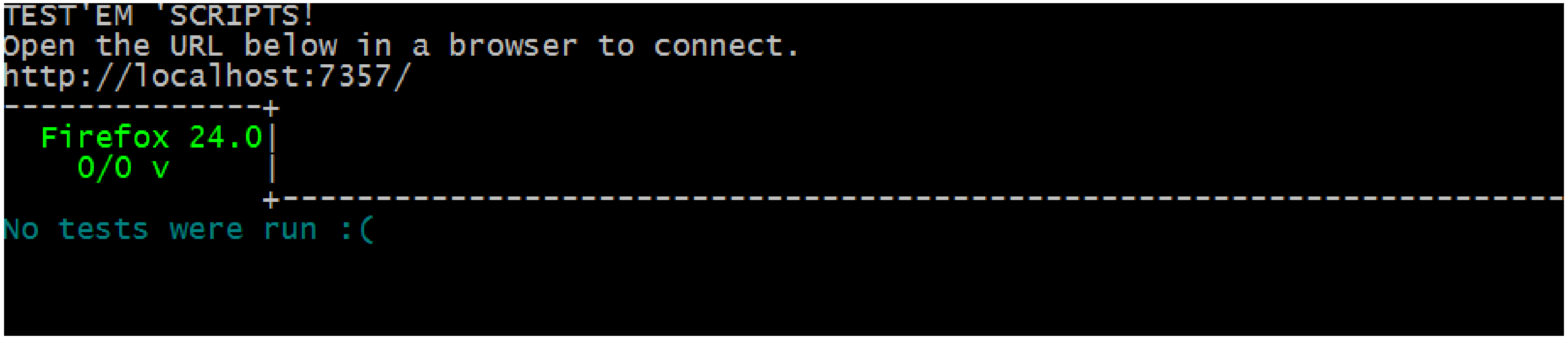
```
{
    "framework": "jasmine",
    "src_files": [
        "test/*.js"
    ]
}
```

testem --help

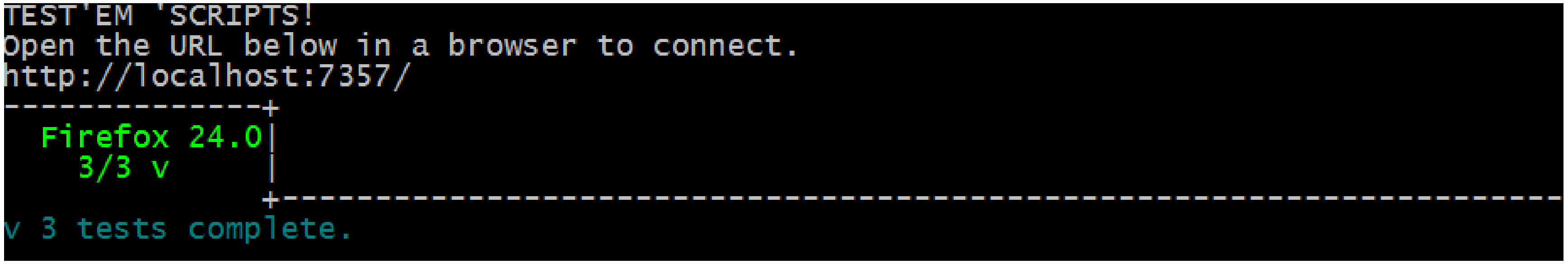


```
Usage: testem.js [options]

Commands:

  launchers               Print the list of available launchers (browsers & process launchers)
  ci [options]            Continuous integration mode
  server                  Run just the server

Options:

  -h, --help               output usage information
  -V, --version            output the version number
  -f, --file [file]        config file - defaults to testem.json or testem.yml
  -p, --port [num]         server port - defaults to 7357
  --host [hostname]        host name - defaults to localhost
  -l, --launch [list]      list of launchers to launch(comma separated)
  -s, --skip [list]        list of launchers to skip(comma separated)
  -d, --debug              output debug to debug log - testem.log
  -t, --test_page [page]   the html page to drive the tests
  -g, --growl              turn on growl notifications

Keyboard Controls (in dev mode):

  ENTER                   run the tests
  q                       quit
  LEFT ARROW              move to the next browser tab on the left
  RIGHT ARROW             move to the next browser tab on the right
  TAB                     switch between top and bottom panel (split mode only)
  UP ARROW                scroll up in the target text panel
  DOWN ARROW              scroll down in the target text panel
  SPACE                   page down in the target text panel
  b                       page up in the target text panel
  d                       half a page down in the target text panel
  u                       half a page up in the target text panel
```

Testem (0)

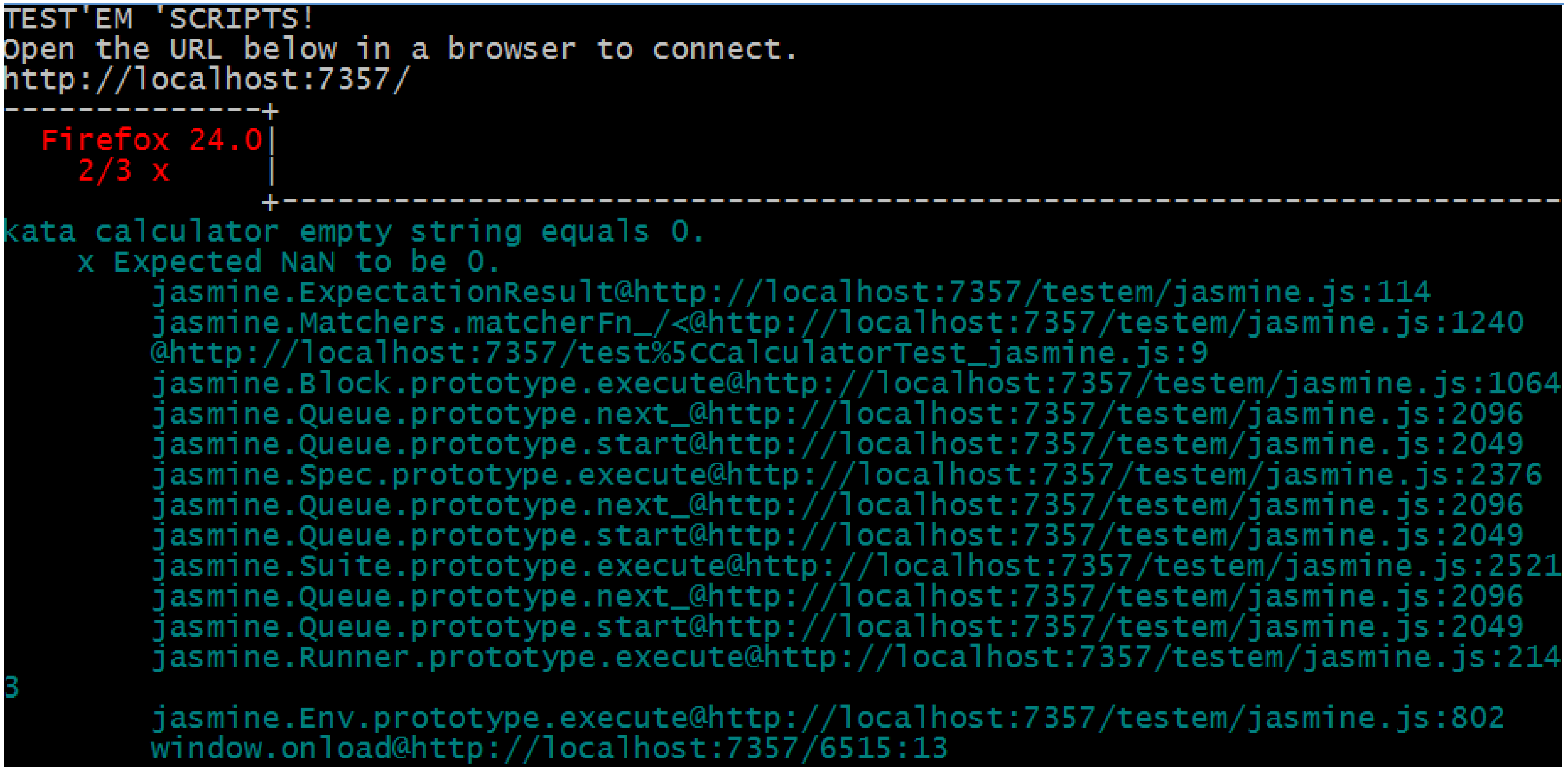


```
TEST'EM 'SCRIPTS!
Open the URL below in a browser to connect.
http://localhost:7357/
--------------+
  Firefox 24.0|
    0/0 v     |
              +------------------------------------------------------------------
No tests were run :(
```



```
TEST'EM 'SCRIPTS!
Open the URL below in a browser to connect.
http://localhost:7357/
--------------+
  Firefox 24.0|
    3/3 v     |
              +------------------------------------------------------------------
v 3 tests complete.
```

Testem (1)



```
TEST'EM 'SCRIPTS!
Open the URL below in a browser to connect.
http://localhost:7357/
--------------+
  Firefox 24.0|
    2/3 x     |
              +------------------------------------------------------------------------
kata calculator empty string equals 0.
    x Expected NaN to be 0.
        jasmine.ExpectationResult@http://localhost:7357/testem/jasmine.js:114
        jasmine.Matchers.matcherFn_/<@http://localhost:7357/testem/jasmine.js:1240
        @http://localhost:7357/test%5CCalculatorTest_jasmine.js:9
        jasmine.Block.prototype.execute@http://localhost:7357/testem/jasmine.js:1064
        jasmine.Queue.prototype.next_@http://localhost:7357/testem/jasmine.js:2096
        jasmine.Queue.prototype.start@http://localhost:7357/testem/jasmine.js:2049
        jasmine.Spec.prototype.execute@http://localhost:7357/testem/jasmine.js:2376
        jasmine.Queue.prototype.next_@http://localhost:7357/testem/jasmine.js:2096
        jasmine.Queue.prototype.start@http://localhost:7357/testem/jasmine.js:2049
        jasmine.Suite.prototype.execute@http://localhost:7357/testem/jasmine.js:2521
        jasmine.Queue.prototype.next_@http://localhost:7357/testem/jasmine.js:2096
        jasmine.Queue.prototype.start@http://localhost:7357/testem/jasmine.js:2049
        jasmine.Runner.prototype.execute@http://localhost:7357/testem/jasmine.js:214
3
        jasmine.Env.prototype.execute@http://localhost:7357/testem/jasmine.js:802
        window.onload@http://localhost:7357/6515:13
```

In summary

- Today JS is no longer the *„add some animation to my website*” language.
- It’s now the language of the web.
- JS code can and should be tested.
- There are many tools that make testing easy and enjoyable in JavaScript.

Examples

All examples of this presentation
(and even more) are available at

https://**github**.com/**slon1024/intr_js_test**