refactoring javascript

stuart halloway
http://thinkrelevance.com

ground rules

- cover code with tests
- don’t code javascript naked
- do the “traditional” oo refactorings
- also do functional refactorings

unit testing: **screw.unit**

screw.unit example

```
Screw.Unit(function(){
  describe("Your application javascript", function(){
    it("does something", function(){
      expect("hello").to(equal, "hello");
    });
  });
});
```

mocking: **smoke**

smoke example

```
it("can stub with Smoke!", function() {
  stub(Foo, "bar").and_return(7);
  expect(Foo.bar()).to(equal, 7);
});

it("can mock with Smoke!", function() {
  mock(Foo).should_receive("bar")
    .with_arguments(10).exactly(1, "time").and_return(42);
  expect(Foo.bar(10)).to(equal, 42);
});
```

javascript attire: **jquery**

putting it all together: **blue-ridge**

http://github.com/relevance/blue-ridge

headless builds

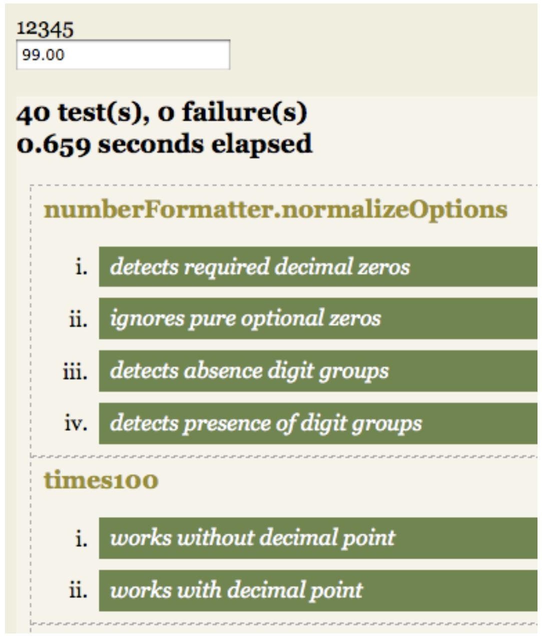
```
rake test:javascripts
(in /Users/stuart/presentations/refactoring-javascript)
Running application_spec.js with fixture 'fixtures/application.html'...
..

2 test(s), 0 failure(s)
0.456 seconds elapsed
Running numberformatter_spec.js with fixture 'fixtures/numberformatter.html'...
........................................

40 test(s), 0 failure(s)
0.518 seconds elapsed
```

9

in-browser builds



```
12345
99.00

40 test(s), 0 failure(s)
0.659 seconds elapsed

numberFormatter.normalizeOptions
i. detects required decimal zeros
ii. ignores pure optional zeros
iii. detects absence digit groups
iv. detects presence of digit groups

times100
i. works without decimal point
ii. works with decimal point
```

10

something to refactor

http://code.google.com/p/jquery-numberformatter/

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http://github.com/stuarthalloway/refactoring-number-formatter

11

covering tests
document what you have

12

need a fixture

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.1//EN"
                      "http://www.w3.org/TR/xhtml11/DTD/xhtml11.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">

<head>
  <title>Numberformatter | JavaScript Testing Results</title>
  <link rel="stylesheet" href="screw.css" type="text/css" charset="utf-8" />
  <script type="text/javascript"
          src="../../../vendor/plugins/blue-ridge/lib/blue-ridge.js"></script>
</head>

<body>
  <div id="value"></div>
  <form>
    <input id="input" type="text"></input>
  </form>
</body>

</html>
```

node to
operate on

default to u.s. format

```
it("defaults to us #,###.00", function(){
  $("#value").text(1999);
  $("#value").format();
  expect($("#value").text()).to(equal, "1,999.00");
});
```

percents

```
it("supports percents", function(){
  $("#value").text(".25");
  $("#value").format({format: "##%"});
  expect($("#value").text()).to(equal, "25%");
});
```

input elements

```
it("works with input elements", function(){
  $("#input").val(99);
  $("#input").format();
  expect($("#input").val()).to(equal, "99.00");
});
```

non-format characters

```
it("ignores non-format characters at start and end",

function(){
  $("#value").text("42");
  $("#value").format({format: "BOO ## YAA"});
  expect($("#value").text()).to(equal, "BOO 42 YAA");
});
```

negative prefix

```
it("handles negative prefix, then non-format
characters then number, then non-format",

function(){
  $("#value").text("-500,000.77");
  $("#value").format({format: "-$#.#"});
  expect($("#value").text()).to(equal, "-$500000.8");
});
```

forcing decimal

```
it("shows decimal for whole numbers if forced",

function(){
  $("#value").text("15");
  $("#value").format({
    format: "#.##",
    decimalSeparatorAlwaysShown: true
  });
  expect($("#value").text()).to(equal, "15.");
});
```

refactoring #1: extract method

parsing options string

```
function parseOptionsFormat(options) {
  var validFormat = "0#-,.";

  // strip all the invalid characters at the beginning and the end
  // of the format, and we'll stick them back on at the end
  // make a special case for the negative sign "-" though, so
  // we can have formats like -$23.32
  options.prefix = "";
  options.negativeInFront = false;
  for (var i=0; i<options.format.length; i++)
  {
     if (validFormat.indexOf(options.format.charAt(i))==-1)
         options.prefix = options.prefix + options.format.charAt(i);
     else if (i==0 && options.format.charAt(i)=='-')
     {
        options.negativeInFront = true;
        continue;
     }
     else
         break;
  }
  options.suffix = "";
  for (var i=options.format.length-1; i>=0; i--)
  {
     if (validFormat.indexOf(options.format.charAt(i))==-1)
         options.suffix = options.format.charAt(i) + options.suffix;
     else
         break;
  }

  options.format = options.format.substring(options.prefix.length);
  options.format = options.format.substring(0, options.format.length - options.suffix.length);
};
```

our enemies

- control flow
- interrupted control flow
- variables

refactoring #2: use the right tools

use regular expressions

```
function parseOptionsFormat(options) {
  var match = /^(-?)([^-0#,.]*)([-0#,.]*)([^-0#,.]*)$/.exec(options.format);
  if (!match) throw "invalid number format " + options.format;
  options.negativeInFront = (match[1] == "-");
  options.prefix = match[2];
  options.format = match[3];
  options.suffix = match[4];
};
```

testing exceptions

```
it("throws up if it finds non-format characters in
the middle",

function(){
  $("#value").text("767");
  expect(function () {
    $("#value").format({
      format: "## AND ##"
    })
  }).to(throw_object,
        "invalid number format ## AND ##");
});
```

extending Screw.Unit

```
// TODO: add to Screw.Unit
throw_object: {
  match: function(object, actual_fn) {
    actual_fn._last_err = "[no error]";
    try {
      actual_fn();
      return false;
    } catch (e) {
      actual_fn._last_err = e;
      return e === object;
    }
  },

  failure_message: function(expected_exc, actual_fn, not) {
    return 'expected ' + $.print(actual_fn) + (not ? ' to not ' : '
to ') + 'throw ' + $.print(expected_exc) + ' not "' +
actual_fn._last_err + '"';
  }
},
```

refactoring #3 extract method

```
if (jQuery(this).is(":input"))
   jQuery(this).val(returnString);
else
   jQuery(this).text(returnString);
```

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```
jQuery.fn.valOrText = function() {
  return (
    jQuery(this).is(":input") ?
      jQuery.fn.val : jQuery.fn.text
  ).apply(this,arguments);
};
```

refactoring #4: imperative loop => declarative re

29

```
while (text.indexOf(group)>-1)
        text = text.replace(group,'');
var number = new Number(text.replace(dec,".").replace(neg,"-"));
```

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```
// technical debt: what happens to numbers with more than one ‘
// decimal or negative sign?
var number = new Number(text.replace(new RegExp(group, "g"), "")
                              .replace(dec,".")
                              .replace(neg,"-"));
```

30

refactoring #5: kill dead code

31

anybody using this?

```
jQuery.formatNumber = function(number, options) {
    var options =
jQuery.extend({},jQuery.fn.parse.defaults, options);
    var formatData =
formatCodes(options.locale.toLowerCase());

    var dec = formatData.dec;
    var group = formatData.group;
    var neg = formatData.neg;

    var numString = new String(number);
    numString =
numString.replace(".",dec).replace("-",neg);
    return numString;
};
```

32

breaking change #1:

23z4 => 23, not 234

recognize numbers

```
it("knows all the valid number characters",

function(){
  $("#value").text("-123,456.789");
  expect(
    $("#value").parse()).to(equal, [-123456.789]
  );
});
```

ignore trailing junk

```
it("ignores junk at the end", function(){
  $("#value").text("36XL");
  expect($("#value").parse()[0]).to(equal, 36);
});
```

ignore trailing digits

```
it("ignores everything after the first non-number
character",

function(){
  $("#value").text("14 to 16");
  expect($("#value").parse()[0]).to(equal, 14);
});
```

breaking change #2:

big numbers

zero format digits

```
it("handles zero format digits", function() {
  expect($.numberFormatter.formatNumber(
    "123.45",
    {decimalsRightOfZero: 0}
  )).to(equal, "123");
});
```

a few format digits

```
it("handles a few format digits", function() {
  expect($.numberFormatter.formatNumber(
    "0.0136",
    {decimalsRightOfZero: 2}
  )).to(equal, "0.01");
});
```

many format digits

```
it("handles a lot of format digits", function() {
  expect($.numberFormatter.formatNumber(
    "1.01234567890001",
    {decimalsRightOfZero: 14}
  )).to(equal, "1.01234567890001");
});
```

format > actual

```
it("handles more format digits than actual digits",

function() {
  expect($.numberFormatter.formatNumber(
    "1.5",
    {decimalsRightOfZero: 8}
  )).to(equal, "1.50000000");
});
```

rounding

```
it("handles more format digits than actual digits",

function() {
  expect($.numberFormatter.formatNumber(
    "1.5",
    {decimalsRightOfZero: 8}
  )).to(equal, "1.50000000");
});
```

opportunities or risks?

- corner cases
- range limitations
- exceptional conditions
- generalizations
- specializations

refactoring #5: convert classes and functions to data

covering tests

```
describe("formatCodes", function() {
  it("knows us and friends", function() {
    expect($.numberFormatter.formatCodes("en")).to(
      equal,  { dec: ".", group: ",", neg: "-" });
  });

  it("knows es and friends", function() {
    expect($.numberFormatter.formatCodes("es")).to(
      equal,  { dec: ",", group: ".", neg: "-" });
  });

  // etc.
});
```

data hidden in code

```
function formatCodes(locale) {

    // default values
    var dec = ".";
    var group = ",";
    var neg = "-";

    if (locale == "us" ||
        locale == "in"
       )
    {
        dec = ".";
        group = ",";
    }

   // ... dozens of lines elided ...
   return new FormatData(dec, group, neg);

};
```

```
function FormatData
(dec, group, neg) {
   this.dec = dec;
   this.group = group;
   this.neg = neg;
};
```

data, revealed

```
var us_et_al = { dec: ".", group: ",", neg: "-" }
var eu_et_al = { dec: ",", group: ".", neg: "-" }
var cz_et_al = { dec: ",", group: " ", neg: "-" }
nf.formatCodesTable = {
  us: us_et_al,
  ae: us_et_al,
  de: eu_et_al,
  es: eu_et_al,
  cz: cz_et_al,
  fr: cz_et_al,
  ch: {group: "'", dec: ".", neg: "-"}
};

nf.formatCodes = function(s) {
 return nf.formatCodesTable[s] || nf.formatCodesTable["us"];
};
```

...and some debt

```
// Technical debt: would like to see this throw error
it("brooks no nonsense", function() {
  expect($.numberFormatter.formatCodes("splat")).to(
    equal,  { dec: ".", group: ",", neg: "-" });
});
```

recap

start with covering tests

don't code naked

functions longer than seven lines are bad

always prefer data

mark breaking changes/tech debt

Code and Slides:
http://github.com/stuarthalloway/refactoring-number-formatter

Email:	stu@thinkrelevance.com
Office:	919-442-3030
Twitter:	twitter.com/stuarthalloway
Facebook:	stuart.halloway
Github:	stuarthalloway

Talks:	http://blog.thinkrelevance.com/talks
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