I Am NOT Your Mother …

Naomi Dushay
Jessie Keck
Willy Mene

Write Your Test Code!
Ad Hoc Testing
OMG – did I break it two months ago?

I’m sure I fixed that!

What I just did couldn’t possibly have broken that!

It was working before!
You already test.

Did that work?

Is the value correct?

Does it look right?
Why Not Automate?

If it’s worth checking once …

Do you *enjoy* manual repetition?

● Regression Testing
  ○ Local Code
  ○ Local Mods to Other Code
● My Code Doesn’t Break Her Code
● Refactoring!
● Reduce Design Complexity
● Specify Expected Behaviors
● Catch My Own Errors
Cost of change vs. development time

http://gamesfromwithin.com/backwards-is-forward-making-better-games-with-test-driven-development
Test code is only useful if ... ... it is executed.
<table>
<thead>
<tr>
<th>S</th>
<th>W</th>
<th>Job</th>
<th>Last Success</th>
<th>Last Failure</th>
<th>Last Duration</th>
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<tbody>
<tr>
<td>☀</td>
<td>☀</td>
<td>Catalog Service</td>
<td>19 days (#5)</td>
<td>N/A</td>
<td>23 sec</td>
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<tr>
<td>☀</td>
<td>☀</td>
<td>CFB</td>
<td>6 days 11 hr (#2)</td>
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<td>4 sec</td>
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<td>☀</td>
<td>☀</td>
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<td>☀</td>
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<td>DMS Index</td>
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<td>N/A</td>
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<tr>
<td>☁</td>
<td>☁</td>
<td>dor-robots</td>
<td>6 days 7 hr (#858)</td>
<td>6 days 7 hr (#857)</td>
<td>6.5 sec</td>
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<tr>
<td>☁</td>
<td>☁</td>
<td>dor-service</td>
<td>3 days 0 hr (#10)</td>
<td>3 days 0 hr (#9)</td>
<td>1 min 3 sec</td>
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<tr>
<td>☀</td>
<td>☀</td>
<td>GATT Digital Library</td>
<td>6 days 11 hr (#3)</td>
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<td>32 sec</td>
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<tr>
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<td>Google GRIN Download</td>
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<td>☀</td>
<td>hydra-eted</td>
<td>8 hr 5 min (#11)</td>
<td>9 days 11 hr (#5)</td>
<td>6 min 20 sec</td>
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<tr>
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<td>☀</td>
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<td>☁</td>
<td>JHOVE1 Toolkit</td>
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<td>19 days (#2)</td>
<td>3.8 sec</td>
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<td>☀</td>
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<td>mdtoolkit</td>
<td>2 hr 37 min (#5)</td>
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<td>2 min 52 sec</td>
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</table>
Project SearchWorks

SearchWorks project in GIT

Rcov coverage

workspace

Rails stats report

Recent Changes

Permalinks

- Last build (#29), 7 hr 0 min ago
- Last stable build (#29), 7 hr 0 min ago
- Last successful build (#29), 7 hr 0 min ago
- Last failed build (#28), 7 hr 32 min ago

Rails stats
### Rcov coverage report

![Coverage Chart](chart.png)

<table>
<thead>
<tr>
<th>Name</th>
<th>Total lines</th>
<th>Lines of code</th>
<th>Total coverage</th>
<th>Code coverage</th>
</tr>
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<tbody>
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</table>
Rcov report for: app/controllers/feedback_controller.rb

<table>
<thead>
<tr>
<th>Name</th>
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<tr>
<td>app/controllers/feedback_controller.rb</td>
<td>27</td>
<td>22</td>
<td>77.8%</td>
<td>72.7%</td>
</tr>
</tbody>
</table>

```ruby
1 class FeedbackController < ApplicationController
2   def show
3     if request.method == :post
4         if validate
5             if params[:message] =~ /.+href=./.*url=.//i
6                 flash[:error] = "Your message appears to be spam, and has not been sent. Please try sending your message again without any links in the comments."
7                 redirect_to params[:url]
8     else
9         RecordMailer.deliver_user_feedback(params)
10         redirect_to params[:url]
11     end
12   end
13 end
14
16 protected
17
18 # validates the incoming params
19 # returns either an empty array or an array with error messages
20 def validate
21   unless params[:message] =~ /\w+/
22     flash[:error] = 'A message is required'
23   end
24   !flash[:error].nil?
25 end
26
27 end
```
# Code Coverage

## Cobertura Coverage Report

### Trend

<table>
<thead>
<tr>
<th>Time</th>
<th>Classes</th>
<th>Conditionals</th>
<th>Files</th>
<th>Lines</th>
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### Project Coverage Summary

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<th>Methods</th>
<th>Lines</th>
<th>Conditionals</th>
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</table>
# Rcov coverage report

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<th>Code coverage</th>
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<tr>
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<td>10</td>
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</tr>
</tbody>
</table>
It starts with ...

... ONE Automatable Test

http://farm1.static.flickr.com/46/193824423_e70bd36403.jpg?v=0
Jessie Keck

- Recent testing convert
  - Past history: little to no testing
Current Testing:
- rSpec
- Cucumber
- Rails testing framework
Demos
Types of Tests
Unit Tests

Integration tests

http://www.sis.uncc.edu/~wwang22/Research/Projects/CCLI-I/LegoPiece.jpg
"Now witness the firepower of this fully ARMED and OPERATIONAL battle station!"
- *The Emperor, Return of the Jedi*
What to test?
You already do this...

```java
System.out.println("Title:");
book.getTitle();

System.out.println("Author:");
book.getAuthor();
```
assertEquals("Bacon: A Love Story", book.getTitle());

assertEquals("Lauer, Heather", book.getAuthor());
At least 3 tests for this method

```cpp
some_method() {  
  ...  
  if(this is true)
    do this
  else if(that is true)
    do that
  else
    do this by default
  ...  
}
```
Write tests when fixing bugs

1. Write a test that triggers bug
2. Fix the code
3. Re-run the test
4. You're done when the test passes
A problem has been detected and Windows has been shut down to prevent damage to your computer.

**DRIVER_IRQL_NOT_LESS_OR_EQUAL**

If this is the first time you've seen this Stop error screen, restart your computer. If this screen appears again, follow these steps:

Check to make sure any new hardware or software is properly installed. If this is a new installation, ask your hardware or software manufacturer for any Windows updates you might need.

If problems continue, disable or remove any newly installed hardware or software. Disable BIOS memory options such as caching or shadowing. If you need to use Safe Mode to remove or disable components, restart your computer, press F8 to select Advanced Startup Options, and then select Safe Mode.

**Technical Information:**

```plaintext
*** STOP: 0x000000D1 (0x000000C, 0x0000002, 0x00000000, 0xF86B5A89)

*** gv3.sys - Address F86B5A89 base at F86B5000, DateStamp 3dd991eb

Beginning dump of physical memory
Physical memory dump complete.
Contact your system administrator or technical support group for further assistance.
```
Error Handling/Corner Cases

try
  while(ch != '\0')
    ch = buffer.read_ch
  end
catch Exception
  handle problem here
end
Tests for Legacy Code
Start with Bug Fixing
Write high level tests that exercise system as a whole
Write unit tests around the legacy section

http://www.jacksonmunyezapools.com/safety-net1.jpg
Enables bug fixing with confidence

Mocks

- Want tests to run fast
- Need to isolate what you’re testing
- For dependencies on other processes
  - Network, database, Solr, external services
Rspec Mock Example
Whichever Language, Context

- Java - JUnit
- C# - NUnit
- PHP - PHP Unit
- Perl - Perl Unit
- Python - PyUnit
- Web - Selenium, WebRat, Watir
- Database - DbUnit
IDE Support
public void putGoogleWorkflow() {
    // Insert 1 process row
    Process p = new Process()
    p.setDruid("dr:1234");
    p.setDatetstream("GoogleWorkflow");
    p.setName("download");
    p.setStatus("pending");
    processDao.persist(p);

    p = processDao.findProcess("dr:1234", "GoogleWorkflow", "downl");

    // Assert that workflow rows added
    assertNotNull(processDao.findProcess("dr:1234", "GoogleWorkflow", "downl");
    assertNotNull(processDao.findProcess("dr:1234", "GoogleWorkflow", "conve");

    // Assert existing workflow updated
    assertEquals(2, this.countRowsInTable("WORKFLOW");
    persistGoogleWorkflowWith2Processes();

    // Assert that workflow rows added
    assertFalse(!repoService.wasCreateWorkflowDataStreamUsed());
}
RSpec Code Examples

Etd

1. Should be a kind of ActiveFedora::Base
2. Should have a #supplemental_files method
3. Should have a #permission_files method
   - expected #<Etd::0x4c54e93 @props_changed=false, @datastreams=>"work"

/Users/wendle/Dev/git/hydra_ett/spec/models/ett_spec.rb:71

/im/teXipate-command-4739.rb:3

69
70  it "Should have a #permission_files method" do
71    @ett.should_not respond_to?(:permission_files)
72  end

73

Etd should handle incoming ps xml

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should set the properties datastream from PS xml
should refresh an existing Etd with incoming data from PS and set props_changed to true
should keep Etd#props_changed to false when incoming PS xml is the same data
should produce dissertation xml for PS when an ETD has been submitted

Etd should handle incoming ps xml submit/reject data handling#submit_to_registrar

should set the submit date to now
should clear all registrar and reader actions, timestamps, and comments
What does all of this buy you?

- Fewer bugs
- Better design
- Refactoring freedom
Professional Responsibility

• "...it is irresponsible for a developer to ship a line of code he has not executed in a unit test."

Robert 'Uncle Bob' Martin
-Author and Agile Evangelist
Questions?

“Lucky for you there was a safety net.”

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