StickyMinds.com and Better Software magazine presents…

Envisioning the Next Generation of Functional Test Tools

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Envisioning the Next Generation
FTDD* Tools

*Functional Test Driven Development
What’s wrong with this generation?

Tool Users:
• not picking appropriate tool
• not using tool appropriately
What’s wrong with this generation?

Tool Users:
- not picking appropriate tool
- not using tool appropriately

Tool Developers:
- not building what is needed
- feature / tool silos

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TDD: Red-Green-Refactor

FTDD
throw notImplementedException("not started")
Green

test  api  business logic

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Refactor
Beyond Red-Green-Refactor

FTDD

Requirement Specification

Project Characteristics

Team Characteristics

Other Needs

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FTDD: Context Diagram

Author

Functional Test Tool

Customer, Product Owner, Subject Matter Expert (SME), Tester, Business Analyst, Tech Writer, User Experience (Ux) Designer

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FTDD: Context Diagram

Validate: Product Owner, Business Analyst, Compliance Officer
Develop: Programmer, Tester, Ux Designer, Operations Support
Other: Tech Writer, Trainer

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FTDD: Context Diagram

- **Author**
- **Reader**
- **Executor**
- **Functional Test Tool**

- **FTDD**: Tester, Programmer, SME, Operational support
- **Other**: Marketing, Sales engineer, Tech writer

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FTDD: Context Diagram

- **Author**
- **Reader**
- **Executor**
- **Result Consumer**
- **Functional Test Tool**

Programmer, Tester Operational Support, Release Manager, Continuous Integration System

Copyright 2008 Jennitta Andrea
<table>
<thead>
<tr>
<th></th>
<th>FTDD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Author</strong></td>
<td>FTDE</td>
</tr>
<tr>
<td><strong>Read</strong></td>
<td>Locate, Display</td>
</tr>
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</tr>
<tr>
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<td>Pass/fail, Navigate, History</td>
</tr>
<tr>
<td><strong>Report</strong></td>
<td>Coverage (code)</td>
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</table>

Functional Test Dev Env (FTDE)
- code completion
- dynamic syntax validation
- refactoring
- version control

- search … browse
- multiple views

- IDE, FTDE, build script
- static
- dynamic (priority, failures, area, …)

- IDE, FTDE
- functional test -> code
- failure -> functional test -> code

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Requirement Specification
FT’s must be more readable

Test Script

1. Start at the Maintain Titles page
2. Page title should be: Video Store Admin – Maintain Movie Titles
3. Click the Add New Title button
4. Page title should be: Video Store Admin – Add New Title
5. Enter text Star Wars into the field labelled Title
6. Select Science Fiction from Category selection list
7. Select DVD from Media Type selection list
8. Click the Save button
9. Page title should be Video Store Admin – Maintain Movie Titles
10. Message should be New title successfully added
11. Titles should be listed as:

<table>
<thead>
<tr>
<th>Title</th>
<th>Category</th>
<th>Media Type</th>
<th># Copies</th>
<th># In Store</th>
<th># Rented</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aladdin</td>
<td>Children</td>
<td>Video</td>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Star Trek</td>
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<td>DVD</td>
<td>1</td>
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<td>Children</td>
<td>Video</td>
<td>0</td>
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12. 
13. ....
14. ....
FT’s must be more readable

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    | Title    | Category | Media Type | # Copies | # In Store | # Rented |
    |----------|----------|------------|----------|------------|----------|
    | Aladdin  | Children | Video      | 4        | 2          | 2        |
    | Star Trek| Sci Fi   | DVD        | 1        | 1          | 0        |
    | Star Wars| Sci Fi   | DVD        | 0        | 0          | 0        |
    | Toy Story| Children | Video      | 0        | 0          | 0        |

Domain Specific Language

1. Add Movie Title (Star Wars, Sci Fi, DVD)
2. Verify Title Inventory

<table>
<thead>
<tr>
<th>Title</th>
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3. Add Movie Title (Star Wars, Sci Fi, DVD)
4. Verify Add Movie Title Message ( “Error: The movie title Star Wars already exists”)

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FT’s must be more readable

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Domain Specific Language

1. Add Movie Title (Star Wars, Sci Fi, DVD)
2. Verify Title Inventory

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3. Add Movie Title (Star Wars, Sci Fi, DVD)
4. Verify Add Movie Title Message ("Error: The movie title Star Wars already exists")

Declarative, Behavior Driven

1. Given inventory contains: Star Wars, sci fi, DVD
2. When add movie title: Star Wars, sci fi, DVD
3. Then inventory unchanged
4. And message: “Error: The movie title Star Wars already exists”

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<thead>
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<th></th>
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<th><strong>Req Spec</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Author</strong></td>
<td>FTDE</td>
<td>3rd party DSTL Format</td>
</tr>
<tr>
<td><strong>Read</strong></td>
<td>Locate Display</td>
<td>Locate+</td>
</tr>
<tr>
<td><strong>Execute</strong></td>
<td>Multi env Grouping Debug</td>
<td>3rd party personas</td>
</tr>
<tr>
<td><strong>Result</strong></td>
<td>Pass/fail Navigate History</td>
<td>Navigate+</td>
</tr>
<tr>
<td><strong>Report</strong></td>
<td>Coverage (code)</td>
<td>Coverage (req)</td>
</tr>
</tbody>
</table>

- excel, word, drawing tool, etc
- Domain Specific Test Lang (DSTL)
- • navigate ... refactor ... uses of ... completion ... dynamic validation ...
- • navigation: req/story <-> test
- • search: tests covering req/story
- • browser, etc
- • declarative run-time variations
- • failure -> functional test -> DSTL -> code

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multiple years, multiple projects, and multiple teams

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<tr>
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<td>Locate++</td>
</tr>
<tr>
<td>Execute</td>
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<td>touch-pts</td>
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</tr>
<tr>
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<td></td>
</tr>
</tbody>
</table>

- diff team -> diff format
- domain -> multi modal
- not green-field
- end-end workflow
- branch ... compare ... merge (test + DSTL)
- find all functional tests associated with code
- same test against
  - ui (legacy)
  - api (port)
Team Characteristics
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<td></td>
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Other Needs
<table>
<thead>
<tr>
<th>Author</th>
<th>• Performance ... Ux ...</th>
<th>Format</th>
<th>Format++</th>
<th>Decorate</th>
<th>Meta data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read</td>
<td>• assigned to ... status ... priority ...</td>
<td>DSTL</td>
<td>Record</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• business analysis (impacts of proposed change)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Execute</td>
<td>• exploratory testing ... demo ... training ...</td>
<td>3rd party</td>
<td>touch-pts</td>
<td></td>
<td>What if Screens</td>
</tr>
<tr>
<td></td>
<td>Debug</td>
<td>Multi env</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Result</td>
<td>• marketing ... training ...</td>
<td>Navigate</td>
<td>History</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Report</td>
<td>Coverage (code)</td>
<td>Coverage (req)</td>
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<td></td>
<td>Progress Audit</td>
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<tr>
<td></td>
<td>FTDD</td>
<td>Req Spec</td>
<td>Proj Context</td>
<td>Team Context</td>
<td>Other</td>
</tr>
<tr>
<td>-------</td>
<td>--------</td>
<td>----------------</td>
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<td>touch-pts</td>
<td>What if Stop/start Screens</td>
<td></td>
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**Envisioning Next Generation**

<table>
<thead>
<tr>
<th>Core:</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>FTDD</td>
<td>Req’s</td>
</tr>
<tr>
<td></td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Context:</td>
<td></td>
</tr>
<tr>
<td>Project</td>
<td>Team</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
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<td></td>
<td>✓</td>
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<tr>
<td>Other:</td>
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</tr>
<tr>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Title</td>
<td>Description</td>
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<tr>
<td>----------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>“Envisioning the Next Generation Functional Testing Tools”</td>
<td>A call to improve the state of the art of functional test driven development by: reflecting on where we are now, describing processes and scenarios within the full application lifecycle, and painting a vision for the next generation functional testing tools (IEEE Software, May 2007)</td>
</tr>
<tr>
<td>“Brushing Up On Functional Test Effectiveness”</td>
<td>Explains how to make a functional test into an effective requirements specification by refactoring a test script into a declarative, succinct, autonomous, sufficient, and locatable specification (Better Software, November/December 2005)</td>
</tr>
<tr>
<td>“Some Assembly Required: Piecing Together the Truth About TDD”</td>
<td>Teams that naively adopt test driven development frequently run into serious problems. This article applies a magnifying glass to the TDD fine print and suggests paths to safely navigate some key landmines (Better Software, January 2008)</td>
</tr>
</tbody>
</table>

**Agile Alliance Functional Test Tool Program (aa-ftt)**

[http://tech.groups.yahoo.com/group/aa-ftt/](http://tech.groups.yahoo.com/group/aa-ftt/) Agile Alliance Functional Test Tool Program (aaftt) yahoo discussion group. The first workshop was held in October 2007. Videos of demos and lightening talks can be found at [http://video.google.com/videosearch?q=AAFTT](http://video.google.com/videosearch?q=AAFTT)
Masters of Un-done Software

Ward Cunningham
AboutUs.org
February 2008
Wield the Computer’s Power

- Masters know what to do next by reading the un-done program
- What the un-done program does is meaningful even if not desirable
- The whole team cooperates to master modern programs
- Masterful teams use tests to guide their collaboration
Example One: WyCash

- Financial application had to get calculations right
- Interactive reports felt like spreadsheets with objects behind each row
- Fit-style tests slipped into WyCash as new kind of row
- Lesson: Abstracted conversions valuable, but uncommon
- Lesson: Analyst & developer can pair-program
Basic Employee Compensation

For each week, hourly employees are paid a standard wage per hour for the first 40 hours worked, 1.5 times their wage for each hour after the first 40 hours, and 2 times their wage for each hour worked on Sundays and holidays.

Here are some typical examples of this:

<table>
<thead>
<tr>
<th>Payroll Fixtures Weekly Compensation</th>
<th>Holiday Hours</th>
<th>Wage</th>
<th>Pay ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Hours</td>
<td></td>
<td>40</td>
<td>$800</td>
</tr>
<tr>
<td>40</td>
<td>0</td>
<td>20</td>
<td>$950</td>
</tr>
<tr>
<td>45</td>
<td>0</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>48</td>
<td>8</td>
<td>20</td>
<td>$1360</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$1040  actual</td>
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</tbody>
</table>
Example Two: IoGame

- Multi-player game in a powerful but unfamiliar language
- New assert semantics can test objects while compiling
- Test-Accelerated development calls for tests only when uncertain
- Lesson: Way too much of test code is about being separate
- Lesson: Tests explain what is expected better than types

http://c2.com/~ward/io/IoGame
Method Setup

We modify the built-in abstraction for time intervals to format using a less precise but more user friendly notation. We test this method by setting different interval magnitudes into the clones of the receiver (the prototype, Duration) and then trying the conversions. The first argument of the assert is everything up to the comma, in this case, two statements separated by a semicolon.

Duration do (  
asString := method (  
    s ::= (asNumber floor)  
    if '((m ::= ((s / 60) floor)) < 2, return s asString .. " seconds")  
    if '((h ::= ((m / 60) floor)) < 2, return m asString .. " minutes")  
    if '((d ::= ((h / 24) floor)) < 2, return h asString .. " hours")  
    if '((w ::= ((d / 7) floor)) < 2, return d asString .. " days")  
    if '((m ::= ((d / 30) floor)) < 2, return w asString .. " weeks")  
    if '((y ::= ((d /365) floor)) < 2, return m asString .. " months")  
y asString .. " years"
  )  
assert (setSeconds (5); asString, "5 seconds")  
assert (setSeconds (90); asString, "90 seconds")  
assert (setSeconds (120); asString, "2 minutes")  
assert (setDays (14); asString, "2 weeks")  
assert (setDays (20); asString, "2 weeks")
)
Example Three: Eclipse Portal

- Automation of long-running collaborations
- Test scripts capture screen fragments to tell collaboration story
- Post processing organizes fragments as a swim-lane diagram
- Lesson: Plenty of web technology to visualize complex situations
- Lesson: Deploy tests as documentation to keep both up-to-date

http://portal.eclipse.org
This slide to be replaced with presentation url:
http://c2.com/pnsqc2007/example/
Committer Election for technology.foo

Candidate: Karl Candidate
Your vote: +1
Vote summary: 1/0/0 with 1 pending (7 days remaining)
Lessons

• Test against the interface that best exposes your fears
• Couple test results to decision making
• Accept that tests are part of your product and invest accordingly
Thank you for watching this archived presentation!