Patterns for Continuous Test Automation with Canoo WebTest.

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Who's this Nate Oster guy?

- Player-Coach with Number Six Software
- Emphasis on helping teams adopt Agile testing practices
- Agile Alliance Member
- RUP-certified Consultant

- Committer, Eclipse Process Framework
- Content Lead, OpenUP Test Discipline

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Testing is about *Feedback.*

- **Two levels of Testing**
- **Developer Tests**
  - ***Unit*** **and** ***Integration*** **level**
  - **Isolate and drive smallest pieces**
  - ***Design*** **focused**
- **Acceptance Tests**
  - ***System*** **level**
  - ***Requirements*** **focused**

Testing is about *Feedback.*

- **Testers specify Test Cases as logical "conditions of satisfaction," in parallel with requirements.**
  - **Tests are "Intent."**
  - **They are *specifications* of what the system has to do to satisfy a requirement.**
  - **"Test First."**

Testing is about *Feedback.*

- **Test *Scripts* are executable.**
  - Automation? Yes, please.
  - They might be written before or after the solution is implemented.
  - TDD is ideal, but this decision is often technology dependent.

Why extensive functional test automation?

- Enables more frequent feedback
- Provides a built-in safety net (Stop-the-Line mentality)
- Better velocity: The power to test is the power to *change*
- Provide the executable definition of "correctness"
- *Critical* to agile testing, or test cycles become too long.

What other benefits can you think of?

Just-in-Time Test Specification.

- There is no “Test Phase”
- Test Scripts are fully specified just in time for immediate goals.
- Follows the Lean principle of “defer commitment to the last responsible moment.”
- Why wait?

Less time for tests to get stale.

Throw out your “test phase” and start building working, tested software! Fly! Be free!

What is Canoo WebTest?

- **A popular open-source testing tool for web applications**
- **An extension to Ant, the Java build tool.**
- **You write Test Scripts directly in XML (using any editor)**

```
<webtest name="check that WebTest is Google's top 'WebTest' result">

    <invoke url="http://www.google.com/ncr" description="Go to Google (in English)"/>
    <verifyTitle text="Google" />
    <setInputField name="q" value="WebTest" />
    <clickButton label="I'm Feeling Lucky" />
    <verifyTitle text="Canoo WebTest Homepage" />

</webtest>
```

It's a powerful tool, but easy to start with.

- Under the hood, it uses HTMLUnit to simulate a browser.
- Extensive support for Javascript with Rhino.
- Helps resolve the mismatch between OO and what is essentially a procedural programming task.
- Clean reporting and results browsing.

webtest

WebTest Test Report Tests started at Thu Sep 06 15:48:04 CEST 2007

Result Summary

WebTests	#	%	Graph
✓	1	100	
✗	0	0	
Sum	**1**	**100**	

Steps	#	%	Graph
✓	5	100	
✗	0	0	
▫	0	0	
Sum	**5**	**100**	

Server Roundtrip Timing Profile

Secs	#	%	Histogram
0 - 1	1	50	
1 - 3	1	50	
3 - 5	0	0	
5 - 10	0	0	
10 - 30	0	0	
> 30	0	0	
Sum	**2**	**100**	
Avg			**711 ms**

✓ check that WebTest is Google's top 'WebTest' result

Test started at Thu Sep 06 15:48:04 2007, lasting 1431 ms.

#	Result	Name	Parameter	Duration
1	✓	**invoke** Go to Google (in English) Resulting page	**url** http://www.google.com/ncr	1130
2	✓	**verifyTitle**	**text** Google	3
3	✓	**setInputField**	**name** q **value** WebTest	6
4	✓	**clickButton** Resulting page	**label** I'm Feeling Lucky	292
5	✓	**verifyTitle**	**text** Canoo WebTest Homepage	0

Back to Test Report Overview

Yeah Yeah Yeah! Let's take a look!

- **Run the demo suite from a command line**
- **View the results in any browser**
  - **Easy inspection**
  - **"Movie playback"**

WebTest uses a “declarative-procedural” style.

- **Declarative**
  - Expect specific outcome from specific input.
  - Example: 2+5=7 Not: x+y=z
  - Don’t put business logic in the tests!
  - Keep tests as thin as possible.

- **Among agilists, considered a Good Thing.**

WebTest uses a “declarative-procedural” style.

- **Procedural**
  - A sequence of steps
  - Similar to traditional, manual test scripts
  - Follows the pattern of how an end-user actually executes the feature in a step-by-step way.

- **More controversial among testing thought leaders.**
  - Tests as executable requirements specifications
  - Procedural tests can be too verbose and lack context

Challenges with this approach:

- **Procedural tests can be long**
  - It can be unclear what is unique about each script
  - Not effective as executable requirements *by themselves*
- **Thought leaders see move away from "imperative" to a terse "declarative" style of executable requirements specifications**
  - Use Domain-Specific Languages (DSLs)
  - Enable Functional Test Driven Development (FTDD)
  - See Jennitta Andrea's article, "Envisioning the Next Generation of Functional Testing Tools" (IEEE Software, May/June 2007).
  - Brian Marick, http://www.testing.com/writings.html
- **Currently, there appears to be weak tooling around these ideas.**

Though imperfect, the procedural style has good real-world results.

- **FTDD is a promising leading edge technique, but few teams have these skills at present.**
- **Procedural test scripts are familiar:**
  - Directly convert majority of manual scripts
  - WebTests are XML, so you can transform them to any format for enhanced readability
  - Retire the manual script for good!
- **On a recent project we had:**
  - 1200 WebTest Scripts, 4 Test Engineers
  - 92% functional test automation
  - Ran in about 45 minutes
  - We were sneaky and said it took 4 hours. And it did. Sort of.

Other Styles of Test Scripts?

- **Script-driven ← boo! hiss!**
  - "Intelligent" scripts interpret GUI
  - Hallmark is lots of business logic and flow of control
- **Data-driven**
- **Table-driven**
  - Fit/FitNesse
  - Some Selenium approaches
  - Purely declarative DSLs
- **Exploratory ← woo!**
- **And a cast of thousands!**

Data-driven scripts in WebTest are simple.

- Data-driven tests just run one script repeatedly with different data
- Use the <dataDriven> task.
- The script captures the *structure* of the test condition
- Perfect for:
  - Business rules
  - Field validations
  - Fault injection
  - Boundary and exception handling
  - Wreaking havoc on your hard disk

Demo!

http://opensource.basehaus.com/webtest/screencasts/data-driven-webtest.htm

Why not use record-playback?

- **Record-Playback is a great way to quickly record many scripts**
- **A horrible way to *maintain* them**
- ***Tends* toward lots of duplication**
  - Removing duplication means factoring out common code
  - Focus on what's unique about each test
  - Reduces need to record long sequences in the first place
  - Experienced users write code directly.
- **Eventually, recorded "objects" just get in the way.**

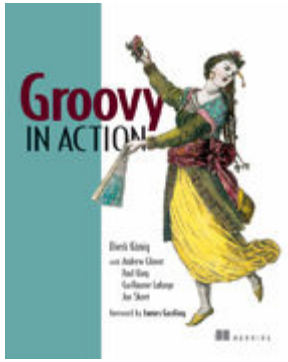
Pick your metaphor: Fool's Gold? Quicksand? Snake Oil?

Maintainability is the key to extensive functional automation.

- **Modularize scripts and ruthlessly drive out duplication:**
  - Follow the rule: “two strikes and you’re out!”
  - Refactor scripts as you work. Avoid planning paralysis.
- **Couple to the GUI as loosely as possible:**
  - In some cases, avoid it altogether (Fit/FitNesse)
  - Specify strict expectations, not unrelated UI details.
- **Use XPath for flexible selection of HTML elements**
  - Always use relative XPath expressions
  - Get free tools: Firefox, XPather, View Formatted Source, View Source Chart.
  - Good: `//input[@name='as_rq']`
  - Bad *and* Ugly:
    `/html/body/form/font/div[@id='__vpps_16']/table/tbody/tr/td/div[@id='__vpps_17']/table/tbody/tr[1]/td/div[@id='__vpps_18']/table/tbody/tr/td[3]/div[@id='__vpps_19']/table/tbody/tr[1]/td/input`

Next Steps…

- **Connect your Test Suites to your CI system**
  - Use at least an overnight build
  - WebTests are just Ant files, so integration is generally simple
  - Add source control update and commit results
  - Email results to team members
- **Extend with Groovy scripting**
  - You can write extensions and macros where procedural doesn't make sense (like sorting)
  - You have full access to the HTMLUnit object model
  - You can write test scripts in pure Groovy



Next Steps…

- Download WebTest at http://webtest.canoo.com
- Try out the demos
- See the screencasts
  http://opensource.basehaus.com/webtest/screencasts/
- Join the mailing list

Questions? Anyone? Llama?

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