Automatisiertes Testen von Web-Applikationen
mit dem Open Source Tool WebTest

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Free open source tool for automated testing of web applications.
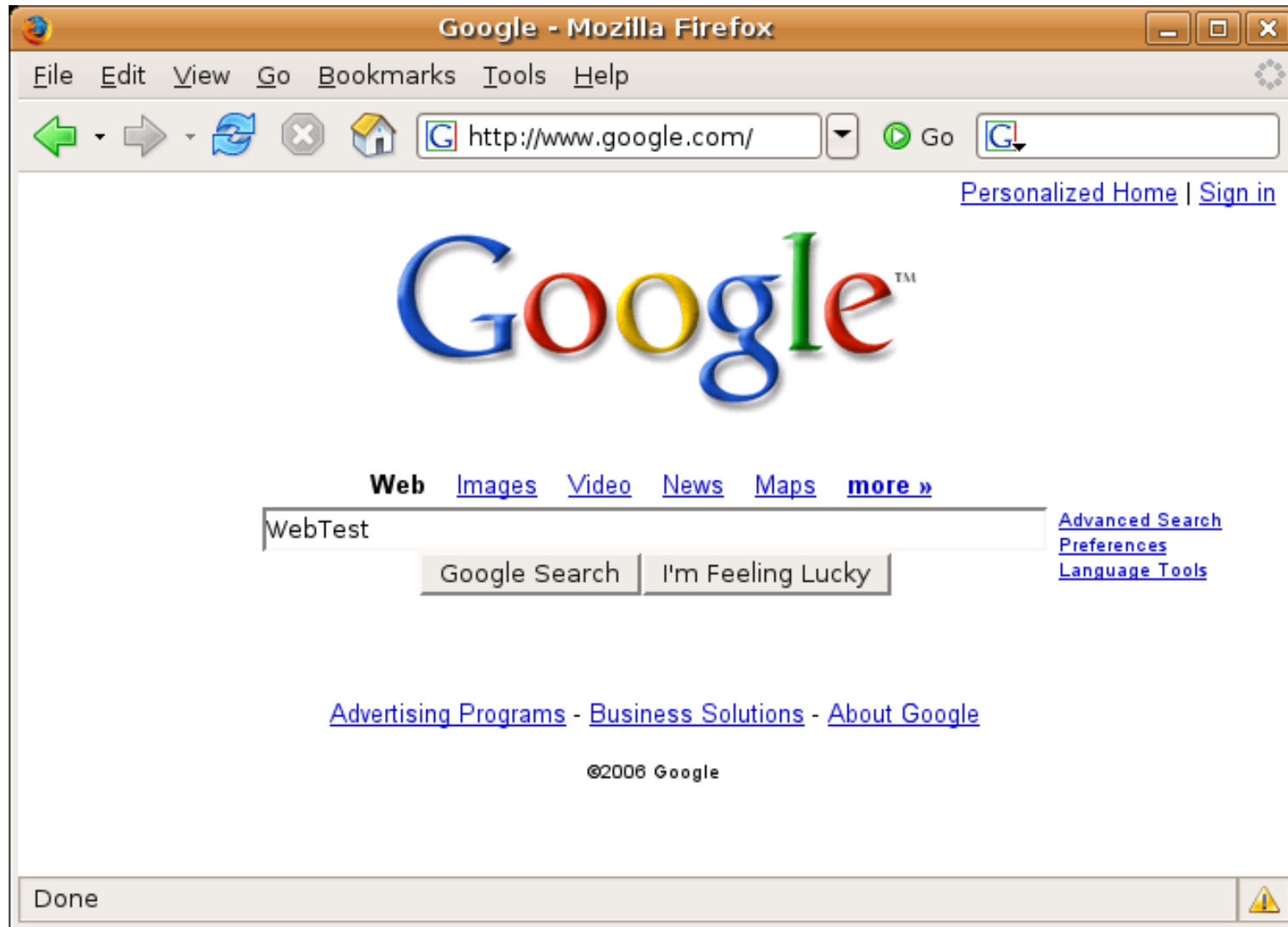
Agenda

- 9:00-9:30
  Vorstellung Referenten &
  Teilnehmer
- 9:30-10:00
  Präsentation WebTest &
  Paradigmen
- 10:00-10:45
  Übung (Testwebapp mit
  runWebTest)
- 10:45-11:15
  Pause
- 11:15-12:15
  verifyXxx und XPath
  WebTestRecorder Präsentation
- 12:15-13:00
  Recorder/ XPath Übung
- 13:00-14:00
  Mittagspause

- 14:00-14:30
  Lösungsbesprechung/Diskussion
- 14:30-15:00
  WebTests organisieren:
  Properties, Entities, Makros,
  Integration in der IDE (DTD, Ant
  Skript starten, Syntaxhighlighting)
- 15:00-15:15
  Pause
- 15:15-16:00
  WebTest erweitern (Groovy step,
  eigene Tasks - Java, Groovy -,
  eigene XPath Funktionen, eigene
  Reports), WebTest in Groovy/Grails
  Outroduction

The 4 testing paradigms

- Capture / replay
  - "the least cost-effective way of test automation"
  - Use capturing wisely

- Model based testing
  - Specification: modelling expected behaviour
  - Fault model: modelling unexpected behaviour
  - Be tolerant to accidental behaviour

- Data driven testing
  - Narrow scope for data variations on same workflow

- Scripted automation
  - Maximum flexibility and power
  - Maximum responsibilty

Testing Google

WebTest Starter

```xml
<project name="example" default="test">
 <target name="test">


  <webtest name="check that WebTest is Google's top 'WebTest' result">
   <steps>
     <invoke url="http://www.google.com"/>
     <verifyTitle text="Google"/>
     <setInputField name="q" value="WebTest"/>
     <clickButton label="I'm Feeling Lucky"/>
     <verifyTitle text="Canoo WebTest Homepage"/>
   </steps>
  </webtest>


 </target>
</project>
```

runWebtest google.xml

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AllTests   Tests started at Mon Oct 23 18:49:48 CEST 2006

Result Summary

Result	#	%	Graph
✔	5	100	
✗	0	0	
▫	0	0	
Sum	**5**	**100**	

Server Roundtrip Timing Profile

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

Test Scenario Overview (1332)

No	Result	Name	# Steps	Duration	%	Timing profile Graph	Failing step
1	✔	check that WebTest is Google's top 'WebTest' result	5 / 5	1332	100		

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

Test started at Mon Oct 23 18:49:48 CEST 2006, lasting 1332 ms.
Source: /home/marc/fmr/OOPSLA2006/build.xml:4:
Base URL (used by **invoke** steps with a relative URL): http://localhost/

No	Result	Name	Parameter		Duration
1	✔	**invoke** Resulting page	**method** GET	**url** http://www.google.com	1138
2	✔	**verifyTitle**	**text** Google		8
3	✔	**setInputField**	**name** q	**value** WebTest	3
4	✔	**clickButton** Resulting page	**label** I'm Feeling Lucky		183
5	✔	**verifyTitle**	**text** Canoo WebTest Homepage		0

Back to Test Report Overview

Created using Canoo Webtest (R_1367). Report created at 23.10.2006 18:49

WebTest results (zoomed)

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

Test started at Mon Oct 23 18:49:48 CEST 2006, lasting 1332 ms.
Source: `/home/marc/fmr/OOPSLA2006/build.xml:4`:
Base URL (used by **invoke** steps with a relative URL): http://localhost/

No	Result	Name	
1	✓	**invoke** Resulting page	**method** GET **url** http://www.google.com
2	✓	**verifyTitle**	**text** Google
3	✓	**setInputField**	**name** q **value** WebTest
4	✓	**clickButton** Resulting page	**label** I'm Feeling Lucky
5	✓	**verifyTitle**	**text** Canoo WebTest Homepage

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Over 100 WebTest Steps

- General:
  -
  -
  - ...
- Forms
  -
  -
  -
  -
  - ...
- Verification
  -
  -
  - <verifyInputField>
  - ...

- PDF
  -
  -
  -
  - ...
- Excel Documents
  -
  -
  -
  - ...
- ...

Comprehensive online documentation:

http://webtest.canoo.com/

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WebTest in Action

http://webtest.canoo.com

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Excercise 1

- Installation
    - Prerequisite: JDK 1.4+, JAVA_HOME set
    - Use USB stick installation or download from http://webtest.canoo.com

- Testing Google
    - Create Script
    - Run
      runWebtest myFirstTest.xm
    - View results

```xml
<project name="example" default="test">
 <target name="test">

  <webtest name="...">
   <steps>
    <invoke url=..../>
    <verify...
   </steps>
  </webtest>


 </target>
</project>
```

Verifications

- Verification
  -
  -
  - <verifyInputField>
  - ...
  - See documentation

- How to
  - As loose as possible
  - As specific as needed

  - => XPath to the rescue!

- Verify failures (fail first)

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Sustainable Tests

- Exploit XPath wisely

  - good: //*[@id='total']

    bad: /html/body/div[2]/table[3]/tbody/tr[6]/td[4]

- XPath docs : www.w3schools.com/xpath

Category	Appearance	Note
path operators	/, //, @, [], *, .., .	as above
union operator			union of two node-sets
boolean operators	and, or, not()	not() is a function
arithmetic operators	+, -, *, div, mod	
comparison operators	=, !=, <, >, <=, >=	
string functions	concat(), substring(), contains(), substring-before(), substring-after(), translate(), normalize-space(), string-length()	see the docs for exact meaning and parameters
number functions	sum(), round(), floor(), ceiling()	
node functions	name(), local-name(), namespace-uri()	
context functions	position(), last()	[n] is short for [position()=n]
conversion functions	string(), number(), boolean()	

- Testable HTML code

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Google - Mozilla Firefox

File   Edit   View   Go   Bookmarks   Tools   Help

G http://www.google.fr   Go   G

Webtest Recorder

☑ Enable recording

XML | G Groovy

```xml
<invoke description="Get the page"
url="http://www.google.fr/"/>
<setInputField description="Set text
field q" name="q" value="Webtest"/>
<setRadioButton description="Check
radio button meta: lr=lang_fr"
name="meta" value="lr=lang_fr"/>
```

XPath | Debug | Log

XPath: //a

Type	No...	value	
ele...	A	<A href="/url?sa=p&p...	▲
ele...	A	<A href="https://www...	
ele...	A	<A href="/search?q=j...	
ele...	A	<A id="1a" class="q"...	
ele...	A	<A id="2a" class="q"...	
ele...	A	<A id="3a" class="q"...	
ele...	A	<A id="4a" class="q"...	
ele...	A	<A href="/intl/fr/op...	
ele...	A	<A href="/advanced_s	▼

Nb results:15

Done

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Web   Images   Groupes   Annuaire   Actualités   **plus »**

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Recherche Google   J'ai de la chance

Rechercher dans :   ○ Web   ● Pages francophones   ○ Pages : Fran

Publicité - Solutions d'entreprise - À propos de Google - Google.com in En

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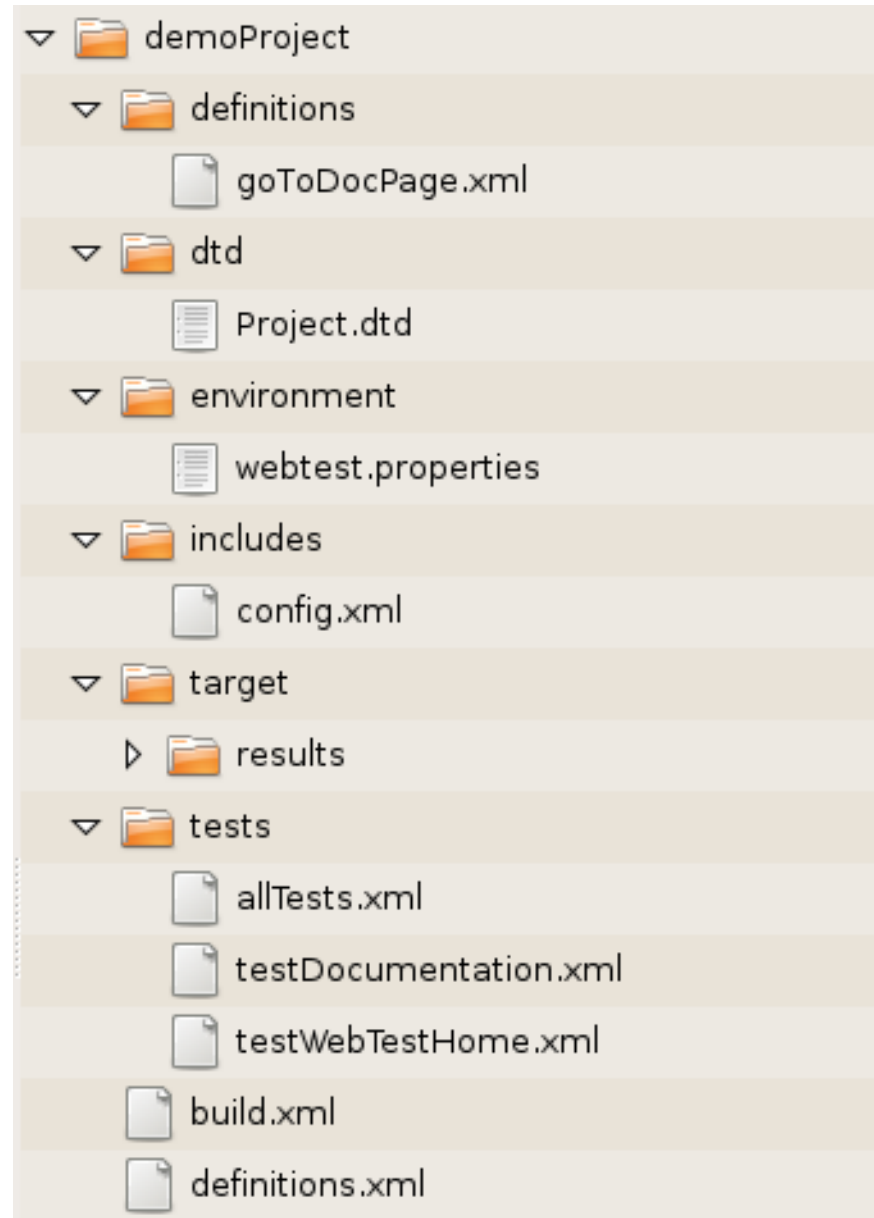| Add verifyTitle for this page: "Google" |
|---|
| Open Link in New Window |
| Open Link in New Tab |
| Bookmark This Link... |
| Save Link As... |
| Send Link... |
| Copy Email Address |
| Copy Link Location |
| View Image |
| Copy Image Location |
| Save Image As... |
| Send Image... |
| Set As Desktop Background... |
| Back |
| Forward |
| Reload |
| Stop |
| Bookmark This Page... |
| Save Page As... |
| Send Link... |
| View Background Image |

Exercise 2

- Test the application under http://groovy.canoo.com/tutor/ -> Tutorials
- Verify the the tutorial entry list
  - Decide what to test
    - Number of links
    - Number of rows
    - Whatever you fancy
  - For the geeks
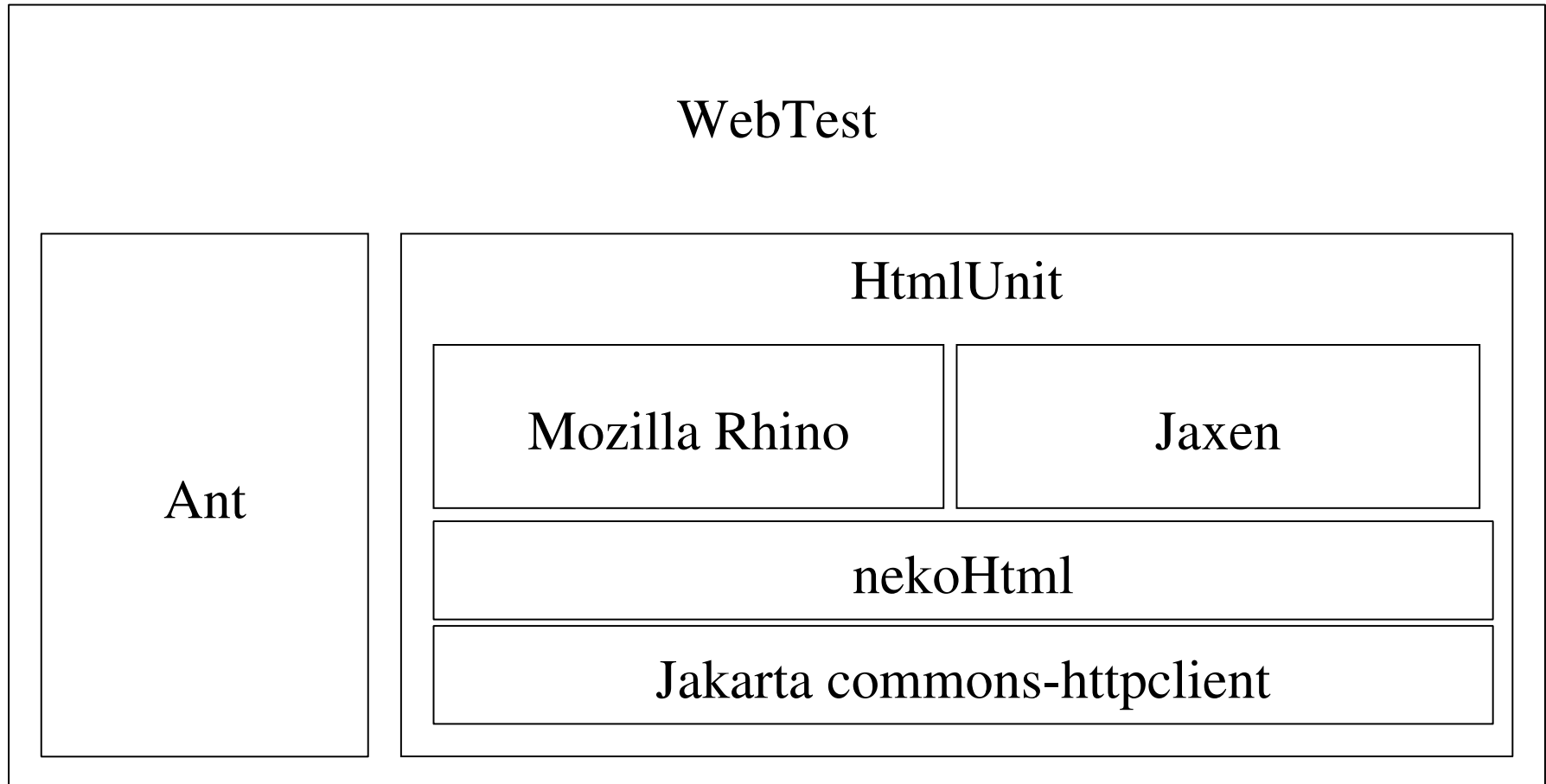   - Verify all entries in the first column are links

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Structuring

- structured tests

  - property files

  - XML entities

  - Ant macros

- => Refactor the tests

```
▽ 📁 demoProject
   ▽ 📁 definitions
         📄 goToDocPage.xml
   ▽ 📁 dtd
         📄 Project.dtd
   ▽ 📁 environment
         📄 webtest.properties
   ▽ 📁 includes
         📄 config.xml
   ▽ 📁 target
      ▷ 📁 results
   ▽ 📁 tests
         📄 allTests.xml
         📄 testDocumentation.xml
         📄 testWebTestHome.xml
      📄 build.xml
      📄 definitions.xml
```

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Building blocks

WebTest

Ant

HtmlUnit

Mozilla Rhino

Jaxen

nekoHtml

Jakarta commons-httpclient

Fine-grained control

From WebTest Mailinglist (27.11.2006)

```
...
    <setproxy proxyhost="myproxy" proxyport="1234" nonproxyhosts="otherHost">
...

    <steps>
      <groovy description="proxy configuration">
          step.context.webClient.addHostsToProxyBypass("otherHost")
      </groovy>
      <invoke url="http://myHost"/>

      .....
    </steps>
...
```

Simply extend WebTest

```
<groovyScript>
  class MyExtension extends com.canoo.webtest.steps.Steps
  {

        String myProp
        void doExecute()
        {
              // do something
        }

  }
  project.taskDefinitions['myNewStep'] = MyExtension
</groovyScript>
  ....
<steps>

   ...
  <myNewStep myProp="whatever"/>

   ...
</steps>
```

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Customize XPath

```
<groovyScript>

import org.jaxen.*

import org.jaxen.function.*

import com.canoo.webtest.engine.xpath.XPathHelper


class ReverseFunction implements Function {
    Object call(Context context, List _args) {
        def input = StringFunction.evaluate(_args[0], context.navigator);
        return input.reverse()
}    }
XPathHelper.registerGlobalFunction("http://webtest.canoo.com",
                                    "reverse", new ReverseFunction())

</groovyScript>

...
<verifyXPath xpath="wt:reverse('food')" text="doof"/>
```

Groovy WebTest

```
ant.webtest(name: 'Test Google with Groovy, AntBuilder and WebTest')
{
    steps()
    {
        invoke(url: 'http://www.google.com')
        verifyTitle(text: 'Google')
        setInputField(name: 'q', value: 'Groovy')
        clickButton(name: 'btnG')
        verifyXPath(xpath: "//a[@href='http://groovy.codehaus.org/']")
    }
}
```

Grails automagically generates WebTests for the generated CRUD operations

Lessons learned

- use recorder only to give you a jump start

- specify expectations

- distinguish guaranteed from accidental behavior

- apply rules of software engineering
    - remove duplications, extract modules
    - use source control

- consider modifications and extensions
    - Ant, Java, Groovy

- design for testability
    - valid html code, test early

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Happy Testing!

http://webtest.canoo.com/

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