Agile Web Development with Grails

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Abstract

Agile development is all about developing code and seeking feedback from your users to make sure you're developing what's relevant. When they suggest changes, those must be affordable and reliable. Grails, along with its facility to develop test driven, is a killer combination for rapidly developing web applications. In this ZePo (Zero PowerPoint) presentation, we will take a test driven approach to developing a small but fully functional web application in Grails. We will cover the fundamental features of Grails along with utilizing other capabilities like Ajax. At the end of this presentation, you will not only be confident, but eager to roll your own web application using Grails.
Agenda

- What’s Grails?
- Principles
- Fundamentals
- A Quick App
- Phase I
- Unit Testing

- Functional Testing
- Phase II
- Templatizing
- Ajaxing
- Conclusion

What’s Grails?

- Open Source Web Framework
- Inspired by Rails, but not a port
- Uses Groovy and Java
- Built for JVM
- Rapid Development of CRUD Applications
  - But you can leverage Java strengths
  - This presentation based on Grail 0.6
Grails Principles

- DRY
- Convention Over Configuration
  - A bit of a problem when you’re new
  - Once you get used to it, you’re in Paradise
- Keep it Simple
- Leverage Java Platform
Grails MVC

- Grails built on concept of MVC
- It does not merely recommend that you use MVC
  - It tells you to do so, then follows you home, and sits next to you to make sure you do

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Build and Learn

- A Contacts Application
- Add name, email, phone, state of residence
- Edit, list, ...
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Create App

> grails create-app contact

Welcome to Grails 0.6 - http://grails.org/
Licensed under Apache Standard License 2.0
Grails home is set to: /usr/local/bin/grails-0.6

Base Directory: /Users/venkats/workarea/examples
Environment set to development
Note: No plugin scripts found
Running script /usr/local/bin/grails-0.6/scripts/CreateApp.groovy
Caching script CreateApp.groovy to dir /Users/venkats/.grails/0.6/scriptCache
Caching script Clean.groovy to dir /Users/venkats/.grails/0.6/scriptCache
Caching script Package.groovy to dir /Users/venkats/.grails/0.6/scriptCache
Caching script Compile.groovy to dir /Users/venkats/.grails/0.6/scriptCache
Caching script GetDependencies.groovy to dir /Users/venkats/.grails/0.6/scriptCache
Caching script InstallGroovy to dir /Users/venkats/.grails/0.6/scriptCache
Caching script PackagePlugins.groovy to dir /Users/venkats/.grails/0.6/scriptCache
Overriding previous definition of reference to groovylarSet

[mkdir] Created dir: /Users/venkats/workarea/

Directory Structure
Code Generation

- Grails script generates quite a bit of stuff for you
  - Mostly html
  - Code is mostly synthesized rather than being generated

Three Configurations

- Creates three configurations
  - Production
  - Development
  - Testing
Create Domain class

```
> pwd
/Users/venkats/workarea/examples/contact

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Base Directory: /Users/venkats/workarea/examples/contact
Environment set to development
Note: No plugin scripts found
Running script /usr/local/bin/grails-0.6/scripts/CreateDomainClass.groovy
Caching script CreateDomainClass.groovy to dir /Users/venkats/.grails/0.6/scriptCache
Caching script CreateIntegrationTest groovy to dir /Users/venkats/.grails/0.6/scriptCache
[Copy] Copying 1 file to /Users/venkats/workarea/examples/contact/grails-app/domain
Created For State
[Copy] Copying 1 file to /Users/venkats/workarea/examples/contact/test/integration
Created Tests for State
```

Generated Code

```
1 class State {
2 }
3

1 class StateTests extends GroovyTestCase {
2
3   void testSomething() {
4
5   }
6 }  
7
```
Editing Domain Class

class State
{
    String twoLetterCode
}

Generating Controller and Views

> grails generate-all State
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Base Directory: /Users/venkats/workarea/examples/contact
Environment set to development
Note: No plugin scripts found
Running script /usr/local/bin/grails-0.6/scripts/GenerateAll.groovy
Caching script GenerateAll.groovy to dir /Users/venkats/.grails/0.6/scriptCache
[MDir] Created dir: /Users/venkats/.grails/0.6/projects/contact/classes
Compiling 5 source files to /Users/venkats/.grails/0.6/projects/contact/classes
[MDir] Created dir: /Users/venkats/workarea/examples/contact/web-app/WEB-INF/grails-app/18n
[Copy] Copying 8 files to /Users/venkats/workarea/examples/contact/web-app/WEB-INF/grails-app/18n
[Copy] Copying 1 file to /Users/venkats/workarea/examples/contact/web-app/WEB-INF/spring
[Copy] Copying 1 file to /Users/venkats/.grails/0.6/projects/contact/classes
[Copy] Copying 1 file to /Users/venkats/.grails/0.6/projects/contact/classes
Generating views for domain class State ... 
Generating controller for domain class State ...
Finished generation for domain class State
Controller

```ruby
class StateController
  def index = { redirect(action:'list', params:params) }

  // the delete, save and update actions only accept POST requests
  def allowedMethods = [delete:'POST', save:'POST', update:'POST']

  def list = {
    if(params.max)params.max = 10
    [ stateList: State.list(params) ]
  }

  def show = {
    [ state: State.get(params.id) ]
  }

  def delete = {
    def state = State.get(params.id)
    if(state) {
      state.delete()
      flash.message = "State ${params.id} deleted."
    }
  }
end
```

Views

```html
<table>
  <thead>
    <tr>
      <th><a href="/state/list">State List</a></th>
      <th><a href="/state">Add State</a></th>
      <th>Update</th>
      <th>Delete</th>
    </tr>
  </thead>
  <tbody>
    #{stateList.map do |state|
      %w(<tr>
          <td><%= state.id %></td>
          <td><%= state.state %></td>
          <td><%= state.abbreviation %></td>
          <td><%= state.timezone %></td>
          %w(<td><%= link_to 'Show', state %></td>
              <td><%= link_to 'Edit', edit_state_path(state) %></td>
              <td><%= link_to 'Destroy', state, method: :delete, confirm: 'Are you sure?' %></td>
          %w('</td>
      ).join('')}</tr>)[1..-2]
    </tbody>
</table>
```
A Quick Test Drive

> grails run-app

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Base Directory: /Users/venkats/workarea/examples/contact
Environment set to development
Note: No plugin scripts found
Running script /usr/local/bin/grails-0.6/scripts/RunApp.groovy
Caching script RunApp.groovy to dir /Users/venkats/.grails/0.6/
[mkdir] Created dir: /Users/venkats/workarea/examples/contact
Compiling 1 source:
Running Grails application...

A Quick Test Drive...

Created New State by clicking on this link
Test Driven Development

- A way to design an application
- Helps find problems quickly
- As system evolves, let us know if we meet the expectations
- Serves as a valuable form of documentation
- Safety net for refactoring
- Write Positive, Negative, and Exception tests
- In Grails 0.6, these are generated under Integration Tests (from a pure definition point of view, they are since you may talk to DB?)
**Test First Domain Logic**

```groovy
class StateTests extends GroovyTestCase {

class State {
    String twoLetterCode
}

  void testStateCodeTwoLetters() {
    State state = new State(TwoLetterCode: 'Texas')
    assertFalse state.validate()
  }
}
```

Welcome to Grails 0.6 - http://grails.org/
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Grails home is set to: /usr/local/bin/grails-0.6

```
Note: There was no test found
Running script /usr/local/bin/grails-0.6/scripts/TestApp.groovy
Compiling 1 source files to /Users/venkates/workarea/grails/0.6/projects/contact/classes
Compiling 2 source files to /Users/venkates/workarea/examples/contact/test/classes
No tests found in test/unit to execute ...
```

[junitreport] Transform time: 156ms
Tests failed: 0 errors, 1 failures, 0 compilation errors. View reports in /Users/venkates/workarea/examples/contact/test/reports

---

**Code Next Domain Logic**

```groovy
class State {
    String twoLetterCode

    static constraints = {
        twoLetterCode(size: 2..2)
    }
}
```

```
>grails test-app
...
Running test StateTests... testStateCodeTwoLetters...SUCCESS
Integration Tests Completed in 1291ms
...
```
After Two More Tests...

```groovy
class StateTests extends GroovyTestCase {

    void testStateCodeTwoLetters() {
        def state = new State(twoLetterCode: 'Texas')
        assertFalse state.validate()
    }

    void testStateCodeNotEmpty() {
        def state = new State(twoLetterCode: '')
        assertFalse state.validate()
    }

    void testStateCodeUnique() {
        def state = new State(twoLetterCode: 'TX')
        state.save()
        def another = new State(twoLetterCode: 'TX')
        assertFalse another.validate()
        new State(twoLetterCode: 'TX').save()
    }

    static constraints = {
        twoLetterCode(size: 2..2, blank: false, unique: true)
    }
}
```

---

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Integration Testing

- Functional Testing or Integration Testing is automated testing of functionality
- Very helpful when done in addition to unit testing
- Grails uses Canoo for this

Generate Web Test

>grails generate-webtest State

... Running script /usr/local/bin/grails-0.6/scripts/GenerateWebtest.groovy

Creating dir: /usr/local/bin/grails-0.6/downloads

[get] To: /usr/local/bin/grails-0.6/downloads/webtest.zip

Web Test generated at webtest/tests/StateTest.groovy
Running Generated Tests

Got an error, so downloaded latest version of log4j and copied log4j-1.2.15.jar to grails install lib directory

```bash
grails run-webtest
...
Environment set to test
...
Running Grails application..  
...
WebTest complete
...
Server stopped
```
Viewing Test Results

> open webtest/reports/WebTestResults.html

Fixing the Test for Validation Error

```python
def testStateListNonDelete():
    webtest('State basic operations: view list, create new entry, view, edit, delete, view'):
        invoke(url='state')
        verifyText(text='Home')
        verifyListPage(0)
        clickLink(label='New State')
        verifyText(text='Create State')
        setInputField(Name='twoLetterCode', Value='CO')
        clickButton(label='create')
        verifyText(text='Show state', description='Detail page')
        clickLink(label='List', description='Back to list view')
        verifyListPage(1)
```
Building Second Domain Class

- We will continue to build the next Domain class—Person
- Steps similar to what we’ve done earlier
  - Create Domain Class
  - Generate Controller and Views
Person Class

> grails create-domain-class Person

```groovy
class Person {
    String name
    String email
    String phoneNumber
    State residenceState

    def belongsTo = State
}
```

Test Driving

> grails generate-all Person

Where’s our State?
Was in the in-memory database
Missing State won’t give confidence to our customer
Bootstrap Data

```java
class Bootstrap {
    def init = { servletContext ->
        new State{twoLetterCode: 'TX'}.save()
        new State{twoLetterCode: 'CA'}.save()
        new State{twoLetterCode: 'MA'}.save()
        new State{twoLetterCode: 'CO'}.save()
        new State{twoLetterCode: 'IL'}.save()
    }
    def destroy = {
    }
}
```

Restart grails

???
A Quick Fix

Add optionValue element to the select element in create.gsp

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Templates

- Reusable fragments
- File naming convention starts with _
- You can render as a bean or collection
  - bean results in one expansion
  - collection results in one expansion per element of collection

Content moved to _addperson.gsp and referred here
**Ajaxing Frameworks**

- Very easy to integrate with Ajax frameworks
- Ships with Prototype
- You may use other frameworks as well
Ajaxing Create

<html>
<head>
  <meta http-equiv="Content-Type" content="text/html; charset=UTF-8" />
  <meta name="layout" content="main" />
  <title>Person List</title>
</head>
<body>
  <div class="nav">
    <span class="menuItem"><a class="home" href="/create/">Create</a></span>
  </div>
  <div class="content">
    <h1>Person List</h1>
    <div class="message">${flash.message}</div>
    <div class="list">
      <g:render template="listpeople" bean="personList" />
    </div>
    <div class="paginateButtons">
      <g:paginate total="${Person.count()}" />
    </div>
    <g:render template="addperson" bean="new Person()" />
  </div>
</body>
</html>

Ajaxing Create...

<table id="peopleTable">
  <thead>
    <tr>
      <th><g:sortableColumn property="id" title="Id" /></th>
      <th><g:sortableColumn property="email" title="Email" /></th>
      <th><g:sortableColumn property="name" title="Name" /></th>
      <th><g:sortableColumn property="phoneNumber" title="Phone" /></th>
    </tr>
  </thead>
  <tfoot>
  </tfoot>
  <tbody>
    <g:render template="listPerson" collection="${personList}" />
  </tbody>
</table>
Ajaxing Create...

```html
<tr>
  <td>someone = $(person.id); $(person.id).encodeAsHTML();</td>
  <td>${person.email}.encodeAsHTML();</td>
  <td>${person.name}.encodeAsHTML();</td>
  <td>${person.phoneNumber}.encodeAsHTML();</td>
  <td>${person.residenceState}.encodeAsHTML();</td>
</tr>
```
Ajaxing Create...

```
def save = {
    def person = new Person()
    person.properties = params
    if(person.save()) {
        flash.message = "Person ${person.id} created."
        redirect(action:'list')
    }
    else {
        render(view:'create', model:[person:person])
    }
}
```

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Thank You!

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