Groovy For Java Programmers

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About Me

- Jeff Brown
- Principal Engineer - Object Computing Inc.
  - Training, Consulting, Product Development
  - Java, Groovy, C/C++, CORBA, OO, etc...
- Software Engineering For 15 Years
- Mostly Java For 10 Years
- Java/OO Instructor For 8 Years
- Grails Core Development Team Member

What Is Groovy?

- Open Source
- Agile Dynamic Language
  - Others...
    - JavaScript, Ruby, Python
- Integrates Very Well With Java
  - Runs On The JVM
  - Call Groovy From Java
  - Call Java From Groovy
  - Leverage Powerful Existing Java Libraries

Why Groovy?

- Familiar Syntax For Java Programmers
- Leverage The Wealth Of Java Libraries
- Easy Integration With Your Existing Infrastructure
  - App Servers
  - Servlet Containers
  - Loads Of Databases With JDBC Drivers
  - All Your Homegrown Java Infrastructure

Installing Groovy

- Download Release
  - http://groovy.codehaus.org/
- Extract The Archive
- Set GROOVY_HOME
- Add $GROOVY_HOME/bin to PATH

Hello Groovy

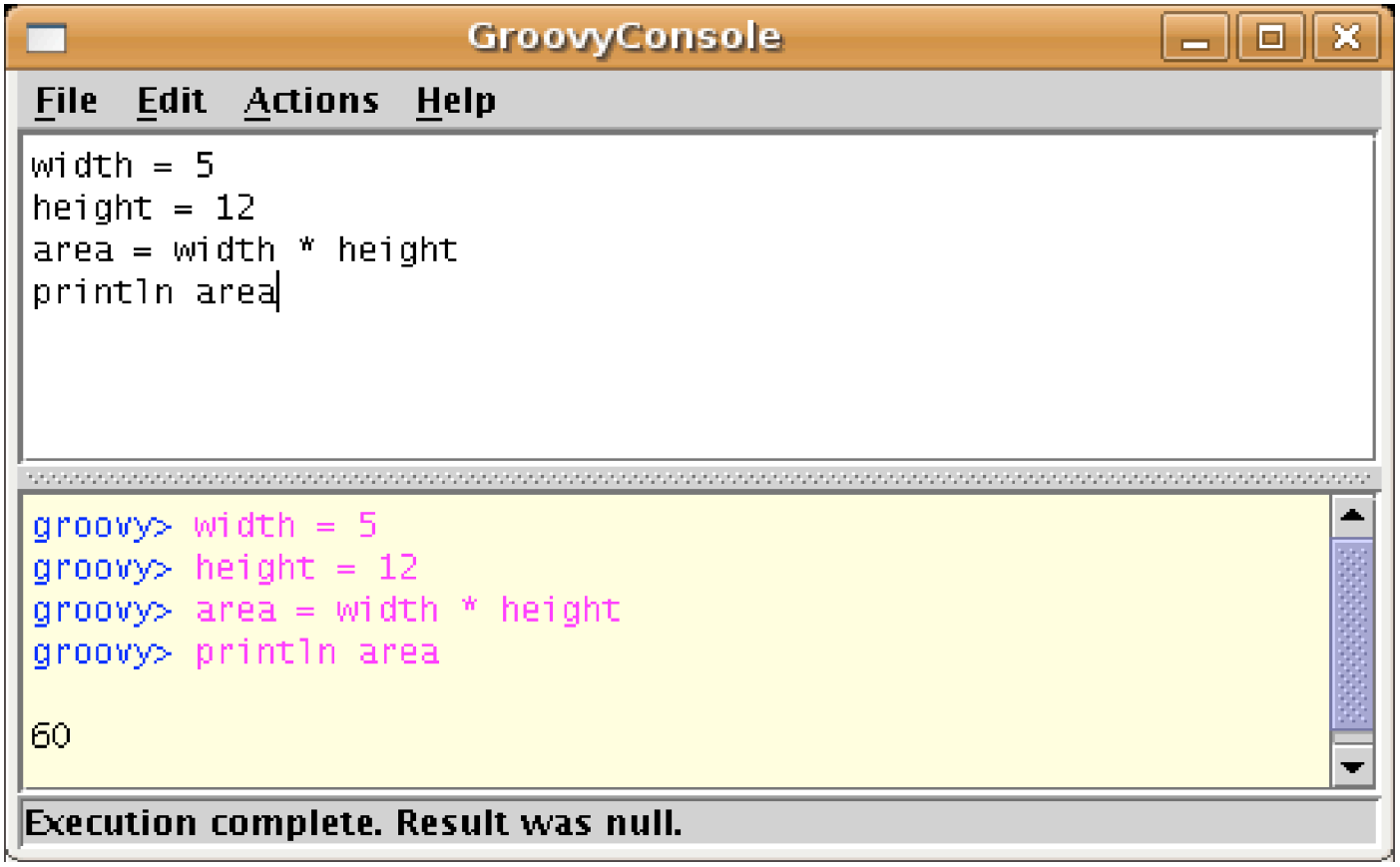
- Give It A Spin...

```
$ groovy -version
Groovy Version: 1.0 JVM: 1.4.2-76

$ groovy -e " println 'Hello From Groovy' "
Hello From Groovy

$ groovy -e "a=10;b=4;c=a*b;println c"
40
```

Groovy Shell


```
$ groovysh
Let's get Groovy!
================
Version: 1.0 JVM: 1.4.2-76
Type 'exit' to terminate the shell
Type 'help' for command help
Type 'go' to execute the statements

groovy> width = 5
groovy> height = 12
groovy> area = width * height
groovy> println area
groovy> go
60
```

Groovy Console



Groovy Scripts


```
// mygroovyscript.groovy
println 'Hello From My Groovy Script'
```

```
groovy mygroovyscript.groovy
Hello From My Groovy Script
```

Groovy Classes


```
// MyGroovyTest.groovy
class MyGroovyTest {
  def sayHello() {
        println 'Hello From MyGroovyTest'
  }

  static void main(args) {
        def mgt = new MyGroovyTest()
        mgt.sayHello()
  }
}
```

```
groovy MyGroovyTest.groovy
Hello From MyGroovyTest
```

groovyc

- groovyc Compiles Groovy To Bytecode
- Compiled Code Runs As Normal Java Code
- CLASSPATH
  - groovy-all-[version].jar
  - in $GROOVY_HOME/embeddable/

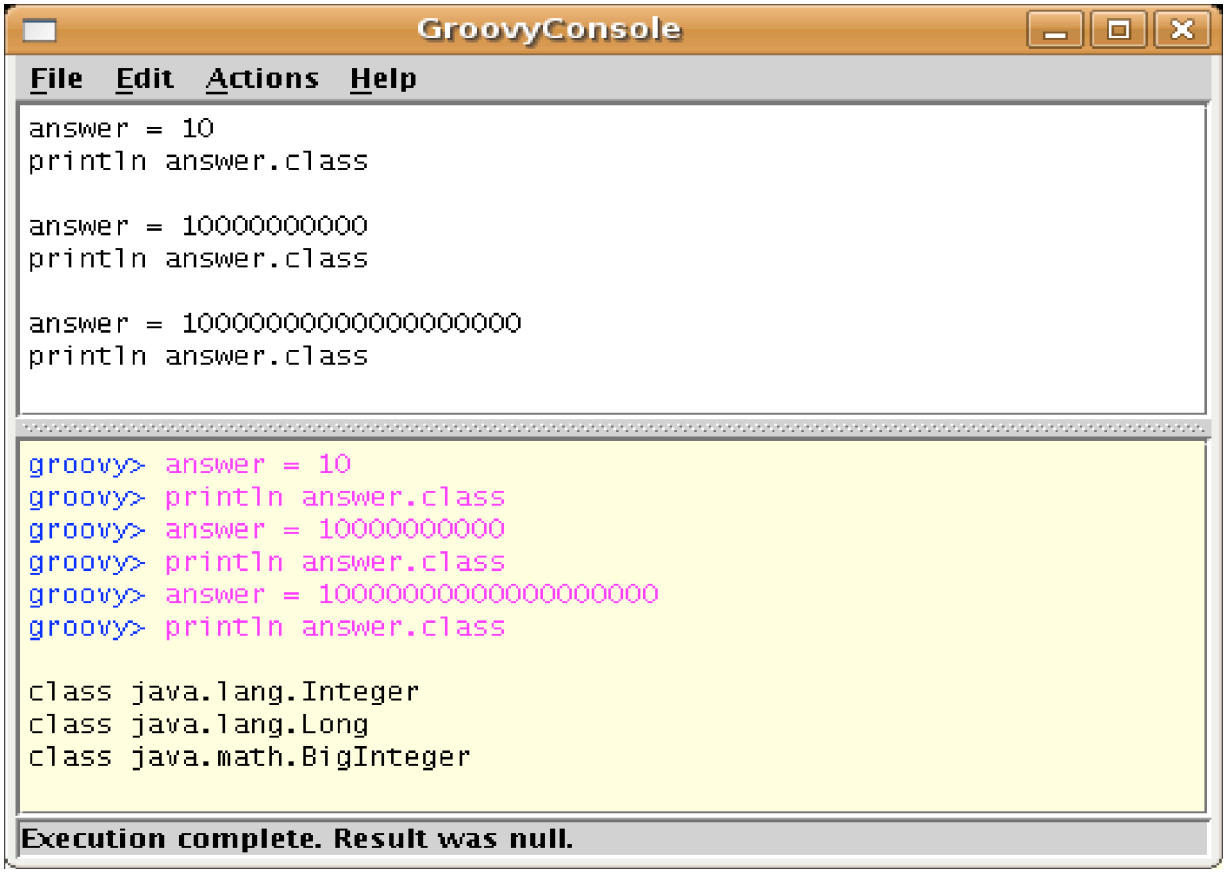
```
groovyc MyGroovyTest.groovy
java MyGroovyTest
Hello From MyGroovyTest
```

Some Language Basics

- Everything Is An Object
- GString
- Closures
- Collections
- Categories
- Ranges
- Groovy Beans
- Builders
- Meta Programming

Lots of examples to come...

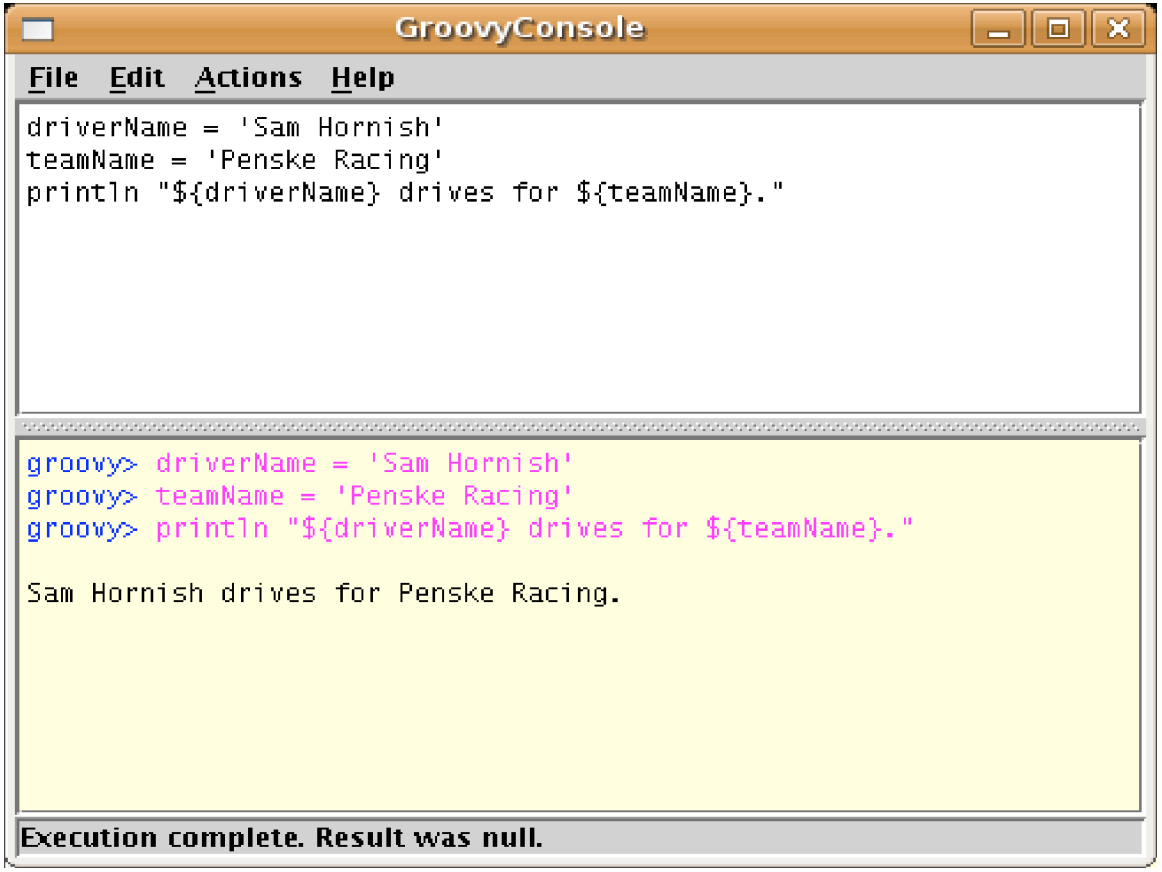
Everything Is An Object



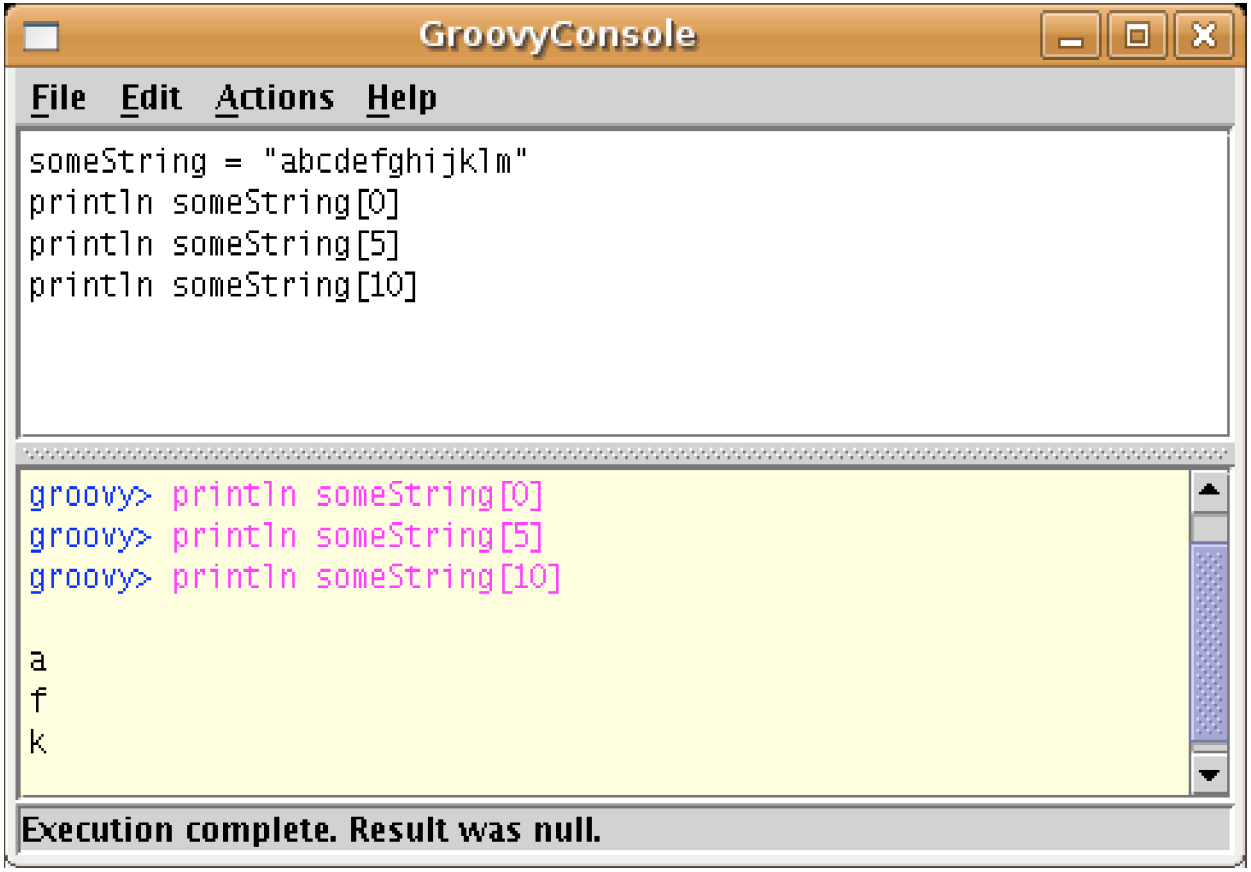
Groovy Strings

- Known As GStrings
- GStrings Are Surrounded By Double Quotes
  - single quotes are used for regular strings
- May Contain Groovy Expressions
  - expressions surrounded by ${ }
  - evaluated and substitution takes place at runtime
- Square Bracket Syntax My Be Applied
  - like charAt(i)
  - more complicated range related example later

Groovy Strings



Groovy Strings



Closures

- A Block Of Code
- May Be Passed Around
- May Accept Arguments
- Always Return Something
  - not necessarily explicitly
- More Flexible Than Anonymous Inner Class

Closures

- Groovy Adds A times Method to Number
- The times Method Accepts A Closure

```
groovy> 3.times { println 'Hello' }
groovy> go
Hello
Hello
Hello
```

Closures

- Closures Are First Class Objects
- References May Point To Closures

```
groovy> cl = { println 'Closures Are Cool' }
groovy> 3.times cl
groovy> go
Closures Are Cool
Closures Are Cool
Closures Are Cool
```

Closures

- Closures May Accept Arguments
- The times Method Passes An Argument To The Closure

```
groovy> 3.times { index -> println "index is ${index}" }
groovy> go
index is 0
index is 1
index is 2
```

Closures

- Closures Have An Implicit “it” Argument

```
groovy> 3.times { println "index is ${it}" }
groovy> go
index is 0
index is 1
index is 2
```

Closures

- Multiple Arguments

```
groovy> myMap = [name:'Jeff', location:'St. Louis']
groovy> myMap.each { key, value ->
          println "${key} is ${value}"
        }
groovy> go
location is St. Louis
name is Jeff
```

Collections

- Lists Are Simple To Declare

```
groovy> kids = ['Zack', 'Jake']
groovy> println kids.class
groovy> go
class java.util.ArrayList
```

Collections

- Adding To A List

```
groovy> albums = ['Rush']
groovy> albums << 'Fly By Night'
groovy> albums += 'Caress Of Steel'
groovy> albums.add '2112'
groovy> println albums
groovy> go
["Rush", "Fly By Night", "Caress Of Steel", "2112"]
```

Collections

- Removing From A List

```
groovy> instruments =
    ['drums', 'keyboards', 'guitars', 'lutes']
groovy> instruments.remove 'keyboards'
groovy> instruments -= 'lutes'
groovy> println instruments
groovy> go
["drums", "guitars"]
```

Collections

- Closure To Iterate Over A List

```
groovy> tracks = ['Custard Pie',
                  'The Rover',
                  'In My Time Of Dying']
groovy> tracks.each { println it }
groovy> go
Custard Pie
The Rover
In My Time Of Dying
```

Collections

- Iterating With An Index

```
groovy> tracks = ['Custard Pie',
                  'The Rover',
                  'In My Time Of Dying']
groovy> tracks.eachWithIndex { track, index ->
          println "Track ${index + 1}: ${track}"
        }
groovy> go
Track 1: Custard Pie
Track 2: The Rover
Track 3: In My Time Of Dying
```

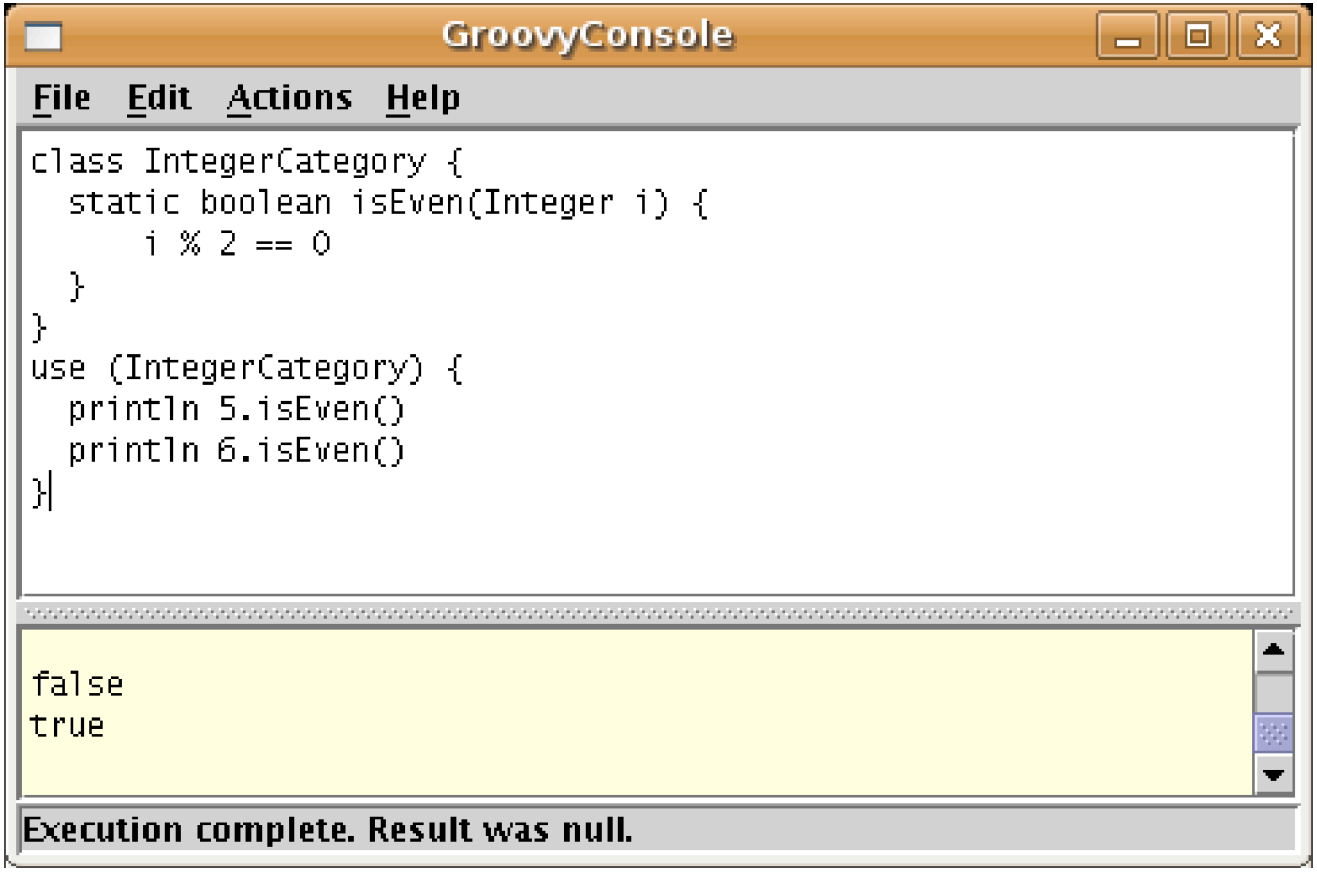
Collections

- Map Manipulation

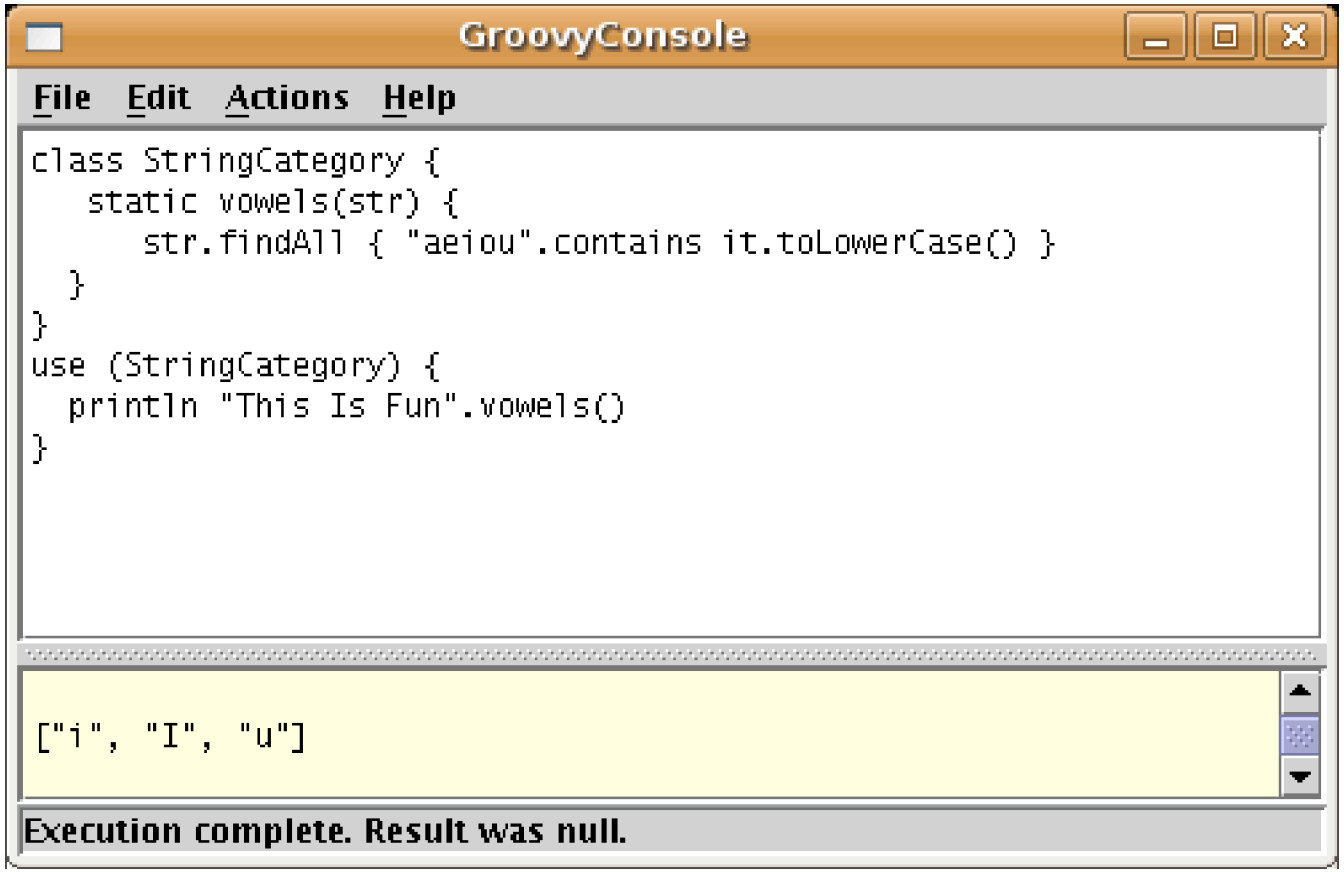
```
groovy> myMap = [bass:'Geezer', drums:'Bill']
groovy> myMap['vocals'] = 'Ozzy'
groovy> myMap.guitar = 'Tony'
groovy> println myMap
groovy> go
["drums":"Bill", "vocals":"Ozzy",
 "bass":"Geezer", "guitar":"Tony"]
```

Watch out for myMap.class

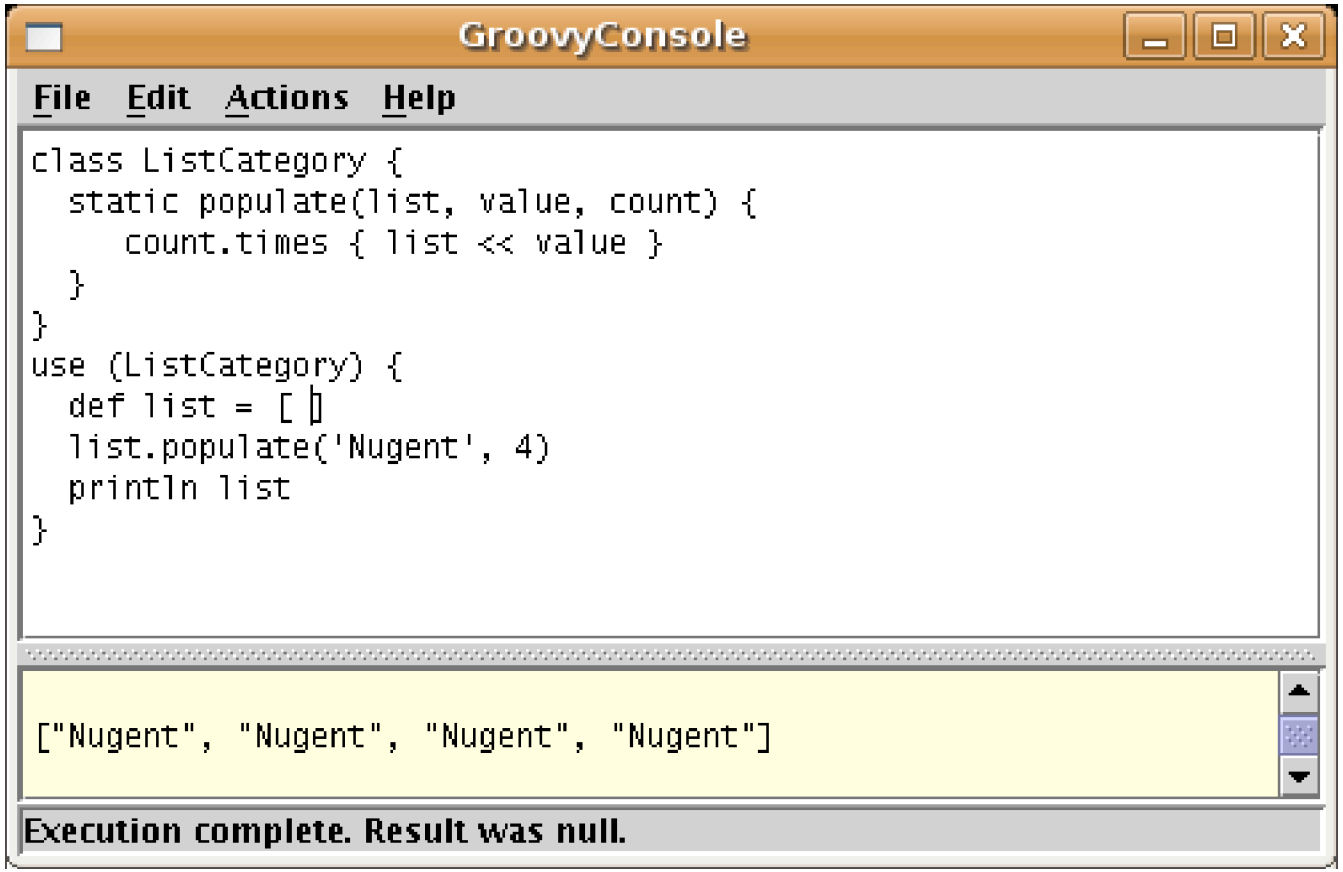
Groovy Categories



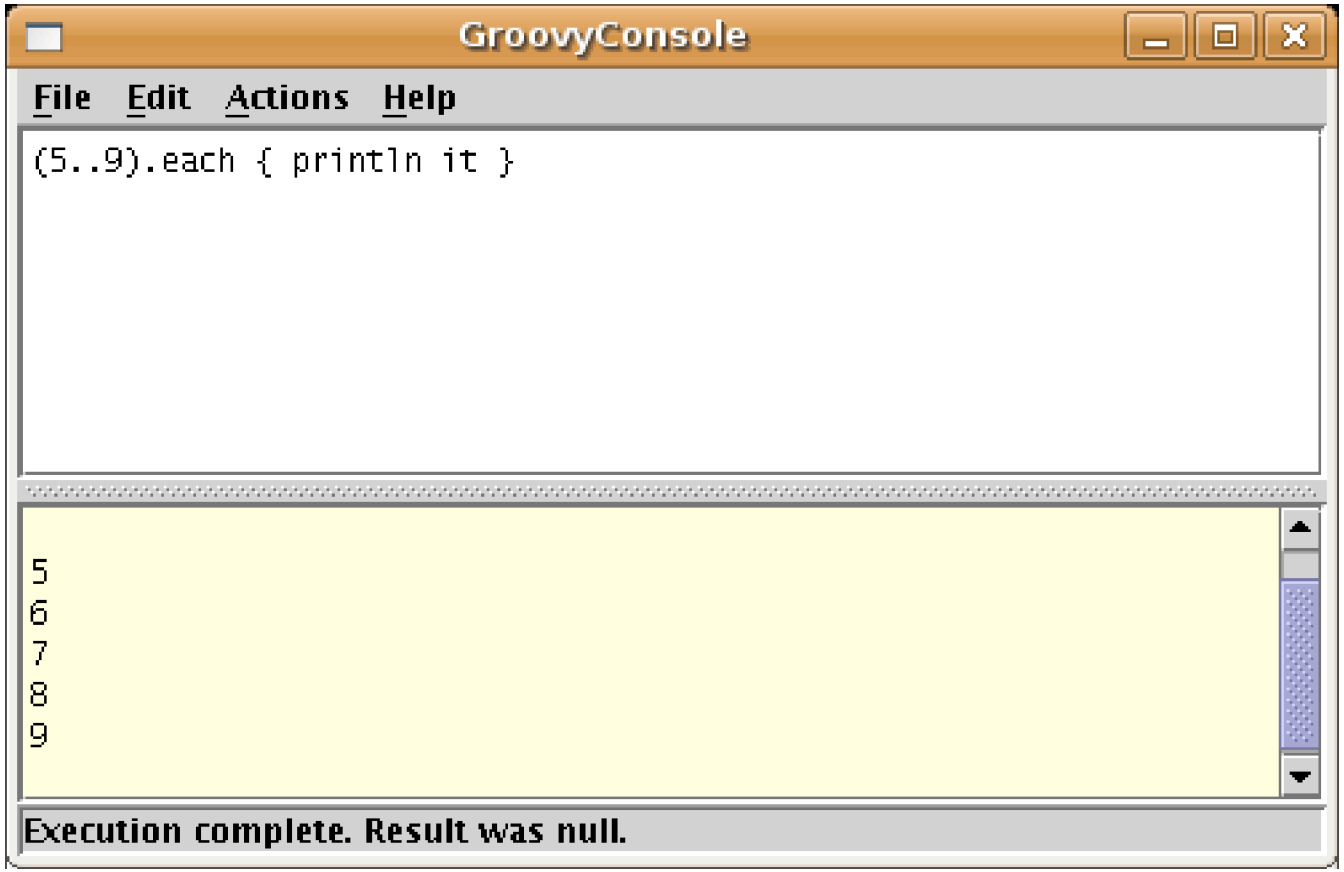
Groovy Categories



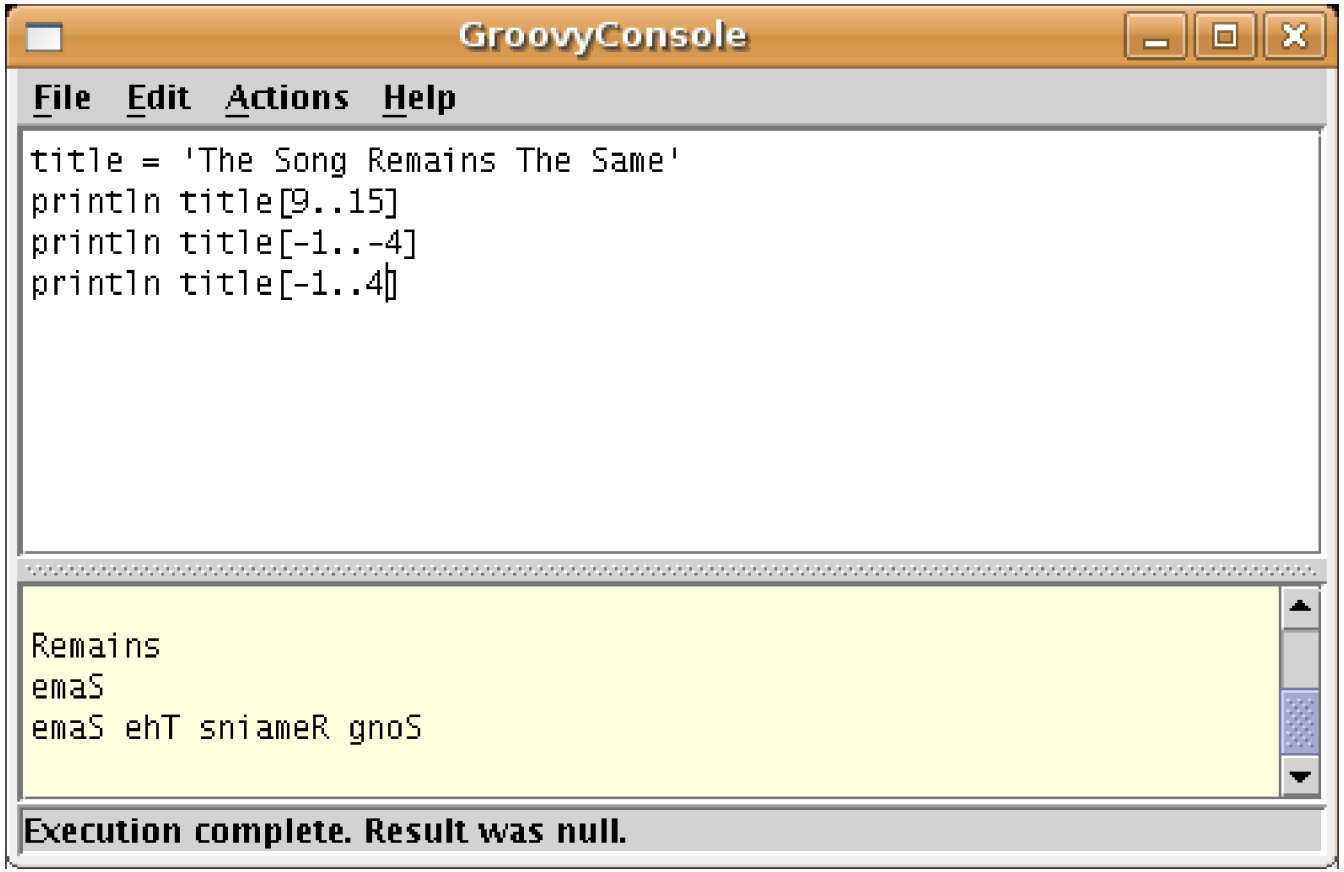
Groovy Categories



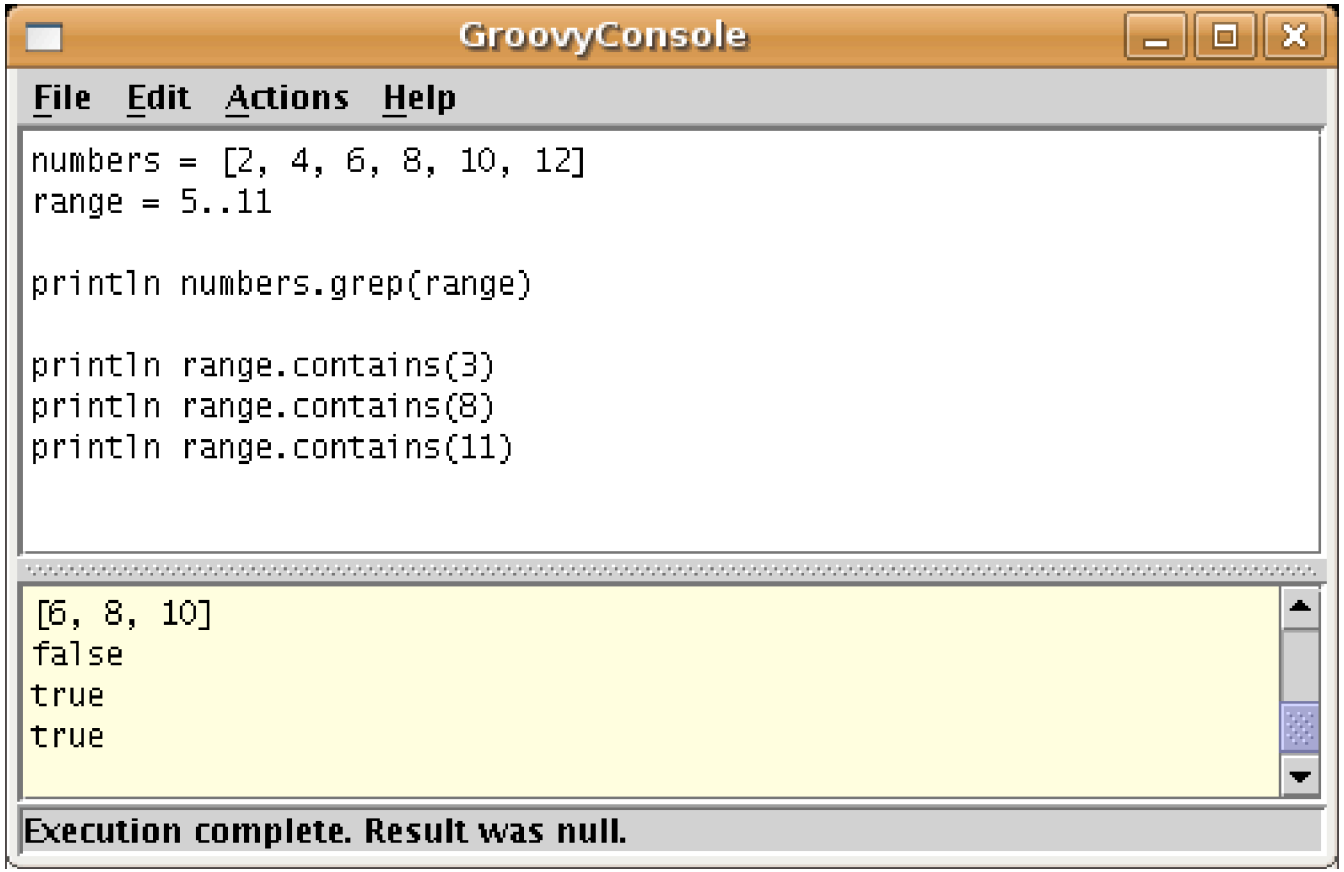
Ranges


GroovyConsole
File Edit Actions Help
(5..9).each { println it }
5
6
7
8
9
Execution complete. Result was null.

Ranges


GroovyConsole
File Edit Actions Help
title = 'The Song Remains The Same'
println title[9..15]
println title[-1..-4]
println title[-1..4]
Remains
emaS
emaS ehT sniameR gnoS
Execution complete. Result was null.

Ranges


GroovyConsole
File Edit Actions Help
numbers = [2, 4, 6, 8, 10, 12]
range = 5..11
println numbers.grep(range)
println range.contains(3)
println range.contains(8)
println range.contains(11)
[6, 8, 10]
false
true
true
Execution complete. Result was null.

Groovy Beans

- Groovy Beans Are POGOs
- Similar To POJOs
- Boilerplate Code Is Eliminated

POJO


```
// Person.java
public class Person {

        private String firstName;
        private String lastName;

        public Person() {}

        public Person(String firstName, String lastName) {
                this.firstName = firstName;
                this.lastName = lastName;
        }
```

POJO


```
        public String getFirstName() {
                return firstName;
        }

        public void setFirstName(String firstName) {
                this.firstName = firstName;
        }

        public String getLastName() {
                return lastName;
        }

        public void setLastName(String lastName) {
                this.lastName = lastName;
        }
}
```

POJO

- I Wrote Code To Declare The Fields
- I Let Eclipse Generate Constructors
- I Let Eclipse Generate Getters/Setters

If all of that code can be generated by the IDE, why can't it be generated by the compiler or the runtime environment?

Groovy Beans


```
// BaseballTeam.groovy
class BaseballTeam {
        def cityName
        def teamName
}
```

- No Need To Write Constructors
- No Need To Write Getters/Setters
- May Declare Types – Don't Need To

Groovy Beans


```
cardinals = new BaseballTeam(cityName:'St. Louis',
                             teamName:'Cardinals')
println "City Name: ${cardinals.cityName}"
println "Team Name: ${cardinals.teamName}"
```

```
City Name: St. Louis
Team Name: Cardinals
```

Groovy Beans

- Property Access Looks Like Field Access
  - name = cardinals.teamName
  - name = cardinals.getTeamName()
- Assignment Works The Same Way
  - cardinals.teamName = 'Saint Louis'
  - cardinals.setTeamName('Saint Louis')

Groovy Beans

- Properties Aren't Necessarily Declared As Fields

```
class BaseballTeam {

        def cityName
        def teamName

        def getDisplayName () {
                "${cityName} ${teamName}"
        }

}
```

Groovy Beans


```
cardinals = new BaseballTeam(cityName:'St. Louis',
                             teamName:'Cardinals')
println cardinals.displayName
```

St. Louis Cardinals

Groovy Beans

- Properties Are Public By Default
  - private field
  - public getter/setter
- Properties May Be Private Or Protected
- No 'package' Level

MarkupBuilder


```
builder = new groovy.xml.MarkupBuilder()
builder.baseball {
  league(name:"National") {
    team("Cardinals")
    team("Cubs")
    team("Mets")
  }
  league(name:"American") {
    team("Angels")
    team("Yankees")
    team("Royals")
  }
}
```

MarkupBuilder


```
<baseball>
  <league name='National'>
    <team>Cardinals</team>
    <team>Cubs</team>
    <team>Mets</team>
  </league>
  <league name='American'>
    <team>Angels</team>
    <team>Yankees</team>
    <team>Royals</team>
  </league>
</baseball>
```

MarkupBuilder


```
builder = new groovy.xml.MarkupBuilder()
builder.html() {
  head() {
    title('Markup Builder Demo')
  }
  body {
    h1('Bands')
    ul {
      li('Rush')
      li('King Crimson')
      li('Opeth')
    }
  }
}
```

MarkupBuilder


```
<html>
  <head>
    <title>Markup Builder Demo</title>
  </head>
  <body>
    <h1>Bands</h1>
    <ul>
      <li>Rush</li>
      <li>King Crimson</li>
      <li>Opeth</li>
    </ul>
  </body>
</html>
```

Meta Programming


```
class MyGroovyThing {
    Object invokeMethod(String name, Object args) {
        // do something cool
    }
}
```

Live Meta Programming Demo...

Call Groovy From Java

- GroovyShell
- GroovyClassLoader
- Bean Scripting Framework
- Java 6 (and beyond...)

Live Demo...

Links

- Main Groovy Site
  - http://groovy.codehaus.org/
- Main Grails Site
  - http://grails.org/
- Groovy Portal
  - http://aboutgroovy.com/
- My Blog
  - http://javajeff.blogspot.com/

Thank You For Coming

Q & A