Simplify Enterprise Development With Scripting

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Groovy Goal of This Talk

Simplifying Enterprise Development with Scripting

Learn how **scripting** can increase your productivity and help you build and test solutions faster on the **Java™ Platform, Enterprise Edition**

Agenda

Scripting back on rails

What is Groovy, and why it matters?

Groovy syntax, APIs and beyond

SOA scripting

JSR 223, an API to rule them all

Conclusion

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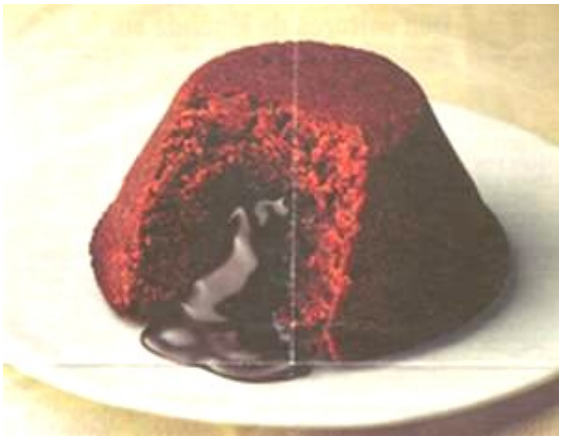
Full Steam Ahead on Scripting!

- Scripting languages are in fashion (again?)
  - **AJAX** with JavaScript™ technology, and **Ruby on Rails** with Ruby
- **Java SE 6 integrates JSR 223** with Rhino
- JCP℠ agreed to standardize Groovy (JSR 241) and BeanShell (JSR 274)
- Upcoming bytecode **invokeDynamic** (JSR 292)
- Microsoft also believe in dynamic languages and hire IronPython lead
- Need simplicity to overcome enterprise development complexity → **Groovy can help!**

Scripting Integration Patterns



“Super-glue” Pattern

- Glue together isolated components or applications to make them interact and bring value through the combination

“Liquid Center” Pattern

- Customize, externalize business rules, presentation logic to make applications evolve with more agility

Three Main Use Cases of Integration

- **Prototyping/testing/scripting**
  - Shell or build scripting, data manipulation, unit testing, code generation, driving native applications
- **Building standalone applications**
  - Small to mid-sized non-critical applications
- **Integrating scripting in Java EE applications**
  - Programmatic configuration (less XML)
  - Business rules externalization
  - UI or application customizations

Java Technology and Scripting

- **Leverage Java Platform**
  - Use scripts inside Java SE and Java EE
  - Reuse existing Java technology skills and components
- Many existing languages on the Java VM
  - Groovy, Rhino (JavaScript), BeanShell, Jython, JRuby, Pnuts, Scala…
- Current **standardization effort** around scripting languages and Java technology
  - JSR 223, JSR 241, JSR 274, JSR 292
- Let's dive in Groovy as an example…

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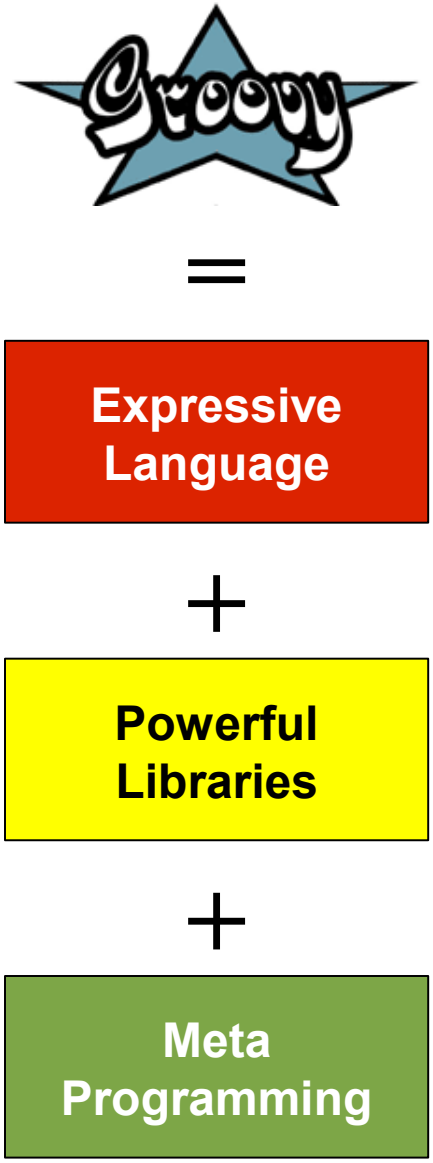
Why Groovy Is Relevant?

- Groovy is a dynamic and agile scripting language for the Java VM
- OSS project hosted by **Codehaus**
- Inspired by Ruby and Python
- **Generates bytecode** for the Java VM: integrates well with Java libraries
- However, Groovy differentiates itself
  - **GDK**: additional libraries to simplify complex APIs
  - **MOP**: advanced meta-programming features



Groovy in Production

- **Finance/Insurance**: risk or rate computation
  - Mutual of Omaha (Fortune 500)
  - Aspect Capital (Finance, London)
- **Collaborative software**:
  - eXo Platform (eXo SARL), XWiki (XpertNet)
- **Web sites**: PepsiCo, UUZone.com
- **Frameworks**:
  - Spring, RIFE, NanoContainer, Drools, ServiceMix
- **E-Learning**: Maxim Learning (Grails' lead)
- **Testing**: Canoo Web Test

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Groovy at a Glance

- Expressive Java language-like syntax
- Same OO model as Java technology
- Can be used in a shell or embedded
- Supports “**duck typing**”, and strong typing
- Native syntax constructs for Lists, Maps, regex
- Permits operator overloading
- GStrings: interpolated strings
- **Closures**: reusable and assignable code blocks

Groovy Syntax Basics

```
class Speaker {
    @Property String name
    @Property age
    String toString() {
      "My name is $name and I'm $age"
    }
}

def speakers = [
    new Speaker(name:'Tim Gleason', age:30),
    new Speaker(name:'Guillaume Laforge', age:28)
]

def upper = { it.toString().toUpperCase() }
speakers.findAll { name -> name =~ /.*Tim.*/ }
        .collect(upper).each { println it }
```

Groovy version of a JavaBean

Getter/setters generated

GString

Weakly typed

Native syntax for lists: [a, b, c]
For maps: [a:1, b:2, c:3]

Default ctor with call of setters

Closure with implicit parameter

Regex and matcher

Named closure

Inline closure

Groovy Development Kit

- **JDK™ software class extensions**, and write your own!
  - String → each(), execute(), center(), reverse()
  - Collection → collect(), join(), findAll(), inject()
  - File → eachFile(), eachLine(), getText()
- Powerful APIs
  - Easy to play with JDBC™ software
  - GString powered template engine
  - Handy XML parsers and GPath
  - Manipulating JMX™ MBeans API as local objects
  - Additional modules: SOAP, scripting ActiveX/COM

JDBC Software

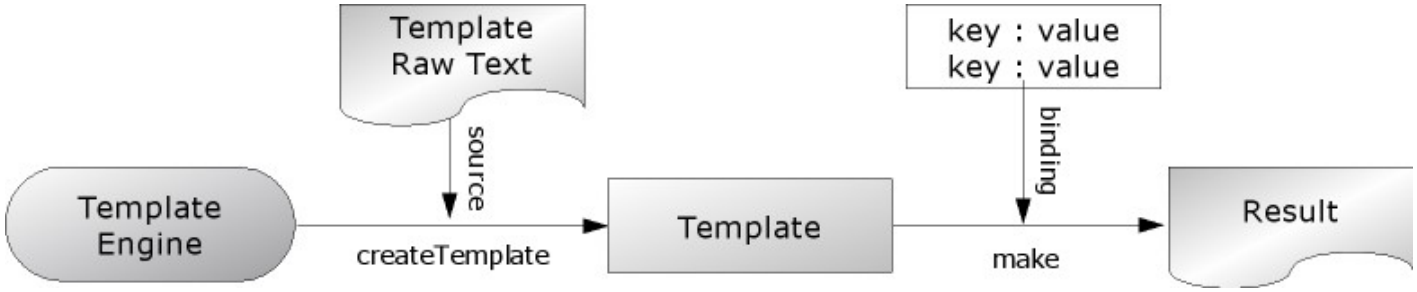
- Easy to use JDBC software thanks to closures

```
def sql = Sql.newInstance(url, usr, pwd, driver)
sql.execute("insert into table values ($foo, $bar)")
sql.execute("insert into table values(?,?)", [a, b])
sql.eachRow("select * from USER") { print it.name }
def list = sql.rows("select * from USER")
```

- DataSet notion: poor-man ORM

```
def set = sql.dataSet("USER")
set.add(name: "Johnny", age: 33)
set.each { user -> println user.name }
set.findAll { it.age > 22 && it.age < 42 } // LINQ ☺
```

Template Engine



- Dear $fname ${lname.toUpperCase()},
  nice to meet you in <%= city %>.
  ${signed}

```
def binding = [fname:"Joe",   lname: "Bar",
               city: "Paris", signed:"MrG"]
def engine = new SimpleTemplateEngine()
def template =
    engine.createTemplate(text).make(binding)
println template.toString()
```

Parsing XML and GPath Expressions

- XML's never been that fun to parse!

```
def xml = """
<languages>
   <language name="Groovy">
      <feature coolness="low">SQL</feature>
      <feature coolness="high">Template</feature>
   </language>
   <language name="Perl"/>
</languages>"""
```

- XML nodes are mere properties!

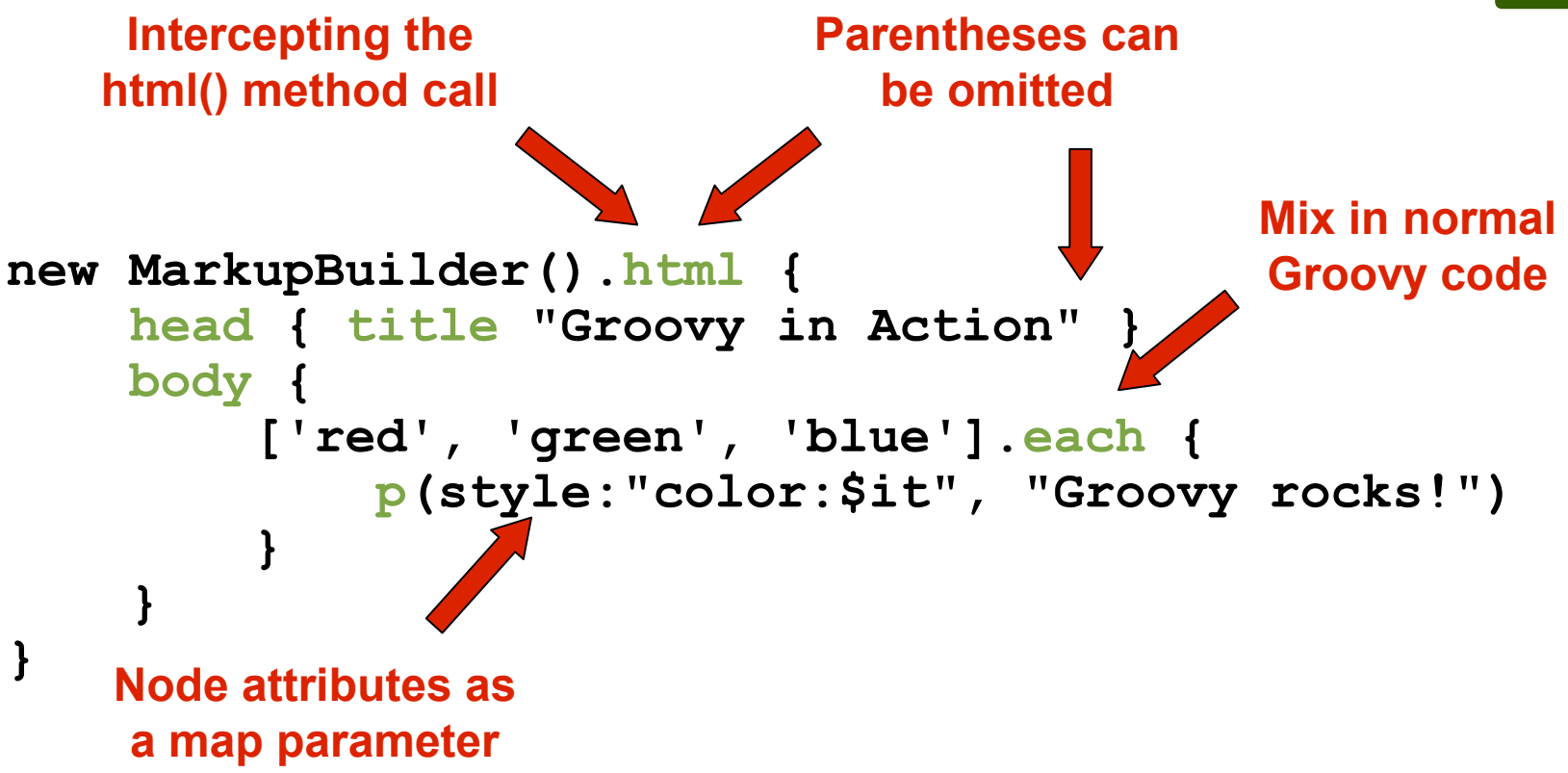
```
def root = new XmlParser().parseText(xml)
println root.language.feature[1].text()

root.language.feature
    .findAll{ it['@coolness'] == "low" }
    .each{ println it.text() }
```

Groovy's MOP

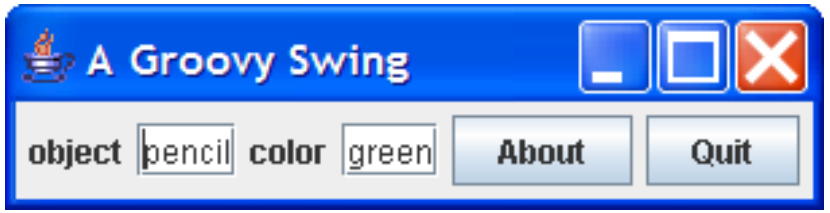
- What's that MOP $#@??
  → **Meta Object Protocol**
- At runtime, allows you to
  - Intercept method calls (even non-existing ones)
  - Intercept property accesses
  - Inject new methods or new properties
- You can create **Domain Specific Languages**
- With the MOP, come the…builders
  - **Builder pattern at the syntax level!**
  - MarkupBuilder, SwingBuilder, AntBuilder…

MarkupBuilder

- Creating XHTML markup programmatically



SwingBuilder



- Composition and nesting of Swing components

```
def theMap = [color: "green", object: "pencil"]
def swing = new SwingBuilder()
def frame = swing.frame(
            title: 'A Groovy Swing', location: [240,240],
            defaultCloseOperation:WindowConstants.EXIT_ON_CLOSE) {
  panel {
    for (entry in theMap) {
      label(text: entry.key)
      textField(text: entry.value)
    }
    button(text: 'About', actionPerformed: {
      def pane = swing.optionPane(message: 'SwingBuilder')
      def dialog = pane.createDialog(null, 'About')
      dialog.show()
    })
    button(text:'Quit', actionPerformed:{ System.exit(0) })
  }
}
frame.pack()
frame.show()
```

AntBuilder

- Reuse hundreds of Ant tasks as simple method calls
- Even create your own build system!

```
def ant = new AntBuilder()
def patterns = ["**/*.groovy", "**/*.java"]
ant.sequential {
    mkdir(dir: "dir1")
    copy(todir: "dir1") {
        fileset(dir: "dir2") {
            for(pattern in patterns)
                include(name: pattern)
        }
    }
    echo("done")
}
```

DEMO

Administer an Application Server by Manipulating JMX-Based Beans with Groovy

Status

- Groovy RC-1 released recently
- Next month: release of **Groovy 1.0 final**!
- **JSR 241** will standardize Groovy 1.0
- Groovy already JSR 223 compliant
- First version of **Grails**
- Two books soon on the shelves, including
  - "**Groovy in Action**", Manning

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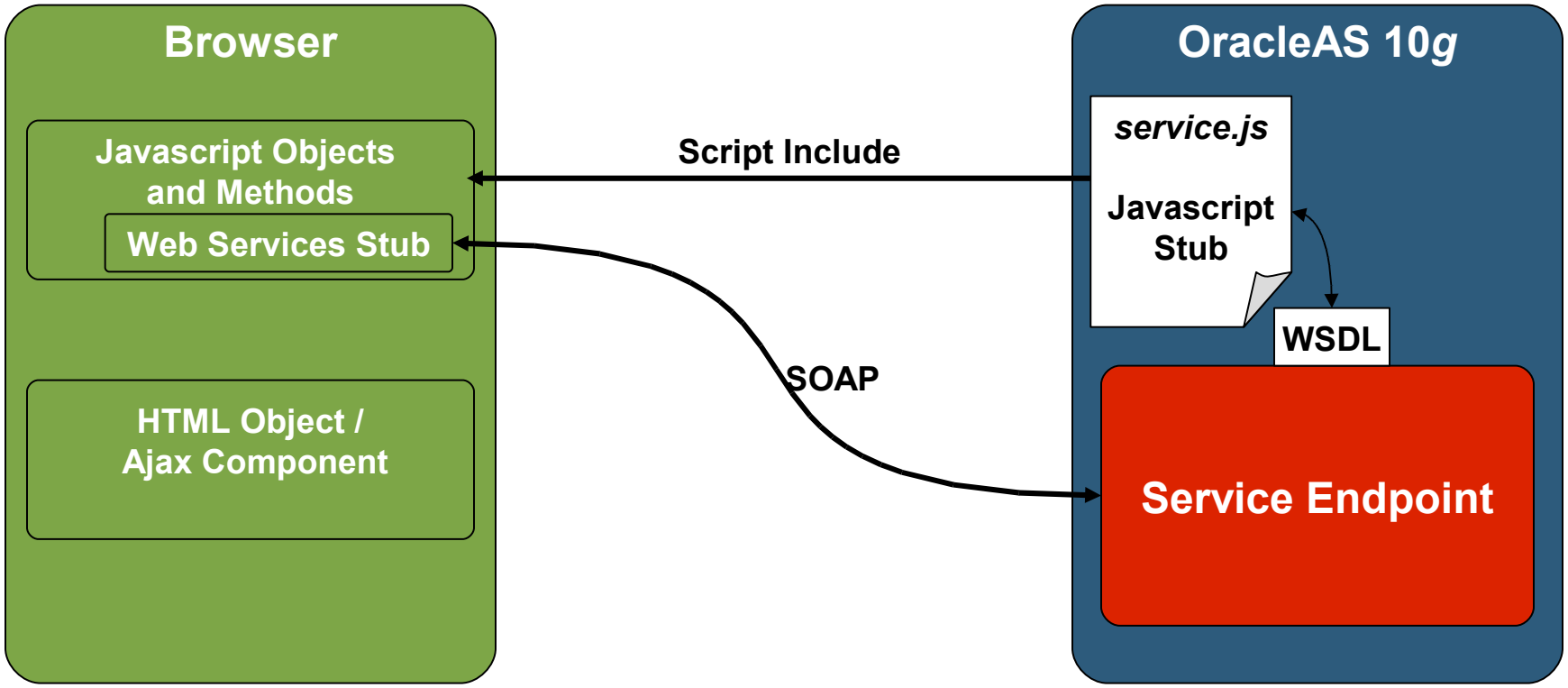
Simplify SOA With JavaScript Technology

- Generating JavaScript-based stub using Web Services metadata (WSDL)
  - Leverage the simplicity of JavaScript technology
  - Leverage Objects programming
- Use JavaScript
  - In the browser for AJAX applications
  - In the Java VM (Rhino/Java SE 6)

AJAX Web Services

Consume Web Services Directly From the Client



DEMO

Generate and Use Web Services Stubs for AJAX

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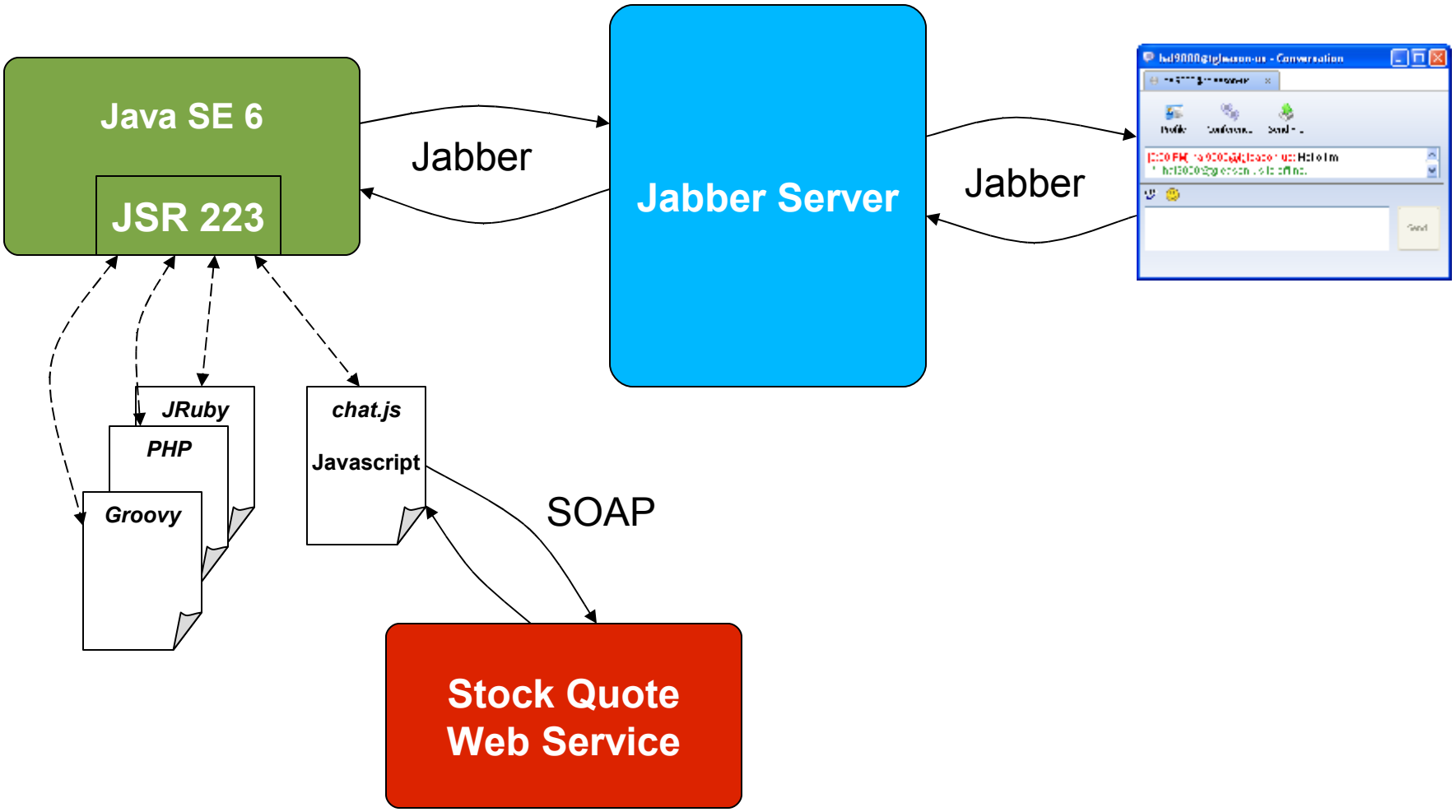
JSR 223—Scripting for the Java™ Platform

- **One API to rule them all!**
- JSE™ 6 includes JSR 223 and embeds JavaScript™ (Rhino)
- RI already usable starting from JDK 1.4
  - With Groovy, PHP, and Rhino
- ScriptEngines provide a common way to integrate stateful interpreters into Java
- Invocable and Compilable interfaces extend ScriptEngines to support generic function invocations and compilation of scripts

Chatting With Scripts



DEMO

Java SE 6 and Scripting

Chatting With Scripts

```
ScriptEngineManager manager =
        new ScriptEngineManager();

ScriptEngine engine =
        manager.getEngineByExtension(
            getExtension(args[0]));
```

Chatting With Scripts

Once:

```
engine.eval(new InputStreamReader(
    new FileInputStream(args[0])));
```

For Each Message:

```
invocableEngine.invoke("onMessage",
    new Object[]{chat, msgBody});
```

Chatting With Scripts: JavaScript

```
var SOAPScript = new Packages.soapscript.SOAPGen();
var namespace = SOAPScript.useWSDL("http://localhost:8888/…");
var service = SOAPScript.makeStub(namespace, "StockQuote");

var count = 0;

function onMessage (chat, message) {
    var params = message.split(" ");
    if (params[0] == "echo") {
        chat.sendMessage(params[1]);
    } else if (params[0] == "count") {
        count = count + 1;
        chat.sendMessage ("Count: " + count);
    } else if (params[0] == "quote") {
        var quote = service.StockQuotePort.getQuote(params[1]);
        chat.sendMessage(quote.name + ": $" + quote.price);
    }
}
```

Dynamic Java Objects in Scripts

- When you want to code in Java without a fixed interface
- Different for every language:
  - Groovy:
    - GroovyObject interface
    - `Object invokeMethod (String name, Object args)`
  - JavaScript (Rhino):
    - Scriptable and Function interfaces
    - `Object call(Context cx, Scriptable scope, Scriptable thisObj, Object[] args)`

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Integration patterns and use cases

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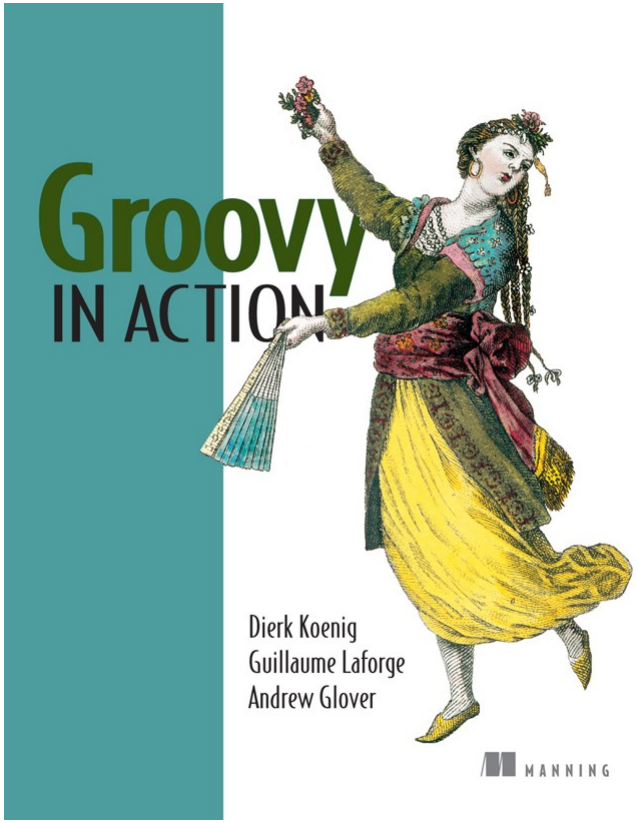
Summary

- Scripting simplifies development in the enterprise
- Scripting languages, such as **Groovy**, leverage the richness of Java technology
- Scripts can be used in various contexts
  - From the client using AJAX to the server
- The Java platform is embracing scripting with various standards

For More Information to Get the Groove…

- Attend Graeme Rocher's **Grails session**
- Web resources:
  - http://groovy.codehaus.org
  - http://grails.codehaus.org
- Read the upcoming **"Groovy in Action"** book from **Manning**, written by Dierk Koenig, Andrew Glover, and Guillaume Laforge



Q&A

With Guillaume, Tugdual, and Tim

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Grails—Groovy on Rails

Simplifying Web Application Development with Grails

Learn how **scripting** can allow you to dramatically speed up the **development of Web applications** and let you concentrate on the core parts of your project

Grails—Groovy on Rails

- New MVC Web Framework:
  - "**Convention over Configuration**"
- Reuses and innovates around standard bricks
  - **Spring**: Spring MVC, Spring WebFlow
  - **Hibernate**
  - **SiteMesh**
- Spiced up with some Groovy
  - GSP (Groovy Server Pages) and custom dynamic tags
  - Controllers and actions, Services
- But **no XML configuration**!

Grails Domain Classes

- Persistent domain beans

```
class Book {
    @Property Long id
    @Property Long version
    @Property String title
    @Property String author
}
```

No dependency

- Dynamic methods, thanks to the MOP

```
new Book(author: "x", title: "y").save()
Book.findByAuthor("Rowling").each{…}
```

- With Grails, it's possible to
  - Reuse existing Hibernate mappings
  - Specify validation constraints with a DSL
  - Define associations (1-1, 1-n, n-m)

Grails Services

- Create and injecting dependent services

```
class BookService {

    @Property MyService myService
    @Property boolean transactional = true

    def allBooks() {
        Book.findAll()
    }
}
```

No dependency

Automatic wiring and injection of services (No XML)

Transactional demarcation for atomic method calls

Manipulate your domain classes

- Possible to
  - Reuse existing Spring configuration
  - Services implemented in Java technology

Grails Controllers

- Create controllers and actions

```
class BookController {

    @Property BookService service

    @Property list = {
        ["books": service.allBooks()]
    }
}
```

Automatic wiring and injection of services

Pass the books to the view

- Injection of services
- Also integration of Spring WebFlow
- **Dynamic** CRUD **"scaffolding"** for views and controllers

Grails Views

- And now a GSP for the view

```
<html>
  <head><title>Book list</title></head>
  <body>
    <h1>Book list</h1>
    <table>
      <tr><th>Title</th><th>Author</th> </tr>
      <% books.each { %>
      <tr>
        <td>${it.title}</td>
        <td>${it.author}</td>
      </tr>
      <% } %>
    </table>
  </body>
</html>
```

- Possibility to use JavaServer Pages™ technology as well
- Grails dynamic tag library (AJAX, links, templates, etc…)