JBoss Seam

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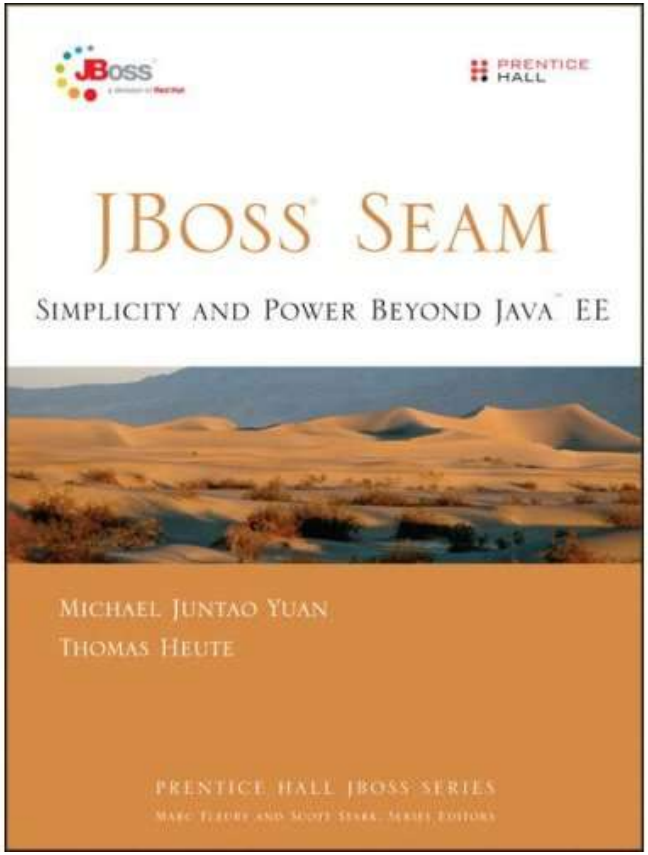
Who am I

- Seam core dev team member
  - Asynchronous method and Quartz integration
  - Performance analysis
  - Support for non-JBoss servers
  - Tools integration
  - Icefaces integration
  - Examples and demos
- Technologist at Ezee
- Editor for Red Hat Developer Portal
- Author of “JBoss Seam” from Prentice Hall



Agenda

- What is Seam and who should use it?
- 0 to 60
- Seam is made for JSF
- Conversations and business processes
- Security made easy
- The future

Seam in one sentence ...

Seam is a “deep integration” framework designed for web applications

A sensible programming model

- **All POJOs are first class Seam components. There is only one kind of component in Seam**
  - Entity beans, Hibernate POJOs
  - UI actions and event handlers
  - Business logic and transactional code
- **XHTML for all view needs**
  - Dynamic web pages, Ajax, Email, PDF, etc.
- **EL is used everywhere**
  - Link view pages with POJO components
  - XML configuration files
  - Pageflow, business process, tests definition etc.
- **XML configuration files are used for “configuration” only**
  - Database connections, runtime behavior, page flow

Deep integration

- **Seam provides access to other frameworks via the Seam programming model**
  - No need to use framework specific object factories, APIs, and XML configuration files
  - No need to manage several different component models
  - No need to use value transfer objects to communicate between frameworks
- **Seam adopts best design pattern to make frameworks work together out-of-the-box**
  - e.g., Open Session in View pattern to make Hibernate lazy loading work in JSF pages
- **Seam eliminates the repetitive API calls and XML files in integration work**
  - Eliminates the glue code

Deep Integration: Hibernate

- **Traditional architecture**
  - DAOs in business tier
  - Hibernate session closed in the controller (before the view is rendered)
  - Lazy loading does not work in view!!
- **Open session in view**
  - Close Hibernate session in servlet filter
  - Cannot display DB error in view (let alone messy code)
- **Seam**
  - Persistence context open until view is completely rendered (inc. page forward and redirect)
  - One transaction for controller and another for view (i.e., allows view to show the updated content in database)
  - No coding required for this to happen

Deep integration: jBPM

- Use jBPM to manage JSF pageflow
- Start / end jBPM process with annotated POJO methods
- Use JSF EL in jBPM process conditions
- Use JSF EL to access jBPM built-in objects

```
<pageflow-definition ...>

  <start-page name="selectCategory" view-id="/sell.xhtml">
    <redirect/>
    <transition name="next" to="enterDetails"/>
  </start-page>
  ... ...
  <page name="confirm" view-id="/confirm.xhtml">
    <redirect/>
    <transition name="finish" to="summary">
      <action expression="#{auctionAction.confirm}"/>
    </transition>
    <transition name="previous" to="enterDetails"/>
  </page>
</pageflow-definition>
```

```
@Begin(pageflow="createAuction",
            join=true)
public void createAuction() {
      // ... ...
}

... ....

@End
public void confirm () {
      // ... ...
}
```

Deep integration: iText

- Write PDF page in declarative XHTML
- No need to fiddle with iText Java API

```
<p:document ... title="Why Seam” keywords="mykeyword"
     subject="seam” author="Seam Team” creator="Seam PDF example app">

   <p:image alignment="right" wrap="true" value="/jboss.jpg" />
   <p:font size="24"><p:paragraph spacingBefore="16" spacingAfter="40">
      Order #{currentOrder.orderId}
   </p:paragraph></p:font>

   <p:paragraph>Dear #{currentOrder.customerName},</p:paragraph>

   <p:paragraph>... </p:paragraph>

   <p:barCode type="code128" code="My BarCode" />

   <p:signature field="My Signature"  size="200 200 400 400"  />
</p:document>
```

Deep integration: Quartz

```
@Asynchronous
public QuartzTriggerHandle schedulePayment(
      @Expiration Date when,
      @Cron String cron,
       ... any other call parameters ...) {
        // do the repeating or long running task
}
```

```
QuartzTriggerHandle handle =
         processor.schedulePayment(payment.getPaymentDate(),
                                   "0 10,44 14 ? 3 WED”,
                                   payment);
        payment.setQuartzTriggerHandle( handle );
        // Save payment to DB

        // later ...

        // Retrieve payment from DB
        // Cancel the remaining scheduled tasks
        payment.getQuartzTriggerHandle().cancel();
```

Who should use Seam?

- **JSF developers**
  - Seam solves a lot of nagging issues with JSF
  - Many Seam JSF features will be in JSF 2.0 and WebBeans
  - It would be crazy if you use JSF w/o Seam
- **Spring Hibernate users**
  - Seam eliminates the Lazy loading errors
  - Seam provides deep integration into other frameworks as opposed to Spring's "thin wrapper" + XML approach
- **Developers for business process driven web apps**
- **Anyone who has RoR envy but want to leverage the powerful Java platform**

Does Seam lock you into JBoss?

- **Seam deeply integrates JBoss and non-JBoss OSS frameworks**
  - JSF 1.2, EJB3, JPA, Web services, JMS
  - Facelets, iText, GWT, Dojo
  - Ajax4jsf, RichFaces, IceFaces
  - jBPM, Drools, Quartz, Groovy, , TestNG, Spring
- **Seam runs on a variety of application servers**
  - Glassfish, Oracle, WebLogic, WebSphere, plain Tomcat
- **Seam developers are from inside and outside of JBoss / Red Hat**

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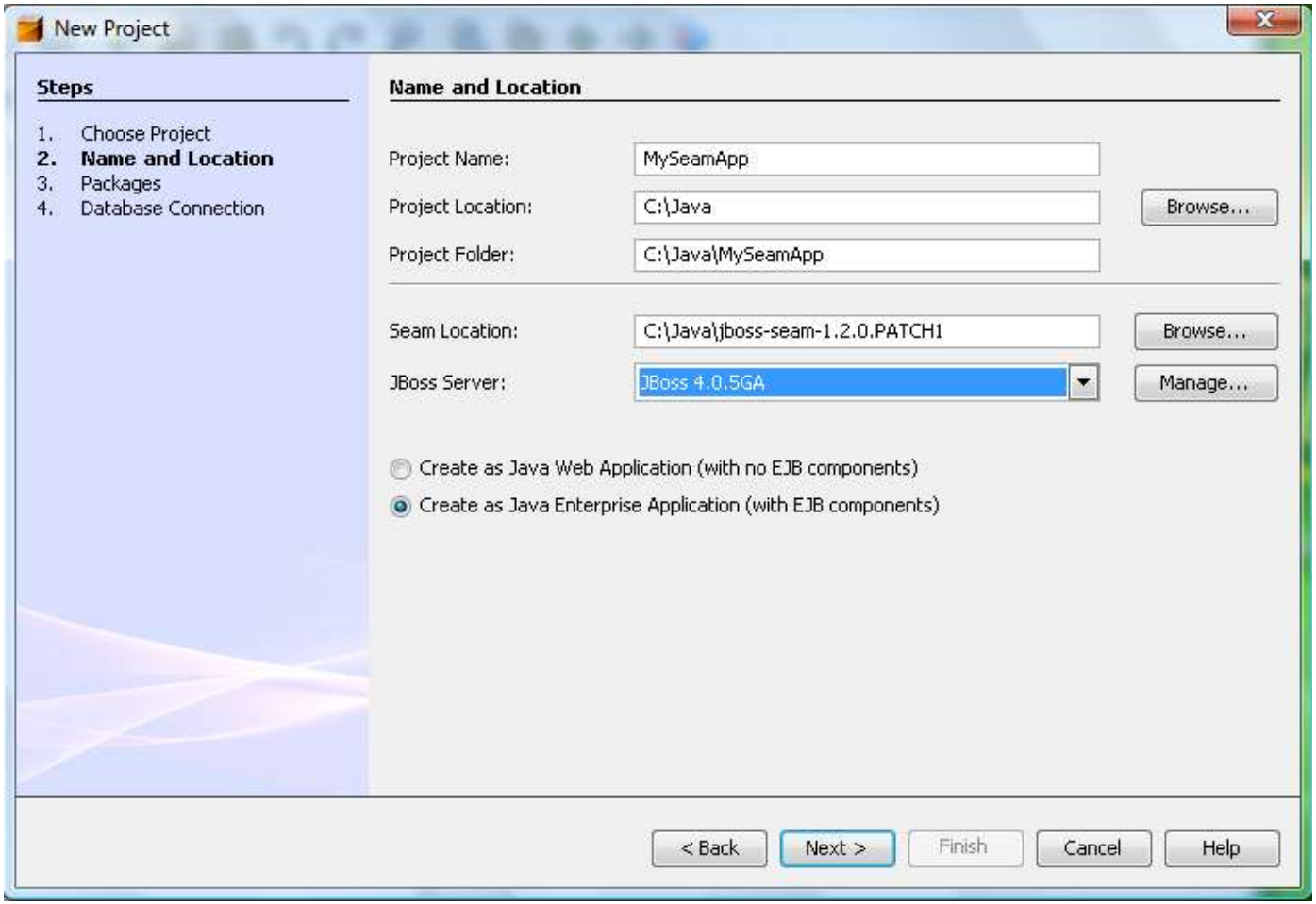
- Security made easy
- The future

Gavin’s dilemma

- If I talk about the really unique stuff in Seam, everyone thinks it must be complicated and difficult to use
- If I show how easy it is to use, people think its just another action/CURD framework

Setup a project



What was generated?

- A basic project skeleton
- With an Ant build script
- That deploys to a WAR or exploded directory
- With support for persistence via JPA
  - with test, dev and prod database profiles
- Basic login / logout
- A Facelets template
  - What if we don’t like it? (Change the CSS!)
- And a welcome page
  - What if we don’t like the welcome message?

Add a web page

```
<ui:composition xmlns="http://www.w3.org/1999/xhtml"
                xmlns:ui="http://java.sun.com/jsf/facelets"
                template="layout/template.xhtml">

<ui:define name="body">
        Hello!
        The time is #{currentTime} .
</ui:define>

</ui:composition>
```

Add some interaction

```
<ui:composition ...>

<ui:define name="body">
<h:form>
  Hello! #{hello.name} <br/> The time is #{currentTime}.<br/>

  <h:inputText value="#{hello.name}"/><br/>
  <h:commandButton type="submit" value="Say Hello"
                   action="#{hello.sayHello}"/>
</h:form>
</ui:define>

</ui:composition>
```

Each EL symbol corresponds to a Java object / method

The action class

```
@Name("hello")
public class HelloAction {
    String name;
    public String getName() {return name;}
    public void setName(String name) {this.name = name;}

    public void sayHello () { name = name.toUpperCase();}
}
```

- How it works:
  - Seam creates a new HelloAction instance and put it under name "hello" for each request
  - The object is destroyed after the response is completely rendered
  - There are other scopes available
  - You do not create new objects by hand

What we learned so far

- Look ma, no XML!
- Bi-directional Java binding to web page
- The action class is a fully fledged Seam component
  - Business logic, business process, rules are encapsulated in the same class
  - Fully object oriented and easily tested
  - The name “action” is just for Struts and RoR developers

Support persistence

```
<ui:composition ...>

<ui:define name="body">
<h:form>
  <h:inputText value="#{person.name}"/><br/>
  <h:commandButton type="submit" value="Say Hello"
                   action="#{hello.sayHello}"/><br/>

  The follow people said hello! <br/>
  <h:dataTable value="#{fans}" var="fan">
    <h:column><h:outputText value="#{fan.name}"/></h:column>
  </h:dataTable>

</h:form>
</ui:define>

</ui:composition>
```

The entity and action beans

```
@Entity
@Name("person")
public class Person implements Serializable {

  private long id;
  private String name;

  @Id @GeneratedValue
  public long getId() { return id;}
  public void setId(long id) { this.id = id; }

  public String getName() { return name; }
  public void setName(String name) {
    this.name = name;
  }
}
```

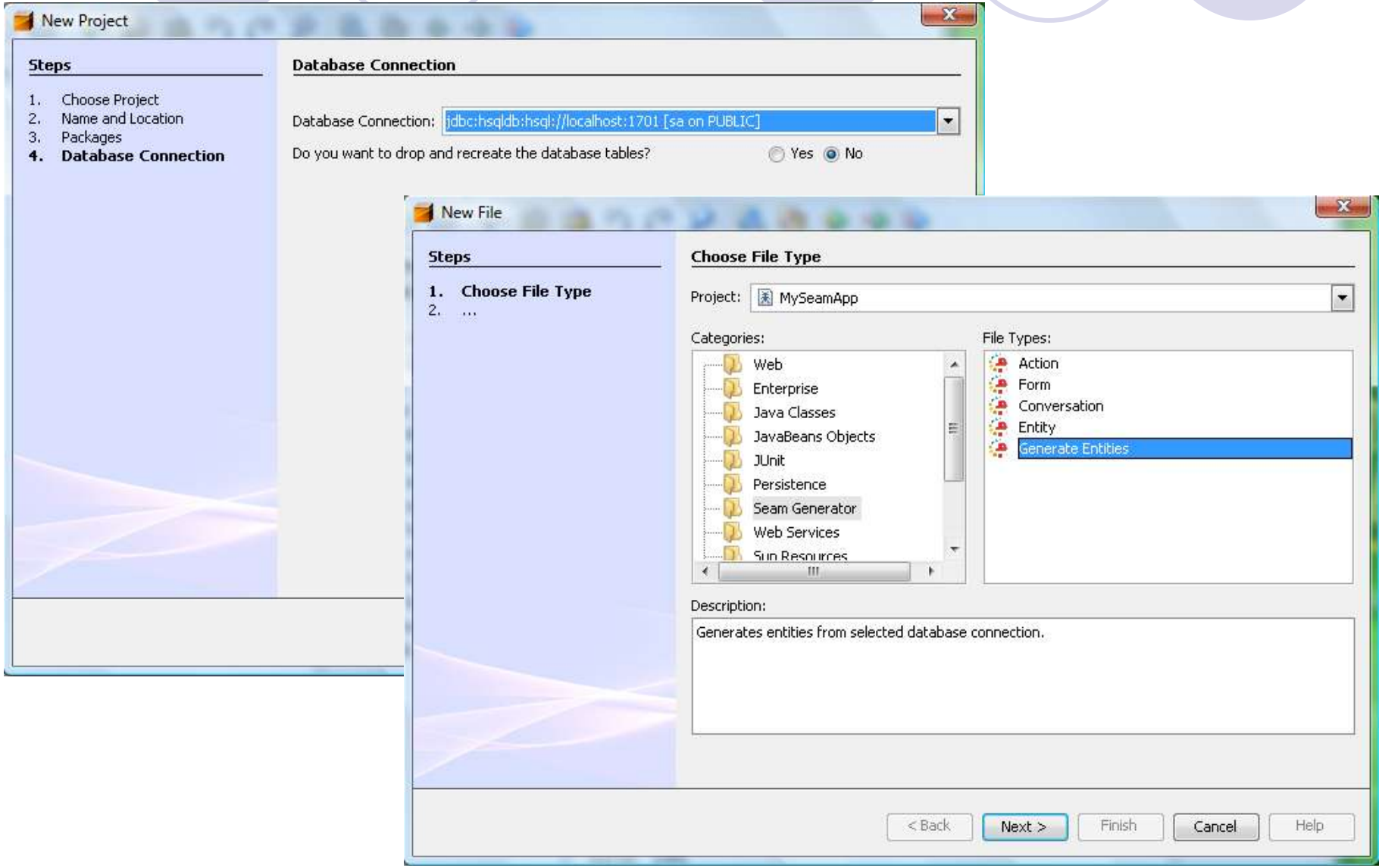
```
@Name(“hello")
public class HelloAction {

  @In @Out private Person person;

  @Out private List <Person> fans;

  @In (create=true) private EntityManager em;

  public void sayHello () {
    em.persist (person);
    person = new Person ();
    fans = em.createQuery(
                "select p from Person p")
              .getResultList();
    return null;
  }
}
```

Notice how bi-jection works in the action class

The rich domain model

- The “entity bean” is now a fully fledged Seam component
  - It can back UI or business logic
  - Just like any other POJOs in Seam
- You can add transient logic to the entity objects
  - The methods can be invoked from web pages (via EL) or from other Seam components (via bijection)
  - Encapsulate data with behavior!
  - True OO programming model!

Now, something more interesting



The generated app in action

Home | Payments List | Offices List | Orders List | Orderdetails List | Customers List | Productlines List | Employees List | Products List |

Welcome, demo | Logout |

MySeamApp

Payments

Generated edit page

paymentnumber * value is required

checknumber * 12345

paymentdate * value is required

amount *

April 2007						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	1	2	3	4	5
13 April 2007						

* required fields

customers*

No customers

Select customers

Key features

- Reverse engineer interlinked database tables to Hibernate / JPA POJOs
  - Foreign keys, composite keys are supported
- Generate CURD pages for each table and its associated tables
- Fully Ajax-based validation and data tables
- RESTful URLs are supported for each table
- Security is already built in

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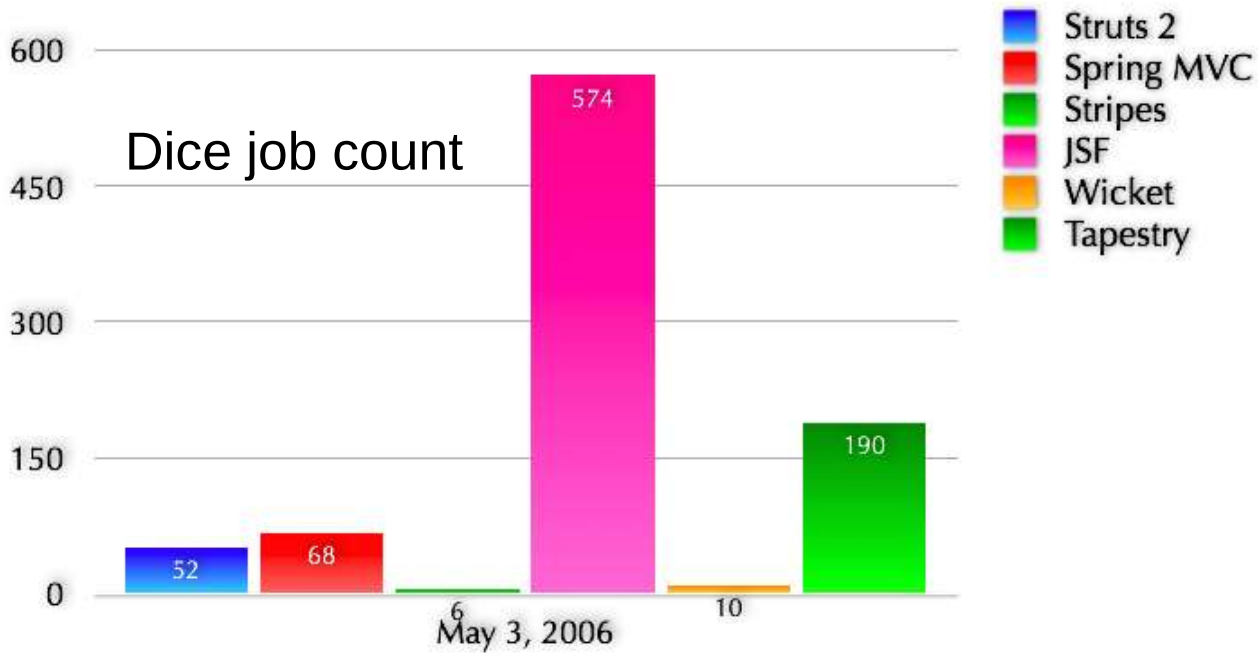
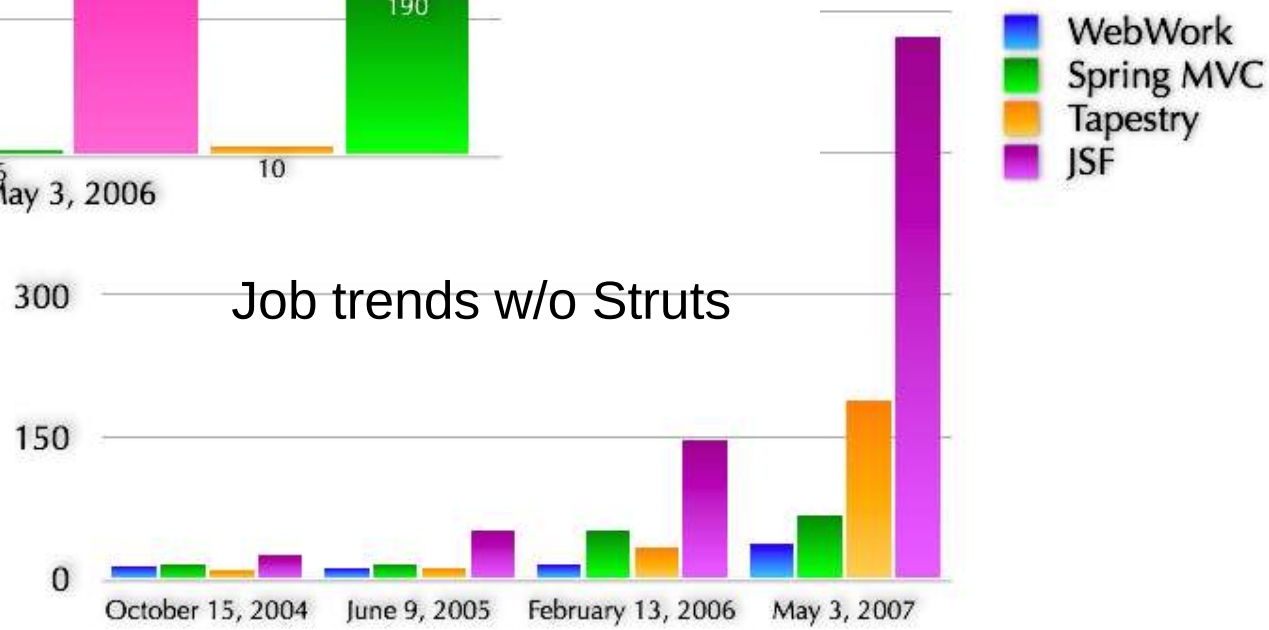
JSF: what's hot

- Fully component-based web framework
  - Event-based UI programming model
  - Great for visual tools support
  - Free and commercial component libraries
- Rich interaction model
  - Many places for external frameworks to plugin
- Integrated input validation / conversion
- Unified Expression Language (EL)
- Multiple rendering output from same pages
- Non-JSP template engines available
- Official Java EE standard

JSF jobs





Source: Matt Raible of appfuse, May 2007, http://raibledesigns.com/rd/date/20070503

JSF: what's not

- Does not follow Java EE 5 programming model
  - No special integration with EJB3, WS, JMS
  - Use verbose and repetitive XML instead of annotations
- Not "web friendly"
  - HTTP GET and RESTful URLs are hard
  - Hard to integrate custom JavaScript libraries
- Poor exception handling and error page redirection
- Hard to test out of the container

Key Seam enhancements

- Reduces boilerplate code
- No XML hell
- Integrated ORM support
- RESTful URLs and page actions
- Integrated page navigation rules
- Extended use of JSF EL
- Direct JavaScript integration for AJAX
- Elegant input validation
- Graceful exception handling
- Full support for “Redirect after Post”
- Very easy to test

Reduces boilerplate code

- No JSF backing beans
  - Use transactional components directly on web pages or in other components
  - There is only one kind of Seam component!
- Bi-jection of named components
- Simplified navigation rules
  - Navigation based on state not returned strings
- Configuration by exception

No XML hell

- Do not use XML for code
- XML is used in the following scenarios
  - Configure the framework components
  - Configure web page parameters and actions
  - Configure business processes and pageflows

Integrated ORM support

- Lazy loading just works
  - Eliminate the dreaded lazy loading exception
  - Built-in support for “open session in view” pattern
  - No need for complex DTOs between layers
- Automatic transaction rollback
  - Based on method return value or exceptions
- Can keep database session open across multiple requests (conversation and web transaction)

RESTful web applications

- The powerful pages.xml
- Inject HTTP GET parameters directly to Seam components
- Invoke arbitrary Seam methods when loading the page

```
<page view-id="/person.xhtml">
  <param name="pid" value="#{manager.pid}"
         converterId="javax.faces.Long"/>
  <action execute="#{manager.findPerson}"/>
</page>
```

```
@Name("manager")
public class ManagerAction {

  public void setPid (Long pid) { this.pid = pid; }

  public void findPerson () {
     if (pid != null) {
      person = (Person) em.find(Person.class, pid);
    } else { person = new Person (); }
  }
}
```

Robust page flow

Specify navigation rules based on EL expressions in pages.xml

- Application internal state
- Method binding
- No more fragile literal strings

```
<page view-id="/editperson.xhtml">
   <param name=“pid" value="#{manager.id}"/>

   <navigation>
     <rule if=“#{manager.error}”>
       <redirect view-id="/error.xhtml"/>
     </rule>
   </navigation>

   <navigation from-action="#{manager.delete}">
     <redirect view-id="/confirm.xhtml"/>
   </navigation>

   <navigation from-action="#{manager.update}">
     <redirect view-id="/main.xhtml"/>
   </navigation>
</page>
```

Expand JSF EL

- Expand the EL syntax

```
<h:inputText value="{person.name}"/><br/>
<h:commandButton type="submit" value="Save"
        action="#{hello.sayHello(person.name)}"/>
```

- Expand the EL usage
  - web pages
  - annotation parameters
  - XML configuration files
  - TestNG test scripts

Seam and Ajax

- Use Ajax enabled JSF components (e.g., RichFaces and IceFaces)
- Use Ajax4jsf to wrap regular JSF components
- Use Seam remoting to directly access Seam component from JavaScript
  - Very much like DWR
  - All popular JavaScript libraries supported
- Use the Seam GWT integration servlet

Elegant input validation

- Use Hibernate validators on data model
- Decorate the invalid fields
- Ajax validator supported out of the box

```
@Entity
@Name("person")
public class Person implements Serializable {

  private String name;
  @NotNull
  @Pattern(regex="^[a-zA-Z.-]+ [a-zA-Z.-]+",
     message="Need a firstname and a lastname")
  public String getName() { return name; }
  public void setName(String name) {this.name = name;}
}
```

```
<s:decorate>
  <h:inputText value="#{person.name}"/>
</s:decorate>
```

Failing Gracefully

- Redirect any exception to any page
- Configure error pages on a per-page basis
- Redirect to previous page upon login exception

```
<exception class="java.lang.RuntimeException">
   <redirect view-id="/generalError.xhtml">
     <message>Unexpected failure</message>
   </redirect>
</exception>
```

```
@ApplicationException(rollback=true)
@Redirect(viewId="/inventoryError.xhtml")
public class InventoryException extends Exception {

  public InventoryException () { }

}
```

Redirect after Post

- A very popular design pattern to avoid “double submit”
- JSF partially supports it via the <redirect/> navigation rule
  - However, JSF messages are not passed to the redirected page
  - Making it hard to use in current JSF
- Seam stateful context maintains JSF messages across re-directs

Seam testing framework

```
@Test
public void testSayHello() throws Exception {
  new FacesRequest("/hello.jsp") {

  @Override
  protected void updateModelValues() throws Exception {
    setValue("#{person.name}", "Michael Yuan");
  }

  @Override
  protected void invokeApplication() {
    assert getValue ("#{person.name}").equals("Michael Yuan");
    assert invokeMethod("#{manager.sayHello}") == null;
    assert getValue ("#{person.name}") == null;
  }

  @Override
  protected void renderResponse() {
    List<Person> fans =
          (List<Person>) getValue("#{fans}");
    assert fans!=null;
    assert fans.get(fans.size()-1)
                .getName().equals("Michael Yuan");
    }
  }.run();
}
```

TestNG-based

The entire JSF lifecycle
as well as database session
are mocked

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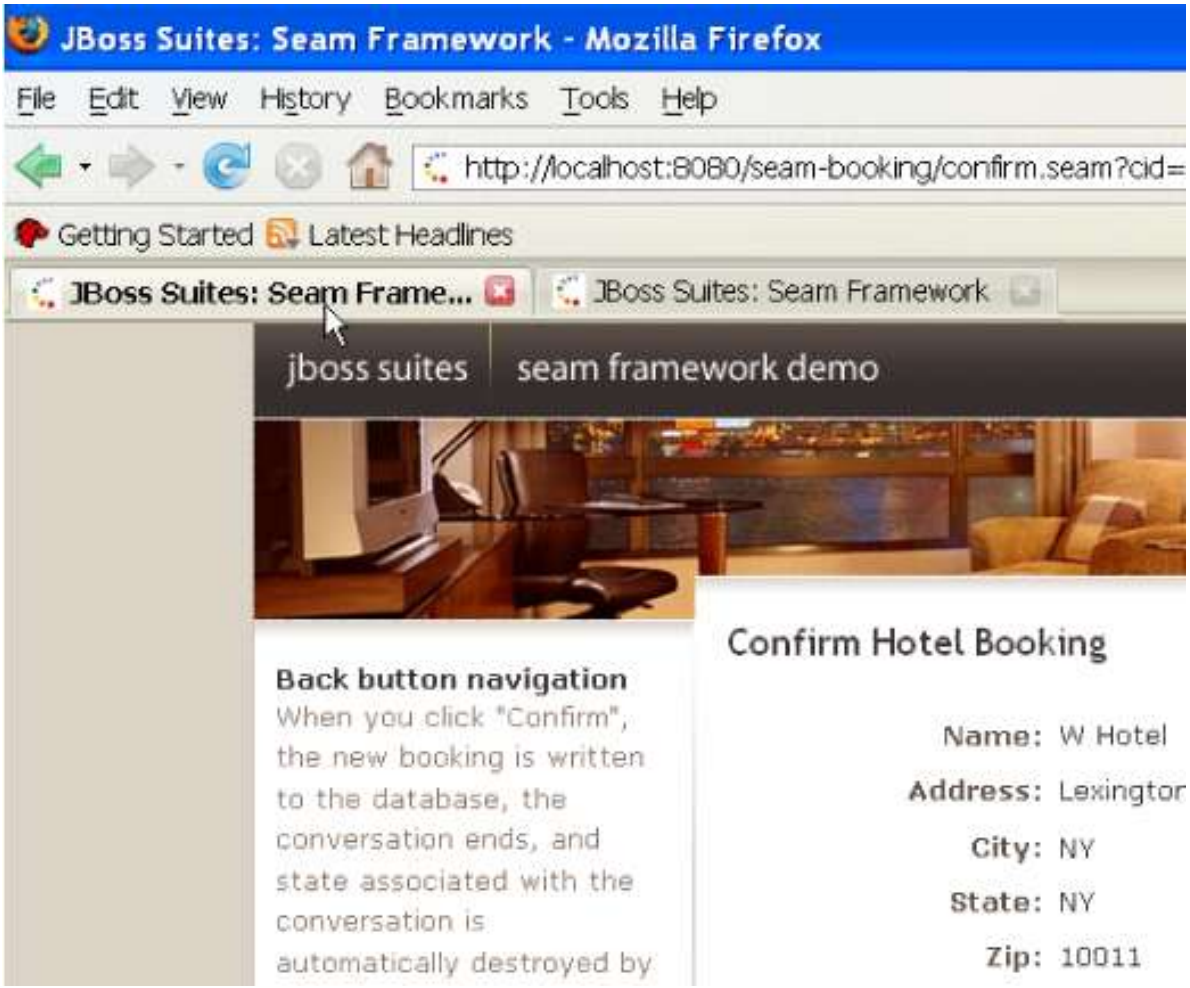
- Security made easy
- Conclusions

Conversations

- More finely grained than HTTP session
- Support “web transaction”
- Support multiple browser windows / tabs
- Support BACK buttons
- Great for wizards, shopping carts etc.

Conversation in action



Business process

- Manage long-lived objects in the “process scope”
- Map business process actors and actions to web actions via JSF EL
- Integrate with JBoss Rules (a.k.a Drools)

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Finely-grained security

- Username/password authentication
  - Authenticate against any backend
  - Authentication logic in Java code
- Finely-grained access control
  - Web pages
  - Elements on a web page
  - Java methods
- Rule-based instance-level access control

Protect a web page

```
Username: <h:inputText value="#{identity.username}"/>
Password: <h:inputSecret value="#{identity.password}"/>
<h:commandButton id="login" action="#{identity.login}" value="Account Login"/>
```

```
public boolean authenticate() {
  List results = em.createQuery("select u from User u where
                                u.username=#{identity.username} and
                                u.password=#{identity.password}")
            .getResultList();
  if ( results.size()==0 ) {
    return false;
  } else {
    user = (User) results.get(0);
    return true;
  }
}
```

```
<page viewId="/book.xhtml"
          login-required="true">
  ... ...
</page>
```

```
<components>
  ... ...
  <security:identity
      authenticate-method="#{authenticator.authenticate}"/>
</components>
```

Role-based access control

```
public boolean authenticate() {
  List results = em.createQuery("select u from User u where
                                u.username=#{identity.username} and
                                u.password=#{identity.password}")
            .getResultList();
  if ( results.size()==0 ) {
    return false;
  } else {
    user = (User) results.get(0);
    if (user.getRoles() != null) {
      for (UserRole mr : user.getRoles())
        identity.addRole(mr.getName());
    }
    return true;
  }
}
```

```
@Restrict(#{s:hasRole('admin')})
public void someAction () {
  ... ...
}
```

```
<s:div rendered="#{s:hasRole('admin')}">
  ... restricted content ...
</s:div>
```

```
<page viewId="/audit.xhtml">
  <restrict>#{s:hasRole('admin')}</restrict>
  ... ...
</page>
```

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The future

- Seam is moving extremely fast
  - New release every 2 months
  - Many new features for each release
  - One of the most active Java open source project today
- But the core API and programming model has been stable since 1.2 release
- Standardized into WebBeans and JSF 2.0
  - http://in.relation.to/Bloggers/Gavin

Seam 2.0 features

- Web services and ESB / SOA support
- Maven integration
  - Let Maven figure out dependency versions of frameworks integrated by Seam
- Integration of new frameworks
  - Groovy
  - GWT
  - Quartz
  - Hibernate Search
  - JFreeChart

The Red Hat Developer Studio

- Wizards to generate Seam applications
- Rich UI editor for WYSIWYG web pages
- Validate EL expressions in pages and configuration files
- Link EL expressions to Java code
- Deployment / preview directly from IDE
- Run tests directly from IDE
- Integrated JBoss EAP 4.2
- “Free” version available as “JBoss Tools”