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Israel JBoss User Group

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JBoss Seam

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Agenda

- JEE5 pros and cons
- Seam components
- Conversations
- Integration with Seam
  - Seam AF
  - Spring
  - Remoting and JMS
- Integration Tests with Seam

Lightweight Framework For JEE5

- What does that mean?
- Isn't JEE5 itself a collection of "frameworks"?
- Why do you need another one that is outside the official specification?
- Seam – The "missing framework" that should have been included in Java EE 5.0.

JEE5 Programming Model – JSF

- Template language
  - » Extensible component model for widgets
- *Contextual* "Managed Bean" component model
- Defines interactions between the page and managed beans
- True MVC – No httpRequest and httpResponse
- Validation
- XML-based "Navigation Rules"

JEE5 Programming Model – EJB3

- Component model for transactional components
  - Dependency injection
  - Declarative transaction and persistence context demarcation
  - Sophisticated state management
- ORM for persistence
- Annotation-based programming model

Let's Suppose We Have Some Data

```
create table Document (
    id bigint not null primary key,
    title varchar(100) not null unique,
    summary varchar(1000) not null,
    content clob not null
)
```

We'll Use an Entity Bean

```
@Entity
public Document {
    @Id @GeneratedValue private Long id;
    private String title;
    private String summary
    private String content;
    //getters and setters...
}
```

Surrogate key identifier attribute

Search Page

```
<h:form>
  Document Id
  <h:inputText value="#{documentEditor.id}"/>

  <h:commandButton type="submit" value="Find"
                                 action="#{documentEditor.get}"/>
</h:form>
```

JSF value binding

JSF control

JSF method binding

Edit Page

```
<f:form>
  Title
  <h:inputText value="#{documentEditor.title}">
    <f:validateLength maximum="100"/>
  </h:inputText>

  Summary
  <h:inputText value="#{documentEditor.summary}">
    <f:validateLength maximum="1000"/>
  </h:inputText>

  Content
  <h:inputText value="#{documentEditor.content}"/>

  <h:messages/>

  <h:commandButton type="submit" value="Save"
                                   action="#{documentEditor.save}"/>
</f:form>
```

JSF validator

Should We Use SLSB?

```
@Stateless
public EditDocumentBean implements EditDocument {
  @PersistenceContext
  private EntityManager em;

  public Document get(Long id) {
    return em.find(Document.class, id);
  }

  public Document save(Document doc) {
    return em.merge(doc);
  }
}
```

And a "Backing Bean"?

```
public class DocumentEditor {
  private Long id;
  private Document document;

  public String getId() { return id; }
  public void setId(Long id) { this.id = id; }
  public String getTitle() { return document.getTitle(); }
  public void setTitle(String title){ document.setTitle(title); }
  //etc...

  private EditDocument getEditDocument() {
    return (EditDocument) new InitialContext().lookup(…);
  }

  public String get() {
    document = getEditDocument().get(id);
    return document==null ? "notFound" : "success";
  }

  public String save() {
    document = getEditDocument().save(document);
    return "success";
  }
}
```

Properties bound to controls via value bindings

Action listener methods bound to controls via the method bindings

JSF outcome

We Also Need the JSF XML

```
<managed-bean>
  <managed-bean-name>documentEditor</managed-bean-name>
    <managed-bean-class>
      com.tikal.docs.DocumentEditor
    </managed-bean-class>
    <managed-bean-scope>session</managed-bean-scope>
</managed-bean>

<navigation-rule>
  <from-view-id>/getDocument.xhtml</from-view-id>
    <navigation-case>
      <from-outcome>success</from-outcome>
      <to-view-id>editDocument.xhtml</to-view-id>
    </navigation-case>
</navigation-rule>

<navigation-rule>
  <from-view-id>/editDocument.xhtml</from-view-id>
    <navigation-case>
      <from-outcome>success</from-outcome>
      <to-view-id>findDocument.xhtml</to-view-id>
    </navigation-case>
</navigation-rule>
```

The name of a contextual variable we can refer to in the EL

This is a session scoped component!

Navigation rules map logical, named “outcomes” to URL of the resulting view

JEE5 Compared to J2EE

- Much simpler code
  - Fewer artifacts (no DTO, for example)
  - Less noise (EJB boilerplate, Struts boilerplate)
  - More transparent (no direct calls to HttpSession,HttpRequest)
  - Much simpler ORM (even compared to Hibernate)
  - Finer grained components

JEE5 Compared to J2EE Cont.

- More powerful for complex problems
  - JSF is amazingly flexible and extensible
  - EJB interceptors support a kind of “lightweight AOP”
  - Powerful ORM engine
- Unit testable
  - All these components (except the xhtml pages) may be unit tested using JUnit or TestNG

Room For Improvement in JEE5

- The managed bean is just noise – its concern is pure “glue”
  - Accounts for more LOC than any other component!
  - It doesn’t really decouple layers
- Does not work in a multi-window application
  - Make it work is a major architecture change!

Room For Improvement Cont.

- The application leaks memory
  - The backing bean sits in the session until the user logs out
  - In more complex apps, this is often a source of bugs!
- “Flow” is weakly defined
  - Navigation rules are totally ad hoc and difficult to visualize
  - How can this code be aware of the long-running business process?
- JSF XML is too noisy – especially the first part
- Don't repeat yourself (DRY) regarding validation

Stateful Session Bean ?

- Let's assume we need “Transparent Failover”
  - Put and reconstruct state into the DB for every request
    - Lack of scalability.
    - Added latency
    - Introduce 2nd Level Cache ?
      - LRU instead of user interaction
      - Transactional synch with DB
  - Hold your state in httpSession
    - A lot more difficult than it sounds – i.e. Cluster Bugs
    - You must remember to call session.setAttribute()
  - Stateful Session Bean is your solution to hold state!!!

JBoss Seam

- Unify the two component models
  - Simplify Java EE 5, filling a gap
  - Improve usability of JSF
- Integrate jBPM
  - BPM technology for the masses
- Deprecate so-called stateless architecture
- Enable richer user experience

Contextual Components

- Most of the problems relate directly or indirectly to state management
  - Servlet spec contexts are not meaningful in terms of the application
  - EJB itself has no strong model of state management
  - We need a richer context model that includes “logical” contexts that are meaningful to the application
  - Bind EJB component directly to our view!

Bijection Components

- DI is broken for stateful components
  - A contextual variable can be written / read
  - Its value changes over time
- DI was designed with stateless services in mind
- **bijection – both injection and outjection**
  - **Dynamic, contextual, bidirectional**
  - **Don't think of this in terms of "dependency"**
  - **Think about this as aliasing a contextual variable into the namespace of the component**

Our First Seam Component

```
@Entity
@Name("document")
public Document {
    @Id @GeneratedValue private Long id;
    private String title;
    private String summary
    private String content;

    @NotNull
    @Length(max=100)
    public String getTitle() { return title; }
    public void setTitle(String t) { title = t; }

    @NotNull
    @Length(max=1000, message = "This summary is too long")
    public String getSummary() { return summary; }
    public void setSummary(String s) { summary = s; }
    ...
}
```

Component name

Validation Rules

Error message

The Edit Page

```
<f:form>
  <s:validateAll>
    Title: <h:inputText value="#{document.title}"/>
    Summary: <h:inputText value="#{document.summary}"/>
    Content: <h:inputText value="#{document.content}"/>
    <h:messages/>
  </s:validateAll>
  <h:commandButton type="submit" value="Save"
                                   action="#{documentEditor.save}"/>

</f:form>
```

Bind view to the entity bean directly

Error messages will display here

```
<f:facet name="afterInvalidField">
  <s:message/>
</f:facet>
...

<s:decorate id="content">
  <h:inputText value="#{document.content}"/>
    <a:support event="onblur" reRender="content"/>
  </h:inputText>
</s:decorate>
...
```

Message after invalid field

Use Seam with ajax for re-rendering

Let's Create a "Conversation"

```
@Stateful
@Name("documentEditor")

public EditDocumentBean implements EditDocumentSFSB
  @PersistenceContext(type=EXTENDED)
  private EntityManager em;
  private Long id;

  @Out @In(create=true)
  private Document document;

  @Begin
  public String get() {
    document = em.find(Document.class, id);
    return document==null ? "notFound" : "success";
  }
  @End
  public String save() {
    //NO NEED TO MERGE!
    return "success";
  }

  @Destroy @Remove
  public void destroy(){}
}
```

Binds the component to a contextual variable

The Managed Beans have states so we use SFSB

Extended persistence context.

Injection & Outjection

Starts a conversatio n

End the conversation

Improve performance

Seam Managed Persistence Context

- Outside of a Java EE 5 environment
- Loosely coupled components that collaborate together in the scope of a single conversation
- Inject the Persistence Context with @In annotation
- No more LazyInitializationException
  - Two system transactions to handle one JSF request
    - From Restore View phase Invoke Application phase
    - Read Only – Spans the Render Response phase of a JSF request.

Atomic Conversations

```
@In(create = true, value = "claimEM")
private EntityManager em;

@Begin(flushMode=FlushModeType.MANUAL)
public void beginClaimWizard() {
  claim = em.find(Claim.class, claimId);
}
```

Claim remains managed after we finish the method

```
public void addPartyToClaim() {
  Party party = ....;
  claim.addParty(party);
}
```

Improve performance - Changes will NOT be flushed

```
@End
public void commitClaim() {
  em.flush();
}
```

...until we get here

Booking Hotel Conversation Demo

Seam AF – Home Objects

- Provides persistence operations for a particular entity class: persist(), remove(), update() and getInstance().
- No need for the Session Bean nor the Backing Bean

Factory method

```
<framework:entity-home name="documentHome" entity-class="eg.Document">
  <factory name="document" value="#{documentHome.instance}"/>
</framework:entity-home>
```

Bind variable to instance created by the factory method

```
<h1>Create Document</h1>
<h:form>
  Title: <h:inputText value="#{document.title}"/>
  Summary: <h:inputText value="#{document.summary}"/>
  Content: <h:inputText value="#{document.content}"/>
  <h:commandButton value="Create Document"
action="#{documentHome.persist}"/>
</h:form>
```

Using the Home Object to persist the document

Seam AF – CRUD with Home Objects

```
<pages>
  <page viewid="/editDocument.xhtml">
    <param name="documentId" value="#{documentHome.id}"/>
  </page>
</pages>
```

Pass the entry identifier to the DocumentHome

Seam AF – CRUD with Home Objects

```
<h1>
  <h:outputText rendered="#{!documentHome.managed}" value="Create
Document"/>
  <h:outputText rendered="#{documentHome.managed}" value="Edit Document"/>
</h1>
<h:form>
    Title: <h:inputText value="#{document.title}"/>
    Summary: <h:inputText value="#{document.summary}"/>
    Content: <h:inputText value="#{document.content}"/>



<h:commandButton value="Create Document" action="#{documentHome.persist}"

rendered="#{!documentHome.managed}"/>
<h:commandButton value="Update Document" action="#{documentHome.update}"

rendered="#{documentHome.managed}"/>
<h:commandButton value="Delete Document" action="#{documentHome.remove}"

rendered="#{documentHome.managed}"/>
</h:form>
```

Edit or Create will be determined if we supply id

Seam AF – Query Objects

```
<framework:entity-query name="documents"
                        ejbql="select d from Document d"/>
```

Run the query

```
<h1>List of documents</h1>
<h:dataTable value="#{documents.resultList}" var="document">
  <h:column>
    <s:link view-id="/editDocument.xhtml"
                              value="#{document.title}
#{document.summary}">
      <f:param name="documentId" value="#{document.id}"/>
    </s:link>
  </h:column>
</h:dataTable>
```

Page parameter will be used by the Home object

Binding the document variables

Injecting Components into Spring Beans

```
<beans xmlns="http://www.springframework.org/schema/beans"
  xmlns:seam="http://jboss.com/products/seam/spring"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://www.springframework.org/schema/beans
  http://www.springframework.org/schema/beans/spring-beans-2.0.xsd
  http://jboss.com/products/seam/spring
  http://jboss.com/products/seam/spring-1.2.xsd">

  ...
  <seam:instance id="seamManagedEM" name="someManagedEMComponent"
                                                        proxy="true"/>

  <bean id="someSpringBean" class="SomeSpringBeanClass">
    <property name="entityManager" ref="seamManagedEM">
  </bean>

  ...
</beans>
```

Enabling Seam

Inject a proxy of the Seam component, and resolve the reference when the proxy is invoked

Injecting Spring Beans into Components

```
<application>
  <variable-resolver>
    org.springframework.web.jsf.DelegatingVariableResolver
  </variable-resolver>
</application>
```

```
@In("#{bookingService}")
private BookingService bookingService;
```

Inject bookService Spring bean into Seam component

Making Spring Beans to Components

```
<bean id="someSpringBean" class="SomeSpringBeanClass" scope="prototype">
  <seam:component/>
</bean>
```

Will create a Stateless Seam component

Seam Remoting – Server Side

- Seam provides a convenient method of remotely accessing components from a web page, using AJAX.
- Client-side interaction with your components is all performed via the Seam Javascript object.

```
@Stateless
@Name("helloAction")
public class HelloAction implements HelloLocal {
  public String sayHello(String name) {
    return "Hello, " + name;
  }
}
```

Component name

```
@Local
public interface HelloLocal {
  @WebRemote
  public String sayHello(String name);
}
```

A Remote Service

Seam Remoting – Client Side

```
<script type="text/javascript"
src="seam/resource/remoting/resource/remote.js"></script>
  <script type="text/javascript"
src="seam/resource/remoting/interface.js?helloAction"></script>
```

```
<button onclick="javascript:sayHello()">
  Say Hello
</button>
```

```
<script type="text/javascript">
    //<![CDATA[
    function sayHello() {
      var name = prompt("What is your name?");
      Seam.Component.getInstance("helloAction").
                                    sayHello(name, sayHelloCallback);

    }

    function sayHelloCallback(result) {
      alert(result);
    }

    // ]]>
</script>
```

The remote call

Creates a proxy

The callback function for results

JMS Subscription

```
function subscriptionCallback(message) {
  if (message instanceof Seam.Remoting.TextMessage)
    alert("Received message: " + message.getText());
  }

Seam.Remoting.subscribe("topicName", subscriptionCallback);
```

Subscribe to a topic

The callback function to invoke when a message is received.

```
<remoting:remoting poll-timeout="1" poll-interval="5"/>
```

Integration Tests

- How can we emulate user interactions ?
- Where to put our assertions ?
  - Test the whole application by reproducing user interactions with the web browser is not appropriate for use at development time.
- Solution – Script your components while running inside a pruned down container environment
  - You get to pretend you are the JSF implementation!

Integration Tests Cont.

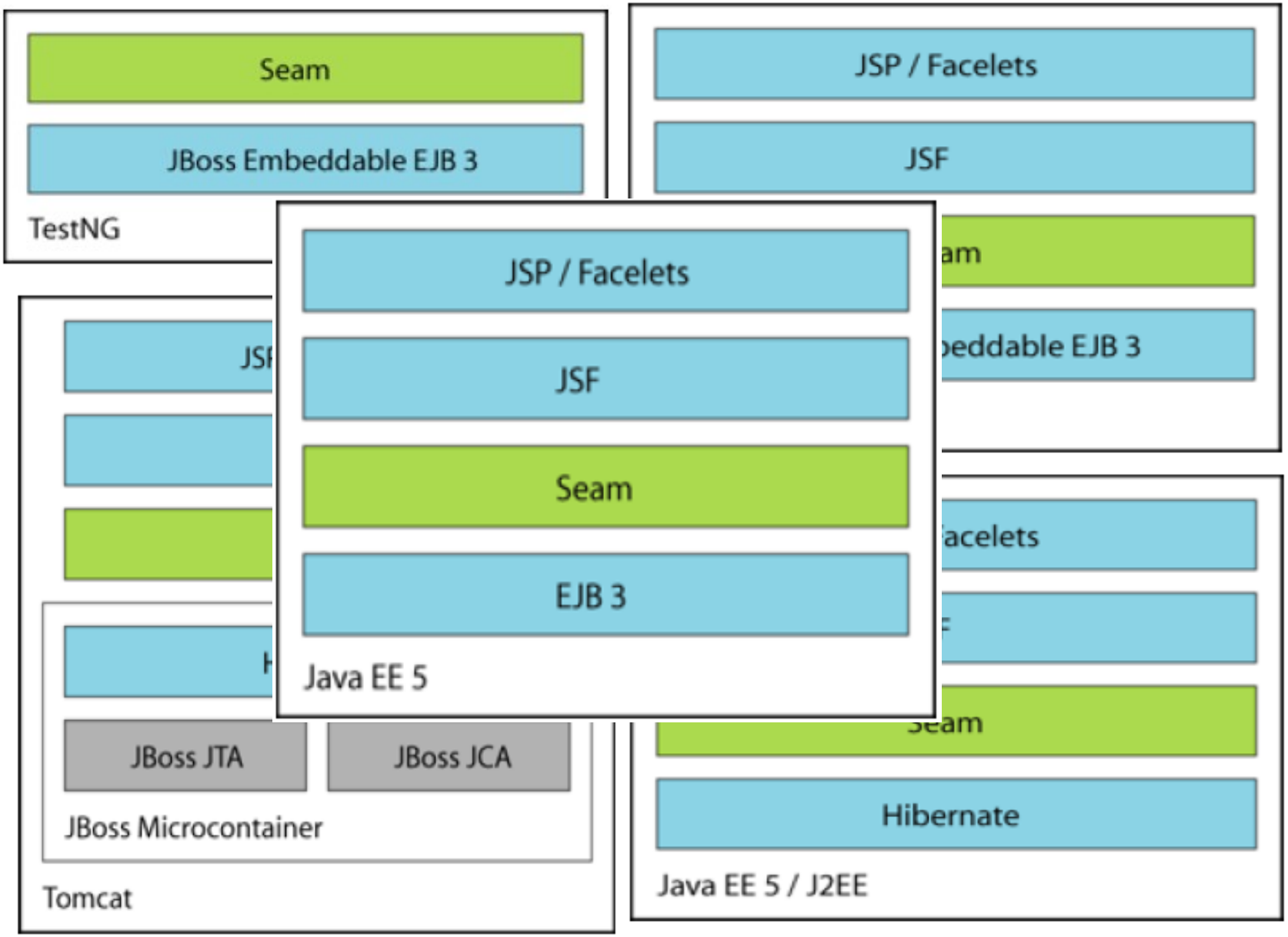
```
public class CreateDocumentTest extends SeamTest{
   @Test public void testCreate() throws Exception  {
      new FacesRequest() {
         @Override protected void processValidations() throws Exception {
            validateValue("#{document.title}", "Some Document Title");
            validateValue("#{document.summary}", "A short summary");
            validateValue("#{document.content}", "Blah Blah");
            assert !isValidationFailure();
         }

         @Override protected void updateModelValues() throws Exception {
            setValue("#{document.title}", "Some Document Title");
            setValue("#{document.summary}", "A short summary");
            setValue("#{document.content}", "Blah Blah");
         }

         @Override protected void invokeApplication() {
            assert invokeMethod("#{documentEditor.save}").equals("success");
         }

         @Override protected void renderResponse() {
            assert getValue("#{document.title}", "Some Document Title");
            assert getValue"#{document.summary}", "A short summary");
            assert getValue("#{document.content}", "Blah Blah");
         }
      }.run();
   }
}
```

Runtime Environments



JBoss Seam Summary

- Provides a consistent programming model for all components in an enterprise web application.
- Other covered areas by Seam:
  - Email, iText, Security (Authentication, Authorization), Jboss Rules, Caching, Exception Handling, I18N, Interceptors, jBPM
- Tested: GlassFish, WebLogic WebSphere, Jboss, Oracle
- Future enhancements
  - Web Services
  - Web Beans – JSR-299 may be introduced into JEE6

Q&A

Thank You

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