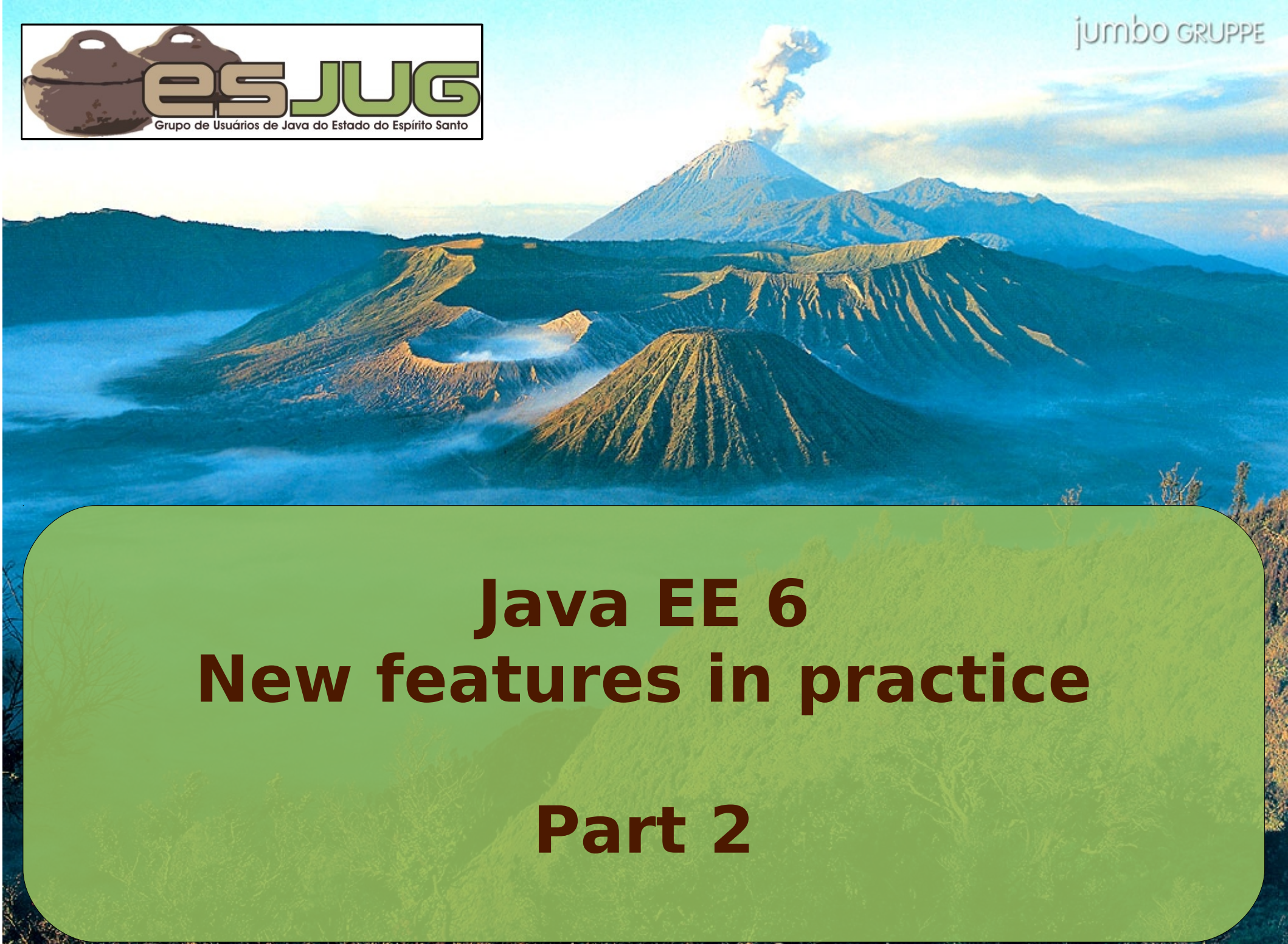

Java EE 6
New features in practice

Part 2

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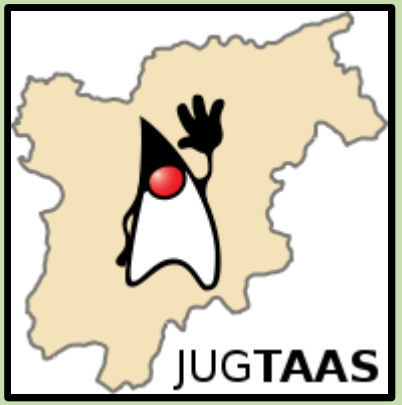
About the author – Vítor Souza

- Education:
  - Computer Science graduate, masters in Software Engineering – (UFES, Brazil), taking PhD at U. Trento.
- Java:
  - Developer since 1999;
  - Focus on Web Development;
  - Co-founder and coordinator of ESJUG (Brazil).
- Professional:
  - Substitute teacher at Federal University of ES;
  - Engenho de Software Consulting & Development.
- Contact: vitorsouza@gmail.com

JUG TAAS = JUG Trento + JUG Bolzano

- Website:
  - http://www.jugtrento.org/
  - http://www.jugbz.org/
- Mailing list (in Italian, mostly): http://groups.google.com/group/jugtaa
- If you're interested in Java, join and participate!



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Agenda

- Quick summary of part 1;
- Facelets for page decoration;
- Criteria API;
- Conversations;
- AJAX support.

Quick summary of part 1 (1)

- Java EE 6 (JSR 316), released in December 2009;
  - Platform for development of enterprise applications (scalability, security, accessibility, etc.);
  - New version focuses on flexibility, extensibility and ease of development;
- The platform includes many other technologies:

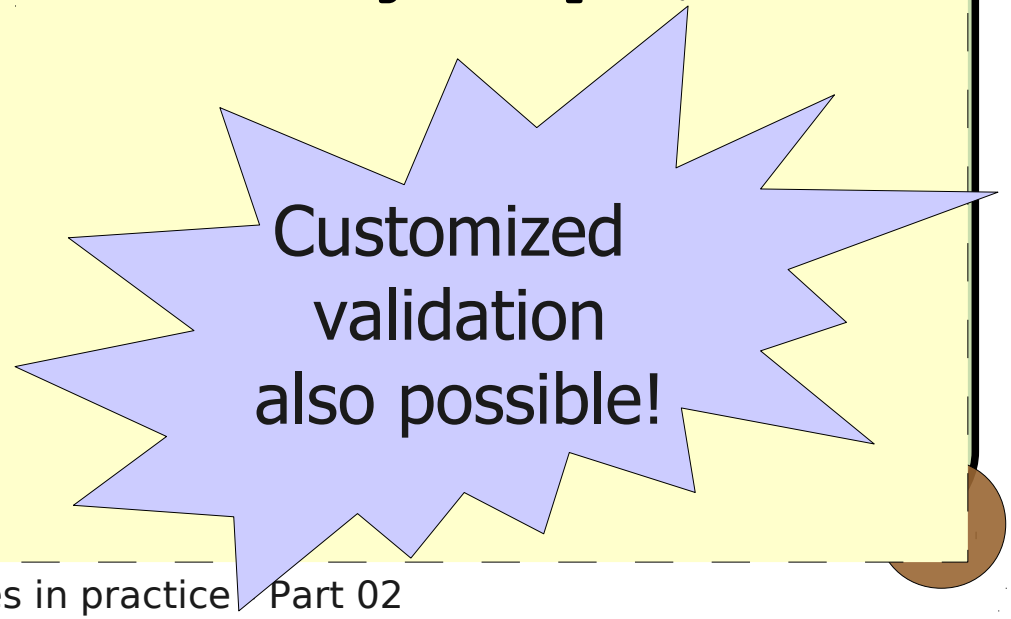
  Bean Validation, CDI, EJB, EL, JACC, JASPIC, Deployment API, Management API, JavaMail, JAX-RS, JAX-WS, JAXB, JCA, JMS, JPA, JSF, JSP, JSTL, JTA, Managed Beans, Servlet, Web Services Metadata.

- Profiles: standard, Web, more in the future?

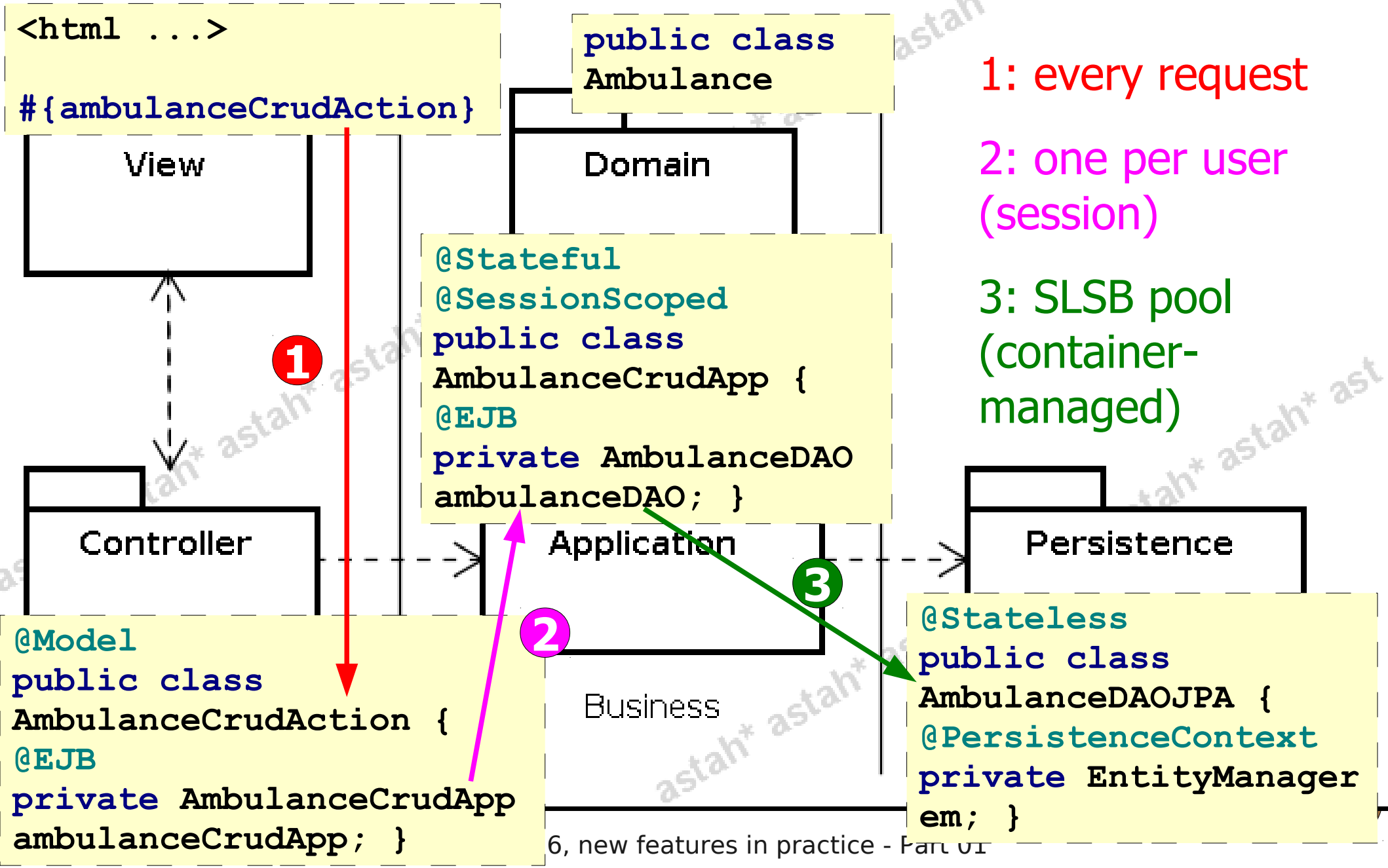
Quick summary of part 1 (2)

- Tools: GlassFish V3, NetBeans 6.9;
- Example application: ADS;
- Domain objects: POJO + JPA Annotations;
- Bean Validation: annotations on domain classes provide validation across the platform.

```
public class Ambulance extends PersistentObjectImpl {
   @NotNull
   private int number;

   @NotNull
   @Size(min = 8, max = 8)
   private String licensePlate;

   /* ... */
}
```



Quick summary of part 1 (3) – CDI



Facelets

Facelets

- Alternative to JSP for JSF pages (since 2005);
- JSF and JSP are incompatible (see [1]);
- Was framework, became standard in Java EE 6;
- Web pages written in XHTML (verifiable);
- Allows the construction of decorators for pages;
- Allows the creation of custom components.

[1] = onjava.com/pub/a/onjava/2004/06/09/jsf.html

Facelets decorators

```
<?xml version='1.0' encoding='UTF-8' ?>
<!DOCTYPE ...>
<html ...>
   <h:head>
      <link href="#{facesContext.externalContext.
         requestContextPath}/arquivos/estilos/style.css"
         rel="stylesheet" type="text/css" media="screen" />
      <title><h:outputText value="ADS :: " />
         <ui:insert name="title" /></title>
   </h:head>
   <h:body>
      <!-- Header... -->
      <ui:insert name="content">Default text</ui:insert>
      <!-- Footer... -->
   </h:body>
</html>
```

Using Facelets decorators

```
<!DOCTYPE ...>
<ui:composition xmlns="http://www.w3.org/1999/xhtml"
                xmlns:ui="http://java.sun.com/jsf/facelets"
                xmlns:f="http://java.sun.com/jsf/core"
                xmlns:h="http://java.sun.com/jsf/html"
            template="/resources/templates/decorador.xhtml">
   <ui:define name="title">Welcome</ui:define>

   <ui:define name="content">
      <h1>Welcome to the ADS</h1>

      <p>Some information...</p>
   </ui:define>
</ui:composition>
```

Custom components with Facelets

```
<ui:composition ...>
   <table align="center" border="0" cellpadding="3">
      <ui:insert />
   </table>
</ui:composition>
```

form.xhtml

```
<ui:composition ...>
   <tr>
      <td align="right" valign="top">
         <ui:insert name="fieldName" />:
      </td>
      <td><ui:insert /></td>
   </tr>
</ui:composition>
```

field.xhtml

```
<ui:composition ...>
   <tr>
      <td colspan="2" align="right">
         <ui:insert />
      </td>
   </tr>
</ui:composition>
```

button.xhtml

Using custom components

```
<ui:decorate template="/resources/templates/form.xhtml">
<h:form>
   <ui:decorate template="/resources/templates/field.xhtml">
      <ui:define name="fieldName">Username</ui:define>
      <h:inputText size="15" />
   </ui:decorate>
   <ui:decorate template="/resources/templates/field.xhtml">
      <ui:define name="fieldName">Password</ui:define>
      <h:inputSecret size="15" />
   </ui:decorate>
   <ui:decorate
      template="/resources/templates/button.xhtml">
      <h:commandButton value="Log in" />
   </ui:decorate>
</h:form>
</ui:decorate>
```

Example of a complex component

```
<ui:composition ...>
   <table border="0" class="formField #{(fieldName == null
or empty facesContext.getMessageList(fieldName)) ? '' :
'formFieldError'}">
      <tr>
         <td class="label #{(fieldName == null or empty
facesContext.getMessageList(fieldName)) ? '' :
'labelError'}" valign="top">
            <ui:insert name="label" /><h:panelGroup
styleClass="star" rendered="#{(fieldName != null and
facesContext.viewRoot.findComponent(fieldName).required)}">*
</h:panelGroup>:
         </td>
         <td class="spacing"></td>
         <td class="field #{(fieldName == null or empty
facesContext.getMessageList(fieldName)) ? '' :
'fieldError'}">
            <h:messages for="#{fieldName}" layout="table"
rendered="#{fieldName != null}" />
            <ui:insert />
</td></tr></table></ui:composition>
```

JPA 2.0 Criteria API

Criteria API

- New in JPA 2.0;
- Before there was JPQL only;
- Similar to Hibernate Criteria API (like JPQL is similar to HQL);
- Allows programmatic construction of queries;
  - Uses objects instead of Strings;
  - Thus, can be verified at compile time.
- Two modes: static and dynamic.

Criteria API – Dynamic mode

```
public Employee retrieveByUsername(String username) {
   CriteriaBuilder cb = em.getCriteriaBuilder();
   CriteriaQuery<Employee> cq =
      cb.createQuery(Employee.class);
   Root<Employee> root = cq.from(Employee.class);

   EntityType<Funcionario> model = root.getModel();
   cq.where(cb.equal(root.get(model.getSingularAttribute(
      "login", String.class)), username));

   Funcionario funcionario = null;
   try {
      funcionario = em.createQuery(cq).getSingleResult();
   } catch (RuntimeException e) {
      /* Do something... */
      return null;
   }

   return funcionario;
}
```

Dynamic

Criteria API – Static mode

```
public Employee retrieveByUsername(String username) {
   /* Same stuff before... */

   cq.where(cb.equal(root.get(EmployeeJPAMetamodel.login),
      username));

   /* Same stuff after... */
```

Static

```
package it.unitn.disi.ads.core.persistence;

import it.unitn.disi.ads.core.domain.Employee;
import it.unitn.disi.ads.core.domain.EmployeeType;
import javax.persistence.metamodel.SingularAttribute;
import javax.persistence.metamodel.StaticMetamodel;

@StaticMetamodel(Employee.class)
public class EmployeeJPAMetamodel {
 public static volatile SingularAttribute<Employee, String> name;
 public static volatile SingularAttribute<Employee, String> login;
 public static volatile SingularAttribute<Employee, String>
    password;
 public static volatile SingularAttribute<Employee, EmployeeType>
    type;
}
```

Dynamic x Static

```
EntityType<Funcionario> model = root.getModel();
cq.where(cb.equal(root.get(model.getSingularAttribute(
   "login", String.class)), username));
```

Dynamic

```
cq.where(cb.equal(root.get(EmployeeJPAMetamodel.login),
   username));
```

Static

- Dynamic model uses String (prone to error);
- Static model requires an extra class (meta-model);
  - Code generators could easily help here...

Conversations in CDI

CDI Scopes

- Determine when beans exist and are bound;
- Are extensible: create your own scope;
- Five scopes already provided:
  - Defined by the Servlet API: Request, Session, Application;
  - Dependent scope: the bean's scope is the same as the bean that injected it;
  - Conversation scope: a collection of requests within a session, established programmatically.

Conversations

- Are **transient** by default;
- Transient conversations begin/end with the request;
- Can be programmatically changed to **long-running**:

```
public class ReceiveCallAction {
  @Inject
  private Conversation conversation;

  public void someMethod() {
    if (conversation.isTransient()) conversation.begin();

    /* ... */
  }
}
```

Conversations

- Long-running conversations last until programmatically ended:

```
public class ReceiveCallAction {
  @Inject
  private Conversation conversation;

  public void someOterMethod() {
    /* ... */

    If (! conversation.isTransient()) conversation.end();
  }
}
```

- Objects with conversation scope are bound to that context until the conversation ends.

Conversations

- Propagation:
  - If navigation is done through JSF (e.g. `<h:commandLink />`), propagation is automatic;
  - Otherwise, you can use `?cid=X` in the URL;
- Conversation management:
  - Conversation ids can be changed (give it a name);
  - Conversations can be stored in a collection of a session-scoped bean;
  - User can change the active conversation using the `cid` parameter in the URL.

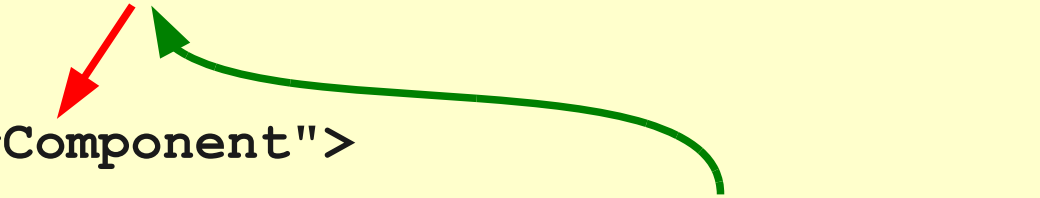
AJAX Support

Support for AJAX in JSF 2.0

- New tag `<f:ajax />`;
- Attributes:
  - `event`: which event should trigger the request (`action`, `blur`, `change`, `click`, ...);
  - `listener`: method to execute when the event occurs;
  - `execute`: data to submit in the request (`@all`, `@none`, `@this`, `@form`, component IDs);
  - `render`: what should be redrawn (`@all`, `@none`, `@this`, `@form`, component IDs).

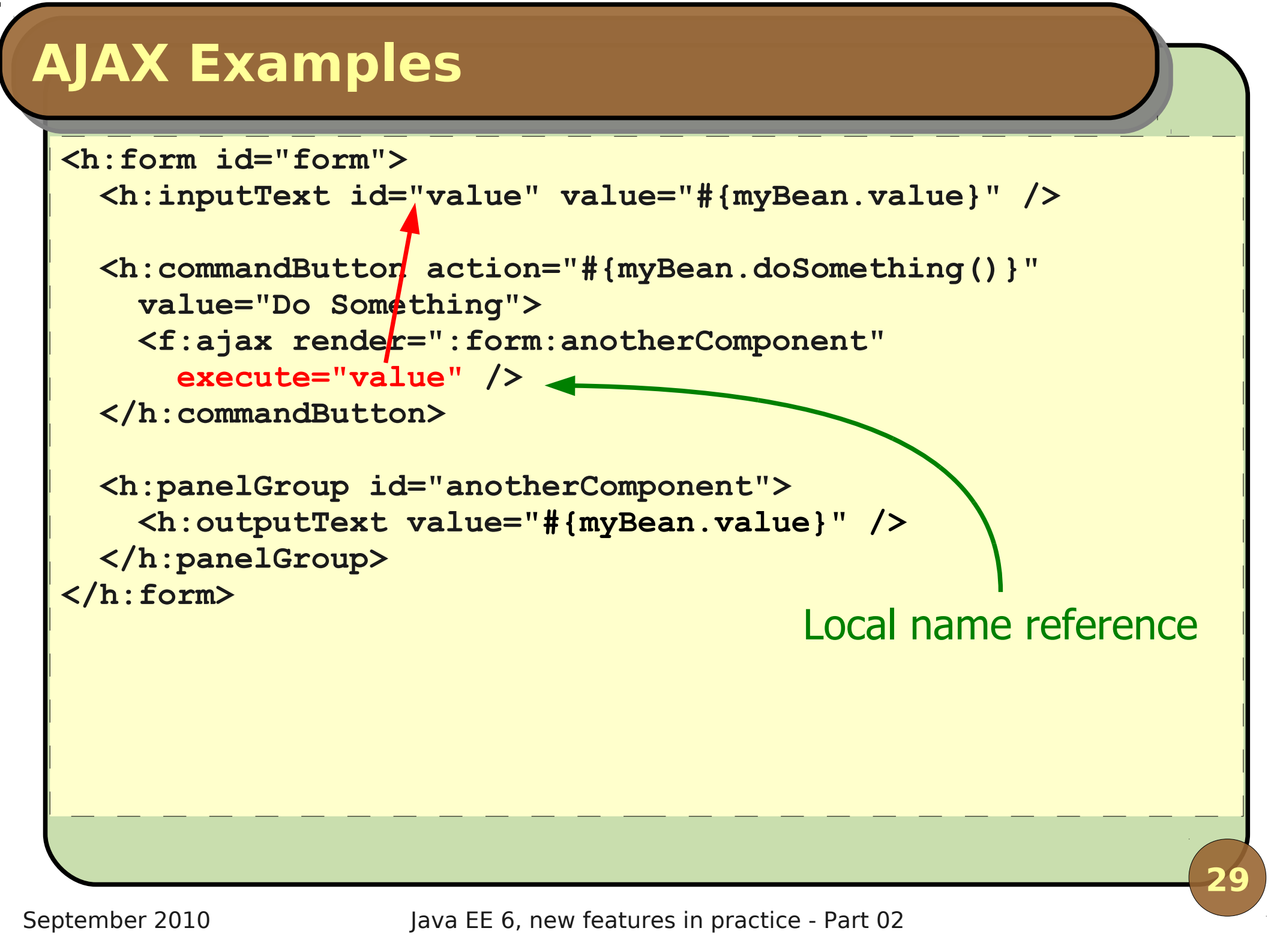
AJAX Examples

```
<h:form id="form">
  <h:commandButton action="#{myBean.doSomething()}"
    value="Do Something">
    <f:ajax render=":form:anotherComponent" />
  </h:commandButton>

  <h:panelGroup id="anotherComponent">
    <!-- ... -->
  </h:panelGroup>
</h:form>
```



AJAX Examples

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

  <h:commandButton action="#{myBean.doSomething()}"
    value="Do Something">
    <f:ajax render=":form:anotherComponent"
      execute="value" />
  </h:commandButton>

  <h:panelGroup id="anotherComponent">
    <h:outputText value="#{myBean.value}" />
  </h:panelGroup>
</h:form>
```



AJAX Examples

```
<h:form id="form">
  <h:inputText id="name" value="#{myBean.obj.name}">
    <f:ajax event="blur" render="acronym"
      listener="#{myBean.suggestAcronym}" />
  </h:inputText>

  <h:inputText id="acronym" value="#{myBean.obj.acronym}" />

  <!-- ... -->
</h:form>
```

```
@Named
public class MyBean {
  private DomainObject obj = new DomainObject();
  public DomainObject getObj() { return obj; }

  public void suggestAcronym(AjaxBehaviorEvent event) {
    String acronym = /* Calculate an acronym. */
    obj.setAcronym(acronym);
  }
}
```

AJAX and Bean Validation

1 - Add validation annotation to your entities;

2 - Use the entity to exchange data with JSF (model-driven);

3 - Use a Facelets custom component to put fields in the form;

4 - Add `<f:ajax />` to form fields, blur event, re-render the whole Facelets component;

5 - In your Facelets component code, check for JSF messages on that field and change color if there are errors.

Remembering Bean Validation

```
public class Ambulance extends PersistentObjectImpl {
   @NotNull
   private int number;

   @NotNull
   @Size(min = 8, max = 8)
   private String licensePlate;

   /* ... */
}
```

Remembering Facelets components

```
<ui:composition ...>
   <table border="0" class="formField #{(fieldName == null
or empty facesContext.getMessageList(fieldName)) ? '' :
'formFieldError'}">
      <tr>
         <td class="label #{(fieldName == null or empty
facesContext.getMessageList(fieldName)) ? '' :
'labelError'}" valign="top">
            <ui:insert name="label" /><h:panelGroup
styleClass="star" rendered="#{(fieldName != null and
facesContext.viewRoot.findComponent(fieldName).required)}">*
</h:panelGroup>:
         </td>
         <td class="spacing"></td>
         <td class="field #{(fieldName == null or empty
facesContext.getMessageList(fieldName)) ? '' :
'fieldError'}">
            <h:messages for="#{fieldName}" layout="table"
rendered="#{fieldName != null}" />
            <ui:insert />
</td></tr></table></ui:composition>
```

Finally, the form

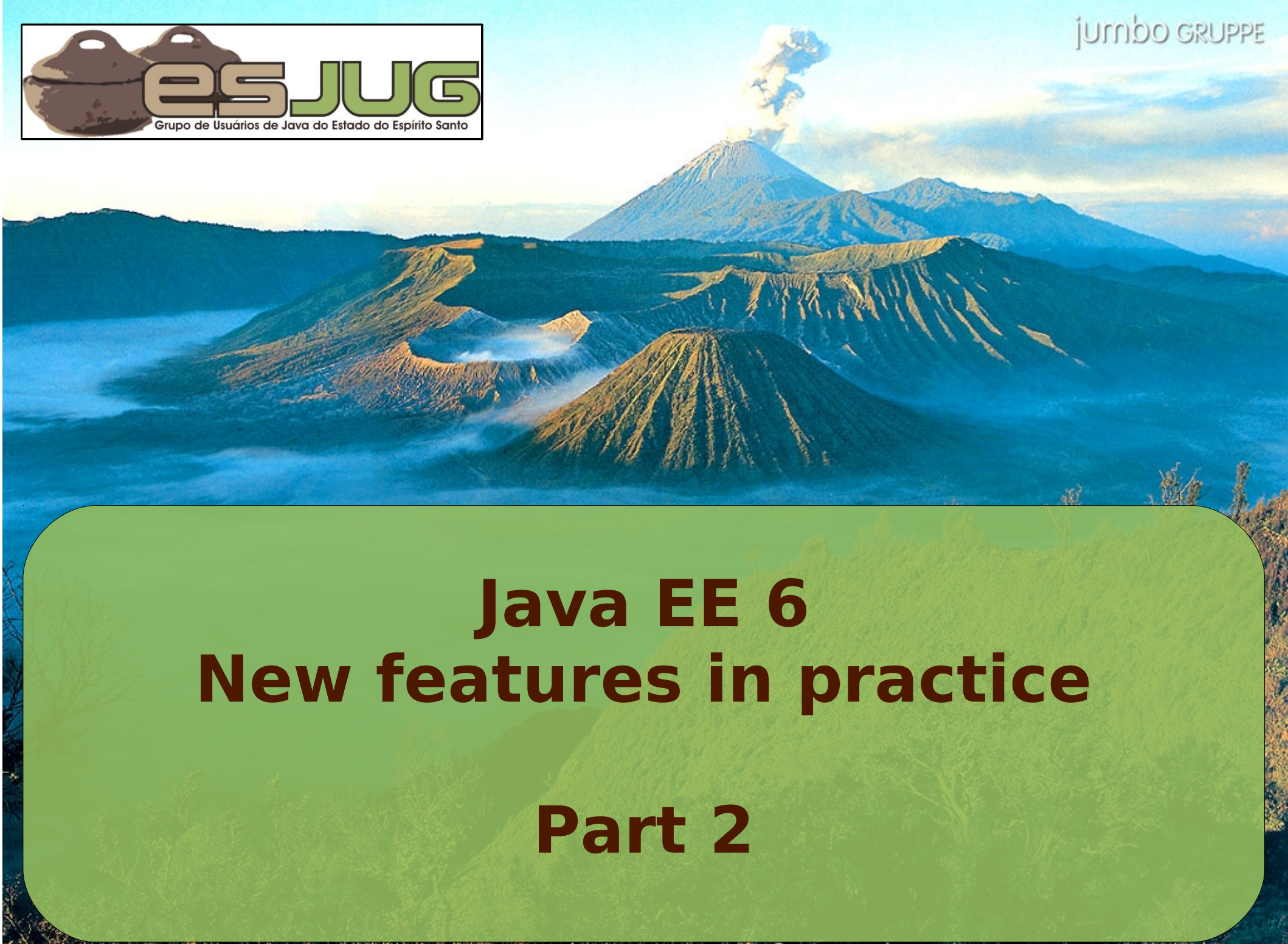
```
<ui:decorate template="/templates/form.xhtml">
  <h:form id="form">
    <h:panelGroup id="numberField">
      <ui:decorate template="/templates/field.xhtml">
        <ui:param name="fieldName" value="form:number" />
        <ui:define name="label">Number</ui:define>
        <h:inputText id="number"
          value="#{ambulanceCrudBean.ambulance.number}">
          <f:ajax event="blur" render="numberField" />
        </h:inputText>
    </ui:decorate>
  </h:panelGroup>

  <!-- ... -->

  </h:form>
</ui:decorate>
```

Conclusions

- Facelets can provide decorator templates and custom components for forms and etc.;
- The Criteria API allows us to check our queries at compile time in exchange for increased complexity in the code;
- Conversations provide a new scope to which objects can be bound, also allowing for management of multiple conversations;
- JSF 2.0 comes with built-in AJAX support.

Would you like to know more?

- Part 3, if you're interested, talks about:
  - JAAS, the Java Authentication and Authorization Services – manage users in the Application Server;
  - Servlets 3.0: what's new in the oldest specification of Java for the Web;
  - More JPA 2.0: new JPQL commands;
  - EJB enhancements: no-interface EJBs, singleton EJBs, asynchronous methods.



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