Intro to JavaServer Faces

Component-oriented, rapid web development

New York Java Special Interest Group

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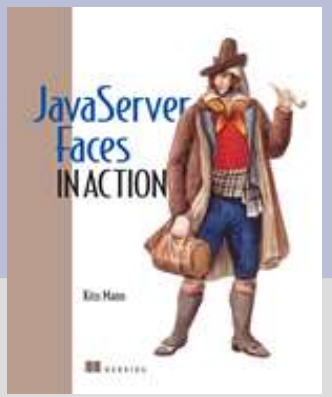

- Hands-on enterprise architecture consultant and author
- Author, JavaServer Faces in Action (Manning Publications, July/August, 2004)
- Founder, JSF Central – development community for JavaServer Faces with news, FAQ, links, and so on (www.jsfcentral.com)
- Experience with Java since its release in 1995
- Web development since 1993

Agenda

- Introduction
- Key concepts
- JSF demo inside of an IDE
- Wrap up and book giveaway

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- ***Introduction***
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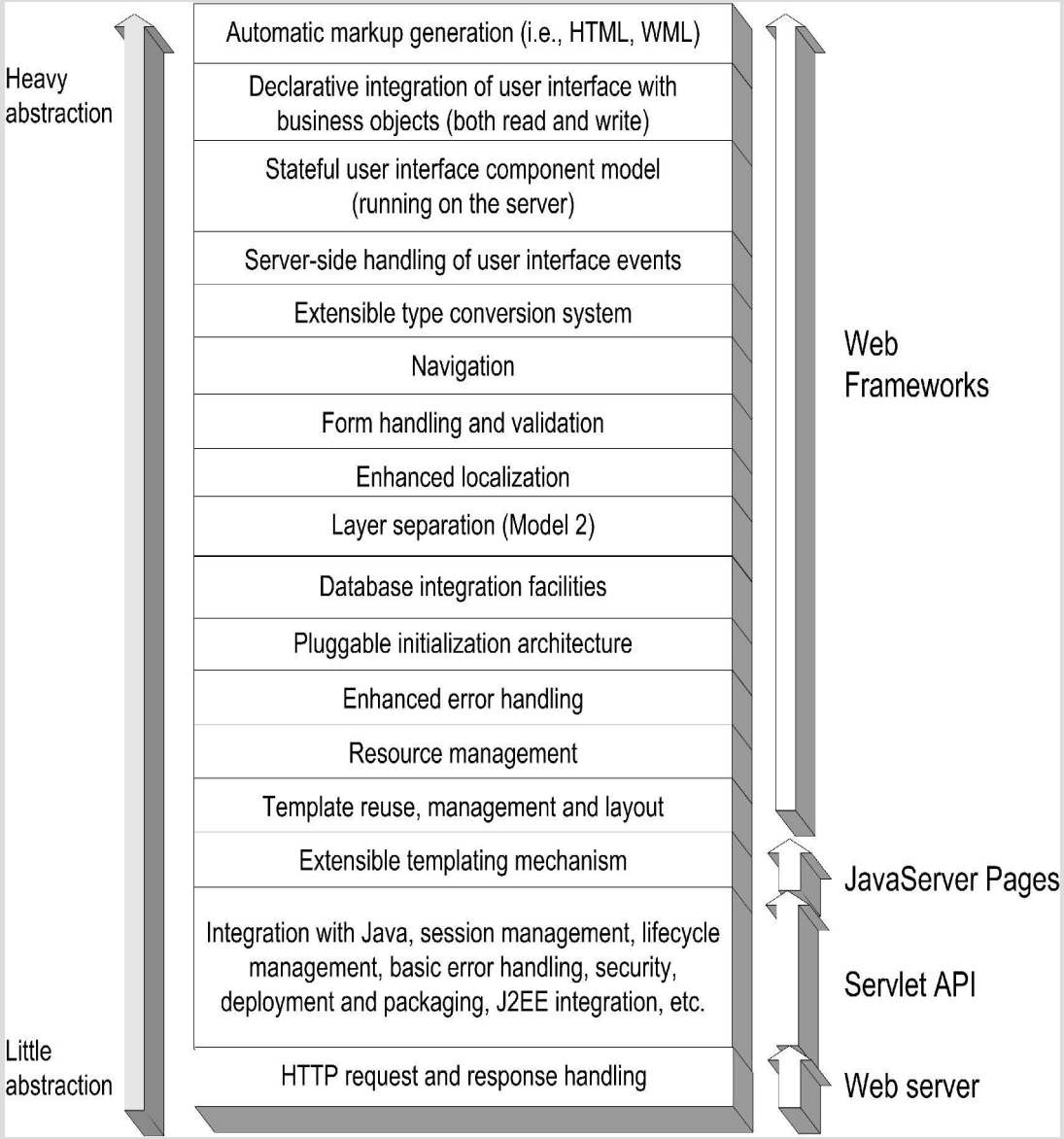
Servlets, JSP, and Frameworks

- Servlets and JSP provide basic plumbing, but we need more

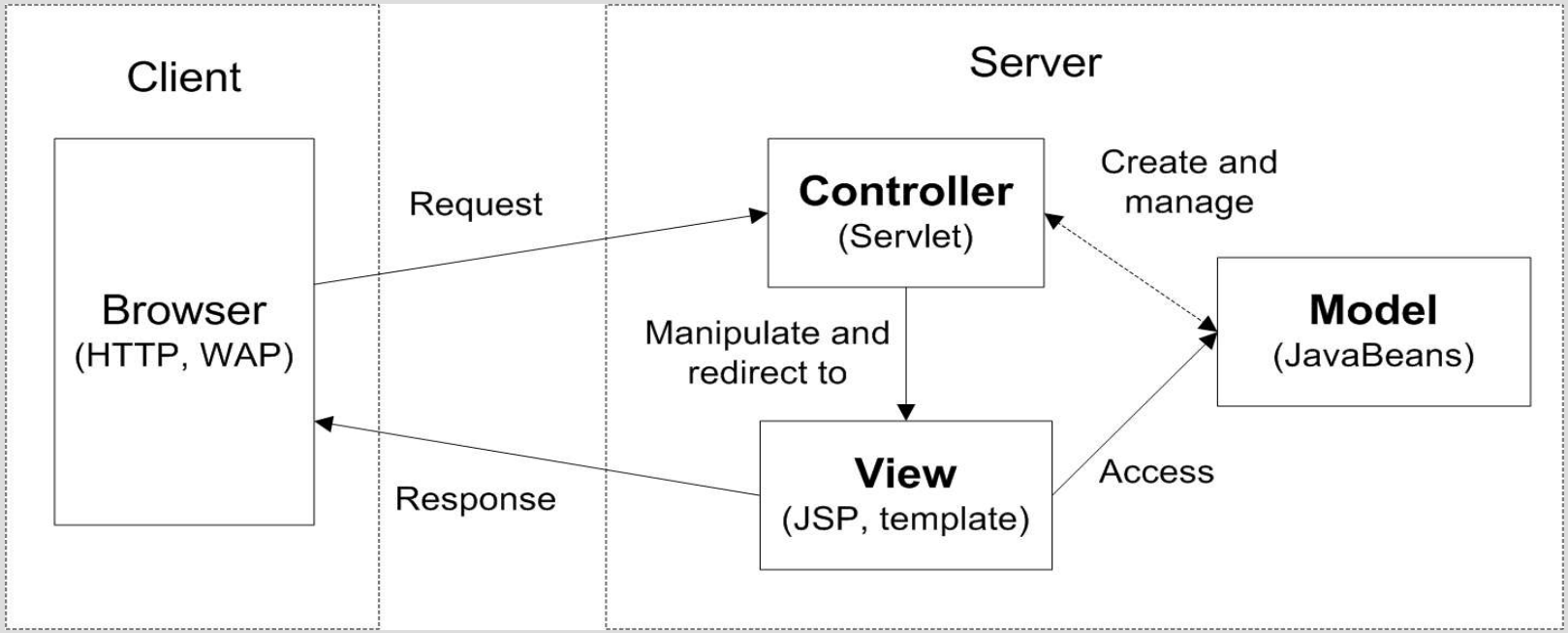


Web frameworks use the MVC pattern

- In addition to services, frameworks help structure application code
- Model-View-Controller (MVC)
  - Model is application and data
  - View is user interface
  - Controller responds to user input and talks to model
- Classic MVC assumes fine-grained events
- Not suitable for web (UI in a browser; too many round trips)

Web frameworks use the MVC pattern

- Web variation is “Model-2”
  - View is JSP or other display technology (Velocity, XSLT, and so on)
  - Controller is a servlet
  - Model are JavaBeans



Many diferent frameworks

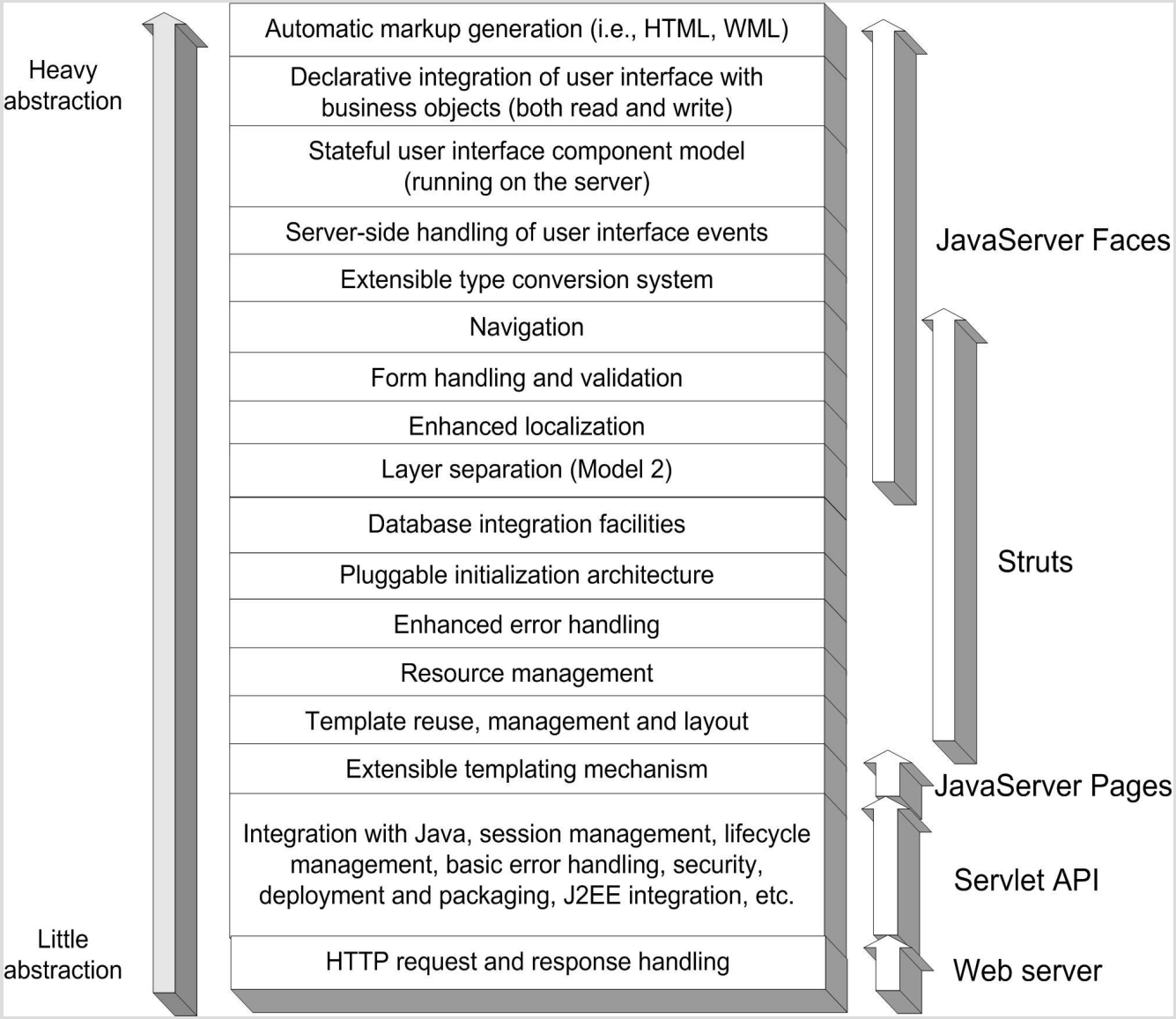
- Two types of frameworks:
  - Foundation
    - Struts, WebWork, Maverick, many others
  - User interface
    - Tapestry, SOFIA, many others
- Over 30 different Java web development frameworks available
- Framework paralysis!
- JSF is a **standard** best-of-breed framework
- Java needed a competitor to Microsoft's ASP.NET WebForms

What is JavaServer Faces?

- Standard web user interface framework for Java
- Defines UI component and event model, standard UI components, and application infrastructure
- UI components live on the server
- Client-generated events are handled on ther server
- Can automatically synchronize UI components with application objects
- Extensive tool support (Sun, IBM, Oracle, others)
- Enables RAD-style approach to Java web development
- Sets stage for third-party UI component market
- Built on top of Servlet API
- Works with JSP, but does not require it

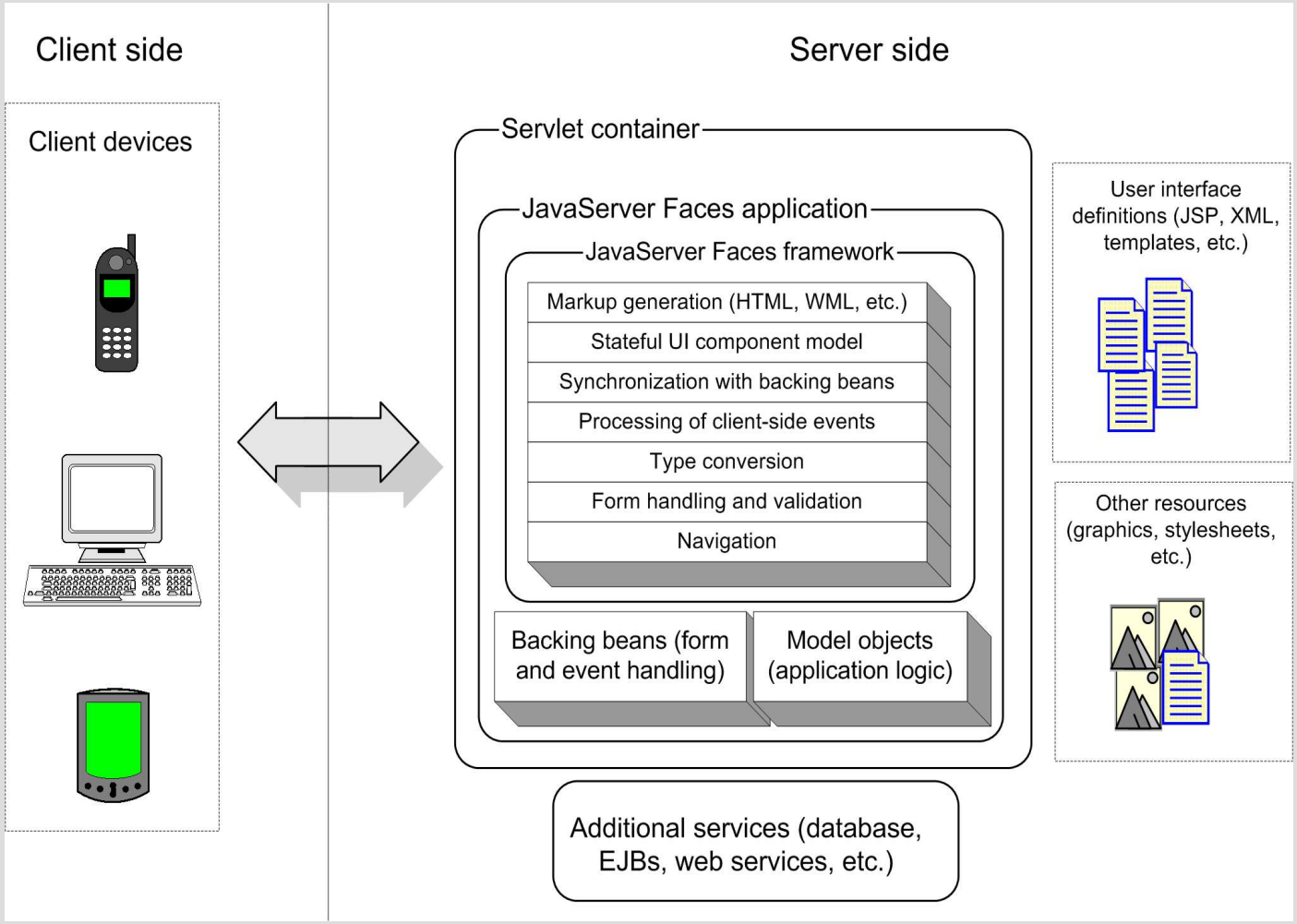
JSF and Struts

- JSF is UI framework
- Services overlap with Struts
- Can be used with Struts



What is JavaServer Faces?

JSF Application Architecture



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Key JSF concepts

- User interface (UI) components
- Renderers
- Backing beans
- Validators
- Converters
- Events and listeners
- Expression language
- Messages
- Navigation

User interface components

- Objects that manage interaction with a user
- May be responsible for its own display, or may delegate display to a renderer
- Stored in a tree on the server (“view”)
- Retain state inbetween client requests
- Standard components: text box, panel, label, data grid, graphic, listbox, radio button, check box, and so on
- Other possibilities: toolbar, menu, RSS viewer, tabbed pane, file upload, and so on

User interface components

- UI components can be declared in markup:

```
<h:inputText id="helloInput" value="default"
                    required="true">
```

- and manipulated on server in Java code:

```
...
HtmlInputText input = (HtmlInputText)event.getSender();
input.setDisabled(true);
input.setStyle("color: blue");
...
```

Renderers

- Responsible for encoding and decoding components
- *Encoding* displays the component
- *Decoding* translates the user's input into component values or events
- Grouped into render kits
  - JSF ships with an HTML 4.01 render kit
  - Render kits can implement a look and feel (“skin”)
  - Render kits can target a specific device (phone, PC) or markup language (WML, HTML, SVG)
  - The render kit can be changed on the fly

Backing beans

- Collect form input from components
- Properties can be synchronized with component values
- Can reference and manipulate UI component instances
- Handle UI events
- A combination of Struts ActionForms and Struts Actions
- Conceptually similar to code-behind classes in ASP.NET WebForms
- Usually talk to model objects to execute actual business logic

Backing beans

- You can bind a component's value to a backing bean property:

```
<h:outputText id="helloBeanOutput"
              value="#{helloBean.numControls}"/>
```

- You can also bind a component instance to a backing bean property:

```
<h:panelGrid id="controlPanel" binding="#{helloBean.controlPanel}"
             columns="20" border="1" cellspacing="0"/>
```

Backing beans

```
public class HelloBean {
  private int numControls;
  private HtmlPanelGrid controlPanel;

  public HtmlPanelGrid getControlPanel() {
    return controlPanel;
  }
  public void setControlPanel(HtmlPanelGrid controlPanel) {
    this.controlPanel = controlPanel;
  }
  public int getNumControls() {
    return numControls;
  }
  public void setNumControls(int numControls) {
    this.numControls = numControls;
  }
... // event listener and/or validation methods
}
```

Backing beans

- Usually configured using *Managed Bean Creation facility*
- Facility can be used for model objects as well
- Configured in JSF configuration file
- Object will be created automatically if it doesn't exist
- Example:

```
<managed-bean>
  <description>The one and only HelloBean.</description>
  <managed-bean-name>helloBean</managed-bean-name>
  <managed-bean-class>org.jia.hello.HelloBean
  </managed-bean-class>
  <managed-bean-scope>session</managed-bean-scope>
</managed-bean>
```

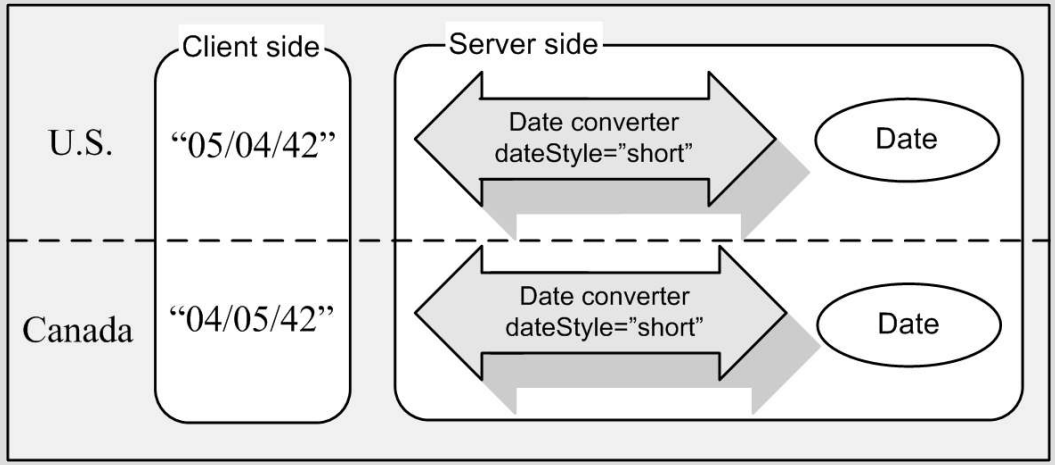
Validators

- Validators verify that a component's value is acceptable
- A UI component can be associated with one or more validators
- Validation can also be handled by backing bean methods
- JSF includes standard validators for checking range and length
- Example:

```
<h:inputText id="helloInput" value="#{helloBean.numControls}"
                    required="true">
    <f:validateLongRange minimum="1" maximum="500"/>
</h:inputText>
```

Converters

- Convert value of the component to and from a String for display
- Perform formatting or localization
- Standard converters for all basic Java data types
- Example:




```
<h:outputText value="#{user.dateOfBirth}">
  <f:convertDateTime type="date" dateStyle="short"/>
</h:outputText>
```

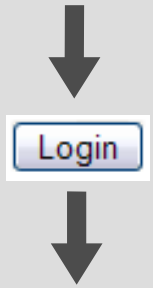
Events and listeners

- Uses JavaBean event model (like Swing)
- Objects create events which are consumed by listeners
- Listeners can be implemented as backing bean methods (unlike Swing) or separate listener classes (like Swing)
- Action methods – special listeners that perform logic and impact navigation
- Standard events
  - Action events (user clicked on a button or link)
  - Value-change events (value of control changed)
  - Data model events (new row in data set selected)
  - Phase events (used when processing a request)

Events and listeners

- Example: When a user clicks on the button, an action event is fired, and the action method is executed.

```
<h:commandButton type="submit" value="Login"
                 action="#{loginForm.login}"/>
```




```
public class LoginForm {
  public String login() {
    if (...)  // login is successful
      { return “success”; }
    else
      { return “failure”; }
    }
 ...
}
```

Navigation

- Full support for declarative navigation
- Outcome of action methods used to select next page
- Eliminates need for Java code or JSPs to know file names

```
<navigation-rule>
  <from-view-id>/login.jsp</from-view-id>
  <navigation-case>
    <from-outcome>success</from-outcome>
    <to-view-id>/mainmenu.jsp</to-view-id>
  </navigation-case>
  <navigation-case>
    <from-outcome>failure</from-outcome>
    <to-view-id>/login.jsp</to-view-id>
  </navigation-case>
  <navigation-case>
    <from-outcome>mainmenu</from-outcome>
    <to-view-id>/mainmenu.jsp</to-view-id>
  </navigation-case>
</navigation-rule>
```

The JSF expression language

- Used to associate UI component properties with backing beans and model objects
- Based on EL included in JSP 2.0
- Properties are referenced with *value binding expressions*: #{myBean.myProperty}
- Methods are referenced with *method binidng expressions*: #{myBean.myMethod}
- Supports mixed literal values and implicit variables
- Can interact with same objects as JSP 2.0 and JSTL tags (or rest of web application)
- Extensible API for creating and evaluating expressions in Java code

Messages

- Built-in support for application messages
- Messages created by validators, converters, or application code
- Can be displayed by UI components

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- Developing a JSF application
- ***JSF inside of an IDE***
- Wrap up and book giveaway

Hello, world! with Java Studio Creator

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Summary

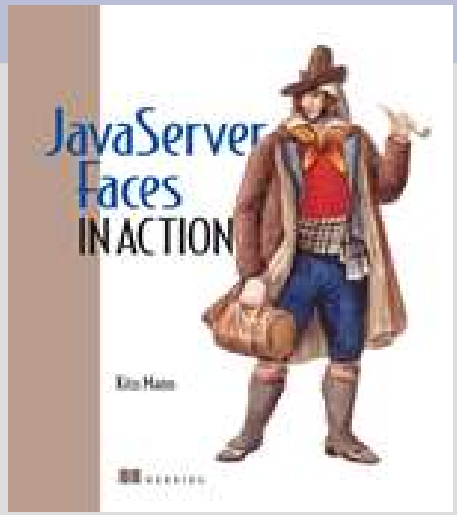
- JavaServer Faces is a standard web-based user interface framework for Java
- JSF includes:
  - Stateful user interface components
  - Automatic synchronization of components with bean properties
  - Server-side handling of client-generated events
  - Validation, type conversion, navigation, and internationalization
- Supported by industry standard tools from Sun (Java Studio Creator), IBM (WSAD), Oracle (JDeveloper) and others
- Can be used with Struts and other frameworks

Resources

- JSF Central
  - News, info, products, FAQ, and an extensive list of resources
  - http://www.jsfcentral.com
- Sun's JSF home page
  - http://java.sun.com/j2ee/javaserverfaces
- MyFaces open source implementation
  - http://www.marinschek.com/myfaces/tiki/tiki-index.php
- Smile open source implementation
  - Class-based (Java) pages instead of JSP
  - http://smile.sourceforge.net/index.html
- JSF in Action home page
  - http://www.manning.com/mann

Q&A

JavaServer Faces in Action



- Available now through MEAP
  - http://www.manning.com/mann
- What's inside:
  - Explains what JSF is, how it works, and how it relates to existing web frameworks
  - Extensive examples of using all standard components, renderers, validators, and converters
  - Comprehensive case study
  - Application design guidelines
  - Integration with Struts and JSTL integration
  - Working with JSP and other display technologies
  - How to create custom renderers, components, validators, and converters
  - Coverage of different IDEs