



Struts Development

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New York Metro Area Oracle User Group Day
September 21, 2004

Agenda

- ◆ Overview
- ◆ Struts elements
- ◆ JDeveloper implementation of Struts
- ◆ Creating Struts-based applications





What is Struts?

- ◆ Framework of reusable components and tag libraries for building and managing web applications
- ◆ Model-View-Controller architecture
 - Struts acts as the Controller
 - Action control
 - Page building

Models 1 and 2 Architecture

◆ Model 1 Architecture (Traditional)

- UI controls all application logic.
- No separation between application components and how they interact
- Java code is embedded in HTML code and JSP page
- Difficult to develop, debug and maintain

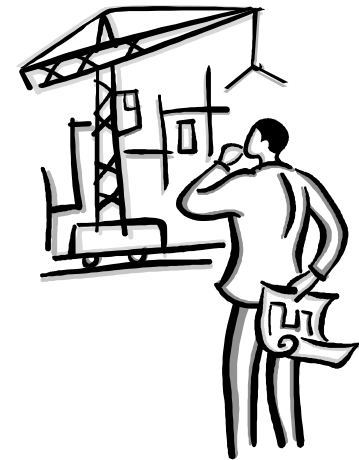
◆ Model 2 Architecture

- Separates logic from UI development.
- Display code is separate from page flow control code.
- Servlets control page flow



Struts Architecture

- ◆ Provides a structured approach to application development
- ◆ Uses a state transition engine (STE) metaphor for page control.
- ◆ Uses JSP or HTML pages





Struts Elements (1)

◆ Action Tag

- Used to change control in an application
- May have other tags nested inside it
- May have many Forward tags defined within it
- May point to a Java file (action class) for complex control

◆ Forward Tag

- Changes control based on parameter passed from the application
 - `name` – expected value of passed parameter (e.g. "success")
 - `path` – indicates where control will be passed

Struts Elements (2)

◆ Action Class

- Custom Java class extending Struts class
`org.apache.struts.Action`
- Supports complex flow logic
- Includes "execute" method

◆ ActionForm Class (FormBean)

- Java class
- Caches data from page to page movement
- Handles persistence requirements
- Not often used in JDeveloper 10g



Struts Elements

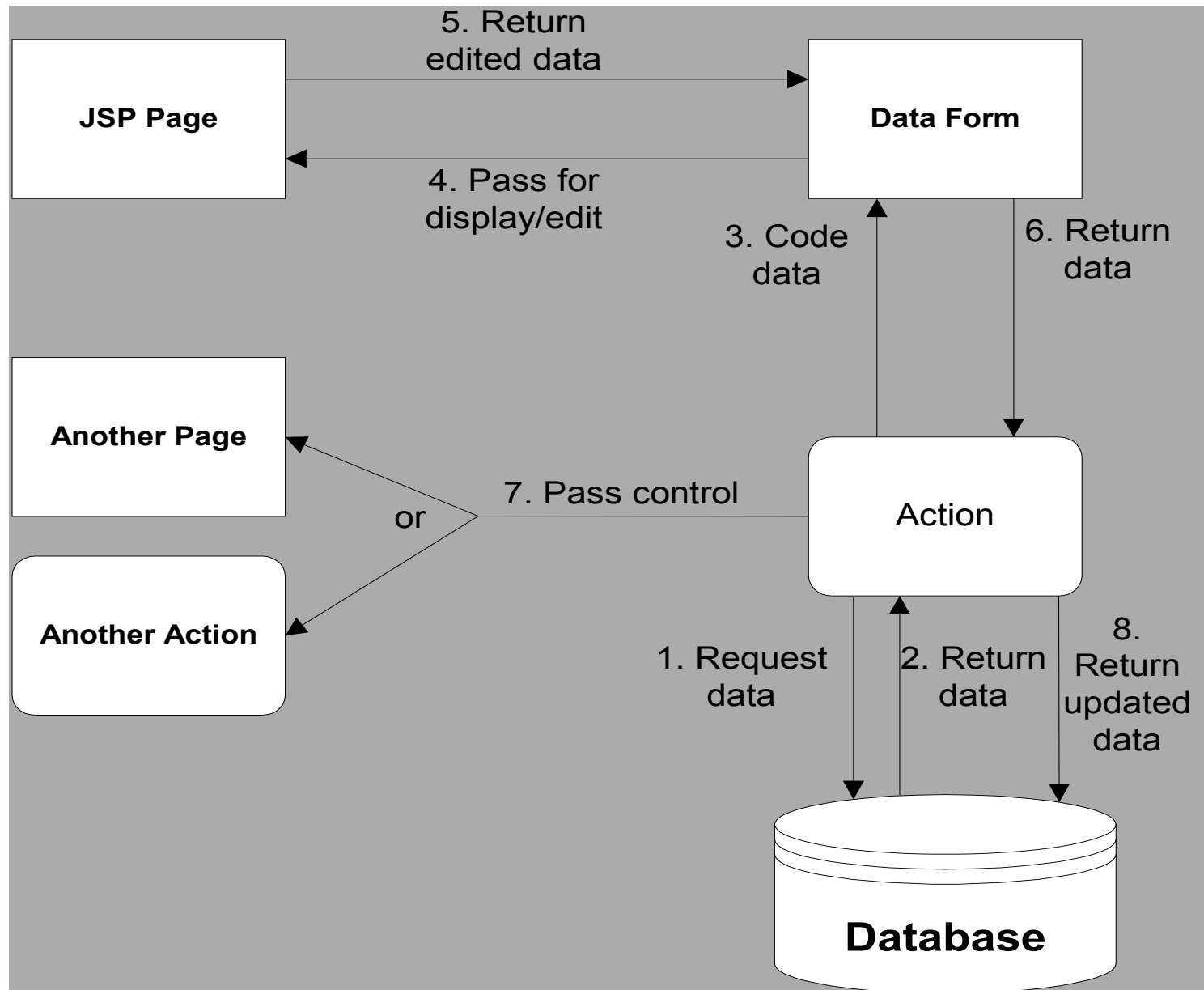
◆ Action (/browseDept.do)

- Tag used to change control in the application
<forward name="success" path="/xxy.do">
<forward name="fail" path="/error.jsp">

◆ Action Class (actionlogicDept.java)

- Java class for an action (add complex logic)
 - Minor Validation
 - Page Navigation
 - Logic to select forward: "success" or "fail"

Struts Element Interaction





ApplicationResources.properties files

- ◆ Element/Value pairs (multi-lingual support)
- ◆ Files store string values and global variables and/or initialization parameters
- ◆ Easy to change properties referenced in many places in the page
- ◆ Can have multiple files for different languages

Sample .properties files



Simple Struts Application???

```
<?xml version = '1.0' encoding = 'windows-1252'?>
<!DOCTYPE struts-config PUBLIC "-//Apache Software Foundation//DTD Struts Configuration 1.1//EN" "http://
<struts-config>
  <form-beans>
    <form-bean name="DataForm" type="oracle.adf.controller.struts.forms.BindingContainerActionForm"/>
  </form-beans>
  <action-mappings>
    <action path="/browseDeptDP" className="oracle.adf.controller.struts.actions.DataActionMapping" type="c
      <set-property property="modelReference" value="browseDeptDPUIModel"/>
    </action>
    <action path="/editDeptDP" className="oracle.adf.controller.struts.actions.DataActionMapping" type="c
      <set-property property="modelReference" value="editDeptDPUIModel"/>
      <set-property property="methodName" value="editDeptDPUIModel.setCurrentRowWithKey"/>
      <set-property property="resultLocation" value="{requestScope.methodResult}"/>
      <set-property property="numParams" value="1"/>
      <set-property property="paramNames[0]" value="{param.rowKeyStr}"/>
      <forward name="deptUpdate" path="/browseDeptDP.do"/>
    </action>
    <action path="/createDeptDA" className="oracle.adf.controller.struts.actions.DataActionMapping" type="c
      <set-property property="modelReference" value="createDeptDAUIModel"/>
      <set-property property="methodName" value="createDeptDAUIModel.Create"/>
      <set-property property="resultLocation" value="{requestScope.methodResult}"/>
      <set-property property="numParams" value="0"/>
      <forward name="success" path="/editDeptDP.do"/>
    </action>
    <action path="/setCurrentDeptDA" className="oracle.adf.controller.struts.actions.DataActionMapping" t
      <set-property property="modelReference" value="setCurrentDeptDAUIModel"/>
      <set-property property="methodName" value="setCurrentDeptDAUIModel.setCurrentRowWithKey"/>
      <set-property property="resultLocation" value="{requestScope.methodResult}"/>
      <set-property property="numParams" value="1"/>
      <set-property property="paramNames[0]" value="{param.rowKeyStr}"/>
      <forward name="success" path="/deleteDeptDA.do"/>
    </action>
```

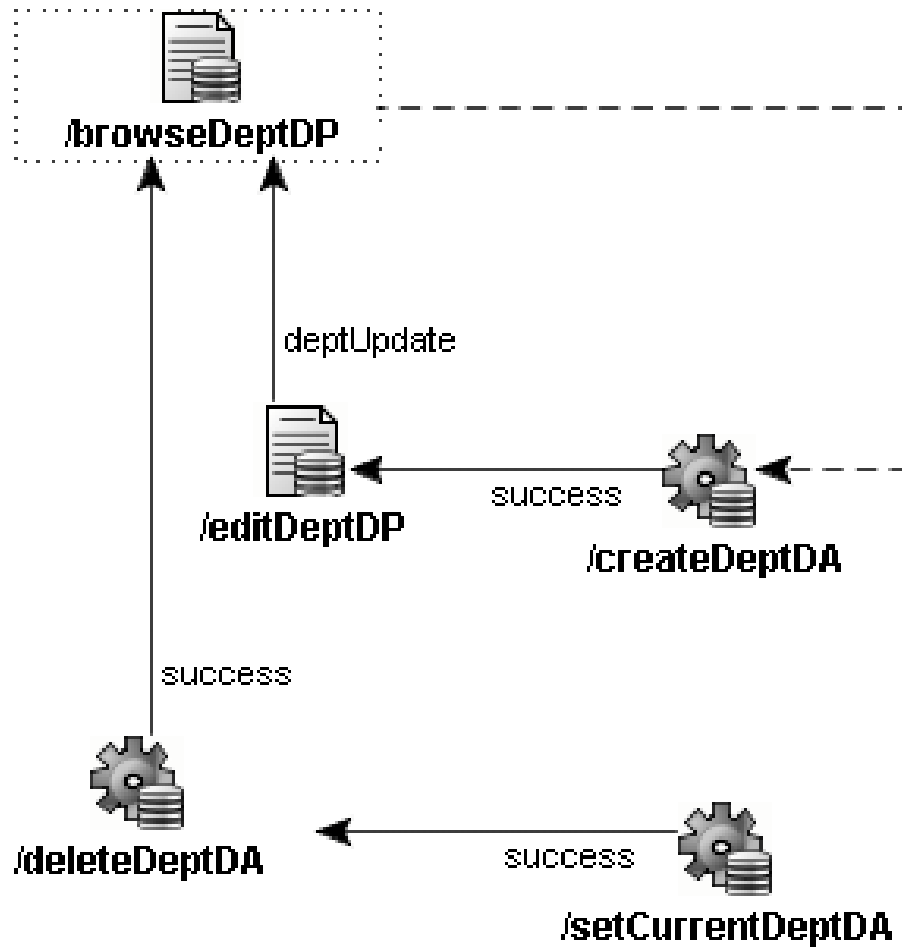
struts-config.xml File

◆ struts-config.xml

- **Core of Struts !!!**
- XML file
- Ties all the components of your struts application together



Sample JDeveloper10g Struts Flow





Sample JDeveloper10g Struts Application

Departments Application

First	Previous	Next	Last			
			DepartmentId	DepartmentName	ManagerId	LocationId
Edit	Delete	*	10	Administration	201	1700
Edit	Delete		20	Marketing	201	1800
Edit	Delete		30	Purchasing	114	1700
Edit	Delete		40	Human Resources	203	2400
Edit	Delete		50	Shipping	121	1500
Edit	Delete		60	IT	103	1400
Edit	Delete		70	Public Relations	204	2700
Edit	Delete		80	Sales	145	2500
Edit	Delete		90	Executive	100	1700
Edit	Delete		100	Finance	108	1700

[Commit](#) [Rollback](#)

[Create a department](#)



Sample JDeveloper 10g Edit Page

Edit Departments

DepartmentId	<input type="text" value="40"/>
DepartmentName	<input type="text" value="Human Resources"/>
ManagerId	<input type="text" value="203"/>
LocationId	<input type="text" value="2400"/>



struts-config.xml

- ◆ **XMLfile** – <tags> for all components in the application and how they interact
- ◆ **Two main parts:**
 - **Form bean area**
 - ActionForm/DynaActionForm classes
 - **Action mappings area**
 - Actions and re-directions



Inside Struts-config.xml

- ◆ Form bean
- ◆ Just **one reference** in Jdev10g!
 - Complete connection to all ADF BC's

```
<struts-config>
  <form-beans>

    <form-bean name="DataForm"
      type="oracle.adf.controller.struts.forms.BindingContainerActionForm"/>

  </form-beans>
  ...
  ...
</struts-config>
```



Inside Struts-config.xml

◆ Action mappings

```
<action path="/browseDeptDA"
  className="oracle.adf.controller.struts.actions.DataActionMapping"
  type="view.BrowseDeptAction" name="DataForm">
  <set-property property="modelReference"
    value="browseDeptPGUIModel"/>
  <forward name="success" path="/browseDeptPG.do"/>
</action>
```

```
<action path="/browseDeptPG"
  className="oracle.adf.controller.struts.actions.DataActionMapping"
  type="oracle.adf.controller.struts.actions.DataForwardAction"
  name="DataForm" parameter="/browseDeptPG.jsp">
  <set-property property="modelReference"
    value="browseDeptPGUIModel"/>
</action>
```



View-level Struts (tag libs)

◆ **Html**

- This library is used to generate standard HTML elements.

◆ **Bean**

- Beans are used to provide a number of utility-like operations such as access data in a cookie.

◆ **Logic**

- These libraries provide conditional logic support.

◆ **Nested**

- These libraries are used to support nested elements such as an address embedded in an Edit Person page.

◆ **Template**

- These libraries help create pages based on a template.

◆ **Tiles**

- Tiles partition your pages into areas that are static and dynamic to improve update performance and ease development.

Struts Development

Traditional Struts

◆ Code:

- Pages
- Actions
- ActionClasses
 - Navigation
- ActionForms
 - Validation
 - Data Storage
- Struts-config.xml

JDeveloper Struts

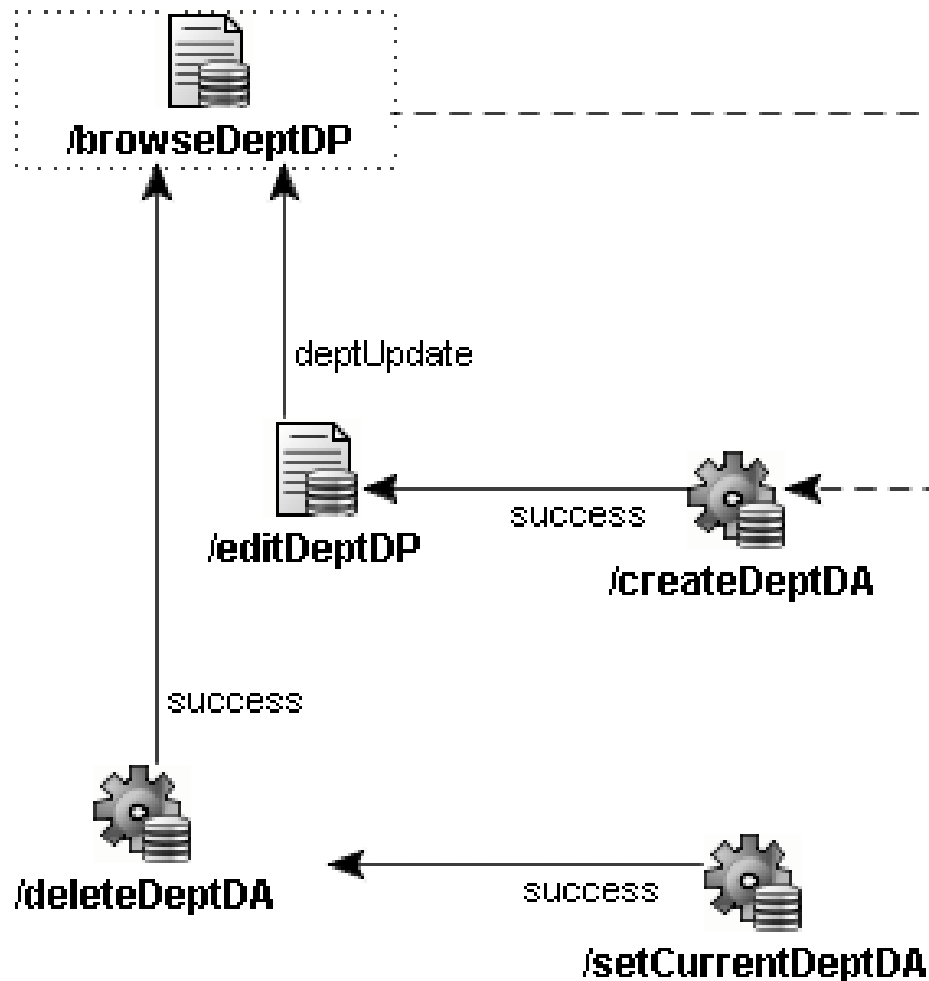
◆ Draw:

- Page flow

◆ Drag & Drop

- ADF data objects

Sample JDeveloper10g Struts Flow





Page Flow Diagram

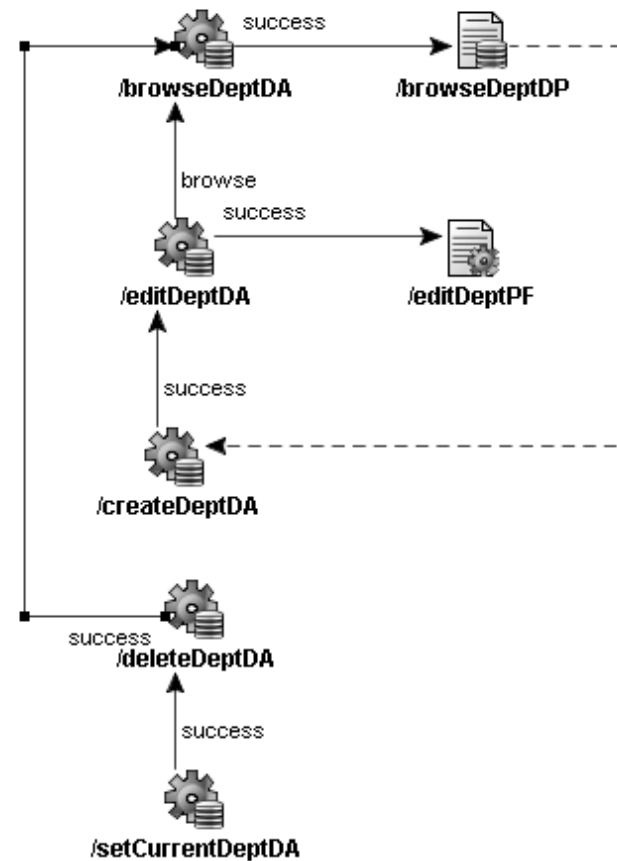
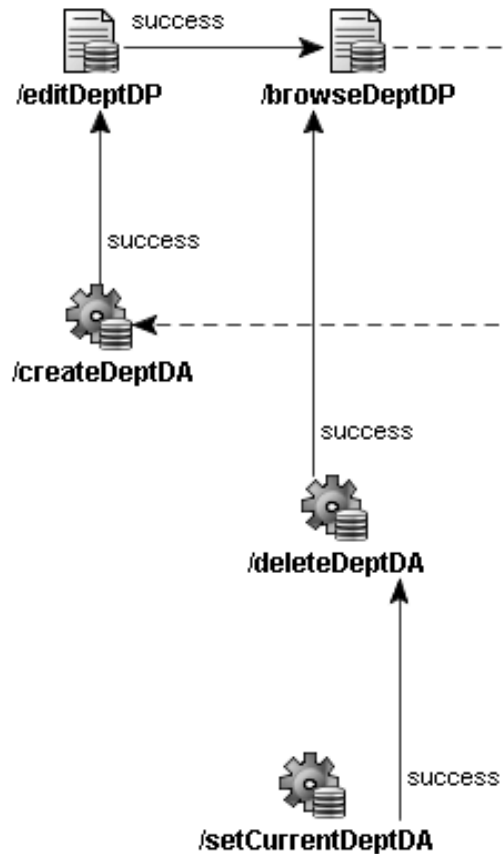
- ◆ **Main JDev10g interface for Struts**
- ◆ **Drag-and-drop** functionality makes development easy!.
- ◆ Elements added from the **Component Palette** or **Data Control Palette** are automatically added to the code and vice versa.



Sample JDeveloper Page Flow Diagrams

Simplified flow taking advantage of ADF

Extra data actions to support complex logic





JDeveloper Data Controls

- ◆ Easy drag-and-drop functionality from the Data Control Palette
- ◆ Select the type of component (JSP, HTML, etc.)
 - Filtered lists of components appropriate for file type
- ◆ “Operations” can be dropped onto elements in the Page Flow Diagram.
 - Create, Find, Execute, First, Previous, Previous Set, Next Set, Last, Delete



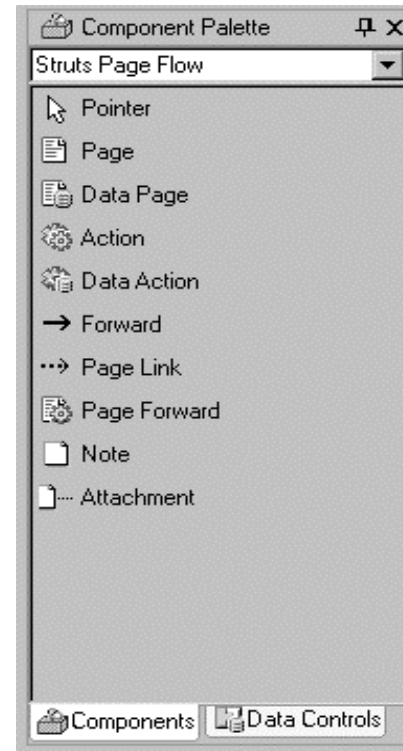
View-Level Struts

◆ Custom Oracle Struts tags

- Used in the view layer
- Simplify page construction
- Tie view elements to framework
- Drag & Drop to add:
 - Tables
 - Forms
 - Buttons
 - Etc.

Components

- ◆ Page
- ◆ Data Page
- ◆ Action
- ◆ Data Action
- ◆ Forward
- ◆ Page Link
- ◆ Page Forward
- ◆ Notes & Attachments can be added to any Page Flow Diagram





Page (basic – but not useful)

- ◆ Allows you to create a JavaServer Page
- ◆ No effect on the struts-config.xml file
- ◆ Not needed - if developing ADF applications in JDev10g



Data Page (basic ADF element)

- ◆ Extension of the Struts idea of a page
- ◆ The framework will take care of binding them to the ADF BC view components.
- ◆

```
<action path="/dataPage1"
className="oracle.adf.controller.struts
.actions.DataActionMapping"
type="oracle.adf.controller.struts.acti
ons.DataForwardAction" name="DataForm"
parameter="unknown"/>
```



Action (basic – not used in ADF)

- ◆ Adapts incoming HTTP request to business logic to be executed
 - Model interaction
 - Page navigation
- ◆ Represents the `org.apache.struts.action.Action` element in the `struts-config.xml` file.



Data Action (basic ADF element)

- ◆ Frequently used to simply query data and pass it on to the next element.
- ◆ It can also do non-trivial things such as navigation to one element or another based upon some condition.
- ◆

```
<action path="/dataAction1"  
  className="oracle.adf.controller.struts.actions.DataActionMapping"  
  type="oracle.adf.controller.struts.actions.DataAction"  
  name="DataForm"/>
```

Forward

- ◆ Standard Struts element
- ◆ Links any two data actions, data pages, forwards, etc...
- ◆ Name/destination pair
- ◆ It is the Struts equivalent of a “GoTo”.
- ◆ If you create a forward (“success”) from a component to one called “B”, it adds the code
`<forward name="success" path="/B.do"/>`



Page Link

- ◆ Corresponds to the standard HTML anchor tag
 - Page tag: Sends you to another page or action.
- ◆ If you create link in a JSP to take you to page “B”:, it will add the following code

```
<html:link page="/B.do">  
    <bean:message key="link.B"/>  
</html:link>
```
- ◆ The link page tag tells the page where to go and the message key tag indicates the location of the label text for the link in the .properties file.

```
link.B=Please take me to page "B"
```

Page Forward

◆ Simple link to a page

- When you drag in a page forward it makes the following code:

```
<action path="/page1" forward="unknown"/>
```

- ◆ When you double click on the component and create a UI file (e.g. .jsp file) it will use the name of the file as the forward destination.
- ◆ Can be used for "child" data pages such as new or edit record pages.



Using the Struts Elements

- ◆ Many ways of building an application
- ◆ Different combinations may be used
- ◆ Most use data actions and data pages
- ◆ Standard pages can be used when there is no data interaction.



JDeveloper 10g Struts Development

- ◆ Extended and simplified
 - Visual – page flow diagramming tool
 - Drag & Drop integration with ADF Services
 - Struts-Tags custom tag libraries
- ◆ JDev10g provides easiest way to use Struts
 - MUCH better than *9i*
 - MUCH better than anything else
 - Still not trivial





Tips

- ◆ Cut and paste code with caution
 - Use wizards
 - Most data operations are in two places
 - XML, Code (Java, HTML)
- ◆ Don't rename
 - Even remove is not safe if you have used it
 - Drag and drop adds, it never leaves
 - In JSP delete from screen AND Structure pane
 - Bindings area does not clean up.
- ◆ Save often (certainly prior to each running)
 - Make backups of whole directory



More Tips

◆ event_...

- In forward tag in struts_config.xml
- event_Submit default
- event_ErrorHandler custom
- Saves coding, ADF auto looks for events named this way (uses “line” name)

◆ - one blank space in HTML

◆ Don't use “HTML” components when doing struts – won't bind

- Component Palette “Struts HTML”

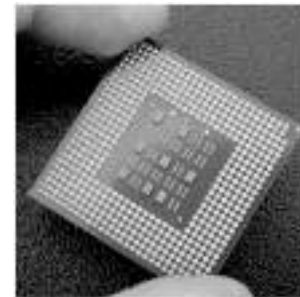


Development Method Tips

- ◆ 1. Ultra-thin client
- ◆ 2. Put everything possible into the database.
- ◆ 3. Make a view for each screen display and each screen update
- ◆ 4. Applications should never access anything other than views.
 - Views wrap functions and procedures.

Required Hardware

- ◆ Dual 20 inch monitors
- ◆ ≥ 1 GB memory (even if you are not running the DB) 2 GB nice, 4 GB cool
- ◆ > 2 GHz processor



Resources

- ◆ *Oracle JDeveloper 10g Handbook*, (Faderman, Koletzke & Dorsey, Oracle Press, 2004)
- ◆ OTN white papers
- ◆ Google for help (it will even find the OTN papers)
- ◆ Post questions on ODTUG, OTN.
- ◆ Get a mentor .
 - Without one, you will fail one or more projects
- ◆ Basic Struts book may not help much.

References

- ◆ *Oracle 10G JDeveloper Handbook*, Faderman, Koletzke & Dorsey (Oracle Press, 2004) ISBN: 0072255838
- ◆ *Oracle 9iAS: Building J2EE Applications*, Morrisseau-Leroy (Oracle Press, 2002) ISBN: 0072226145
- ◆ *Oracle 9i Application Server Portal Handbook*, Vandivier & Cox (Oracle Press, 2001) ISBN: 0072222492
- ◆ *Oracle 9i JDBC Programming*, Jason Price, (Oracle Press, 2002) ISBN: 0072222549 (not needed if you use BC4J)
- ◆ *Java2: The Complete Reference (5th Edition)*, Herbert Schildt, (McGraw-Hill, 2002) ISBN: 0072224207
- ◆ *Struts Kick Start*, Turner & Bedell, (SAMS, 2002) ISBN: 0672324725
- ◆ *Oracle9i XML Handbook*, Chang, Scardina & Kiritzov, (Oracle Press, 2001) ISBN: 007213495X
- ◆ *Refactoring: Improving the Design of Existing Code*, Martin Fowler (Addison-Wesley, 1999) ISBN: 0201485672
- ◆ *Oracle 9i Web Development*, Bradley D. Brown (Oracle Press, 2001) ISBN: 0072193883
- ◆ *The Java Class Libraries – Volumes 1, 2, 3*, Chan & Lee, (Addison-Wesley)
- ◆ *The Java Tutorial (series)*, Campione, et. al (Addison-Wesley)



Share your Knowledge: Call for Articles

◆ Help contribute your knowledge to the larger Oracle community:

➤ Articles wanted on topics of interest to the Oracle community.

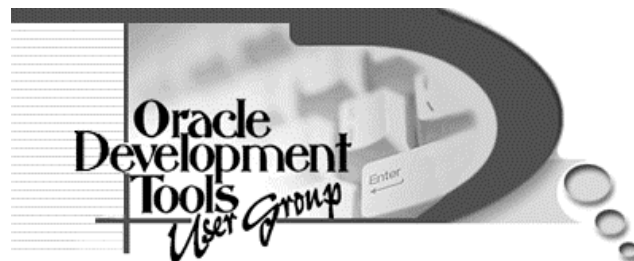
◆ Submit articles, questions, ... to

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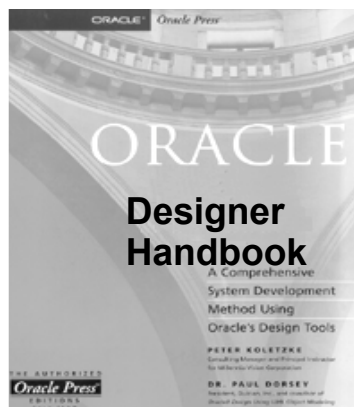
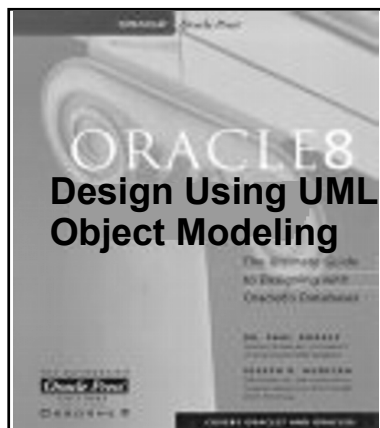
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