Tag Libraries in JavaServer Pages

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Outline

- **Standard and Custom Actions**
- **Roles**
- **Types of Tag Libraries**
- **Using Tag Libraries**
- **Implementing Tag Libraries**
- **Jakarta-Taglibs**
- **JSR on Standard Tag Library**

Standard Actions

- Available in JSP 1.0 and JSP 1.1
- Common actions:
  - useBean
  - setProperty
  - getProperty
  - include
  - forward
  - plugin

Custom Actions

- Encapsulate functionality
  - Reusable
  - Maintainable
- Easier to
  - Author manually
  - Manipulate by tool
- Provide
  - Portable semantics
  - Portable tool support

Roles

- User of Tag Library
  - Web page author
  - Expert at UI and presentation
- Author of Tag Library
  - Developer
  - Expert in access to data, service, etc.
- Customizer of Tag Library
  - Not yet well developed

Types of Tag Libraries

- Web Site Development Group
  - Uniform Access to Data
- Services Provider
  - Access
  - Presentation
  - Customization of Service
- Platform Vendor
  - Access to custom functionality
  - Specialized implementations of standard functions

Using Tag Libraries

- Activated using a taglib directive

  <%@ taglib uri="identifier" prefix="prefix" %>

- TagLib introduces new actions
- Action at request time
  - "Tag Handler" object
  - Has access to all page objects

Simple Action

- l <x:includeSaleOfDay att1="one" />
- l <x:logAction .../>
- l <x:forwardBasedOnClient .../>
- l <x:applyXSL .../>
- Do an action passing some arguments
- Most custom tags are like this
- Very easy to write

Simple Nested Action

```
<x:includeIfVIP>
   VIP stuff <x:VIPgreeting/>
</x:includeIfVIP>
```

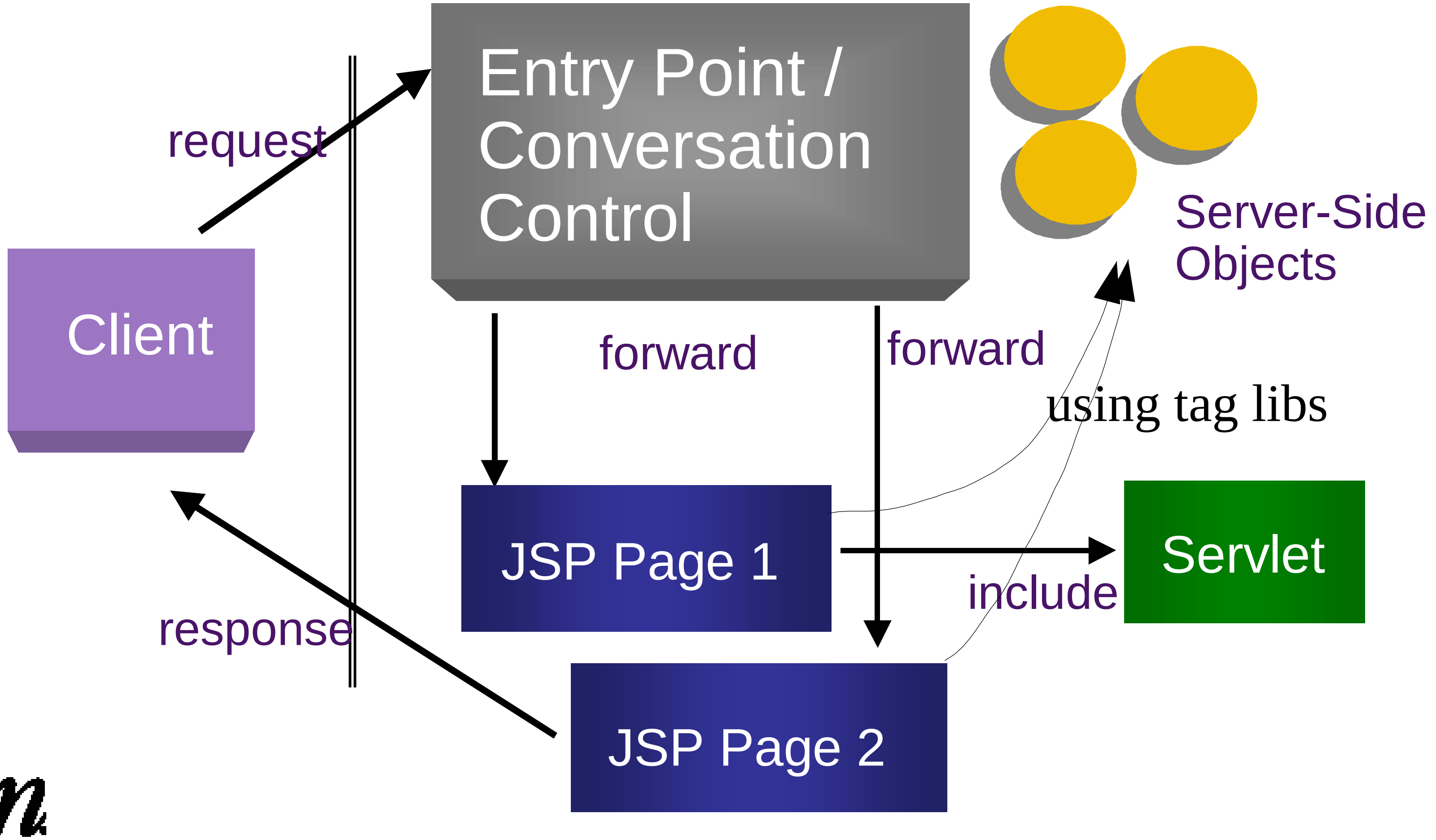
- Conditionally include body
  - cannot manipulate body
- May interact with inner actions
  - e.g. To define a scope
- Many custom tags are like this
- A bit more work but still easy to write

Nested and Iterative Action

l <x:loopOverTopSales>
  stuff <x:insertSaleItem/> more stuff
  </x:loopOverTopSales>

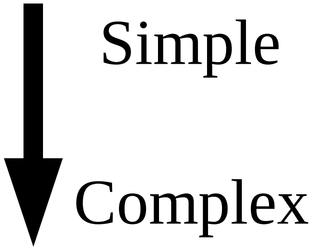
- Creates some context
- Iterates >=0 times on body
- Can manipulate body
- Fewer of these
- Harder to write

Typical Organization



Implementing Tag Libraries

- Tag Library Descriptor
- Tag Handler
  - Simple
  - Nested
  - Iterative



Simple

Complex

- Tag Body

Tag Library Descriptor

- Defines
  - new tag names
  - valid attributes
- Maps
  - action tags to tag handler classes
- Provides Authoring Info
  - very basic for 1.1
- Organized as an XML document

Tag Handler

- Request-Time Server Side Object
- Evaluates an Action
- Has access to:
  - attributes using setter/getter
  - server-side objects
  - enclosing actions
- Can have access to its content
- Implements one of 2 interfaces:
  - Tag - for simple handlers
  - BodyTag - for more power

Simple Action

l <x:doIt att1="one" />

- Handler needs to define
  - setAtt1(String s) { ... }
  - doStartTag() { ... }
- Handler implements Tag
- Usually extends TagSupport
  - inherits other standard behavior

Simple Action with Body

- <x:includeWhen condition="one">
  body
  </x:include>
- Like Simple Action but
  - doStartTag() returns
    - EVAL_BODY_INCLUDE - if include
    - SKIP_BODY - if skip
- Cannot manipulate body
- Can insert before and after body
  - doStartTag() and doEndTag()

Nested Action

-
  ```
  <x:outer>
     <x:inner />
  </x:outer>
  ```
- OuterHandler
  - doStartTag() returns EVAL_BODY_INCLUDE
- InnerHandler
  - doStartTag() calls into *findAncestorWithClass(OuterHandler.class)*

BodyContent

- Abstraction of the *evaluation* of body
- Managed by page implementation
- Nested
- Provided to tag Handler object
  - Can pass to its enclosing BodyContent
  - Can read and process
  - Uses methods in BodyTag interface

Body with Manipulation

l **<x:makeQuery>**

SQL statement

</x:loop>

- ***doStartTag*() returns EVAL_BODY_TAG**
- ***doInitBody*() is called**
- ***setBodyContent*() passes *BodyContent***
- **body gets evaluated into *BodyContent***
- ***doAfterBody*() returns SKIP_BODY**
- ***doEndTag*() is called**

Action with Iteration

l <x:loop n="34">
  This is iteration <x:insertCount/>
</x:loop>

- LoopHandler
  - doStartTag() initializes loop
  - doAfterBody() checks end of loop
- InsertCountHandler
  - doStartTag() looks for enclosing loop and inserts

Full Example

```
<html>
<%@ taglib uri=“/tlds/simpleDB.tld” prefix=“q” %>
<q:queryBlock connData=“conData1”>
  <q:queryStatement>SELECT account,
     balance...</q:queryStatement>
  The top 10 accounts and balances are:
  <table>
     <tr><th>ACCOUNT</th><th>BALANCE</th></tr>
<q:queryCreateRows from=“1” to=“10”>
   <td><q:queryDisplay field=“ACCOUNT”/></td>
   <td><q:queryDisplay field=“BALANCE”/></td>
<q:queryCreateRows>
  </table>
</q:queryBlock>
</html>
```

Handling XML Content

- **JSP Pages Can:**
  - **Accept / Generate XML Through**
    - **Raw parser (now)**
    - **Data binding (later)**
  - **Manipulate Content Through**
    - **DOM access**
    - **XSL/XSLT**
  - **Encapsulated in Tag Library actions**

Jakarta-Taglibs

- An Apache project @ Jakarta
- Code examples of TagLibs
- Goals:
  - educational
  - basis for cut-and-paste examples
  - experimental ideas
  - useful libraries
- Not the Standard Tag Library

JSR Standard Tag Library

- Goals include:
  - Actions for Data Sources
    - LDAP
    - JDBC queries
  - Actions for control of presentation
    - Conditional
    - Iterative

Standard Tag Library

- Benefits include:
  - Widespread availability
    - Ease of use by authors
    - Better support by tools
  - High quality
  - Mindshare: training, portability, maintenability
  - Enables specialized implementations

JSR Endorsers

- Abobe
- Allaire
- ATG
- BEA
- Bluestone
- Caucho
- Exoffice
- Jakarta (ASF)
- IBM
- Gefion
- KL Group
- K&A
- Macromedia
- NetObjects
- Netscape
- New Atlanta
- Oracle
- Visual Cafe Group
- Orion
- Turbine (ASF)
- Sun Microsystems
- SilverStream

TagLibs in JSP Spec

- **Next JSP & Serlvet spec may:**
  - **Improve authoring support**
  - **Improve composition mechanisms**
  - **Enable customization of libraries**
  - **Tune mechanism based on experience**

Summary

- Tag Libraries is key JSP 1.1 feature
- Encapsulated functionality
- High interest in user community
- Standard Tag Library has wide industry interest
- Practical experience will drive evolution

Resources

1 http://java.sun.com/products/jsp

1 http://java.sun.com/products/servlet

1 http://java.sun.com/j2ee

1 http://java.sun.com/apm

" jsp-interest@java.sun.com

" servlet-interest@java.sun.com

"

" http://jakarta.apache.org/