**Example – Items (JSP version)**

- **Login.jsp**
  - Authentication

- **Admin.jsp**
  - Display items
  - Adding new items

- **User.jsp**
  - Display items

- **Logout.jsp**
  - Invalidate session

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**About Items (JSP version)**

- **Advantages**
  - Easy to code

- **Problems**
  - ??

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**Model 1 Architecture**

- **JSPs + Java beans**
  - JSPs for presentation
  - Beans for business logic

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**Java Beans**

- **POJO (Plain Old Java Objects)**
- Properties defined by *getter* and *setter* methods

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**Items (Model 1 version)**

- **What would it look like??**
- **Compared to the JSP version, what problems are addressed and what still remain??**
Model 2 Architecture

- Also known as Model-View-Controller (MVC) architecture
  - JSPs + beans + servlet
  - Beans for business logic – Model
  - JSPs for presentations – View
  - Servlet for web logic – Controller
    - HTTP related processing, e.g. request, response, sessions etc.
    - Request dispatching

MVC Control Flow ...

... MVC Control Flow

1. Process request
2. Populate beans
3. Store results in request, session, or servlet context
4. Forward request to JSP page
5. Extract bean data from beans and display

Multiple Controllers

Items (MVC version)

- FrontController
  - Login handler
  - Logout handler
  - User handler
  - Admin handler
- Models: Item and User
- Views: Login.jsp, Admin.jsp, User.jsp

Admin Control Flow

1. Process request
2. Populate beans
   
   ```java
   List<Item> items = itemDao.getAllItems();
   ```
3. Store results in request, session, or servlet context
   
   ```java
   request.setAttribute("items", items);
   ```
4. Forward request to JSP page
   
   ```java
   request.getRequestDispatcher("WEB-INF/jsp/Admin.jsp").forward(request, response);
   ```
5. Extract bean data from beans and display
   
   ```xml
   <c:forEach items="${items}" var="item">
   ```...
More About The Example

- web.xml
- Data Access Object (DAO)

Directory Structure ...

- Recommended by SUN:
  http://java.sun.com/blueprints/code/proj ectconventions.html

... Directory Structure

- Recommended by This SUN:

```
\webapp
  \build
  \dist
  \doc
  \src
  \lib
  \compile
  \runtime
  \src
  \web
  \WEB-INF
  \web.xml
  \tld
  build.xml
  build.properties.sample
```

Need for Web Application Frameworks

- What are missing from Items (MVC version)??

Some Web Application Frameworks

- Struts
  - http://struts.apache.org/
- Spring
  - http://www.springframework.org/
  - More than a MVC framework
- Ruby on Rails
  - http://www.rubyonrails.org/

Web App Development – Where Do We Start?

- Control flow driven approach
Web App Development – Where Do We Start?

Data driven approach

1. Models
2. Database Schema
3. Application