CS320 Web and Internet Programming
MVC Architecture

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## Java Web Application

- Servlets
- Beans
- JSPs
  - Scripting elements, EL, JSTL
- Static resources
  - HTML, CSS, images, …
- Metadata files
  - web.xml, …

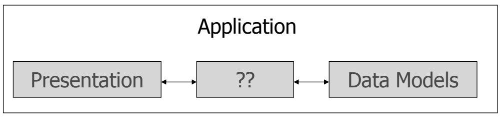
## Model 1 Architecture

- JSP + Bean
  - JSP for presentation
  - Bean for business logic
- Example
  - User management

## Problems of Model 1 Architecture

- Using scripting elements mixes presentation and processing
  - Hard to debug, maintain, or reuse code
- Not using scripting elements limits the interaction between presentation and processing to getters and setters
  - Tedious to program
  - Beans are no longer independent of the presentation layer, i.e. special getters/setters are needed

## Improve Model 1 Architecture



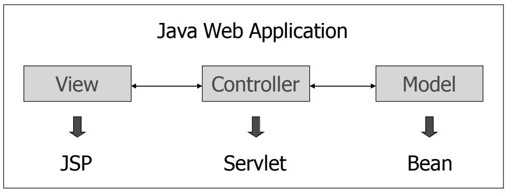
Application

Presentation ↔ ?? ↔ Data Models

- Presentation
  - Create UI
  - Input and output
  - JSP, JFC/Swing ...
- Data Models
  - Independent of UI
  - Bean (POJO)
  - E.g. the `User` class

## Model 2 Architecture

- A.K.A. Model-View-Controller (MVC) Architecture



Java Web Application

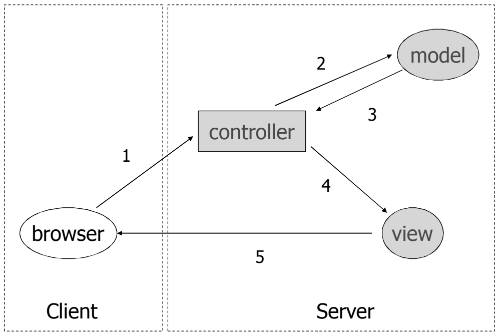
View ↔ Controller ↔ Model

JSP — Servlet — Bean

## About MVC

- Originate from the work on *Smalltalk*
- Widely used in GUI applications

## MVC in a Web Application ...



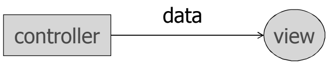
## ... MVC in a Web Application

1. Process request
2. Create/update beans
3. Store beans in request, session, or application scope
4. Forward request to JSP page
5. Extract data from beans and display

## Guest Book Example Using MVC

- **M**odel
  - GuestBookEntry.java
- **V**iew
  - GuestBook.jsp, AddComment.jsp, EditEntry.jsp
- **C**ontroller
  - GuestBook.java, AddComment.java, EditEntry.java

## Send Data From Controller to View …



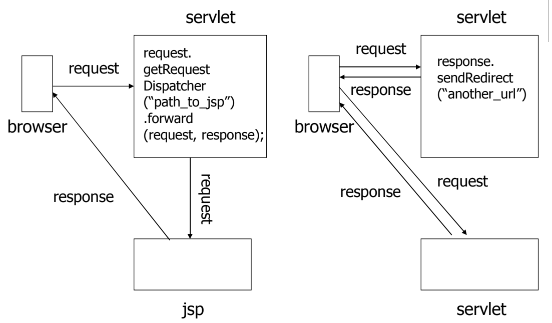
```
request.getRequestDispatcher( “path_to_jsp" )
        .forward( request, response );
```

## … Send Data From Controller to View

- Objects in *application* and *session scope* are shared by all servlets and JSPs of the application
- Additional data can be passed from servlet to JSP in *request scope*

```
request.setAttribute( “objName”, obj );
request.getRequestDispatcher( “path_to_jsp" )
        .forward( request, response );
```

# Forward vs. Redirect



servlet

browser

request

request.
getRequest
Dispatcher
("path_to_jsp")
.forward
(request, response);

request

response

jsp

servlet

browser

request

response

response.
sendRedirect
("another_url")

response

request

servlet

# More About the MVC Example

- One operation, one controller
- Requests always go to controllers first
  - "Hide" JSPs under `/WEB-INF/`
- Controllers do not generate HTML
  - No `out.println()`
- JSPs are only used for display
- No scripting elements in JSP