MVC Pattern (MVC Framework)

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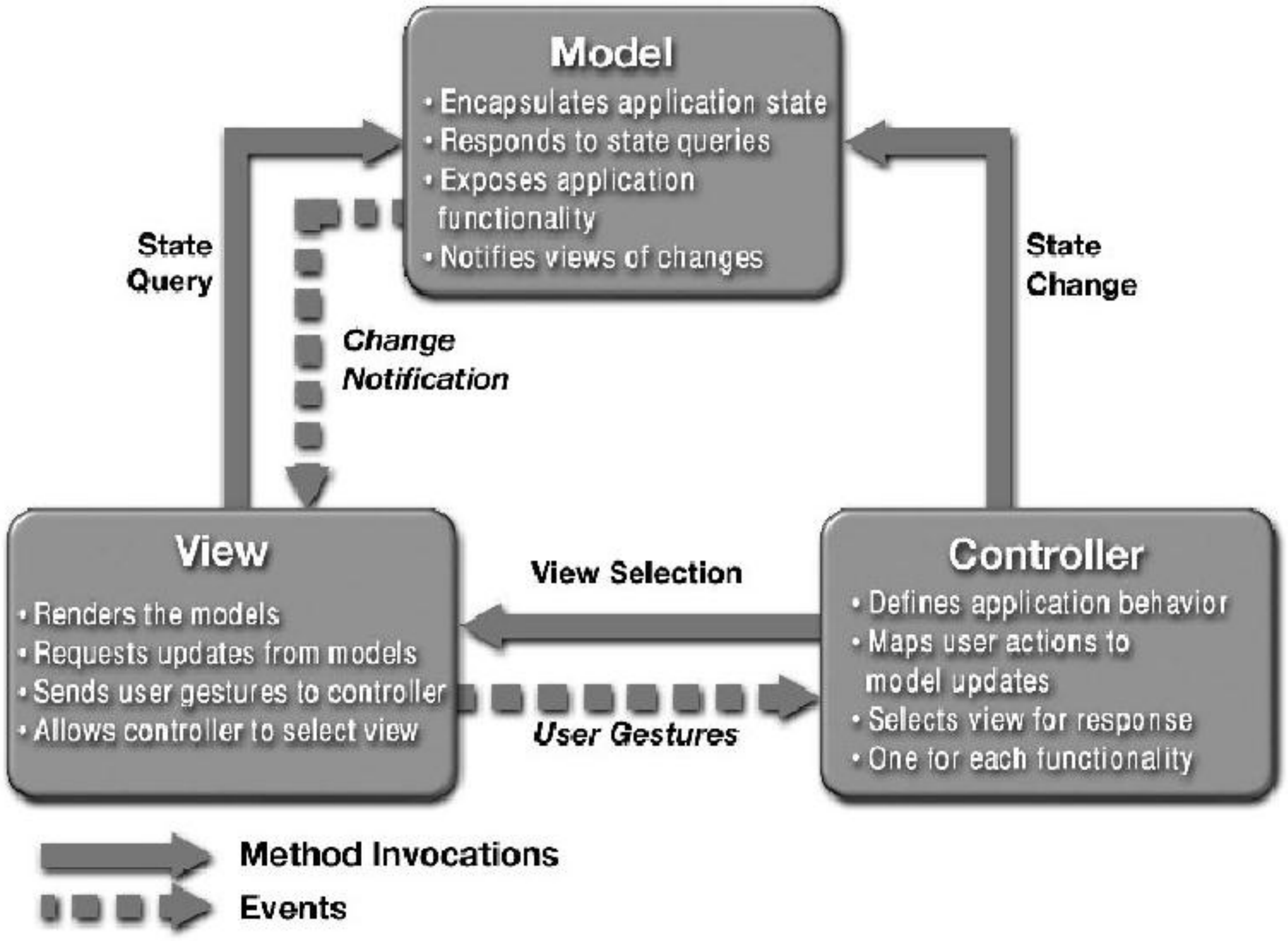
Introduction to MVC Pattern

MVC Pattern: Three Logical Layers in a Web Application


Model
• Encapsulates application state
• Responds to state queries
• Exposes application functionality
• Notifies views of changes
State Query
Change Notification
State Change
View
• Renders the models
• Requests updates from models
• Sends user gestures to controller
• Allows controller to select view
View Selection
User Gestures
Controller
• Defines application behavior
• Maps user actions to model updates
• Selects view for response
• One for each functionality
Method Invocations
Events

MVC : Model

- Model (Business process layer)
  - Models the data and behavior behind the business process
  - Responsible for actually doing
    - Performing DB queries
    - Calculating the business process
      - Processing orders
  - Encapsulate of data and behavior which are independent of presentation

MVC: View

- View (Presentation layer)
  - Display information according to client types
  - Display result of business logic (Model)
  - Not concerned with how the information was obtained, or from where (since that is the responsibility of Model)

MVC: Controller

- Controller (Control layer)
  - Serves as the logical connection between the user's interaction and the business services on the back
  - Responsible for making decisions among multiple presentations
    - e.g. User's language, locale or access level dictates a different presentation.
  - A request enters the application through the control layer, it will decide how the request should be handled and what information should be returned

Web Applications

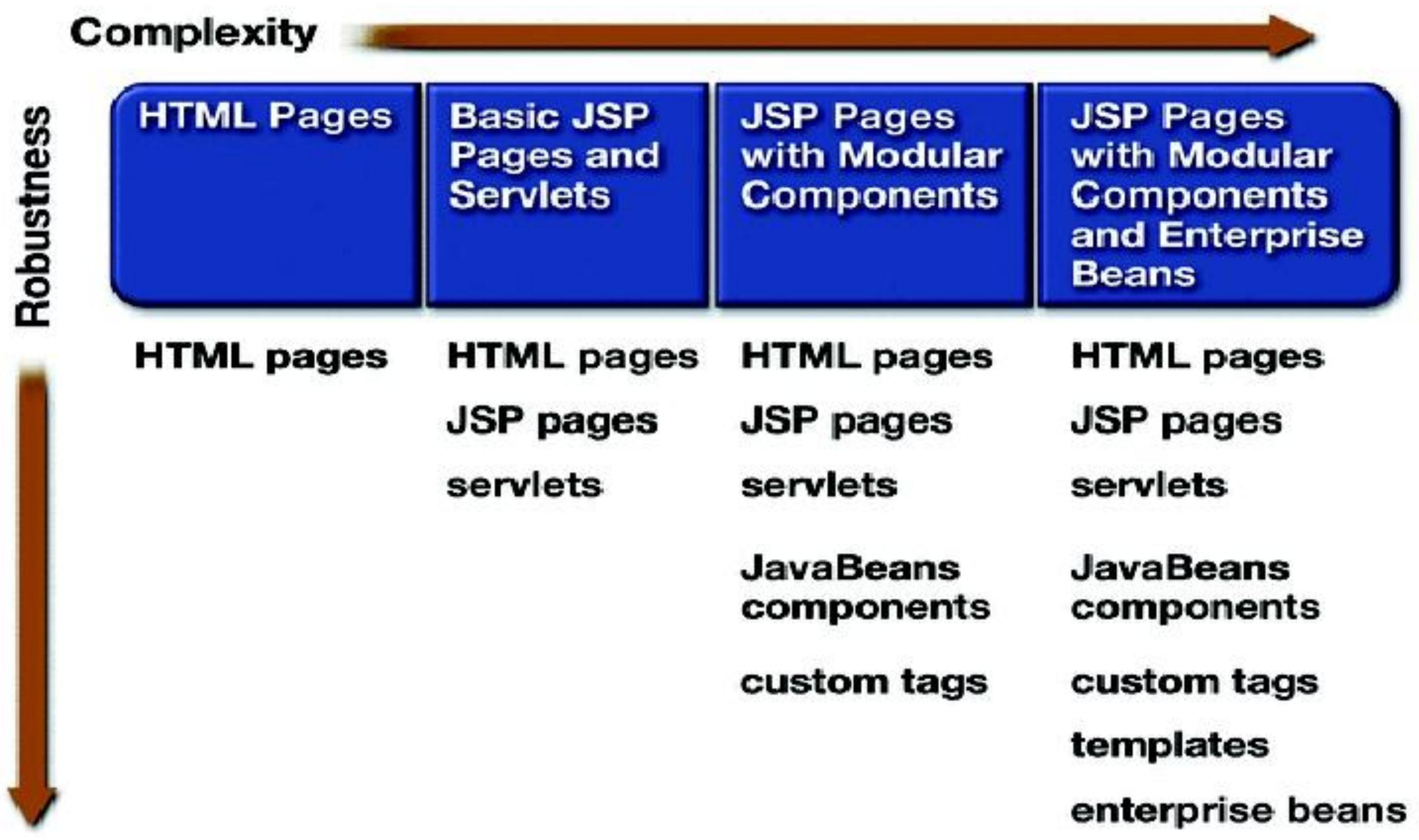
- It is often advantageous to treat each layer as an independent portion of your application
- Do not confuse logical separation of responsibilities with actual separation of components
- Some of the layers can be combined into single components to reduce application complexity

Evolution of Web Application Design Architecture

Evolution of MVC Architecture

1. No MVC
2. MVC Model 1 (Page-centric)
3. MVC Model 2 (Servlet-centric)
4. Web application frameworks
   - Struts
5. Standard-based Web application framework
   - JavaServer Faces (JSR-127)

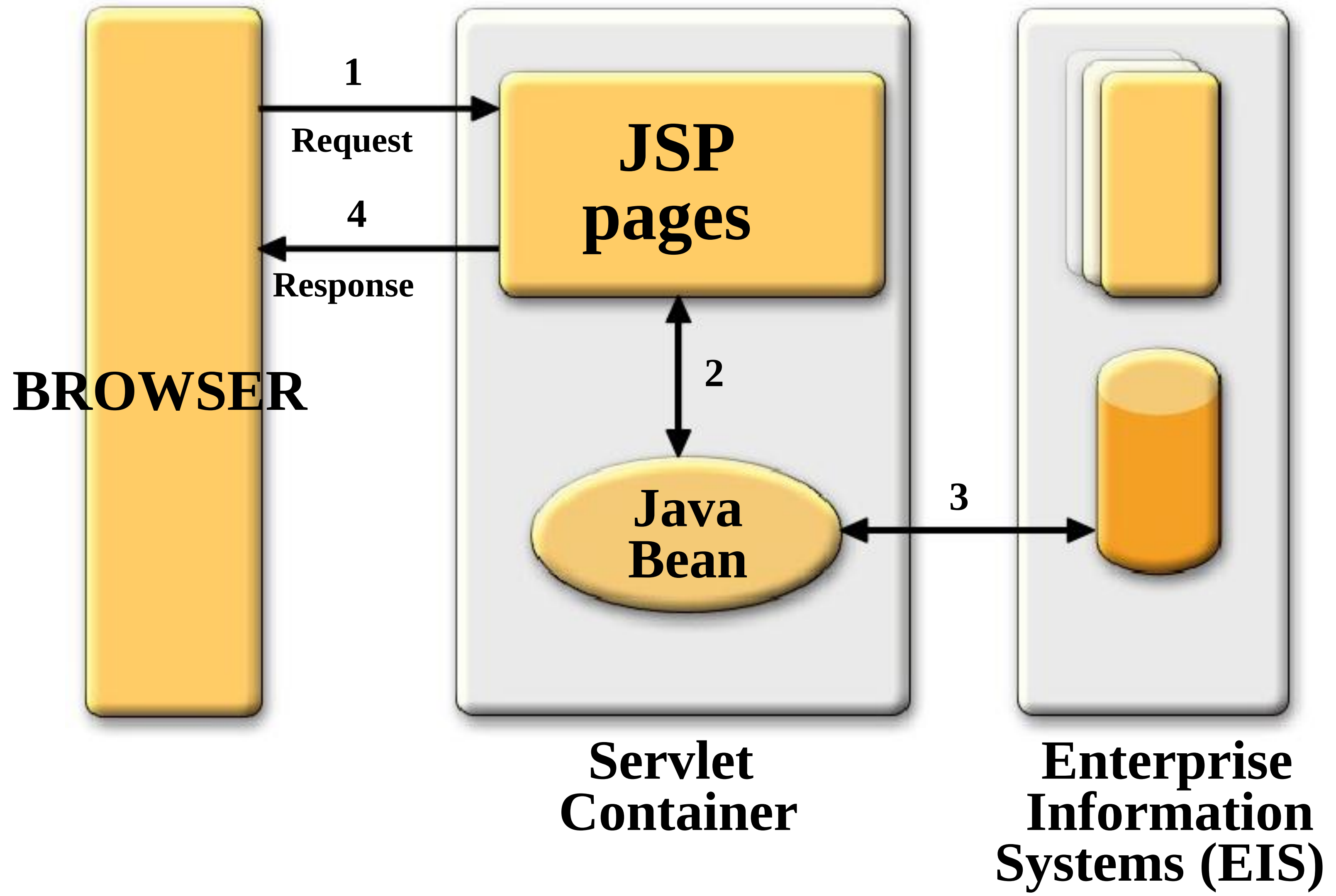
Evolution of Web Application Design until Model 1 Architecture



No MVC	Model 1 architecture

Model 1 (Page-Centric Architecture)

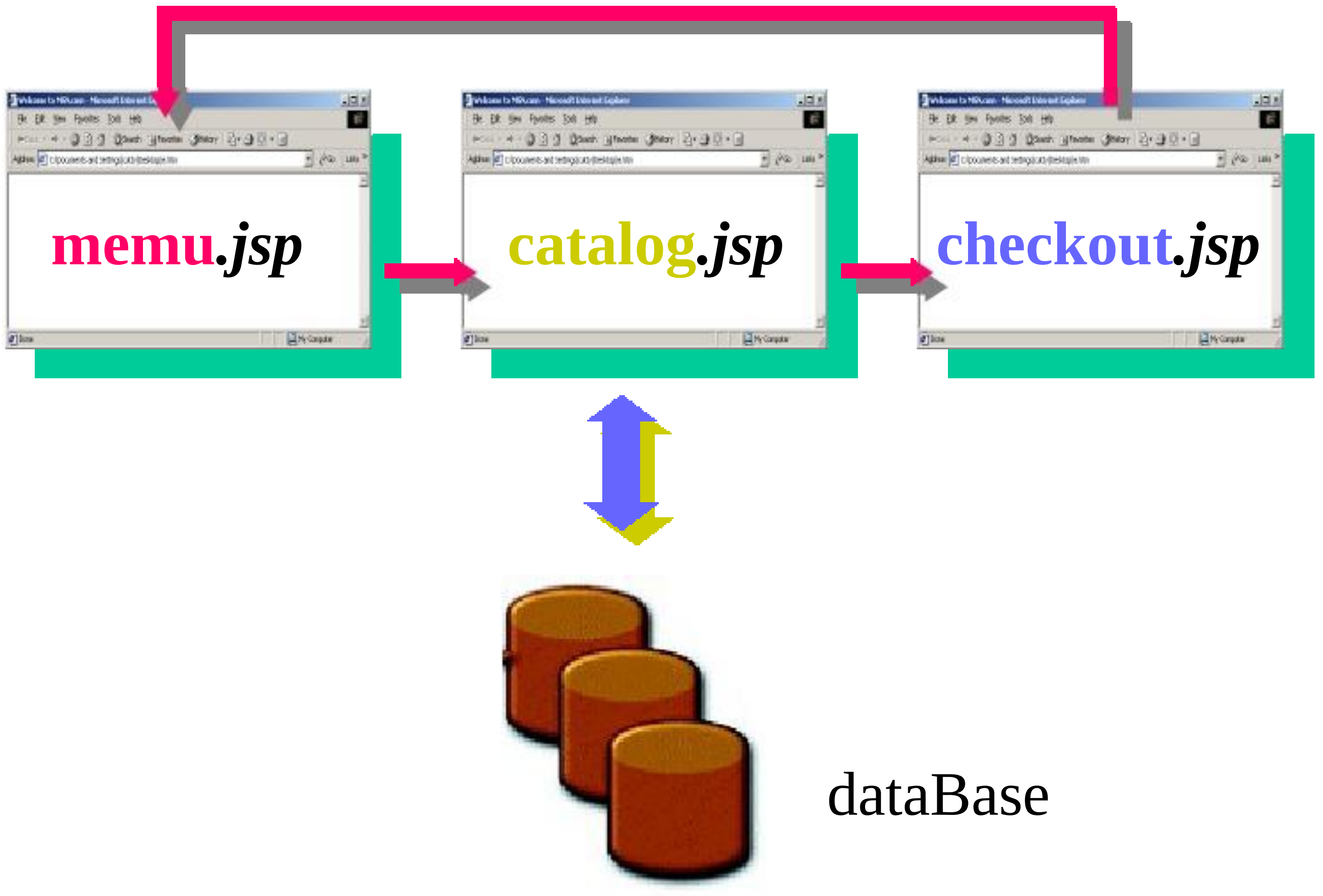
Model 1 Architecture (Page-centric)



Page-centric Architecture

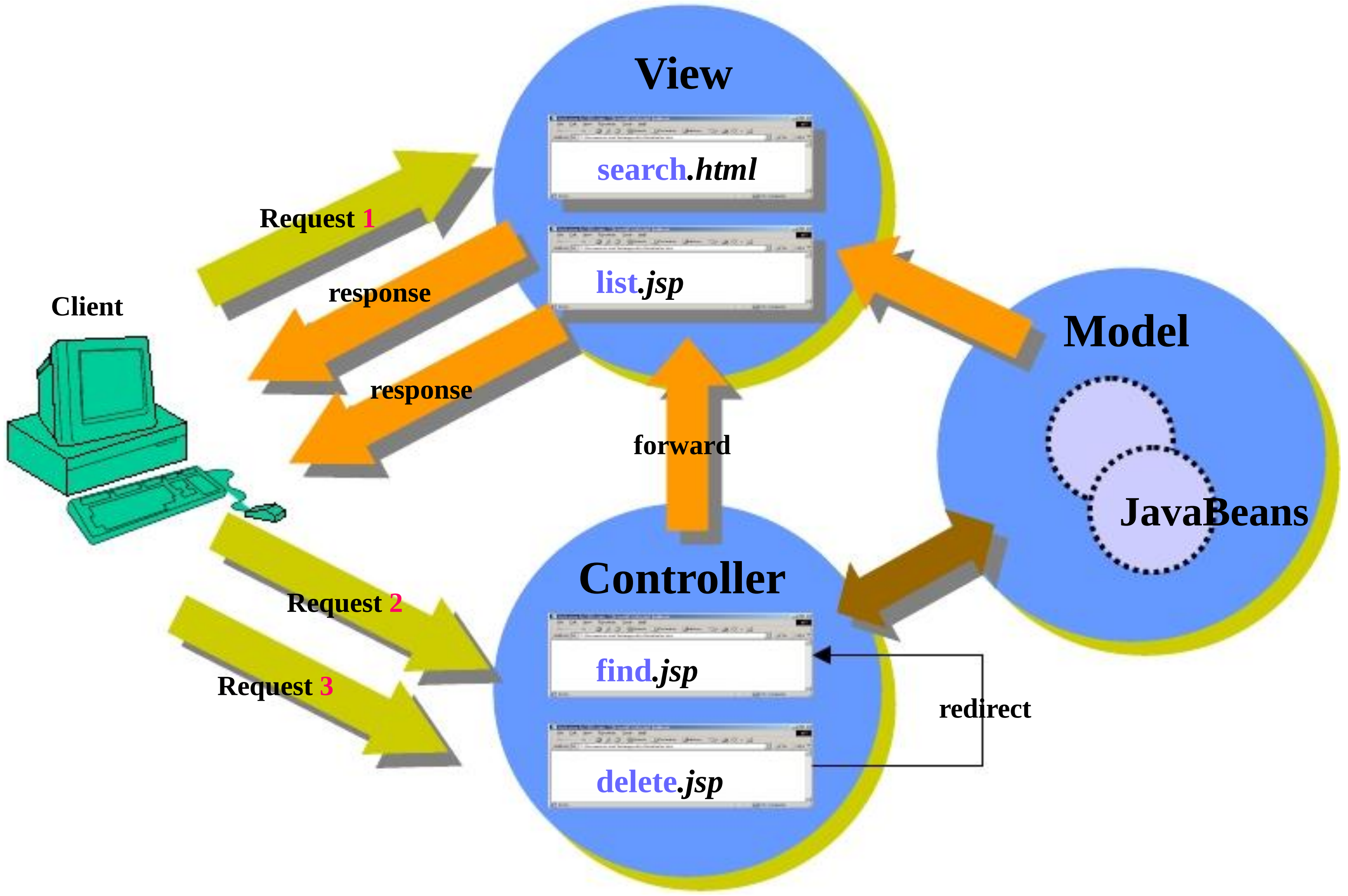
- Composed of a series of interrelated JSP pages
  - JSP pages handle all aspects of the application - presentation, control, and business process
- Business process logic and control decisions are hard coded inside JSP pages
  - in the form of JavaBeans, scriptlets, expression
- Next page selection is determined by
  - A user clicking on a hyper link, e.g. <A HERF="find.jsp>
  - Through the action of submitting a form, e.g. <FORM ACTION="search.jsp">

Page-centric Architecture



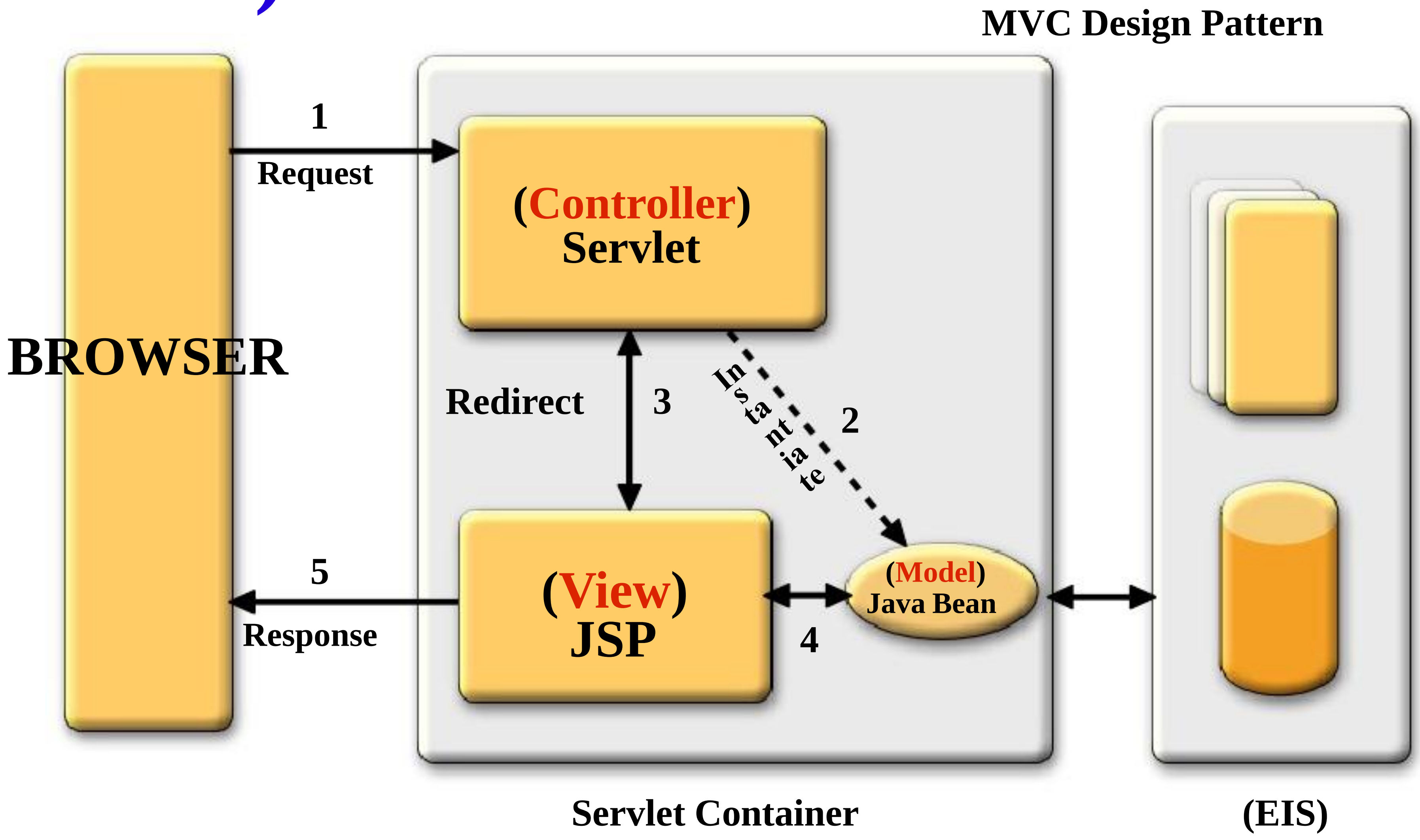
page–centric catalog application

Page-centric Scenario



Model 2 (Servlet-Centric Architecture)

Model 2 Architecture (Servlet-centric)



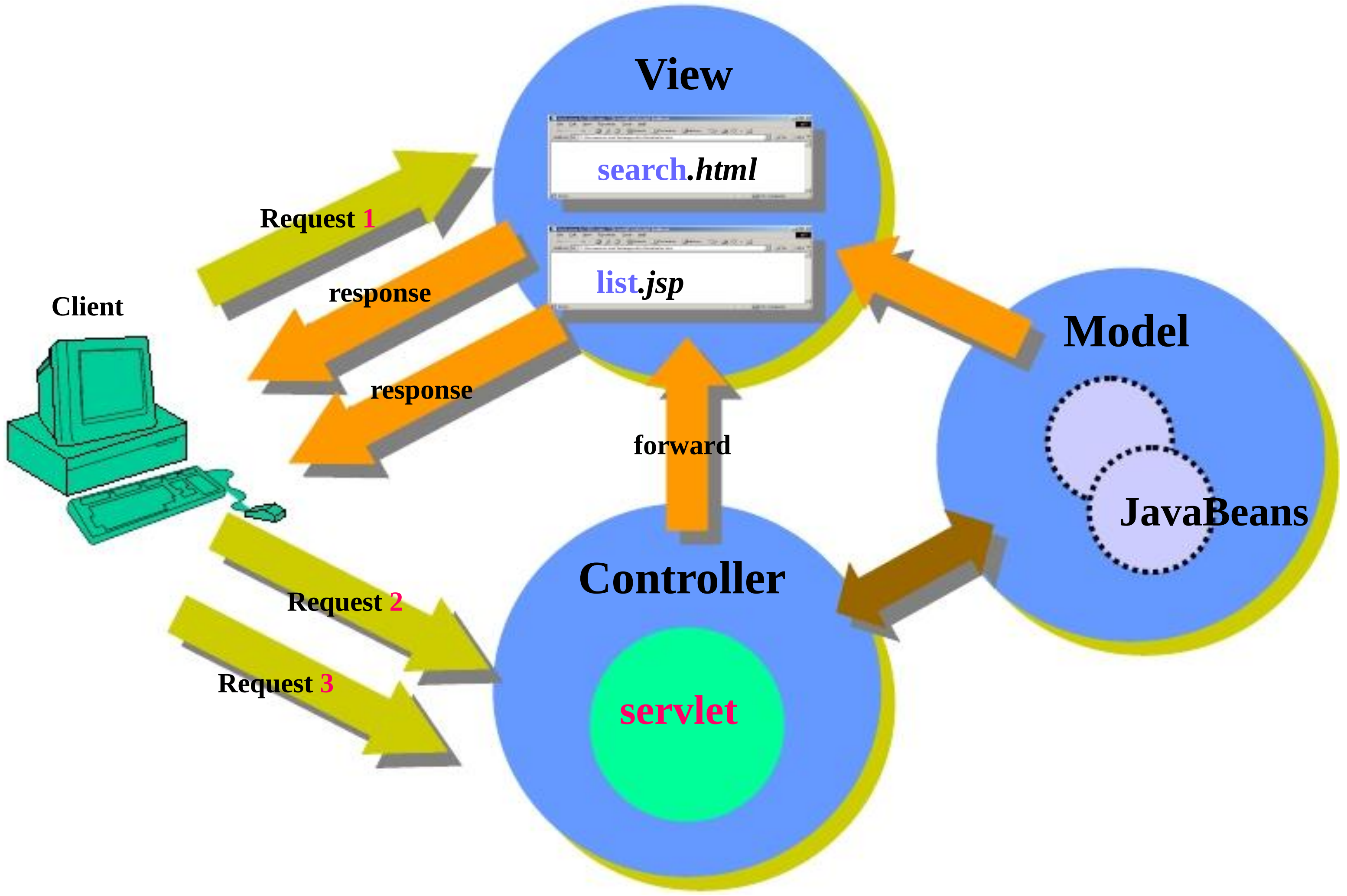
Why Model 2 Architecture?

- What if you want to present different JSP pages depending on the data you receive?
  - JSP technology alone even with JavaBeans and custom tags (Model 1) cannot handle it well
- Solution
  - Use Servlet and JSP together (Model 2)
  - Servlet handles initial request, partially process the data, set up beans, then forward the results to one of a number of different JSP pages

Servlet-centric Architecture

- JSP pages are used only for presentation
  - Control and application logic handled by a servlet (or set of servlets)
- Servlet serves as a gatekeeper
  - Provides common services, such as authentication, authorization, login, error handling, and etc
- Servlet serves as a central controller
  - Act as a state machine or an event dispatcher to decide upon the appropriate logic to handle the request
  - Performs redirecting

Servlet-centric Scenario



Model 1? Model 2?

- Use page-centric
  - If the application is simple enough that links from page to page.
- Use servlet-centric
  - Each link or button click requires a great deal of processing and decision-making about what should be displayed next.
- “How mapping between requests and responses are done” can help you to decide
  - Each request maps to one and only one response
    - No need for controller.
  - Each request spawns a great deal of logic and a variety of different views can result
    - A servlet is ideal

Web Application Frameworks

Web Application Frameworks

- Based on MVC Model 2 architecture
- Web-tier applications share common set of functionality
  - Dispatching HTTP requests
  - Invoking model methods
  - Selecting and assembling views
- Provide classes and interfaces that can be used/extended by developers

Why Web Application Framework?

- De-coupling of presentation tier and business logic into separate components
- Provides a central point of control
- Provides rich set of features
- Facilitates unit-testing and maintenance
- Availability of compatible tools
- Provides stability
- Enjoys community-supports
- Simplifies internationalization
- Simplifies input validation

Why Web Application Framework?

- Frameworks have evolved with Java Server technology
- JSP/Servlets are still hard to use
- Frameworks define re-usable components to make this job easier.
- A good framework defines how components work to create a usable application.

Web Application Frameworks

- Apache Struts
- JavaServer Faces (JSR-127)
  - A server side user interface component framework for JavaTM technology-based web applications
- Echo
- Tapestry

The End!