102045605
Advanced Java

Unit-7
Spring MVC

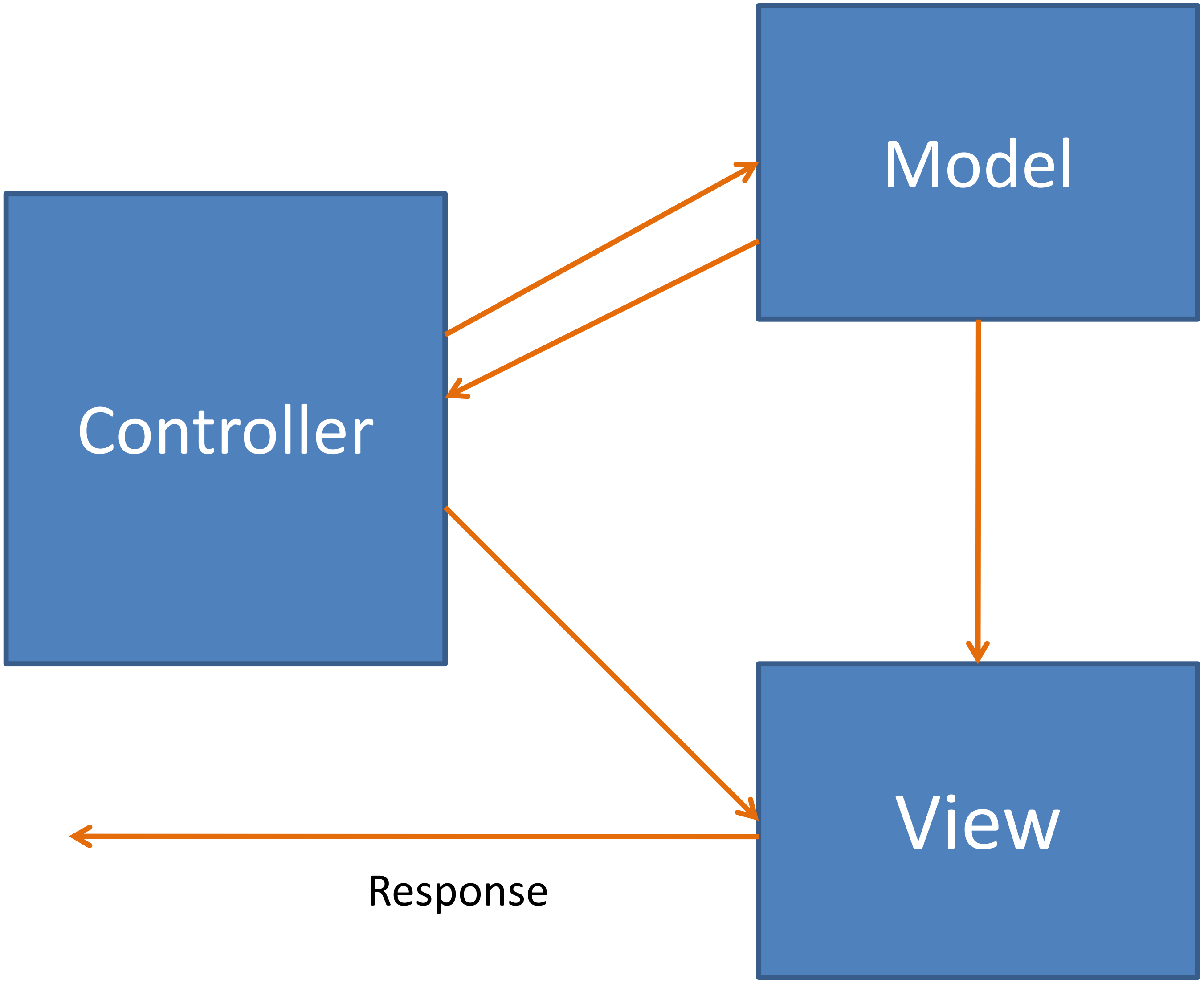
Subject Overview

Sr. No.	Unit	% Weightage
1	Java Networking	5
2	JDBC Programming	10
3	Servlet API and Overview	25
4	Java Server Pages	25
5	Java Server Faces	10
6	Hibernate	15
7	**Java Web Frameworks: Spring MVC**	**10**

Reference Book:
Black Book “ Java server programming” J2EE, 1st ed., Dream Tech Publishers, 2008. 3. Kathy walrath ”
Chapter 21

What is MVC?

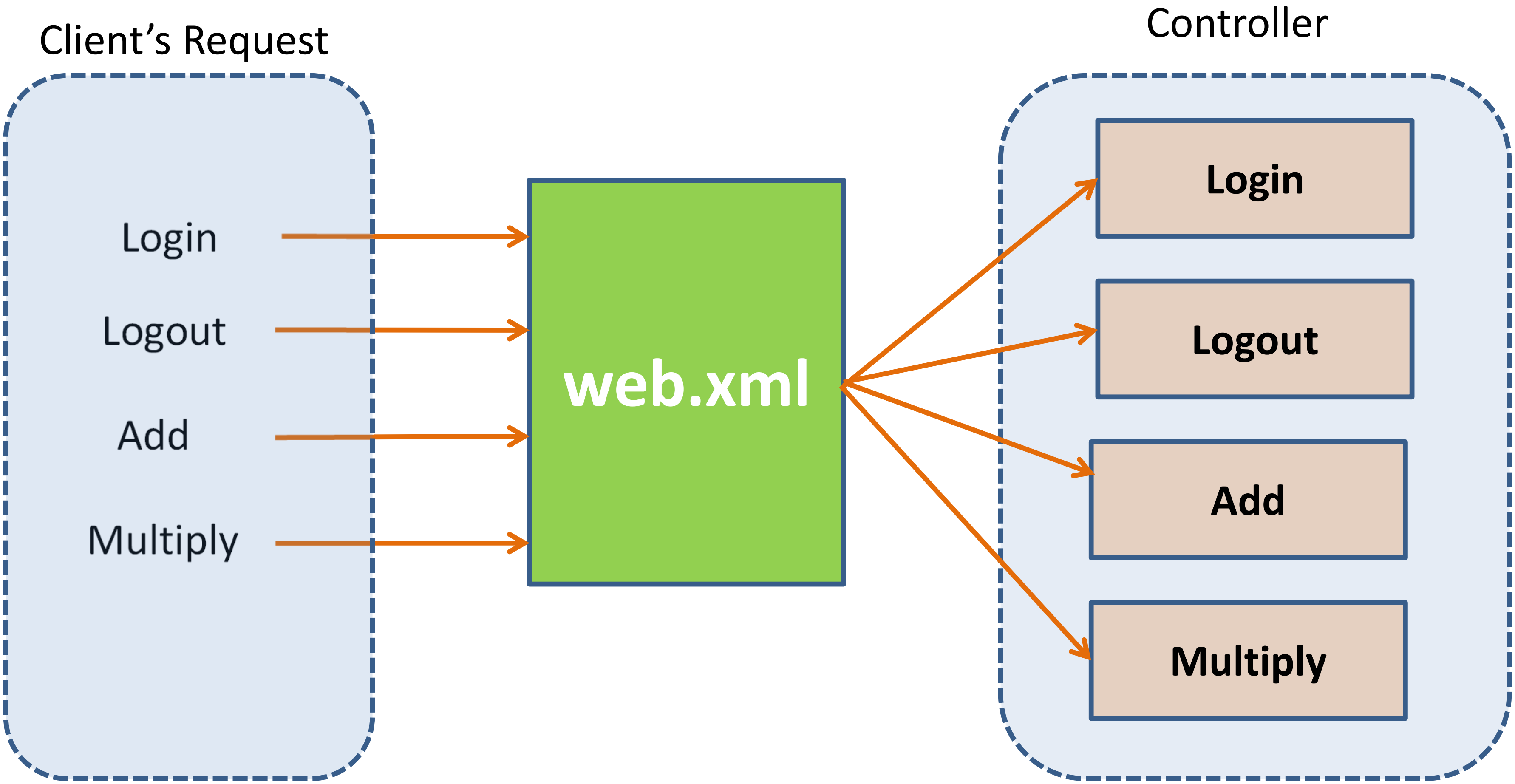
MVC – An overview



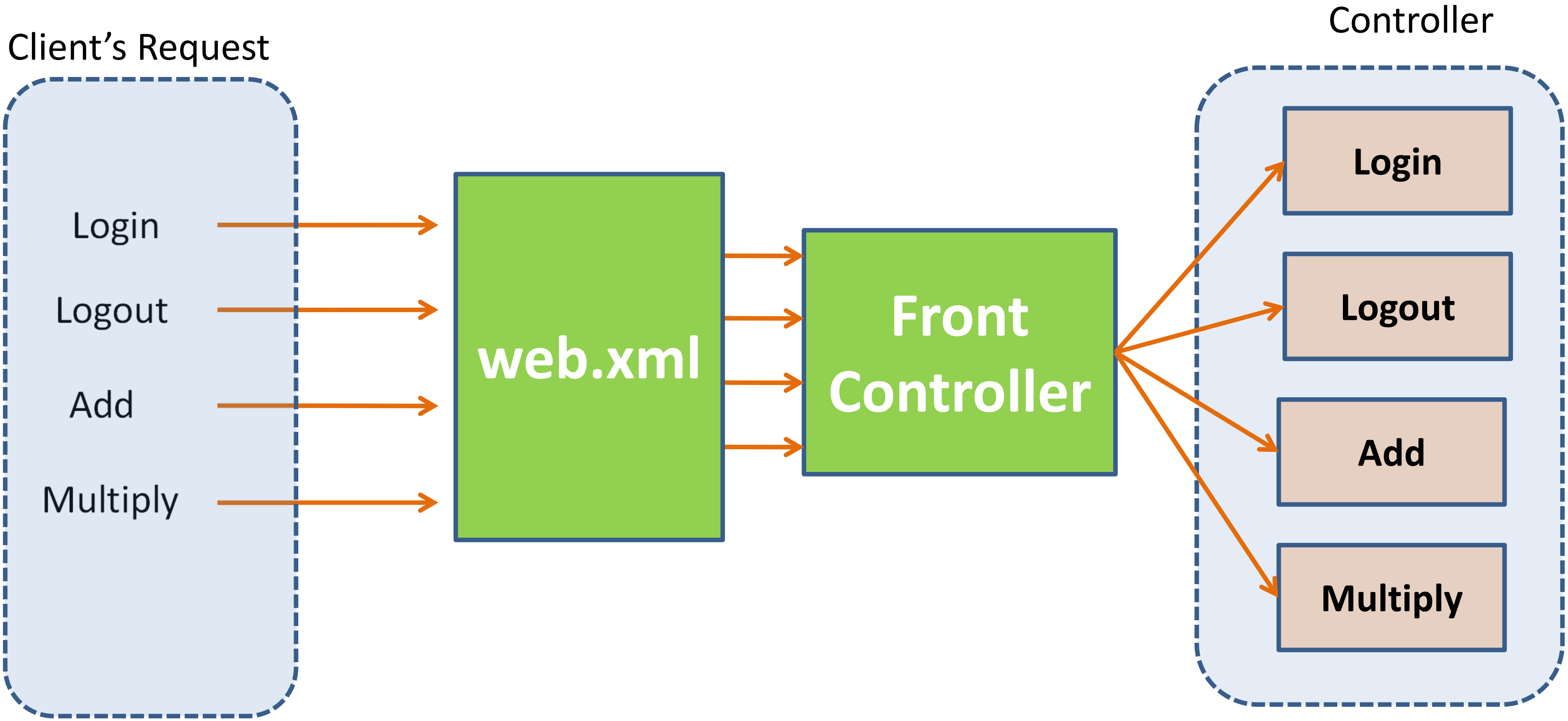
Advantage of MVC

- Navigation control is centralized. Now only controller contains the logic to determine the next page.
- Easy to maintain
- Easy to extend
- Easy to test
- Better separation of concerns
- Reusability

MVC Architecture



Spring MVC Architecture



Front Controller - Responsibilities

- Initialize the framework to supply to the requests.
- Load the map of all the URLs and the components responsible to handle the request.
- Prepare the map for the views.

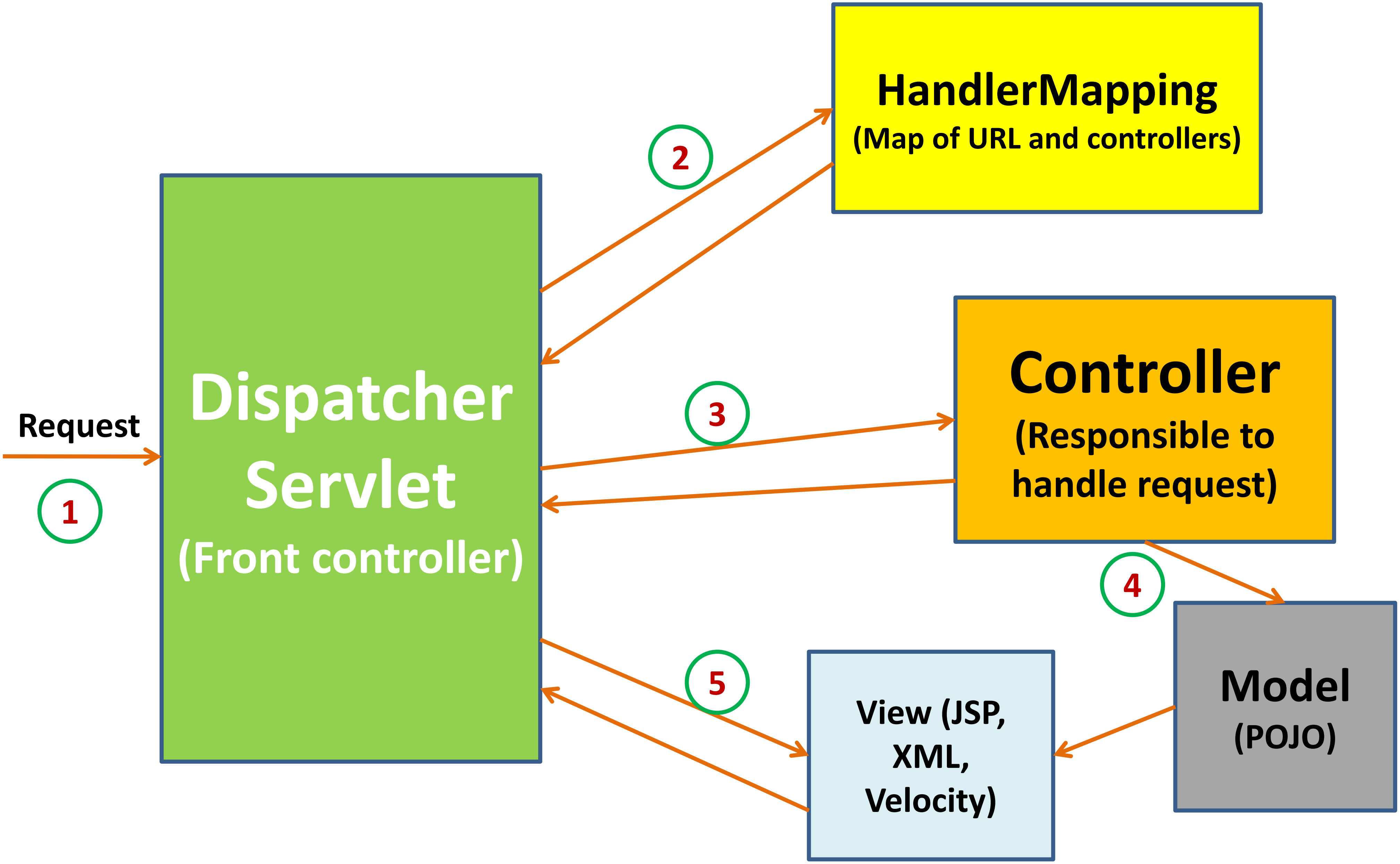
What is Spring MVC Framework?

- Spring links objects together instead of the objects linking themselves together.
- Spring object linking is defined in XML files, allowing easy changes for different application configurations thus working as a plug in architecture.

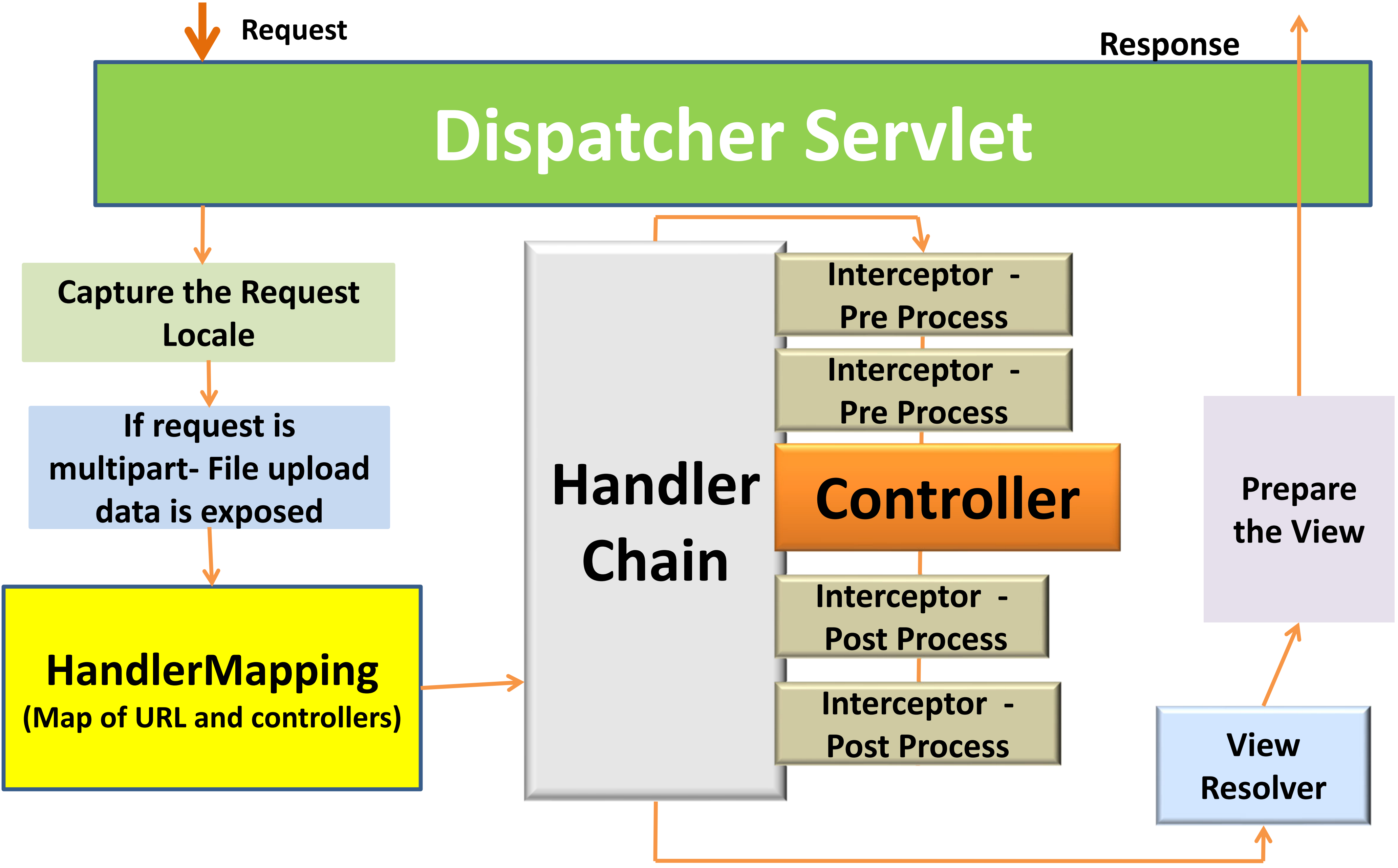
What is Spring MVC Framework?

- In an MVC architecture the controllers handle all requests.
- Spring uses a “DispatcherServlet” defined in the web.xml file to analyze a request URL pattern and then pass control to the correct controller by using a URL mapping defined in a “Spring bean” XML file.

Spring 3 MVC- Basic Architecture


HandlerMapping
(Map of URL and controllers)
2
Request
1
Dispatcher
Servlet
(Front controller)
3
Controller
(Responsible to handle request)
4
Model
(POJO)
5
View (JSP, XML, Velocity)

Spring 3.0 MVC Request Flow



Request

Response

Dispatcher Servlet

Capture the Request Locale

If request is multipart- File upload data is exposed

HandlerMapping

(Map of URL and controllers)

Handler Chain

Interceptor - Pre Process

Interceptor - Pre Process

Controller

Interceptor - Post Process

Interceptor - Post Process

View Resolver

Prepare the View

Why Spring Framework?

- All frameworks integrate well with Spring.
- Consistent Configuration, open plug-in architecture.
- Integrates well with different O/R Mapping frameworks like Hibernate.
- Easier to test applications with.
- Less complicated then other frameworks.
- Active user community.
- Spring is well organized and seems easier to learn comparatively
- Spring also supports JDBC Framework that makes it easier to create JDBC Apps.

Features of Spring MVC Framework

1. Inversion of Control (IoC) Container

   It is used to provide object reference to class during runtime.

2. Data Access Framework

   It enables developers to easily write code to access the persistant data throughout the application.

3. Transaction Management

   It enables developers to model a wide range of transaction by providing Java Transaction API (JTA).

4. Spring Web Services

   It provides powerful mapping for transmitting incoming XML request to any object.

Advantage of Spring MVC Framework

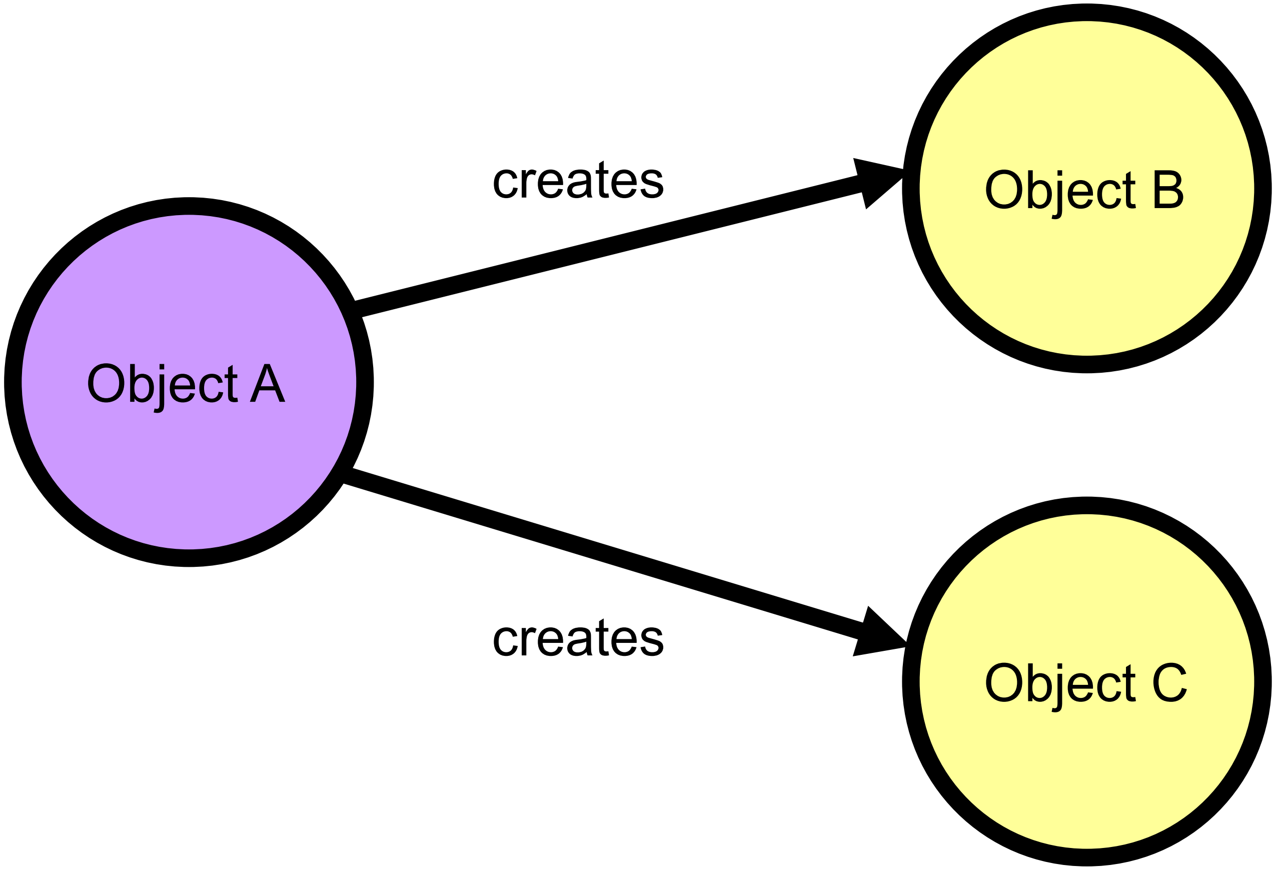
- Predefined Templates
- Loose Coupling
- Easy to test
- Lightweight
- Fast Development
- Declarative Support
- Hibernate and JDBC Support
- MVC Architecture and JavaBean Support

Example of web.xml file

```
<web-app>
<servlet>
    <servlet-name>tradingapp</servlet-name>
  <servlet-class>DispatcherServlet</servlet-class>
</servlet>
<servlet-mapping>
<servlet-name>tradingapp</servlet-name>
    <url-pattern>*.html</url-pattern>
</servlet-mapping>
</web-app>
```

*** Any URL ending with an “.html” pattern is routed to the DispatcherServlet, the DispatcherServlet loads the **tradingapp-servlet.xml** file and routes the user to the correct controller.

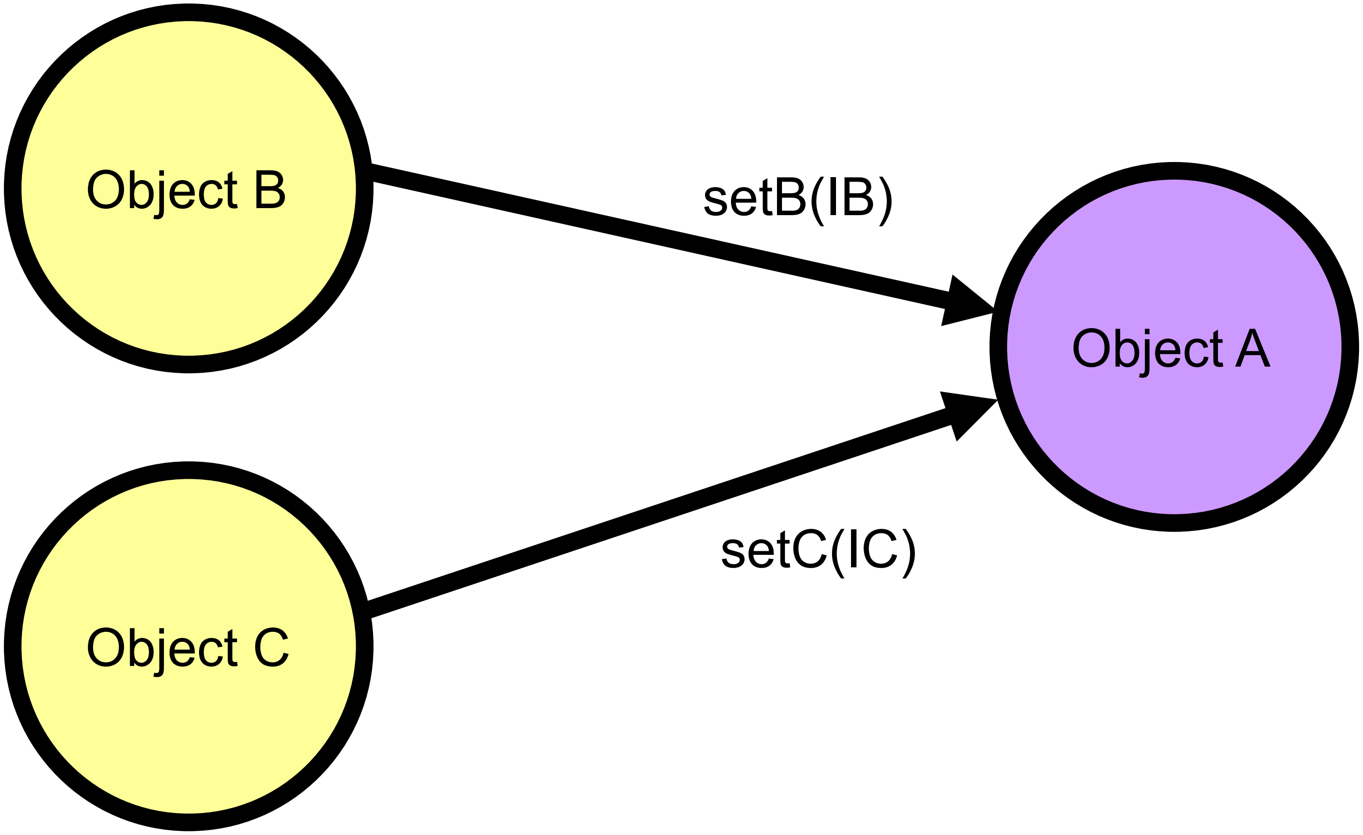
Without Dependency-Injection/IoC



An object creating its dependencies without IoC leads to tight object coupling.

With Dependency-Injection/IoC

- Allows objects to be created at higher levels and passed into object so they can use the implementation directly



Object A contains setter methods that accept interfaces to objects B and C. This could have also been achieved with constructors in object A that accepts objects B and C.

Advantage of Spring MVC over MVC

- Spring is a powerful Java application framework, used in a wide range of Java applications.
- Spring provides a very clean division between controllers, JavaBean models, and views.
- Spring’s MVC is very flexible.
- Spring MVC is entirely based on interfaces.
- Every part of the Spring MVC framework is configurable via plugging in your own interface.
- No Action Forms, bind directly to domain objects.
- More testable code (validation has no dependency on Servlet API).
- Spring offers better integration with view technologies other than JSP (Velocity / XSLT / FreeMarker / XL etc.)

Important Intefaces

Interface	**Default bean name**	**purpose**
org.springframework.web.servlet.HandlerMapping	handlerMapping	Maps the Request to Handlers(Controllers)
org.springframework.web.servlet.HandlerAdapter	none	Plugs the other frameworks handlers
org.springframework.web.servlet.ViewResolver	viewResolver	Maps the view names to view instances
org.springframework.web.servlet.HandlerExceptionResolver	handlerExceptionResolver	Mapping of the exceptions to handlers and views
org.springframework.web.multipart.MultipartResolver	multipartResolver	Interface to handle the file uploads
org.springframework.web.servlet.LocaleResolver	localeResolver	Helps to resolve the locale from the request
org.springframework.web.servlet.ThemeResolver	themeResolver	Resolves a theme for a Request.

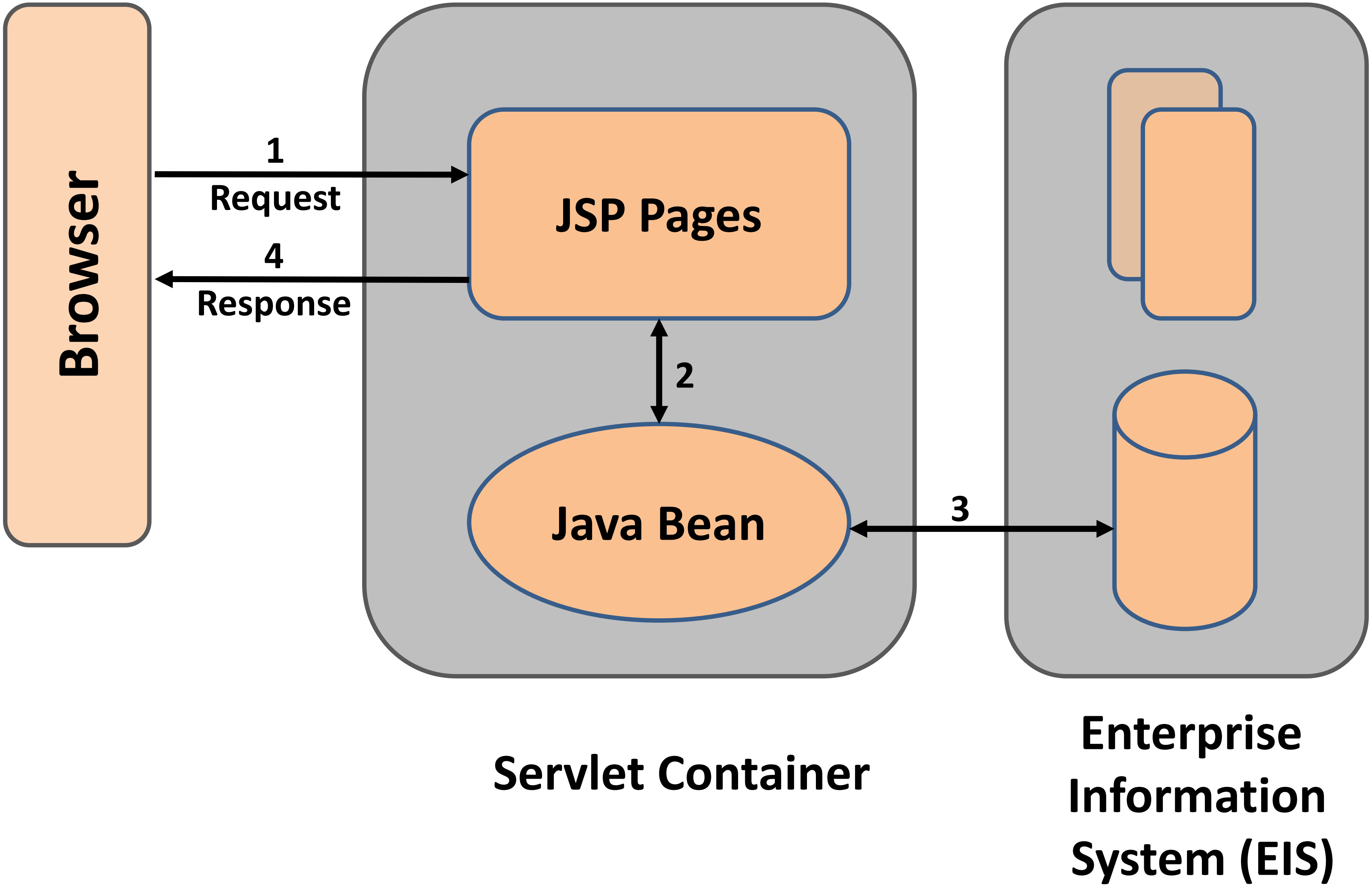
Java Bean vs Basic Java Class

- A Bean is a Java class, but a Java class does not have to be a bean.
- A Java Bean is a java class that should follow following conventions:
  1. It should have a no-arg constructor.
  2. It should be Serializable.
  3. It should provide methods to set and get the values of the properties, known as getter and setter methods.

Why use Java Bean?

- It is a reusable software component.
- A bean encapsulates many objects into one object, so we can access this object from multiple places.
- Moreover, it provides the easy maintenance.

Java Bean Architecture



Browser

1

Request

4

Response

JSP Pages

2

Java Bean

3

Servlet Container

Enterprise
Information
System (EIS)

Bean Life Cycle

- The life cycle of a Spring bean is easy to understand.
  1. When a bean is instantiated, it may be required to perform some initialization to get it into a usable state.
  2. Similarly, when the bean is no longer required and is removed from the container, some cleanup may be required.

Bean Life Cycle

```java
public class HelloWorld {
  private String message;
  public void init(){
  System.out.println("Bean is going through init.");}
  public void setMessage(String message){
          this.message = message;      }
  public void getMessage(){
  System.out.println("Your Message : " + message);}
  public void destroy(){
  System.out.println("Bean will destroy now."); }}
```

GTU Questions

1.	Explain MVC Architecture
2.	What are the differences between Java Bean and basic java class? Explain Java Bean Architecture.
3.	Differentiate : Java Bean and basic java class and Explain Java Bean Architecture and Show the use of JSP inbuilt objects: request and response, with their use in application
4.	What is Spring Web MVC framework? List its key features.
5.	Explain MVC architecture in detail with figure.
6.	Write a java bean named “student” having roll no and name having getter & setter methods. Write a JSP page to set the roll number and name for a student object and then print them by reading from object.
7.	What is MVC architecture? Explain Spring architecture with neat sketch.
8.	What is Dependency Injection?
9.	Briefly explain spring bean life cycle.