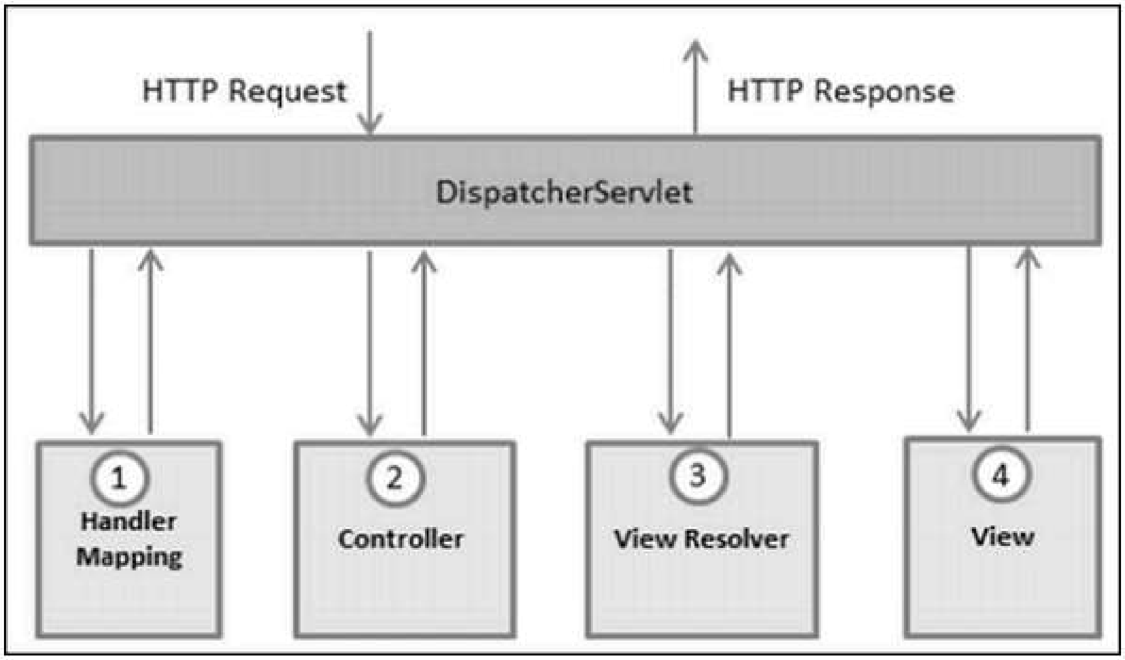
# Spring - MVC Framework Overview

The Spring Web MVC framework provides a model-view-controller architecture and ready components that can be used to develop flexible and loosely coupled web applications. The MVC pattern results in separating the different aspects of the application (input logic, business logic, and UI logic), while providing a loose coupling between these elements.

- The **Model** encapsulates the application data and in general, they will consist of **POJO**.
- The **View** is responsible for rendering the model data and in general, it generates **HTML** output that the client's browser can interpret.
- The **Controller** is responsible for processing **User Requests** and **Building Appropriate Model** and passes it to the view for rendering.

## The DispatcherServlet

The Spring Web model-view-controller (MVC) framework is designed around a DispatcherServlet that handles all the HTTP requests and responses. The request processing workflow of the Spring Web MVC DispatcherServlet is shown in the following illustration.



Following is the sequence of events corresponding to an incoming HTTP request to DispatcherServlet –

- After receiving an HTTP request, DispatcherServlet consults the **HandlerMapping** to call the appropriate Controller.

defined business logic and returns view name to the DispatcherServlet.

- The DispatcherServlet will take help from **ViewResolver** to pick up the defined view for the request.
- Once view is finalized, The DispatcherServlet passes the model data to the view, which is finally rendered, on the browsers.

All the above-mentioned components, i.e. HandlerMapping, Controller and ViewResolver are parts of **WebApplicationContext**, which is an extension of the plain **ApplicationContext** with some extra features necessary for web applications.

## Required Configuration

We need to map requests that you want the DispatcherServlet to handle, by using a URL mapping in the **web.xml** file. The following is an example to show declaration and mapping for **HelloWeb** DispatcherServlet –

```
<web-app id = "WebApp_ID" version = "2.4"
   xmlns = "http://java.sun.com/xml/ns/j2ee"
   xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance"
   xsi:schemaLocation = "http://java.sun.com/xml/ns/j2ee
   http://java.sun.com/xml/ns/j2ee/web-app_2_4.xsd">

   <display-name>Spring MVC Application</display-name>

   <servlet>
      <servlet-name>HelloWeb</servlet-name>
      <servlet-class>
         org.springframework.web.servlet.DispatcherServlet
      </servlet-class>
      <load-on-startup>1</load-on-startup>
   </servlet>

   <servlet-mapping>
      <servlet-name>HelloWeb</servlet-name>
      <url-pattern>*.jsp</url-pattern>
   </servlet-mapping>
</web-app>
```

The **web.xml** file will be kept in the **WebContent/WEB-INF** directory of your web application. Upon initialization of the **HelloWeb** DispatcherServlet, the framework will try to load the application context from a file named **[servlet-name]-servlet.xml** located in the application's WebContent/WEB-INF directory. In this case, our file will be **HelloWeb-servlet.xml**.

Next, the **<servlet-mapping>** tag indicates which URLs will be handled by which DispatcherServlet. Here, all the HTTP requests ending with .jsp will be handled by the **HelloWeb** DispatcherServlet.

If you do not want to go with the default filename as **[servlet-name]-servlet.xml** and default location as WebContent/WEB-INF, you can customize this file name and location by adding the servlet listener **ContextLoaderListener** in your web.xml file as follows −

```
<web-app...>

   <!-------- DispatcherServlet definition goes here----->
   ....
   <context-param>
      <param-name>contextConfigLocation</param-name>
      <param-value>/WEB-INF/HelloWeb-servlet.xml</param-value>
   </context-param>

   <listener>
```

```
      <listener-class>
         org.springframework.web.context.ContextLoaderListener
      </listener-class>
   </listener>
</web-app>
```

Now, let us check the required configuration for **HelloWeb-servlet.xml** file, placed in your web application's WebContent/WEB-INF directory.

```
<beans xmlns = "http://www.springframework.org/schema/beans"
   xmlns:context = "http://www.springframework.org/schema/context"
   xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance"
   xsi:schemaLocation = "
   http://www.springframework.org/schema/beans
   http://www.springframework.org/schema/beans/spring-beans-3.0.xsd
   http://www.springframework.org/schema/context
   http://www.springframework.org/schema/context/spring-context-3.0.xsd">

   <context:component-scan base-package = "com.tutorialspoint" />

   <bean class =
"org.springframework.web.servlet.view.InternalResourceViewResolver">
      <property name = "prefix" value = "/WEB-INF/jsp/" />
      <property name = "suffix" value = ".jsp" />
   </bean>

</beans>
```

Following are some important points about **HelloWeb-servlet.xml** file −

- The **[servlet-name]-servlet.xml** file will be used to create the beans defined, overriding the definitions of any beans defined with the same name in the global scope.
- The **<context:component-scan...>** tag will be used to activate the Spring MVC annotation scanning capability, which allows to make use of annotations like **@Controller** and **@RequestMapping**, etc.
- The **InternalResourceViewResolver** will have rules defined to resolve the view names. As per the above-defined rule, a logical view named **hello** is delegated to a view implementation located at **/WEB-INF/jsp/hello.jsp**.

Let us now understand how to create the actual components i.e., Controller, Model and View.

## Defining a Controller

The DispatcherServlet delegates the request to the controllers to execute the functionality specific to it. The **@Controller** annotation indicates that a particular class serves the role of a controller. The **@RequestMapping** annotation is used to map a URL to either an entire class or a particular handler method.

```
@Controller
@RequestMapping("/hello")
public class HelloController{

   @RequestMapping(method = RequestMethod.GET)
   public String printHello(ModelMap model) {
      model.addAttribute("message", "Hello Spring MVC Framework!");
      return "hello";
   }

}
```

The **@Controller** annotation defines the class as a Spring MVC controller. Here, the first usage of **@RequestMapping** indicates that all handling methods on this controller are relative to the **/hello** path.

The next annotation **@RequestMapping (method = RequestMethod.GET)** is used to declare the **printHello()** method as the controller's default service method to handle HTTP GET request. We can define another method to handle any POST request at the same URL.

We can also write the above controller in another form, where we can add additional attributes in the @RequestMapping as follows −

```
@Controller
public class HelloController{

   @RequestMapping(value = "/hello", method = RequestMethod.GET)
   public String printHello(ModelMap model) {
      model.addAttribute("message", "Hello Spring MVC Framework!");
      return "hello";
   }
}
```

The **value** attribute indicates the URL to which the handler method is mapped and the **method** attribute defines the service method to handle the HTTP GET request.

Following are some important points to be noted regarding the controller defined above −

- You will define the required business logic inside a service method. You can call another method inside this method as per the requirement.
- Based on the business logic defined, you will create a model within this method. You can set different model attributes and these attributes will be accessed by the view to present the result. This example creates a model with its attribute "message".
- A defined service method can return a String, which contains the name of the **view** to be used to render the model. This example returns "hello" as the logical view name.

## Creating JSP Views

Spring MVC supports many types of views for different presentation technologies. These include - **JSPs, HTML, PDF, Excel Worksheets, XML, Velocity Templates, XSLT, JSON, Atom** and **RSS** feeds, **JasperReports**, etc. However, the most common ones are the JSP templates written with JSTL. So, let us write a simple hello view in /WEB-INF/hello/hello.jsp −

```
<html>
   <head>
      <title>Hello Spring MVC</title>
   </head>
   <body>
      <h2>${message}</h2>
   </body>
</html>
```

Here **${message}** Here is the attribute, which we have setup inside the Controller. You can have multiple attributes to be displayed inside your view.