**JSP & Servlets**

**Prerequisite: Eclipse EE, Tomcat 8.0**

**How to create a Project?**

* **Servlet** technology is used to create a web application.
* A **servlet** is a Java class that is used to extend the capabilities of servers that host applications accessed by means of a request-response model.
* Servlets are mainly used to extend the applications hosted by web services.
* In Servlet we write html code inside our java file.

**How to create a Project?**

* Click on **perspective** on the right side of Eclipse and select **Java EE (default)**
* Then click on **windows > show view > navigator (depreciated)**
* From **navigator** click on new then on **dynamic web project**
* Give the name for the project and select the **target runtime** to **Tomcat 8.0**
* Click on next > next > tick mark on **generate web.xml deployment descriptor** then click on finish

**How to create index.html?**

* Right click on **project name** then on **new** and after that select **other** then type html click on **html file** and click on **next** after that give a name for the file (index.html) and click on finish

**How to run it?**

* Right click on empty space in the html code editor and then click on **run as** and then **run on server**

**Creating servlet & web.xml?**

* Right click on **src** folder and then select **new > other > type class > select class > click on next > give it a name** (for example AddServlet) **> package name** (for example: com.cosmostaker) and click on finish
* Then we have to write the code for the servlet this is how it will look like:

**package com.cosmostaker;**

**import java.io.IOException;**

**import java.io.PrintWriter;**

**import javax.servlet.http.HttpServlet;**

**import javax.servlet.http.HttpServletRequest;**

**import javax.servlet.http.HttpServletResponse;**

**public class AddServlet extends HttpServlet {**

**public void doPost(HttpServletRequest *req*, HttpServletResponse *res*) throws IOException {**

**int i = Integer.parseInt(req.getParameter("num1"));**

**int j = Integer.parseInt(req.getParameter("num2"));**

**int k = i+j;**

**PrintWriter out = res.getWriter();**

**out.println("Result is: " + k);**

**}**

**}**

* Then we will go to **webapp > WEB-INF** and inside it there is a file called web.xml we have to edit it; the code will look like this:

**<?xml version="1.0" encoding="UTF-8"?>**

**<web-app xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns="http://xmlns.jcp.org/xml/ns/javaee" xsi:schemaLocation="http://xmlns.jcp.org/xml/ns/javaee http://xmlns.jcp.org/xml/ns/javaee/web-app\_3\_1.xsd" id="WebApp\_ID" version="3.1">**

**<display-name>Addition</display-name>**

**<servlet>**

**<servlet-name>addFunc</servlet-name>**

**<servlet-class>com.cosmostaker.AddServlet</servlet-class>**

**</servlet>**

**<servlet-mapping>**

**<servlet-name>addFunc</servlet-name>**

**<url-pattern>/add</url-pattern>**

**</servlet-mapping>**

**</web-app**>

* And the **index.html** which is inside the **webapps** folder looks like this:

**<!DOCTYPE html>**

**<html>**

**<head>**

**<meta charset="ISO-8859-1">**

**<title>CosmostakeR</title>**

**</head>**

**<body>**

**<form action="add" method="post">**

**Enter 1st number: <input type="text" name="num1"><br>**

**Enter 2nd number: <input type="text" name="num2"><br>**

**<input type="submit">**

**</form>**

**</body>**

**</html>**

* Now while the **index.html** is open right click on empty space and then click on **run as > run on server** and after that **server** will start and the app will start on default browser.

**Calling a Servlet from a Servlet? (RequestDispatcher)**

* Let’s say we want to add two numbers in one servlet and we want to get the square of that number using second/another servlet.
* So, for that we will first create a **new java class** inside our **cosmostaker folder** it is named **SquareServlet.java**.
* This is the code for first servlet 🡪 **AddServlet.java**

**package com.cosmostaker;**

**import java.io.IOException;**

**import javax.servlet.RequestDispatcher;**

**import javax.servlet.ServletException;**

**import javax.servlet.http.HttpServlet;**

**import javax.servlet.http.HttpServletRequest;**

**import javax.servlet.http.HttpServletResponse;**

**public class AddServlet extends HttpServlet {**

**public void doPost(HttpServletRequest *req*, HttpServletResponse *res*) throws IOException, ServletException {**

**int i = Integer.parseInt(*req*.getParameter("num1"));**

**int j = Integer.parseInt(*req*.getParameter("num2"));**

**int k = i+j;**

***req*.setAttribute("k", k);**

**RequestDispatcher rd = *req*.getRequestDispatcher("square");**

**rd.forward(*req*, *res*);**

**}**

**}**

* This is the code for second servlet 🡪 **SquareServlet.java**

**package com.cosmostaker;**

**import java.io.IOException;**

**import java.io.PrintWriter;**

**import javax.servlet.http.HttpServlet;**

**import javax.servlet.http.HttpServletRequest;**

**import javax.servlet.http.HttpServletResponse;**

**public class SquareServlet extends HttpServlet {**

**public void doPost(HttpServletRequest *req*, HttpServletResponse *res*) throws IOException {**

**int k = (int) *req*.getAttribute("k");**

**k = k\*k;**

**PrintWriter out = *res*.getWriter();**

**out.println("Result is: " + k);**

**}**

**}**

* This is the code for deployment descriptor 🡪 **web.xml**

**<?xml version="1.0" encoding="UTF-8"?>**

**<web-app xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns="http://xmlns.jcp.org/xml/ns/javaee" xsi:schemaLocation="http://xmlns.jcp.org/xml/ns/javaee http://xmlns.jcp.org/xml/ns/javaee/web-app\_3\_1.xsd" id="WebApp\_ID" version="3.1">**

**<servlet>**

**<servlet-name>addFunc</servlet-name>**

**<servlet-class>com.cosmostaker.AddServlet</servlet-class>**

**</servlet>**

**<servlet-mapping>**

**<servlet-name>addFunc</servlet-name>**

**<url-pattern>/add</url-pattern>**

**</servlet-mapping>**

**<servlet>**

**<servlet-name>squareFunc</servlet-name>**

**<servlet-class>com.cosmostaker.SquareServlet</servlet-class>**

**</servlet>**

**<servlet-mapping>**

**<servlet-name>squareFunc</servlet-name>**

**<url-pattern>/square</url-pattern>**

**</servlet-mapping>**

**</web-app>**

**HttpServletRequest & HttpServletResponse?**

* These both are the interfaces so the implementation will be done by the tomcat server and the object creation will also be done by the tomcat server

**sendRedirect & URL Rewriting?**

* We can use URL rewriting with **GET** method to call the **SquareServlet.java,** make sure we use GET method in index.html form.
* Code of **AddServlet.java**

**import java.io.IOException;**

**import javax.servlet.ServletException;**

**import javax.servlet.http.HttpServlet;**

**import javax.servlet.http.HttpServletRequest;**

**import javax.servlet.http.HttpServletResponse;**

**public class AddServlet extends HttpServlet {**

**public void doGet(HttpServletRequest *req*, HttpServletResponse *res*) throws IOException, ServletException {**

**int i = Integer.parseInt(*req*.getParameter("num1"));**

**int j = Integer.parseInt(*req*.getParameter("num2"));**

**int k = i+j;**

***res*.sendRedirect("square?k="+k);**

**}**

**}**

* Code of **SquareServlet.java**

**import java.io.IOException;**

**import java.io.PrintWriter;**

**import javax.servlet.http.HttpServlet;**

**import javax.servlet.http.HttpServletRequest;**

**import javax.servlet.http.HttpServletResponse;**

**public class SquareServlet extends HttpServlet {**

**public void doGet(HttpServletRequest *req*, HttpServletResponse *res*) throws IOException {**

**int k = Integer.parseInt(*req*.getParameter("k"));**

**k = k\*k;**

**PrintWriter out = *res*.getWriter();**

**out.println("Result is: " + k);**

**}**

**}**

**HttpSession & Cookie?**

* We can also use session to pass the value from one servlet to another.
* In this way we can pass multiple values and it works with GET method only.
* We can delete the attribute value also by calling the **session.getRemove()** method.
* The code will look like this
  + **AddServlet.java**

**import java.io.IOException;**

**import javax.servlet.ServletException;**

**import javax.servlet.http.HttpServlet;**

**import javax.servlet.http.HttpServletRequest;**

**import javax.servlet.http.HttpServletResponse;**

**import javax.servlet.http.HttpSession;**

**public class AddServlet extends HttpServlet {**

**public void doGet(HttpServletRequest req, HttpServletResponse res) throws IOException, ServletException {**

**int i = Integer.parseInt(req.getParameter("num1"));**

**int j = Integer.parseInt(req.getParameter("num2"));**

**int k = i+j;**

**HttpSession session = req.getSession();**

**session.setAttribute("k", k);**

**res.sendRedirect("square");**

**}**

**}**

* + **SquareServlet.java**

**import java.io.IOException;**

**import java.io.PrintWriter;**

**import javax.servlet.http.HttpServlet;**

**import javax.servlet.http.HttpServletRequest;**

**import javax.servlet.http.HttpServletResponse;**

**import javax.servlet.http.HttpSession;**

**public class SquareServlet extends HttpServlet {**

**public void doGet(HttpServletRequest *req*, HttpServletResponse *res*) throws IOException {**

**HttpSession session = *req*.getSession();**

**int k = (int) session.getAttribute("k");**

**k = k\*k;**

**PrintWriter out = *res*.getWriter();**

**out.println("Result is: " + k);**

**}**

**}**

* For Cookie the code will look like this:
  + **AddServlet.java**

**import java.io.IOException;**

**import javax.servlet.ServletException;**

**import javax.servlet.http.Cookie;**

**import javax.servlet.http.HttpServlet;**

**import javax.servlet.http.HttpServletRequest;**

**import javax.servlet.http.HttpServletResponse;**

**import javax.servlet.http.HttpSession;**

**public class AddServlet extends HttpServlet {**

**public void doGet(HttpServletRequest *req*, HttpServletResponse *res*) throws IOException, ServletException {**

**int i = Integer.parseInt(req.getParameter("num1"));**

**int j = Integer.parseInt(req.getParameter("num2"));**

**int k = i+j;**

**Cookie cookie = new Cookie("k", k+"");**

**res.addCookie(cookie);**

**res.sendRedirect("square");**

**}**

**}**

* + **SquareServlet.java**

**import java.io.IOException;**

**import java.io.PrintWriter;**

**import javax.servlet.http.Cookie;**

**import javax.servlet.http.HttpServlet;**

**import javax.servlet.http.HttpServletRequest;**

**import javax.servlet.http.HttpServletResponse;**

**import javax.servlet.http.HttpSession;**

**public class SquareServlet extends HttpServlet {**

**public void doGet(HttpServletRequest *req*, HttpServletResponse *res*) throws IOException {**

**int k = 0;**

**Cookie cookie[] = *req*.getCookies();**

**for(Cookie c : cookie) {**

**if(c.getName().equals("k")) {**

**k = Integer.parseInt(c.getValue());**

**}**

**}**

**k = k\*k;**

**PrintWriter out = *res*.getWriter();**

**out.println("Result is: " + k);**

**}**

**}**

**ServletConfig & ServletContext?**

* We use these two to get the initial values for the servlet / application.
* ServletContext is an object which will be shared by all the servlets.
* ServletConfig is not shared by all the servlets it will be available for that specific particular servlet in which it is defined.
* Code for **MyServlet.java**

**package com.cosmostaker;**

**import java.io.IOException;**

**import java.io.PrintWriter;**

**import javax.servlet.ServletConfig;**

**import javax.servlet.ServletContext;**

**import javax.servlet.ServletException;**

**import javax.servlet.http.HttpServlet;**

**import javax.servlet.http.HttpServletRequest;**

**import javax.servlet.http.HttpServletResponse;**

**public class MyServlet extends HttpServlet {**

**public void doGet(HttpServletRequest *req*, HttpServletResponse *res*) throws IOException, ServletException {**

**PrintWriter out = *res*.getWriter();**

**out.print("Hi ");**

**ServletConfig cg = getServletConfig();**

**String name = cg.getInitParameter("Name");**

**out.print(name);**

***//      ServletContext Code***

***//      ServletContext ctx = req.getServletContext();***

***//      String name = ctx.getInitParameter("Name");***

***//      String mobile = ctx.getInitParameter("Mobile");***

***//***

***//      out.print(name);***

***//      out.print(", has "+ mobile);***

**}**

**}**

* **Code for web.xml**

**<?xml version="1.0" encoding="UTF-8"?>**

**<web-app xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns="http://xmlns.jcp.org/xml/ns/javaee" xsi:schemaLocation="http://xmlns.jcp.org/xml/ns/javaee http://xmlns.jcp.org/xml/ns/javaee/web-app\_3\_1.xsd" id="WebApp\_ID" version="3.1">**

**<display-name>ServletConfigContext\_Proj</display-name>**

**<servlet>**

**<servlet-name>ConfigContext</servlet-name>**

**<servlet-class>com.cosmostaker.MyServlet</servlet-class>**

**<init-param>**

**<param-name>Name</param-name>**

**<param-value>Jai Prakash</param-value>**

**</init-param>**

**</servlet>**

**<servlet-mapping>**

**<servlet-name>ConfigContext</servlet-name>**

**<url-pattern>/home</url-pattern>**

**</servlet-mapping>**

**<context-param>**

**<param-name>Name</param-name>**

**<param-value>Sandeep</param-value>**

**</context-param>**

**<context-param>**

**<param-name>Mobile</param-name>**

**<param-value>Mi 11X</param-value>**

**</context-param>**

**</web-app>**

**ServletAnnotation Configuration?**

* New projects are using annotations for the servlets instead of web.xml because not everyone likes working with xml.
* We just have to write a simple annotation; code will look like this (Highlighted part).

**@WebServlet("/add")**

**public class AddServlet extends HttpServlet {**

**public void doGet(HttpServletRequest *req*, HttpServletResponse *res*) throws IOException, ServletException {**

**int i = Integer.parseInt(*req*.getParameter("num1"));**

**int j = Integer.parseInt(*req*.getParameter("num2"));**

**int k = i+j;**

**Cookie cookie = new Cookie("k", k+"");**

***res*.addCookie(cookie);**

***res*.sendRedirect("square");**

**}**

**}**

**Why JSP?**

* **JSP** is used to create web applications just like **Servlet** technology.
* A **JSP** is a text document that contains two types of text: static data and dynamic data.
* The static data can be expressed in any text-based format (like HTML, XML, SVG, and WML), and the dynamic content can be expressed by JSP elements.
* In JSP we write java code inside the html.
* For JSP code to work we write it in **src>main>webapp** folder of out project.
  + **Add.jsp**

**<%@**

**page language="java" contentType="text/html; charset=ISO-8859-1"**

**pageEncoding="ISO-8859-1"**

**%>**

**<!DOCTYPE html>**

**<html>**

**<head>**

**<meta charset="ISO-8859-1">**

**<title>CosmostakeR</title>**

**</head>**

**<body bgcolor="cyan">**

**<%**

**int i = Integer.parseInt(request.getParameter("num1"));**

**int j = Integer.parseInt(request.getParameter("num2"));**

**int k = i+j;**

**out.print("Output: "+ k);**

**%>**

**</body>**

**</html>**

* + Index.html

**<!DOCTYPE html>**

**<html>**

**<head>**

**<meta charset="ISO-8859-1">**

**<title>CosmostakeR</title>**

**</head>**

**<body>**

**<form action="Add.jsp" method="get">**

**Enter 1st number: <input type="text" name="num1"><br>**

**Enter 2nd number: <input type="text" name="num2"><br>**

**<input type="submit">**

**</form>**

**</body>**

**</html>**

* JSP TAGs:
  + Directive 🡪 <%@ For import statements %>
  + Declaration 🡪 <%! For declaration %>
  + Scriptlet 🡪 <% For service method code %>
  + Expression 🡪 <%= For printing value %>

**Why JSP?**

* **JSP** is used to create web applications just like **Servlet** technology.