Experiment-5

1.1 Objective:

Developing Servlets based applications.

Task-1: Sever Configuration - Configuration of Tomcat Server using Eclipse for EE Developer.

Task-2: **Understanding the role of XML file** - Write a HTML file index.html to show the welcome message. Understand the importance of server and XML file. Check and verify the working of tomcat server using the appropriate port number display the Catalina page to show the connectivity.

Task-3: Demonstration of Servlet Life Cycle - Write a servlet program to demonstrate the working of Servlet life cycle. Understand and observe the working of XML file.

Task-4: Demonstration of Cookies - Create persistent and non-persistent cookies on client side using a servlet. Create a servlet file which will display the first name and last name when the request will come. Create an html file Hello.html. In the html file write the appropriate code to create caption First name and Last name. Design text boxes to accept the first name and last name create a button submit. When a user will hit submit button then XML file should render the detail from the servlet file HelloForm.java created in Task-2.

Task-5: Preparing Write Up - Finally, understand the working of each task one by one prepare write up as per the template provided.

1.2 Learning Outcomes:

At the end learners will be able to:

- Describe the working of Servlets.
- Explain and demonstrate the architectural aspects involved in Servlets application development.
- They will be able to justify the Tasks performed by servlets as a middle layer.
- Describe and understand the servlet life-cycle.

1.3 Resources required

• Software: JDK, Eclipse for EE Developer, Tomcat server, web browser.

• Hardware: you need to specify as appropriate.

1.4 Faculty/Instructor Role

- Explain each concept to the learners.
- Make sure that every understood the concept in enough depth.
- Ensure the leaner's understandability by asking questions or by any other mechanism.
- Work as a mentor and supervisor when leaner implement the tasks.

1.5 Students/Learners Roles

- Understand each and every concept with their implementation in enough details.
- Ask questions, if anything not clear.
- Implement each task and show the working.
- Explain the observations during the implementation and after implementation.
- Prepare write up according to the template given.
- Ready for answer the questions asked during the discussion session.

1.6 Steps Involved

Step-1: Download Eclipse EE Developer and install in your machine by unzipping.



Step-2: open Eclipse executable



Step3: Select the workspace

Workspace Launcher	×
Select a workspace	
Eclipse stores your projects in a folder called a workspace. Choose a workspace folder to use for this session.	
Workspace: C:\Users\Lenovo\workspace	Browse
Use this as the default and do not ask again	
	OK Cancel

Step4: once you will choose the workspace you will see the IDE as shown below:

Java - Eclipse	
File Edit Navigate Search Project Run Window H	elp
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Step5: Download Tomcat and unzip.



Step6: Starting the server using Eclipse.

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Step7: To configure the new server follow the steps as shown below:

		New	•	₽	Server
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		Stop	Ctrl+Alt+S		
	2	Publish	Ctrl+Alt+P		
		Clean			
🕼 Problems 🖉 Javadoc 😣 Dec	6	Add and Remove			
		Monitoring	+		
▷ 📴 I omcat v6.0 Server at localh		Clean Tomcat Work Directory			
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Step8: when you will click on server option you will see:

New Server	
Define a New Server	
Choose the type of server to	create
	Download additional server adapters
Select the server type:	
type filter text	
🔁 Apache	A
🗁 Basic	
HTTP Preview	
HTTP Server	~
Publishes and runs projects or	n an HTTP server.
· · · · · · · · · · · · · · · · · · ·	
Server's host name:	localhost
Server name:	HTTP Server at localhost
Server runtime environment:	HTTP Server Add
	Confirme mutine en inconsta
	<u>Configure funtime environments</u>
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Step9: At this stage you need to choose the appropriate server you want. As we want to use Apache therefore we will chose the Tomcat serve.

New Server				
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Tomcat v4.0 Serv	er			=
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Now, click on next button.

mity School of Engineering & Technology, A	Amity University
	Plank if as
New server	
Add and Remove Modify the resources that are com	project present
Move resources to the right to config Available:	gure tem on the server Configured:
SimpleServletProject	Add > < Remove
	Add All >> << Remove All
A Back	Next > Finish Cancel

Then click on finish. Now, you can see the servers as shown in the below diagram.

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☆ Other Projects	Image: Constraint of the second se
	Problems @ Javadoc 😟 Declaration 🦚 Servers 🛛 📮 Console
	Tomcat v6.0 Server at localhost [Stopped]
	a Tomcat volu Server at localnost (2) [stopped, kepublish]
□ [◆] 🔓 1 items selected	

Step10: click of start to start the server.

		New Open Show In	► F3 Alt+Shift+W
Java - Eclipse File Edit Navigate Search Project Run Window Help		Copy Paste Delete	Ctrl+C Ctrl+V Delete
Image Explorer Image	☆ ◇ ◇ ■ 門	Rename Debug Start Profile Stop Publish	F2 Ctrl+Alt+D Ctrl+Alt+R Ctrl+Alt+S Ctrl+Alt+P
 ➡ JRE System Library [JDK] ➡ Apache Tomcat v6.0 [Apache Tomcat v6.0] ➡ build ➡ WebContent 	ß	Clean Add and Remove Monitoring Clean Tomcat Work Directory Properties	► Alt+Enter
		er (Stohheol)	

Step 11: Once, you will choose the start option, server will start and you can see the logs using console option.

🔘 Java - Eclipse	
File Edit Navigate Search Project Run Window H	elp
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Start up	😰 Problems @ Javadoc 😥 Declaration 🕷 Servers 📃 Console 🖄 🦳 🗖 🗖
	Tomcat v6.0 Server at localhost [Apache Tomcat] C:\JDK\bin\javaw.exe (Feb 5, 2014 12:56:13 AM
logs for	
(server) (INFO: Jk running ID=0 time=0/20 config=null
	Feb 5, 2014 12:56:15 AM org.apache.catalina.startup.Catalina start

Now, at this stage your server is ready to use.

Creating a servlet application:

Now first stop the tomcat.

Right click and then choose clear.



Now create a project just like any other java applications. In this case we will choose Java web application project.

> Go to the package explorer tab right click, select new go to other.

You will see this only if you have installed Eclipse for Java EE Developers. When you will go to the Eclipse URL you will see many packages such as Eclipse for Java Developer, Eclipse for EE Developer and lot more. It is recommended that you should download Eclipse for Java EE Developer.

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29 23 8	Import Export Refresh		1911 1912 1913 1914 1914 1914 1914 1914 1914 1914	Connector Project Application Client Project Static Web Project Project		
		해 Servers 🗐 Console 🖄 Tomcat v6.0 Server at localho		Servlet Session Bean (EJB 3.x) Message-Driven Bean (EJB 3.x) Web Service Folder File Example	Cheli N	014 8

What we are interested in this is web folder. This has Dynamic Web Project; this is what we will select here and then choose next option.

New New	
Select a wizard Create a Dynamic Web project	
Wizards:	
type filter text	
 User Assistance Web CSS File Dynamic Web Project Filter Filter Filter JSP File JSP Tag Listener Servlet Static Web Project Web Fragment Project 	E
Sack Next > Finish	Cancel

Now, it will ask for a project name.

IVEW Dynamic Web Project	
namic Web Project	2
Create a standalone Dynamic Web project or add it to a new or existing interprise Application.	
roject name:	
Project location	
Use default location	
Location: C:\Users\Lenovo\workspace	Browse
Target runtime	
Apache Tomcat v6.0 🔹	New Runtime
Dynamic web module version	
2.5	
Configuration	
Default Configuration for Apache Tomcat v6.0 🔹	Modify
A good starting point for working with Apache Tomcat v6.0 runtime. A can later be installed to add new functionality to the project.	dditional facets
EAR membership	

Here give the suitable name for the project. It will ask for default location, if you want any location for your choice you can set here. It will also ask for Target runtime, you are happy with the default runtime set it as default otherwise choose as appropriate. You can also set the Dynamic we module version at this stage. The last option which we will see here is configuration which will be the tomcat chosen by you. Now hit next.

New Dynamic Web Project	
Java Configure project for building a Java application.	
Source folders on build path:	
进 src	Add Folder
	<u>E</u> dit
	Remove
Default output folder:	
build\classes	
? < <u>B</u> ack <u>N</u> ext > E	inish Cancel

Now, it will ask for source folder where the source files will get saved. I will choose src. At this stage I am telling Eclipse that I want to save all my source code in src folder.

The Default output folder is build\classes again I am leaving it as it is. Now press next.

💽 New Dynamic We	eb Project			
Web Module Configure web mo	dule settings.			
Context <u>r</u> oot:	SimpleServletProject1			
Content directory: WebContent				
⊽ <u>G</u> enerate web.xn	nl deployment descriptor			
?	< <u>Back</u> <u>N</u> ext > <u>Finish</u>	Cancel		

Now, it will ask me for context root and content directory. Here we will check on Generate web.xml deployment descriptor. And finally click "Finish".

New Dynamic We	eb Project				
Web Module Configure web mo	dule settings.				
Context <u>r</u> oot:	SimpleServletProject1				
Content <u>d</u> irectory:	Content directory: WebContent				
☑ <u>G</u> enerate web.xn	nl deployment descriptor				
?	< <u>B</u> ack <u>N</u> ext > <u>Finish</u>	Cancel			



So finally you can see the project you created in the project explorer

In the beginning we are not interested in all the nodes given but we are interested in Deployment Descriptor, this is actually an XML file.

Now let's open the navigator.

> Go to window → Show view → Navigator



Here, .classpath and .project are Meta data for eclipse.

> Go to the WebContent folder and expand it and see the WEB-INF file.



Web.xml: Design View

index.html 🚺 SimpleServletLifeCycle.java	web.xml 🕱 🗖
Node	Content
?=? xml	version="1.0" encoding="UTF-8"
e web-app	(((description*, display-name*, icon*)) distributable context-param filter filter-mapping listener servle
(a) xmlns:xsi	http://www.w3.org/2001/XMLSchema-instance
③ xmlns	http://java.sun.com/xml/ns/javaee
(a) xmlns:web	http://java.sun.com/xml/ns/javaee/web-app_2_5.xsd
(a) xsi:schemaLocation	http://java.sun.com/xml/ns/javaee http://java.sun.com/xml/ns/javaee/web-app_2_5.xsd
(a) id	WebApp_ID
(a) version	2.5
e display-name	SimpleServletProject1
e welcome-file-list	(welcome-file+)
e servlet	(((description*, display-name*, icon*)), servlet-name, (servlet-class jsp-file), init-param*, load-on-startup?, i
e servlet-mapping	(servlet-name, url-pattern+)
Design Source	
🗱 Servers 📃 Console 😣	■ × ½ 📴 🗗 🖃 × 🗂 × 🗂
Tomcat v6.0 Server at localhost [Anache Tomcat] C:\JDK\bin	Niavaw.exe (Feb 11, 2014 11:41:45 PM)

Web.xml: Source View: shows welcome file details

index.html	SimpleServletLifeCycle.java	X *web.xml 🛛		
xml \</td <td>version="1.0" encoding="UTF-8"?</td> <td>></td> <td></td> <td>ĸ.</td>	version="1.0" encoding="UTF-8"?	>		ĸ.
⊖ <web-ap< td=""><td>op xmlns:xsi="http://www.w3.org/</td><td>/2001/XMLSchema-instance" xmlns="http://java.sun.com/xml/ns/javaee" xmlns:web="http://java</td><td>ı.sun.</td><td>i</td></web-ap<>	op xmlns:xsi="http://www.w3.org/	/2001/XMLSchema-instance" xmlns="http://java.sun.com/xml/ns/javaee" xmlns:web="http://java	ı.sun.	i
<disp< td=""><td><pre>play-name>SimpleServletProject1</pre></td><td></td><td></td><td>l</td></disp<>	<pre>play-name>SimpleServletProject1</pre>			l
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Design Sourc	e			

</html>

Writing new HTML file named: index.html

If you are interested in showing your own welcome message then you may create/write your own html file named index.html as shown below:

```
<html>
<head>
<meta http-equiv="Content-Type" content="text/html; charset=ISO-8859-1">
<title>Bravo Dude You Did it. You Developed A Simple Web Application</title>
</head>
<body>
Bravo Dude You Did it. You Developed A Simple Web Application
</body>
</html>
📄 index.html 🛛 🗎
    <!DOCTYPE html PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN" "http://www.w3.org/TR/html4/loose.dtd">
  ⊖ <html>
  ⊖ <head>
    <meta http-equiv="Content-Type" content="text/html; charset=ISO-8859-1">
    <title>Bravo Dude You Did it. You Developed A Simple Web Application</title>
    </head>
  ⊖ <body>
    Bravo Dude You Did it. You Developed A Simple Web Application
    </body>
```

In order to run this HTML file we will use tomcat server (deploy with tomcat server) as shown below:

 ∠ com ∠ AL ∠ AL ∠ MebCont ∠ META M. ∠ WEB-I ∠ Ib ∠ we ∠ Hello. ⊇ index. ℝ .classpath ℝ .project 	Open Open With Copy Paste Delete Move Rename Import Export Refresh Validate Show in Remote Systems view		•	You	Did	it. Y	ou Dev	veloped	d A Simp	Le Web
	 Run As Debug As Profile As Team Compare With Replace With Source Properties Remove from Context	Ctrl+Alt+Shift+Down	<pre>> </pre>		1 Run Run C	on Ser	over urations	•••	Alt+Shift+	X, R



It is running using the localhost: 8080 port which is nothing but the default port for tomcat server. If we will use localhost: 8080 then we can see the cataline property i.e. the congratulation message if everything works well.



Now if you want to see the result of the html file then simply type the project name and then html file name and then hit the enter key.

Now at this stage I would recommend you to develop a servlet program to see the "Servlet life cycle".

> Go to src folder in the project explorer right click on it select new and then other.





New New	-				
Select a wizard Create a new Se	rvlet				
Wizards:					
type filter text					
 ✓ Web S CSS S Dyna S Filter HTM JSP F JSP F S Servi S Stati S Stati Web Servi 	File amic Web Project r ML File File Fag ener let c Web Project o Fragment Project vices				E
?	< Back	Ne	t >	Finish	Cancel

> Go to web folder, choose Servlet and hit on next button. Now you will see:

Specify class file				
	destination.	S		
Project: Si	impleServletProject1	•		
Source folder: /	SimpleServletProject1/src	Browse		
Java package: c	com.ADJP.GeniusHari			
Class name: S	ServletLifeCycle			
Superclass: ja	javax.servlet.http.HttpServlet			
🔲 Use an existing	g Servlet class or JSP			
Class name: S	ervletLifeCycle	Browse		

Here, write package name for example I have given "com.ADJP.GeniusHari" and then choose the appropriate class name of your choice. At last you have to choose the Superclass option, if you want to go with default then no need to change. And then hit on Next

Create Serv	rlet	l	
Create Servie Enter serviet	et deployment descriptor specific	c information.	S
Name:	ServletLifeCycle		
Description: Initialization p	parameters:		
Name	Value	Description	Add Edit
URL mapping	IS:		Remove
/ServletLife0	Cycle		Add Edit
			Remove
0	Resk	Next	Cancel
?	< Back	Next > Finish	Cancel

Here, you can initialize the parameters if you are interested otherwise you can do the same within the code. In addition, you can set the URL mapping option, the purpose of this step is to make web.XML to understand what to render because during the implementation there is possibility that many applications are using the server and therefore this mapping option will tell the server to run the particular application which user/program/developer want to execute at any particular time.

Finally hit the Finish button. At this stage you will be able to see the following:



This is nothing but the servlet file with doGet and doPost methods. Here, you can write the code as you want and execute.



Figure: packages named GeniusHari and haribrain lies in ADJP which is in com and stored in

src folder.

Servlet Life Cycle

package com.ADJP.haribrain;

```
import java.io.IOException;
import javax.servlet.ServletException;
import javax.servlet.http.HttpServlet;
```

```
import javax.servlet.http.HttpServletRequest;
import javax.servlet.http.HttpServletResponse;
import java.io.*;
import javax.servlet.*;
//import javax.servlet.http.*;
//**
//* Servlet implementation class SimpleServletLifeCycle
//*/
@SuppressWarnings("serial")
public class SimpleServletLifeCycle extends HttpServlet {
       int count;
        public void init(ServletConfig config) throws ServletException {
          // Always call super.init(config) first (servlet mantra #1)
          super.init(config);
          // Try to load the initial count from our saved persistent state
          try {
            FileReader fileReader = new FileReader("InitDestroyCounter.initial");
            BufferedReader bufferedReader = new BufferedReader(fileReader);
            String initial = bufferedReader.readLine();
            count = Integer.parseInt(initial);
            return;
          }
          catch (FileNotFoundException ignored) { } // no saved state
          catch (IOException ignored) { }
                                                     // problem during read
          catch (NumberFormatException ignored) { } // corrupt saved state
          // No luck with the saved state, check for an init parameter
          String initial = getInitParameter("initial");
          try {
            count = Integer.parseInt(initial);
            return;
          }
          catch (NumberFormatException ignored) { } // null or non-integer value
          // Default to an initial count of "0"
          count = 0;
        }
        public void doGet(HttpServletRequest req, HttpServletResponse res)
                                      throws ServletException, IOException {
          res.setContentType("text/plain");
          PrintWriter out = res.getWriter();
          count++;
          out.println("Since the beginning, this servlet has been accessed " +
                      count + " times.");
        }
        public void destroy() {
          saveState();
        }
```

```
public void saveState() {
    // Try to save the accumulated count
    try {
      FileWriter fileWriter = new FileWriter("InitDestroyCounter.initial");
      String initial = Integer.toString(count);
      fileWriter.write(initial, 0, initial.length());
      fileWriter.close();
      return;
    }
    catch (IOException e) { // problem during write
      // Log the exception. See.
    }
}
```

Output:

Writing cookies

package com.ADJP.haribrain; import java.io.IOException; import javax.servlet.ServletException; import javax.servlet.http.HttpServlet; import javax.servlet.http.HttpServletRequest; import javax.servlet.http.HttpServletResponse; import java.io.*; //import javax.servlet.*; import javax.servlet.*;

```
/**
* Servlet implementation class HelloForm
*/
@ SuppressWarnings("serial")
public class HelloForm extends HttpServlet {
    public void doGet(HttpServletRequest request,
        HttpServletResponse response)
        throws ServletException, IOException
    {
        // Create cookies for first and last names.
        Cookie firstName = new Cookie("first_name",
```

```
request.getParameter("first_name"));
```

```
Cookie lastName = new Cookie("last_name", request.getParameter("last_name"));
```

```
// Set expiry date after 24 Hrs for both the cookies.
firstName.setMaxAge(60*60*24);
```

lastName.setMaxAge(60*60*24);

// Add both the cookies in the response header.
response.addCookie(firstName);
response.addCookie(lastName);

// Set response content type response.setContentType("text/html"); PrintWriter out = response.getWriter(); String title = "Setting Cookies Example"; String docType = "<!doctype html public \"-//w3c//dtd html 4.0 " + "transitional//en\">\n"; out.println(docType + < html > n'' +"<head><title>" + title + "</title></head>\n" + $<body bgcolor=\"#f0f0f0\">\n" +$ $<h1 align=\"center">" + title + "</h1>\n" +$ "\n" + " First Name: " + request.getParameter("first_name") + "\n" + " Last Name: " + request.getParameter("last_name") + "\n" + "\n" + "</body></html>"); } }

The html file

```
<html>
<body>
<form action="HelloForm" method="GET">
First Name: <input type="text" name="first_name">
<br />
Last Name: <input type="text" name="last_name" />
<input type="submit" value="Submit" />
</form>
</body>
</html>
```

Output of html file

index.html	SimpleServletLifeCycle.java	📔 Hello.html	🕽 HelloForm.java	SimpleServletProject1/Hello.html ⊗
00	http://localhost:8080/SimpleServle	Project1/Hello.htm	I	
First Name:				
Last Name:	Submit			

Enter the relevant data

L/Hello.html - Eclipse					
ow Help					
S ▼ B ← A ▼ S B ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓					
	index.html	SimpleServletLifeCycle.java	🔋 Hello.html	🚺 HelloForm.java	🚱 http://localhost:8080/SimpleServletProject1/Hello.html 🕅
	A A A A				
	First Name: Ha Last Name: Pa	ari Indey Submit]		

Now hit on submit.

Once you will hit on submit the following screen should come.



Finally verify using web browser and understand the working of doGet, doPost, Cookies and other related concepts.