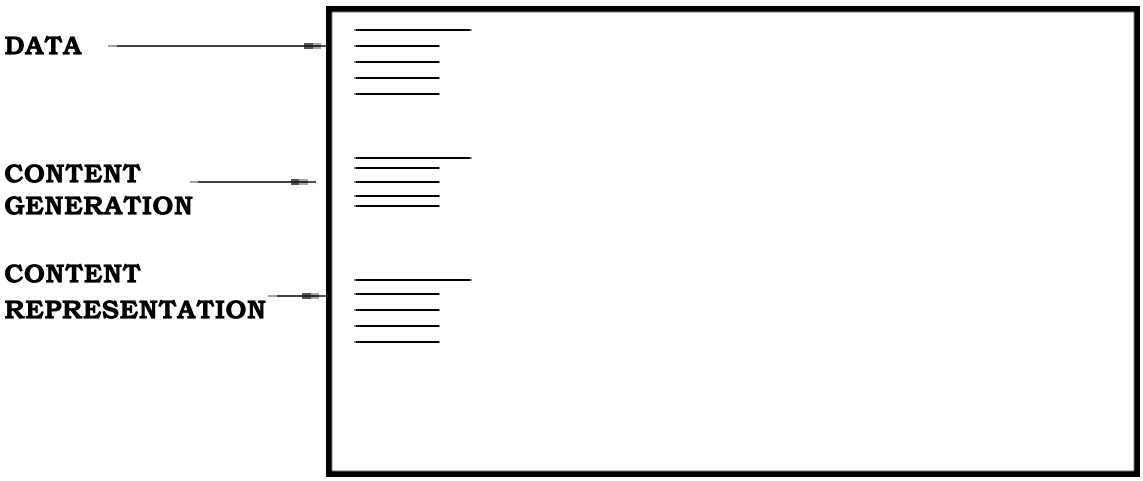
Java Server Pages

➢ **WHY JSP?**

Servlet follows Component architecture, follows request response model.



- All the code goes inside **service() / doGet () / doPost().**
- This makes Servlet monolithic in nature.
- It is a tough job to write all the code in same method.
- Hence there emerged a need for a clear separation between **CONTENT GENERATION & CONTENT REPRESENTATION.**
- Using JSP Separation found was something like this.

➢ **Java Server Pages**

- JSP stands for **Java Server Pages.**
- **JSP is a text document with any name which can contain 100% HTML tags** & additional tags to embed java code.
- It is a java technology which allows software developer to dynamically generate HTML, XML or other types of document in response to Web client request.
- This document is stored in WEB-ROOT of a WEB-APPLICATION.
- Whenever the request comes for any jsp for the first time, JSP ENGINE

(which) is part of Container translates **.jsp** into a **.java** file.

- Translated **.java** file is nothing but a 100% HttpServlet.
- Whenever any changes are made in **.jsp** file. JSP ENGINE retranslates & Recompile it.

➢ ADVANTAGES OF JSP

1) WRITE ONCE, RUN ANYWHERE

- JSP technology is platform independent.
- JSP can be written on any platform, it can run from any platform & can Be accessed from any web-browser on any platform.

2) HIGH QUALITY TOOL SUPPORT

- An explicit goal of Java Server Pages design is to enable the creation of high quality portable tools.

3) REUSE OF COMPONENTS & TAG LIBRARIES

- **JSP** uses reusable components such as
  - ❖ JAVA BEANS
  - ❖ ENTERPRISE JAVA BEANS
  - ❖ TAG LIBRARIES
- This save development time as well as gives cross-platform power & flexibility of Java programming.

4) SEPERATION OF DYNAMIC & STATIC CONTENT

- **JSP** enables separation of dynamic contents from static contents that is inserted in static template.
- This makes work easier & hence diminishes the dependency of WEB-DESIGNER over WEB-DEVELOPER & vice-versa.

5) SUPPORTS SCRIPTING & ACTIONS

- JSP supports scripting elements as well as actions.
- Action permits ENCAPSULATION.
- Scripting provides mechanism to glue-together functionalities.
-

➢ SERVLETS V/S JSP

1) Servlet

- Servlet does not have any separation between dynamic & static contents.

JSP

- JSP has a clean separation between dynamic & static content.

2) Servlet

- Servlet does not have support for implicit objects.

JSP

- JSP supports implicit objects.

3) Servlet

- Servlet supports any protocol including Http.

JSP

- JSP supports only Http protocol.

4) Servlet

- Servlets are pure java program stored with extension (.java).

JSP

- JSPs are document-centric stored with extension(.jsp)

5) Servlet

- If any changes are made in **.class** file. It has to be redeployed

JSP

- Whenever any changes are made to (.jsp) file, JSP ENGINE Retranslates & recompiles, hence no redeployment.

➢ JSP ARCHITECTURE

--- Important Question. Expect for 6 or 8 marks.

- Whenever a request arises for **.jsp** file.

- **JSP-ENGINE will :**
  - i) Translate **.jsp** file into a **.java** file.
  - ii) Compiles the file into a servlet file.
- **Container will:**
  - iii) Load the servlet class.
  - iv) Instantiate it using default constructor.
  - v) Invokes jspInit()

  Required that :
    - a) jspInit() does not throw any exception.
    - b) jspInit() returns in stipulated time.
  - vi) Put the servlet in service.
  - vii) Creates request & response object.
  - viii) Starts the thread, invoke _jspService() & passes request & response object as arguments.
  - ix) Retreive the request parameter, perform processing, send responses to the client using writer object.
  - x) Close the writer object.

xi) When Container shut downs jspDestroy() is invoked.

➢ JSP LIFE CYCLE METHODS

public void jspInit()

- This method is invoked when JspPage is intialised.
- This method is called once in the life-time of JSP Page.
- To put Jsp in service, jspInit() must get completed successfully.

public void _jspService(HttpServletRequest request,

HttpServletResponse response) throws

ServletException, IOException

- The _jspService() corresponds to the body of JSP page.
- This method is defined automatically by the Container & this should not be defined by JSP page author.
- This method is called many a times in its life cycle .

public void jspDestroy()

- This method is invoked when Jsp Page is about to be destroyed.

➢ JSP Comments

- Comments can be used in JSP.
- Two different types of comments are allowed in JSP.

i) HTML COMMENT

<!-- HTML COMMENT -->

- Container passes the straight to the client where browser intercepts this as a comment.
- Hence any attempt of client for view source on browser will end up showing comments.

ii) JSP COMMENT

<%-- JSP COMMENT --%>

- These are for page developers, and are stripped off the translated page.
- Hence a client can't see any of these comments.

➢ **JSP Tags**

i) Directive

a)Page Directive

b)Include Directive

ii)Scripting Element

a) Expression

b) Data Declaration/Method Definition

c) Scriplets

a)Page Directive

-This tag is always given above <HTML> tag.

-Controls resultant translated page.

-No output.

Syntax:

<%@ page attribute="value" attribute="value" %>

Attribute of page directive.

i) language

-By default java is used.

<%@ page language="Java" %>

<html>

|

</html>

-It is used for future consideration, where JSP might support language other than java.

ii) import

-import package required by this JSP page.

-This is the only attribute which can be repeated more than once.

<%@ page language="Java" import="java.util.*" import="java.sql.*" %>

OR

<%@ page language="Java" import="java.util.*, java.sql.*" %>

iii) buffer

-JSP does not uses PrintWriter, but uses JSPWriter.

-Buffer can be "none","8 kb","12 kb" as per requirement.

<%@page buffer="15 kb" %>

iv) autoflush

-Defines whether the buffered output is flushed automatically.

-Default value is true.

-If false is passed, an IOException is generated.

<%@ page autoflush="true" %>

v)isErrorPage

-Defines whether current page represent JSP error page.

-Default value is "false",but if it's change to true,page has access to implicit exception object.

<%@ page isErrorPage="true" %>

vi) errorPage

-Defines the URL to which Exception should be sent.

-The target JSP's isErrorPage value should be true.

<%@ page errorPage="MyExceptionPage.jsp" %>

vii) session

-Defines whether page will have implicit session object.

-Default value is "true".

<%@ page session="true" %>

equivalent to getSession(true);

<%@ page session="false" %>

equivalent to getSession(false);

viii) isThreadSafe

-Defines whether the generated servlet need to implement the SingleThreadModel.

-Default value is "true".

b)include Directive

-include directive are given after <html> and before </html>.

-It makes the static inclusion of .html/.jsp file.

-These files are include during translation.

Syntax:

<%@ include file="somename.html" %>

-Include .html/.jsp file should not contain <html> and </html>.

Header.html

<body>

<h6>Welcome To Tech Solution</h6>

```
<hr>

</body>
```

Footer.html

```
<body>

<hr>

<br>

<h6>This website is a copyright of Tech Solution</h6>

</body>
```

IncludeJSP.jsp

```
<%@ page language="Java" %>

<html>

<body>

<%@ include file="Header.html" %>

<p> Please login.....</p>

>%@ include file="Footer.html" %>

</body>

</html>
```

- **Scripting Elements**

a)Expressions

b)Data Declaration and Method Definition

c)Scriplets

a) Expressions

-JSP expression automatically print out whatever is being sent between the tags.

-Expressions are evaluated and output is sent to the browser.

-Expressions are later resolved and consumed by HTML itself.

<%= expression %>

[Anything which comes on right hand side int i=1;

int z=x+y;

Date dt =new Date();

Point To REMEMBER:

NO semi-colon at the end.

Ease of using Expressions.

Without expression:

```
<%@ page import="java.util.* %>
<html>
<body>
Date: <% out.println(new Date());%>
</body>
</html>
```

With expression:

```
<%@ page import="java.util.*" %>
<html>
<body>
Today's Date:<%=new Date() %>
</body>
</html>
```

-Whenever container encounters expression, Container

takes everything typed between the <%= %> and put it as an argument in out.println()

<%= new Date() %>

Becomes

out.println(new Date());

Tip for Students:

You people always by mistake put up a semi-colon at the end which result in

<%= new Date(); %>

Becomes

out.println(new Date(););

Which becomes error then.

Hence,No semi-colon(;) at the end of Expression.

FirstJSP.jsp

```
<%@ page import="java.util.*" %>

<html>
<body>
<%@ include file="Header.html" %>
<b>
<Hello User!!!Welcome to the world of  JSP !!
</b>
Current Date : <%= new Date() % >
<%@ include file="Footer.html"  %>
</body>
</html>
```

b) Data Declaration and Method Definition

-There may arise a case when a programmer requires to use his own method.

-But till yet, we have seen that whatever we write goes in servlet method (service ()).

-As JSP Declaration doesn't provide any output they are used in conjuction with JSP Expression and JSP Scriplets.

```
<%! Data Declaration; %>

<%! Method Definition()

{

}

%>


<%! int count=0; %>

<%! public String m1()

{

return "Hello";

}

%>
```

-Method returning some values are allowed in JSP Declaration.

http://localhost:8080/TechWebApp/j2?name=Tom

HelloDeclarationJSP.jsp

```
<html>

<body>

<%!

public String sayHello(String name)
```

```
{
return "Hello" + name;
}
%>

Message:<%= sayHello(request.getParameter("name") %?>
</body>
</html>
```

c) Scriplets

-Any piece of code written in scriplet goes into service() method.

-Any complex or simple java code can be written in srciplet.

-Scriplet are meant for embedding java code.

-Scriplet never get translated.

-Hence a very simple but logical point to remember for scriplet is that Scriplet NEVER CAUSE TRANSITION ERRORS.

-Scriplet CAN BE BROKEN by STATIC content.

```
<% Java Code %>
<%------------
    ------------
    ------------%>
```

-Nothing but pure java code goes in the dotted area.

-Any data declared become local to service().

TomJSP.jsp/j3

```
<html>
```

```
<body>
<%
      String name=request.getParameter ("name");
     if(name.equalsIgnoreCase("Tom"))
       {
          out.println("Hi Tom!!!");
          out.println("How are You ?");
       }
else
     {
        out.println("Who You ?");
        out.println("I don't know You");
     }
%>

</body>
</html>
```

URL:http://localhost:8080/TechWebApp/j3 ?name=Tom

ScripletTomJSP.jsp/j4

```
<html>
<head> Scriplet Tom </head>
<body>

<b>
```

A JSP to demonstrate that SCRIPLET can be broken by static content

```
</b>
<% String name=request.getParameter("name");
    if(name.equals("tom"))
        {
%>
<b>
Hi Tom! How are you ?
</b>
<br>
<%
    }
    else
   {
%>
<b>
Who you ? I don't know you ?  <%= name %>
<%
     }
%>
</body>
</html>
```

➢ **OBJECT SCOPE**

- Scope of an object define

1) How long the object is available.

2) Form on which JSP object will be available

There are four scopes

1) request scope

2) session scope

3) page scope

4) application scope

1) request scope

- request scope indicates that object is bound to **javax.servlet.http.HttpServletRequest.**

- Hence, object in request scope can be accessed using getAttribute() on implicit request object.

- The object is distinct for every client request.

- Scope of such objects is available, till **HttpServletRequest** object exists.

Implicit objects coming under request scope: **request.**

2) session scope:-

- session scope indicates that object is bound to **javax.servlet.http.HttpServletSession**

- Object in session scope can be accessed using getValue() on implicit object session.

- Object is different for different client.

- Object in this scope helps in session binding.

- Scope of such object is available, till the client's session valid.

Implicit objects coming under session scope : session

3) page scope

- page scope indicates that object is bound to **javax.servlet.jsp.PageContext .**

* Object in page scope can be accessed using getAttribute() of implicit pageContext object.

* Object in page scope are created & destroyed for each client request to the page.

* scope of such object can be considered as long as page is responding to the current request.

Implict objects coming under page scope are: **response,out,config,page,pageContext,exception**

4) application scope :-

- application scpoe indicates that the object is bound to **javax.servlet,ServletContext.**

- object in application scope can be accessed using getAttibute() of implicit application object.

- scope of this objects are very persistent, they are destroyed when Container is put down.

Implicit objects coming under application scope: **application**

➢ **IMPLICIT OBJECTS**

- JSP simplifier authoring & provides certain objects implicitly to be accessed within a JSP page without any explicit declaration.
- These objects are called as implicit objects .
- These objects are not declared explicitly but they are provided by Container during translation phase.

There are in all 9 implicit objects

TIP FOR STUDENT:it is always recomended to remember the name of tjis implicit object & their classes in context to interiviews.....

There are 9 implicit objects:-

1) request.

2) response

3) out

4) session

5) application

6) config

7) page

8)pageContext

9)exception

1) request:-

- request object represents all the information about HttpRequest.

- Instance of :**javax.servlet.http.HttpServletRequest**

- **Scope:request scope.**

- Using this object we can access headers cookies ,etc.

2) response:-

- response object represents response to the client.

- Instance of : **javax.servlet.http.HttpServletResponse.**

- Scope:page scope

- response object is used for adding cookies, redirecting the calls,etc

3) out:-

- out object represents output stream.

- out objects are used for sending arguments to print methods.

- Instance of:**javax.servlet.jsp.JSPWriter**

-**Scope:page scope**

4) session:-

- session object is used to track client's information across the session.

- Instance of: **javax.servlet.http.HttpSession**

- Scope:session scope.

5) application:-

- application object represent the context for the JSP page.

- application object is accessible to any object used within JSP page.

- Instance of:**javax.servlet.ServletConfig**

- Scope:page scope.

6) config:-

- config object provides access to the initialization parameters

- Instance of : **javax.servlet.ServletConfig**

- Scope : page scope

7) page:-

- page refers to the instance of JSP implementation class, i.e the JSP itself.

- accessed using 'this' reference.

- Instance of : **javax.lang.Object**

- Scope:page scope.

8) pageContext:-

- pageContext encapsulates other implicit objects.

- If a class is given pageContext reference it get access to all the objects from all the scope

- Instance of : **javax.servlet.jsp.PageContext**

- **Scope:page scope.**

9) **exception:-**

- Refers to runtime exception that resulted in invoking the errorPage.

- Available only in error page.

- errorPage:- a JSP which has is errorPage attribute true in page directive.

- Instance of :**java.lang.Throwable**

- Scope:page scope.

➢ **JSP DOCUMENT**

- JSP document is an XML document.
- Hence it must comply with xml standards.
- JSP documents must be a well formatted file,with each start tag having an end tag & document must have only one root element.
- Most of the JSP syntax are xml –complaint
- Those elements that are not complaint are summarized in following table.
-

AX ELEMENTS	**DARD SYNTAX**	**SYNTAX**
ents	....%>	.....>
ation	....%>	<jsp:declaration>.. ...</jsp:declaration>
ves	nclude....%> age....%> aglib....%>	<jsp:directive.include.../> <jsp:directive.page...../> prefix="tag library url"
ssion	<%= .....%>	<jsp:expression>..... ...<jsp:expression>
Scriplet	.....%>	criplet>...<jsp:scriplet>

➢ CHARACTER QUOTING CONVENTIONS

SYNTAX	PURPOSE
<\%	Used in static html where we want to use "<%"
%>	Used in static html where we want to use "%>"
\'	Used to insert single quote in static HTML page
\"	Used to insert double quotes in static HTML page.

➢ TECHNICAL CONSIDERATION FOR JSP

Configuring **web.xml** for **jsp** file

```
<web-app>
<servlet>
    <servlet-name>MyFirstJSP_jsp</servlet-name>
    <jsp-file>FirstJSP.jsp</jsp-file>
</servlet>

<servlet-mapping>
    <servlet-name>MyFirstJSP</servlet-name>
    <url-pattern>FirstJSP.jsp</ url-pattern >
</servlet-mapping>
<web-app>
```

Where to keep JSP File.

e.g. I want to keep my file.

MyFirstJSP.jsp in WebApp.

- **ALWAYS remember .jsp file are kept in WEB-ROOT folder of a Web-App**
-

PROGRAMS

A JSP FOR REQUESTING VALUES FROM A HTML FORM AND REPLYING BACK.

NameAgeHtml.html

```
<html>
<body>
<form action="http://localhost:8080/ZWebApp/NameAgeJSP.jsp" method="POST" >
Name : <input type="text" name="name">
<br>
AGE : <input type="number" name="age">
<br>
<input type="submit" value="submit">
</form>
</body>
</html>
```

NameAgeJSP.jsp

```
<html>
<body>
<%
String name=request.getParameter("name");
int age=Integer.parseInt(request.getParameter("age"));
%>
<B>Hi ! <%= name %> You are <%= age %> years old.
<br>
Next year you will be <%= age+1 %> years old.
</body>
</html>
```

- **PROGRAM**

JSP WITH JDBC.

A JSP TO INSERT A NEW USER IN LOGIN TABLE

Insert.html

```
<html>
<body>
<form action="http://localhost:8080/TechWebApp/InsertUserJSP.jsp" method="POST" >
UserName : <input type="text" name="user">
<br>
Password: <input type="text" name="password">
<br>
<input type="submit" value="register">
</form>
</body>
</html>
```

InsertUserJSP.jsp

```
<%@ page import="java.sql.*" %>
<html>
<body>
<%
String username=request.getParameter("user");
String password=request.getParameter("password");
%>
<B>Inserting a new User in Login Table.... <br>Process Going On..
<br>Please wait for the notification.....
<hr>
<%
```

```
try
                {
                        Class.forName("com.mysql.jdbc.Driver");
                        Connection
con=DriverManager.getConnection("jdbc:mysl://localhost:3306/Tech","root","tech");
                        String query="Insert into Login values(?,?);";
                        PreparedStatement pstmt=con.prepareStatement(query);
                        pstmt.setString(1,username);
                        pstmt.setString(2,password);


                        pstmt.executeUpdate();
%>
        <hr> Values Inserted Successfully...
        <BR> Welcome  <%= username %>
<%
        con.close();
                }
                catch (Exception e)
                {
                System.out.println("DB : "+e.getMessage());
                }
%></body>
</html>
```