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CHAPTER: 3 JSP Java Beans

(1) Introduction:-

JSP is Java Server Pages (JSP) technology enables you to mix regular, static HTML with dynamically generated content. JSP are run in a server side component known as JSP container which translate them into equivalent Java Servlet. You simply write the regular HTML in the normal manner, using familiar Web-page-building tools. You then enclose the code for the dynamic parts in special tags, most of which start with `<%` and end with `%>`. JSP typically comprised of:

- Static HTML/XML components
- Special JSP tags.
- Code written in the java language called "scriptless".

Benefits of JSP

- **No body can borrow the code**

The JSP code written and runs and remains on the server. So issue of copy source code does not arise at all.

All of JSP's functionality is handled before the page is sent to browser.

- **Faster loading of pages.**

With JSP, decision can be made about what user want to see at web server prior to pages being dispatched. So only the content that the user is interested will be dispatched to the user. There is no extra code and extra content.

- **No browser compatibility Issues.**

JSP pages can run same way in browser. The developer ends up sending standard HTML to a user browser. This largely eliminates scripting issues and cross browser compatibility.

- **JSP support**

JSP is supported by number of web server like Apache, Microsoft IIS and PWS, Netscape's FastTracks and Enterprise web server and others. Built in support for JSP is available Java Server from Sun Microsystem.



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- **Compilation**

JSP compiled before the web server processes it. This allows the server to handle JSP pages much faster, because in the older technologies such as CGI require the server to load an interpreter and the target script each time the page is requested.

- **JSP elements in HTML/XML pages**

JSP page look like HTML /XML page, it holds text marked with a collection of tags. While a regular JSP page is not a valid XML page, there is a variant JSP tag syntax that lets the developer use JSP tags within XML documents.

Disadvantages of JSP

1. Attractive Java Code

Putting java code within web page is really bad design, but JSP makes it tempting to do just that. Avoid this as far as possible. It is done using template using.

2. Java Code required

To relatively simple things in JSP can actually demand putting java code in a page.

3. Simple task are hard to code

Even including page headers and footers is a bit difficult with JSP.

4. Difficult looping in JSP

In regular JSP pages looping is difficult. In advance JSP we can use some custom tags for looping.

5. Occupies a lot of space.

JSP consumes extra hard drive and memory space.

1 Word Question Answer

Sr.No.	Question	Answer
1.	JSP stands for?	Java Server Pages
2.	_____ Technology enables you to mix regular, static HTML with dynamically generated content.	JSP



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3.	In advance JSP we can use some custom tags for_____.	Looping.
----	--	----------

(2) Servlet v/s JSP

JSP and servlet both used for developing dynamic web content. A servlet is a java class implementing the javax.sevlet.Servlet interface that runs within a web or application server's Servlet engine, servicing client request forwarded through the server. JSP is slightly more complicated. JSP contain mixture of HTML, javascript, JSP elements and directives. The element in a JSP will generally be compiled by the JSP engine into a servlet, but the JSP specification only require that the JSP execution entity the servlet protocol.

One advantage of jsp over servlet is it allows logical division between what is displayed and the web server side code specification that dictates what content files the page. It is easy to modify the look and feel of what is delivered by jsp without having to alter any web server side, java code specification.

JSP are documents – centric. servlet look and act like programs. JSP contain java program fragement that instantiate and execute java classes, but these occure inside an HTML template file and primarily used to generate dynamic content. some of the JSP functionality can be achieved on the client, using javascript.

Whilel its true that anything done with a JSP can also be done with using a servlet, JSP s provides a nice clean separation of the applications presentation layer from its data manipulating layer. JSP are simpler to craft than servlet.

1 Word Question Answer		
Sr.No.	Question	Answer
1.	_____ used for developing dynamic web content.	JSP and servlet both
2.	A servlet is a java class implementing the_____.	javax.sevlet
3.	_____ contain mixture of HTML, javascript.	JSP
4.	Some of the JSP functionality can be achieved on the client, using_____.	Javascript



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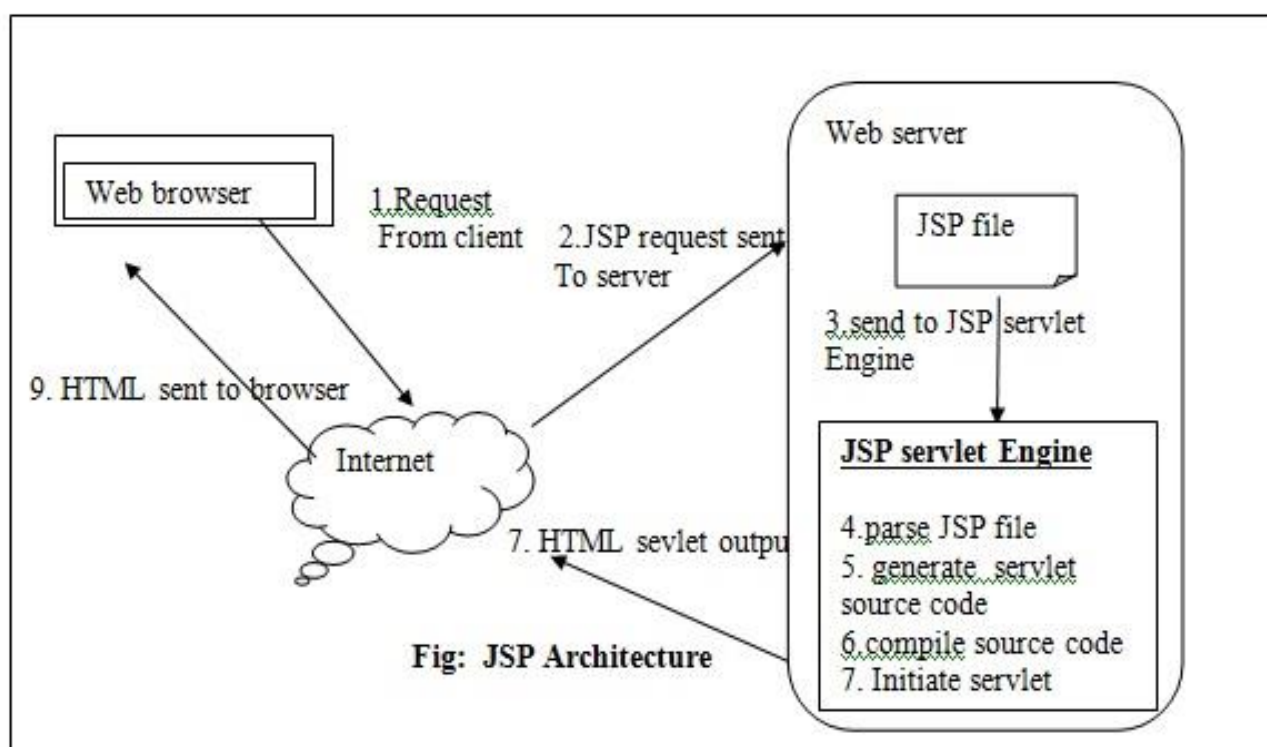
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(3) JSP Architecture Development

The purpose of JSP is to provide a declarative, presentation centric method of developing servlet. JSP are subject to translation phase and ad request processing phase. The translation time phase is carried out only once, unless the JSP page in which case it is repeated. Communication of web browser and web server in terms of JSP is shown below:



JSP are built by sun microsystem servlet technology. JSP contain java code and its file extension in jsp.

JSP engine parse the .jsp file and creates a java servlet source file. then it compiles the source file into a class file, this is done first time only therefore JSP is probably slower than when first time it is accessed. After this compile servlet is executed and is therefore returned faster.

Step for JSP request shown in figure:

- (1) When user goes to jsp page web browser make a request via Internet.
- (2) JSP request then sent to the server.



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- (3) Web server recognizes the .jsp file and passes the JSP file to the JSP servlet Engine.
- (4) If JSP file has been called for first time, Then JSP file is parsed, otherwise the servlet is instantiated.
- (5) The next step is to generate a servlet from jsp file .the entire HTML required is converted to println statements.
- (6) Servlet source code is compiled into class file.
- (7) Servlet is instantiated, calling the init and service method.
- (8) HTML from the servlet output is sent via the Internet.
- (9) HTML results are displayed on the user's web browser.

1 WordQuestion Answer

Sr.No.	Question	Answer
1.	JSP are built by_____.	sun microsystem
2.	Extension of JSP files is_____.	.jsp

(4) JSP LIFECYCLE

JSP enables you to write standard HTML pages containing tags that run powerful programs based on Java Technology. The goal of JSP technology is to support separation of presentation and business logic. Web designer can design and update pages without learning the programming language. Programmer for java platform can write codes without dealing with web page design's files are also converted into servlet at last. This process is done in the background by the Web Container. `javax.servlet.jsp.HttpjspPage` interface is used to create servlet from JSP file.

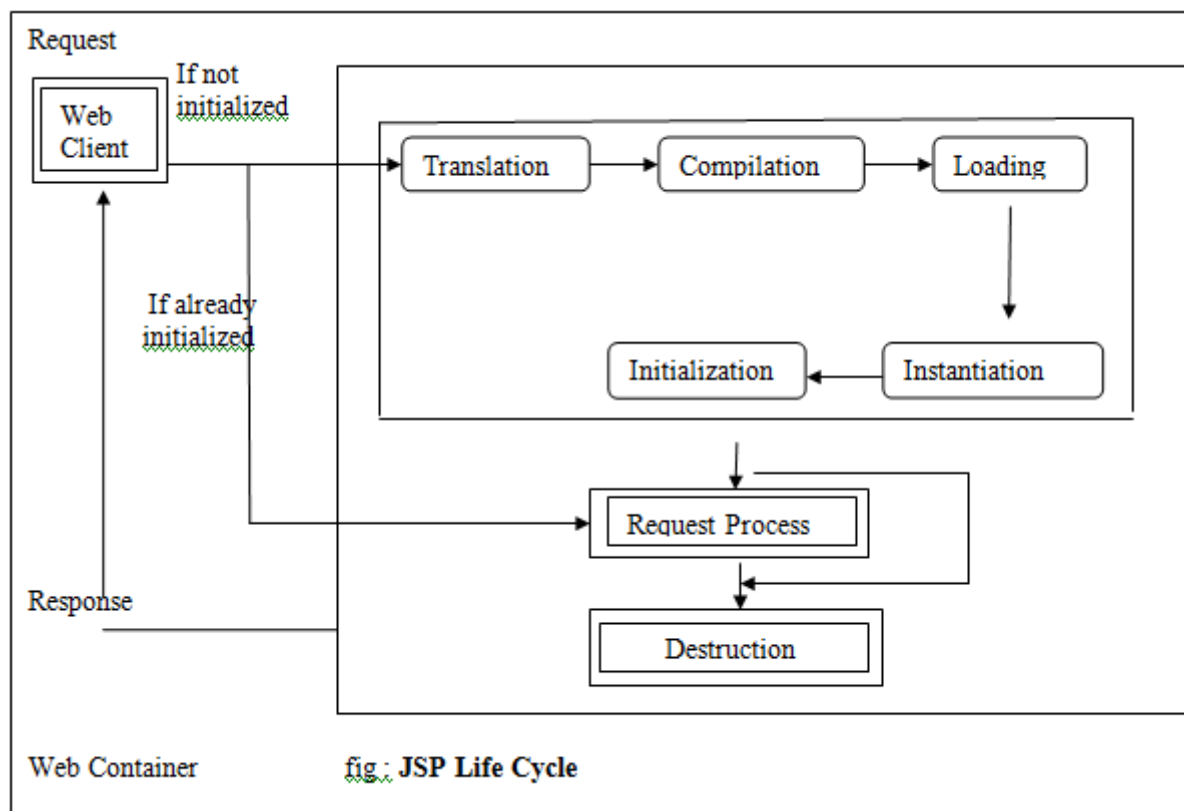


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Above figure shows that if the JSP page is requested first time by web client to web container, then requested JSP code is converted into servlet code into the translation phase.

After that in compilation phase converted servlet code is compiled and bytecode is created in the form of servlet class. In next phase servlet class is loaded into servlet engine and servlet instance is created. After the creating instance it goes to the Request Process phase.

But If JSP is already initialized then it goes to Request Process phase directly. When JSP servlet class completes its execution it goes in to the Destruction phase.

After creating an instance of servlet class, following methods are called in turn accordingly which they are available under javax.jsp.JspPage.

- `jspInit()`



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When jsp servlet instance is created, `jspInit()` called. You can use `ServletContext` object or `ServletConfig` object to get initial parameters. It is similar to `init()` of servlet.

Syntax of `jspInit()` is as follows:

Public void `jspInit()`

- **`_jspService()`**

This is similar to `service()` of servlet. When jsp servlet instance is called, `_jspService()` is called where request and response object are sent.

Syntax of `jspService()` is as follows:

Public void `_jspService(HttpServletRequest req, HttpServletResponse res)` throws
Servlet Exception, IOException

- **`jspDestroy()`**

This is similar to `destroy()` of servlet. This method is called when the JSP servlet instance is destroyed from the web container.

Syntax of `jspInit()` is as follows:

Public void `destroy()`

Request-response cycle of JSP

1) Client sends an HTTP request for a JSP page to the server, either using a GET /POST method.

2) The browser identifies the JSP files and compiles and loads the corresponding servlet class if the servlet class is not already present in the JVM. The server calls the `service()` which often passes the request and response to the `doGet()` or `doPost()`. The servlet processes the input from the request and prepares an HTML page as a response.



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3) The response is sent back to the client browser.

1 Word Question Answer

Sr.No.	Question	Answer
1.	_____ enables you to write standard HTML pages containing tags that run powerful programs based on Java Technology.	JSP
2.	After JSP page converted in to servlet page which code is created?	Bytecode
3.	When jsp servlet instane is created_____is called.	jspInit()
4.	When jsp servlet instance is called_____ is called where request and response object are sent.	_jspService()
5.	_____ method is called when the JSp servlet instance is destroyed from the web container.	jspDestroy()

(5) JSP Elements

JSP elements are instruction to JSPcontainer about what code to generate and how it should operate. JSP elements have a special identity to jsp compiler because it starts and ends with special kind of tags.template data(HTML) code is not compiled by the jsp compiler and also not recognized by the jsp container.it is also known as Component of the Jsp pages. There are basically three type of JSP elements are as given follow.

- i. Directive Elements
- ii. Scripting Elements
- iii. Action Elements

(1) Directive Elelments

The role of directive is to pass information to the JSP container.

Syntax:

<%@ directive {attribute name="value"} %>



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There are three type of directive elements are as given below.

- Page Directive
- Include Directive
- Taglib Directive

(1) Page Directive:

Page Directive is uses to specify attributes for the whole JSP page.syntax is as follows:

```
<%@ page [attribute1="value1" attribute2="value2".....attributeN= "valueN"] %>
```

Where the attribute can be as follows:

Attribute Name	Use(description)	Default value
Language	It is used to define the language which is used with the scriptlet elements.Most probably its valid value is java only.	Java
extends	It defines fully qualified name of the super class of the jsp page.	
Import	It defines list of packages which are imported with the JSP page with its fully qualified name.	Javax.servlet.*, Javax.servlet.http.*, Javax.servlet.jsp.*,java.lang.*
Session	It defines the Boolean value indicating if jsp page require HTTP session then its value Is true else it becomes false.	True
Buffer	It specifies the size of buffer.	8 kb
autoFlush	It defines the Boolean indicating if it is true then it automatically flushed the buffer ad if false then it throws an exception buffer overflow.	True
isThreadSafe	It defines the Boolean indicating	True



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	if it is true jsp page handles the all the request simultaneously from multiple threads if false then generates servlet declares that it implements the SingleThreadModel.	
Info	It returns string message information related to jsp page using <code>getServletInfo()</code>	-
isErrorPage	It defines the Boolean indicating if it is true jsp page considered as error page and if false then it is normal page and implements it with other jsp page to handle exception.	False
errorPage	It defines the url of the error page we want to implement the error page with the other jsp pages we can use this directive.	
contentType	It specifies the MIME type and character encoding which used with generated servlet.	<code><%@ page contentType="text/html"%></code>
pageEncoding	It defines the character encoding of the jsp page	ISO 8859 -1 (Latin script)for JSP style and UTF-8 for xml style tags.

Syntax for all jsp directives:

```
<%@page [language="java"]
[extends="package.class"]
[import="{package.class | package.*},....."
[session="true/false"]
[buffer="none | 8kb | sizekb"]
[autoFlush="true | false"]
[isThreadSafe="true/false"]
[info="text"]
[errorpage="relativeURL"]
```



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```
[contentType="MIME[;charset=charset]" | "text/html";  
Charset=ISO 8859-1"]  
[isErrorPage="true|false"]%>
```

Example:

```
<%@page import="java.util.*;" %>  
<html>  
  <head>  
  
    <title> Page Directive Example </title>  
  </head>  
  <body>  
    <%  
      Date d1=new Date();  
      out.println("curent date is=");  
      out.println(d1);  
    %>  
  </body>  
</html>
```

(2) Include Directive:

Include directive is used to include the static page and dynamic pages with the other jsp pages. For example if we want to Set same header and footer for all the pages we can create header.html and can include it with necessary jsp pages. In short it is used to insert a part of the code that is common to multiple pages.

Syntax: <%@include file="relative path"%>

The file attribute is used to specify the name of the file to be included.

First.html

```
<html>  
  <head><title>Include example</title></head>  
  <body>  
    Username : <input type="text" name="txtnm" value="">
```



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Password : <input type="text" name="txtps" value="">
<input type="submit" name="submit" value="submit">

</body>
</html>

IncludeDemo.jsp

```
<%@include file="First.html" %>
<html>
  <head>
    <meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
    <title>JSP Page<./title>
  </head>
  <body>
    <h1>welcome to include directive example</h1>
  </body>
</html>
```

Example for include one jsp page to another jsp page:

IncrementDemo.jsp

```
<html>
  <head>
    <title>JSP Page</title>
  </head>
  <body>
    <% for (int sctr=0; ctr<=5; ctr ++)>
      {%>
        The value of ctr is <%= ctr% ><br/>
      <%}%>
    </body>
</html>
```

(3)Taglib Directive:

It declares that the JSP file uses custom tags, names the tag library that defines them, and specifies their tag prefix. Syntax:



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<%@ Taglib uri="URItoTagLibrary" prefix="tagPrefix" %>

Example:

<%@ taglib uri="/tlds/Fancy/TableGenerator.tld" prefix="fancytable" %>

< fancytable: table>

.....

</fancytable:table>

1 Word Question Answer

Sr.No.	Question	Answer
1.	_____ Directive is uses to specify attributes for the whole JSP page	Page
2.	_____ directive is used to include the static page and dynamic pages with the other jsp pages.	Include
3.	_____ Directive declares that the JSP file uses custom tags	Taglib

2. Scripting Elements

Scripting Elements are used to write java code with the jsp file. As you know in jsp java code is embedded within HTML code. You need to write some java language statements or use java features within the JSP page.

There are 3 types of scripting elements which are as follows:

- **Scriptlets**
- **Declaration**
- **Expression**

1. Scriptlets:

Scriptlets are block of java code with the jsp page. Scriptlets starts with <% tag and end with %>closing tag.JSP converted into servlet code and then JSP engine adds all processing statements of JSP processes them under _jspService().



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Syntax:

<%

Statement 1;

Statement 2;

.....

Statement n;

%>

Example:

We can write any valid java statements with the scriptlets declaring variable, writing processing and output part.

2. Declaration:

Declaration tags are used to declare the variables, methods and instance of the classes with the jsp pagescriptlets code become part of the `_jspService()` whereas declaration code is incorporated into generate d source file outside the `_jspService()`.Declaration starts with `<%!` tag and end with `%>`closing tag.

<%!

Statement 1;

Statement 2;

.....

Statement n;

%>

Example:

Scriptlet.html

3. Expression:

Expression element is used to print value of any variable or any valid expression when the jsp page is requested. All the expressions are printed automatically by converting values into string values. If the result can not be converted into a string ,an error will be raised at translation time .An expression starts with `<%=` and ends with `%>`

Syntax:

<%= expressions %>

Example:



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Current Time :< %= java.util.Calendar.getInstance().getTime() %>

This expression will be translated into the following statements in the `_jspService()` of the generated servlet.

1 word Question Answer

Sr.No.	Question	Answer
1.	_____ Elements are used to write java code with the jsp file.	Scripting Elements
2.	_____ are block of java code with the jsp page.	Scriptlets
3.	Scriptlets starts with _____ tag and end with _____ closing tag.	<%,%>
4.	Declaration starts with _____ tag and end with _____ closing tag.	<%!,%>
5.	_____ is used to print value of any variable or any valid expression when the jsp page is requested.	Expression element
6.	An expression starts with _____ and ends with _____.	<%=,%>

4. Action Elements:

Action elements are high level jsp elements which are used to create, modify and use other objects. Syntax of action element's tags just like XML syntax.

- `<jsp:param>`
- `<jsp:include>`
- `<jsp:forward>`
- `<jsp:plugin>`

1. `<jsp:param>`

This element is used to provide the tag/value pair of information, by including these as sub attribute of the `<jsp:include>`, `<jsp:forward>` and the `<jsp:plugin>` actions.

Syntax:



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```
<jsp:param name="pname" value="pvalue"/>  
OR  
<jsp:param name="pname" value="pvalue">  
</jsp:param>
```

2. <jsp:include>

This element is used to include static and dynamic resource of the current JSP page. This object is just used to include resource on the current JSP page. It can not be used to send response.

Syntax:

```
<jsp:include page="jsp page" flush="true/false"/>  
<jsp:param name="pname" value="pvalue">  
</jsp:include>
```

Example:

```
<jsp:include page="login.jsp" flush="true"/>  
<jsp:param name="username" value="java">  
</jsp:include>
```

Here <jsp:include> has two attributes which are:

Page: Specifies the resource (JSP/HTML) file which will be included.

Flush: An optional parameter used to flush buffer. Specified true/false.

Note: Once the buffer is flushed, the value can not be recalled as it is flushed from the memory directly.

3. <jsp:forward>:

This control is used to transfer control from current JSP page to another source which may be any valid source of application. It is obvious to understand that



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whenever this action elements is called, execution of current JSP page is stopped and control is transferred to another specified URL into `<jsp:forward>`:

Note: `<jsp:forward>` action element is same as `forward()` of request dispatcher of servlet programming.

Syntax:

```
<jsp:forward page="destinationpage"/>
```

Example

```
<jsp:forward page="abc.jsp"/>
```

Above example will transfer control from current page to abc.jsp

4. `<jsp:plugin>`

This element is used to embed an applet and java beans with the jsp page. the tag automatically detects the browser type and inserts the appropriate HTML tag either `<embed>` or `<object>` in the output.

Syntax:

```
<jsp:plugin type="plugintype" code="classname" codebase="url">  
</jsp:plugin>
```

Example:

```
<jsp:plugin type="applet" code="AppletDemo.class" >  
</jsp:plugin>
```

1 Word Question Answer

Sr. No.	Question	Answer
1.	_____ Element is used to include static and dynamic resource of the current JSP page.	<code><jsp: include></code>
2.	_____ Control is used to transfer control from current JSP page to another source which may be any valid source of	<code><jsp:forward></code>



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	application.	
3.	_____ element is used to embed an applet and java beans with the jsp page	<jsp:plugin>

➤ COMMENTS AND TEMPALATE DATA

We can use two type of comment with JSP page one is for HTML and another for JSP.HTML comment :<! --this comment will appear in the client's browser -->
JSP comment: <% -- this comment will not appear in the client's browser --%>
JSP comment will not appear in the page output to the client.

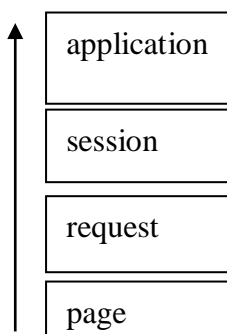
Template Data:

In JSP page everything that is not a directive,declaration,Scriptlets,expression,action elements or JSP comments is termed as Template Data.Usually all the HTML and text in the page .In other words ,template data is ignored by the JSP translator.This data Is output to the client as if it had appeared within a static web page.

SCOPE OF THE JSP OBJECTS

Objects that are created as part of the JSP page have a certain lifetime and may or may not be accessible to other components or objects in the web application.The lifetime and accessibility of an object is known as scope.There are four valid scope.

- Page Scope
- Request Scope
- Session Scope
- Application Scope



- Object are accessible from page that belongs that
- That belongs to same page
- Least restrictive & most visible



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- Object are accessible from page that belongs that That belongs to same session
- Object are accessible from page processing the most restrictive & least visible request where they were created.
- Object are accessible only within the page that where they were created.

1. Page scope:

This scope is most restrictive. With page scope, the object is accessible only within the current jsp page in which it is defined. Javabeans created with page scope and objects created by Scriptlets are thread safe. Jsp implicit objects out, exception, response, config, pageContext and page have 'page' context.

2. Request scope:

Jsp object created using the 'request' scope can be accessed from any pages that serve that request. This means that the object is available within the page in which it is created and within pages to which the request is forwarded or included. Object with request scope are thread safe. Only the execution thread for a particular request can access these objects. Implicit object request has 'request scope'.

3. session scope:

Objects with session scope are available to all application component that participate in the client's session. These objects are not thread safe. If multiple requests could use the same session object at the same time, you must synchronize access to that object. JSP object that is created using the session scope is bound to the session object. Implicit object session has the 'session' scope.

4. Application Scope:

Objects with application scope are available to the entire application for the life of the application. These objects are not thread safe and access to them must be synchronized if there is a chance that multiple requests will attempt to change the object at the same time. JSP object is bound to the application object. Implicit object application has the 'application scope'.

1 Word Question Answer

Sr.No.	Question	Answer
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1.	_____ Template data is ignored by the JSP translator.	Template
2.	The lifetime and accessibility of an object is known as _____	Scope
3.	Jsp object created using the _____ scope can be accessed from any pages that serve that request	request
4.	Implicit object request has _____ scope	Request
5.	Objects with _____ scope is available to all application components that participate in the client's session.	session
6.	Objects with application scope are available to the entire _____ for the life of the application	application

(6) IMPLICIT OBJECT OF JSP

Implicit objects means the object which is created already created by JSP itself. Implicit objects are automatically created in JSP pages and can be used without declaring their object.

The reason behind that implicit object is, jsp page is also converted into servlet at last, so some of objects should be provided by JSP also for programming similar to sevlet. Implicit object are used within scriptlet and expression elements.

- request
- response
- out
- session
- config
- exception
- application

1. request:

This is the most important object which is used in JSP programming. The entire request coming from the client can be obtained from this object. Similar to servet



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programming, request object in JSP also belongs to `javax.servlet.http.HttpServletRequest` class. You can see all the parameters sent by client through the request object.

The request object has request scope. That means that the implicit request object can be in scope until the response to the client is complete.

Example:

```
<%  
String u=request.getParameter("txt_username");  
String p=request.getParameter("txt_password");  
Out.println("welcome,"+u);  
%>
```

The above example is used to retrieve username and password from request object and then print it.

2. Response:

This is another most important object which is used in JSP programming. If you want to generate any output for client, then you can generate it using response object. As similar to servlet programming, response object in jsp belongs to `javax.servlet.HttpServletResponse` class. This object allows us to set content type using `setContentType()`, set header using `addHeader(String name, String value)`, to set cookie using `addCookie(Cookie cookie)` for the client and send a redirect response to the client using `sendRedirect()` of response.

3. Session:

This object is used for session tracking. This belongs to `javax.servlet.http.HttpSession` class. Session object is created under session implicit object. We can use session methods like `getAttribute()`, `setAttribute()`, `getValue()`, `putValue()`, `removeAttribute()`, `removeValue()`, `isNew()`, `getId()`, `getCreationTime()`.

4. Application

This object is used for set values and attributes at application level. Application object of JSP is similar to `ServletContext` object of servlet programming `getServletConfig()`,



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`getServletContext ()` can be used to retrieve application object. As it is similar `ServletContext` object of application object.you can use all methods available under `ServletContext` object. `getAttribute()`,`setAttribute()`,`removeAttribute()`,`getServletInfo()`,`getInitParameter()`, `getInitParameterNames()`.

5. out:

This object is used to write output to the output stream of the client.The scope of out is current page.out object is created using `javax.servlet.jsp.JspWriter` class.methods of out object is `print()`,`println()`,`clear()`,`clearBuffer()`,`close()`,`flush()`.

6. config:

This object is similiar to `ServletConfig` object of `servlet` class.config object is created using `javax.Servlet.ServletConfig` class.this is mainly used to read some initial parameters which are passed to particular page.Method available inside config object are `getInitParameter()`, `getInitParameterNames()`, `getServletContext()`, `getServletName()`.

7. page:

As you know JSP page is converted into `servlet` class at last. Then the `servlet` instance is created of that perticular sevlet class. Page is the instance of the instance of the jsp `servlet` class created by web container for the current request.As page is the instance of the current jsp sevlet class; it contains method of object class along with all the methods created inside jsp page.

Implicit objects	Super class	Description
Request	<code>HttpServletRequest</code>	Provides HTTP request information
Response	<code>HttpServletResponse</code>	Send back data to the client
Out	<code>JspWriter</code>	Write data to the response stream
Session	<code>HttpSession</code>	Track information about a user from one request to another.
Application	<code>ServletContext</code>	Data shared by all JSP and servlets in the application.
pageContext	<code>Pagecontext</code>	Contains data associated with the whole page.



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Config	ServletConfig	Provides servlet configuration data.
Page	Objects	Similar with “this” object in java
Exception	Throwable	Exception not caught by appliacation code

1 Word Question Answer

Sr.No.	Question	Answer
1.	_____ objects means the object which is created already created by JSP itself.	Implicit
2.	Request object in JSP also belongs to _____ class.	javax.servlet.httpServletRequest
3.	If you want to generate any output for client,the you can generate it using _____object	Response
4.	_____ object is used for session tracking	Session
5.	_____ object is used for set values and attributes at application level.	Application
6.	_____object is used to write output to the output stream of the client	Out

(7) Handling and Errors and Exception with JSP Page

Exception referred to the error occurred at run time. In java exception handled through the exception object. In jsp exception is implicit object with page scope.

It is an instance of java.lang.throwable as you know that Throwable class is the super class of all the exception and error classes in the java .Here with the jsp we can handle exception with Scriptlets, by creating an errorpage and with deployment descriptor.

Exception handling using Scriptlets:

Exception can be handled in a scriptlet in the same way as in java, by using the try and catch block.



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Exception handling using the page Directive:

This is the second way to handle exception by creating an error page. To create an error page with JSP we can use `isErrorpage=true` attribute of page directive. After creating an error page we can handle the exception with any JSP page by invoking this error page with it using `errorPage="URL of the error page"` attribute of the page directive.

Exception handling using Deployment Descriptor

This is the third way to by which we can handle an exception with JSP page. Deployment descriptor is a web.xml file which defines the classes, resources and configuration of the application and how the web server uses them to serve web requests. It resides in the application under the WEB-INF/directory. If an error page is defined for handling an exception, the request is directed to the error page's URL. The web application deployment descriptor uses the `<error-page>` tag. To define web components that handle errors. We can set deployment descriptor for error handling in two ways, either using exception type or using error code.

```
<error-page>
    <exception-type>java.lang.throwable</exception-type>
    <location>/errorpage.jsp</location>
</error-page>
<error-page>
    <exception-type>500</exception-type>
    <location>/erorpage.jsp</location>
</error-page>
```

1 Word Question Answer

Sr.No.	Question	Answer
1.	_____ referred to the error occurred at run time.	Exception
2.	. In jsp exception is ____ object with page scope.	Implicit
3.	_____ class is the super class of all the exception and error classes in the java.	Throwable
4.	To create an error page with JSP we can use	<code>isErrorpage=true</code>



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	_____ attribute of page directive.	
5.	The web application deployment descriptor uses the _____ tag.	<error-page>

(8) INCLUDING AND FORWARDING FROM JSP

JSP pages have the ability to include other jsp pages or servlet in the output that is sent to the client, or to forward the request to other jsp page or servlet for servicing. This thing is possible through the standard actions, <jsp: include> and <jsp: forward>.

Include Action

Including a jsp page or servlet through a standard differs from the include directive.

```
<%@ include file="/WEB-INF/footer.jsp"%>
```

```
<jsp:directive.include file="/WEB-INF/footer.jsp">
```

When the jsp container translates the page, this directive causes the indicated file to be included in that place in the page and become part of the java source file that is compiled into the jsp page implementation class; that is, it is included at translation time. Using the include directive, the included file does not need to be a complete and valid jsp page.

With the “include” standard action, the jsp file stops processing the current request and passing the request to the included file. The included file passes its output to the response. After that control of the response to the calling jsp, which completes further process of the response? The output of the included page or servlet is included at request time. Components that are included via the include action must be valid jsp pages or servlet.

The included file is neither allowed to modify the headers of the response, not to set cookies in the response.

Syntax:

```
<jsp:include page="URL" flush="true/false">
```

```
<jsp:param name="paramname" value="paramvalue"/>
```

```
</jsp:include>
```



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For the include element, the page attribute is required, and its value is the URL of the page whose output is included in the response. This URL is relative to the jsp page. The flush attribute is optional, and it indicates whether the output buffer should be flushed before the included file is called. The default value is false.

If the jsp needs to pass parameters to the included file, it does so with the `<jsp:param>` element. One element is used for each parameter. This element is optional. If it is included, both the name and value attributes are required. The included jsp page can access the parameters using the `getParameter()` and `getParameterValues()` methods of the request object.

Forward action

With the forward action, the current page stops processing the request and forwards the request to another web component. These other components complete the response. Execution never returns to the calling page. Unlike the include action, which can occur at any time during a response, the forward action must occur prior to writing any output to `OutputStream`. In other words, the forward action must occur prior to any HTML template data in the jsp, and prior to any Scriptlets or expressions that write data to the `OutputStream`. If any output has occurred in the calling jsp, an exception will be thrown when the forward action is encountered.

Syntax:

```
<jsp:forward page="URL">
```

```
<jsp:param name="paramname" value="paramvalue"/>
```

```
</jsp:forward>
```

The meaning and use of the attributes and of the `<jsp:param>` element are the same as those for the include action.

1 Word Question Answer

Sr.No.	Question	Answer
1.	When the jsp container translates the page, ____ directive causes the indicated file to be included in that place in the page and become	Include



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	part of the java source file	
2.	With the ____ standard action, the jsp file stops processing the current request and passing the request to the included file	Include
3.	For the include element, the ____ attribute is required.	Page
4.	If the jsp needs to pass parameters to the included file, it does so with the ____ element	<jsp:param>
5.	With the ____ action, the current page stops processing the request and forward the request to another web component.	Forward
6.	If any output has occurred in calling jsp, an exception will be thrown when the ____ action is encountered.	forward

JavaBeans Introduction:

The server and client tiers might also include components based on the Java-Beans component architecture (JavaBeans components) to manage the data flow between an application client or applet and components running on the J2EE server, or between server components and a database. JavaBeans components are not considered J2EE components by the J2EE specification.

JavaBeans components have properties and have get and set methods for accessing the properties.

JavaBeans components used in this way are typically simple in design and implementation but should conform to the naming and design conventions outlined in the JavaBeans component architecture.

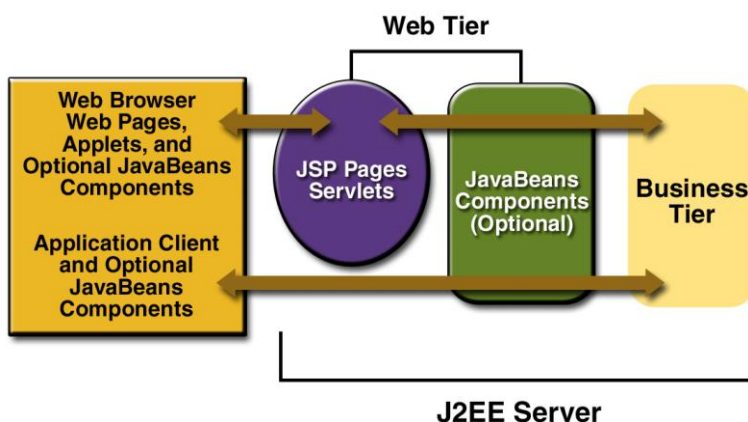


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As shown in above Figure, the web tier, like the client tier, might include a Java-Beans component to manage the user input and send that input to enterprise beans running in the business tier for processing.

(9) Java Bean Properties

To define a property in a bean class, supply public getter and setter methods.

A builder tool like NetBeans recognizes the method names and shows the mouthWidth property in its list of properties. It also recognizes the type, int, and provides an appropriate editor so the property can be manipulated at design time.

Various specializations of basic properties are available and described in the following sections.

Indexed Properties

An *indexed* property is an array instead of a single value. In this case, the bean class provides a method for getting and setting the entire array.

Bound Properties

A *bound* property notifies listeners when its value changes. This has two implications:

1. The bean class includes `addPropertyChangeListener()` and `removePropertyChangeListener()` methods for managing the bean's listeners.
2. When a bound property is changed, the bean sends a `PropertyChangeEvent` to its registered listeners.



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PropertyChangeEvent and PropertyChangeListener live in the java.beans package.

The java.beans package also includes a class, PropertyChangeSupport, that takes care of most of the work of bound properties. This handy class keeps track of property listeners and includes a convenience method that fires property change events to all registered listeners.

Bound properties can be tied directly to other bean properties using a builder tool like NetBeans. NetBeans allows you to do this without writing any code.

Constrained Properties

A *constrained* property is a special kind of bound property. For a constrained property, the bean keeps track of a set of *veto* listeners. When a constrained property is about to change, the listeners are consulted about the change. Any one of the listeners has a chance to veto the change, in which case the property remains unchanged.

The veto listeners are separate from the property change listeners. Fortunately, the java.beans package includes a VetoableChangeSupport class that greatly simplifies constrained properties.

Development Support in NetBeans

The coding patterns for creating bean properties are straightforward, but sometimes it's hard to tell if you are getting everything correct. NetBeans has support for property patterns so you can immediately see results as you are writing code.

To take advantage of this feature, look at the **Navigator** pane, which is typically in the lower left corner of the NetBeans window. Normally, this pane is in **Members View** mode, which shows all the methods and fields defined in the current class.

Click on the combo box to switch to **Bean Patterns** view. You will see a list of the properties that NetBeans can infer from your method definitions. NetBeans updates this list as you type, making it a handy way to check your work.

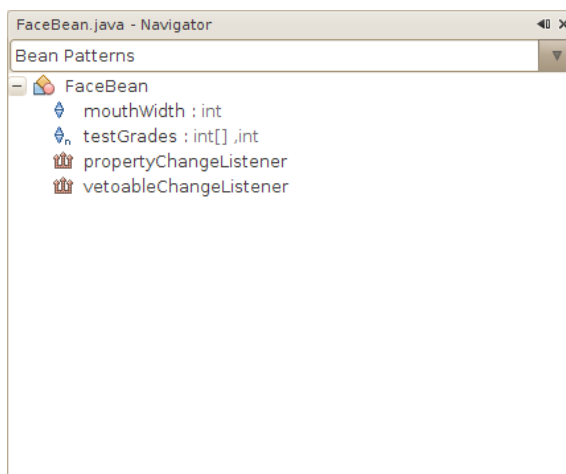


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1 Word Question Answer

Sr.No.	Question	Answer
1.	JavaBeans components have properties and have ____and____ methods for accessing the properties.	Get,set
2.	To define a property in a bean class, supply public ____and ____ methods.	Getter, setter
3.	An ____property is an array instead of a single value	<i>Indexed</i>
4.	When a bound property is changed, the bean sends a ____to its registered listeners.	PropertyChangeEvent
5.	PropertyChangeEvent and PropertyChangeListener live in the ____package.	java.beans
6.	____properties can be tied directly to other bean properties using a builder tool like NetBeans.	Bound
7.	A ____property is a special kind of bound property.	<i>Constrained</i>
8.	For a constrained property, the bean keeps track of a set of ____listeners.	<i>veto</i>



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(10) Methods

A bean's methods are the things it can do. Any public method that is not part of a property definition is a bean method.

When you use a bean in the context of a builder tool like NetBeans, you can use a bean's methods as part of your application. For example, you could wire a button press to call one of your bean's methods.

Package java.beans

Contains classes related to developing *beans* -- components based on the JavaBeans™ architecture.

Interface Summary

AppletInitializer	This interface is designed to work in collusion with <code>java.beans.Beans.instantiate</code> .
BeanInfo	A bean implementor who wishes to provide explicit information about their bean may provide a <code>BeanInfo</code> class that implements this <code>BeanInfo</code> interface and provides explicit information about the methods, properties, events, etc, of their bean.
Customizer	A customizer class provides a complete custom GUI for customizing a target Java Bean.
DesignMode	This interface is intended to be implemented by, or delegated from, instances of <code>java.beans.beancontext.BeanContext</code> , in order to propagate to its nested hierarchy of <code>java.beans.beancontext.BeanContextChild</code> instances, the current "designTime" property.
ExceptionListener	An <code>ExceptionListener</code> is notified of internal exceptions.
PropertyChangeListener	A "PropertyChange" event gets fired whenever a bean changes a "bound" property.



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PropertyEditor	A PropertyEditor class provides support for GUIs that want to allow users to edit a property value of a given type.
VetoableChangeListener	A VetoableChange event gets fired whenever a bean changes a "constrained" property.
Visibility	Under some circumstances a bean may be run on servers where a GUI is not available.

Class Summary

BeanDescriptor	A BeanDescriptor provides global information about a "bean", including its Java class, its displayName, etc.
Beans	This class provides some general purpose beans control methods.
DefaultPersistenceDelegate	The DefaultPersistenceDelegate is a concrete implementation of the abstract PersistenceDelegate class and is the delegate used by default for classes about which no information is available.
Encoder	An Encoder is a class which can be used to create files or streams that encode the state of a collection of JavaBeans in terms of their public APIs.
EventHandler	The EventHandler class provides support for dynamically generating event listeners whose methods execute a simple statement involving an incoming event object and a target object.
EventSetDescriptor	An EventSetDescriptor describes a group of events that a given Java bean fires.
Expression	An Expression object represents a primitive expression in which a single method is applied to a target and a set of arguments to return a result - as



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	in "a.getFoo()".
FeatureDescriptor	The FeatureDescriptor class is the common baseclass for PropertyDescriptor, EventSetDescriptor, and MethodDescriptor, etc.
IndexedPropertyChangeEvent	An "IndexedPropertyChange" event gets delivered whenever a component that conforms to the JavaBeans specification (a "bean") changes a bound indexed property.
IndexedPropertyDescriptor	An IndexedPropertyDescriptor describes a property that acts like an array and has an indexed read and/or indexed write method to access specific elements of the array.
Introspector	The Introspector class provides a standard way for tools to learn about the properties, events, and methods supported by a target Java Bean.
MethodDescriptor	A MethodDescriptor describes a particular method that a Java Bean supports for external access from other components.
ParameterDescriptor	The ParameterDescriptor class allows bean implementors to provide additional information on each of their parameters, beyond the low level type information provided by the java.lang.reflect.Method class.
PersistenceDelegate	The PersistenceDelegate class takes the responsibility for expressing the state of an instance of a given class in terms of the methods in the class's public API.
PropertyChangeEvent	A "PropertyChange" event gets delivered whenever a bean changes a "bound" or "constrained" property.
PropertyChangeListenerProxy	A class which extends the EventListenerProxy specifically for adding a named PropertyChangeListener.



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PropertyChangeSupport	This is a utility class that can be used by beans that support bound properties.
PropertyDescriptor	A PropertyDescriptor describes one property that a Java Bean exports via a pair of accessor methods.
PropertyEditorManager	The PropertyEditorManager can be used to locate a property editor for any given type name.
PropertyEditorSupport	This is a support class to help build property editors.
SimpleBeanInfo	This is a support class to make it easier for people to provide BeanInfo classes.
Statement	A Statement object represents a primitive statement in which a single method is applied to a target and a set of arguments - as in "a.setFoo(b)".
VetoableChangeListenerProxy	A class which extends the EventListenerProxy specifically for associating a VetoableChangeListener with a "constrained" property.
VetoableChangeSupport	This is a utility class that can be used by beans that support constrained properties.
XMLDecoder	The XMLDecoder class is used to read XML documents created using the XMLEncoder and is used just like the ObjectInputStream.
XMLEncoder	The XMLEncoder class is a complementary alternative to the ObjectOutputStream and can be used to generate a textual representation of a JavaBean in the same way that the ObjectOutputStream can be used to create binary representation of Serializable objects.
Exception Summary	
IntrospectionException	Thrown when an exception happens during Introspection.
PropertyVetoException	A PropertyVetoException is thrown when a proposed change to a property represents an unacceptable value.



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Annotation Types Summary

ConstructorProperties	An annotation on a constructor that shows how the parameters of that constructor correspond to the constructed object's getter methods.
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1 Word Question Answer

Sr.No.	Question	Answer
1.	Any public method that is not part of a property definition is a _____ method.	Bean
2.	A _____ class provides a complete custom GUI for customizing a target Java Bean.	customizer
3.	A "PropertyChange" event gets fired whenever a bean changes a _____ property.	Bound
4.	The _____ class provides a standard way for tools to learn about the properties, events, and methods supported by a target Java Bean.	Introspector

(12) Package java.beans Description

Contains classes related to developing *beans* -- components based on the JavaBeans™ architecture.

A few of the classes are used by beans while they run in an application. For example, the event classes are used by beans that fire property and vetoable change events (see `PropertyChangeEvent`). However, most of the classes in this package are meant to be used by a bean editor (that is, a development environment for customizing and putting together beans to create an application).

In particular, these classes help the bean editor create a user interface that the user can use to customize the bean. For example, a bean may contain a property of a special type that a bean editor may not know how to handle. By using the `PropertyEditor` interface, a bean developer can provide an editor for this special type.



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To minimize the resources used by a bean, the classes used by bean editors are loaded only when the bean is being edited. They are not needed while the bean is running in an application and therefore not loaded. This information is kept in what's called a bean-info (see BeanInfo).

Unless explicitly stated, null values or empty Strings are not valid parameters for the methods in this package. You may expect to see exceptions if these parameters are used.