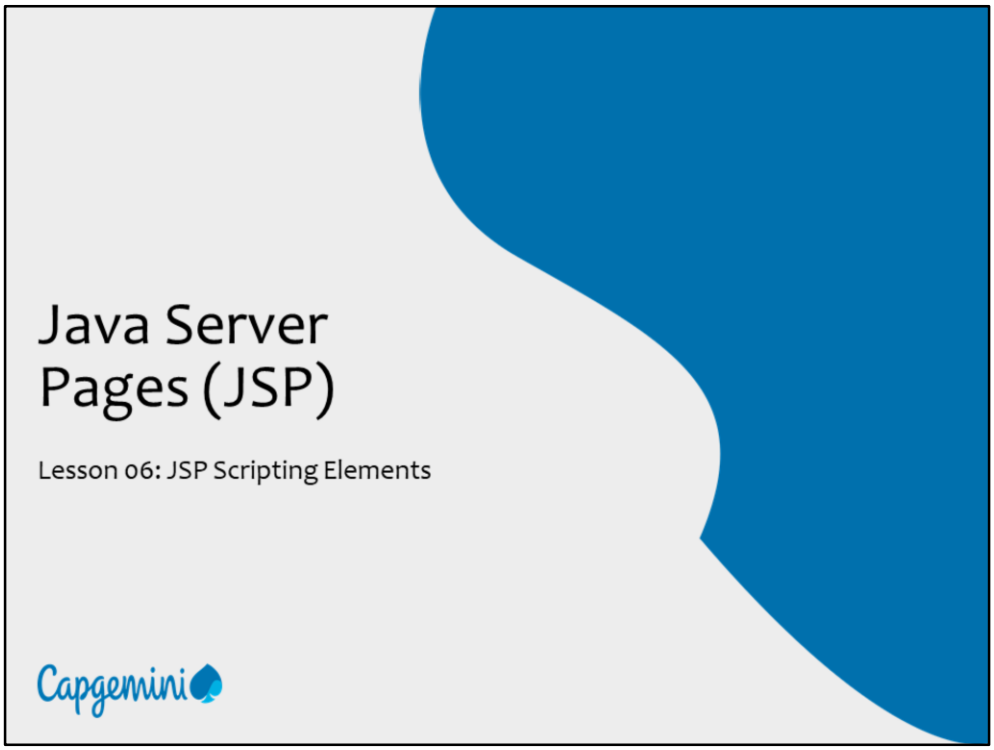
Instructor Notes:

Add instructor notes here.



Instructor Notes:

This lesson explains the various JSP Scripting elements

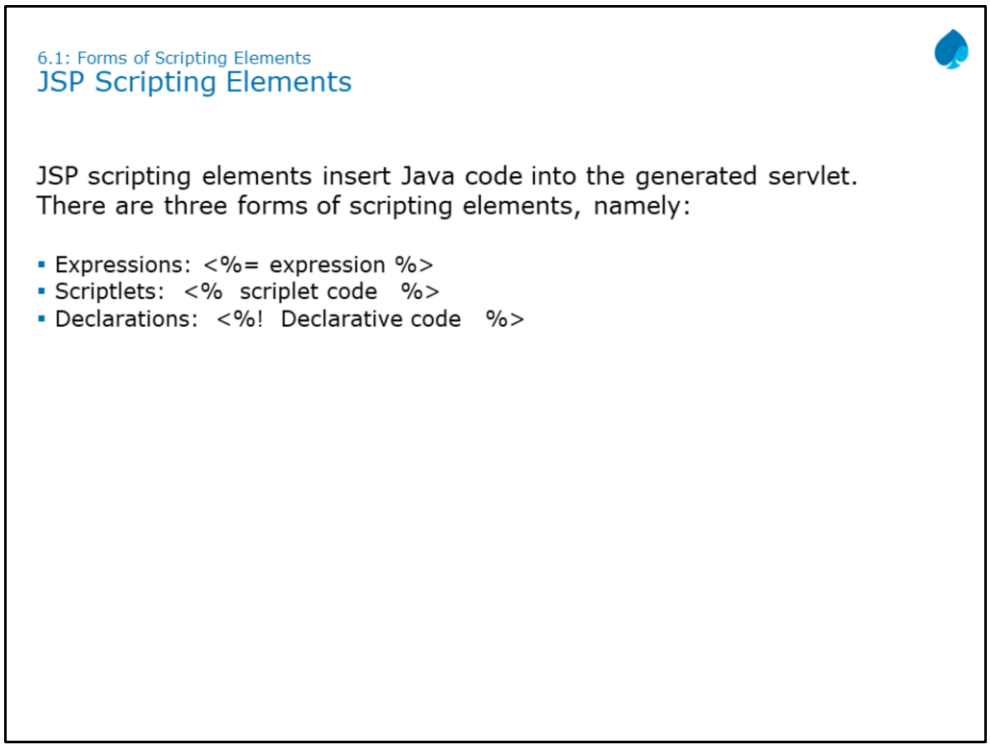
Lesson Objectives

In this lesson, you will learn about:

- Forms of Scripting Elements
  - JSP Expressions
  - JSP Scriptlets
  - JSP Declarations
- Predefined Variables
- Examples using Scripting Elements

Instructor Notes:

Introduce the three forms of scripting elements.



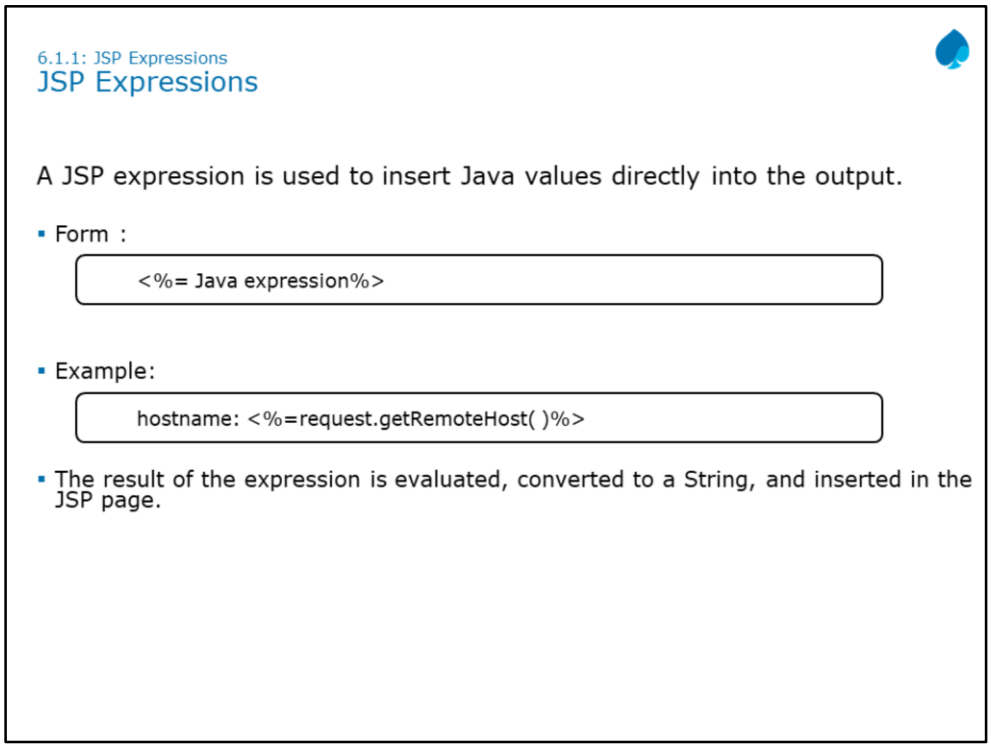
Forms of Scripting Elements:

JSP Scripting Elements:

- With JSP scripting elements Java code into the servlet that will be generated from the current JSP page.
- There are three forms of scripting elements:
  - **Expressions** of the form *<%= expression %>* that are evaluated and inserted into the output.
  - **Scriptlets** of the form *<% code %>* that are inserted into the servlet's service method.
  - **Declarations** of the form *<%! code %>* that are inserted into the body of the servlet class, outside of any existing methods.
- Each of these are described in more detail in the subsequent slides.

Instructor Notes:

Explain the significance of JSP expressions. Do mention that we cannot use a semicolon to end an expression otherwise it will result into exception. The expression is equivalent to a single out.println (…) statement. The results of the expression are displayed as part of the JSP output.



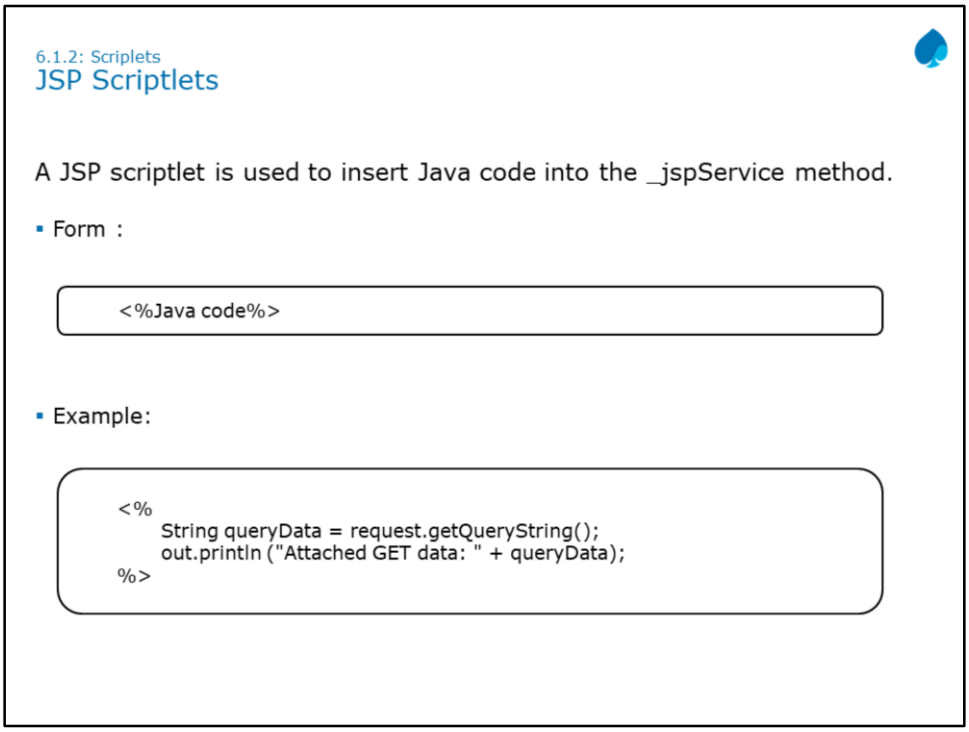
Forms of Scripting Elements:

JSP Expressions:

- The **JSP expression** is evaluated at run-time (when the page is requested), and thus has full access to information about the request. The JSP expression example shown on the above slide will retrieve the remote host information from the pre-defined **request object** and insert it in the **JSP** page. The result is in fact stored in the **out object** and inserted where the **expression** appears in the JSP page.
- To simplify these expressions, there are a number of predefined variables that can be used. These implicit objects are discussed in more detail later, but for the purpose of expressions, the most important ones are as follows:
  - **request:** the HttpServletRequest;
  - **response:** the HttpServletResponse;
  - **session:** the HttpSession associated with the request (if any); and
  - **out:** the PrintWriter (a buffered version of type JspWriter) used to send output to the client.
- When using Java as the scripting language, remember that:
  - A semicolon should not be used to end an expression.
  - The expression tag can contain any expression that is valid according to the Java Language Specification.
  - Expressions are evaluated in left-to-right order as they appear in the tag.

Instructor Notes:

For JSP expression as well as JSP scriptlet the expression results or the Java code is inserted into the **Service** method (_jspService( )) of the translated Servlet.



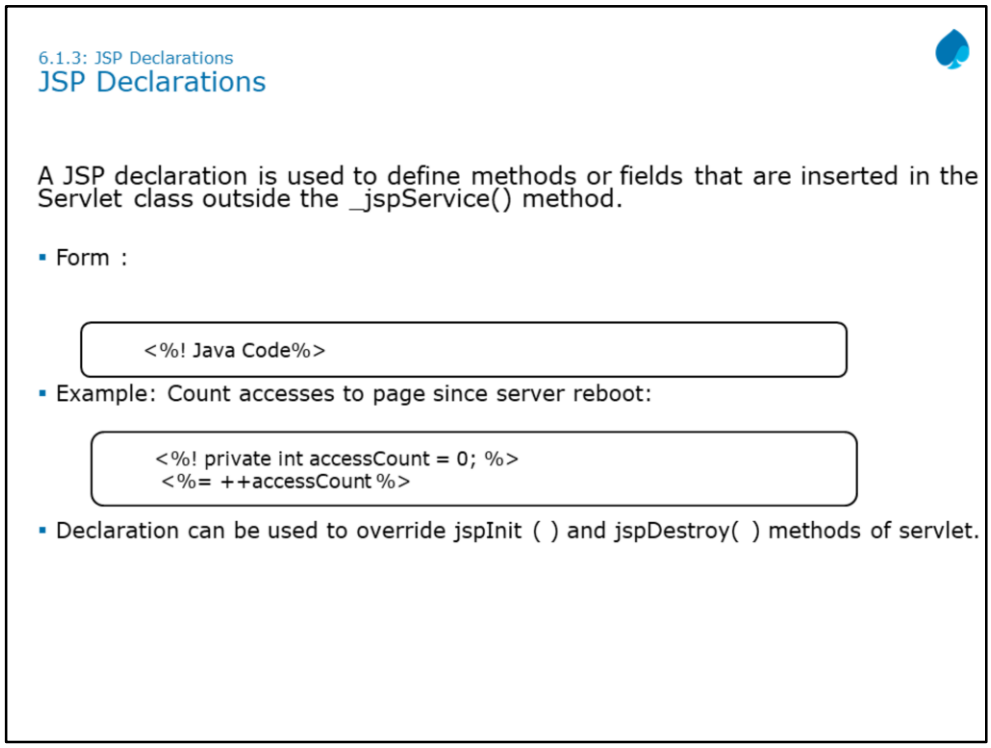
Forms of Scripting Elements:
JSP Scriptlets:
Scriptlets have the following form: <% Java Code %>. Scriptlets are executed when the JSP engine processes the client request. If the scriptlet produces output, then the output is stored in the out object, from which it can be displayed.
Note that code inside a scriptlet gets inserted exactly as written. Any static HTML (template text) before or after a scriptlet gets converted to print statements. This means that scriptlets need not contain complete Java statements, and blocks left open can affect the static HTML situated outside of the scriptlets.
For example:
Consider the following JSP fragment, containing mixed template text and scriptlets:

```
<% if (Math.random() < 0.5) { %>
Have a <B>nice</B> day!
<% } else { %>
Have a <B>lousy</B> day!
<% } %>
```

```
if (Math.random() < 0.5) {
  out.println("Have a <B>nice</B> day!");
} else {
  out.println("Have a <B>lousy</B> day!");
}
```

Instructor Notes:

The Java code in the JSP declaration is put into the translated Servlet class outside the service method. Hence, it can be used to declare instance variables or define methods (private or public) in the generated Servlet class. We can even override the methods inherited from the base class of the Servlet (i.e. jspInit, jspDestroy, etc.)



Forms of Scripting Elements:

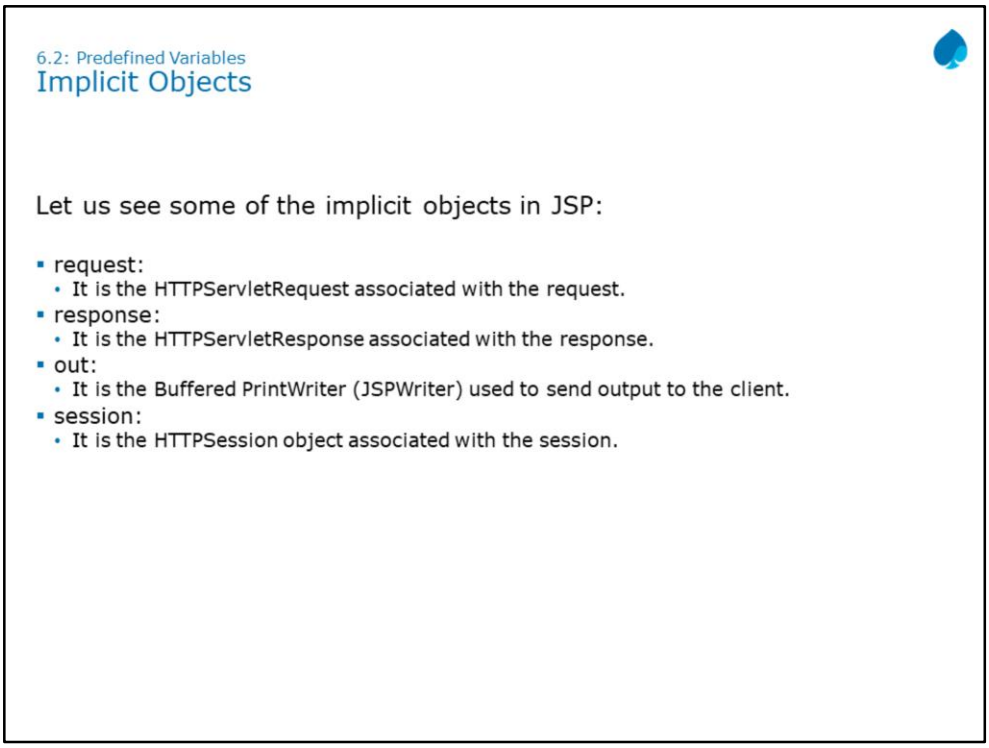
JSP Declarations:

- A JSP *declaration* lets helps to define methods or fields that are inserted in the servlet class (outside of the service method processing the request).
- It has the following form: ***<%! Java Code %>***
- The example, shown on the slide prints out the number of times the current page has been requested since the server booted (or the servlet class was changed and reloaded). The **accessCount** variable is now an instance variable that is defined only once within the lifecycle of JSP. If, however, **accessCount** was part of a scriptlet, then it would have been a local variable whose scope would be the **service()** method!
- The JSP usually runs as multiple "**threads"** of one single instance. Different threads interfere with **variable access**, because it will be the same variable for all of them. If variables has to be used in JSP, it should be used with "**synchronized access"**, but that hurts the performance. In general, any data should go either in the "**session object**" or the "**request object**" if passing data between different JSP pages.
- JSP declarations can be used to override **jspInit( )** and **jspDestroy( )** methods.

```
<%! public void  jspInit() {
      …….      }
    public void jspDestroy(){
    ……..      }                    %>
```

Instructor Notes:

The participants have used these pre-defined variables in Servlet – check whether they recollect the usage of each of these variables. In Servlet they had to get these objects and use them whereas in JSP they are available as Implicit objects. Do explain the difference between the PrintWriter out object available in Servlet & JSP.



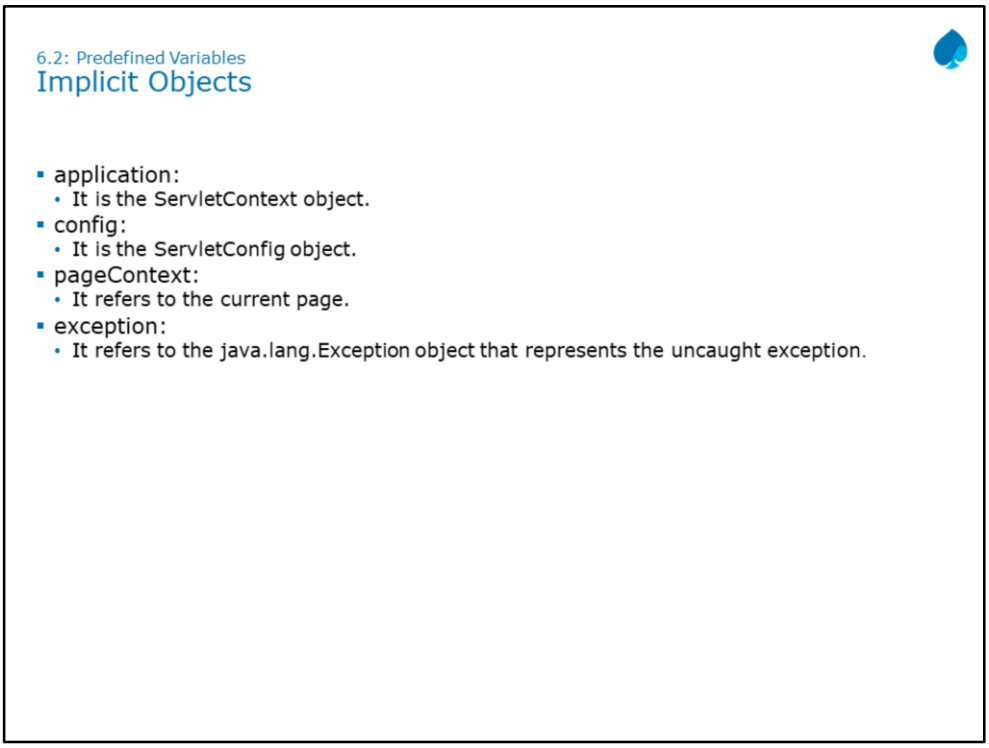
Predefined Variables:

To simplify code in **JSP expressions** and **scriptlets**, JSPs are supplied with eight automatically defined variables, sometimes are called **implicit objects**. The available variables are as follows:

- **request:** This is the **HttpServletRequest** associated with the request, and lets to look at the request parameters (via getParameter), the request type (GET, POST, HEAD, and so on), and the incoming HTTP headers (cookies, Referrer, and so on).
- **response:** This is the **HttpServletResponse** associated with the response to the client. Note that, since the output stream is buffered, it is legal to set HTTP status codes and response headers, even though this is not permitted in regular Servlets once any output has been sent to the client.
- **out:** This is the **PrintWriter** used to send output to the client. However, in order to make the response object useful, this is a buffered version of PrintWriter called **JspWriter**. Note that we can adjust the buffer size, or even turn buffering off, through use of the buffer attribute of the page directive. In scriptlets, need to refer to out explicitly in case we need to display anything.
- **session:** This is the **HttpSession object** associated with the session. As sessions are created automatically, this variable is bound even if there is no incoming session reference. The one exception is that if the session attribute of the page directive is used to turn sessions off. In this case, attempts to reference the session variable cause errors at the time the JSP page is translated into a servlet.

Instructor Notes:

The pageContext, page (listed in notes page) & exception object were not there in Servlets so explain the significance of these implicit objects in JSP.



Predefined Variables:

- **Application:** This is the **ServletContext** as obtained via the **getServletConfig().getContext()**.
- **config:** This is the **ServletConfig** object for this page.
- **pageContext:** JSP introduced a new class called **PageContext** to encapsulate use of server-specific features like higher performance JspWriters. The advantage is that these can be accessed through this class rather than directly, code will still run on “regular” servlet/JSP engines.
- **page:** This is simply a synonym for **this**, and is not very useful in Java. It was created as a placeholder for the time when the scripting language could be something other than Java.
- **exception:** This implicit object applies only to JSP error pages – these are pages to which processing is forwarded when an exception is thrown from another JSP page. They must have the page directive **isErrorPage** attribute set to **true**. The implicit exception object is a **java.lang.Exception** instance that represents the uncaught exception that was thrown from another JSP page and that resulted in the current error page being invoked. The exception object is accessible only from the JSP error page instance to which processing was forwarded when the exception was encountered.

Instructor Notes:

Demonstrate the examples for all the three forms of Scripting elements (i.e. Expressions, Scriptlet & Declarations).

Demo: JSP Scripting Elements

JSP Expressions
- remotehost.jsp
- predefined.jsp

JSP Scriplets
- scriptlet.jsp
- conditional.jsp

JSP Declarations
- declaration1.jsp
- declaration2.jsp
- declaration3.jsp
- fact.jsp

Deploy web application **Lesson3-JSPScriptlets** and show demo by executing each of the above JSP pages.

Instructor Notes:

Lab on all the three forms of Scripting elements.

Lab: JSP Scripting Elements

Lab 3.1

Instructor Notes:

Summary

In this lesson, you have learnt the following concepts:

- JSP Expressions
- JSP Scriptlets
- JSP Declarations
- Predefined Variables

Instructor Notes:

Answers for the Review Questions:

Answer 1: JSP Scriptlet

Answer 2: False

Answer 3: JSP Declaration

Review – Questions

Question 1: ___ inserts java code into _jspService( ) method.

Question 2: A JSP expression can end with a semicolon (:) . True/False

Question 3: ___ can be used to override jspInit( ) method.

Instructor Notes:

Answers for the Review Questions:

Answer 4:
JSPWriter

Answer 5:
application

Review – Questions

Question 4: ___ is a buffered PrintWriter used in JSP to send output to client.

Question 5: ___ implicit object is used to share data across users of the same web application.