Java Server Pages (JSP)

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Java Server Pages (JSP)

JavaServer Pages (JSP) technology provides a simplified, fast way to create dynamic web content. JSP technology enables rapid development of web-based applications that are server- and platform-independent.

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Introduction

- JSP technology is used to create web application just like Servlet technology.
- It can be thought of as an extension to Servlet because it provides more functionality than servlet such as expression language, JSTL, etc.
- A JSP page consists of HTML tags and JSP tags.

Cont…

- The JSP pages are easier to maintain than Servlet because we can separate designing and development.
- It provides some additional features such as Expression Language, Custom Tags, etc.

Cont…

- Java Server Pages (JSP) is a technology which is used to develop web pages by inserting Java code into the HTML pages by making special JSP tags.
- The JSP tags which allow java code to be included into it are <% ----java code----%>.
- It can consist of either HTML or XML (combination of both is also possible) with JSP actions and commands.

Cont...

- It can be used as HTML page, which can be used in forms and registration pages with the dynamic content into it.
- Dynamic content includes some fields like dropdown, checkboxes, etc. whose value will be fetched from the database.

Cont…

- This can also be used to access JavaBeans objects.
- We can share information across pages using request and response objects.
- JSP can be used for separation of the view layer with the business logic in the web application.

Advantages of JSP (vs. Servlet)

- There are many advantages of JSP over the Servlet, such as-

➢ Extension to Servlet

➢ Easy to maintain

➢ Fast Development: No need to recompile and redeploy

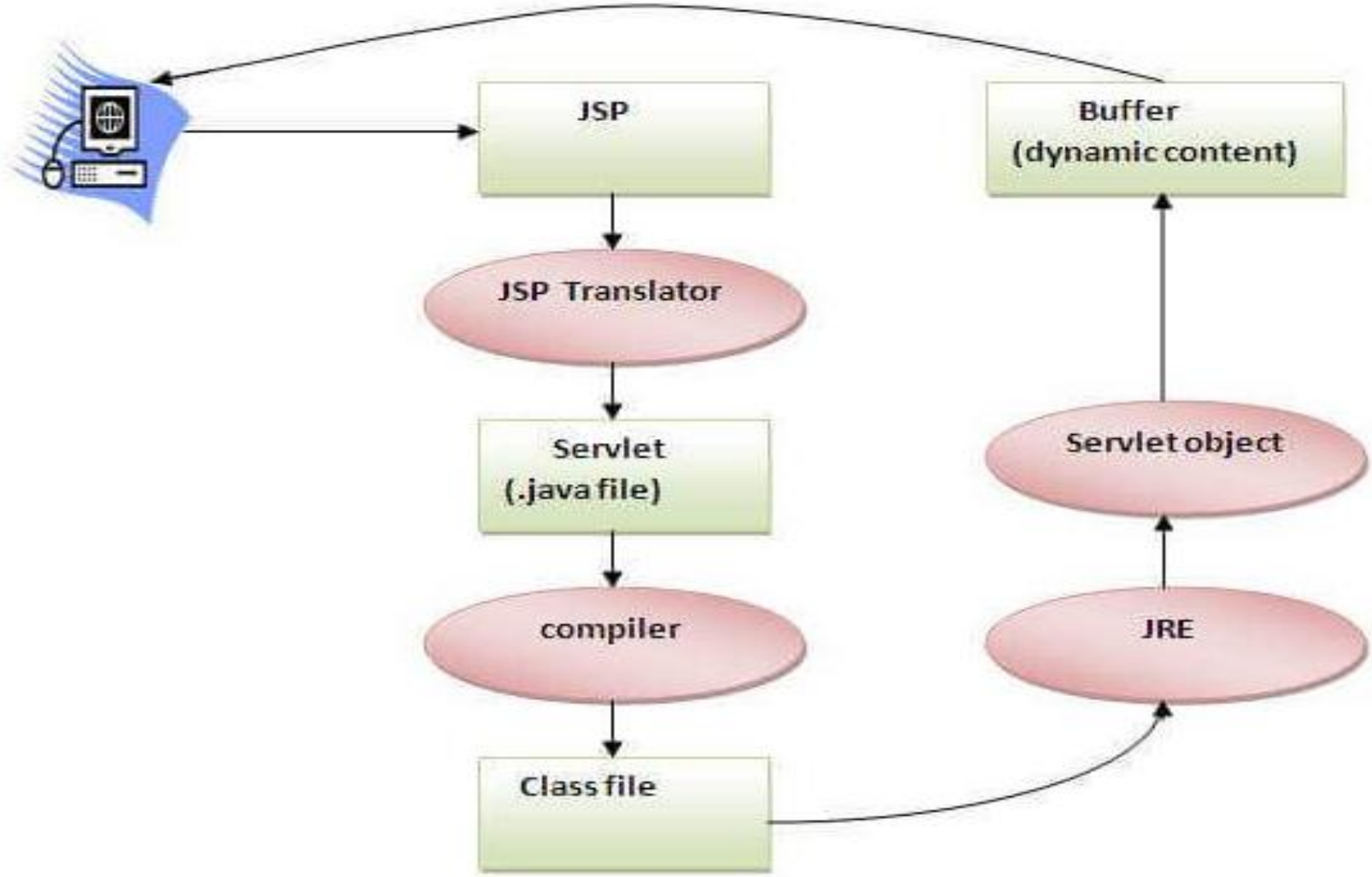
➢ Less code than Servlet

Lifecycle of a JSP Page

- The JSP pages follow these phases-

✓ Translation of JSP Page
✓ Compilation of JSP Page
✓ Classloading (the classloader loads class file)
✓ Instantiation (Object of the Generated Servlet is created).
✓ Initialization (the container invokes jspInit() method).
✓ Request processing (the container invokes _jspService() method).
✓ Destroy (the container invokes jspDestroy() method).

Cont…


JSP
Buffer
(dynamic content)
JSP Translator
Servlet
(.java file)
Servlet object
compiler
JRE
Class file

Example

```
<html>
<body>
<% out.print(3*9); %>
</body>
</html>
```

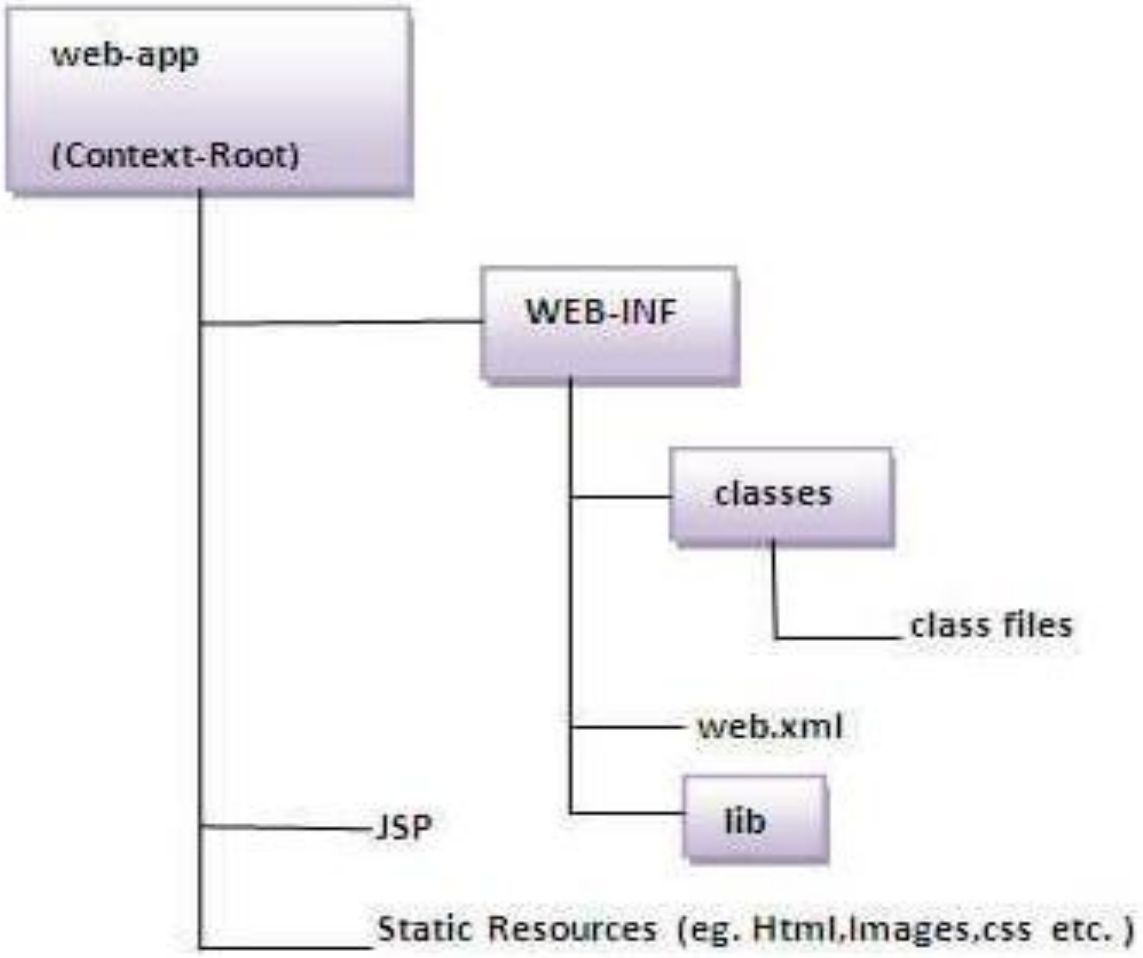
To run a simple JSP Page

Follow the following steps to execute this JSP page:

- Start the server
- Put the JSP file in a folder and deploy on the server
- Visit the browser by the URL http://localhost:portno/contextRoot/jspfile, for example, http://localhost:8888/myapplication/index.jsp

Note: There is no need of directory structure if you don't have class files or TLD files.

Directory structure of JSP



JSP Scripting Elements

- JSP provides the following scripting elements:

- JSP Comment <%-- comments -->
- JSP Expression <%= Java Expression %>
- JSP Scriptlet <% Java Statement(s) %>
- JSP Directive <%@ page|include ... %>

JSP Scriptlet tag (Scripting elements)

- In JSP, java code can be written inside the jsp page using the scriptlet tag.
- The scripting elements provides the ability to insert java code inside the jsp.
- There are three types of scripting elements:

1. scriptlet tag
2. expression tag
3. declaration tag

Example of JSP scriptlet tag

```
<html>
<body>
<% out.print("welcome to jsp"); %>
</body>
</html>
```

Example (JSP expression tag)

```
<html>
<body>
<% out.print("welcome to jsp"); %>
</body>
</html>
```

JSP Declaration Tag

- The JSP declaration tag is used to declare fields and methods.

Syntax The syntax of the declaration tag is as follows:

<%! field or method declaration %>

Difference between JSP Scriptlet tag and Declaration tag

Jsp Scriptlet Tag	Jsp Declaration Tag
The jsp scriptlet tag can only declare variables not methods.	The jsp declaration tag can declare variables as well as methods.
The declaration of scriptlet tag is placed inside the _jspService() method.	The declaration of jsp declaration tag is placed outside the _jspService() method.

JSP Standard Tag Library (JSTL)

- The JSP Standard Tag Library (JSTL) is a collection of tag libraries that implement general-purpose functionality common to many Web applications.

Note: We will install Java and Jboss server on our machine as they are pre-requisites to run a JSP.

Apache Tomcat Server

- JSPs are Internally Compiled into Java Servlets.
- JSPs, like servlets, are server-side programs run inside a HTTP server.
- To support JSP/servlet, a Java-capable HTTP server is required.
- http://tomcat.apache.org, is an open-source software foundation.

Request implicit object

- The JSP request is an implicit object of type HttpServletRequest i.e. created for each jsp request by the web container.
- It can be used to get request information such as parameter, header information, remote address, server name, server port, content type, character encoding etc.
- It can also be used to set, get and remove attributes from the jsp request scope.

Example

```
<form action="welcome.jsp">
<input type="text" name="uname">
<input type="submit" value="go"><br/>
</form>
```

Response implicit object

- In JSP, response is an implicit object of type HttpServletResponse.
- The instance of HttpServletResponse is created by the web container for each jsp request.
- It can be used to add or manipulate response such as redirect response to another resource, send error etc.

Cont…

```
<form action="welcome.jsp">
<input type="text" name="uname">
<input type="submit" value="go"><br/>
</form>
```

Client-side scripting and server-side scripting

Client-side Environment-

- The client-side environment used to run scripts is usually a browser.
- The processing takes place on the end users computer.
- The source code is transferred from the web server to the users computer over the internet and run directly in the browser.

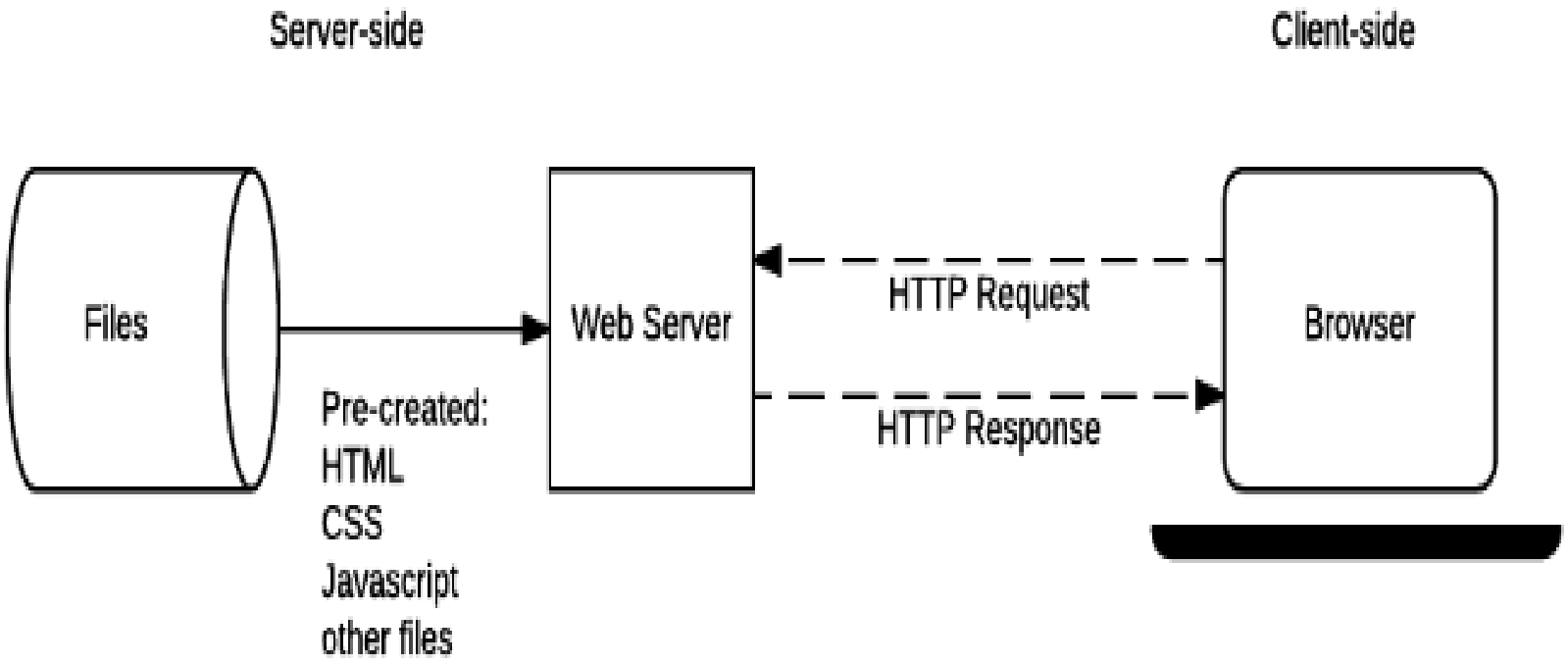
Server-side Environment

- A server is a computer system that serves as a central repository of data and programs and is shared by clients.
- The server-side environment that runs a scripting language is a web server.
- A user's request is fulfilled by running a script directly on the web server to generate dynamic HTML pages.
- This HTML is then sent to the client browser.

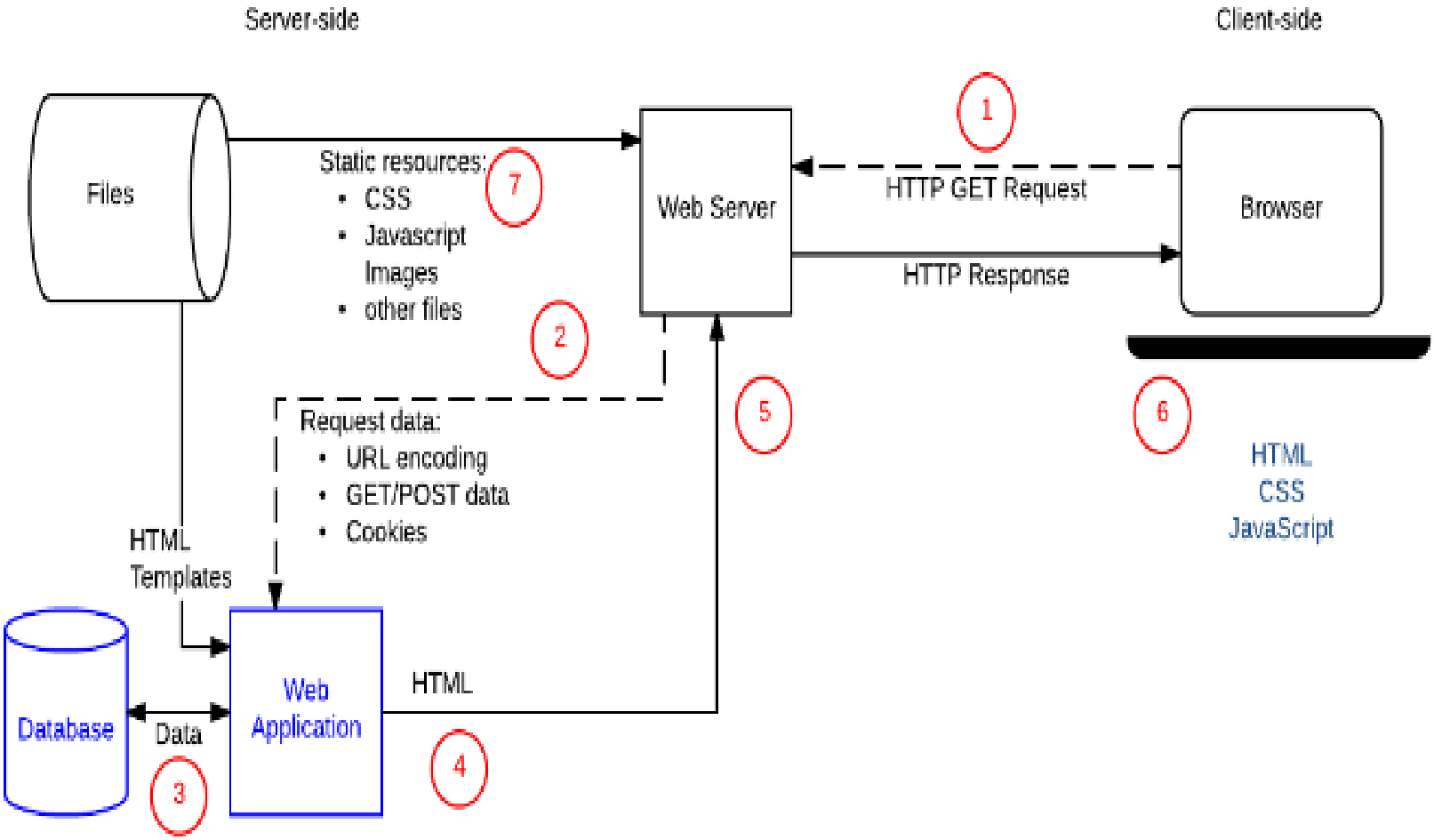
Cont…

- It is usually used to provide interactive web sites that interface to databases or other data stores on the server.
- This is different from client-side scripting where scripts are run by the viewing web browser, usually in JavaScript.
- The primary advantage to server-side scripting is the ability to highly customize the response based on the user's requirements, access rights, or queries into data stores.

Static sites



Dynamic sites



Server-side and client-side programming

- Let's see the code involved in server-side and client-side programming. In each case, the code is significantly different:

- They have different purposes and concerns.
- They generally don't use the same programming languages (the exception being JavaScript, which can be used on the server- and client-side).
- They run inside different operating system environments.

Client-side programming

- Much like the server-side, Client-side programming is the name for all of the programs which are run on the Client.

Uses:

1. Make interactive webpages.
2. Make stuff happen dynamically on the web page.
3. Interact with temporary storage, and local storage (Cookies, localStorage).
4. Send requests to the server, and retrieve data from it.
5. Provide a remote service for client-side applications, such as software registration, content delivery, or remote multi-player gaming.

Cont...

Example languages:

1. JavaScript (primarily)
2. HTML*
3. CSS*
4. Any language running on a client device that interacts with a remote service is a client-side language.

❖ HTML and CSS aren't really "programming languages" per-se. They are markup syntax by which the Client renders the page for the User.

Server-side Programming

- Server-side programming, is the general name for the kinds of programs which are run on the Server.

Uses:

1. Process user input.
2. Display pages.
3. Structure web applications.
4. Interact with permanent storage (SQL, files).

Cont…

Example Languages:

1. PHP
2. Python
3. ASP.Net in C#, C++, or Visual Basic.
4. Nearly any language (C++, C#, Java). These were not designed specifically for the task, but are now often used for application-level web services.

What can you do on the server-side

- Efficient storage and delivery of information
- Customised user experience
- Controlled access to content
- Store session/state information
- Notifications and communication
- Data analysis

Apache Tomcat

- The Apache Tomcat® software is an open source implementation of the Java Servlet, JavaServer Pages, Java Expression Language and Java WebSocket technologies.
- The Java Servlet, JavaServer Pages, Java Expression Language and Java WebSocket specifications are developed under the Java Community Process.

Cont…

- The Apache Tomcat software is developed in an open and participatory environment and released under the Apache License version 2.
- Apache Tomcat software powers numerous large-scale, mission-critical web applications across a diverse range of industries and organizations.

Important Point

- Read about the support for annotations by Java web tier technologies and how they can simplify access to resources, environment data, and life-cycle control.
- Download the final release of the JavaServer Pages Specification, version 2.1. This version of JavaServer Pages technology is part of the Java EE platform.
- JSP Technology 2.1 In this first article in the Web Tier to Go with Java EE 5 series, we discuss the major contributions of JavaServer Pages technology version 2.1 to the Java EE platform.

Reference

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- https://developer.mozilla.org/en-US/docs/Learn/Server-side/First_steps/Introduction
- https://computersciencewiki.org/index.php/Client-side_scripting_and_server-side_scripting

Thank You!

Questions?