Introduction to Web Technologies

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Introduction to Web Technologies:

Working of Internet

Although the physical network connections, the hardware communication devices and the software communication protocols are required for communication across the Internet, the application software provides useful functionalities.

In a network application, two application programs participate in any communication: one application initiates communication and the other accepts it. This is known as the Client-Server interaction. This is the methodology used for internet communication.

1.1.1 Client-Server

Client and Server are two applications involved in communication. These components work together over a network. It involves the client requesting serve from the server. The Server provides the requested service.

The typical features of the Client are:

- It is front-end of an application.
- It manages user-interface portion.
- It validates data entered by the user.
- It dispatches requests to server program.

The typical features of the Server are:

- Performs a back-end task.
- Receives requests from clients.
- Executes database retrievals and updates.
- Manages data integrity.
- Dispatches response to clients.

Web Browsers

A Web browser is a software program that is used to access the World Wide Web(WWW). It allows users to view Web pages and navigate between them.

Examples of Web Browsers are: Mozilla, Microsoft Internet Explorer, Opera, Chrome, Netscape etc.

Web Browsers are known as Universal Clients because they act as the common Client for all Web-based applications. They are the Web Clients that request services from a Web Server, Which is located some where on the Internet or Intranet.

Server Program & Server System

Genrally, the term `Server' refers to a program that waits for a request and provides service. However, a Computer that runs many such Server programs is also known as a Server.

Computers that have fast CPUs, large memories and powerful operating systems are also called Server Machines(or Server Systems or Server Computers).

–A Server is the program that provides Service to a client".

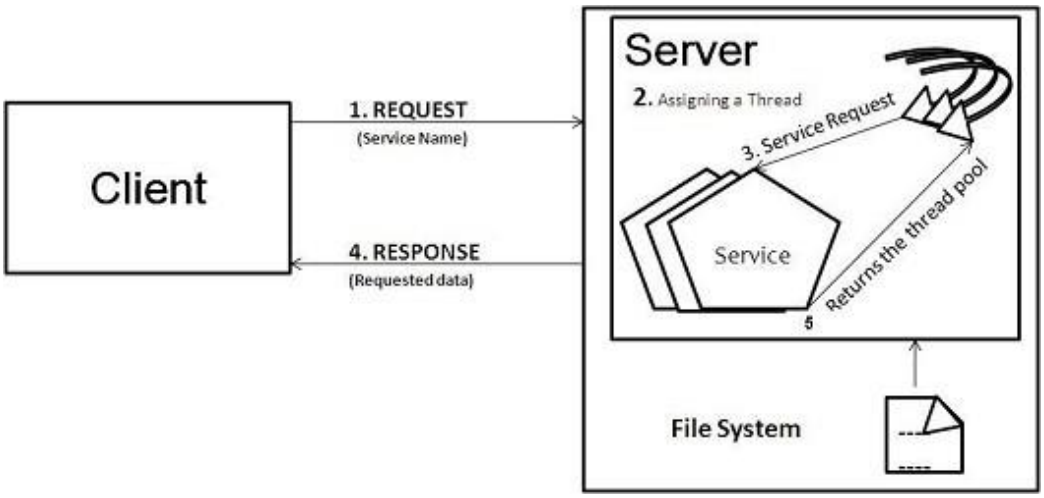
Working of Server

A server offers one or more Services to clients. By default, it does not do any processing until a client sends in a request. It waits for a client to make a request. This is known as `listening mode of the server.

A typical client server interaction happens as follows:

1. The client sends a request for a server.
2. On receiving a request, the service assigns one of the threads in the pool to process the task and continues to wait for further request.

3. The thread executes the code for the requested service.
4. After execution, it sends the response back to the client.
5. It then returns to the thread pool.



World Wide Web(WWW)

The World Wide Web(WWW) is an information sharing model that allows accessing information over the medium of the Internet. It is the collection of electronic documents that are linked together. These electronic documents are known as `Web Pages'. A collection of related WebPages is known as a `Web Site.

A Web Site is resides on Server computers that are located in around the world. Information on the WWW is always accessible, from anywhere in the world.

The basic architecture is characterized by a Web Browser that displays information content and Web Server that transfer's information to the client. This architecture depends on three key standards for creating, publishing and finding Web documents on the Web:

HTML: Hyper Text Markup Language for creating and editing document content.

URL: Uniform Resource Locator for locating resource on the Internet.

HTTP: Hyper Text Transfer Protocol to transfer the data.

HTML: Hyper Text Markup Language

HTML is the authoring language used to create documents on the WWW. HTML makes documents readable across variety of computing plotforms.

URL: Uniform Resource Locator

URL is the unique address that identifies each web page or a resource on the Internet. It indicates where the web pages are stored on the Internet. URL is the standard way of addressing resources on the Internet that are part of WWW.

It supplies the Internet Address of a resource on the WWW, alone with protocol by which the resource is accessed. URLs are used by Web Browsers to connect to a specific server and to get a specific document or page on the Web.

The URL looks like

Protocol://ServerDomainName/Path

Examples

http://www.google.com

Protocol **Resource**

http://192.168.10.1/download

HTML Tag's

Tag	Description
<html> ... </html>	Declares the Web page to be written in HTML
<head> ... </head>	Delimits the page's head
<title> ... </title>	Defines the title (not displayed on the page)
<body> ... </body>	Delimits the page's body
<h *n*> ... </h*n*>	Delimits a level *n* heading
...	Set ... in boldface
...	Set ... in italics
...	Center ... on the page horizontally
...	Brackets an unordered (bulleted) list
...	Brackets a numbered list
...	Brackets an item in an ordered or numbered list
 	Forces a line break here
<p>	Starts a paragraph
<hr>	Inserts a horizontal rule
<img src="...">	Displays an image here
 ... 	Defines a hyperlink

HTTP Response Headers : An HTTP response header is a component of a network that is sent by a web browser or claint machinein response to an HTTP resourse. It is used in Web communications to deliver webpage and other Web-based data from the server to the requesting end-user browsers .The Response must contain header line describing the following.

- MIME-type of the data being sent in response.
- Date and Time stamp.
- Content size etc.

The HTTP Response message body contains the required data.

Web designing

Web design encompasses many different skills and disciplines in the production and maintenance of websites. The different areas of web design include web graphic design; user interface design (UI design); authoring, including standardised code and proprietary software; user experience design (UX design); and search engine optimization.

Common myths of web development:

- Why do I still need to pay if there are free website services? ...
- Once a site is built, it's finished. ...
- Commercial websites are expensive. ...
- Rich content leads to a good search experience. ...
- Content is not as important as design in web development. ...
- Responsive web design is optional.

Web Servers:

A Web Server is a server program running on a computer whose purpose is to serve Web Pages to other computer when required. Every computer on the Internet that contains a Web site will have a Web Server program.

Examples of Web Servers:

1. Apache Web Server
2. Microsoft Internet Information Server (IIS)
3. XAMPP (Bundle server)
4. WAMP (Bundle server)

DATABASE CONNECTIVITY: JDBC perspectives

JDBC stands for **J**ava **D**ata**b**ase **C**onnectivity, which is a standard Java API for database-independent connectivity between the Java programming language and a wide range of databases. The JDBC library includes APIs for each of the tasks mentioned below that are commonly associated with database usage.

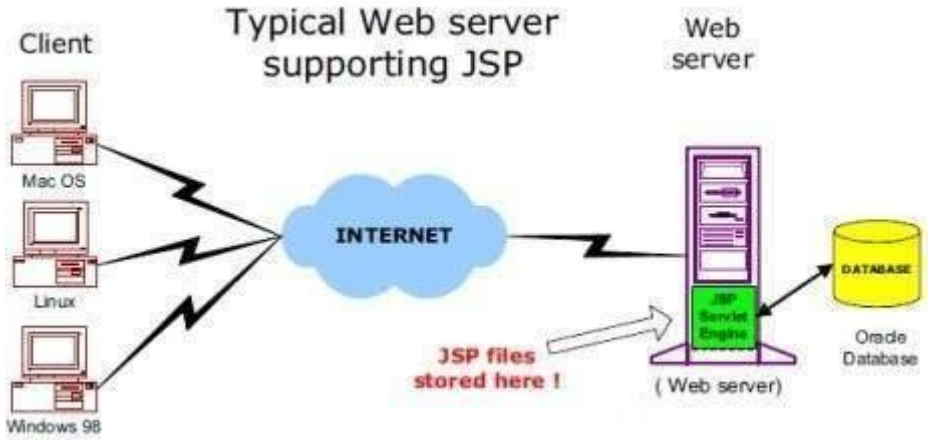
- Making a connection to a database.
- Creating SQL or MySQL statements.
- Executing SQL or MySQL queries in the database.
- Viewing & Modifying the resulting records.

Fundamentally, JDBC is a specification that provides a complete set of interfaces that allows for portable access to an underlying database. Java can be used to write different types of executables, such as −

- Java Applications
- Java Applets
- Java Servlets
- Java ServerPages (JSPs)

JSP: Understanding Java Server Pages

Java Server Pages (JSP) is a server-side programming technology that enables the creation of dynamic, platform-independent method for building Web-based applications. JSP have access to the entire family of Java APIs, including the JDBC API to access enterprise databases.



Forms are an important aid to making the Web interactive. With JavaServer Pages, handling forms is easy--they do most of the work required to get to the information submitted with a form.

A Simple HTML Form

Main.jsp

```
<html>
  <head>
    <title>Using GET Method to Read Form Data</title>
  </head>
    <body>
    <h1>Using GET Method to Read Form Data</h1>
    <ul>
      <li><p><b>First Name:</b>
        <%= request.getParameter("first_name")%>
      </p></li>
      <li><p><b>Last  Name:</b>
        <%= request.getParameter("last_name")%>
      </p></li>
    </ul>
    </body>
</html>
```

Server Side Programming

It is a technique used in Web design which involves embedded scripts in an HTML source code which results in a Client's request to the Server website being handled by a script/program running Server-Side before the Server responds to the client request.

Advantages of Server Side Programs:

- All programs reside in one machine called the Server. Any number of Clients can access the server programs.
- New functionalities to existing programs can be added at the server side.
- Migrating to new versions, architectures, design patterns, switching to new databases can be done at the Server side without having to bother about Clients.
- Issues relating to enter price applications like resource management, concurrency, session management, security and performance are managed by Server side applications.
- They are portable and possess the capability to generate dynamic and user-based content.

Introduction to PHP

PHP stands for PHP: ***Hypertext Preprocessor***, which gives you a good idea of its corepurpose: to process information and produce hypertext (HTML) as a result.

- PHP is a *server - side scripting language* , which means that PHP scripts, or programs,usually run on a Web server.
- PHP is an *interpreted language* a PHP script is processed by the PHP engine each timeit ' s run.

PHP Operaters type

An *operator* is a symbol that tells the compiler to perform specific mathematical or logical mipulations. PHP language supports following type of operators.

* Arthematic operator
* Comparision operator
* Logical (or rational) operator
* Assignment operators
* Conditional (or terminary) operators.

Condiotional/selectuion statements:

Conditional / Selection statements are used to perform different actions based on differentconditions. In PHP we have the following conditional statements:

- **if statement** - executes some code only if a specified condition is true
- **if...else statement** - executes some code if a condition is true and another code if the condition is false
- **if...elseif....else statement** - specifies a new condition to test, if the first condition is false
- **switch statement** - selects one of many blocks of code to be executed.

GET V/S POST

	GET	POST
1	Parameters remain in browser history because they are part of the URL.	Parameters are not saved in browser history.
2	Can be bookmarked.	Can not be bookmarked.
3	GET requests are re-executed but may not be re-submitted to server if the HTML is stored in the browser cache.	The browser usually alerts the user that data will need to be re-submitted.
4	Easier to hack for script kiddies	More difficult to hack
5	Only ASCII characters allowed.	No restrictions. Binary data is also allowed.
6	GET is less secure compared to POST because data sent is part of the URL. So it's saved in browser history and server logs in plaintext.	POST is a little safer than GET because the parameters are not stored in browser history or in web server logs.
7	Restrictions on form data length	No restrictions on form length.
8	GET method should not be used when sending passwords or other sensitive information.	POST method used when sending passwords or other sensitive information.

XML :

Extensible Markup Language (XML) is used to describe data. The XML standard is a flexible way to create information formats and electronically share structured data via the public Internet, as well as via corporate networks.

- XML was designed to **describe data**.
- XML tags are not predefined in XML. You must **define your own tags**.
- XML is **self describing**.
- XML uses a DTD (**Document Type Definition**) to formally describe the data.

Java web services Basics

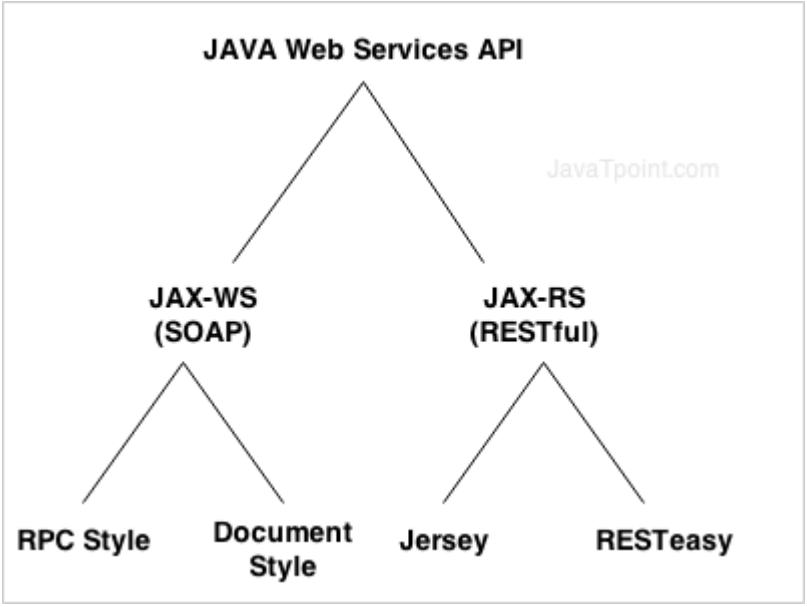
Java web service application perform communication through WSDL (Web Services Description Language). There are two ways to write java web service application code: SOAP and RESTful.

Java Web Services API

There are two main API's defined by Java for developing web service applications since JavaEE 6.

1) **JAX-WS**: for SOAP web services. The are two ways to write JAX-WS application code: by RPC style and Document style.

2) **JAX-RS**: for RESTful web services. There are mainly 2 implementation currently in use for creating JAX-RS application: Jersey and RESTeasy.



Creating a Web Application Project and Adding a Web Service Class in Netbeans

When you create a web service in Netbeans, you focus on the web service‘s logic and let the IDE handle the web service‘s infrastructure. To create a web service in Netbeans, you first create a **Web Application** project. Netbeans uses this project type for web services that are invoked by other applications.

- ***Creating a** Web Application **Project in Netbeans***

To create a web application, perform the following steps:

1. Select File > New Project to open the New Project dialog.

2. Select Web from the dialog‘s Categories list, then select Web Application from the Projectslist. Click Next >.

3. Specify the name of your project (HugeInteger) in the Project Name field and specify where you‘d like to store the project in the Project Location field. You can click theBrowse button to select the location.

1 Select Sun Java System Application Server 9 from the Server drop-down list.

2 Select Java EE 5 from the J2EE Version drop-down list.

6. Click Finish to dismiss the New Project dialog.

This creates a web application that will run in a web browser.

- ***Adding a Web Service Class to a** Web Application **Project***

Perform the following steps to add a web service class to the project:

1.In the Projects tab in Netbeans, right click the HugeInteger project‘s node and se-lectNew > Web Service… to open the New Web Service dialog.

2. Specify HugeInteger in the Web Service Name field.

3. Specify com.deitel.iw3htp4.ch28.hugeinteger in the Package field.
4. Click Finish to dismiss the New Web Service dialog.

SOAP

SOAP (Simple Object Access Protocol) is a platform-independent protocol that uses XML to facilitate remote procedure calls, typically over HTTP. SOAP is one common protocol for passing information between web service clients and web services. The protocol that transmits request-and-response messages is also known as the web service‘s **wire format** or **wire protocol**, because it defines how information is sent ―along the wire.‖

Each request and response is packaged in a **SOAP message** (also known as a **SOAPenvelope**)—an XML ―wrapper‖ containing the information that a web service requires to process the message. SOAP messages are written in XML so that they are platform inde-pendent. Many**firewalls**—security barriers that restrict communication among net-works—are configured to allow HTTP traffic to pass through so that clients can browse websites on web servers behind firewalls. Thus, XML and HTTP enable computers on dif-ferent platforms to send and receive SOAP messages with few limitations.

The wire format used to transmit requests and responses must support all data types passed between the applications. Web services also use SOAP for the many data types it supports. SOAP supports primitive types (e.g., int) and their wrapper types (e.g., Integer), as well asDate, Time and others. SOAP can also transmit arrays and objects of user-defined types

When a program invokes a web method, the request and all relevant information are packaged in a SOAP message and sent to the server on which the web service resides. The web service processes the SOAP message‘s contents (contained in a SOAP envelope), which specify the method that the client wishes to invoke and the method‘s arguments. This process of interpreting a SOAP message‘s contents is known as **parsing a SOAP mes-sage**. After the webservice receives and parses a request, the proper method is called with any specified arguments, and the response is sent back to the client in another SOAP mes-sage. The client-side proxy parses the response, which contains the result of the method call, and returns the result to the client application.

SOAP Request

```
<?xml version="1.0" encoding="UTF-8"?>
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/" xmlns:>
    <soapenv:Body>
        <ns1:add>
            <first>99999999999999999</first>
            <second>1</second>
        </ns1:add>
    </soapenv:Body>
</soapenv:Envelope>
```

SOAP Response

```
<?xml version="1.0" encoding="UTF-8"?>
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/" xmlns:>
    <soapenv:Body>
        <ns1:addResponse>
            <return>100000000000000000</return>
        </ns1:addResponse>
    </soapenv:Body>
</soapenv:Envelope>
```

Fig : SOAP messawge for the hugeinteger web server