GROW TECH SKILLS

Web Technology Fundamentals

Module Number: 02

Module Name: The World Wide Web

AIM:

To get familiarize with the world wide web using Hyper text transfer protocol

Objectives:

- Hyper Text Transfer Protocols
- Methods of Upload using HTTP
- Web versions
- Browser Interface through Internet

Outcome:

- What is World Wide Web
- What are Server Clients
- HTTP Types and Methods

- Web Server Components

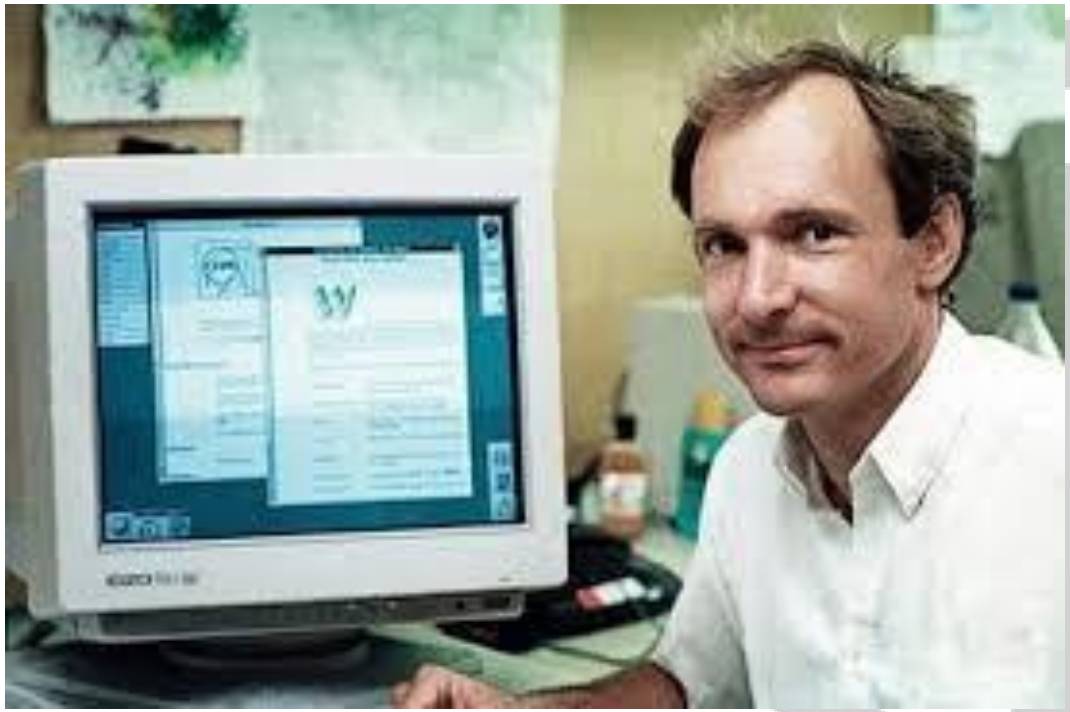
Contents

1. World Wide Web
2. Hyper Text Transfer Protocol
3. Web Technologies and Web Services

World Wide Web

Is the Internet same as the World Wide Web?

WHY?



Tim Berners Lee

The web
was born at **CERN**
in Geneva in 1990,
to allow its researchers who were
geographically dispersed to share
documents using a hypertext system.

Father of World Wide Web The web is not the same as the internet, it is a service provided by the internet.

The World Wide Web is a system of interlinked hypertext documents accessed via the internet.

History of the Web

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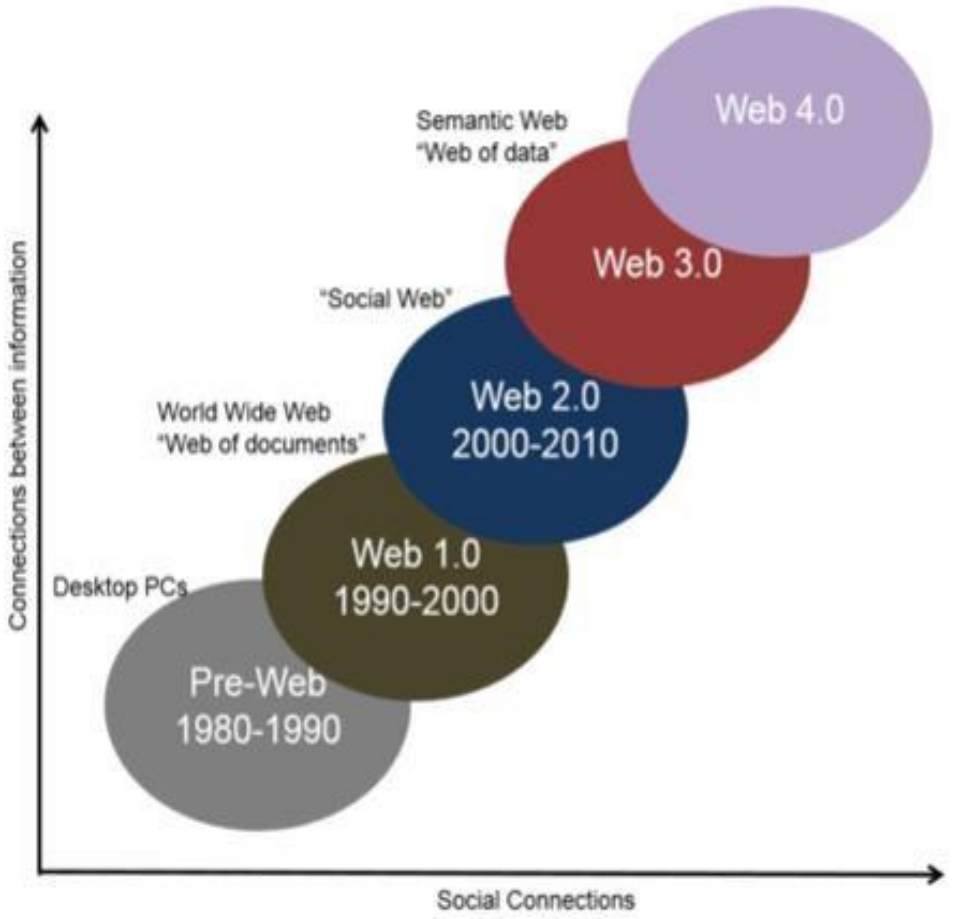

Diagram: World Wide Web Timeline

Web 1.0


Microsoft Internet Central
File Edit View Favorites Help
Address: http://www.msn.com
New to the Internet?
Click here
msn. Membership
Explore
the
Internet
Searches, Links and Tools
Windows95 Launch Event
Microsoft
Products & Information
Help Site Map Site Search Feedback ©Internet Explorer

Diagram: Internet Explorer web page from 1995

Web 2.0

YouTube

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Web 3.0

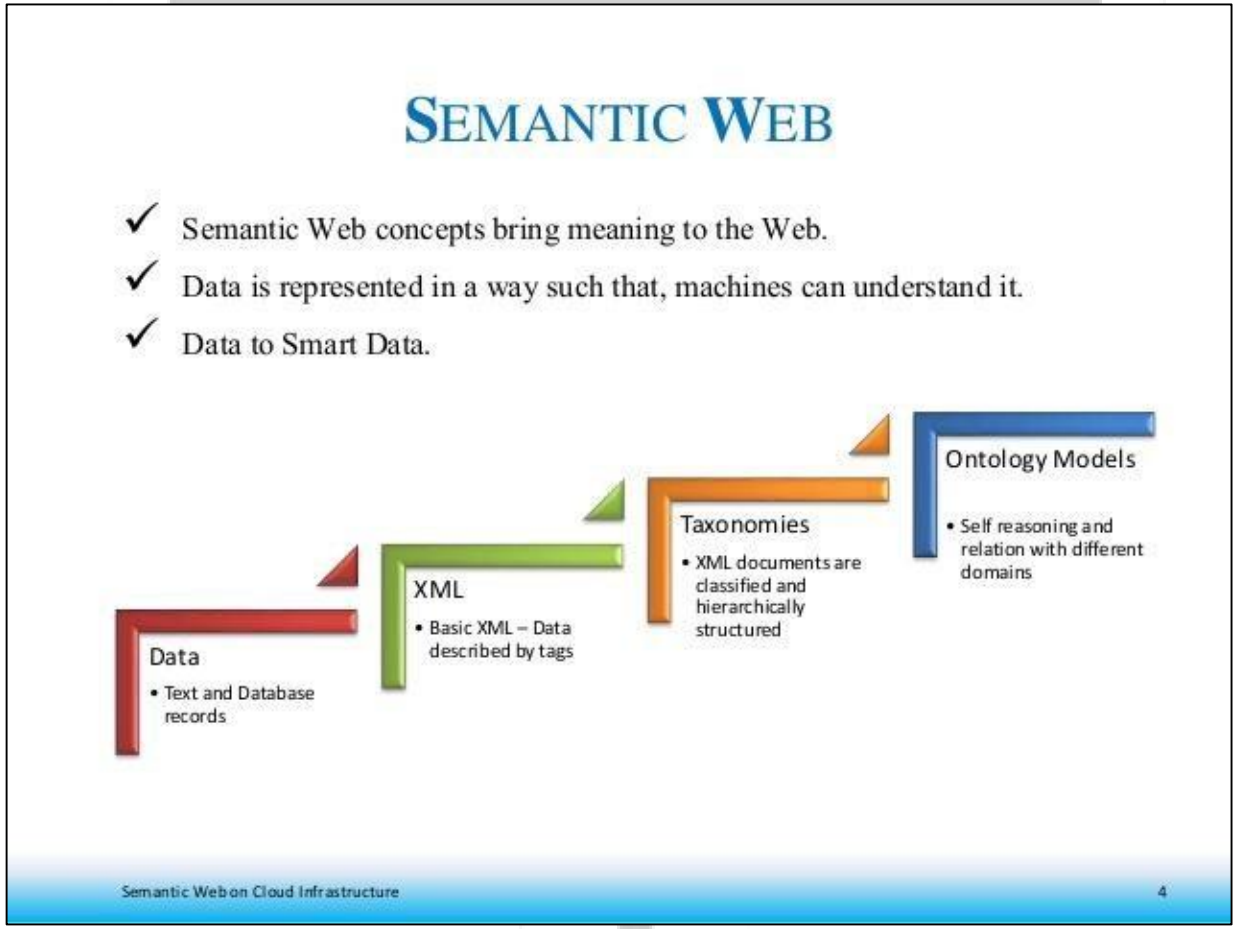
SEMANTIC WEB
✓ Semantic Web concepts bring meaning to the Web.
✓ Data is represented in a way such that, machines can understand it.
✓ Data to Smart Data.
Data
• Text and Database records
XML
• Basic XML – Data described by tags
Taxonomies
• XML documents are classified and hierarchically structured
Ontology Models
• Self reasoning and relation with different domains
Semantic Web on Cloud Infrastructure
4

Diagram: The Semantic Web

Web 1.0 / 2.0 / 3.0 summary

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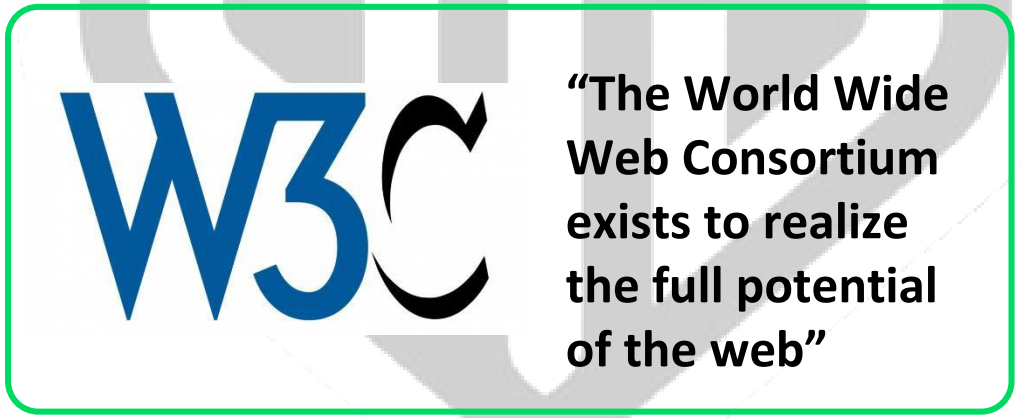
Crawl	Walk	Run
Web 1.0	Web 2.0	Web 3.0
Mostly Read-Only	Wildly Read-Write	Portable & Personal
Company Focus	Community Focus	Individual Focus
Home Pages	Blogs / Wikis	Lifestreams / Waves
Owning Content	Sharing Content	Consolidating Content
Web Forms	Web Applications	Smart Applications
Directories	Tagging	User Behavior
Page Views	Cost Per Click	User Engagement
Banner Advertising	Interactive Advertising	Behavioral Advertising
Britannica Online	Wikipedia	The Semantic Web
HTML / Portals	XML / RSS	RDF / RDFS / OWL

World Wide Web Consortium

In 1994, Tim Berners-Lee with the help of Massachusetts Institute of Technology founded the World Wide Web Consortium (W3C), an international community which is devoted to developing ‘Open web standards’.

The W3C describes itself as,



Unified Resource Identifier (URI)

1. The web servers host web resources.

2. A web resource is a content source, it can be anything from a static file, a live image from a camera or dynamic content resources.

3. Each web server resource has a name to identify the resource uniquely called the ‘Uniform Resource Identifier’ or URI.

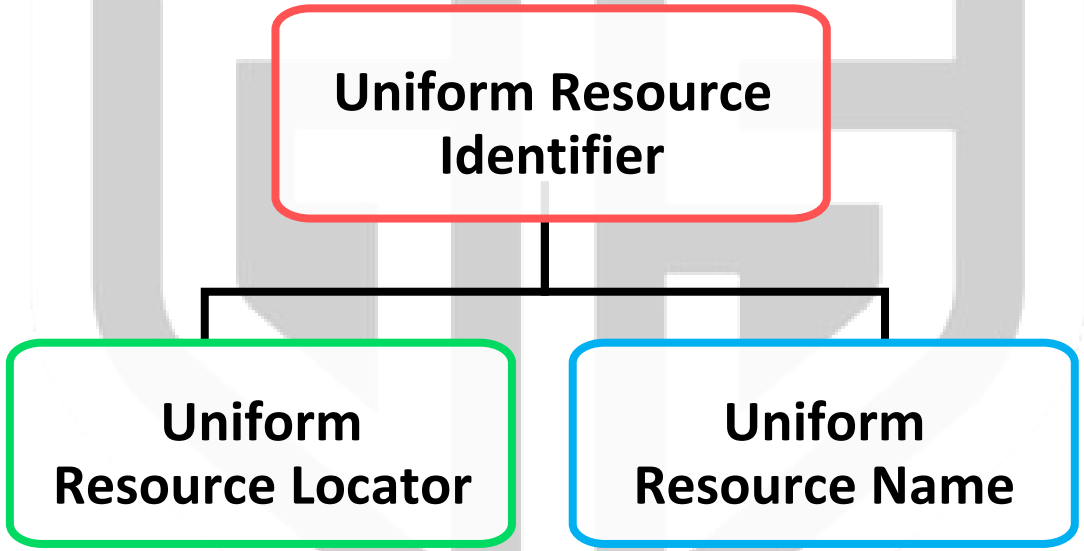
4. For example:

    Below is an example of an image resource URI.

http://www.example.com/specials/polar.gif

The Uniform Resource Identifier has two forms:

- Uniform Resource Locator
- Uniform Resource Name



Unified Resource Locator and Unified Resource Name

Unified Resource Locator (URL)

1. **Uniform Resource** Locator is the most common form of resource identifier.
2. A URL defines the specific location of the resource on a particular server.
3. **Example:** http://www.yahoo.com/images/logo.gif is the URL for the Yahoo! Website's logo.

http:// **Scheme** www.yahoo.com **Address**

/images/logo.gif **Resource location**

Unified Resource Name (URN)

1. **Uniform Resource Name** serves as a unique name to a resource irrespective of the location where it resides.

2. Being location-independent these resources can move freely and can be accessed by multiple network access protocols.

3. Uniform Resource Names are still in experimental stage and not yet widely adopted.

4. For example: The Uniform Resource Name urn:ietf:rfc:2141 can be used to name the internet standards document “RFC 2141”.

Web Server

1. A web server can be both software and hardware.

2. It is a program that responds to the requests made by the client.

3. A computer where the websites are hosted or stored can also be called as a web server.

Web Clients

1. A web client can be both software and hardware.
2. A web client is an application that communicates with a web server, using Hypertext Transfer Protocol (HTTP).
3. A Web client contains two parts: dynamic Web pages and the Web browser.
4. Dynamic Web pages are produced by components that run in the Web tier, and a Web browser delivers

Web pages received from the server.

Web Browser

1. A web browser is an application program used to request, view and traverse the web pages.
2. It can display information in the form of text, images, multimedia and more.
3. We can upload or download files using the browser.

The World Wide Web

This link is an excerpt from a chapter titled “Introduction to World Wide Web” from "Raggett on HTML 4", by Dave Raggett, Jenny Lam, Ian Alexander and Michael Kmiec.
Explains what is WWW, its components and how it is different from the internet.

Explains world wide web and it’s working.

Topic	URL
History of internet	https://www.youtube.com/watch?v=1CsPHKJWiw0

Hyper Text Transfer Protocol

Self Assessment Questions

1. _____ is the father of World Wide Web.

Answer: Tim Berners Lee.

2. WWW is:

a) Same as the internet.

b) A system of interlinked hypertext documents accessed via the internet.

Answer: b)

3. Is it possible to share a file without using the world wide web.

a) Yes

b) No

Answer: a)

4. The World Wide Web Consortium develops _____.

   a) web standards
   b) web sites
   c) web servers
   d) the web architecture

Answer: a)

5. Which of these browsers is a browser for a Linux machine?

   a) Internet Explorer
   b) Opera
   c) Safari

d) Google Chrome

Answer: b)

6. Web 3.0 aims at:

a) Data that can be understood by machines.
b) Dynamic web content.

Answer: a)

7. WWW is: (Select all that apply)

a) A universal system of information capture and delivery.
b) A collection of documents connected by hyperlinks.

c) An application platform

d) A framework of internet

Answer: a), b)

8. Web 2.0 is also called the _____ web.

Answer: Social Web.

9. Communication between the web client and web server happens using:

a) HTTP

b) TCP

Answer: a)

10. A computer where your website is hosted is called the:

    a) Web browser

    b) Web Server

Answer: b)

11. URI stands for _____.

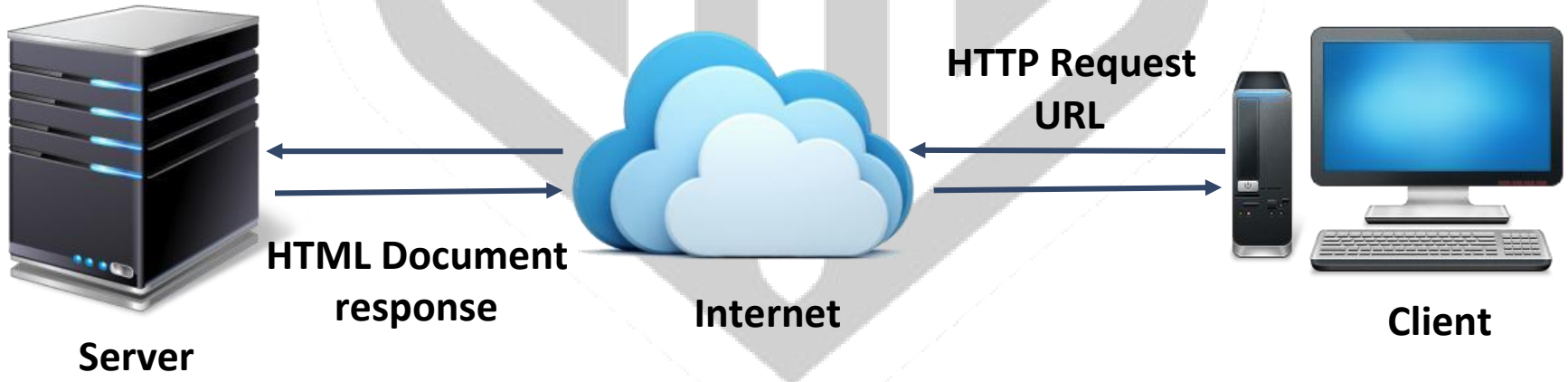
Answer: Uniform Resource Identifier.

12. _____ serves as a unique resource name for a resource on the web.

Answer: Unified Resource Name (URN).

Hyper Text Transfer Protocol

Hyper Text Transfer Protocol or HTTP is the protocol that is used to enable a web browser and a web server to communicate.



HTTP Kitchen Analogy

The Hyper Text Transfer Protocol

1. Suppose I want to access a web page like *www.example.com/myvideos/vid1.*

2. The HTTP protocol uses the URL to identify the server, it makes a connection and sends the request to the server and terminates the connection.

3. The server receives the request and checks if the requested resource is available, if so it re-establishes the connection with the client and sends the response.

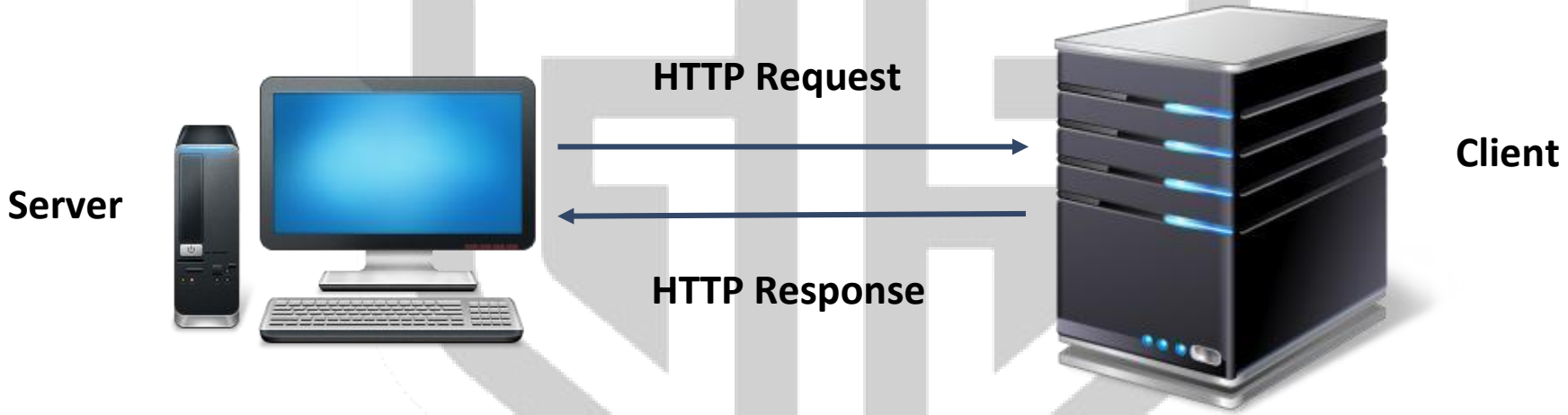
4. The browser can make multiple requests and each request is processed independent of the previous requests.

1. The first thing you need to do is find the restaurant you want to eat from.

2. Once in the restaurant you would send an order to the kitchen for whatever you like to eat.

3. The kitchen checks to see if the ordered item is available, if yes it is delivered to you on your table.
4. You can make multiple orders while in the restaurant and the kitchen while processing a given order does not keep in mind what your previous orders were.

HTTP Client-Server Model

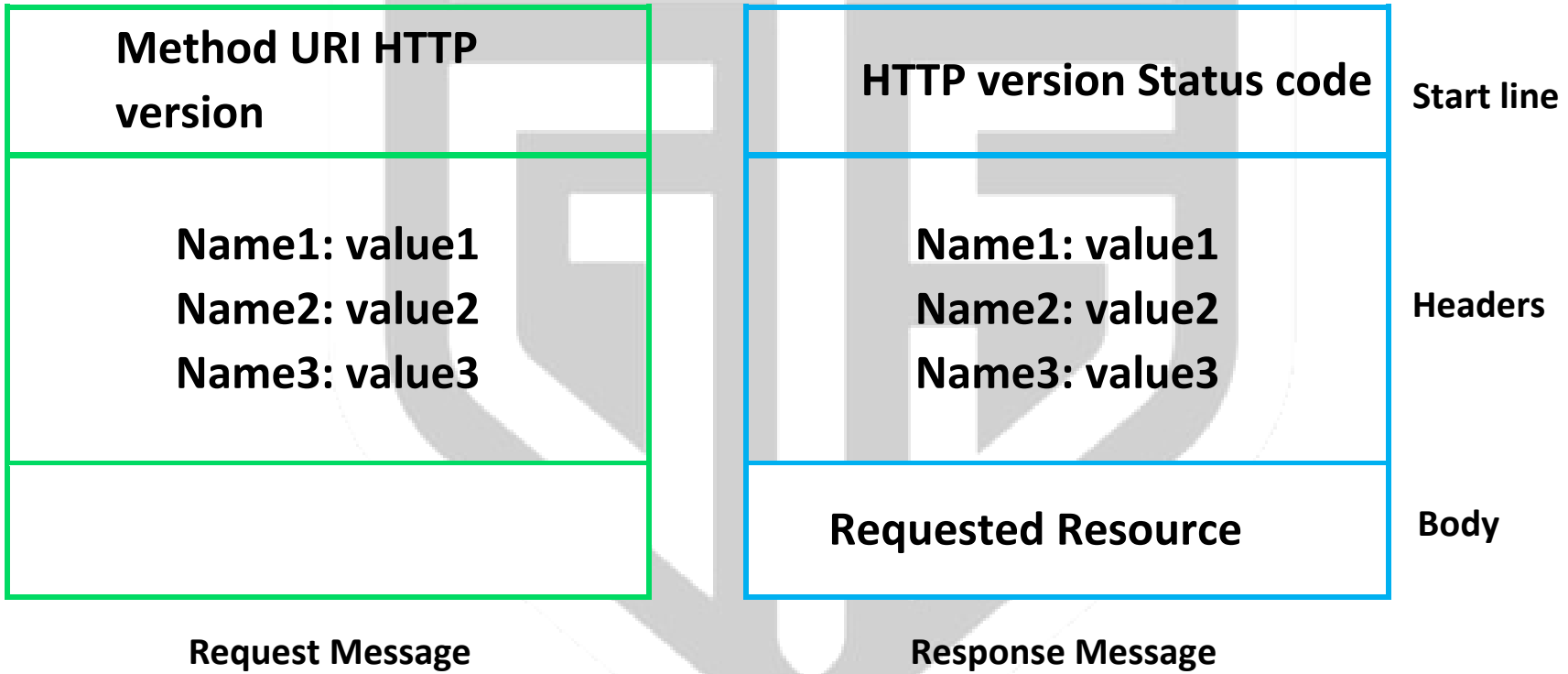


HTTP MIME Types

Document	MIME type

HTML formatted text document	***text/html***
Plain ASCII text document	***text/plain***
JPEG version	***image/jpeg***
GIF format	***image/gif***
Apple quick time movie	***video/quicktime***
Microsoft power point presentation	***application/vnd.ms-powerpoint***

HTTP Transaction



HTTP Message Formats

Using the format let us write request and response messages for our index.html example.

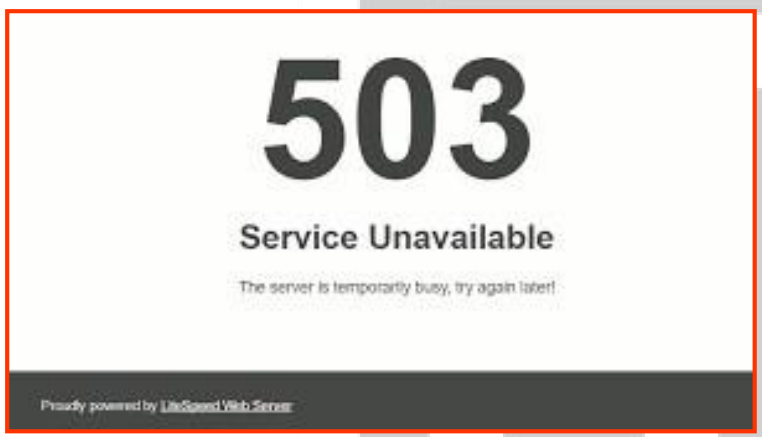
Request Message	Response Message
GET /index.html HTTP 1.0 Host: www.example.com Accept: text/html Accept-language: en-us	HTTP 1.0 200 : OK Host: www.example.com Accept: text/html Accept-language: en-us index.html

Request and Response Messages

HTTP Methods

Method	Description
GET	Used to get a named resource from the server using URI
PUT	Replace all representations of the resource with the new upload
POST	Used to send data to the server like customer information using HTML form
DELETE	Deletes the resource from the server
HEAD	Similar to GET, but transfers the status line and header section of the message
CONNECT	Establishes a connection with the server identified by the URI

The HTTP Status Codes



Hyper Text Transfer Protocol

A tutorial on HTTP and its working.

Explains HTTP and its working along with the request response messages.

Topic	URL
Tutorial on HTTP	https://www.youtube.com/watch?v=JFZMyhRTVt0

Self Assessment Questions

13. HTTP stands for _____.

Answer: Hyper Text Transfer Protocol.

14. The communication between the browser and server happens in a:

    a) Request/response pair

    b) request/message pair

Answer: a)

15. The server responds with _____, when it does not find the web page requested by the browser.

    a) HTTP 404 Not Found error code

b) HTTPs 505 Not Found error code

c) HTTP 407 Not Found error code

d) HTTP 400 error code

Answer: a)

16. Status code 500 stands for:

a) file not found

b) internal server error

c) unauthorized access

d) Stack overflow

Answer: b)

17. Which is an invalid MIME type _____.

    a) text/html

    b) application/javascript

    c) video/x-flv

    d) text/ms-word

Answer: d)

18. HTTP is a :

    a) Connectionless protocol

    b) Connection based but stateless protocol

c) Connectionless and stateless protocol

Answer: c)

19. Default HTTP port is:

a) Port 80

b) Port 81

Answer: a)

20. Processing of all HTTP requests after the first request are dependent on the previous request. a) Yes

b) No

Answer: b)

21. The HTTP response message header contains:

    a) File type

    b) Status code

Answer: b)

22. The HTTP method used to send credit card information is:

    a) GET

    b) PUT

c) POST

Answer: c)

23. Internet allows for automatic updates.

a) Yes

b) No

Answer: a)

Web Applications

Web Application

A **Web application** (**Web** app) is an **application** program that is stored on a remote server and delivered over the Internet through a browser interface.

It can be:

Static Web Application

A collection of related web pages that may contain text, links, audio, images and videos.
It requires only client-side processing.

Dynamic Web Application

- A dynamic web application is interactive.

- They can automatically update different sections based on information from other applications or databases. Users see different inputs based on the input given.
- Dynamic web applications require back-end processing in addition to client-side processing.
- Facebook app is an example of dynamic web application.

Static and Dynamic Web Applications

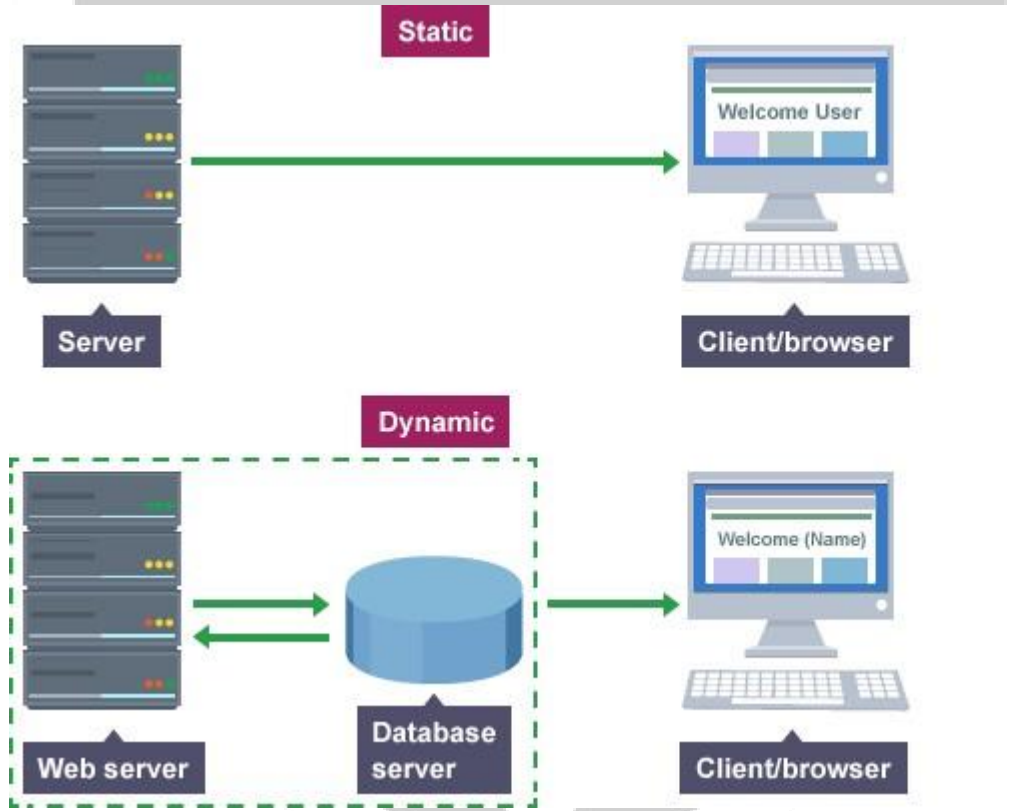


Diagram: Static vs. Dynamic Web Applications

Front-end and Back-end Web Development

The **web development functions** can be categorized into five areas:

1. Preparing page structure.
2. Organizing and managing content hierarchy.
3. Serving content to the user.
4. Capturing user input.
5. Performing back-end processing and integration.

Different web technologies are required to accomplish these functions. Web development can be divided into **two categories:**

1. **Front-end Web Development**

2. Back-end Web Development

Front-end Development is also called the client-side development

1. It is used for developing what the user sees when they open a website or load a web application.
2. It is used to develop the structure and design of websites.

Back-end development - Most of the code that makes a web application work is on the back-end.

1. The back-end code runs on the server therefore, a back-end developer must have a good understanding of the programming languages, database and server architecture.

2. The server-side programming can be divided into four main components:

   - **The Servers**
   - **Databases**

- **Middleware**
- **Programming languages and framework.**

Self Assessment Questions

24. A _____ is an application program that is stored on a remote server and delivered over the Internet through a browser interface.

    a) Web application

    b) Network application

25. Different users are shown different output based on the input given in a: a) Static application

    b) Dynamic application

26. Static web applications require backend processing as well as client side programming. State true or false.
27. Front end web development is used to:
    a) Design the structure and appearance of the website
    b) To store the user data in the database.
28. Middleware is a software that connects the application’s front-end to its back-end. State true or false.

Web Technologies

Web Services

Web Technologies

Web technologies is a general term referring to the many languages and multimedia packages that are used in conjunction with one another, to produce dynamic web sites. Some of the important technologies are:

1. **Hyper Text Markup Language (HTML)** - HTML is the standard **markup language for creating web pages** and web applications.

2. **Cascading Style Sheets (CSS)** - the Cascading Styling Sheets is used to style an HTML document.

3. **JavaScript -** It is a dynamic programming language which when applied to a HTML document can make the websites interactive with the user.

4. **Extensible Markup Language (XML) -** it is an extensible language which can be used to create specific mark-up languages such as chemical mark-up.

5. **ASP.NET -** ASP .NET is a web framework for building dynamic web sites, web applications and web services.

6. **Servlets –** It is a server-side programming language. An efficient and powerful solution for creating dynamic web content.

7. **Java Server Pages (JSP) -** The Java Server Pages is a server-side technology that is used to create dynamic web pages based on HTML, XML or other document types. Java code is inserted into HTML using JSP tag <% ----Java code----%>.

8. **Hypertext Preprocessor (PHP) -** PHP is an open source general purpose scripting language for serverside development. It can be embedded in HTML.

9. **Asynchronous JavaScript And XML (AJAX) -** AJAX is not a programming language in itself. It uses the XMLHttpRequest object to request data from the server and java script and HTML DOM to display or use the data. The most appealing characteristic of the AJAX is that it can communicate with the server, exchange data and update a page without even refreshing the page.

We will learn about HTML, CSS, JavaScript, XML and PHP in the coming chapters.

Web Services analogy

Consider the **aircraft reservation software,**

1. In addition to doing reservations, the software also requires to communicate with e-commerce sites like **PayPal for payments** made online.

2. But we know that the reservation system and the PayPal software are separate systems written in different languages.

3. Communication between the two **heterogeneous** software systems happens through a special kind of web application known as a **web service.**

Airline Reservation Software PayPal Software Service Requester Service Provider

Web Services

- Web service is a service offered by one electronic device to another via the World Wide Web.

The W3C defines a web service as,

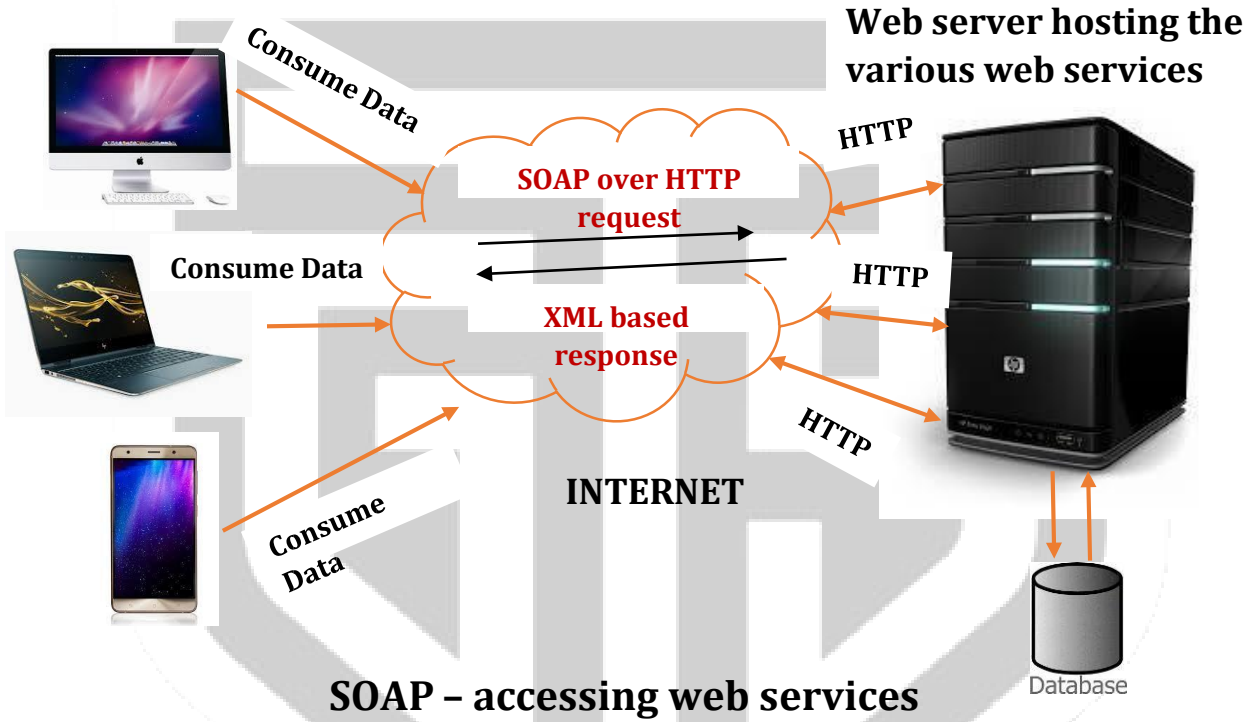
‘A web service is a software system designed to support interoperable machine-to-machine interaction over a network.’

Web Service Components

1. **SOAP –** Simple Object Access Protocol
2. **REST –** Representational State Transfer
3. **WSDL –** Web Services Description Language
4. **UDDI –** Universal Description, Discovery and Integration

SOAP – Simple Object Access Protocol

SOAP is an XML based messaging protocol which allows programs running on different operating systems such as Windows and Linux to communicate using HTTP and XML.

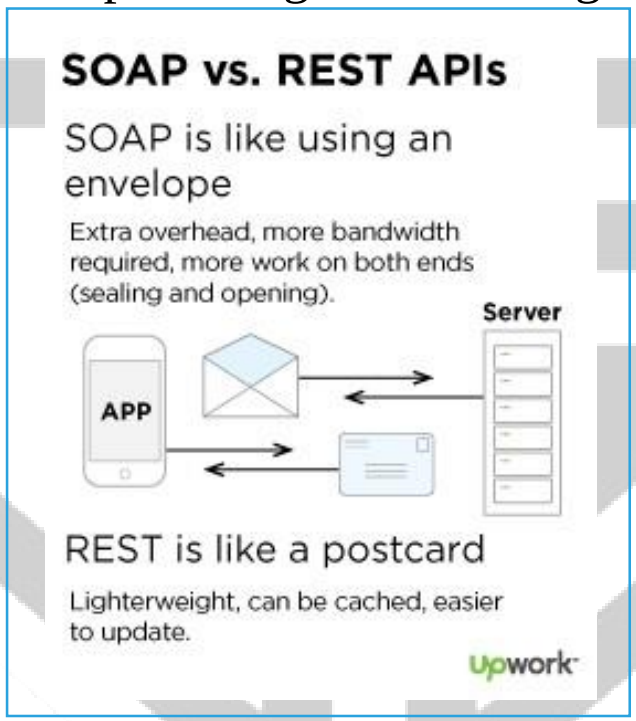


SOAP – accessing web services

REST – Representational State Transfer

1. REST was defined by Roy Fielding in 2000.

2. REST is an architectural style for developing web services. It uses HTTP for accessing resources, but unlike SOAP the web service developed using REST are light weight and use less bandwidth.



3. REST defines a way of accessing resources such as documents, pictures or videos which reside on a different environment.

4. The key elements of RESTful implementation are:

- Resources – the resource itself.
- Request Verbs – to describe what to do with the resource. The verbs include GET, POST, DELETE, PUT.
- Request Header – additional information such as authorization details.
- Request Body – contains Data, usually sent when POST is used.
- Response Body – an XML document with the data.
- Response Status Codes – returned with the response indicating whether there is any error or response has been sent.

REST - Example

Let us assume a RESTful web service is defined at a particular location. The client can use any HTTP verbs to make the request. For Example,

POST – This would be used to create a new employee using the RESTful web service

GET - This would be used to get a list of all employee using the RESTful web service

PUT - This would be used to update all employee using the RESTful web service

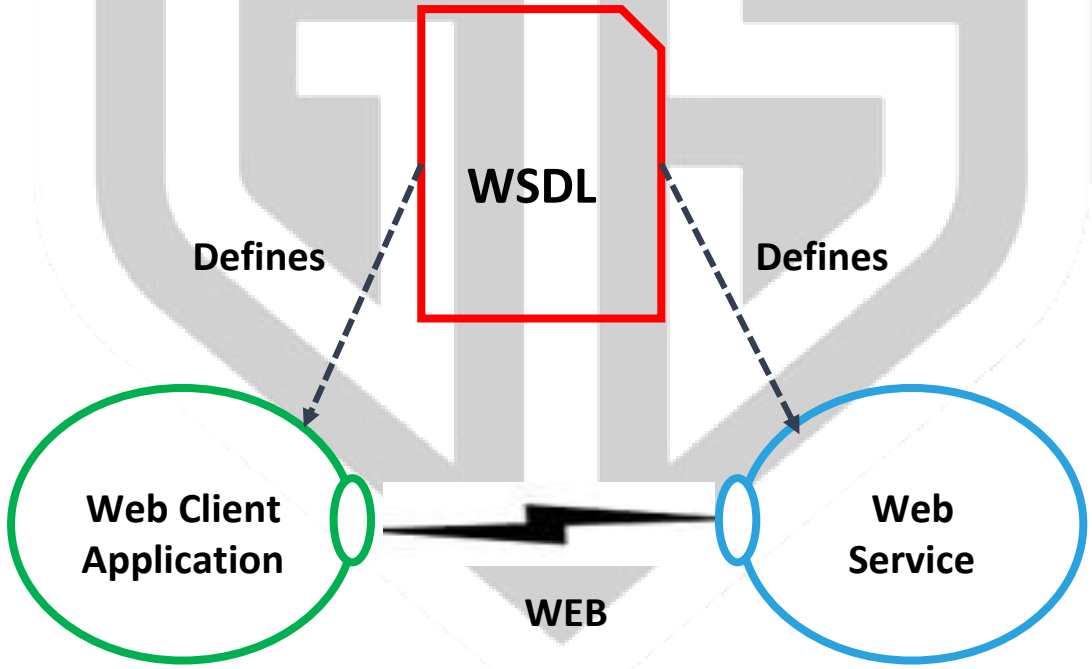
DELETE - This would be used to delete all employee using the RESTful web service

Resource	**Post**	**Get**	**PUT**	**Delete**
/Employee /Employee/1	Create Create a new employee	Read Get all employee details	Update Update relevant employee details	Delete Delete relevant employee details

WSDL – Web Services Description Language

- **A web service cannot be used if it cannot be found.**

- The WSDL is an XML-based file which tells the client what the web service does and where it is located.

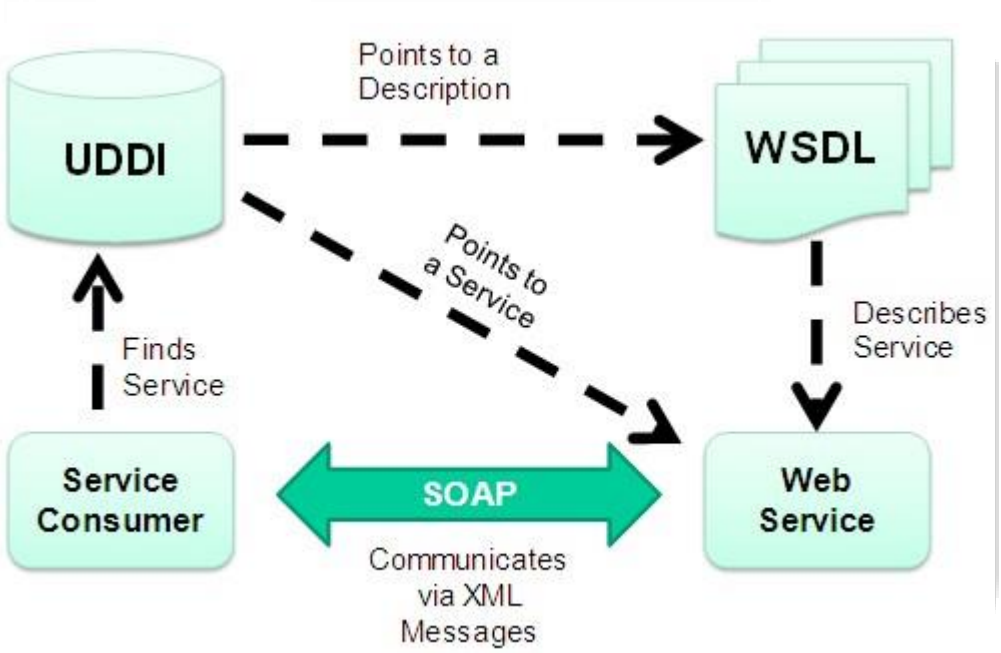


WSDL defines the location and functionality of the web service

UDDI – Universal Description, Discovery and Integration

- UDDI is a **standard for describing, publishing, and discovering the web services** provided by a particular service provider.

- It acts as a repository on which the WSDL files are hosted.



UDDI, SOAP and WSDL

Web Technologies and Web Services

The link describes web services and its components SOAP, WSDL and UDDI.

This link explains the REST web services in detail.

This video is the first in a series of 5 tutorial videos which explain web services, SOAP, WSDL and UDDI in detail. You are required to refer this entire tutorial for a good understanding of web services.

Topic	URL
Web services	https://www.youtube.com/watch?v=1CsPHKJWiw0

Self Assessment Questions

29. _____ is a standard language for creating web pages.

a) HTML

b) CSS

Answer: a)

30. CSS stands for _____.

Answer: Cascading Style Sheet.

31. JavaScript is used to:

a) Add interactivity to a website.

b) Add style to a website. **Answer: a)**

32. ASP .NET is a web framework for building dynamic web sites, web applications and web services. State true or false.

Answer: True.

33. AJAX sands for _____.

Answer: Asynchronous JavaScript and XML.

34. PHP is:

a) A client-side scripting language.

b) An open source scripting language for server side programming.

Answer: b)

35. AJAX is a:

a) Front-end development technology

b) Back-end development technology

c) A group of technologies which enable web page update without reloading

d) A web service

Answer: c)

36. SOAP stands for_____.

Answer: Simple Object Access Protocol.

37. SOAP is an:

    a) Web technology
    b) XML-based messaging protocol
    c) a web service
    d) a web application

Answer: b)

38. Web Services Description Language is an XML file describing what the web service does and where it is located. (True/False)

Answer: True.

39. _____ is an architecture style for developing web services.

a) SOAP

b) REST

Answer: b)

40. UDDI stands for_____.

Answer: Universal Description, Discovery and Integration

41. REST stands for _____.

Answer: Representational State Transfer.

42. UDDI is a:

a) a protocol.

b) an architectural style for developing web services.

c) a repository for WSDL files.

d) a language for developing web services.

Answer: c)

Module /Unit	Keyword/Topic	E-Book Name	Chapter	Page Number	URL	Comments

3	The World Wide Web	Creating a Website: The Missing Manual	Chapter 1	Page No: 7-12	http://pdf.th7.cn/down/files/1312/creating_a_website_the_missing_manual_3rd_edition.pdf	Defines the World wide web, web browser and web server.
4	Hyper Text Transfer Protocol	Web Technologies – A computer Science Perspective by Jeffery C. Jackson	Chapter 1	Page No: 10-20	https://passhojao.com/attachments/7c8727519c30b8baa05ee92432e1d9ecdb8075d7/store/9f2d8d06296185d04b4eb79f6536879639111d3feef8464d55747a803923/Web+Technologies++A+Computer+Science+Perspective+-+J.+Jackson+%28Pearson%2C+2007%29.pdf	Explains the HTTP protocol and HTTP Request/Response message formats in detail.

Assignment

Assignment

Based on the understanding of Subject in Unit I, You need to find solution of below problem statement:

- Prepare a document to show how Hyper Text Transfer Protocol works and illustrate using an example.
- Find the ISP and speed of internet for your educational institution.
- Prepare a list of ipv4 and corresponding ipv6 addresses for all computers in the computer lab.