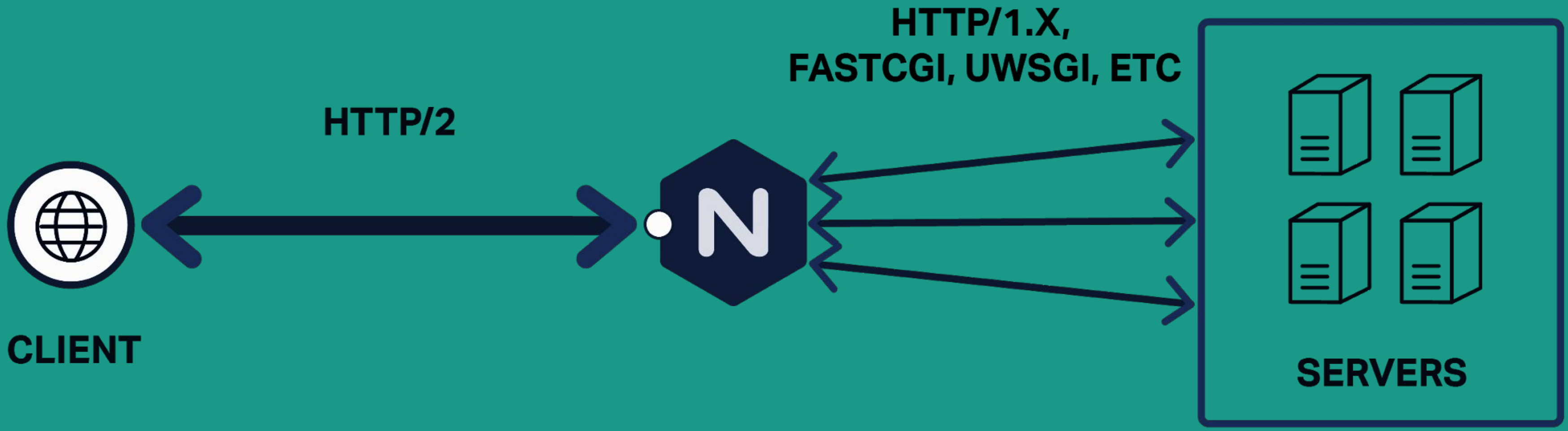
Assignment Presentation
Computer Networks and TCP/IP

Group 7

Web Server



A Web server is a program that uses HTTP to serve the files that form Web pages to users, in response to their requests, which are forwarded by their computers' HTTP clients. Dedicated computers and appliances may be referred to as Web servers as well.

World Wide Web

‘When I took office, only high energy physicists had ever heard of what is called the World Wide Web. Now even my cat has its own page.’

- Bill Clinton

The **World Wide Web** (WWW) is a repository of information linked together from points all over the world.

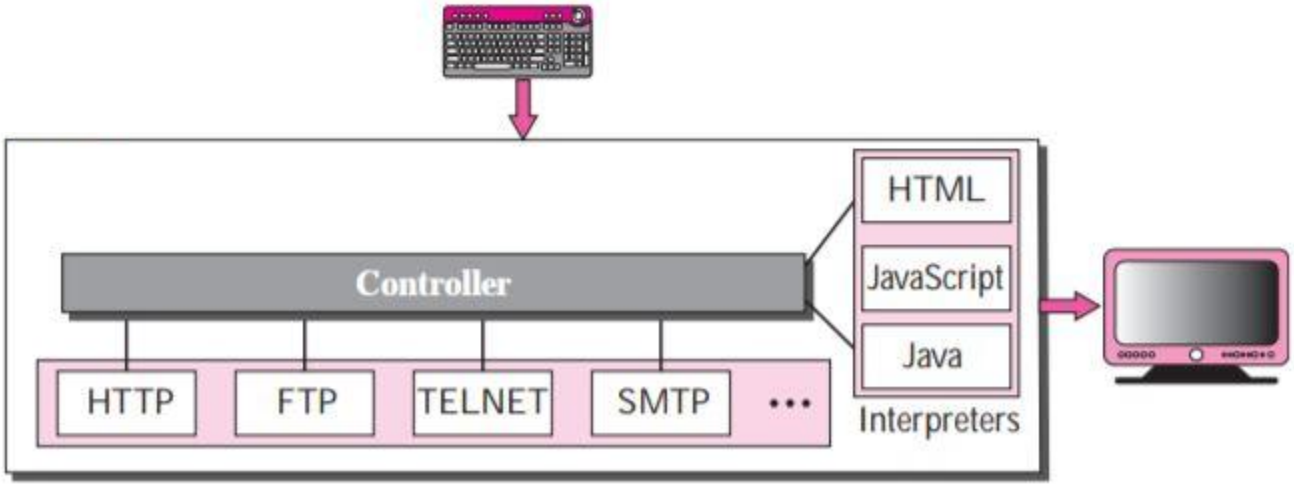
Architecture

- The service provided is distributed over many locations called sites.
- Each site holds one or more documents, referred to as Web pages.
- A Web page can be simple or composite.
- Each Web page is a file with a name and address.

Web Client (Browser)

A web client is an application that communicates with a web server.

Each browser usually consists of three parts: a controller, client protocol, and interpreters.



Uniform Resource Locator (URL)

The uniform resource locator (URL) is a standard locator for specifying any kind of information on the Internet.

https://ecampus.psgtech.ac.in/studzone/CAMarks_View.aspx

Static Documents

- Static documents are fixed-content documents that are created and stored in a server.
- When a client accesses the document, a copy of the document is sent.
- It can be prepared using HTML, XML, XSL, XHTML, etc.

Dynamic Documents

- A dynamic document is created by a Web server whenever a browser requests the document.
- When a request arrives, the Web server runs an application program or a script that creates the dynamic document.
- The server returns the output of the program or script as a response to the browser that requested the document.

Common Gateway Interface

- The Common Gateway Interface (CGI) is a technology that creates and handles dynamic documents.
- It can be used with any programming language.
- It is used for simple interactive applications.
- It results in inefficiency if part of the dynamic document that is to be created is fixed and not changing from request to request.

Active Documents

- A program or a script to be run at the client site.
- When a browser requests an active document, the server sends a copy of the document or a script.
- The document is then run at the client (browser) site.
- The idea of scripts in dynamic documents can also be used for active documents.

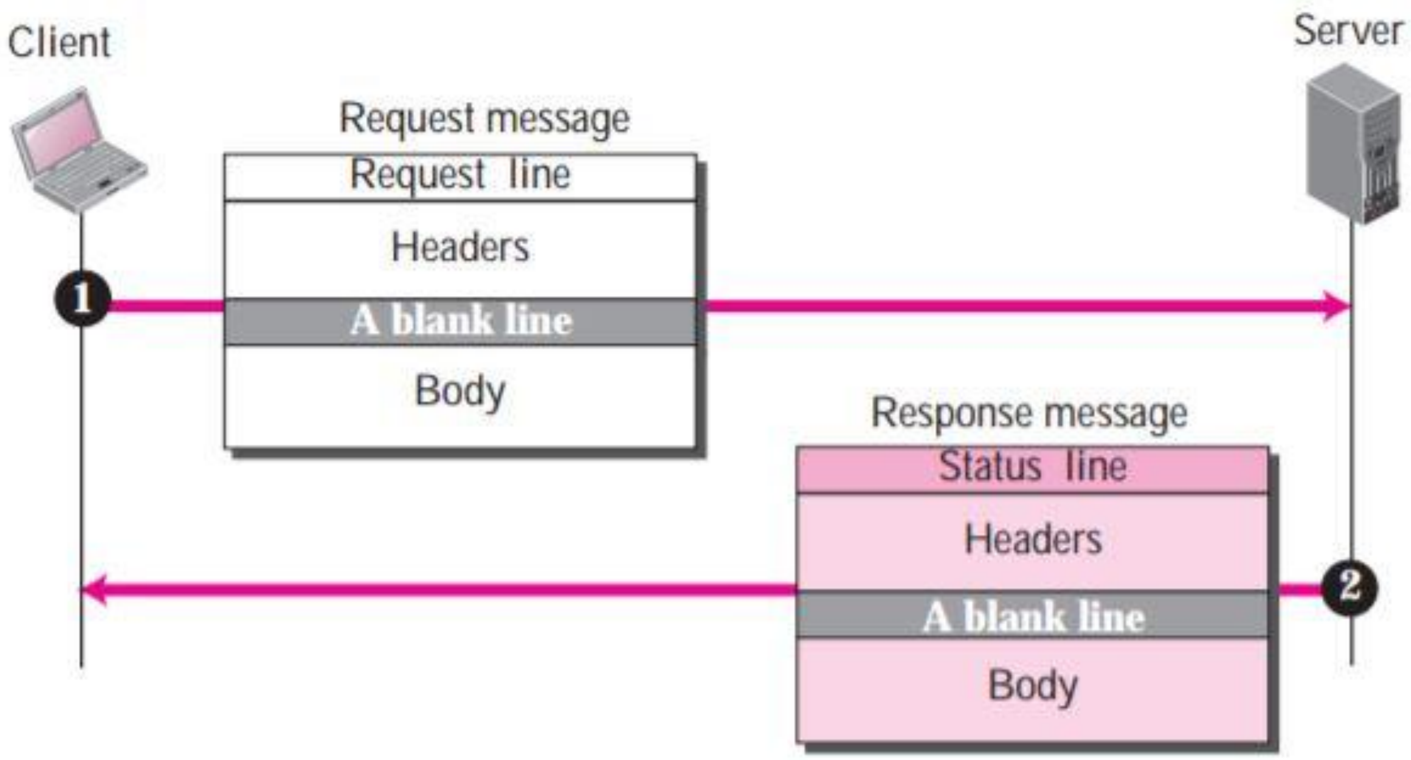
HTTP

- The Hypertext Transfer Protocol (HTTP) is a protocol used mainly to access data on the World Wide Web
- There is no separate control connection; only data are transferred between the client and the server.
- It uses the services of TCP on well-known port 80.
- It is a stateless protocol, which means that the server does not keep information about the client.
- It is connectionless and media independent.

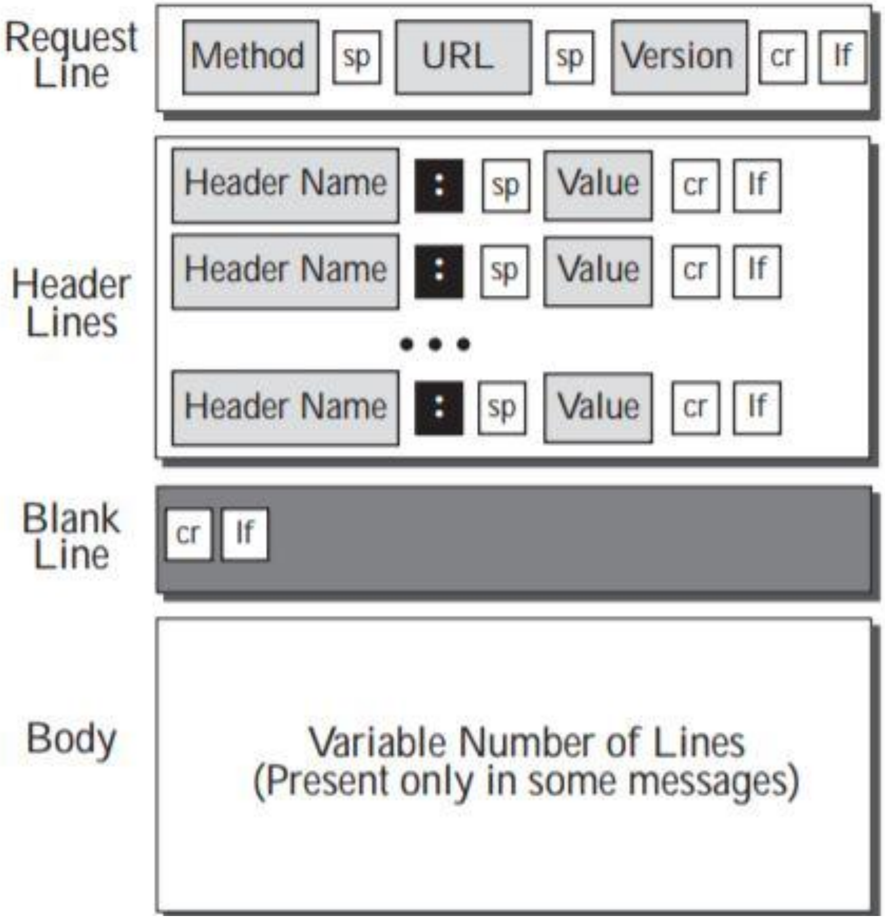
Strategy for a Non-persistent Connection

- The client opens a TCP connection and sends a request.
- The server sends the response and closes the connection.
- The client reads the data until it encounters an end-of-file marker; it then closes the connection.

HTTP Transaction



Request


Request Line
Method
sp
URL
sp
Version
cr
lf
Header Lines
Header Name
:
sp
Value
cr
lf
Header Name
:
sp
Value
cr
lf
• • •
Header Name
:
sp
Value
cr
lf
Blank Line
cr
lf
Body
Variable Number of Lines
(Present only in some messages)

Methods

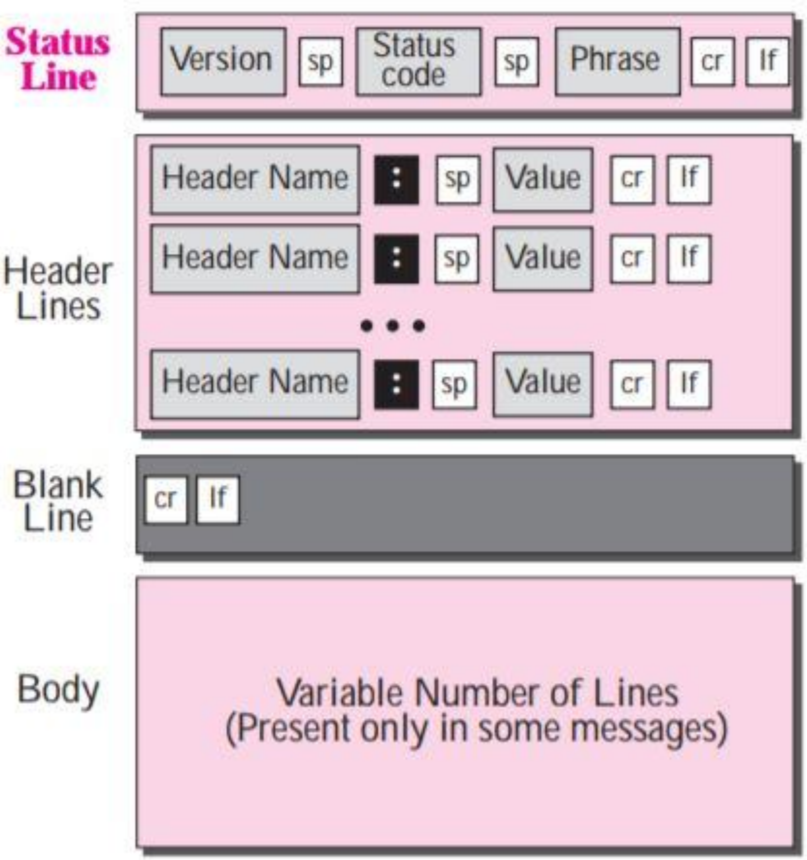
Method	Action
GET	Requests a document from the server
HEAD	Requests information about a document but not the document itself
POST	Sends some information from the client to the server
PUT	Sends a document from the client to the server
TRACE	Echoes the incoming request
DELETE	Remove the Web page
CONNECT	Reserved
OPTIONs	Enquires about available options

Request Header Names

Header	Description
User-agent	Identifies the client program
Accept	Shows the media format the client can accept
Accept-charset	Shows the character set the client can handle
Accept-encoding	Shows the encoding scheme the client can handle
Accept-language	Shows the language the client can accept
Authorization	Shows what permissions the client has

Header	Description
Host	Shows the host and port number of the client
Date	Shows the current date
Upgrade	Specifies the preferred communication protocol
Cookie	Returns the cookie to the server
If-Modified-Since	Returns the cookie to the server

Response Message



Status Line
Version sp Status code sp Phrase cr lf

Header Lines
Header Name : sp Value cr lf
Header Name : sp Value cr lf
• • •
Header Name : sp Value cr lf

Blank Line
cr lf

Body
Variable Number of Lines
(Present only in some messages)

Status Codes and Status Phrases

Status Code	Status Phrase	Description
Information		
100	Continue	The Initial part of the request received, continue
101	Switching	The server is complying to switch protocols

Success		
200	Ok	The request is successful
201	Created	A new URL is created
202	Accepted	The request is accepted, but it is not immediately acted upon
204	No content	There is no content in the body
Redirection		
301	Moved permanently	The requested URL is no longer used by server
302	Moved temporarily	The requested URL has moved temporarily
304	Not modified	The document has not been modified

Client Error		
400	Bad request	There is a syntax error
401	Unauthorized	The request lacks proper authorization
403	Forbidden	Service is denied
404	Not found	The document is not found
405	Method not allowed	This method is not supported in this URL
406	Not acceptable	The format is not acceptable

Server Error		
500	Internal server error	There is an error, such as crash, at server side
501	Not implemented	The action requested cannot be performed
502	Service unavailable	The service is temporarily unavailable

Response Header Names

Header	Description
Date	Shows current date
Upgrade	Specifies the preferred communication protocol
Server	Gives information about the user
Set-Cookie	The server asks the client to save the cookie
Content-Encoding	Specifies the encoding scheme
Content-Language	Specifies the language
Content-Length	Shows the length of the document

Content-Type	Specifies the media type
Location	To ask the client to send the request to another site
Accept-Ranges	The server will accept the requested byte ranges
Last-Modified	Gives the date and time of the last change

Problem : If every HTTP request is independent, how does a user 'stay logged in'?

Sessions

- A session is an association between a client and a server.
- A session ID or a session token is generated by the server and needs to be sent along with every request.
- A hacker can make requests pretending to the server that the hacker is a legitimate user with the correct session ID.

An **HTTP cookie** is a small piece of data sent from a website and stored on the user's computer by the user's web browser while the user is browsing.

Cookies

- Cookies are tied to a specific domain.
- They have an expiry.
- A server can request the client to set a cookie with a particular name and value.
- If the client agrees, then the server sends a cookie header that contains the name and value.

Creating and Storing Cookies

- When a server receives a request from a client, it stores information about the client in a file or a string
- The server includes the cookie in the response that it sends to the client
- When the client receives the response, the browser stores the cookie in the cookie directory, which is sorted by the domain server name.

A proxy server is a computer that keeps copies of responses to recent requests.

Web Caching : Proxy Server

- The HTTP client sends a request to the proxy server. The proxy server checks its cache.
- If the response is not stored in the cache, the proxy server sends the request to the corresponding server. Incoming responses are sent to the proxy server and stored for future requests from other clients.
- The proxy server reduces the load on the original server, decreases traffic, and improves latency.

HTTPS

- HTTPS takes the well-known and understood HTTP protocol, and simply layers an SSL/TLS encryption layer on top of it.
- It verifies that you are talking directly to the server that you think you are talking to.
- It ensures that only the server can read what you send and only you can read what it sends back.

Phases of a Handshake

- Hello
- Certificate Exchange
- Key Exchange

Certificates

- Trust
- Digital Signatures
- Whom are you trusting?

References

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lol

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https://robertheaton.com/2014/03/27/how-does-https-actually-work/