**Assignment No-1**

**Q.How HTTPS works behind the scenes?**

**HTTPS**

1)Hypertext Transfer Protocol Secure is an extension of the Hypertext Transfer Protocol.

2) It is used for secure communication over a computer network, and is widely used on the Internet.

3)In HTTPS, the communication protocol is encrypted using Transport Layer Security or, formerly, Secure Sockets Layer.

4)HTTPS does as much for privacy as for security.

5)HTTPS use Encryption for security.

6)HTTPS keeps your stuff secret by encrypting it as it moves between your browser and the website’s server.

7)HTTPS is certified by the SSL(Secure Socket Layer)

Working:-

HTTPS is the primary protocol used to send data between a web browser and a website.

HTTPS is encrypted in order to increase security of data transfer.

HTTPS takes the well-known and understood HTTP protocol, and simply layers a SSL/TLS encryption layer on top of it.

Servers and clients still speak exactly the same HTTP to each other, but over a secure SSL connection that encrypts and decrypts their requests and responses.

The SSL layer has 2 main purposes:

a)Verifying that you are talking directly to the server that you think you are talking to

b)Ensuring that only the server can read what you send it and only you can read what it sends back

**Q.What are different http methods available and what they exactly do**

Difference methods are:

1)**GET**:The GET method is used to retrieve information from the given server using a given URI. Requests using GET should only retrieve data and should have no other effect on the data.

2)**HEAD**:Same as GET, but transfers the status line and header section only.

3)**POST**:A POST request is used to send data to the server, for example, customer information, file upload, etc. using HTML forms.

4)**PUT**:Replaces all current representations of the target resource with the uploaded content.

5)**PATCH:**PATCH is designed to partially modify a targeted resource. In other words, while PUT places a resource in the target service, PATCH modifies that resource, as opposed to replacing it. This is a good way to update files or versions.

6)**DELETE**:Removes all current representations of the target resource given by a URI.

7)**CONNECT**:Establishes a tunnel to the server identified by a given URI.

8)**OPTIONS**:Describes the communication options for the target resource.

9)**TRACE**:Performs a message loop-back test along the path to the target resource.

**Q.Understand and explain the use of various http response codes.**

HTTP response status codes indicate whether a specific [HTTP](https://developer.mozilla.org/en-US/docs/Web/HTTP) request has been successfully completed. Responses are grouped in five classes:

1)Information Response(100-199)

2)Successful Responses(200-299)

3)Redirects(300-399)

4)Client errors(400-499)

5)Server error(500-599)

**Information Response**

i)100 Continue:Only a part of the request has been received by the server, but as long as it has not been rejected, the client should continue with the request.

ii)101 Switching Protocol:The server switches protocol

**Successful Responses**

i)200 OK:The request has succeeded. The meaning of the success depends on the HTTP method GET,PUT,POST,TRACE.

ii)201 Created:The request is complete, and a new resource is created.

iii)202 Accepted:The request is accepted for processing, but the processing is not complete.

iv)203 Non-authoritative Information:The information in the entity header is from a local or third-party copy, not from the original server.

v)204 No Content:There is no content to send for this request, but the headers may be useful.

vi)205 Reset Content:The browser should clear the form used for this transaction for additional input.

vii)206 Partial Content:This response code is used when the Range header is sent from the client to request only part of a resource.

**Redirection**

i)300 Multiple Choice:The request has more than one possible response.

ii)301 Moved Permanently:The URL of the requested resource has been changed permanently. The new URL is given in the response.

iii)302 Found:The requested page has moved temporarily to a new url.

iv)303 See Other:The requested page can be found under a different url.

v)304 Not Modified:This is used for caching purposes. It tells the client that the response has not been modified, so the client can continue to use the same cached version of the response.

vi)305 Use Proxy:The requested URL must be accessed through the proxy mentioned in the Location header.

vii)306 Unused:This code was used in a previous version. It is no longer used, but the code is reserved.

viii)307 Temporary Redirect:The requested page has moved temporarily to a new url.

**Client errors**

i)400 Bad Request:The server could not understand the request due to invalid syntax.

ii)401 Unauthorized:The requested page needs a username and a password.

iii)402 Payment Required:This response code is reserved for future use. The initial aim for creating this code was using it for digital payment systems.

iv)403 Forbidden:The client does not have access rights to the content; that is, it is unauthorized, so the server is refusing to give the requested resource.

v)404 Not Found:The server can not find the requested resource.

vi)405 Method Not Allowed:The method specified in the request is not allowed.

vii) 406 Not Acceptable:The server can only generate a response that is not accepted by the client.

viii)407 Proxy Authentication Required:You must authenticate with a proxy server before this request can be served.

ix)408 Request Timeout:The request took longer than the server was prepared to wait.

x)409 Conflict:The request could not be completed because of a conflict.

**Server error**

i)500 Internal Server Error:The request was not completed. The server met an unexpected condition.

ii)501 Not Implemented:The request was not completed. The server did not support the functionality required.

iii)502 Bad Gateway:The request was not completed. The server received an invalid response from the upstream server.

iv)503 Service Unavailable:The request was not completed. The server is temporarily overloading or down.

v)504 Gateway Timeout:The gateway has timed out.

vi)505 HTTP Version Not Supported:The server does not support the "http protocol" version.

**Q.What are the different web communication protocols and their use cases?**

**1)Transmission Control Protocol (TCP):**TCP is a popular communication protocol which is used for communicating over a network.

**2)Internet Protocol (IP):**IP is designed explicitly as addressing protocol. It is mostly used with TCP.

**3)User Datagram Protocol (UDP):**Used for establishing low-latency and loss-tolerating connections between applications on the internet.

**4)Post office Protocol (POP):**POP3 is designed for receiving incoming Emails.

**5)Simple mail transport Protocol (SMTP):**SMTP is designed to send and distribute outgoing EMail.

**6)File Transfer Protocol (FTP):** FTP allows users to transfer files from one machine to another.

**7)HyperText Transfer Protocol (HTTP):**HTTP is designed for transferring a hypertext among two or more systems. HTML tags are used for creating links.

**8)HyperText Transfer Protocol Secure (HTTPS):**HTTPS except that the transferring of data is done in an encrypted format.

**9)Telnet:**Telnet is a set of rules designed for connecting one system with another.

**10)Gopher:**Gopher is a collection of rules implemented for searching, retrieving as well as displaying documents from isolated sites. Gopher also works on the client/server principle.

**Q.Pros and cons of Single page and multi page applications.**

**Single Page Application**

**Pros**:

1)Fast and responsive.

2)It’s easy to debug an SPA with Chrome

3)Caching capabilities.

4)Provide users with a simple linear experience.

**Cons**:

1)provide poor SEO optimization.

2)SPA doesn’t save visitors’ jumps between states.

3)provide a false sense of security.

**Multi Page Application**

**Pros**:

1)SEO(Search Engine Optimization) optimization is possible.

2)Ease of scaling.

3)Available ready-made solutions.

4)Analytic capabilities.

**Cons**:

1)Multi-Page App Development Is More Difficult and Expensive

2)Lower Performance Indicators

3)Expensive Maintenance

**Extra Questions Assigned:-**

**TCP**

1)TCP stands for Transmission Control Protocol.

2)TCP/IP is a family of protocols for communication between computers.

3)It defines how electronic devices should be connected over the Internet, and how data should be transmitted between them.

4)TCP is responsible for breaking data down into small packets before they can be sent over a network, and for assembling the packets again when they arrive.

5)TCP protocols for the web are HTTP,HTTPS,FTP.

**a)HTTP - HyperText Transfer Protocol**

HTTP is used for sending requests from a client to a server, returning content from the server back to the client.

**b)HTTPS - Secure HTTP**

HTTPS takes care of secure communication between a server and a browser. HTTPS typically handles credit card transactions and other sensitive data.

**c)FTP - File Transfer Protocol**

FTP takes care of transmission of files between computers.

## **TCP/IP Protocols for Email**

**1)SMTP - Simple Mail Transfer Protocol**

SMTP takes care of sending emails. Often emails are sent to an SMTP server, then to other servers, and finally to its destination. SMTP can only transmit pure text. It cannot transmit binary data like pictures, sounds or movies.

**2)MIME - Multipurpose Internet Mail Extensions**

The MIME protocol let's SMTP transmit multimedia files including voice, audio, and binary data across TCP/IP networks. The MIME protocol converts binary data to pure text, before it is sent.

**3)POP - Post Office Protocol**

The POP protocol is used by email programs to retrieve emails from an email server.

**4)IMAP - Internet Message Access Protocol**

The IMAP protocol works much like the POP protocol. The main difference is that the IMAP protocol will not automatically download all your emails each time your email program connects to your email server.The IMAP protocol allows you to look through your email messages at the email server before you download them.

**P2P**

1)P2P stands for Peer to Peer.

2)P2P is a file sharing technology.

3)The individual users in this network are referred to as **peers**.

4)The peers request for the files from other peers by establishing TCP or UDP connections.

5)A peer-to-peer network allows computer hardware and software to communicate without the need for a server.

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7)The peers directly interact with one another without the requirement of a central server.

**P2P works**

i) when one peer makes a request, it is possible that multiple peers have the copy of that requested object.

ii)Now the problem is how to get the IP addresses of all those peers.This is decided by the underlying architecture supported by the P2P systems.

iii)Means of one of these methods, the client peer can get to know about all the peers which have the requested file and the file transfer takes place directly between these two peers.