**GUVI DAY 1 TASK - FSDB61WD-T - SARASRAMAN**

**Difference between HTTP1 and HTTP2**

**What is HTTP? 🤔**

HTTP (**H**yper **T**ext **T**ransfer **P**rotocol) is a communication protocol via the internet. It has been evolving since 1991.

**HTTP/1.0 (Probably HTTP/1.1):**

Before HTTP/1.0 there was an earlier version HTTP/0.9 which was the first protocol introduced till 1991. In the 0.9 version it is a one-way communication where GET is the only method we can use and the response is only the HTML file. Later in 1996, HTTP/1.0 was released and it supported GET as well as POST and HEAD, especially POST which allows client to send data to the server. It also has a status code and error codes in order to tell the client about the response. It also has a header sent along with the request and response which carries the information about the server and the client. It also introduced Header, Status Code and Content-type (this allows transfer of other files other than plain HTML file)

After just few months, HTTP/1.1 was released in 1997 which has some advantages over the previous version. This version is the which was standardized and introduced some features for improved efficiency through caching, encoding, reusing of HTTP connections and pipelining. This also introduced PUT, PATCH, DELETE and some more methods which allows clients to modify server data. This version introduced persistent connections which means later in 1.0 version each request and response opens a new connection whereas in 1.1 the connection is kept alive until all the necessary files is sent to the client thereby maintaining a single connection.

**HTTP/2.0:**

This version is an improved one over the previous version which is build on top of the previous version, meaning unless dumping the previous version it got improved and we can still use the previous one. This building on top of the previous version is because this new version got released in 2015 which is way longer and most servers have HTTP/1.1 as a connection protocol. The HTTP/2 version has some efficient mechanism over its previous version which makes efficient data transfers over the internet. The 2.0 version is a binary protocol which encodes the transferred data in a binary encoded format.

**Difference between HTTP/1.1 and HTTP/2:**

From the above explanations it is absolute that the comparison is between 1.1 version and 2.0 version. Let’s discuss about that.

**Head Of Line Blocking: 🫷**

The HTTP/1.1 version has some features like keep alive connection which means the TCP connection is maintained until the whole document is sent to the client in the request response cycle. Whereas the transfer mechanism has a flaw called Head of Line Blocking which means the client has to wait for the previous request to respond before responding to the further requests which blocked the transfer which led to slow transfer. In order to overcome this flaw there were multiple TCP connections made to the server each one for a single request but it demands more resources.

The HTTP/2 version has a solution for the above problem which transfers only through a single TCP connection but the data is sent in streams which is smaller pieces of data which is sent to the client and the clients reassembles in the browser. This solved some problems in the Head of Line Blocking behaviour.

**Request Multiplexing: 🤹‍♂️**

As mentioned above in HTTP/1.1 we can only sent a single request at a time and the next one is sent after the previous is solved. In HTTP/1.1 there has to be multiple TCP connections to be made for every request but in 2.0 version only one TCP connection is made and the request is converted to streams with a HTTP header which contains information about the server to reach and made multiple request through a single TCP connection possible.

**Prioritization Responses: 🤴**

The HTTP/2 introduced prioritization which helps developer to prioritize the response by adding weight, meaning when you enter a website which content should load first is it the images or the content can be decided by the developers. This improvement plays a major role in the user experience of the website as we developers can optimise the loading time and show the website is faster to the end user.

**Header Compression: 🔏**

In HTTP/1.1 the data is compressed and sent to the client whereas the HTTP headers are sent as a plain text. Even though the header is small but it grows due to cookies and multiple requests. In HTTP/2 the headers is also compressed using HPACK which decreases the size of the header by encoding it. In addition to the compression the HPACK remembers the previous headers and reusing for the further similar request which further compress the headers which led to faster transfer of data. Since the HTTP/2 version is a binary transfer protocol the headers are encoded in binary which enables security and made transfer of sensitive information via headers.

**Server Push: 🫸**

In HTTP/1.1 the response we get is what we request which means when a request for the HTML document we get the HTML document and then the CSS is requested and then JavaScript is requested. Although there can be multiple connection can be made as discussed before it demands resources.

In HTTP/2 the server tries to predict the needed resources that will be requested soon and pushes to the client cache. This also decreases the amounts of requests and also transfer is done via single TCP connection.

**Automatic Compression: 🗜️**

In the HTTP/1.1 we must explicitly require the compression of requests and responses. Whereas in HTTP/2 enables data compression using Gzip automatically.

**Connection Reset: 🔁**

During some reasons we can allow closing a connection between a server and client and immediately opening a new connection.

**Disadvantages of HTTP/2:**

Even though HTTP/2 is better than the HTTP/1.1 it has its own flaws.

* Despite of addressing the Head of Line Blocking effects in the previous version the TCP level blocking still causes problems which means during transfer loss of packets causes delay in delivering the data to client
* For clients operating in a slow network connection since the transfer is a bit by bit process, the network quality is degraded to single connection causing entire process to slow down.