



ASSIGNMENT 1

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Assignment Statement

Berners-Lee and his team are credited for inventing the original Hyper Text Transfer Protocol (HTTP) along with Hyper Text Markup Language (HTML) and the associated technology for a web server and a text-based web browser. The first version of the protocol had only one method, namely GET, which would request a page from a server. The response from the server was always an HTML page. What you're about to do is to reinvent the wheel on the motivation of getting a deep understanding of how HTTP works! In that assignment, you will use sockets to implement a simple web client that communicates with a web server using a restricted subset of HTTP. The main objective of this assignment is to give you hands-on experience with UNIX sockets.

Data Structures Used

- Array of characters (string) to save our request information.
- Vector of Strings to store our requests independent of each other.
- Struct `socket_address` to utilize our Websocket.
- struct `arg_struct { int client_socket; long long* timer; }.`

User Guide

- Run the server from terminal after changing the directory to its directory and type the following in terminal:
 - `g++ -o HTTP-Server main.cpp -lpthread`
 - `./HTTP-Server <port number>`
- Run the client from terminal after changing the directory to its directory and type the following in terminal:
 - `g++ -o HTTP-Client main.cpp -lpthread`
 - `./HTTP-Client <IP address> <port number>`

Main functions

- **Main functions of HTTP-Server/main.cpp are the following:**
 - `Edits()` => It is used to parse String of command and divide it if it is separated by space.
 - `RequestSplit()` => It is used to split request as if command is give `client_get index.html` it parse the command line by space.
 - `CheckExistenceFile()` => It checks if File is already Exist or not.
 - `ChunkSend()` => It is used to send information of file to socket.
 - `TimeoutOfClient ()` => It is used to close connection when its time is out.
 - `RequestedFileContent()` => It is used to read all content of file and save it in string content.

- GetFileContent() => It is used to get all content of file.
- GetFileINformation() => It takes the requests and parse it and take filename and its type and print its content.
- Client_Post() => It receives file from client and the response will be 200.
- Client_Get() => It tries to get file if it exists response will be 200 else it will be 404 .
- ConnectionOfClient() => It parses command line and check whether it is Post or get.
- **Main functions of HTTP-Client/main.cpp are the following:**
 - findReq() => It returns vector of all the requests in the file with the name give.
 - Splitor() => It takes the request and split it by its spaces and return vector of splitting request.
 - getPostFileContent() => It returns the file with given name content in string.

Design Decisions

- The Server takes the requests and parses it and take from it file name and its type.
- In case of GET, if the file exist the response will be 200 OK and if it doesn't exist the response will be 404 not found.
- In case of POST, the response will be 200 OK after receiving the server from the client.
- The client has the ability make multiple requests on the same connection socket without needing to open a new socket for each connection.
- The thread that is working in the background watching the activity of each client when the time from the last activity of a client exceeded the given threshold this client will be timed out and its socket will be closed.

Sample Run

- Running get request from browser.

← → ↺ ⌂ ⓘ localhost:8081/id.html

Quote of the Day

Press the button below to recieve a random quote!

New quote

```
Accept-Language: en-GB,en-US;q=0.9,en;q=0.8

id.html
Connecting!!!
GET /style.css HTTP/1.1
Host: localhost:8081
Connection: keep-alive
sec-ch-ua: "Not?A_Brand";v="8", "Chromium";v="108", "Google Chrome";v="108"
sec-ch-ua-mobile: ?0
User-Agent: Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/108.0.0.0 Safari/537.36
sec-ch-ua-platform: "macOS"
Accept: text/css,*/*;q=0.1
Sec-Fetch-Site: same-origin
Sec-Fetch-Mode: no-cors
Sec-Fetch-Dest: style
Referer: http://localhost:8081/id.html
Accept-Encoding: gzip, deflate, br
Accept-Language: en-GB,en-US;q=0.9,en;q=0.8
```

- Running following request from the request.txt file.

Client terminal:

```
HTTP-Client > requests.txt
1 post id.html HTTP
2 get id.html HTTP
3 post Omar.txt HTTP
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> fileConte Aa Ab Ac No results ↑ ↓ ≡ ×

PROBLEMS 1 OUTPUT DEBUG CONSOLE TERMINAL
o markhairat@omar-macbook HTTP-Client % ./HTTP-Client 192.168.1.59 8081
post id.html HTTP
HTTP/1.1 200 OK\r\n
<html><head> <link rel="stylesheet" href="style.css"></head><body> <div class="new"> <h1 style="font-size: 80px;">Quote of the Day</h1> <p style="font-size: 40px;">Press the button below to recieve a random quote!</p> <button class="new2" onclick="newquote()">New quote</button> <p style="font-size: 40px;" id="body"></p> <p style="font-size: 40px;" id="head"></p> </div> <script src="main.js" ></script></body></html>
File is saved successfully

get id.html HTTP
HTTP/1.1 200 OK\r\n
String Size : 463
<html><head> <link rel="stylesheet" href="style.css"></head><body> <div class="new"> <h1 style="font-size: 80px;">Quote of the Day</h1> <p style="font-size: 40px;">Press the button below to recieve a random quote!</p> <button class="new2" onclick="newquote()">New quote</button> <p style="font-size: 40px;" id="body"></p> <p style="font-size: 40px;" id="head"></p> </div> <script src="main.js" ></script></body></html>

post Omar.txt HTTP
HTTP/1.1 200 OK\r\n
```

Server terminal:

```
omarkhairat@omar-macbook HTTP-Server % ./HTTP-Server 8081
Connecting!!!
Connecting!!!
post id.html HTTP
<html><head> <link rel="stylesheet" href="style.css"></head><body> <div class="new"> <h1 style="font-size: 80px;">Quote of the Day</h1> <p sty
le="font-size: 40px;">Press the button below to recieve a random quote!</p> <button class="new2" onclick="newqoute()">New qoute</button> <p style="f
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get id.html HTTP
Connecting!!!
post id.html HTTP
<html><head> <link rel="stylesheet" href="style.css"></head><body> <div class="new"> <h1 style="font-size: 80px;">Quote of the Day</h1> <p sty
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get id.html HTTP
post Omar.txt HTTP

```