

Computer Networking CSE 5344

Project 1 Building a Multi-Threaded Web Server

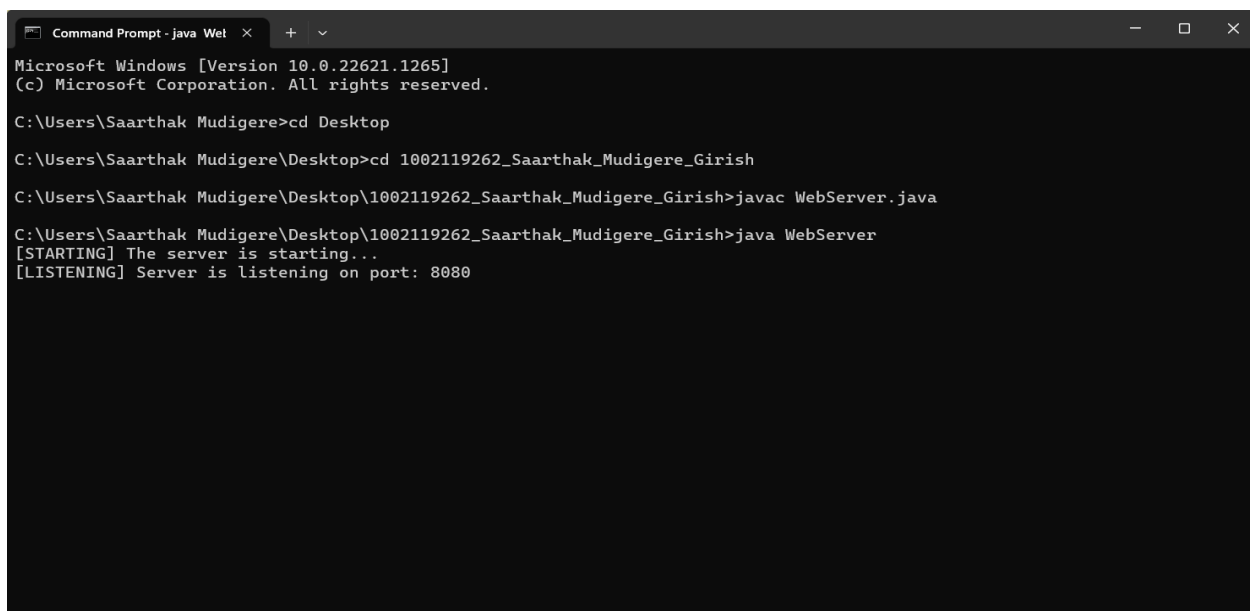
Web Server: A web server is a computer that stores web server software and a website's component files (for example, HTML documents, images, CSS stylesheets, and JavaScript files). A web server connects to the Internet and supports physical data interchange with other devices connected to the web.

HTTP Server: An HTTP request is made by a client to a named host located on a server. The aim of the request is to access a resource on the server. I have built a multi-threaded Web server that is capable of processing multiple simultaneous service requests in parallel. The Web server built is capable of delivering our page to the Web browser.

Here we have considered loading an HTML page, everything was successfully hosted with the help of WebServer designed. Also, we successfully tested multithreading by running multiple applications at once and the server handled it. If an application that is not present is given, then we get a “404 Error Not Found”.

Run the Server:

1. Compile WebServer, using Command - **javac WebServer.java**
2. Run WebServer, using Command - **java WebServer**

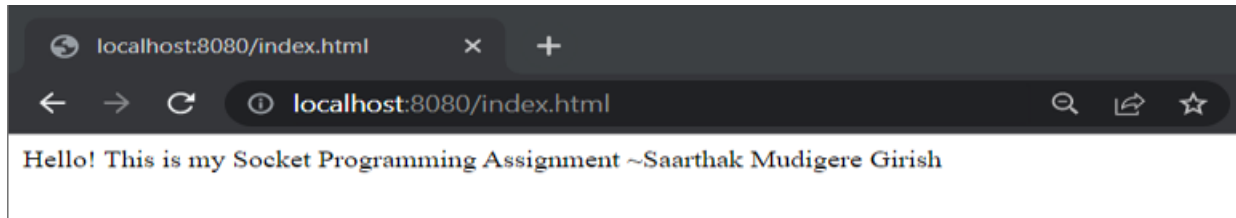


```
Command Prompt - java Wel x + v
Microsoft Windows [Version 10.0.22621.1265]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Saarthak Mudigere>cd Desktop
C:\Users\Saarthak Mudigere\Desktop>cd 1002119262_Saarthak_Mudigere_Girish
C:\Users\Saarthak Mudigere\Desktop\1002119262_Saarthak_Mudigere_Girish>javac WebServer.java
C:\Users\Saarthak Mudigere\Desktop\1002119262_Saarthak_Mudigere_Girish>java WebServer
[STARTING] The server is starting...
[LISTENING] Server is listening on port: 8080
```

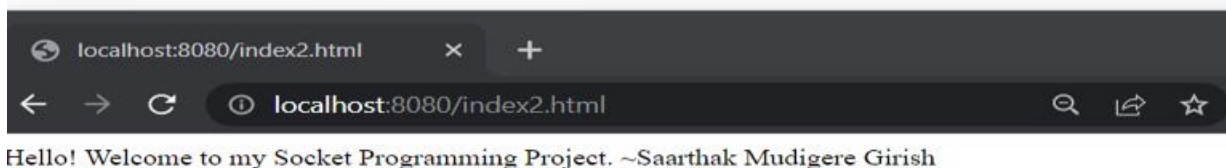
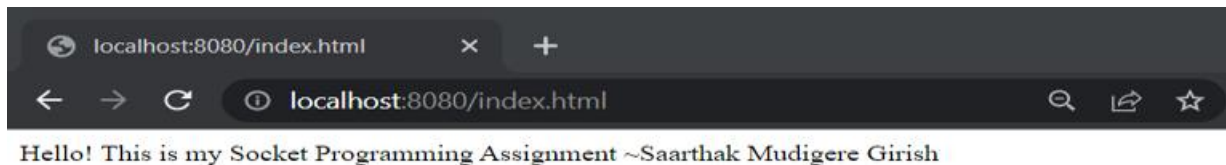
Run the Client:

1. Open your web browser.
2. Obtain index.html, using Command: localhost:8080/index.html



This is an Instance where the Requested File exists on the Server and thus Response from the Server is **HTTP/1.1 200 OK.**

Multi-Threading: With the help of multi-threading both index.html and index2.html were handled simultaneously. Multiple threads provide execution concurrently, supported by the operating system this is called multithreading.



Handling the wrong URL/Exception: When we try to access the files that are not present or if we have given the wrong URL the Server will not be able to respond to the request hence it throws an error. Or any other files outside the directory.



This is an Instance where the Requested File exists on the Server and thus Response from the Server is **HTTP/1.0 404 NOT FOUND**.

Client Message Response:

1. Open a new terminal.
2. Compile WebClient, using Command - **javac WebClient.java**
3. Run WebClient, using Command - **java WebClient 127.0.0.1 8080 index.html**

A screenshot of a Windows Command Prompt window. The text shows the user navigating to a directory and running a Java program. The output of the program is displayed, showing connection details and a message.

```
Microsoft Windows [Version 10.0.22621.1265]
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C:\Users\Saarthak Mudigere>cd Desktop
C:\Users\Saarthak Mudigere\Desktop>cd 1002119262_Saarthak_Mudigere_Girish
C:\Users\Saarthak Mudigere\Desktop\1002119262_Saarthak_Mudigere_Girish>javac WebClient.java
C:\Users\Saarthak Mudigere\Desktop\1002119262_Saarthak_Mudigere_Girish>java WebClient 127.0.0.1 8080 index.html
[CONNECTION ESTABLISHED] Connection Successfully Established
Number of threads 1
Received Connection From : localhost
Port : 8080
Protocol :http
TCP No Delay : false
Timeout : 0
RTT=51.0 ms
response from server
HTTP/1.1 200 OK
Content-type: text/html

Hello! This is my Socket Programming Assignment
~Saarthak Mudigere Girish

Enter 'Exit' to exit the connection
Exit

C:\Users\Saarthak Mudigere\Desktop\1002119262_Saarthak_Mudigere_Girish>
```

This is an Instance where the Requested File exists on the Server and thus Response from the Server is **HTTP/1.1 200 OK**.

```

Command Prompt
Microsoft Windows [Version 10.0.22621.1265]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Saarthak Mudigere>cd Desktop
C:\Users\Saarthak Mudigere\Desktop>cd 1002119262_Saarthak_Mudigere_Girish
C:\Users\Saarthak Mudigere\Desktop\1002119262_Saarthak_Mudigere_Girish>javac WebClient.java
C:\Users\Saarthak Mudigere\Desktop\1002119262_Saarthak_Mudigere_Girish>java WebClient 127.0.0.1 8080 index1.html
[CONNECTION ESTABLISHED] Connection Successfully Established
Number of threads 1
Received Connection From : localhost
Port : 8080
Protocol :http
TCP No Delay : false
Timeout : 0
RTT=54.0 ms
response from server
HTTP/1.1 404 NOT FOUNDContent-type: text/html

<HTML><HEAD><TITLE>Not Found</TITLE></HEAD><BODY>404 Page Not Found</BODY></HTML>

Enter 'Exit' to exit the connection
Exit
C:\Users\Saarthak Mudigere\Desktop\1002119262_Saarthak_Mudigere_Girish>

```

This is an Instance where the Requested File exists on the Server and thus Response from the Server is **HTTP/1.0 404 NOT FOUND**.

Server Message Response:

The request method indicates the method to be performed on the resource identified by the given Request-URL. The GET method is used to retrieve information from the given server using a given URL. Requests using GET should only retrieve data and should have no other effect on the data.

```

Command Prompt - java Wel
C:\Users\Saarthak Mudigere\Desktop\1002119262_Saarthak_Mudigere_Girish>java WebServer
[STARTING] The server is starting...
[LISTENING] Server is listening on port: 8080

[NEW CONNECTION] Connection Successfully Established

GET /index2.html HTTP/1.1
Host: localhost:8080
Connection: keep-alive
sec-ch-ua: "Chromium";v="110", "Not A(Brand";v="24", "Google Chrome";v="110"
sec-ch-ua-mobile: ?0
sec-ch-ua-platform: "Windows"
Upgrade-Insecure-Requests: 1
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/110.0.0.0 Safari/537.36
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,image/apng,*/*;q=0.8,application/sig
ned-exchange;v=b3;q=0.7
Purpose: prefetch
Sec-Fetch-Site: none
Sec-Fetch-Mode: navigate
Sec-Fetch-User: ?1
Sec-Fetch-Dest: document
Accept-Encoding: gzip, deflate, br
Accept-Language: en-US,en;q=0.9
Cookie: username=localhost-8888="2|1:0|10:1676060065|23:username=localhost-8888|44:NDVhYmZmMWQzZTVhNDdmZjlkZTMzMzBiZTA0YjBmOTQ=|6af3ffcba4b3c731b5852ca37c5b84fd88cfee733f30d1169646bc3f1db3ad6b"; _xsrf=2|f4c2c92c|404ab47f0d23b1b8a68bb141560aa814|1676060065
[END CONNECTION] Client Disconnected

```

```

Command Prompt - java Wel X + v

[NEW CONNECTION] Connection Successfully Established

GET /index.html HTTP/1.1
Host: localhost:8080
Connection: keep-alive
sec-ch-ua: "Chromium";v="110", "Not A(Brand";v="24", "Google Chrome";v="110"
sec-ch-ua-mobile: ?0
sec-ch-ua-platform: "Windows"
Upgrade-Insecure-Requests: 1
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/110.0.0.0 Safari/537.36
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,image/apng,*/*;q=0.8,application/signed-exchange;v=b3;q=0.7
Sec-Fetch-Site: none
Sec-Fetch-Mode: navigate
Sec-Fetch-User: ?1
Sec-Fetch-Dest: document
Accept-Encoding: gzip, deflate, br
Accept-Language: en-US,en;q=0.9
Cookie: username=localhost-8888="2|1:0|10:1676060065|23:username=localhost-8888|44:NDVhYmZmMWQzZTVhNDdmZjlkZTMzMzBiZTA0YjBmOTQ=|6af3ffcba4b3c731b5852ca37c5b84fd88cfee733f30d1169646bc3f1db3ad6b"; _xsrf=2|f4c2c92c|404ab47f0d23b1b8a68bb141560aa814|1676060065
[END CONNECTION] Client Disconnected

```

```

Command Prompt - java Wel X + v

[NEW CONNECTION] Connection Successfully Established

GET /index1.html HTTP/1.1
Host: localhost:8080
Connection: keep-alive
sec-ch-ua: "Chromium";v="110", "Not A(Brand";v="24", "Google Chrome";v="110"
sec-ch-ua-mobile: ?0
sec-ch-ua-platform: "Windows"
Upgrade-Insecure-Requests: 1
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/110.0.0.0 Safari/537.36
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,image/apng,*/*;q=0.8,application/signed-exchange;v=b3;q=0.7
Sec-Fetch-Site: none
Sec-Fetch-Mode: navigate
Sec-Fetch-User: ?1
Sec-Fetch-Dest: document
Accept-Encoding: gzip, deflate, br
Accept-Language: en-US,en;q=0.9
Cookie: username=localhost-8888="2|1:0|10:1676060065|23:username=localhost-8888|44:NDVhYmZmMWQzZTVhNDdmZjlkZTMzMzBiZTA0YjBmOTQ=|6af3ffcba4b3c731b5852ca37c5b84fd88cfee733f30d1169646bc3f1db3ad6b"; _xsrf=2|f4c2c92c|404ab47f0d23b1b8a68bb141560aa814|1676060065
[END CONNECTION] Client Disconnected

```

```

[NEW CONNECTION] Connection Successfully Established

GET /index.html HTTP/1.1
[END CONNECTION] Client Disconnected

[NEW CONNECTION] Connection Successfully Established

GET /index1.html HTTP/1.1
[END CONNECTION] Client Disconnected

```