

Programming Assignment 1**MainWebServer.java**














A Java program that implements a basic web server can serve static web content. It listens for incoming HTTP requests, processes them, and responds with the appropriate web page or an error page if necessary. This server supports HTTP 1.1 and handles common status codes like 200 (OK), 400 (Bad Request), 403 (Forbidden), and 404 (Not Found).

This program follows multi-threading approach, creates a new thread for each client connection. It supports:

1. Forever loop for listening for connections, accept new connection from incoming client.
2. Parse HTTP request
3. Ensure well-formed request (return error otherwise)
4. Determine if target file exists and if permissions are set properly
5. Returns errors if exception occurs
6. Transmit contents of file to connect (by performing reads on the file and writes on the socket)
7. Close the connection

Folder structure

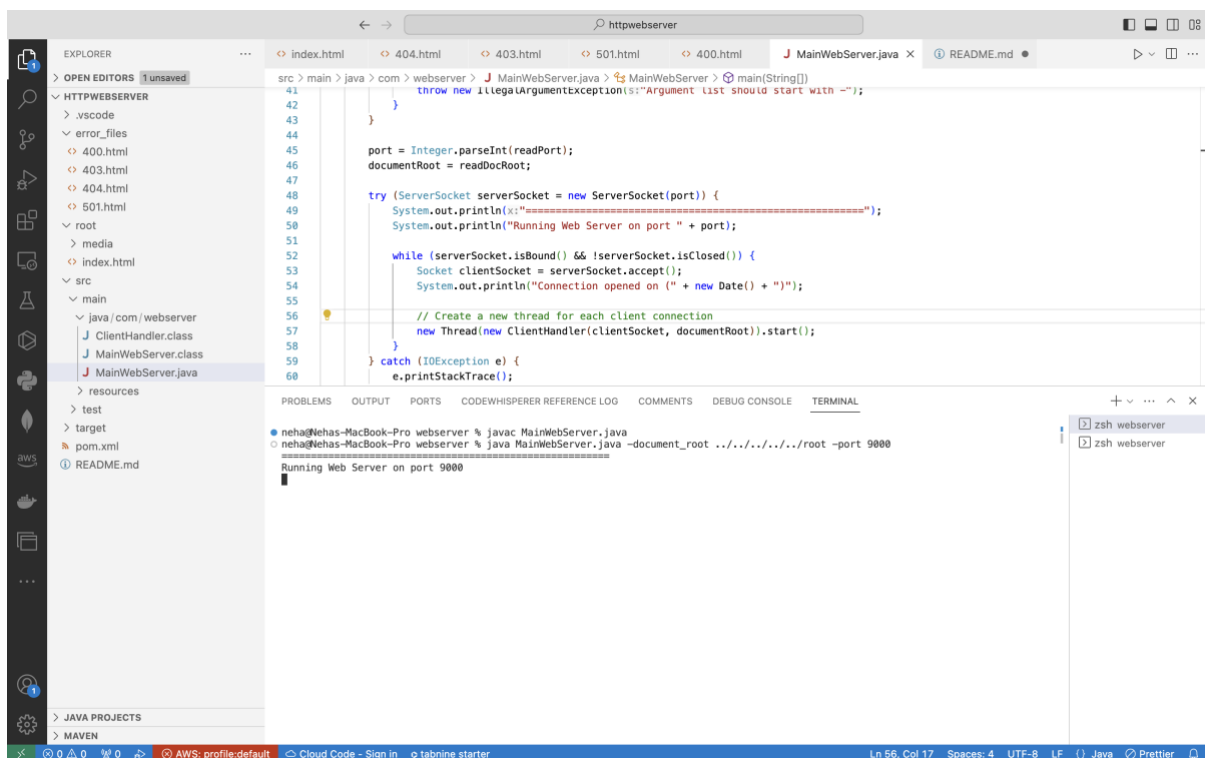
The root folder consists of the index.html file and the images in the media folder.

DS_PA_NehaRaj				
Name	Date Modified	Size	Kind	
 pom.xml	Yesterday, 17:29	583 bytes	XML	
 README.md	Today, 14:39	Zero bytes	Doc	
▼  root	Today, 19:05	--	Fold	
 400.html	Today, 17:14	571 bytes	HTM	
 403.html	Today, 17:59	543 bytes	HTM	
 404.html	Today, 17:59	551 bytes	HTM	
 501.html	Today, 18:00	581 bytes	HTM	
 index.html	Today, 17:09	42 KB	HTM	
>  media	Today, 18:46	--	Fold	
▼  src	Today, 18:46	--	Fold	
>  main	Today, 18:46	--	Fold	
▼  target	Today, 18:46	--	Fold	
>  classes	Today, 18:46	--	Fold	

To Run the Program

1. Go to the directory of the file
2. Enter the following command:
"cd src/main/java/com/webserver"
3. Compile the java class
"javac MainWebServer.java"
4. Run the class, specifying the arguments:
"java MainWebServer.java -document_root ../../../../root -port 9000"

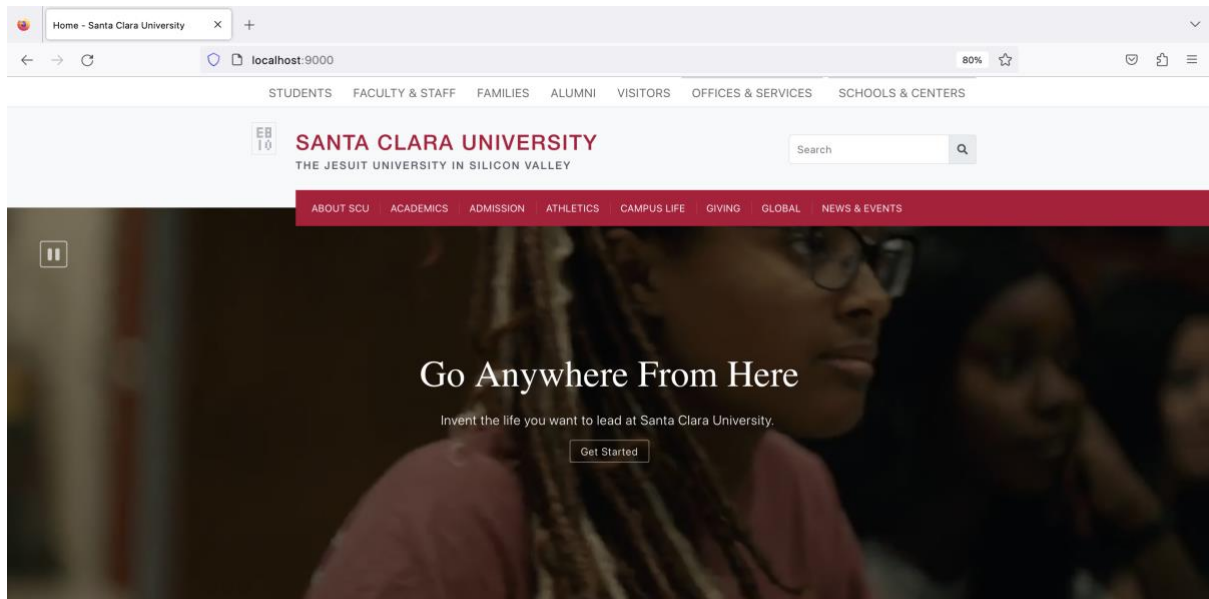
The terminal will appear as follows:



The screenshot shows an IDE with the following components:

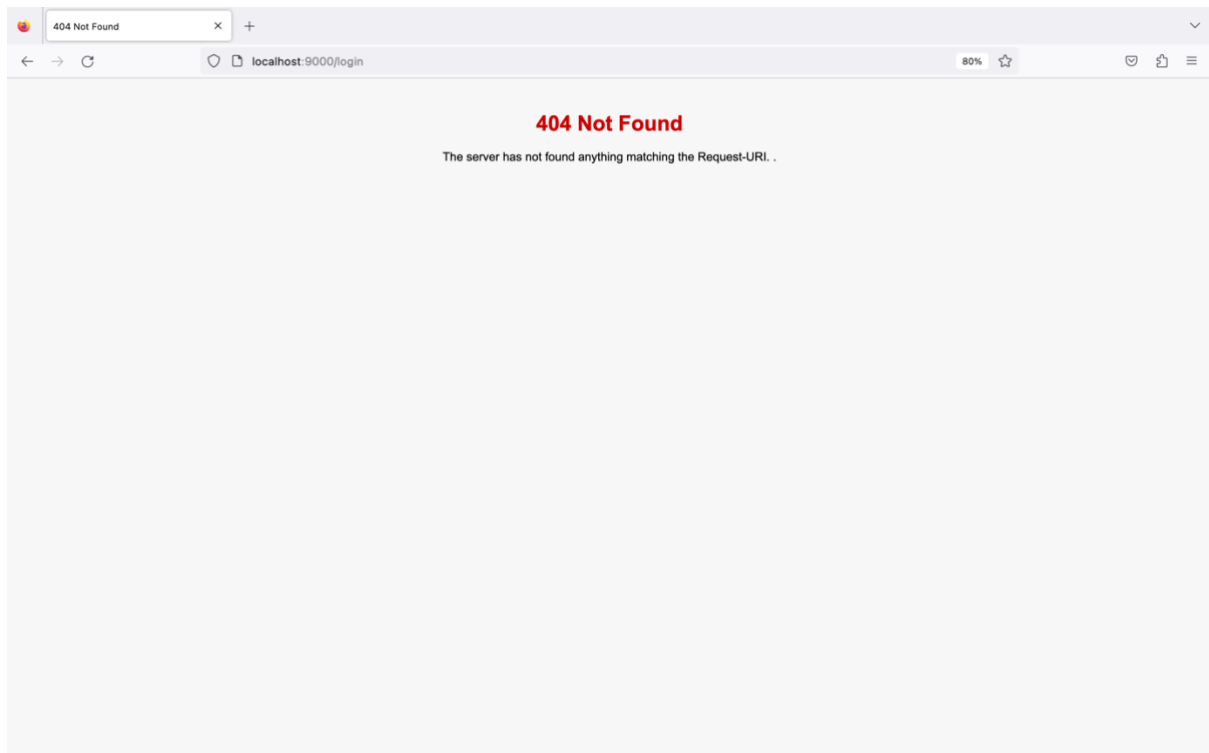
- EXPLORER:** A file tree on the left showing the project structure. The path `src/main/java/com/webserver` is selected, containing `MainWebServer.class` and `MainWebServer.java`.
- EDITOR:** The `MainWebServer.java` file is open, showing Java code for a web server. The code includes a `main` method that parses a port and document root, then starts a `ServerSocket` and handles connections with `ClientHandler` threads.
- TERMINAL:** A terminal window at the bottom right shows the execution of the program. The command `java MainWebServer.java -document_root ../../../../root -port 9000` has been run, and the output is `Running Web Server on port 9000`.

Go to the web browser and enter the URL <https://localhost:9000/>

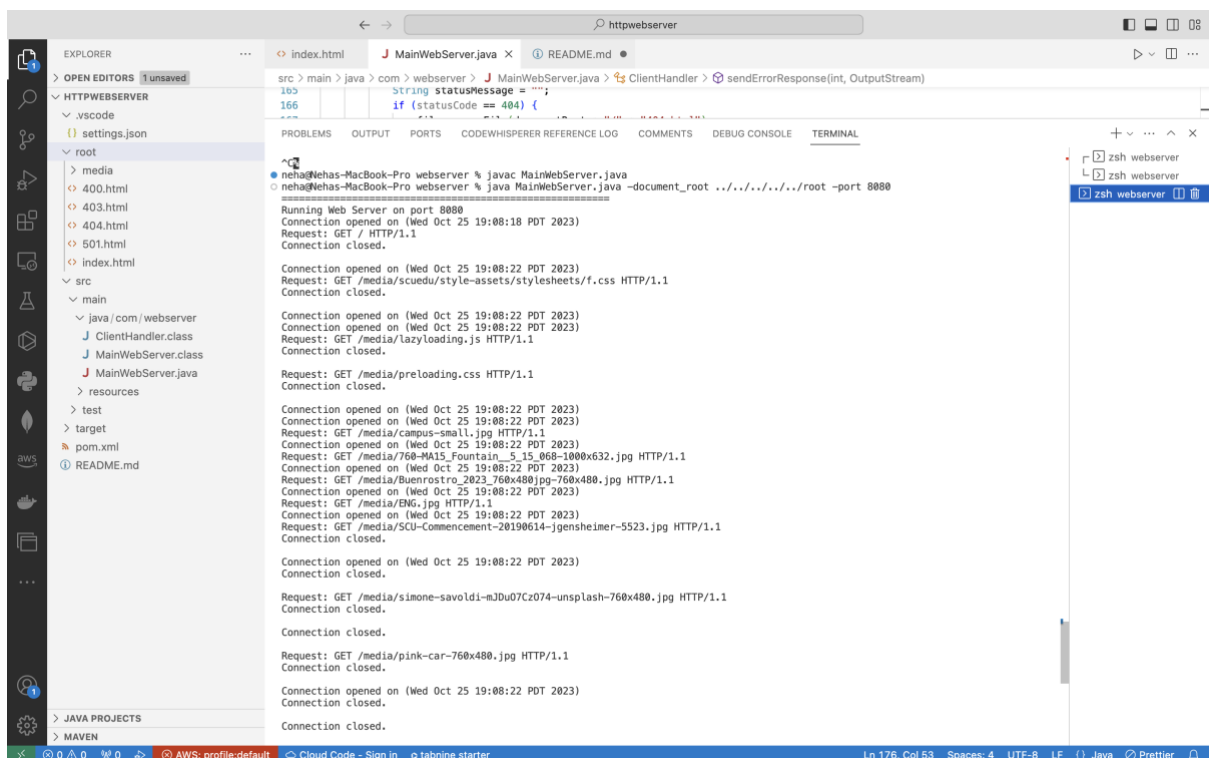
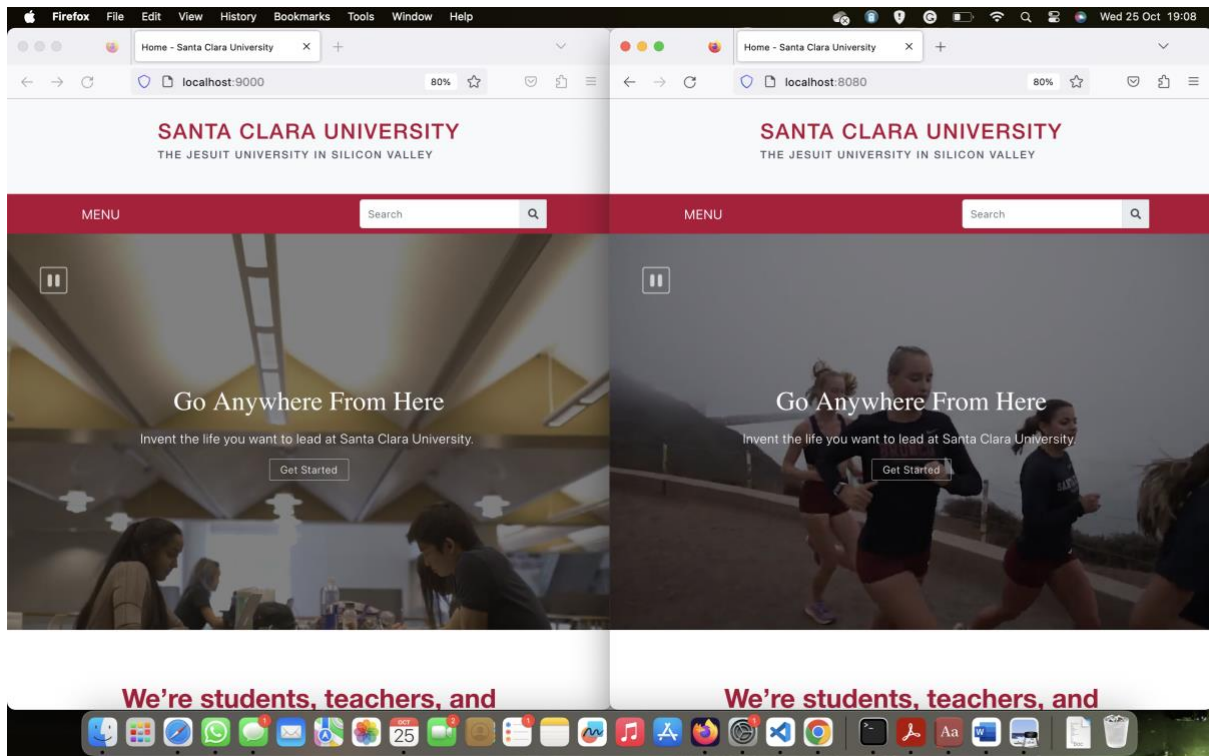


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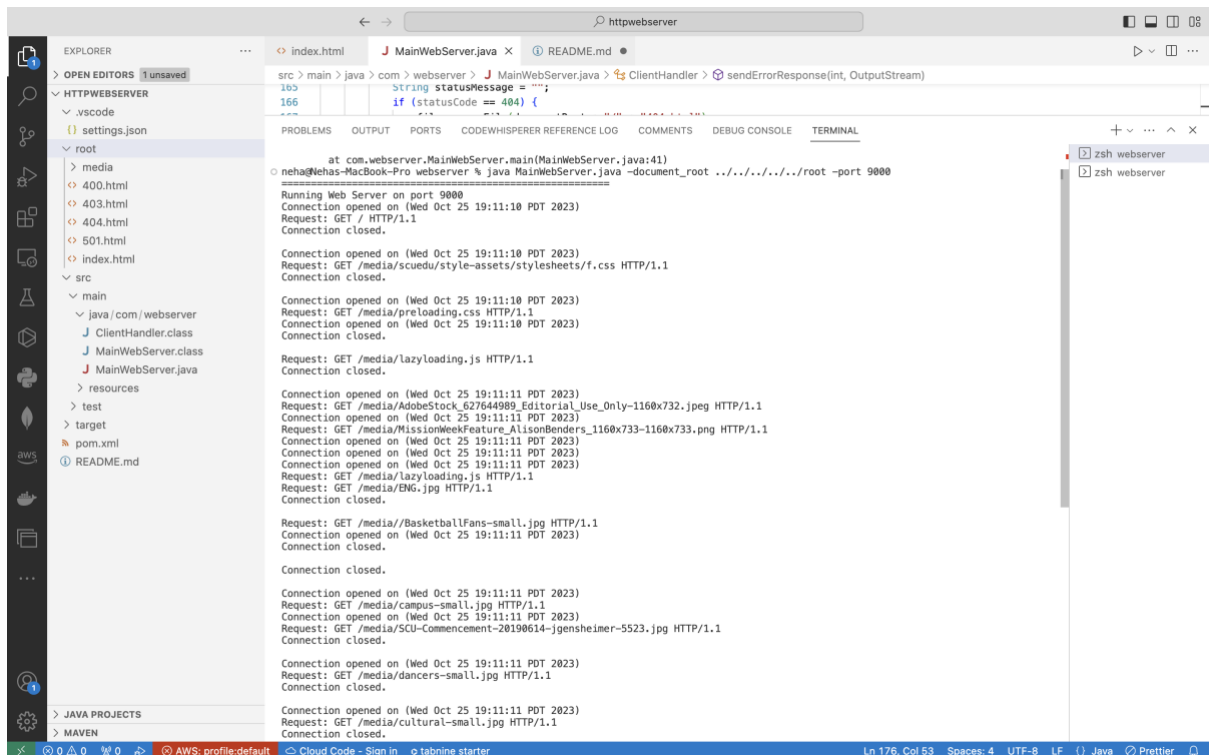
In case of error the page appears as follows:



Running two threads for two clients on two different ports:

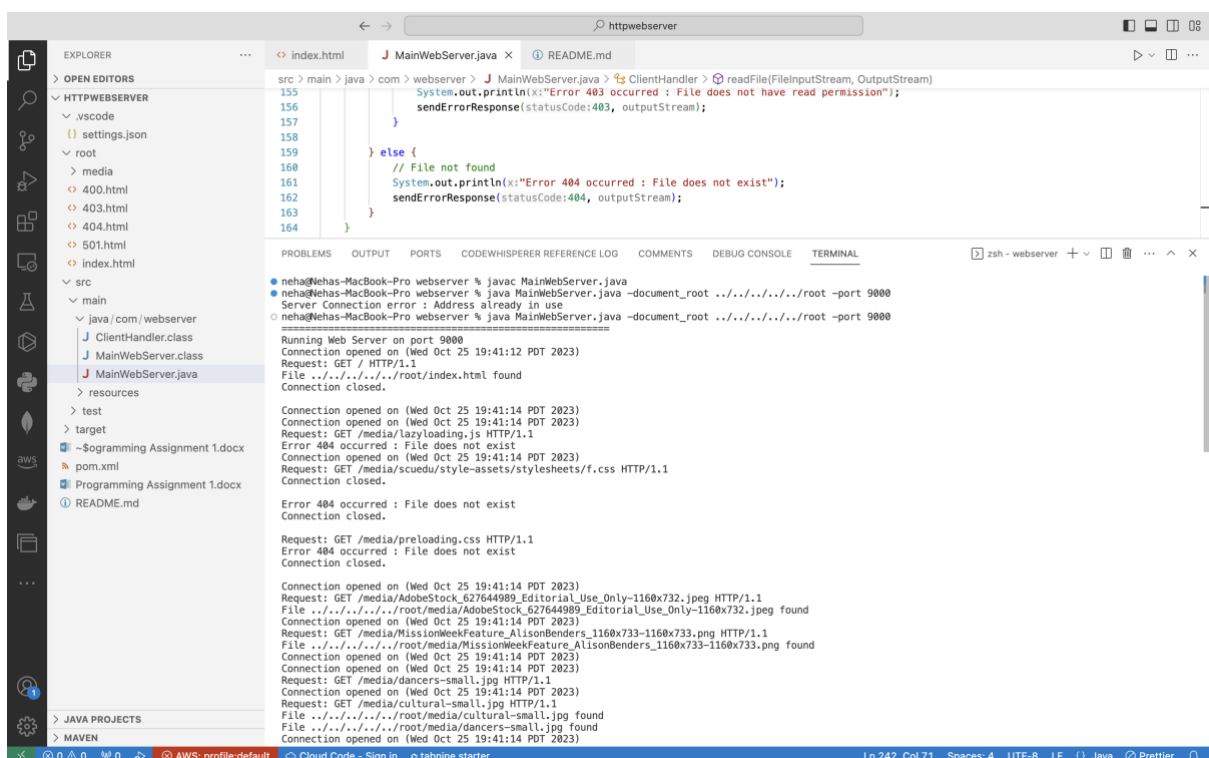


COEN 317 DISTRIBUTED SYSTEMS



```
src > main > java > com > webserver > J MainWebServer.java > ClientHandler > sendErrorResponse(int, OutputStream)
165 String statusMessage = "";
166 if (statusCode == 404) {
    at com.webserver.MainWebServer.main(MainWebServer.java:41)
neha@Neahas-MacBook-Pro webserver % java MainWebServer.java -document_root ../../../../root -port 9000
Running Web Server on port 9000
Connection opened on (Wed Oct 25 19:11:10 PDT 2023)
Request: GET / HTTP/1.1
Connection closed.
Connection opened on (Wed Oct 25 19:11:10 PDT 2023)
Request: GET /media/scuedu/style-assets/stylesheets/f.css HTTP/1.1
Connection closed.
Connection opened on (Wed Oct 25 19:11:10 PDT 2023)
Request: GET /media/preloading.css HTTP/1.1
Connection opened on (Wed Oct 25 19:11:10 PDT 2023)
Connection closed.
Request: GET /media/lazyloading.js HTTP/1.1
Connection closed.
Connection opened on (Wed Oct 25 19:11:11 PDT 2023)
Request: GET /media/AdobeStock_627644989_Editorial_Use_Only-1160x732.jpeg HTTP/1.1
Connection opened on (Wed Oct 25 19:11:11 PDT 2023)
Request: GET /media/MissionWeekFeature_AlisonBenders_1160x733-1160x733.png HTTP/1.1
Connection opened on (Wed Oct 25 19:11:11 PDT 2023)
Connection opened on (Wed Oct 25 19:11:11 PDT 2023)
Request: GET /media/lazyloading.js HTTP/1.1
Request: GET /media/ENG.jpg HTTP/1.1
Connection closed.
Request: GET /media/BasketballFans-small.jpg HTTP/1.1
Connection opened on (Wed Oct 25 19:11:11 PDT 2023)
Connection closed.
Connection opened on (Wed Oct 25 19:11:11 PDT 2023)
Request: GET /media/campus-small.jpg HTTP/1.1
Connection opened on (Wed Oct 25 19:11:11 PDT 2023)
Request: GET /media/SCU-Commencement-20190614-jensheimer-5523.jpg HTTP/1.1
Connection closed.
Connection opened on (Wed Oct 25 19:11:11 PDT 2023)
Request: GET /media/dancers-small.jpg HTTP/1.1
Connection closed.
Connection opened on (Wed Oct 25 19:11:11 PDT 2023)
Request: GET /media/cultural-small.jpg HTTP/1.1
Connection closed.
```

Logging mechanism is incorporated in the program to keep track of requests and errors occurred if any:



```
src > main > java > com > webserver > J MainWebServer.java > ClientHandler > readFile(FileInputStream, OutputStream)
155 System.out.println(x:"Error 403 occurred : File does not have read permission");
156 sendErrorResponse(statusCode:403, outputStream);
157 }
158 }
159 // File not found
160 System.out.println(x:"Error 404 occurred : File does not exist");
161 sendErrorResponse(statusCode:404, outputStream);
162 }
163 }
164 }
neha@Neahas-MacBook-Pro webserver % javac MainWebServer.java
neha@Neahas-MacBook-Pro webserver % java MainWebServer.java -document_root ../../../../root -port 9000
Server Connection error : Address already in use
neha@Neahas-MacBook-Pro webserver % java MainWebServer.java -document_root ../../../../root -port 9000
Running Web Server on port 9000
Connection opened on (Wed Oct 25 19:41:12 PDT 2023)
Request: GET / HTTP/1.1
File ../../../../root/index.html found
Connection closed.
Connection opened on (Wed Oct 25 19:41:14 PDT 2023)
Request: GET /media/lazyloading.js HTTP/1.1
Error 404 occurred : File does not exist
Connection opened on (Wed Oct 25 19:41:14 PDT 2023)
Request: GET /media/scuedu/style-assets/stylesheets/f.css HTTP/1.1
Connection closed.
Error 404 occurred : File does not exist
Connection closed.
Request: GET /media/preloading.css HTTP/1.1
Error 404 occurred : File does not exist
Connection closed.
Connection opened on (Wed Oct 25 19:41:14 PDT 2023)
Request: GET /media/AdobeStock_627644989_Editorial_Use_Only-1160x732.jpeg HTTP/1.1
File ../../../../root/media/AdobeStock_627644989_Editorial_Use_Only-1160x732.jpeg found
Connection opened on (Wed Oct 25 19:41:14 PDT 2023)
Request: GET /media/MissionWeekFeature_AlisonBenders_1160x733-1160x733.png HTTP/1.1
File ../../../../root/media/MissionWeekFeature_AlisonBenders_1160x733-1160x733.png found
Connection opened on (Wed Oct 25 19:41:14 PDT 2023)
Connection opened on (Wed Oct 25 19:41:14 PDT 2023)
Request: GET /media/lazyloading.js HTTP/1.1
Request: GET /media/cultural-small.jpg HTTP/1.1
File ../../../../root/media/cultural-small.jpg found
File ../../../../root/media/dancers-small.jpg found
Connection opened on (Wed Oct 25 19:41:14 PDT 2023)
```