University of Dhaka

Department of Computer Science and Engineering

CSE-3111 : Computer Networking Lab

Lab Report 3 : Implementing File transfer using Socket Programming and HTTP GET/POST requests

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1 Introduction

The preliminary objective of this lab is to create a simple file transferring system using Socket Programming and Hyper Text Transfer Protocol(HTTP) protocol .Through Socket programming and HTTP protocol multiple clients request for files from server and server sends corresponding file to the clients.

1.1 Objectives

The objective of this lab is to give hands-on experience with socket programming and HTTP file transfer. You will

- implement multithreaded chat from many clients to one server
- set up an HTTP server process with a few objects
- use GET and POST methods to upload and download objects in between HTTP clients and a server

2 Theory

2.1 Socket Programming

Socket programming is a method of inter-process communication (IPC) that allows processes to communicate with each other across a network using sockets. A socket is a endpoint for sending or receiving data across a computer network. It is a combination of an IP address and a port number. In socket programming, a client creates a socket and connects to a server using the server's IP address and port number. The server then creates a socket and binds it to a specific IP address and port number. Once the connection is established, the client and server can send and receive data through the socket.

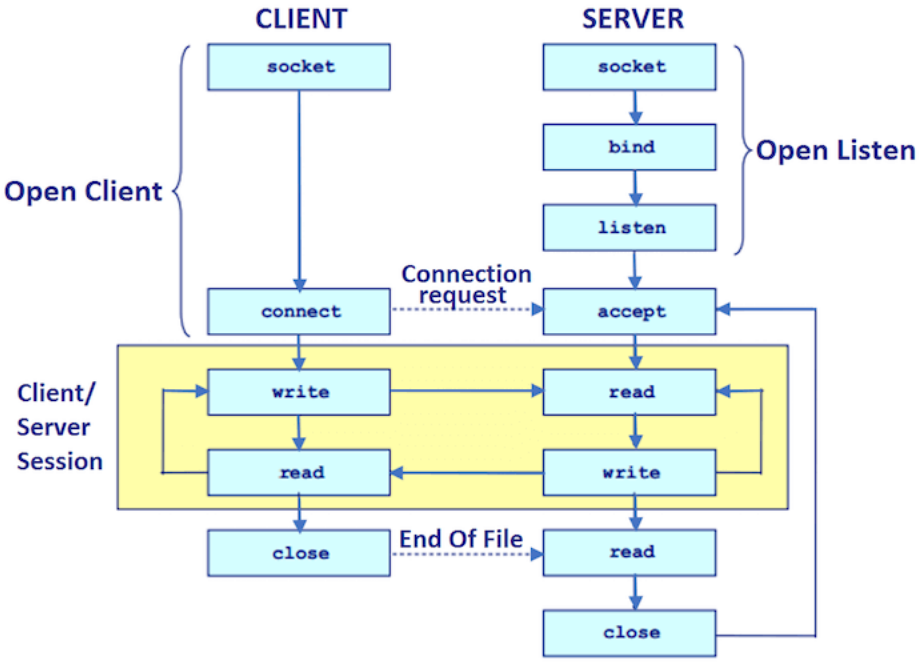

Figure 1: Socket Programming

2.2 HTTP

HTTP (Hypertext Transfer Protocol) is a communication protocol which is used to send data from one program to another over the INTERNET. Every HTTP server website has several web pages inside it. Every HTTP server website has several web pages inside it. Each web page can be separately accessed by the clients getting connected to the web server. These accesses can be of many various forms and ways. Separate HTTP methods exist for each separate applications from the client's side for the HTTP server. Two such type of operations can be requested by the client to the server using POST and GET methods.

- GET : GET is used to request data from a specified resource.
- POST : POST is used to send data to a server to create/update a resource. The data sent to the server with POST is stored in the request body of the HTTP request. It is also used when uploading a file or when submitting a completed web form.

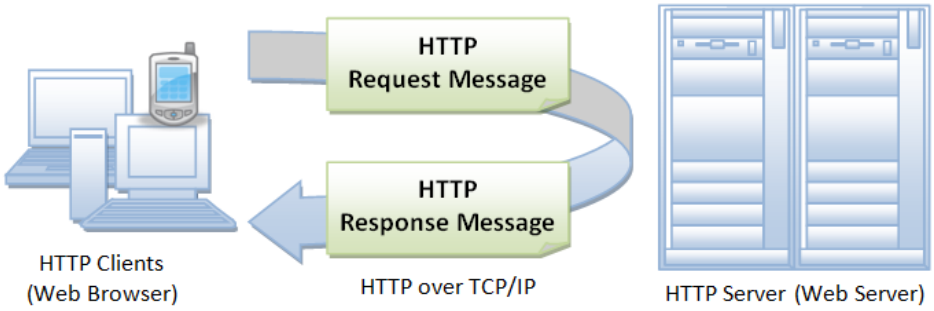

Figure 2: HyperText Transfer Protocol

3 Methodology

3.1 File Transfer via Socket Programming

Socket programming is a way of connecting two nodes on a network to communicate with each other. One socket(node) listens on a particular port at an IP, while the other socket reaches out to the other to form a connection. The server forms the listener socket while the client reaches out to the server.

- Establishing a connection:
  Both client and server need to establish a connection to transfer the file.
- Sending a request:
  The client sends a request to the server asking for the file.
- Receiving a response:
  The server responds to the client with the requested file or with an error message if the file is not found.
- Transferring the file:
  The server sends the file to the client in chunks, which the client receives and writes to its local storage.
- Closing the connection:
  After the file transfer is complete, both client and server close the connection.
- Error handling:
  Error handling mechanism should be implemented to handle possible exceptions, such as file not found or broken connections.

3.2 File Transfer via HTTP

In the server side when we turn it on it will wait for any HTTP request. If it gets any request then it will establish a connection. After setting up the connection, it receives an http query corresponding to which file client requested. Then it will read bytes from that file and send it to the client.

- Requesting a file:
  A client sends an HTTP GET request to the server to request a file.
- Server response:
  The server sends a response to the client, indicating if the file exists and if it's available. The response also includes the file content and related information, such as its size and format.
- File transfer:
  The client receives the file in the response and saves it to its local storage.
- Error handling:
  Error handling mechanisms should be implemented to handle possible exceptions, such as file not found or forbidden access.
- HTTP Verbs:
  HTTP supports several verbs like GET, POST, etc. each with different purposes like getting the data, sending data to the server, updating the data on the server, and deleting the data on the server.
- HTTP Headers:
  Additional information can be sent in the HTTP headers, such as the type of content being sent, encoding, etc.

4 Experimental result

4.1 File Transfer via Socket Programming

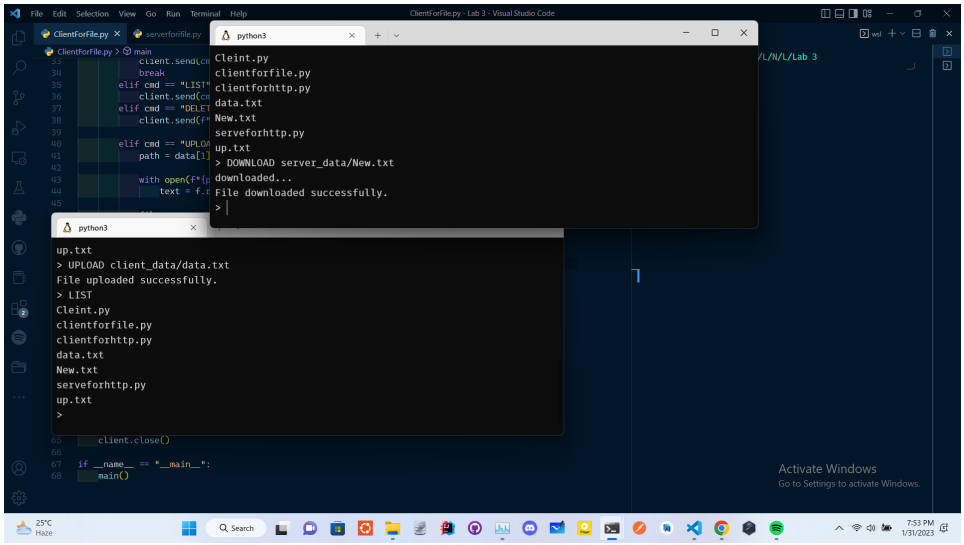

Figure 3: Content of Client

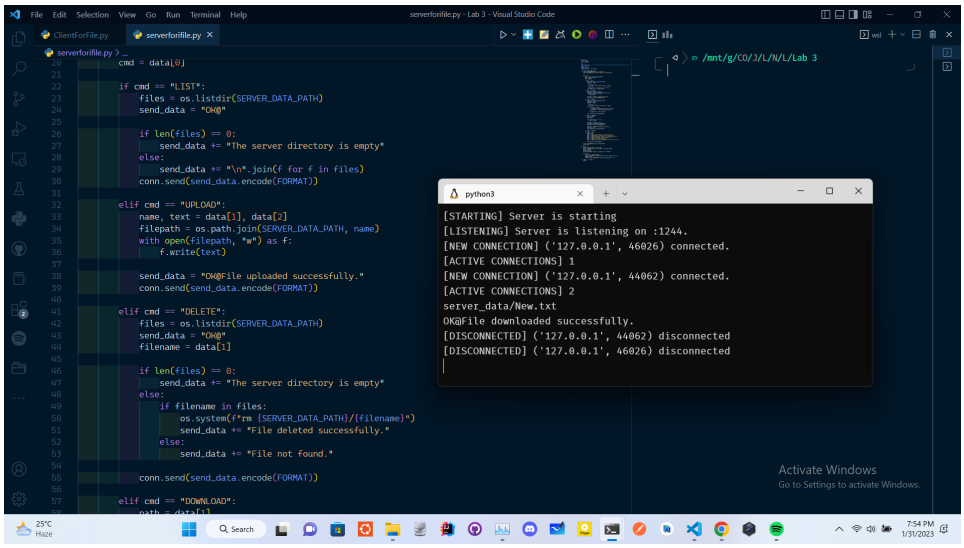

Figure 4: Content of Server

4.2 File Transfer via HTTP

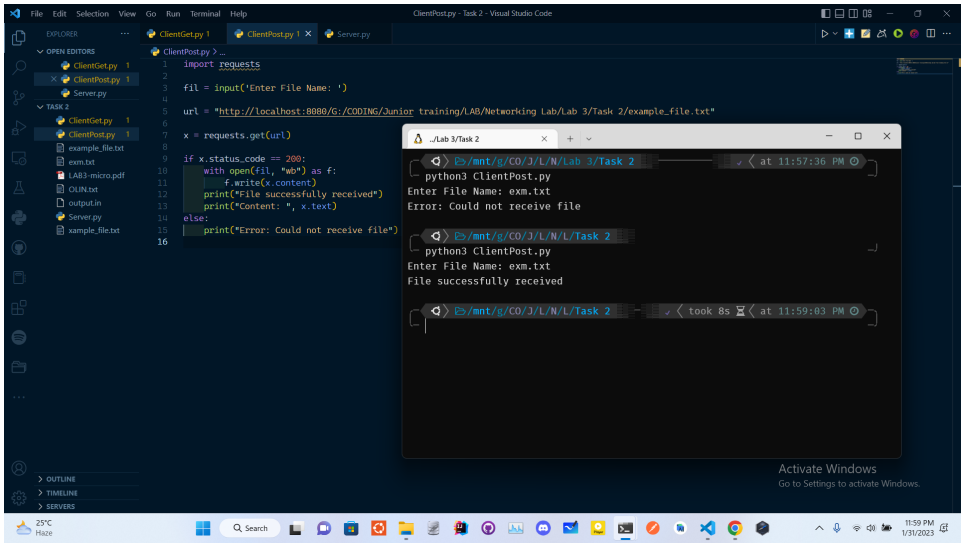

Figure 5: Content of ClientforPost

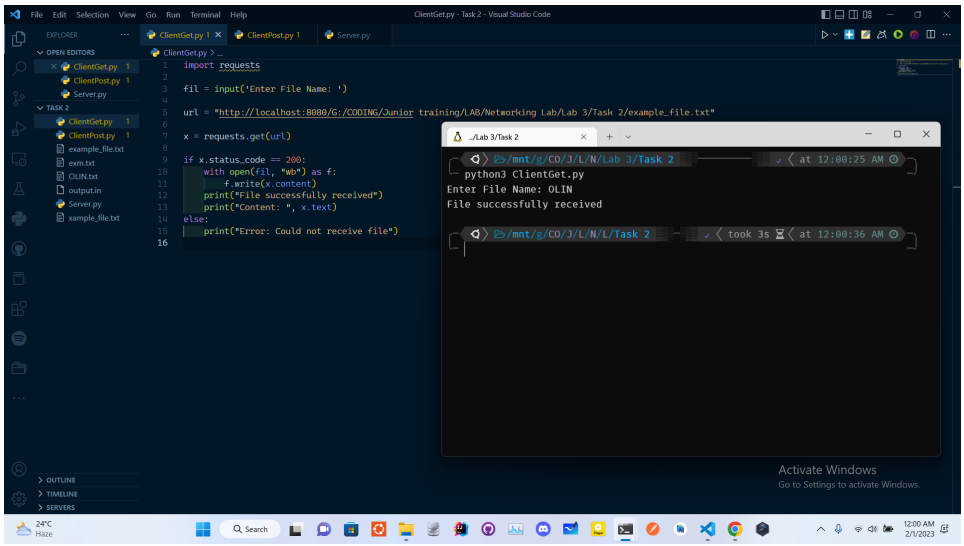

Figure 6: Content of ClientforGET

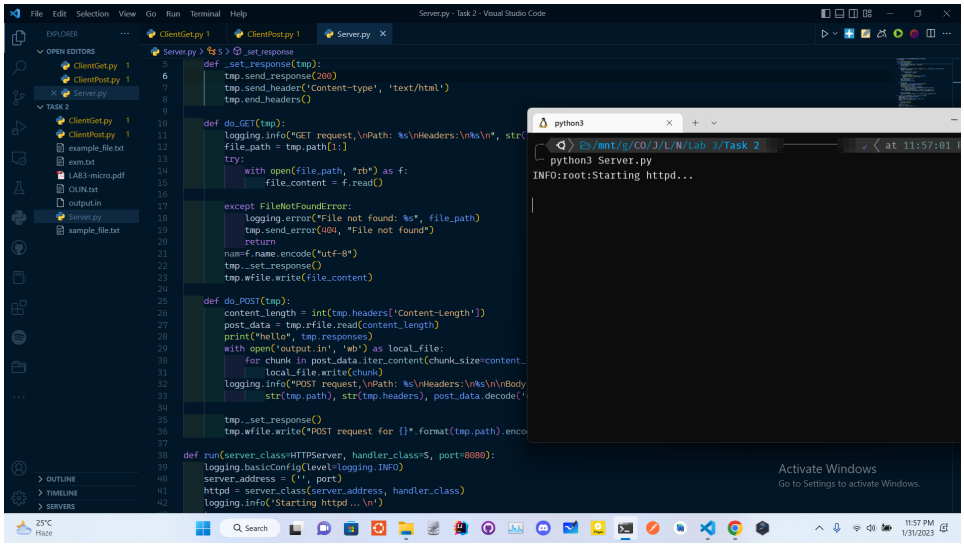

Figure 7: Content of Server

5 Experience

1. We had to implement a socket-based server and client to transfer files between them. The server creates a socket and binds it to a specific address and port. It then listens for incoming client connections.

2. We had to implement an HTTP server and client to transfer files between them.

3. We had to compare the implementation and performance of both socket programming and HTTP to understand the differences and trade-offs between them.

4. We had implemented error handling mechanisms to handle possible exceptions, such as file not found or broken connections.

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