

**University Of Science And Technology Of Hanoi**



## **Distributed Systems**

### **Practical Work 1: TCP File transfer**

Luong Quynh Nhi, 23BI14356, Cyber Security

Lecturer: Ms. Le Nhu Chu Hiep

## **1. Introduction**

This practical work focuses on implementing a simple TCP-based file transfer system using a client–server architecture. The system allows a client to send a file to the server over a reliable TCP/IP connection.

## **2. Objectives**

The main objectives of this practical are:

- Implement a working client–server architecture using TCP.
- Use fundamental socket functions for network communication.
- Organize system components clearly.
- Successfully transfer a text file from the client to the server.

## **3. System Architecture**

The system uses a 1-to-1 TCP connection between a single server and a single client.

### **3.1 Server Responsibilities**

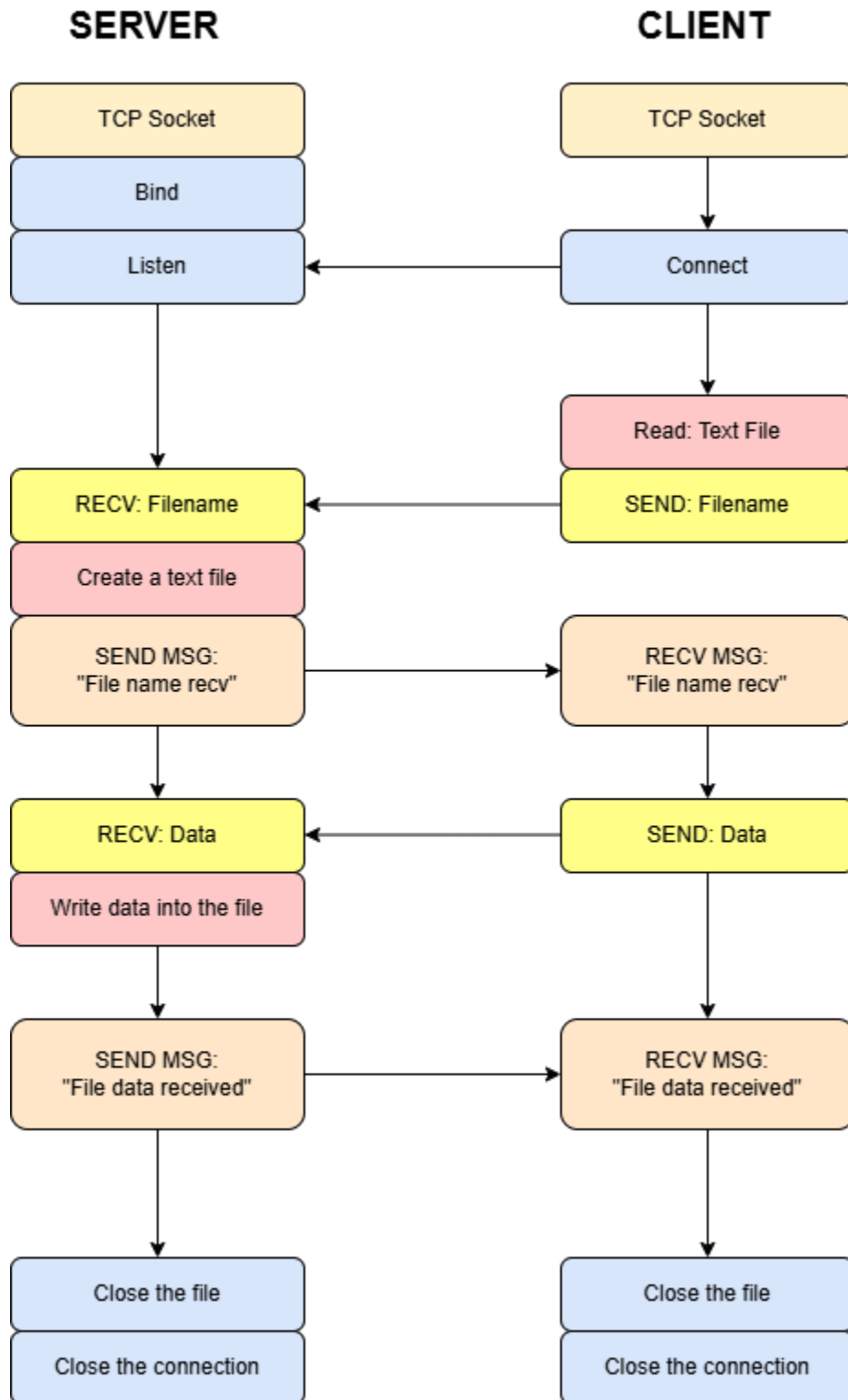
- Start a TCP socket
- Configure socket using `setsockopt()`
- Bind to a specific IP and port
- Listen for incoming connections
- Accept a client
- Receiving file name and file data
- Writing received data to a local file.
- Sending acknowledgement messages.
- Closing the file and the connection.

### **3.2 Client Responsibilities**

- Resolve server hostname using `gethostbyname()`
- Connect to server using TCP
- Send commands to the server
- Reading the file to be uploaded.
- Sending file name and file data
- Receiving acknowledgement messages.

- Closing the connection.

### Client-Server Communication Diagram File Transfer



The diagram shows a linear protocol where:

- The client sends filename and file data
- The server responds with ACK1 ("File name recv") and ACK2 ("File data received")
- Both sides close the connection safely

This simple protocol ensures:

- The server knows the exact filename before receiving data.
- The client waits for confirmation before sending the next stage.
- File data is written only after proper synchronization.
- TCP guarantees reliable transmission.

#### **4. Conclusion**

This practical demonstrates the core principles of TCP socket programming through a simple file transfer system. By designing a custom protocol, implementing a client - server architecture, and managing reliable data transmission, the project illustrates: How network connections are established; How data flows between client and server; How files can be transferred using a TCP stream.