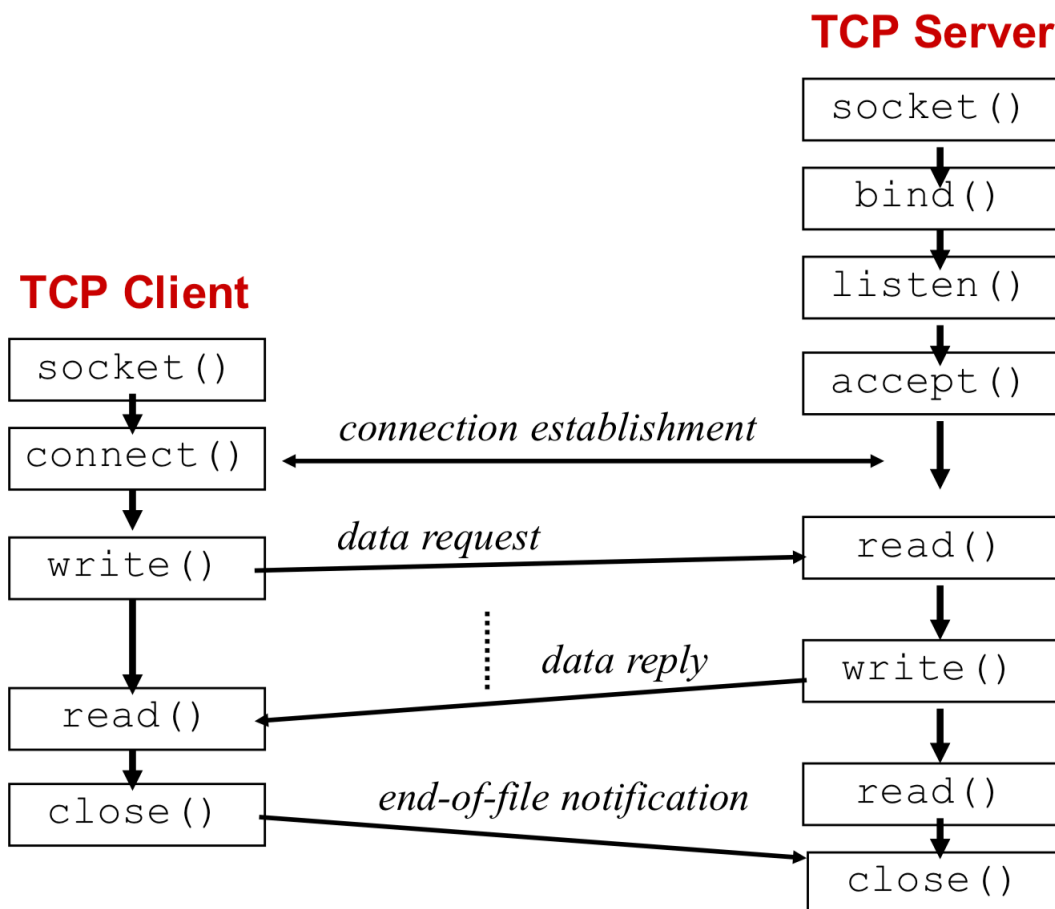# Lab 1: Peer-to-Peer File System

1. Objective

This lab aims to utilize the TCP/IP protocols to implement centralized peer-to-peer system, where there exists a central server that controls the file exchanging procedures.

2. Introduction

Peer-to-peer (p2p) system is a file exchanging system in the sense that every host in the peer network can download the files from other peers while sharing the files they have. Normal p2p system does not always rely on server. On the other hand, the centralized p2p relies on server to carry out the procedures between peers and peers. In this lab, the centralized scene is utilized. The server at this scene acts more like an information center in the sense that the peers will have to ask the server for the information about other peers instead of directly asking the peers.

Below is the basic concept of TCP connection:

TCP Server

| socket() |
| bind() |
| listen() |
| accept() |

TCP Client

| socket() |
| connect() |

connection establishment

| write() |

data request

| read() |

data reply

| write() |

| read() |

| close() |

end-of-file notification

| read() |

| close() |

3. System Description

The system is divided into two parts: server, and client. As mentioned above, the server acts as a center that supports multiple connection. If a peer wants to download a file from other peers, it has to first connect to the server to get the information about the file. The client serves as an end-point for downloading.

The requests that the system supports are: register, listing, location, and leave, each side has its response to the request:

	Client	Server
Register	Upload to the server its file list.	Store the file list from the server along with its IP address and port number.
Listing	Ask the server the file list from all current peers.	Maintain the file list and send to the clients when requested.
Location	Ask the server the IP address of the peer currently having the desired file.	Reply to the client the location, or the IP address of the peer, of the file it desired.
Leave	Abort the p2p connection.	Close the connection of the client.

Below is a figure that shows the concept of the operation on both sides.

Client

Host creates a socket for file exchange

Simultaneously

Host creates a socket to communicate with the server → Connect to server

Register → Upload the file list to the server for further inquiry

List → Retrieve the file list that current peers have

Location → Look up from server the file that the host wants to download

Leave → Leave the p2p peer network

Server

Creates socket and listen to incoming connection → Connect → Connect to clients

Register → Add new entry to the file list it keeps

Listing → Reply to the client the current file list

Location → Get the file name the client wants to download and later initiate downloading process

Leave → Remove the files the left client has and close the socket.