

Assignment 6

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1. Write a client and server program using socket programming in python. To implement a rudimentary idea of File Transfer Protocol (FTP).

Server Code:

```
import socket
import sys
import time
import os
import struct

print("\nWelcome to the FTP server.\n\nTo get started, connect a client.")

IP = "localhost"
PORT = 9999
BUFFER_SIZE = 1024
s = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
s.bind((IP, PORT))
s.listen(1)
conn, addr = s.accept()

print("\nConnected to by address: {}".format(addr))

def upld():

    conn.send("1".encode())

    file_name_size = struct.unpack("h", conn.recv(2))[0]
    file_name = conn.recv(file_name_size).decode()

    conn.send("1".encode())

    file_size = struct.unpack("i", conn.recv(4))[0]

    start_time = time.time()
    output_file = open(file_name, "wb")
    bytes_recieved = 0
    print("\nRecieving...")
    while bytes_recieved < file_size:
        l = conn.recv(BUFFER_SIZE)
        output_file.write(l)
        bytes_recieved += BUFFER_SIZE
    output_file.close()
    print("\nRecieved file: {}".format(file_name))
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conn.send(struct.pack("f", time.time() - start_time))
conn.send(struct.pack("i", file_size))
return

def dwld():
    conn.send("1".encode())
    file_name_length = struct.unpack("h", conn.recv(2))[0]
    print(file_name_length)
    file_name = conn.recv(file_name_length).decode()
    print(file_name)
    if os.path.isfile(file_name):

        conn.send(struct.pack("i", os.path.getsize(file_name)))
    else:

        print("File name not valid")
        conn.send(struct.pack("i", -1))
        return

    conn.recv(BUFFER_SIZE).decode()

    start_time = time.time()
    print("Sending file...")
    content = open(file_name, "rb")

    l = content.read(BUFFER_SIZE)
    while l:
        conn.send(l)
        l = content.read(BUFFER_SIZE)
    content.close()

    conn.recv(BUFFER_SIZE).decode()
    conn.send(struct.pack("f", time.time() - start_time))
    return

def quit():
    # Send quit conformation
    conn.send("1".encode())
    # Close and restart the server
    conn.close()
    s.close()
    os.execl(sys.executable, sys.executable, *sys.argv)

while True:

    print("\n\nWaiting for instruction")
    data = conn.recv(BUFFER_SIZE).decode()
    print("\nRecieved instruction: {}".format(data))

    if data == "UPLD":
        upld()
    elif data == "DWLD":
        dwld()

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elif data == "QUIT":
    quit()

data = None
```

Client Code:

```
import socket
import sys
import os
import struct

IP = "localhost"
PORT = 9999
BUFFER_SIZE = 1024
s = socket.socket(socket.AF_INET, socket.SOCK_STREAM)

def conn():
    # Connect to the server
    print("Sending server request...")
    try:
        s.connect((IP, PORT))
        print("Connection sucessful")
    except:
        print("Connection unsuccessful. Make sure the server is online.")

def upld(file_name):
    # Upload a file
    print("\nUploading file: {}".format(file_name))
    try:
        # Check the file exists
        content = open(file_name, "rb")
    except:
        print("Couldn't open file. Make sure the file name was entered correctly.")
        return
    try:
        # Make upload request
        s.send("UPLD".encode())
    except:
        print("Couldn't make server request. Make sure a connection has bene established.")
        return
    try:
        # Wait for server acknowledgement then send file details
        # Wait for server ok
        s.recv(BUFFER_SIZE).decode()
        # Send file name size and file name
        s.send(struct.pack("h", sys.getsizeof(file_name)))
        s.send(file_name.encode())
        # Wait for server ok then send file size
        s.recv(BUFFER_SIZE).decode()
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        s.send(struct.pack("i", os.path.getsize(file_name)))
    except Exception as e:
        print("Error sending file details")
        print("Error: ", e)
    try:
        # Send the file in chunks defined by BUFFER_SIZE
        # Doing it this way allows for unlimited potential file sizes to be
sent
        l = content.read(BUFFER_SIZE)
        print("\nSending...")
        while l:
            s.send(l)
            l = content.read(BUFFER_SIZE)
        content.close()
        # Get upload performance details
        upload_time = struct.unpack("f", s.recv(4))[0]
        upload_size = struct.unpack("i", s.recv(4))[0]
        print("\nSent file: {}\nTime elapsed: {}s\nFile size:
    {}b".format(file_name, upload_time, upload_size))
    except Exception as e:
        print("Error sending file")
        print("Error: ", e)
        return
    return

def dwld(file_name):
    # Download given file
    print("Downloading file: {}".format(file_name))
    try:
        # Send server request
        s.send("DWLD".encode())
    except:
        print("Couldn't make server request. Make sure a connection has
bene established.")
        return
    try:
        # Wait for server ok, then make sure file exists
        s.recv(BUFFER_SIZE).decode()
        # Send file name length, then name
        s.send(struct.pack("h", sys.getsizeof(file_name)))
        s.send(file_name.encode())
        # Get file size (if exists)
        file_size = struct.unpack("i", s.recv(4))[0]
        if file_size == -1:
            # If file size is -1, the file does not exist
            print("File does not exist. Make sure the name was entered
correctly")
            return
        except:
            print("Error checking file")
    try:
        # Send ok to recieve file content
        s.send("1".encode())
        # Enter loop to recieve file

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        output_file = open(file_name, "wb")
        bytes_recieved = 0
        print("\nDownloading...")
        while bytes_recieved < file_size:
            # Again, file broken into chunks defined by the BUFFER_SIZE
            variable
                l = s.recv(BUFFER_SIZE)
                output_file.write(l)
                bytes_recieved += BUFFER_SIZE
            output_file.close()
            print("Successfully downloaded {}".format(file_name))
            # Tell the server that the client is ready to recieve the download
        performance details
            s.send("1".encode())
            # Get performance details
            time_elapsed = struct.unpack("f", s.recv(4))[0]
            print("Time elapsed: {}s\nFile size: {}b".format(time_elapsed,
file_size))
        except:
            print("Error downloading file")
            return
        return

def quit():
    s.send("QUIT".encode())
    # Wait for server go-ahead
    s.recv(BUFFER_SIZE).decode()
    s.close()
    print("Server connection ended")
    return

print("\n\nWelcome to the FTP client.\n\nCall one of the following
functions:\nCONN          : Connect to server\nUPLD file_path : Upload
file\nDWLD file_path : Download file\nQUIT          : Exit")

while True:
    # Listen for a command
    prompt = input("\nEnter a command: ")
    if prompt[:4].upper() == "CONN":
        conn()
    elif prompt[:4].upper() == "UPLD":
        upld(prompt[5:])
    elif prompt[:4].upper() == "DWLD":
        dwld(prompt[5:])
    elif prompt[:4].upper() == "QUIT":
        quit()
        break
    else:
        print("Command not recognised; please try again")

```

Output:

File Edit View Bookmarks Plugins Settings Help

client: zsh — Konsole

New Tab Split View

server: zsh

client: zsh

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server: zsh
python ftp_server.py
Welcome to the FTP server.
To get started, connect a client.
Connected to by address: ('127.0.0.1', 40492)
Waiting for instruction
Recieved instruction: UPLD
Recieving...
Recieved file: upload_file.txt
Waiting for instruction
Recieved instruction: DWLD
66
download_file.txt
Sending file...
Waiting for instruction
Recieved instruction: QUIT
Welcome to the FTP server.
To get started, connect a client.
Traceback (most recent call last):
  File "/home/hobbist/MyFiles/Assignments/oth_Sem/CS5652_Networks_Lab/Lab_6/server/ftp_server.py", line 13, in <module>
    s.bind((IP, PORT))
  OSError: [Errno 98] Address already in use

client: zsh
python ftp_client.py
Welcome to the FTP client.
Call one of the following functions:
CONN      : Connect to server
UPLD file_path : Upload file
DWLD file_path : Download file
QUIT      : Exit
Enter a command: conn
Sending server request...
Connection successful
Enter a command: upld upload_file.txt
Uploading file: upload_file.txt...
Sending...
Sent file: upload_file.txt
Time elapsed: 0.04317021369934082s
File size: 20b
Enter a command: dwld download_file.txt
Downloading file: download_file.txt
Downloading...
Successfully downloaded download_file.txt
Time elapsed: 0.00039386749267578125s
File size: 28b
Enter a command: quit
Server connection ended
```