CS 461

Lab Assignment 6

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Q. Implement Distributed Banking Application

Server.py:

```
import socket
import threading

class Server:
    def __init__(self, host='127.0.0.1', port=9000):
        self.server_socket = socket.socket(socket.AF_INET,
socket.SOCK_STREAM)
        self.server_socket.bind((host, port))
        self.server_socket.listen(5)
        self.clients = {}

        print(f"Server running on {host}:{port}")

    def handle_client(self, client_socket, client_address):
        try:
            while True:
                packet = client_socket.recv(1024).decode()
                if not packet:
                    break

                # Registration
                if packet.startswith('id_'):
                    client_id = packet[3:]
                    self.clients[client_id] = 0
                    print(f"Registered client ID: {client_id}")

                # Withdrawal
                elif packet.startswith('1'):
                    id, amount = packet[1:].split('.')
                    amount = int(amount)
                    if self.clients.get(id, 0) < amount:
```

```
                        # Insufficient funds
                        client_socket.sendall("0".encode())
                    else:
                        self.clients[id] -= amount
                        client_socket.sendall("1".encode())  #
Successful

                # Deposit
                elif packet.startswith('2'):
                    id, amount = packet[1:].split('.')
                    amount = int(amount)
                    self.clients[id] = self.clients.get(id, 0) +
amount
                    client_socket.sendall("1".encode())  #
Successful

                # Transfer
                elif packet.startswith('3'):
                    id, id2, amount = packet[1:].split('.')
                    amount = int(amount)
                    if self.clients.get(id, 0) < amount:
                        # Insufficient funds
                        client_socket.sendall("0".encode())
                    elif id2 not in self.clients:
                        # Invalid recipient
                        client_socket.sendall("1".encode())
                    else:
                        self.clients[id] -= amount
                        self.clients[id2] += amount
                        client_socket.sendall("2".encode())  #
Successful

                # Balance inquiry
                elif packet.startswith('4'):
                    balance = self.clients.get(packet[1:], 0)
                    client_socket.sendall(str(balance).encode())

                # Exit
                elif packet.startswith('5'):
                    print(f"Client {client_address} disconnected.")
                    break
        finally:
            client_socket.close()

    def start(self):
        while True:
```

```
            client_socket, client_address =
self.server_socket.accept()
            print(f"Connection established with {client_address}")
            threading.Thread(target=self.handle_client, args=(
                client_socket, client_address)).start()

if __name__ == "__main__":
    server = Server()
    server.start()
```

Client.py

```
import socket
import sys

class Client:
    def __init__(self, host='127.0.0.1', port=9000):
        self.host = host
        self.port = port
        self.socket = socket.socket(socket.AF_INET,
socket.SOCK_STREAM)
        self.socket.connect((self.host, self.port))

    def register(self, client_id):
        msg = 'id_' + client_id
        self.socket.send(msg.encode())

    def send_transaction(self, msg):
        self.socket.send(msg.encode())
        response = self.socket.recv(1024).decode()
        return response

    def close(self):
        self.socket.send('5'.encode())
        self.socket.close()

def main():
    client = Client()
    client_id = input(
        "Enter your first name and ID (Ex: John123): ").replace(' ',
'')
    client.register(client_id)
```

```
    while True:
        print("\nEnter the number according to the option you
want:")
        print("1: Withdraw\n2: Deposit\n3: Transfer\n4: Balance\n5:
Exit")
        option = input("Your choice: ")

        if option == '1':
            amount = input("Enter the amount to withdraw: ")
            msg = option + client_id + '.' + amount
            response = client.send_transaction(msg)
            print("Transaction Successful!" if response ==
                  '1' else "Insufficient funds.")

        elif option == '2':
            amount = input("Enter the amount to deposit: ")
            msg = option + client_id + '.' + amount
            response = client.send_transaction(msg)
            print("Deposit Successful!" if response ==
                  '1' else "Deposit Failed.")

        elif option == '3':
            recipient = input("Enter the recipient's ID: ")
            amount = input("Enter the amount to transfer: ")
            msg = option + client_id + '.' + recipient + '.' +
amount
            response = client.send_transaction(msg)
            if response == '2':
                print("Transfer Successful!")
            elif response == '1':
                print("Invalid recipient.")
            else:
                print("Insufficient funds.")

        elif option == '4':
            msg = option + client_id
            balance = client.send_transaction(msg)
            print("Your balance is:", balance)

        elif option == '5':
            client.close()
            break

        else:
            print("Invalid option. Please try again.")
```

```
if __name__ == "__main__":
    main()
```

Code Explanation:

Server Code (server.py):

- The server acts as a central component that listens for client connections and processes requests related to banking operations such as registering clients, withdrawing, depositing, transferring funds, and checking balances.

Client Code (client.py):

- The client interacts with the server to perform various banking operations by sending requests and receiving responses.

Key Features:

1. Withdraw
2. Deposit
3. Transfer
4. Check Balance

Testing Phase:

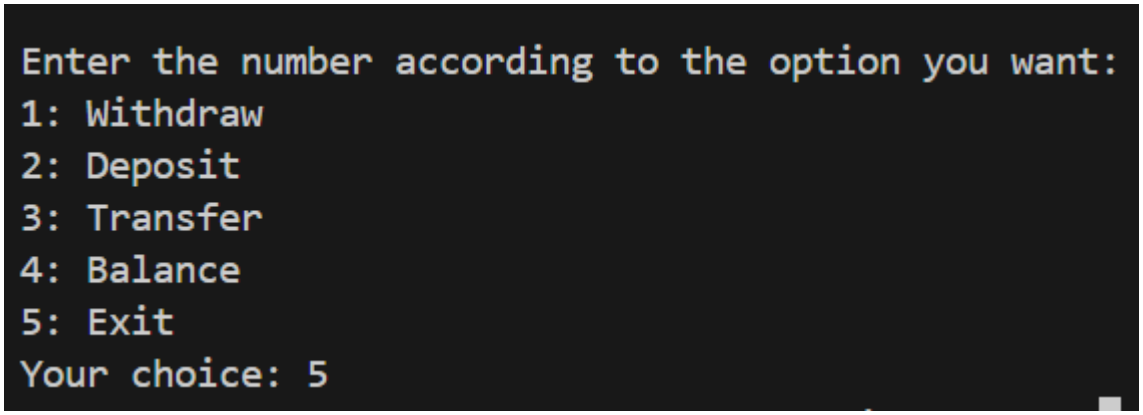
```
Server running on 127.0.0.1:9000
Connection established with ('127.0.0.1', 60732)
Registered client ID: Dhruv123
```

```
Enter your first name and ID (Ex: John123): Dhruv123

Enter the number according to the option you want:
1: Withdraw
2: Deposit
3: Transfer
4: Balance
5: Exit
Your choice: 2
Enter the amount to deposit: 800000
Deposit Successful!
```

```
Enter the number according to the option you want:
1: Withdraw
2: Deposit
3: Transfer
4: Balance
5: Exit
Your choice: 1
Enter the amount to withdraw: 10000
Transaction Successful!
```

```
Enter the number according to the option you want:
1: Withdraw
2: Deposit
3: Transfer
4: Balance
5: Exit
Your choice: 4
Your balance is: 790000
```



Conclusion: Successfully implemented distributed banking application.