Computer Networks

Assignment – 9

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1. Write a TCP/UDP socket program (in C/C++/Java/Python) to establish a connection between client and server. The server should act as a network device, maintaining an ARP table. Implement ARP request and reply functionality.
Display appropriate messages indicating the ARP request and response. Test your program with multiple clients requesting ARP resolution for different IP addresses.

Server.py

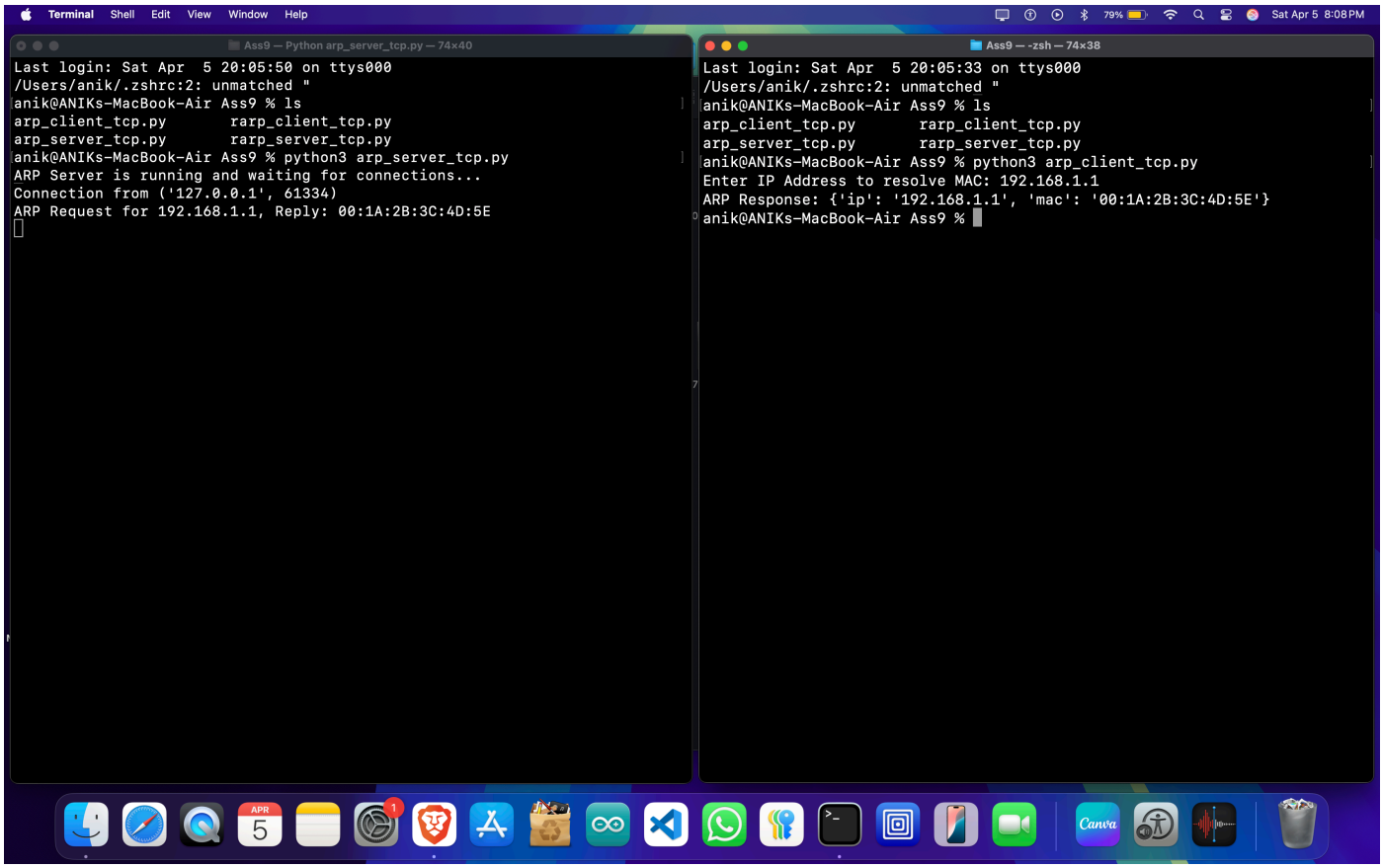
```
import socket
import pickle

# Simulated ARP Table
arp_table = {
    "192.168.1.1": "00:1A:2B:3C:4D:5E",
    "192.168.1.2": "00:1A:2B:3C:4D:5F"
}

def arp_server():
    server_socket = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
    server_socket.bind(("127.0.0.1", 9999))
    server_socket.listen(5)
    print("ARP Server is running and waiting for connections...")

    while True:
        conn, addr = server_socket.accept()
        print("Connection from", addr)

        # Receive ARP Request
        data = conn.recv(1024)
        if not data:
            conn.close()
            continue

        try:
            request = pickle.loads(data)
            ip_address = request.get("ip")
```

```
            # Send ARP Reply
            mac_address = arp_table.get(ip_address, "Not Found")
            response = {"ip": ip_address, "mac": mac_address}
            conn.send(pickle.dumps(response))

            print(f"ARP Request for {ip_address}, Reply: {mac_address}")

        except pickle.UnpicklingError:
            print("Error: Invalid data received")

        conn.close()

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

Client.py:

```
import socket
import pickle

def arp_client(ip_address):
    client_socket = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
    client_socket.connect(("127.0.0.1", 9999))

    # Send ARP Request
    request = {"ip": ip_address}
    client_socket.send(pickle.dumps(request))

    # Receive ARP Reply
    response = pickle.loads(client_socket.recv(1024))
    print("ARP Response:", response)

    client_socket.close()

if __name__ == "__main__":
    ip = input("Enter IP Address to resolve MAC: ")  # Use input() instead of raw_input()
    arp_client(ip)
```

OUTPUT:



2. Write a TCP/UDP socket program (in C/C++/Java/Python) to establish a connection between client and server. The server should act as a network device, maintaining a RARP table mapping MAC addresses to IP addresses. Implement RARP
request and reply functionality.
Display appropriate messages indicating the RARP request and response.
Test your program with multiple clients requesting RARP resolution for different MAC addresses

Server.py

```
import socket

# RARP Table (MAC → IP)
rarp_table = {
    "AA:BB:CC:DD:EE:01": "192.168.1.101",
    "AA:BB:CC:DD:EE:02": "192.168.1.102",
    "AA:BB:CC:DD:EE:03": "192.168.1.103"
}

# Create UDP socket
s = socket.socket(socket.AF_INET, socket.SOCK_DGRAM)
```

```
s.bind(("0.0.0.0", 12345))  # Bind to all available interfaces on port 12345

print("[SERVER] RARP Server is running and waiting for requests...")

while True:
    try:
        # Receive RARP request
        data, addr = s.recvfrom(1024)
        mac = data.decode().strip()  # Decode MAC address request
        print(f"[RARP REQUEST] Received request for MAC: {mac} from
{addr}")

        # Look up MAC in the RARP table
        ip = rarp_table.get(mac, "MAC address not found")

        # Send RARP reply
        s.sendto(ip.encode(), addr)
        print(f"[RARP REPLY] Sent IP: {ip} for MAC: {mac}")

    except Exception as e:
        print(f"[ERROR] {e}")
```

Client.py

```
import socket

def rarp_client():
    s = socket.socket(socket.AF_INET, socket.SOCK_DGRAM)
    server_address = ("127.0.0.1", 12345)  # Use localhost (same as server)

    while True:
        try:
            mac = input("Enter MAC address (or 'exit' to quit): ").strip()
            if mac.lower() == "exit":
                print("Exiting RARP Client.")
                break

            # Send RARP request
            s.sendto(mac.encode(), server_address)

            # Receive RARP reply
            data, _ = s.recvfrom(1024)
            print("Received RARP reply:", data.decode())

        except ConnectionError:
```

```
            print("[ERROR] Server is unavailable. Please check if it is running.")
            break
        except Exception as e:
            print(f"[ERROR] {e}")
            break

    s.close()  # Close socket when done

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

Output