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server.py
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import socket
import threading
import datetime

client_counter = 0

def handle_client(conn, addr, client_name):
    print(f"{client_name} connected from {addr[0]}:{addr[1]}")

    while True:
        data = conn.recv(1024).decode().strip()

        if not data:
            break

        if data == "QUIT":
            print(f"{client_name} disconnected.")
            conn.close()
            return

        if ":" not in data and data not in ["TIME", "DATE"]:
            response = f"ERROR: Unknown command from {client_name}."
            conn.send(response.encode())
            print(f"{client_name} sent: {data} → {response}")
            continue

        # BONUS: TIME & DATE
        if data == "TIME":
            result = datetime.datetime.now().strftime("%H:%M:%S")
            conn.send(result.encode())
            print(f"{client_name} sent: TIME → {result}")
            continue

        if data == "DATE":
            result = datetime.datetime.now().strftime("%Y-%m-%d")
            conn.send(result.encode())
            print(f"{client_name} sent: DATE → {result}")
            continue

        command, message = data.split(":", 1)
        command = command.strip()
        message = message.strip()

        # Execute commands
        if command == "UPPER":
            result = message.upper()
        elif command == "LOWER":
            result = message.lower()
        elif command == "REVERSE":
            result = message[::-1]
        elif command == "COUNT":
            result = str(len(message))
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# BONUS: VOWELS
elif command == "VOWELS":
    vowels = "aeiouAEIOU"
    count = sum(1 for ch in message if ch in vowels)
    result = str(count)
else:
    result = f"ERROR: Unknown command from {client_name}."

conn.send(result.encode())
print(f"{client_name} sent: {data} → {result}")

def main():
    global client_counter

    server = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
    server.bind(("0.0.0.0", 2210))
    server.listen()

    print("Server is running on port 2210")

    while True:
        conn, addr = server.accept()

        client_counter += 1
        client_name = f"Client{client_counter}"

        thread = threading.Thread(target=handle_client, args=(conn, addr, client_name))
        thread.start()

main()

```

Run in Terminal :

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PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS

○ (dl_env) PS C:\University\Semester 5\Computer Network\Labs\Lab 2> python server.py
Server is running on port 2210
Client1 connected from 127.0.0.1:55262
Client1 sent: UPPER: Wireshark → WIRESHARK
Client1 sent: LOWER: Wireshark → wireshark
Client2 connected from 127.0.0.1:55308
Client2 sent: REVERSE: Wireshark → krahseriW
Client3 connected from 127.0.0.1:55333
Client3 sent: COUNT: Wireshark → 9
Client3 sent: VOWELS: Wireshark → 3
Client1 sent: TIME → 00:52:50
Client2 sent: DATE → 2025-11-27
Client1 disconnected.
Client3 sent: TIME → 00:53:19
Client3 sent: DATE → 2025-11-27
Client3 disconnected.
Client2 disconnected.

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client.py
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import socket

client = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
client.connect(("127.0.0.1", 2210))

print("Connected to server.")

while True:
    msg = input("> ")

    client.send(msg.encode())

    if msg == "QUIT":
        print("Connection closed.")
        client.close()
        break

    data = client.recv(1024).decode()
    print("Response from server:", data)

```

Run in Terminal :

Client 1:

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

- (dl_env) PS C:\University\Semester 5\Computer Network\Labs\Lab 2> python client.py
 Connected to server.
 > UPPER: Wireshark
 Response from server: WIRESHARK
 > LOWER: Wireshark
 Response from server: wireshark
 > TIME
 Response from server: 00:52:50
 > QUIT
 Connection closed.
- (dl_env) PS C:\University\Semester 5\Computer Network\Labs\Lab 2>

Client 2:

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

- (dl_env) PS C:\University\Semester 5\Computer Network\Labs\Lab 2> python client.py
 Connected to server.
 > REVERSE: Wireshark
 Response from server: krahseriW
 > DATE
 Response from server: 2025-11-27
 > QUIT
 Connection closed.
- (dl_env) PS C:\University\Semester 5\Computer Network\Labs\Lab 2>

Client 3:

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

- (dl_env) PS C:\University\Semester 5\Computer Network\Labs\Lab 2> python client.py
Connected to server.
> COUNT: Wireshark
Response from server: 9
> VOWELS: Wireshark
Response from server: 3
> TIME
Response from server: 00:53:19
> DATE
Response from server: 2025-11-27
> QUIT
Connection closed.
- (dl_env) PS C:\University\Semester 5\Computer Network\Labs\Lab 2>

Wireshark:

Using filter tcp.port == 2210 → *Shows packets that use TCP port 2210 only*

| No. | Time | Source | Destination | Protocol | Length | Info |
|------|------------|-----------|-------------|----------|--------|--|
| 797 | 56.756586 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 2210 → 55262 [ACK] Seq=1 Ack=17 Win=65280 Len=0 |
| 855 | 63.812616 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 2210 → 55262 [ACK] Seq=10 Ack=33 Win=65280 Len=0 |
| 1740 | 132.548571 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 2210 → 55262 [ACK] Seq=19 Ack=37 Win=65280 Len=0 |
| 1957 | 150.132652 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 2210 → 55262 [ACK] Seq=27 Ack=41 Win=65280 Len=0 |
| 1959 | 150.132818 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 2210 → 55262 [FIN, ACK] Seq=27 Ack=41 Win=65280 Len=0 |
| 798 | 56.756688 | 127.0.0.1 | 127.0.0.1 | TCP | 53 | 2210 → 55262 [PSH, ACK] Seq=1 Ack=17 Win=65280 Len=9 |
| 856 | 63.812673 | 127.0.0.1 | 127.0.0.1 | TCP | 53 | 2210 → 55262 [PSH, ACK] Seq=10 Ack=33 Win=65280 Len=9 |
| 1741 | 132.548794 | 127.0.0.1 | 127.0.0.1 | TCP | 52 | 2210 → 55262 [PSH, ACK] Seq=19 Ack=37 Win=65280 Len=8 |
| 668 | 48.446445 | 127.0.0.1 | 127.0.0.1 | TCP | 56 | 2210 → 55262 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=65495 WS=256 SACK_PERM |
| 1150 | 88.340681 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 2210 → 55308 [ACK] Seq=1 Ack=19 Win=65280 Len=0 |
| 1798 | 138.580706 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 2210 → 55308 [ACK] Seq=10 Ack=23 Win=65280 Len=0 |
| 2284 | 175.189167 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 2210 → 55308 [ACK] Seq=20 Ack=27 Win=65280 Len=0 |
| 2285 | 175.189343 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 2210 → 55308 [FIN, ACK] Seq=20 Ack=27 Win=65280 Len=0 |
| 1151 | 88.340749 | 127.0.0.1 | 127.0.0.1 | TCP | 53 | 2210 → 55308 [PSH, ACK] Seq=1 Ack=19 Win=65280 Len=9 |
| 1799 | 138.580794 | 127.0.0.1 | 127.0.0.1 | TCP | 54 | 2210 → 55308 [PSH, ACK] Seq=10 Ack=23 Win=65280 Len=10 |
| 1057 | 79.524659 | 127.0.0.1 | 127.0.0.1 | TCP | 56 | 2210 → 55308 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=65495 WS=256 SACK_PERM |
| 1376 | 105.716639 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 2210 → 55333 [ACK] Seq=1 Ack=17 Win=65280 Len=0 |
| 2173 | 166.163421 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 2210 → 55333 [ACK] Seq=11 Ack=42 Win=65280 Len=0 |
| 1574 | 121.012443 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 2210 → 55333 [ACK] Seq=2 Ack=34 Win=65280 Len=0 |
| 2240 | 171.333101 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 2210 → 55333 [ACK] Seq=21 Ack=46 Win=65280 Len=0 |
| 2242 | 171.333364 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 2210 → 55333 [ACK] Seq=21 Ack=47 Win=65280 Len=0 |
| 2106 | 161.029548 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 2210 → 55333 [ACK] Seq=3 Ack=38 Win=65280 Len=0 |
| 2243 | 171.333417 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 2210 → 55333 [FIN, ACK] Seq=21 Ack=47 Win=65280 Len=0 |
| 1377 | 105.716751 | 127.0.0.1 | 127.0.0.1 | TCP | 45 | 2210 → 55333 [PSH, ACK] Seq=1 Ack=17 Win=65280 Len=1 |
| 2174 | 166.163575 | 127.0.0.1 | 127.0.0.1 | TCP | 54 | 2210 → 55333 [PSH, ACK] Seq=11 Ack=42 Win=65280 Len=10 |
| 1575 | 121.012527 | 127.0.0.1 | 127.0.0.1 | TCP | 45 | 2210 → 55333 [PSH, ACK] Seq=2 Ack=34 Win=65280 Len=1 |
| 2107 | 161.029679 | 127.0.0.1 | 127.0.0.1 | TCP | 52 | 2210 → 55333 [PSH, ACK] Seq=3 Ack=38 Win=65280 Len=8 |
| 1273 | 97.957368 | 127.0.0.1 | 127.0.0.1 | TCP | 56 | 2210 → 55333 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=65495 WS=256 SACK_PERM |
| 669 | 48.446491 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 55262 → 2210 [ACK] Seq=1 Ack=1 Win=65280 Len=0 |
| 799 | 56.756714 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 55262 → 2210 [ACK] Seq=17 Ack=10 Win=65280 Len=0 |
| 857 | 63.812689 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 55262 → 2210 [ACK] Seq=33 Ack=19 Win=65280 Len=0 |
| 1742 | 132.548813 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 55262 → 2210 [ACK] Seq=37 Ack=27 Win=65280 Len=0 |
| 1960 | 150.132840 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 55262 → 2210 [ACK] Seq=42 Ack=28 Win=65280 Len=0 |
| 1958 | 150.132795 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 55262 → 2210 [FIN, ACK] Seq=41 Ack=27 Win=65280 Len=0 |

| No. | Time | Source | Destination | Protocol | Length | Info |
|------|------------|-----------|-------------|----------|--------|--|
| 796 | 56.756545 | 127.0.0.1 | 127.0.0.1 | TCP | 60 | 55262 → 2210 [PSH, ACK] Seq=1 Ack=1 Win=65280 Len=16 |
| 1958 | 150.132795 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 55262 → 2210 [FIN, ACK] Seq=41 Ack=27 Win=65280 Len=0 |
| 1960 | 150.132840 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 55262 → 2210 [ACK] Seq=42 Ack=28 Win=65280 Len=0 |
| 1742 | 132.548813 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 55262 → 2210 [ACK] Seq=37 Ack=27 Win=65280 Len=0 |
| 857 | 63.812689 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 55262 → 2210 [ACK] Seq=33 Ack=19 Win=65280 Len=0 |
| 799 | 56.756714 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 55262 → 2210 [ACK] Seq=17 Ack=10 Win=65280 Len=0 |
| 669 | 48.446491 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 55262 → 2210 [ACK] Seq=1 Ack=1 Win=65280 Len=0 |
| 1273 | 97.957368 | 127.0.0.1 | 127.0.0.1 | TCP | 56 | 2210 → 55333 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=65495 WS=256 SACK_PERM |
| 2107 | 161.029679 | 127.0.0.1 | 127.0.0.1 | TCP | 52 | 2210 → 55333 [PSH, ACK] Seq=3 Ack=38 Win=65280 Len=8 |
| 1575 | 121.012527 | 127.0.0.1 | 127.0.0.1 | TCP | 45 | 2210 → 55333 [PSH, ACK] Seq=2 Ack=34 Win=65280 Len=1 |
| 2174 | 166.163575 | 127.0.0.1 | 127.0.0.1 | TCP | 54 | 2210 → 55333 [PSH, ACK] Seq=11 Ack=42 Win=65280 Len=10 |
| 1377 | 105.716751 | 127.0.0.1 | 127.0.0.1 | TCP | 45 | 2210 → 55333 [PSH, ACK] Seq=1 Ack=17 Win=65280 Len=1 |
| 2243 | 171.333417 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 2210 → 55333 [FIN, ACK] Seq=21 Ack=47 Win=65280 Len=0 |
| 2106 | 161.029548 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 2210 → 55333 [ACK] Seq=3 Ack=38 Win=65280 Len=0 |
| 2242 | 171.333364 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 2210 → 55333 [ACK] Seq=21 Ack=47 Win=65280 Len=0 |
| 2240 | 171.333101 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 2210 → 55333 [ACK] Seq=21 Ack=46 Win=65280 Len=0 |
| 1574 | 121.012443 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 2210 → 55333 [ACK] Seq=2 Ack=34 Win=65280 Len=0 |
| 2173 | 166.163421 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 2210 → 55333 [ACK] Seq=11 Ack=42 Win=65280 Len=0 |
| 1376 | 105.716639 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 2210 → 55333 [ACK] Seq=1 Ack=17 Win=65280 Len=0 |
| 1057 | 79.524659 | 127.0.0.1 | 127.0.0.1 | TCP | 56 | 2210 → 55308 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=65495 WS=256 SACK_PERM |
| 1799 | 138.580794 | 127.0.0.1 | 127.0.0.1 | TCP | 54 | 2210 → 55308 [PSH, ACK] Seq=10 Ack=23 Win=65280 Len=10 |
| 1151 | 88.340749 | 127.0.0.1 | 127.0.0.1 | TCP | 53 | 2210 → 55308 [PSH, ACK] Seq=1 Ack=19 Win=65280 Len=9 |
| 2285 | 175.189343 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 2210 → 55308 [FIN, ACK] Seq=20 Ack=27 Win=65280 Len=0 |
| 2284 | 175.189167 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 2210 → 55308 [ACK] Seq=20 Ack=27 Win=65280 Len=0 |
| 1798 | 138.580706 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 2210 → 55308 [ACK] Seq=10 Ack=23 Win=65280 Len=0 |
| 1150 | 88.340681 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 2210 → 55308 [ACK] Seq=1 Ack=19 Win=65280 Len=0 |
| 668 | 48.446445 | 127.0.0.1 | 127.0.0.1 | TCP | 56 | 2210 → 55262 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=65495 WS=256 SACK_PERM |
| 1741 | 132.548794 | 127.0.0.1 | 127.0.0.1 | TCP | 52 | 2210 → 55262 [PSH, ACK] Seq=19 Ack=37 Win=65280 Len=8 |
| 856 | 63.812673 | 127.0.0.1 | 127.0.0.1 | TCP | 53 | 2210 → 55262 [PSH, ACK] Seq=10 Ack=33 Win=65280 Len=9 |
| 798 | 56.756688 | 127.0.0.1 | 127.0.0.1 | TCP | 53 | 2210 → 55262 [PSH, ACK] Seq=1 Ack=17 Win=65280 Len=9 |
| 1959 | 150.132818 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 2210 → 55262 [FIN, ACK] Seq=27 Ack=41 Win=65280 Len=0 |
| 1957 | 150.132652 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 2210 → 55262 [ACK] Seq=27 Ack=41 Win=65280 Len=0 |
| 1740 | 132.548571 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 2210 → 55262 [ACK] Seq=19 Ack=37 Win=65280 Len=0 |
| 855 | 63.812616 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 2210 → 55262 [ACK] Seq=10 Ack=33 Win=65280 Len=0 |
| 797 | 56.756586 | 127.0.0.1 | 127.0.0.1 | TCP | 44 | 2210 → 55262 [ACK] Seq=1 Ack=17 Win=65280 Len=0 |