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```
=======================
server.py
=======================

import socket

HOST = '127.0.0.1'
PORT = 12345

server_socket = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
server_socket.bind((HOST, PORT))
server_socket.listen(1)
print(f"Server is running on {HOST}:{PORT}")

conn, addr = server_socket.accept()
print(f"Connected by {addr}")

while True:
    data = conn.recv(1024).decode()
    if not data:
        break

    command = data[0]
    text = data[1:]

    if command == 'A':
        result = ''.join(sorted(text, reverse=True))
    elif command == 'C':
        result = ''.join(sorted(text))
    elif command == 'D':
        result = text.upper()
    else:
        result = data

    conn.sendall(result.encode())

conn.close()
```
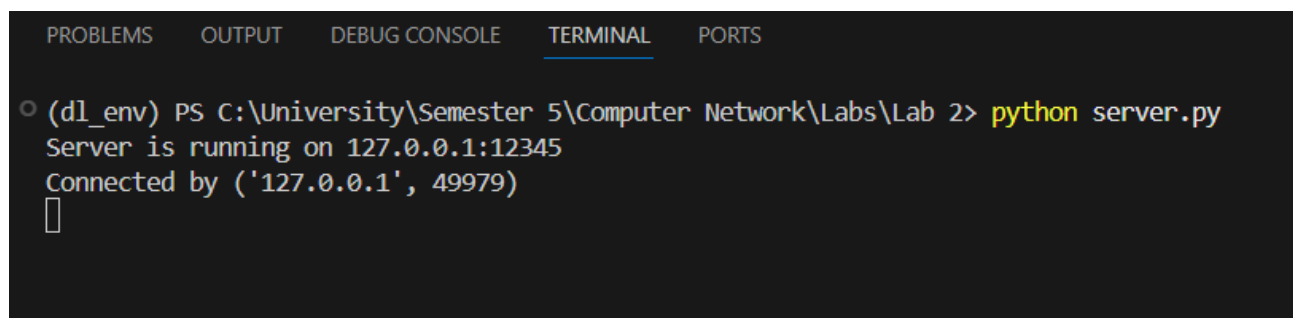
Run in Terminal :

```
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 127.0.0.1:12345
  Connected by ('127.0.0.1', 49979)
  ▯
```

```
=======================
client.py
=======================

import socket

HOST = '127.0.0.1'
PORT = 12345

client_socket = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
client_socket.connect((HOST, PORT))

print("Connected to the server. Type your message or 'exit' to quit.")

while True:
    message = input("Enter message: ")
    if message.lower() == 'exit':
        break

    client_socket.sendall(message.encode())
    data = client_socket.recv(1024).decode()
    print("Server reply:", data)

client_socket.close()
```

Run in Terminal :

Wireshark:

Using filter `tcp.port == 12345` → *Shows packets that use TCP port 12345 only*

No.	Time	Source	Destination	Protocol	Length	Info
469	33.224808	127.0.0.1	127.0.0.1	TCP	54	49979 → 12345 [PSH, ACK] Seq=1 Ack=1 Win=255 Len=10
470	33.224870	127.0.0.1	127.0.0.1	TCP	44	12345 → 49979 [ACK] Seq=1 Ack=11 Win=255 Len=0
471	33.225011	127.0.0.1	127.0.0.1	TCP	53	12345 → 49979 [PSH, ACK] Seq=1 Ack=11 Win=255 Len=9
472	33.225046	127.0.0.1	127.0.0.1	TCP	44	49979 → 12345 [ACK] Seq=11 Ack=10 Win=255 Len=0
952	64.615650	127.0.0.1	127.0.0.1	TCP	54	49979 → 12345 [PSH, ACK] Seq=11 Ack=10 Win=255 Len=10
953	64.615700	127.0.0.1	127.0.0.1	TCP	44	12345 → 49979 [ACK] Seq=10 Ack=21 Win=255 Len=0
954	64.615793	127.0.0.1	127.0.0.1	TCP	53	12345 → 49979 [PSH, ACK] Seq=10 Ack=21 Win=255 Len=9
955	64.615832	127.0.0.1	127.0.0.1	TCP	44	49979 → 12345 [ACK] Seq=21 Ack=19 Win=255 Len=0
1190	82.791685	127.0.0.1	127.0.0.1	TCP	54	49979 → 12345 [PSH, ACK] Seq=21 Ack=19 Win=255 Len=10
1191	82.791730	127.0.0.1	127.0.0.1	TCP	44	12345 → 49979 [ACK] Seq=19 Ack=31 Win=255 Len=0
1192	82.791842	127.0.0.1	127.0.0.1	TCP	53	12345 → 49979 [PSH, ACK] Seq=19 Ack=31 Win=255 Len=9
1193	82.791877	127.0.0.1	127.0.0.1	TCP	44	49979 → 12345 [ACK] Seq=31 Ack=28 Win=255 Len=0
1320	92.423561	127.0.0.1	127.0.0.1	TCP	53	49979 → 12345 [PSH, ACK] Seq=31 Ack=28 Win=255 Len=9
1321	92.423605	127.0.0.1	127.0.0.1	TCP	44	12345 → 49979 [ACK] Seq=28 Ack=40 Win=255 Len=0
1322	92.423712	127.0.0.1	127.0.0.1	TCP	53	12345 → 49979 [PSH, ACK] Seq=28 Ack=40 Win=255 Len=9
1323	92.423746	127.0.0.1	127.0.0.1	TCP	44	49979 → 12345 [ACK] Seq=40 Ack=37 Win=255 Len=0

Without filtering:

No.	Time	Source	Destination	Protocol	Length	Info
169	11.138057	127.0.0.1	127.0.0.1	TCP	44	59494 → 49350 [ACK] Seq=41090 Ack=2 Win=65280 Len=0
170	13.050648	127.0.0.1	127.0.0.1	TCP	56	59499 → 49350 [SYN] Seq=0 Win=65535 Len=0 MSS=65495 WS=256 SACK_PERM
171	13.050839	127.0.0.1	127.0.0.1	TCP	56	49350 → 59499 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=65495 WS=256 SACK_PERM
172	13.050969	127.0.0.1	127.0.0.1	TCP	44	59499 → 49350 [ACK] Seq=1 Ack=1 Win=65280 Len=0
173	13.051149	127.0.0.1	127.0.0.1	TCP	41132	59499 → 49350 [PSH, ACK] Seq=1 Ack=1 Win=65280 Len=41088
174	13.051344	127.0.0.1	127.0.0.1	TCP	44	49350 → 59499 [ACK] Seq=1 Ack=41089 Win=130816 Len=0
175	13.051431	127.0.0.1	127.0.0.1	TCP	44	59499 → 49350 [FIN, ACK] Seq=41089 Ack=1 Win=65280 Len=0
176	13.051493	127.0.0.1	127.0.0.1	TCP	44	49350 → 59499 [ACK] Seq=1 Ack=41090 Win=130816 Len=0
177	13.051912	127.0.0.1	127.0.0.1	TCP	56	59500 → 49350 [SYN] Seq=0 Win=65535 Len=0 MSS=65495 WS=256 SACK_PERM
178	13.052067	127.0.0.1	127.0.0.1	TCP	56	49350 → 59500 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=65495 WS=256 SACK_PERM
179	13.052161	127.0.0.1	127.0.0.1	TCP	44	59500 → 49350 [ACK] Seq=1 Ack=1 Win=65280 Len=0
180	13.052300	127.0.0.1	127.0.0.1	TCP	41132	59500 → 49350 [PSH, ACK] Seq=1 Ack=1 Win=65280 Len=41088
181	13.052454	127.0.0.1	127.0.0.1	TCP	44	49350 → 59500 [ACK] Seq=1 Ack=41089 Win=130816 Len=0
182	13.052513	127.0.0.1	127.0.0.1	TCP	44	59500 → 49350 [FIN, ACK] Seq=41089 Ack=1 Win=65280 Len=0
183	13.052560	127.0.0.1	127.0.0.1	TCP	44	49350 → 59500 [ACK] Seq=1 Ack=41090 Win=130816 Len=0
184	13.080960	127.0.0.1	127.0.0.1	TCP	44	49350 → 59499 [FIN, ACK] Seq=1 Ack=41090 Win=130816 Len=0
185	13.081042	127.0.0.1	127.0.0.1	TCP	44	59499 → 49350 [ACK] Seq=41090 Ack=2 Win=65280 Len=0
186	13.112755	127.0.0.1	127.0.0.1	TCP	44	49350 → 59498 [FIN, ACK] Seq=1 Ack=41090 Win=130816 Len=0
187	13.112877	127.0.0.1	127.0.0.1	TCP	44	59498 → 49350 [ACK] Seq=41090 Ack=2 Win=65280 Len=0
188	13.141901	127.0.0.1	127.0.0.1	TCP	44	49350 → 59497 [FIN, ACK] Seq=1 Ack=41090 Win=130816 Len=0
189	13.141970	127.0.0.1	127.0.0.1	TCP	44	59497 → 49350 [ACK] Seq=41090 Ack=2 Win=65280 Len=0
190	14.057221	127.0.0.1	127.0.0.1	TCP	56	59501 → 49350 [SYN] Seq=0 Win=65535 Len=0 MSS=65495 WS=256 SACK_PERM
191	14.057371	127.0.0.1	127.0.0.1	TCP	56	49350 → 59501 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=65495 WS=256 SACK_PERM
192	14.057490	127.0.0.1	127.0.0.1	TCP	44	59501 → 49350 [ACK] Seq=1 Ack=1 Win=65280 Len=0
193	14.057649	127.0.0.1	127.0.0.1	TCP	41132	59501 → 49350 [PSH, ACK] Seq=1 Ack=1 Win=65280 Len=41088

Packet Bytes Pane:

▸ Frame 469: 54 bytes on wire (432 bits), 54 bytes captured (432 bits) on interface \Device\NPF_Loopback, id 0
▸ Null/Loopback
▸ Internet Protocol Version 4, Src: 127.0.0.1, Dst: 127.0.0.1
▸ Transmission Control Protocol, Src Port: 49979, Dst Port: 12345, Seq: 1, Ack: 1, Len: 10
▸ Data (10 bytes)