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server.py x client.py
server.py > clock_server
1 import socket
2 import threading
3 import datetime
4
5 def get_average_offset(client_times):
6     """
7     Calculates the average offset by computing time differences
8     between the master clock and client clocks.
9     """
10    time_diffs = [datetime.datetime.now() - t for t in client_times]
11    avg_offset = sum(time_diffs, datetime.timedelta(0)) / len(client_times)
12
13    print("Client Time Differences:", [str(diff) for diff in time_diffs])
14    print("Average Offset:", str(avg_offset))
15    return avg_offset
16
17 def clock_server(port=8080):
18     """
19     Starts the server, waits for clients to connect, receives their clock times,
20     calculates the average offset, and sends the synchronized time back.
21     """
22    server = socket.socket()
23    server.bind(("localhost", port))
24    server.listen(3)
25    print("Server started, waiting for clients...")
26
27    clients, client_times = [], []
28
29    for _ in range(3):
30        conn, _ = server.accept()
31        clients.append(conn)
32
33        # Receive full timestamp from client
34        data = conn.recv(1024).decode()
35        print(f"Received raw data from client: {data}")
36        client_time = datetime.datetime.strptime(data, "%Y-%m-%d %H:%M:%S.%f")
37        print(f"Parsed client time: {client_time.strftime('%Y-%m-%d %H:%M:%S.%f')}")
38
39        client_times.append(client_time)
40
41    # Get current server time
42    server_time = datetime.datetime.now()
43    print("-----")
44    print(f"Current Server Time: {server_time.strftime('%Y-%m-%d %H:%M:%S.%f')}")
45    print("-----")
46
47    # Compute average time offset
48    avg_offset = get_average_offset(client_times)
49    print("-----")
50
51    # Send synchronized time to clients
52    for conn in clients:
53        adjusted_time = (server_time + avg_offset).strftime("%Y-%m-%d %H:%M:%S.%f")
54        conn.send(adjusted_time.encode())
55        conn.close()
56        print(f"Sent synchronized time: {adjusted_time}")
57
58    server.close()
59
60 server_thread = threading.Thread(target=clock_server)
61 server_thread.start()
62

```

```
server.py  client.py  X
client.py > ...
1  import socket
2  import datetime
3
4  def clock_client(port=8080):
5      """
6      Connects to the server, sends the current local time in full timestamp format,
7      and receives the synchronized time from the server.
8      """
9      client = socket.socket()
10     client.connect(("localhost", port))
11
12     # Get current local time in full timestamp format
13     local_time = datetime.datetime.now().strftime("%Y-%m-%d %H:%M:%S.%f")
14     print(f"Sending local time: {local_time}")
15
16     # Send time to the server
17     client.send(local_time.encode())
18
19     # Receive synchronized time from server
20     synced_time = client.recv(1024).decode()
21     print(f"Synchronized Time Received: {synced_time}")
22
23     client.close()
24
25 # Run the client
26 clock_client()
27
```