LAPORAN PRAKTIKUM PEMROGRAMAN JARINGAN

Disusun oleh:

IIN SUHANA (231401002)

DOSEN PENGAMPU : Ucok,S.Kom.,MT

MATA KULIAH : PEMROGRAMAN JARINGAN

FAKULTAS ILMU KOMPUTER

PROGRAM STUDI TEKNIK INFORMATIKA

UNIVERSITAS INDONESIA TIMUR

MAKASSAR

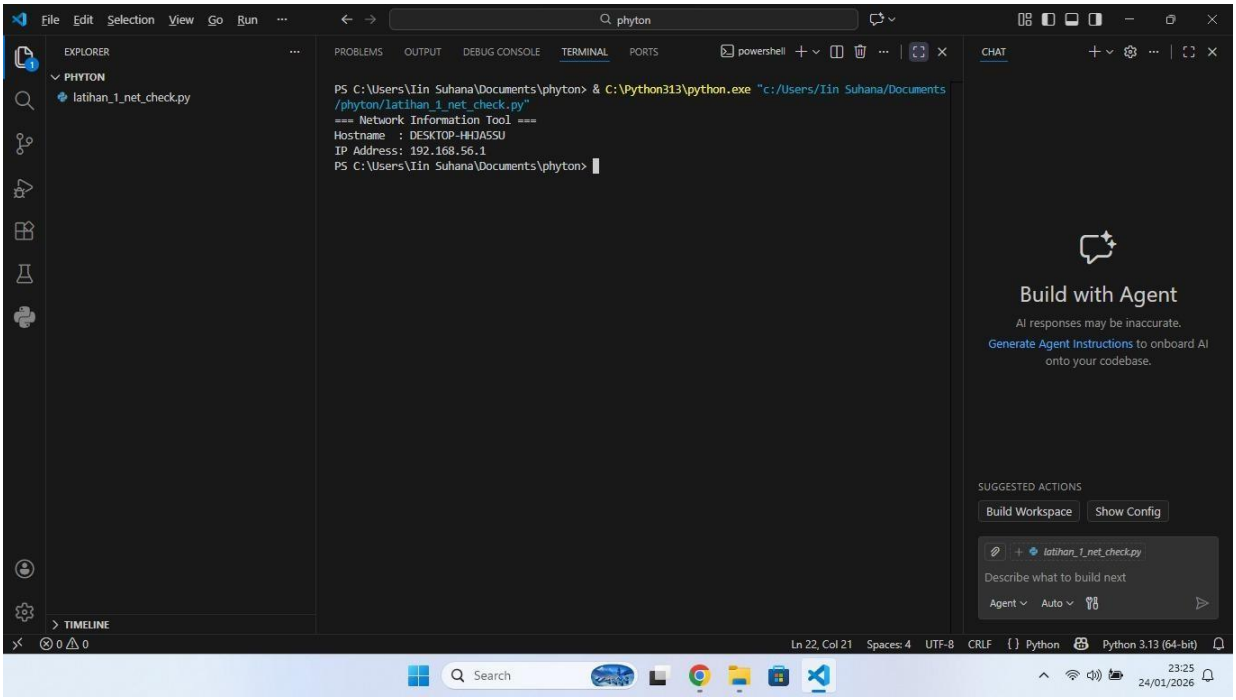
2026

BAB I

KONSEP DASAR PEMOGRAMAN JARINGAN

Pemograman jaringan adalah proses pembuatan aplikasi yang memungkinkan komputer atau perangkat lain saling berkomunikasi melalui jaringan.

HASIL:

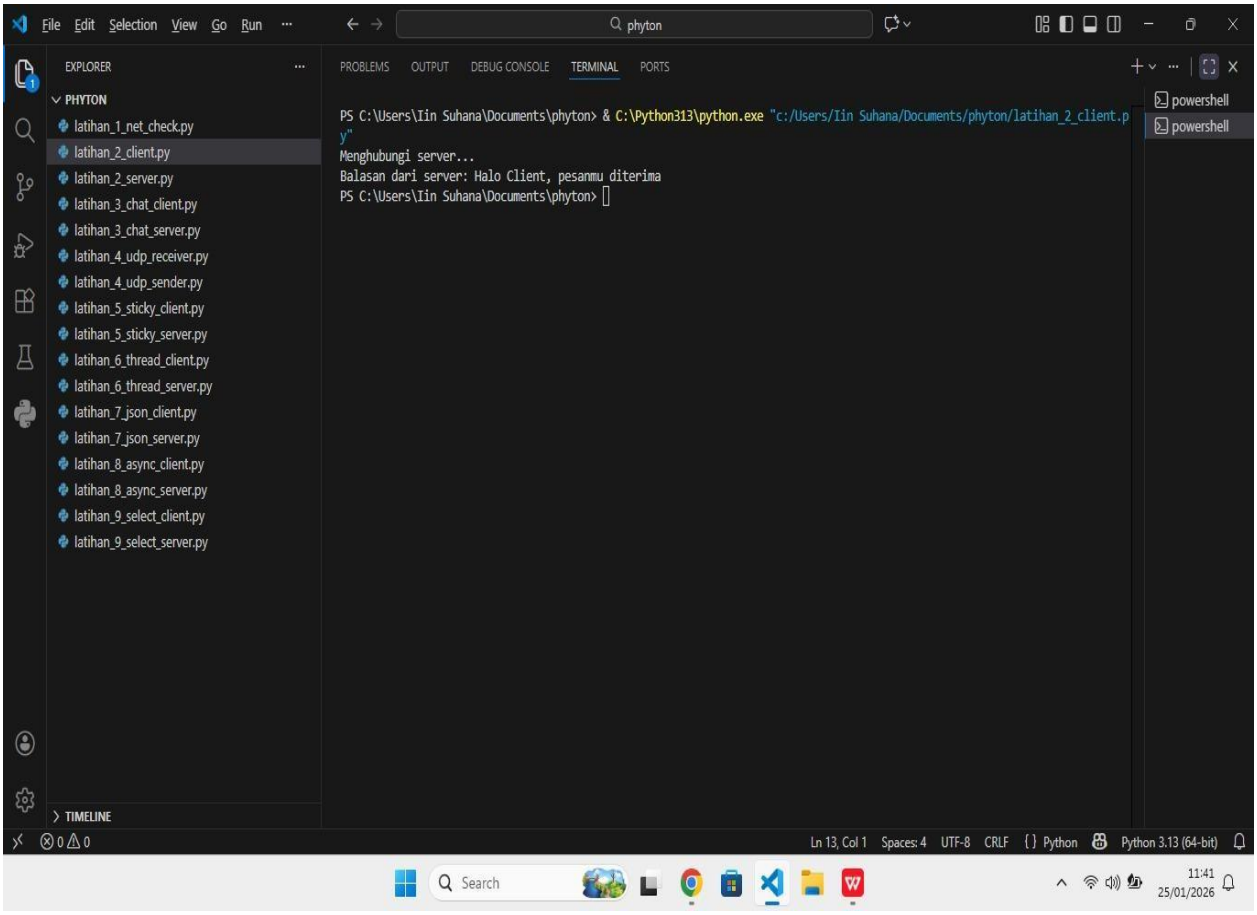


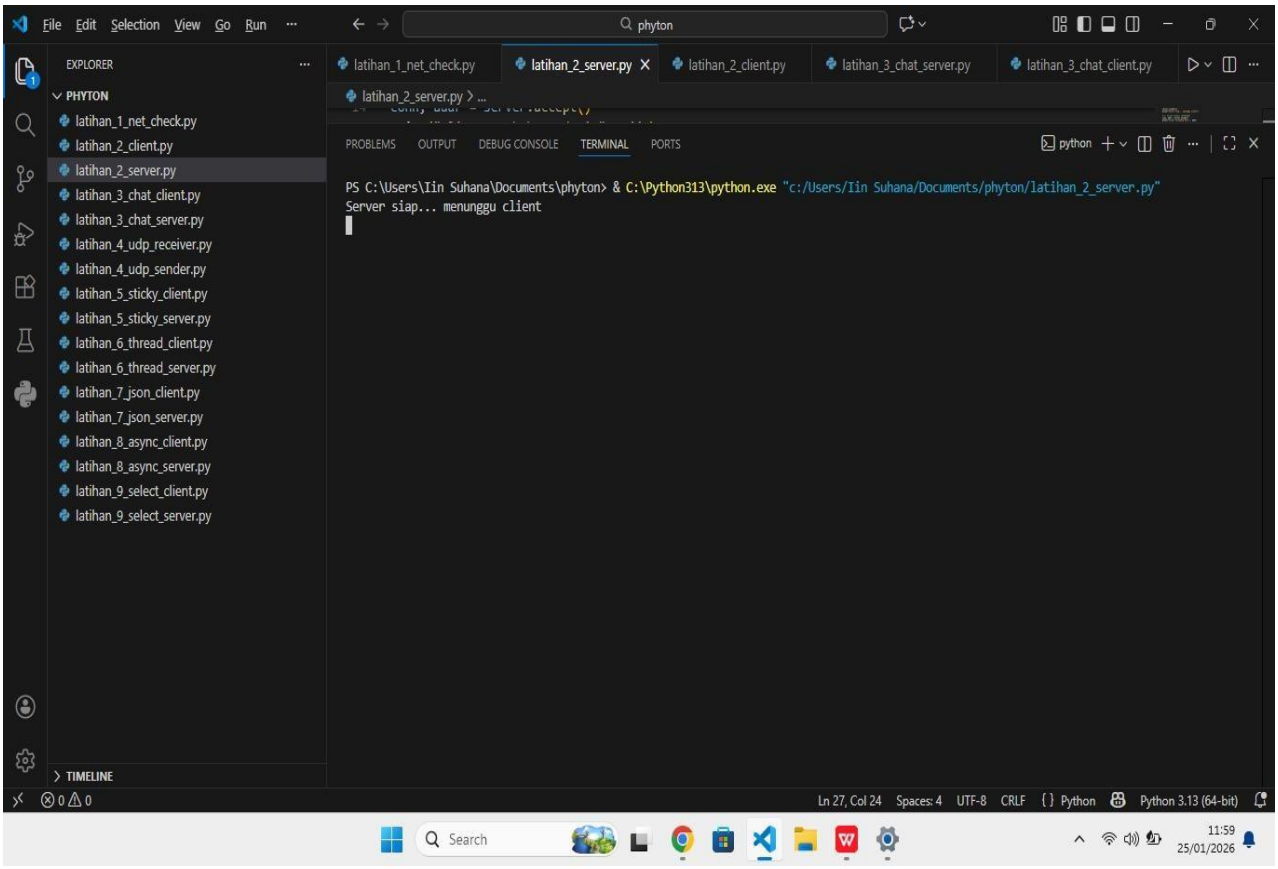
BAB II

SOCKET API DASAR

Socket adalah titik akhir komunikasi yang digunakan oleh aplikasi untuk mengirim dan menerima data melalui jaringan. Socket menjadi penghubung antara aplikasi dan protokol jaringan.

Hasil:



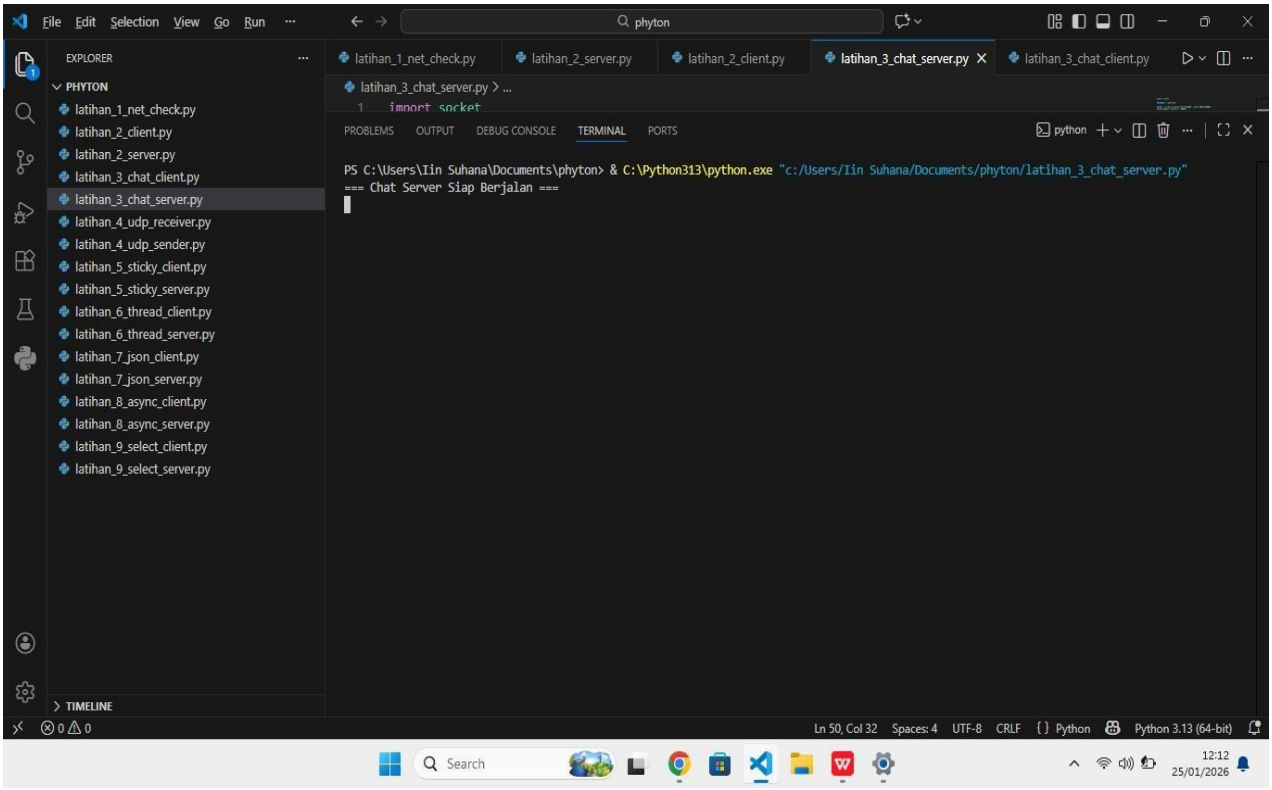

File Edit Selection View Go Run
phyton
EXPLORER
PHYTON
latihan_1_net_check.py
latihan_2_client.py
latihan_2_server.py
latihan_3_chat_client.py
latihan_3_chat_server.py
latihan_4_udp_receiver.py
latihan_4_udp_sender.py
latihan_5_sticky_client.py
latihan_5_sticky_server.py
latihan_6_thread_client.py
latihan_6_thread_server.py
latihan_7_json_client.py
latihan_7_json_server.py
latihan_8_async_client.py
latihan_8_async_server.py
latihan_9_select_client.py
latihan_9_select_server.py
TIMELINE
latihan_1_net_check.py
latihan_2_server.py
latihan_2_client.py
latihan_3_chat_server.py
latihan_3_chat_client.py
latihan_2_server.py > ...
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
python
PS C:\Users\Iin Suhana\Documents\phyton> & C:\Python313\python.exe "c:/Users/Iin Suhana/Documents/phyton/latihan_2_server.py"
Server siap... menunggu client
Ln 27, Col 24 Spaces: 4 UTF-8 CRLF { } Python Python 3.13 (64-bit)
Search
11:59
25/01/2026

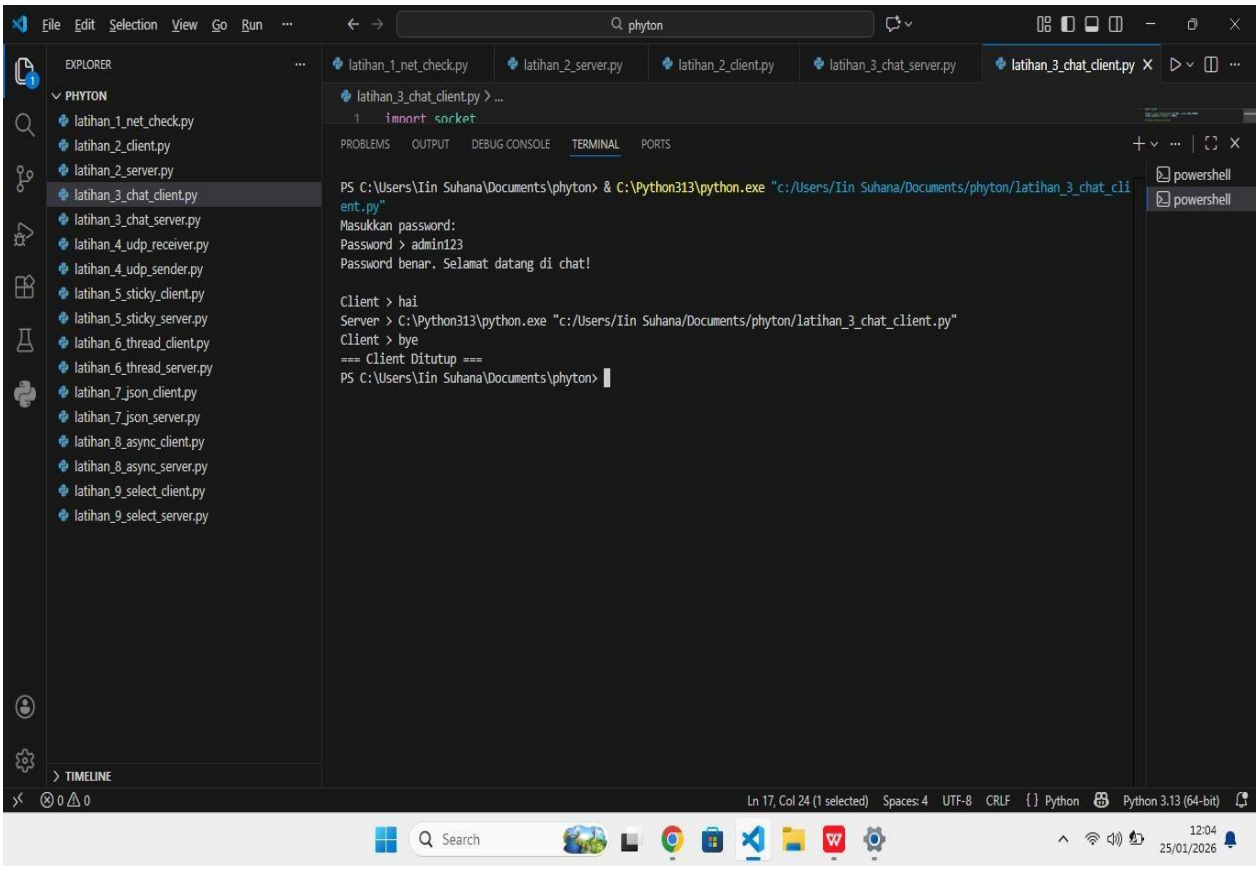
BAB IV

PROTOKOL TCP (APLIKASI CHAT)

TCP (Transmission Control Protocol) adalah protokol komunikasi yang bersifat andal dan beriorientasi koneksi. TCP memastikan data sampai ke tujuan tanpa kehilangan dan dalam urutan yang benar.

HASIL:



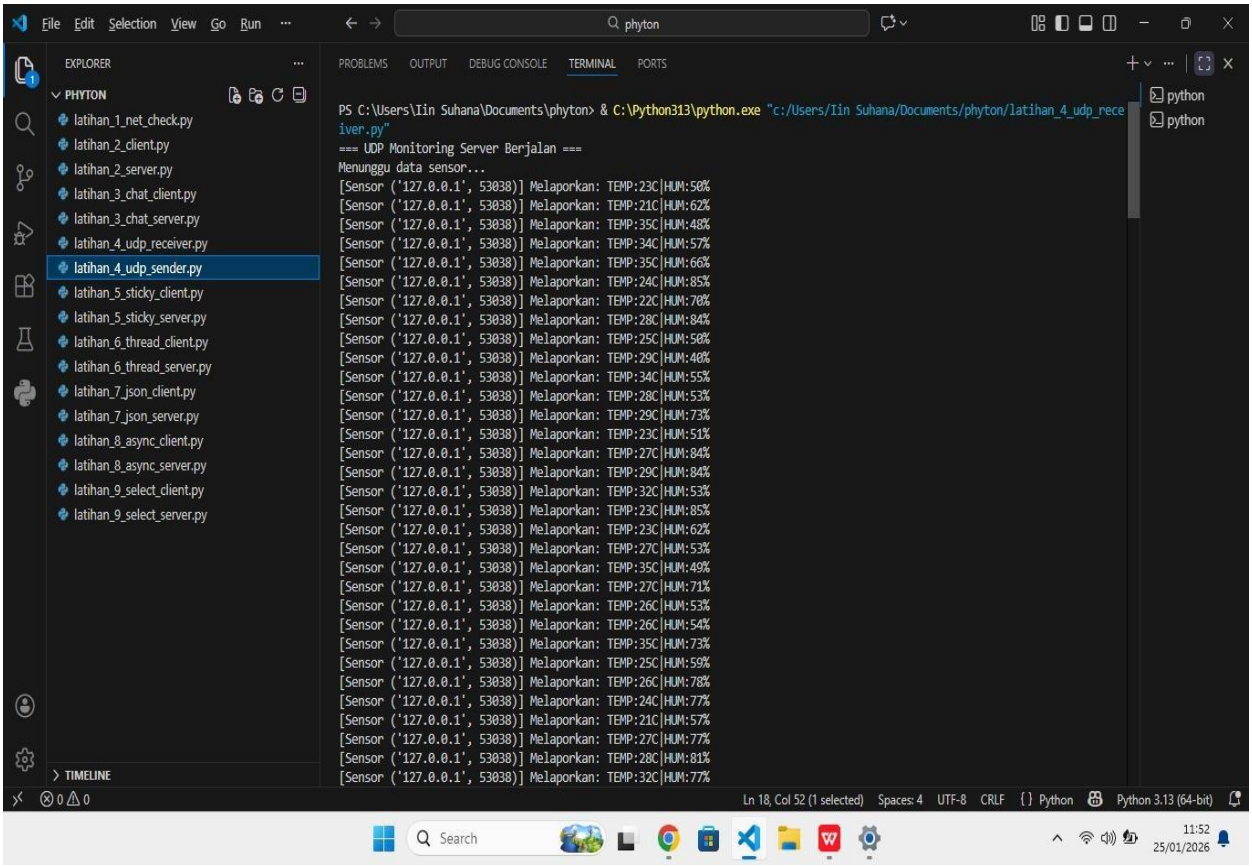

File Edit Selection View Go Run
phyton
EXPLORER
PHYTON
latihan_1_net_check.py
latihan_2_client.py
latihan_2_server.py
latihan_3_chat_client.py
latihan_3_chat_server.py
latihan_4_udp_receiver.py
latihan_4_udp_sender.py
latihan_5_sticky_client.py
latihan_5_sticky_server.py
latihan_6_thread_client.py
latihan_6_thread_server.py
latihan_7_json_client.py
latihan_7_json_server.py
latihan_8_async_client.py
latihan_8_async_server.py
latihan_9_select_client.py
latihan_9_select_server.py
TIMELINE
latihan_3_chat_client.py > ...
1 import socket
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
PS C:\Users\Iin Suhana\Documents\phyton> & C:\Python313\python.exe "c:/Users/Iin Suhana/Documents/phyton/latihan_3_chat_client.py"
Masukkan password:
Password > admin123
Password benar. Selamat datang di chat!
Client > hai
Server > C:\Python313\python.exe "c:/Users/Iin Suhana/Documents/phyton/latihan_3_chat_client.py"
Client > bye
=== Client Ditutup ===
PS C:\Users\Iin Suhana\Documents\phyton>
powershell
powershell
Ln 17, Col 24 (1 selected) Spaces: 4 UTF-8 CRLF { } Python Python 3.13 (64-bit)
Search
12:04
25/01/2026

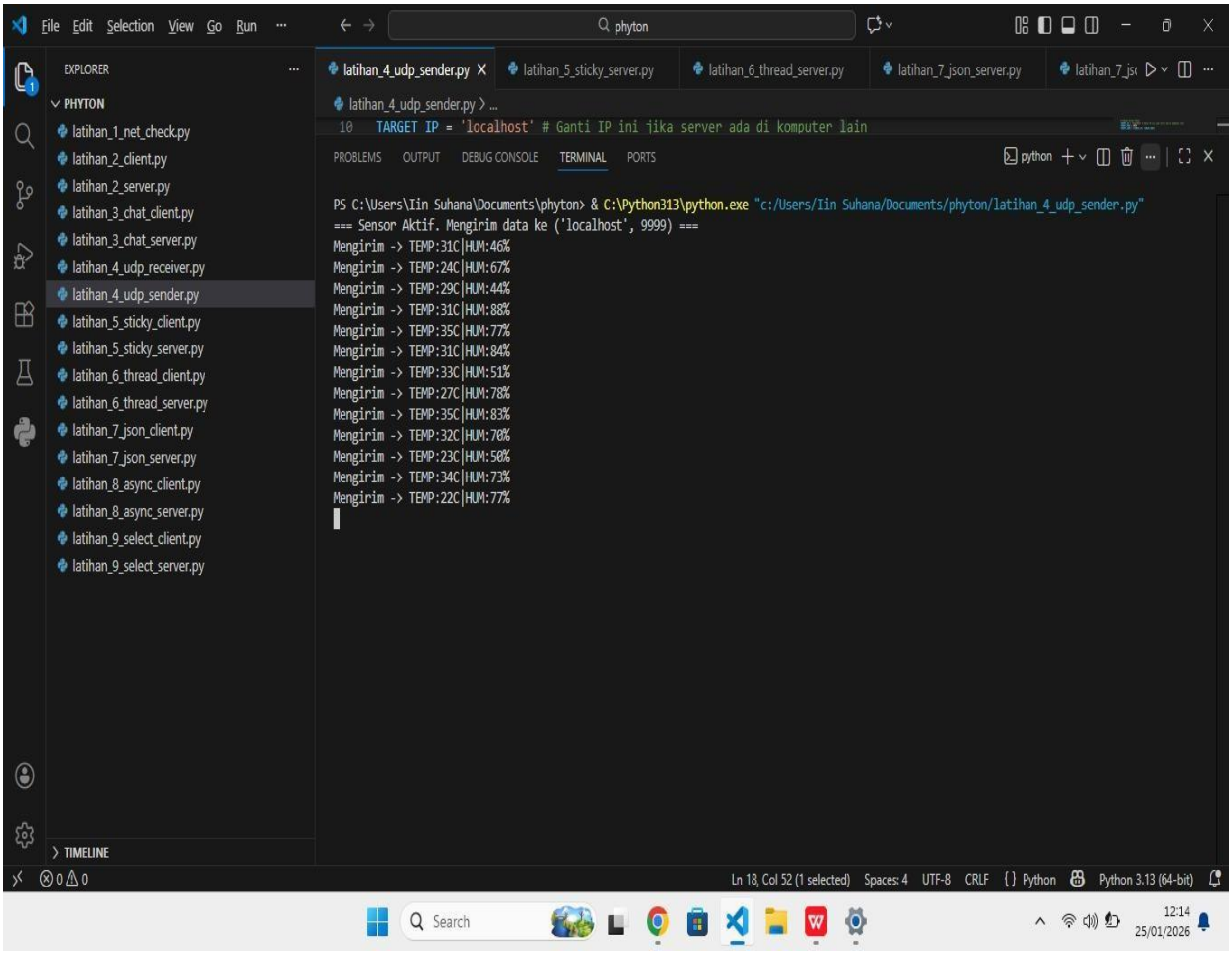
BAB IV

PROTOKOL UDP (STREAMING & BROADCASTING)

UDP (User Datagram Protocol) adalah protokol komunikasi jaringan yang tidak beriorientasi koneksi. Artinya, UDP tidak membangun koneksi terlebih dahulu sebelum mengirim data. Data dikirim dalam bentuk paket tanpa jaminan apakah paket tersebut sampai ke tujuan atau tidak

HASIL:



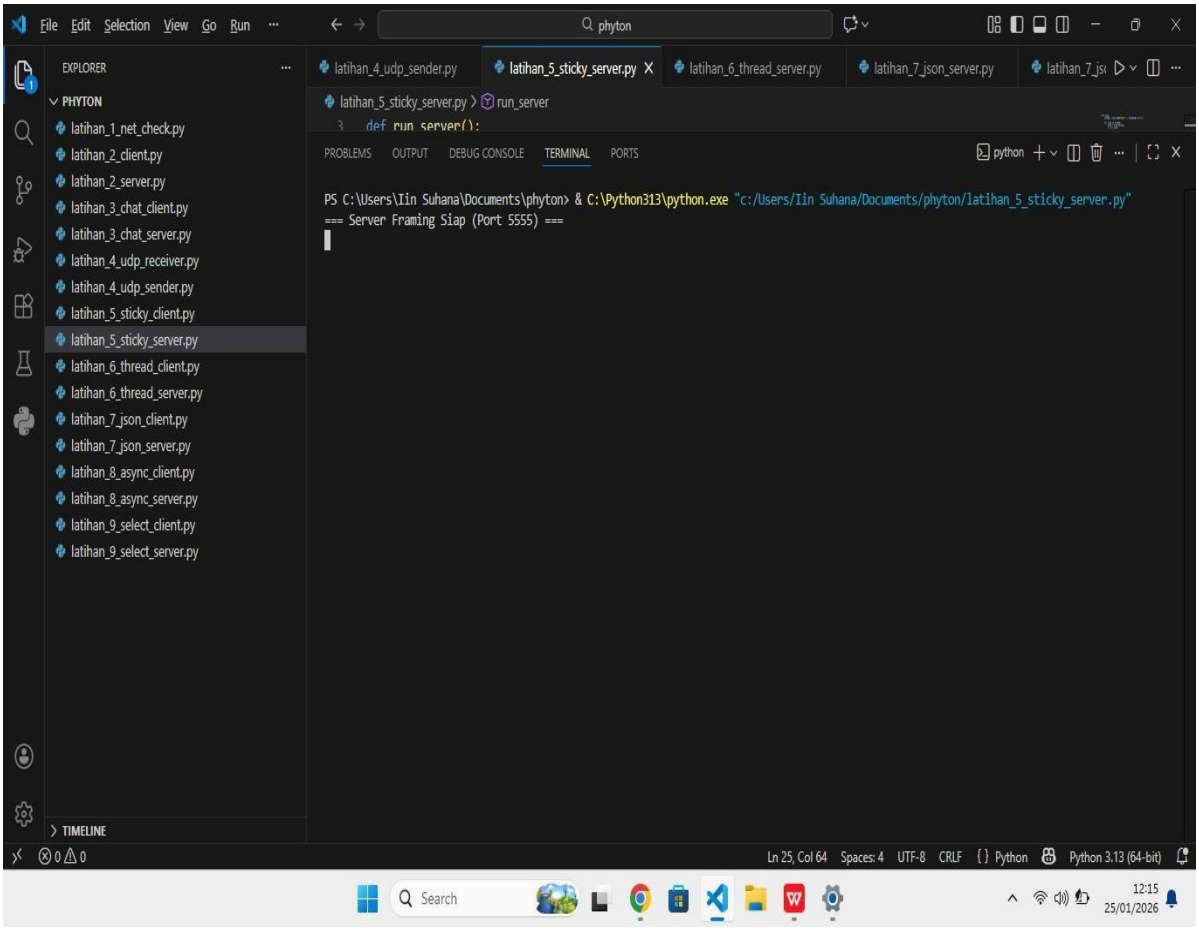

File Edit Selection View Go Run
phyton
EXPLORER
PHYTON
latihan_1_net_check.py
latihan_2_client.py
latihan_2_server.py
latihan_3_chat_client.py
latihan_3_chat_server.py
latihan_4_udp_receiver.py
latihan_4_udp_sender.py
latihan_5_sticky_client.py
latihan_5_sticky_server.py
latihan_6_thread_client.py
latihan_6_thread_server.py
latihan_7_json_client.py
latihan_7_json_server.py
latihan_8_async_client.py
latihan_8_async_server.py
latihan_9_select_client.py
latihan_9_select_server.py
TIMELINE
latihan_4_udp_sender.py
latihan_5_sticky_server.py
latihan_6_thread_server.py
latihan_7_json_server.py
latihan_4_udp_sender.py > ...
10 TARGET IP = 'localhost' # Ganti IP ini jika server ada di komputer lain
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
python
PS C:\Users\Iin Suhana\Documents\phyton> & C:\Python313\python.exe "c:/Users/Iin Suhana/Documents/phyton/latihan_4_udp_sender.py"
=== Sensor Aktif. Mengirim data ke ('localhost', 9999) ===
Mengirim -> TEMP:31C|HUM:46%
Mengirim -> TEMP:24C|HUM:67%
Mengirim -> TEMP:29C|HUM:44%
Mengirim -> TEMP:31C|HUM:88%
Mengirim -> TEMP:35C|HUM:77%
Mengirim -> TEMP:31C|HUM:84%
Mengirim -> TEMP:33C|HUM:51%
Mengirim -> TEMP:27C|HUM:78%
Mengirim -> TEMP:35C|HUM:83%
Mengirim -> TEMP:32C|HUM:70%
Mengirim -> TEMP:23C|HUM:50%
Mengirim -> TEMP:34C|HUM:73%
Mengirim -> TEMP:22C|HUM:77%
Ln 18, Col 52 (1 selected) Spaces: 4 UTF-8 CRLF Python Python 3.13 (64-bit)
Search
12:14
25/01/2026

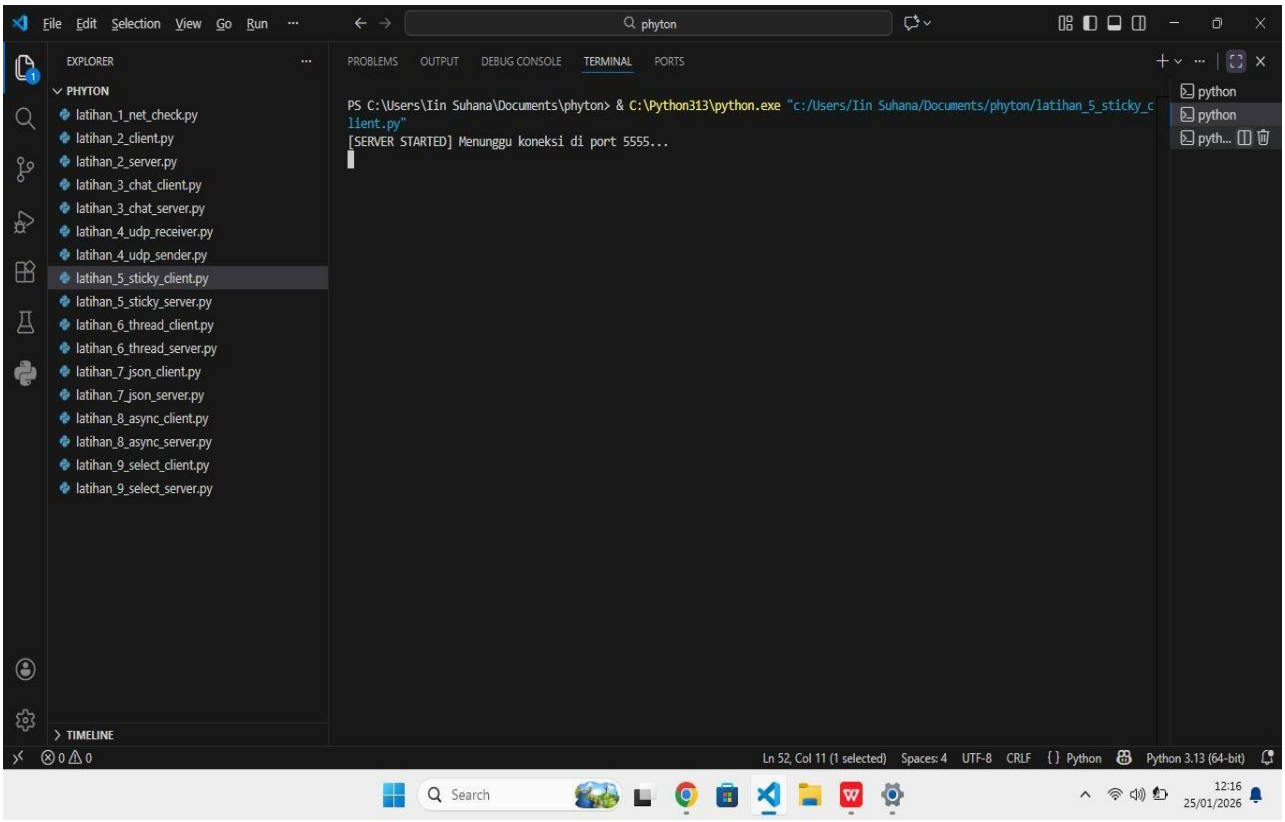
BAB V

ERROR HANDLING & FRAMING DATA

Error handling adalah proses penanganan kesalahan yang terjadi selama komunikasi jaringan. Kesalahan dapat tejadi karena gangguan jaringan, koneksi terputus, atau data yang tidak sesuai format.

HASIL:



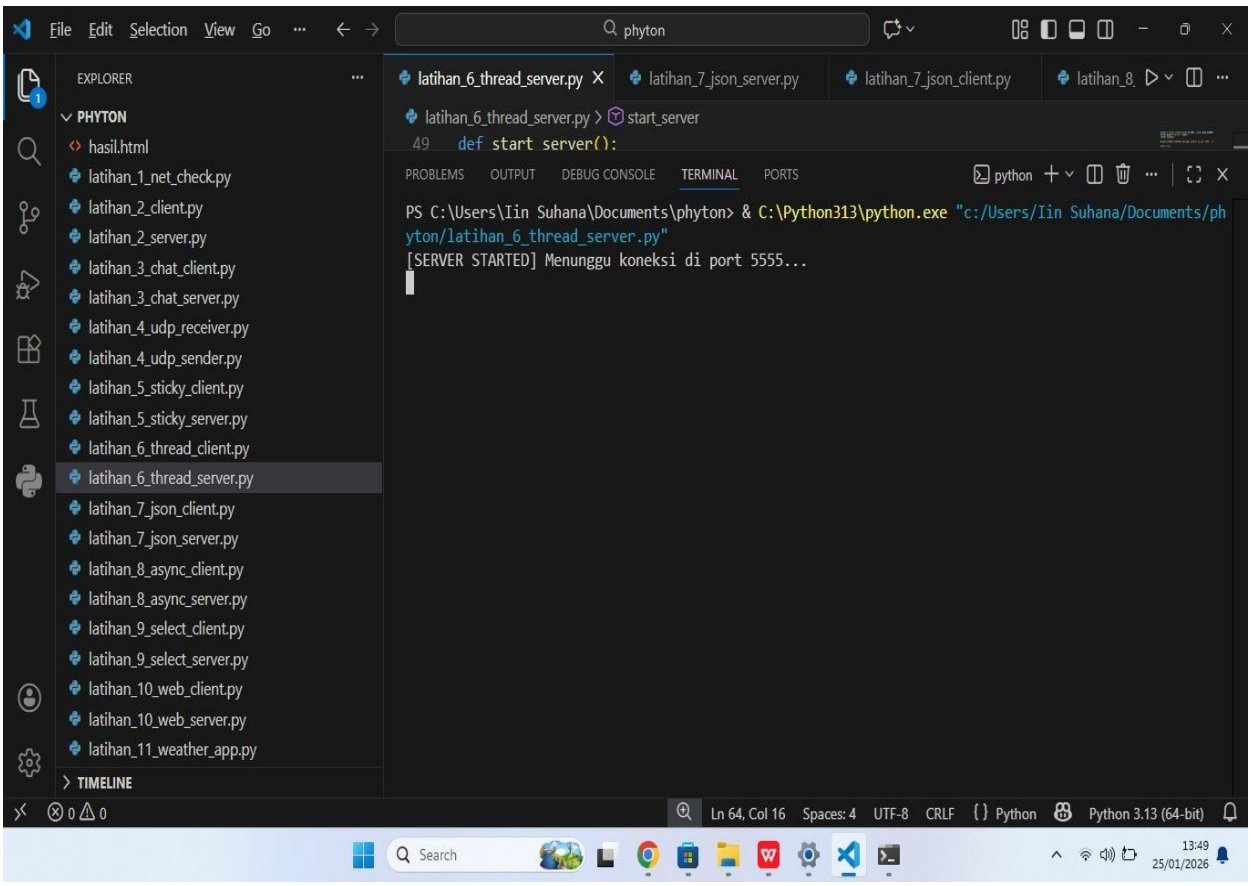

File Edit Selection View Go Run
phyton
EXPLORER
PHYTON
latihan_1_net_check.py
latihan_2_client.py
latihan_2_server.py
latihan_3_chat_client.py
latihan_3_chat_server.py
latihan_4_udp_receiver.py
latihan_4_udp_sender.py
latihan_5_sticky_client.py
latihan_5_sticky_server.py
latihan_6_thread_client.py
latihan_6_thread_server.py
latihan_7_json_client.py
latihan_7_json_server.py
latihan_8_async_client.py
latihan_8_async_server.py
latihan_9_select_client.py
latihan_9_select_server.py
TIMELINE
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
PS C:\Users\Iin Suhana\Documents\phyton> & C:\Python313\python.exe "c:/Users/Iin Suhana/Documents/phyton/latihan_5_sticky_client.py"
[SERVER STARTED] Menunggu koneksi di port 5555...
python
python
pyth...
Ln 52, Col 11 (1 selected) Spaces: 4 UTF-8 CRLF { } Python Python 3.13 (64-bit)
Search
12:16
25/01/2026

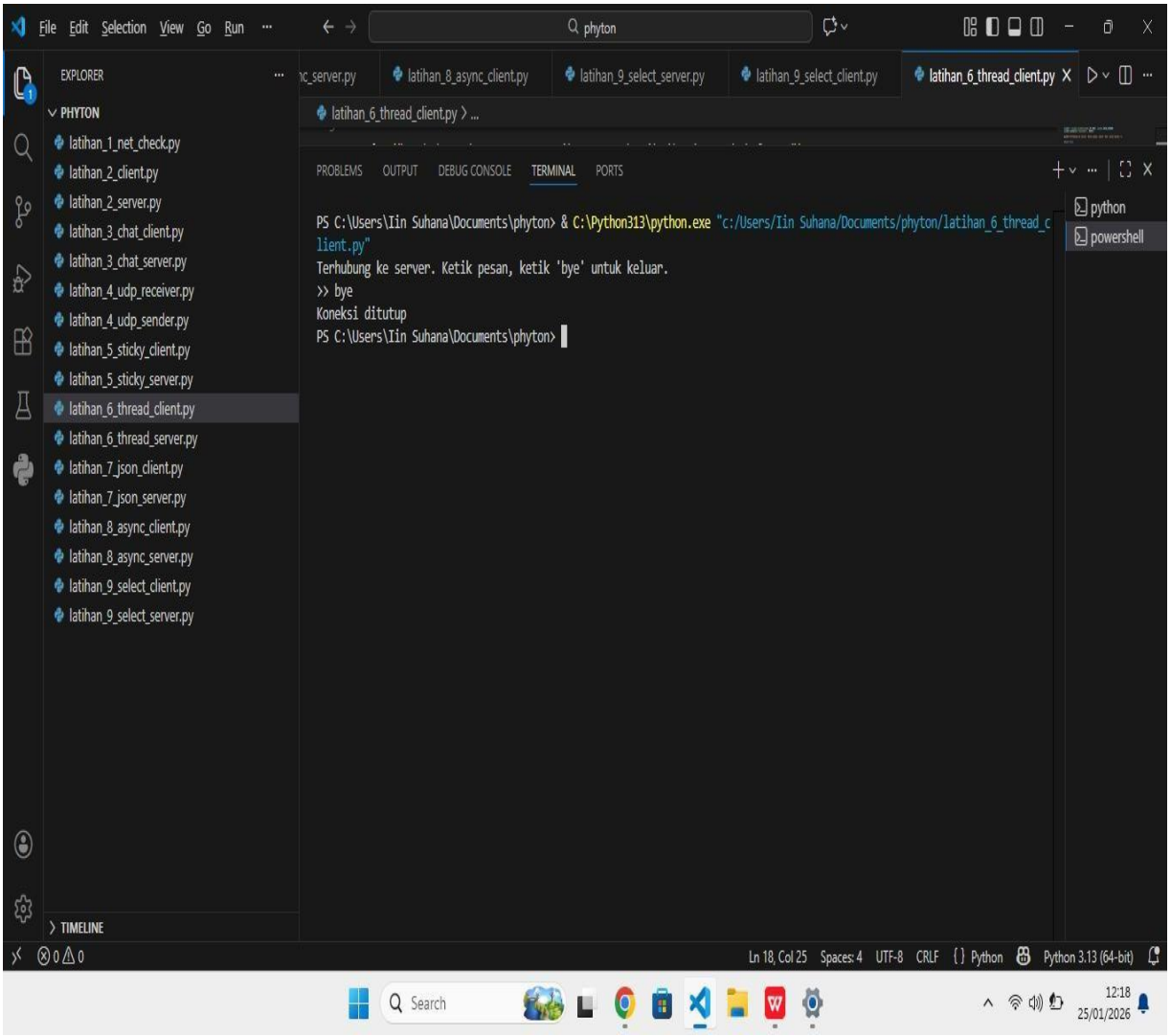
BAB VI

CONCURRENCY PART I (THREADING)

Concurrency adalah kemampuan suatu sistem untuk menangani beberapa proses atau koneksi secara bersamaan. Dalam pemograman jaringan, concurrency sangat penting agar server dapat melayani banyak client.

HASIL:



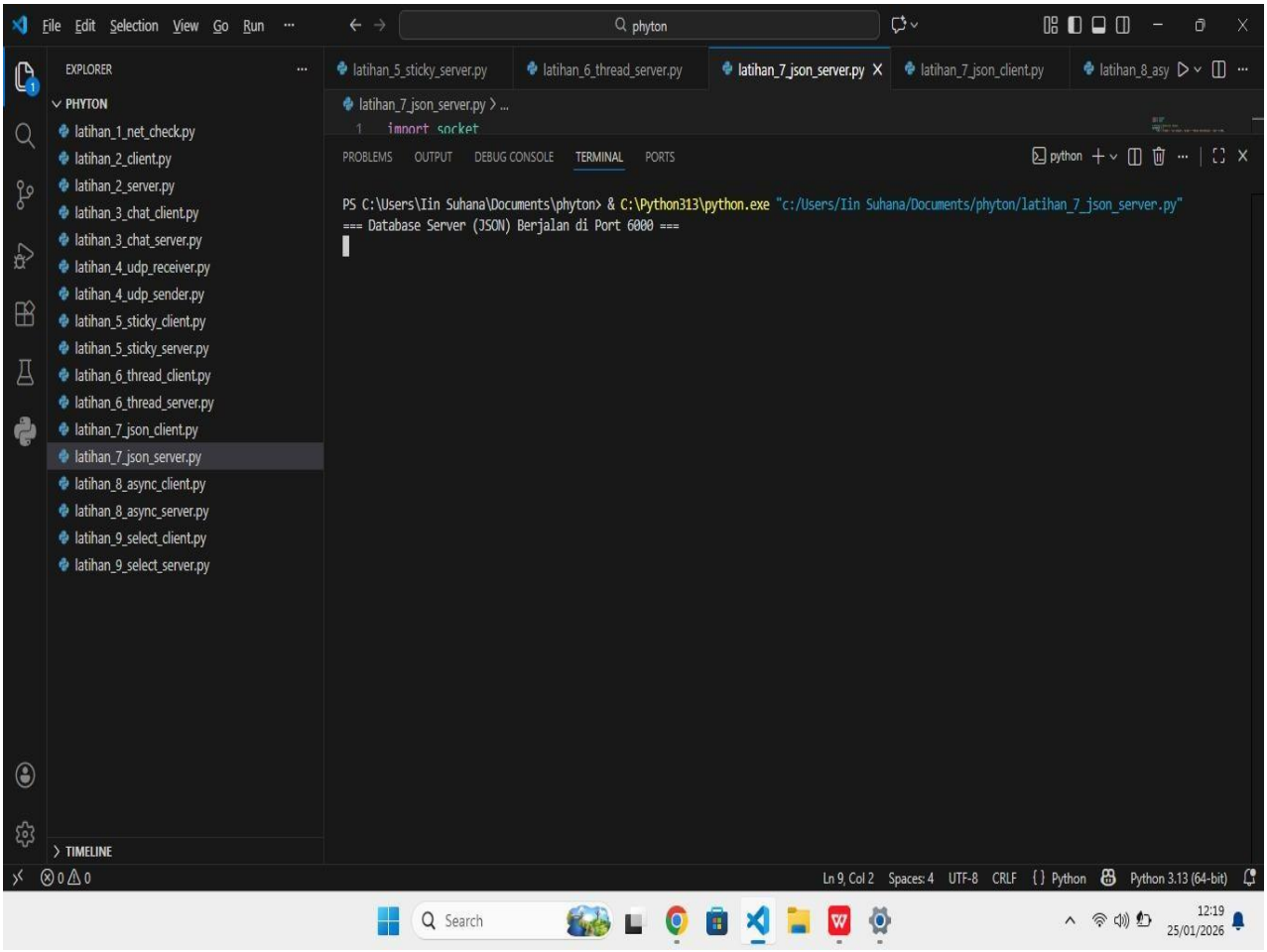

File Edit Selection View Go Run
phyton
EXPLORER
PHYTON
latihan_1_net_check.py
latihan_2_client.py
latihan_2_server.py
latihan_3_chat_client.py
latihan_3_chat_server.py
latihan_4_udp_receiver.py
latihan_4_udp_sender.py
latihan_5_sticky_client.py
latihan_5_sticky_server.py
latihan_6_thread_client.py
latihan_6_thread_server.py
latihan_7_json_client.py
latihan_7_json_server.py
latihan_8_async_client.py
latihan_8_async_server.py
latihan_9_select_client.py
latihan_9_select_server.py
TIMELINE
latihan_8_async_client.py
latihan_9_select_server.py
latihan_9_select_client.py
latihan_6_thread_client.py
latihan_6_thread_client.py > ...
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
PS C:\Users\Iin Suhana\Documents\phyton> & C:\Python313\python.exe "c:/Users/Iin Suhana/Documents/phyton/latihan_6_thread_client.py"
Terhubung ke server. Ketik pesan, ketik 'bye' untuk keluar.
>> bye
Koneksi ditutup
PS C:\Users\Iin Suhana\Documents\phyton>
python
powershell
Ln 18, Col 25 Spaces: 4 UTF-8 CRLF { } Python Python 3.13 (64-bit)
Search
12:18
25/01/2026

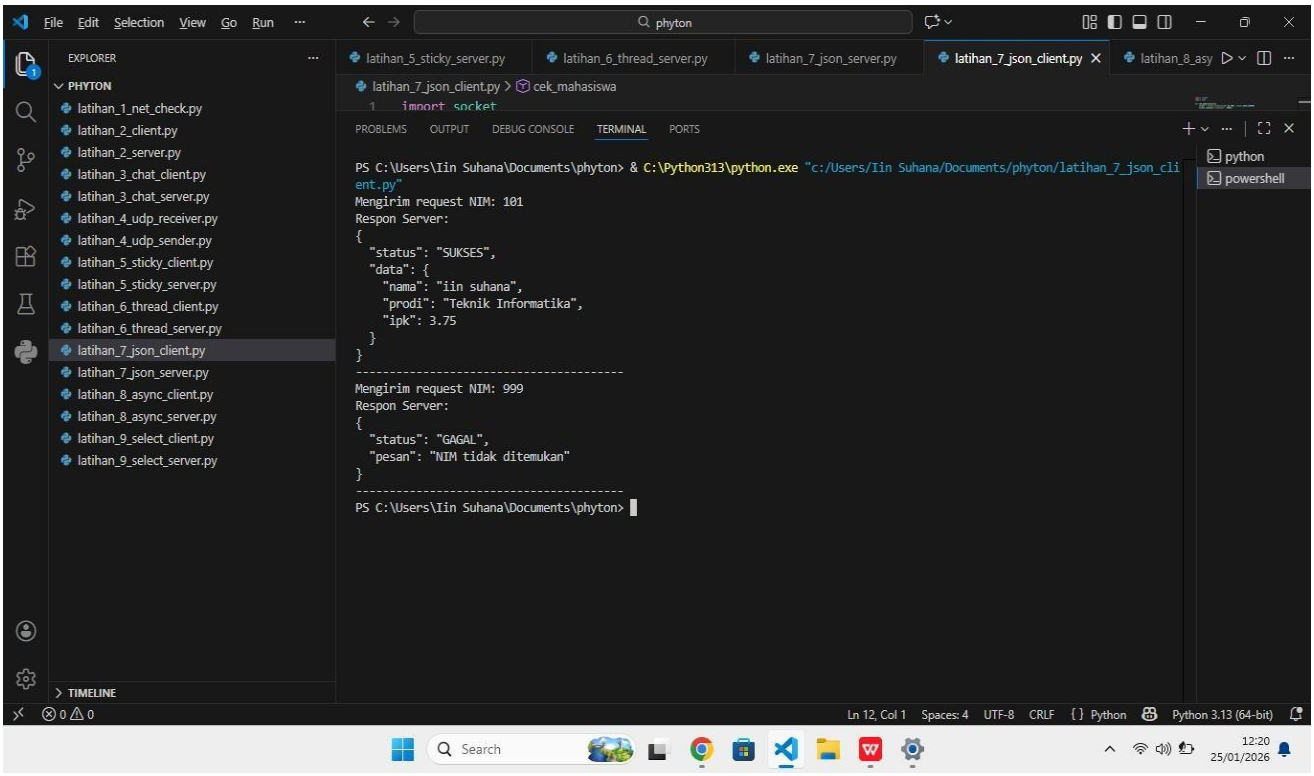
BAB VII

SERIALISASI DATA (JSON & PICKLE)

Serialisasi data adalah proses mengubah data menjadi format tertentu agar dapat dikirim melalui jaringan atau disimpan.

HASIL:




File Edit Selection View Go Run
phyton
EXPLORER
PHYTON
latihan_1_net_check.py
latihan_2_client.py
latihan_2_server.py
latihan_3_chat_client.py
latihan_3_chat_server.py
latihan_4_udp_receiver.py
latihan_4_udp_sender.py
latihan_5_sticky_client.py
latihan_5_sticky_server.py
latihan_6_thread_client.py
latihan_6_thread_server.py
latihan_7_json_client.py
latihan_7_json_server.py
latihan_8_async_client.py
latihan_8_async_server.py
latihan_9_select_client.py
latihan_9_select_server.py
TIMELINE
latihan_5_sticky_server.py
latihan_6_thread_server.py
latihan_7_json_server.py
latihan_7_json_client.py
latihan_8_asy
latihan_7_json_client.py > cek_mahasiswa
1 import socket
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
python
powershell
PS C:\Users\Iin Suhana\Documents\phyton> & C:\Python313\python.exe "c:/Users/Iin Suhana/Documents/phyton/latihan_7_json_client.py"
Mengirim request NIM: 101
Respon Server:
{
"status": "SUKSES",
"data": {
"nama": "iin suhana",
"prodi": "Teknik Informatika",
"ipk": 3.75
}
}

Mengirim request NIM: 999
Respon Server:
{
"status": "GAGAL",
"pesan": "NIM tidak ditemukan"
}

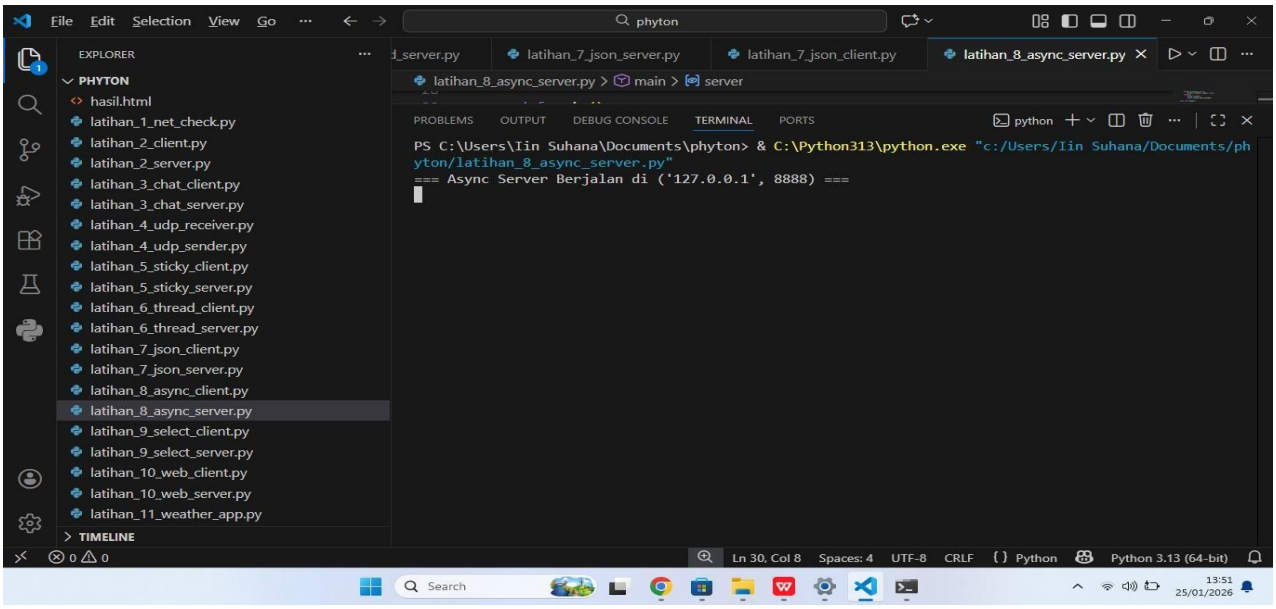
PS C:\Users\Iin Suhana\Documents\phyton>
Ln 12, Col 1 Spaces: 4 UTF-8 CRLF { } Python Python 3.13 (64-bit)
Search
12:20
25/01/2026

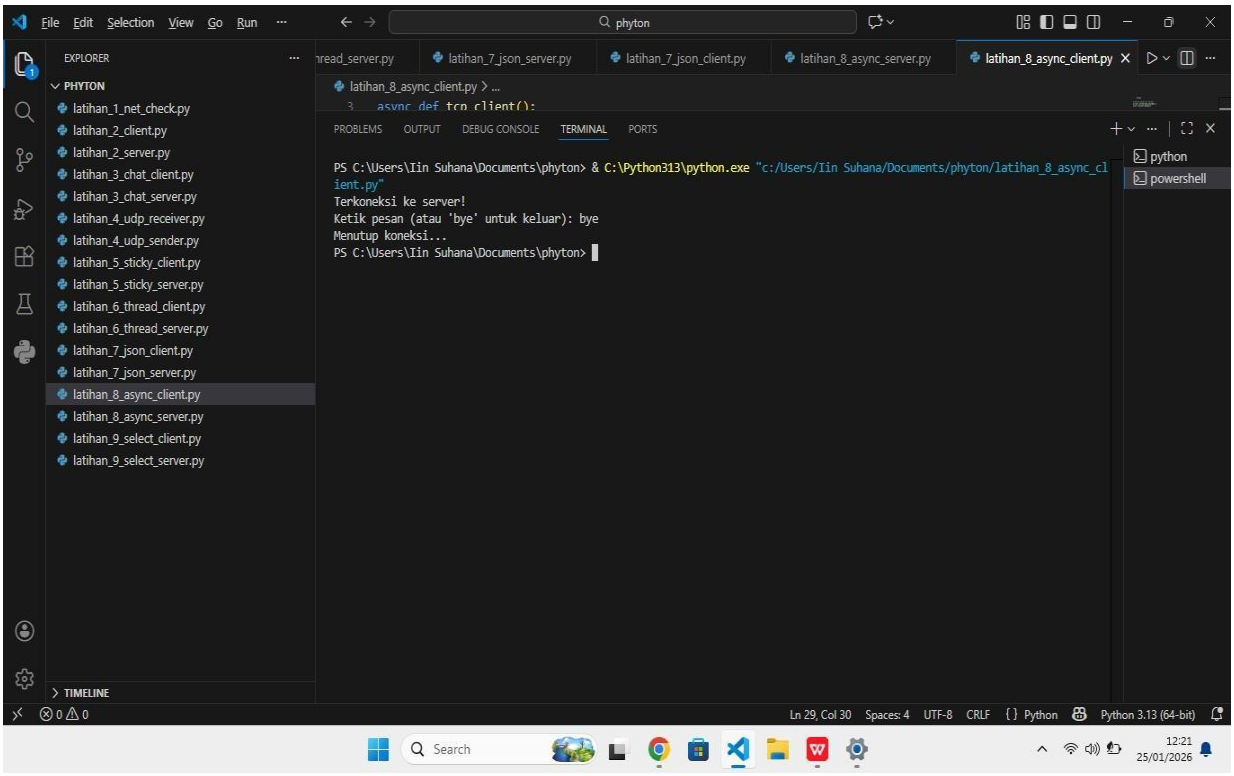
BAB VIII

ASYNCHRONOUS I/O (CONCURRENCY PART II)

Asynchronous I/O memungkinkan program melakukan proses input dan output tanpa harus menunggu proses lain selesai.

HASIL:



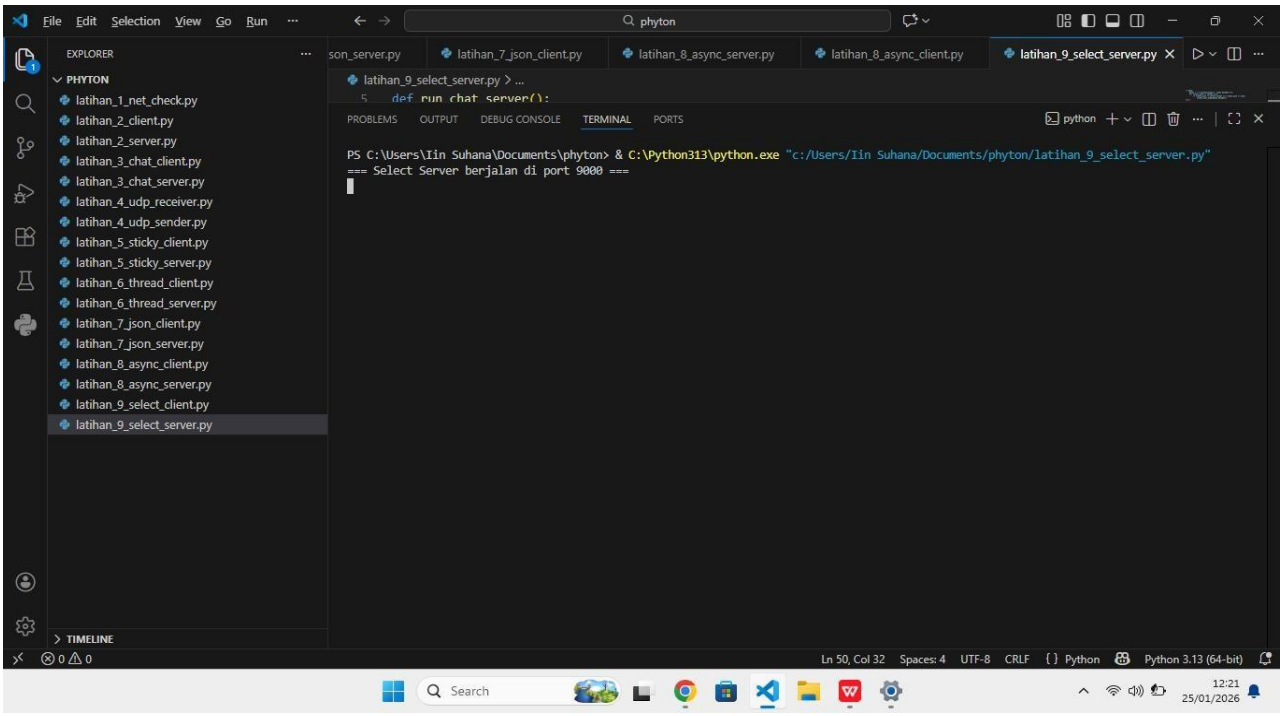

File Edit Selection View Go Run
phyton
EXPLORER
PHYTON
latihan_1_net_check.py
latihan_2_client.py
latihan_2_server.py
latihan_3_chat_client.py
latihan_3_chat_server.py
latihan_4_udp_receiver.py
latihan_4_udp_sender.py
latihan_5_sticky_client.py
latihan_5_sticky_server.py
latihan_6_thread_client.py
latihan_6_thread_server.py
latihan_7_json_client.py
latihan_7_json_server.py
latihan_8_async_client.py
latihan_8_async_server.py
latihan_9_select_client.py
latihan_9_select_server.py
TIMELINE
latihan_7_json_server.py
latihan_7_json_client.py
latihan_8_async_server.py
latihan_8_async_client.py
latihan_8_async_client.py > ...
async def tcp_client():
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
PS C:\Users\Iin Suhana\Documents\phyton> & C:\Python313\python.exe "c:/Users/Iin Suhana/Documents/phyton/latihan_8_async_client.py"
Terkoneksi ke server!
Ketik pesan (atau 'bye' untuk keluar): bye
Menutup koneksi...
PS C:\Users\Iin Suhana\Documents\phyton>
python
powershell
Ln 29, Col 30 Spaces: 4 UTF-8 CRLF { } Python Python 3.13 (64-bit)
Search
12:21
25/01/2026

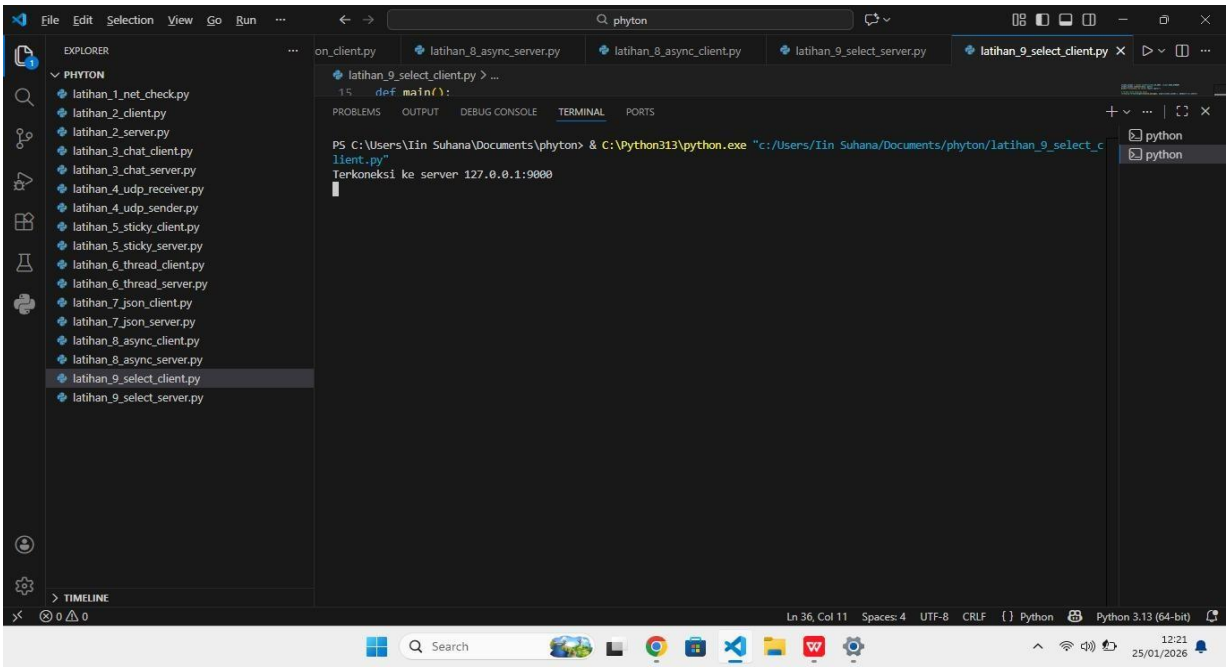
BAB IX

I/O MULTIPLEXING (SELECT & POLL)

Select digunakan untuk memantau banyak socket dalam satu waktu.

HASIL:



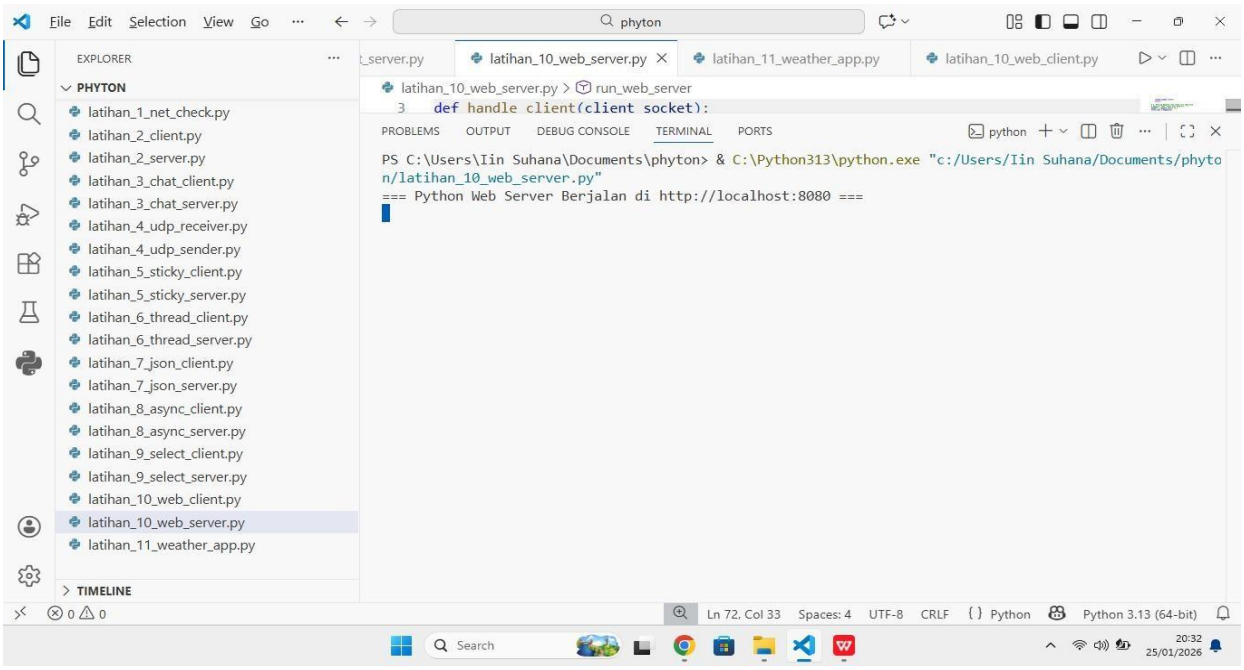

File Edit Selection View Go Run
phyton
EXPLORER
PHYTON
latihan_1_net_check.py
latihan_2_client.py
latihan_2_server.py
latihan_3_chat_client.py
latihan_3_chat_server.py
latihan_4_udp_receiver.py
latihan_4_udp_sender.py
latihan_5_sticky_client.py
latihan_5_sticky_server.py
latihan_6_thread_client.py
latihan_6_thread_server.py
latihan_7_json_client.py
latihan_7_json_server.py
latihan_8_async_client.py
latihan_8_async_server.py
latihan_9_select_client.py
latihan_9_select_server.py
TIMELINE
latihan_8_async_server.py
latihan_8_async_client.py
latihan_9_select_server.py
latihan_9_select_client.py
latihan_9_select_client.py > ...
15 def main():
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
PS C:\Users\Iin Suhana\Documents\phyton> & C:\Python313\python.exe "c:/Users/Iin Suhana/Documents/phyton/latihan_9_select_client.py"
Terkoneksi ke server 127.0.0.1:9000
python
python
Ln 36, Col 11 Spaces: 4 UTF-8 CRLF Python Python 3.13 (64-bit)
Search
12:21
25/01/2026

BAB X

PROTOKOL HTTP & WEB SERVER

HTTP adalah protokol komunikasi yang digunakan pada web.

HASIL:

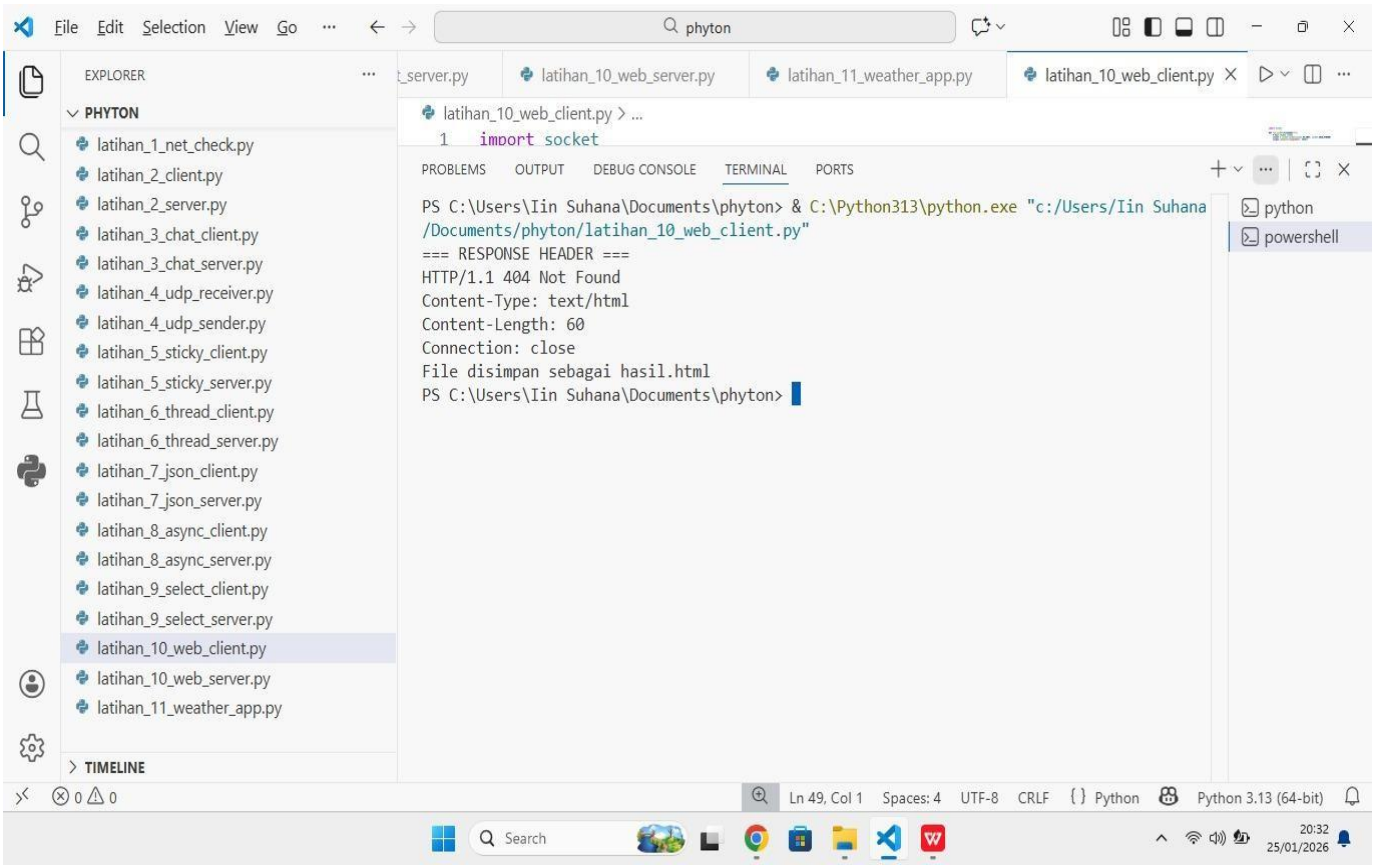


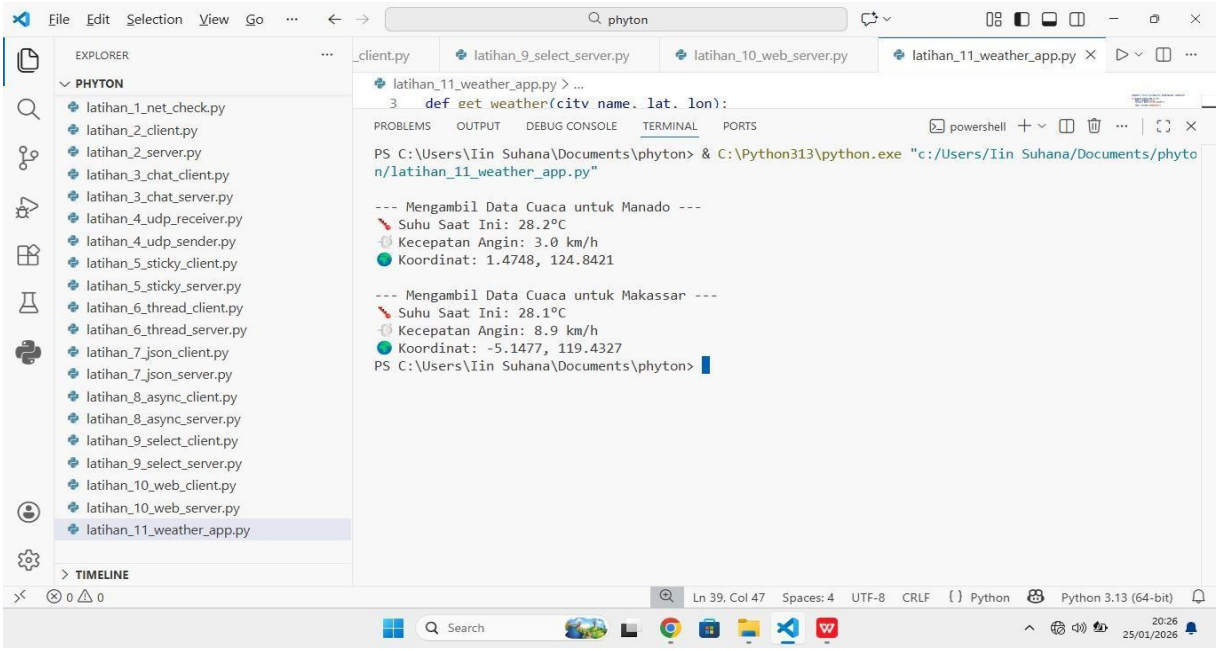
BAB XI

REST API & WEB SERVICES

REST API adalah layanan web berbasis HTTP untuk pertukaran data.

HASIL:



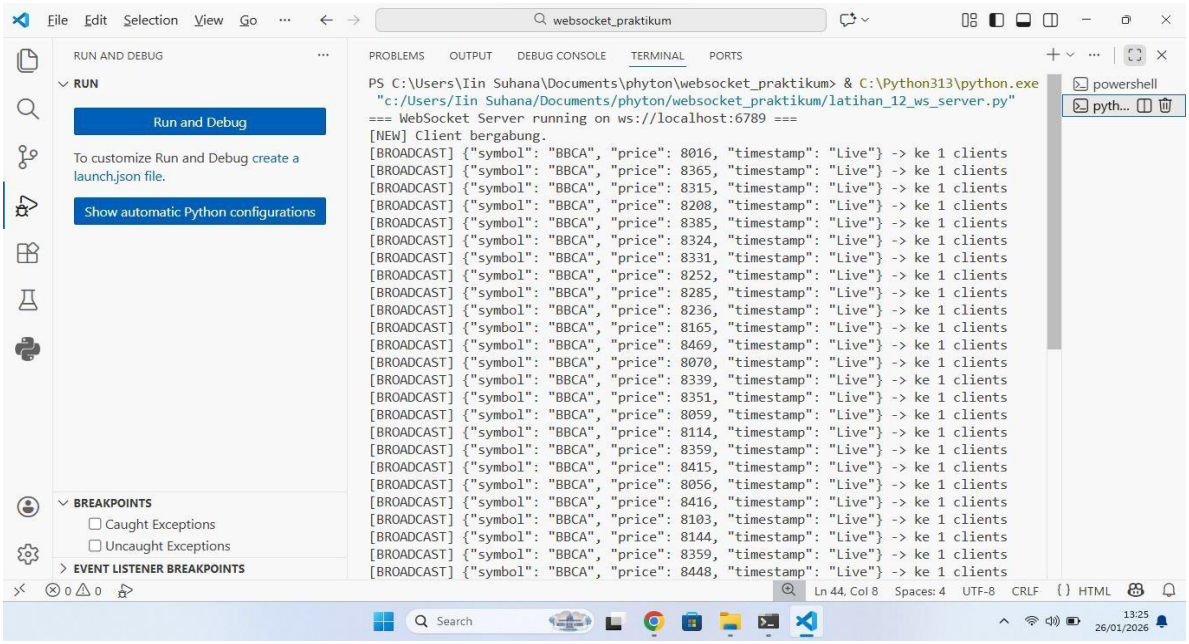

File Edit Selection View Go
phyton
EXPLORER
PHYTON
latihan_1_net_check.py
latihan_2_client.py
latihan_2_server.py
latihan_3_chat_client.py
latihan_3_chat_server.py
latihan_4_udp_receiver.py
latihan_4_udp_sender.py
latihan_5_sticky_client.py
latihan_5_sticky_server.py
latihan_6_thread_client.py
latihan_6_thread_server.py
latihan_7_json_client.py
latihan_7_json_server.py
latihan_8_async_client.py
latihan_8_async_server.py
latihan_9_select_client.py
latihan_9_select_server.py
latihan_10_web_client.py
latihan_10_web_server.py
latihan_11_weather_app.py
TIMELINE
_client.py
latihan_9_select_server.py
latihan_10_web_server.py
latihan_11_weather_app.py
latihan_11_weather_app.py > ...
3 def get_weather(city_name, lat, lon):
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
powershell
PS C:\Users\Iin Suhana\Documents\phyton> & C:\Python313\python.exe "c:/Users/Iin Suhana/Documents/phyton/latihan_11_weather_app.py"
--- Mengambil Data Cuaca untuk Manado ---
Suhu Saat Ini: 28.2°C
Kecepatan Angin: 3.0 km/h
Koordinat: 1.4748, 124.8421
--- Mengambil Data Cuaca untuk Makassar ---
Suhu Saat Ini: 28.1°C
Kecepatan Angin: 8.9 km/h
Koordinat: -5.1477, 119.4327
PS C:\Users\Iin Suhana\Documents\phyton>
0 0
Ln 39, Col 47 Spaces: 4 UTF-8 CRLF { } Python Python 3.13 (64-bit)
Search
20:26
25/01/2026

BAB XII

REAL TIME COMMUNICATION (WEB SOCKET)

WebSocket memungkinkan komunikasi dua arah secara real-time.

HASIL:



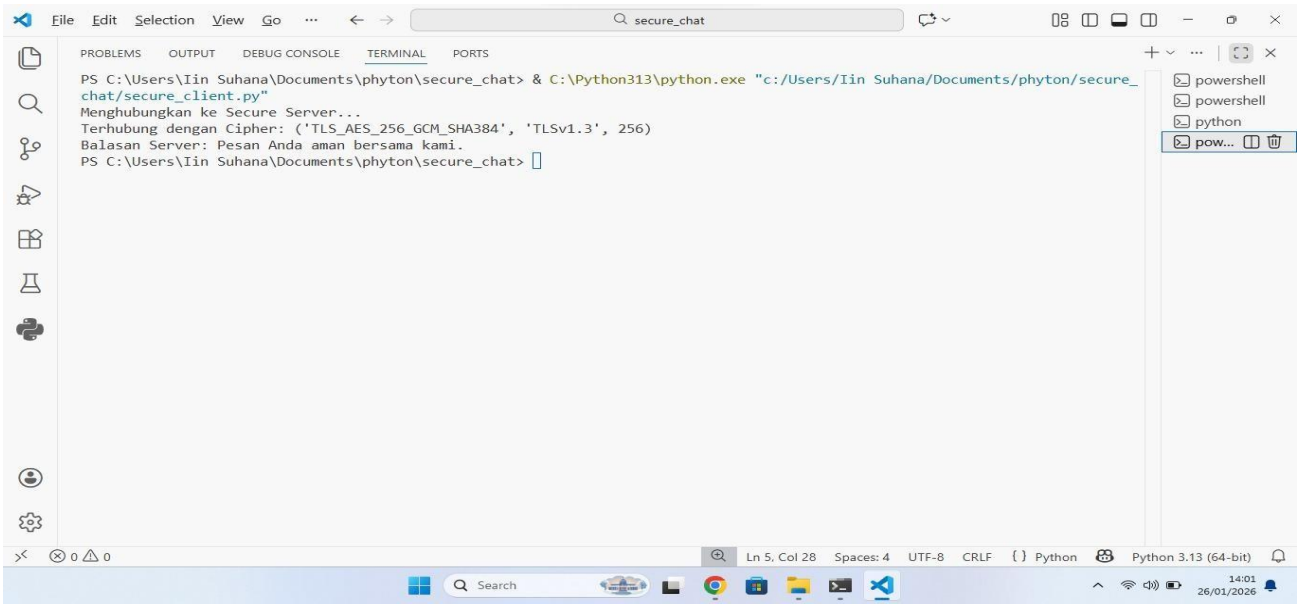

Live Stock Dashboard
File
C:/Users/lin%20Suhana/Documents/phyton/websocket_praktikum/dashboard.html
Pantauan Saham BBCA (Real-time)
Rp 8469
Connected to Server
powershell
python
ke 1 clients
Ln 44, Col 8
Spaces: 4
UTF-8
CRLF
HTML
Search
13:24
26/01/2026

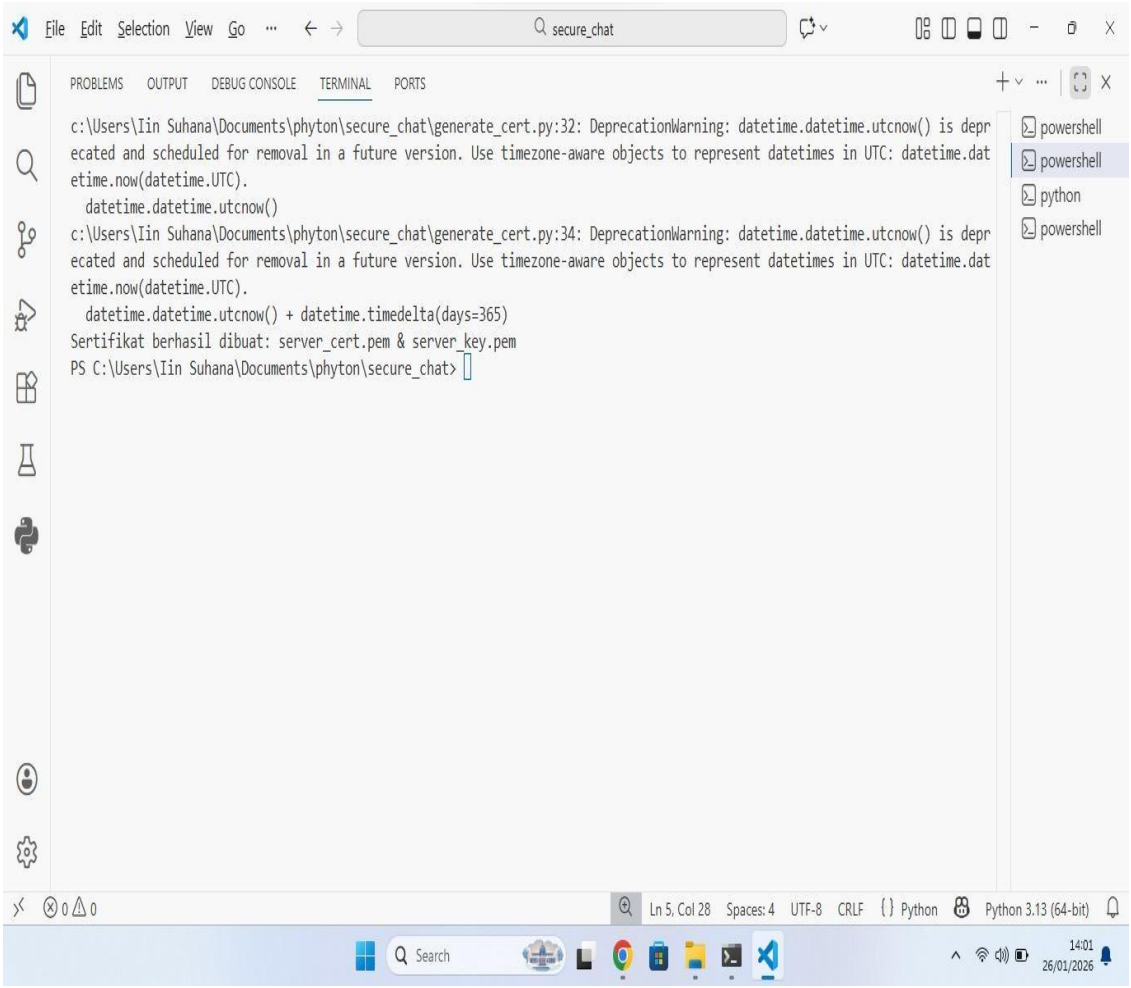
BAB XIII

KEAMANAN JARINGAN (NETWORK SECURITY)

Keamanan jaringan bertujuan melindungi data dan sitem.

HASIL:



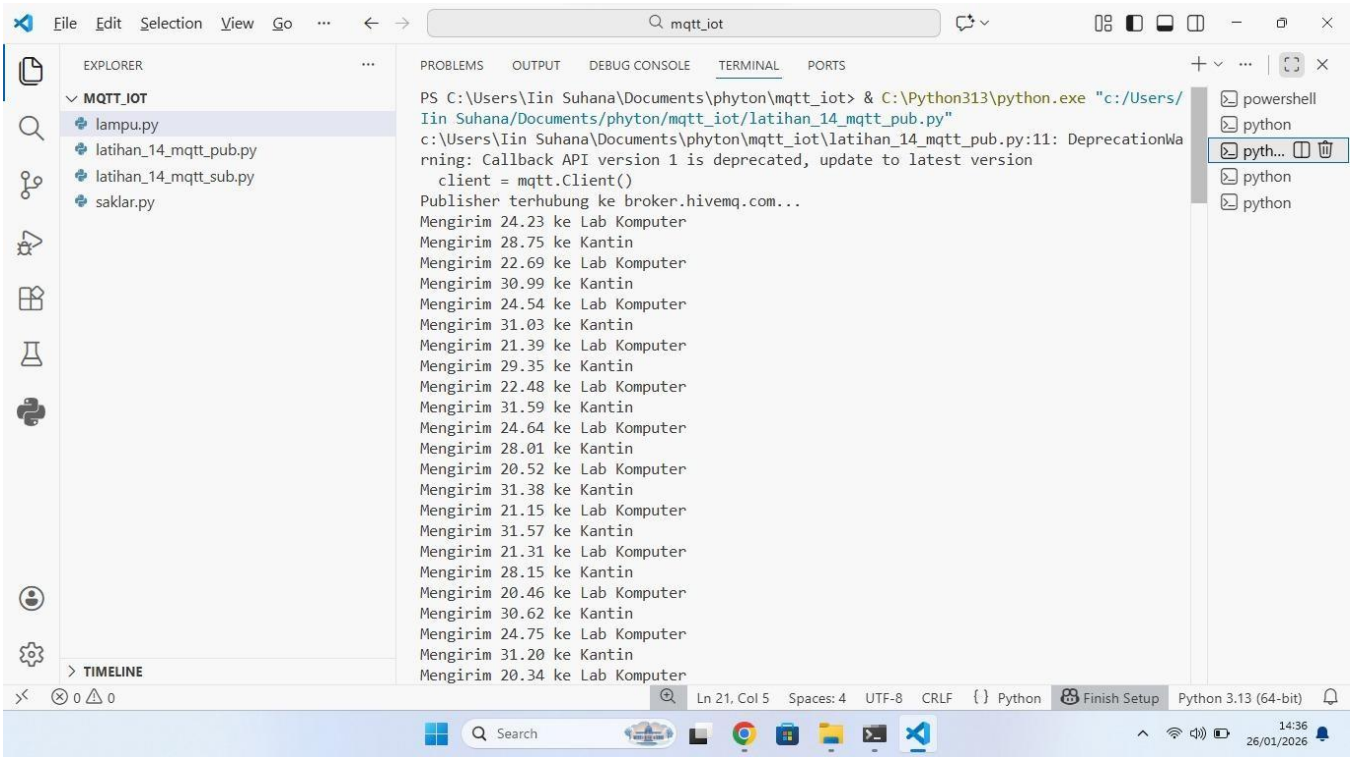

File Edit Selection View Go
secure_chat
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
c:\Users\Iin Suhana\Documents\phyton\secure_chat\generate_cert.py:32: DeprecationWarning: datetime.datetime.utcnow() is deprecated and scheduled for removal in a future version. Use timezone-aware objects to represent datetimes in UTC: datetime.datetime.now(datetime.UTC).
datetime.datetime.utcnow()
c:\Users\Iin Suhana\Documents\phyton\secure_chat\generate_cert.py:34: DeprecationWarning: datetime.datetime.utcnow() is deprecated and scheduled for removal in a future version. Use timezone-aware objects to represent datetimes in UTC: datetime.datetime.now(datetime.UTC).
datetime.datetime.utcnow() + datetime.timedelta(days=365)
Sertifikat berhasil dibuat: server_cert.pem & server_key.pem
PS C:\Users\Iin Suhana\Documents\phyton\secure_chat>
powershell
powershell
python
powershell
Ln 5, Col 28 Spaces: 4 UTF-8 CRLF Python Python 3.13 (64-bit)
Search
14:01
26/01/2026

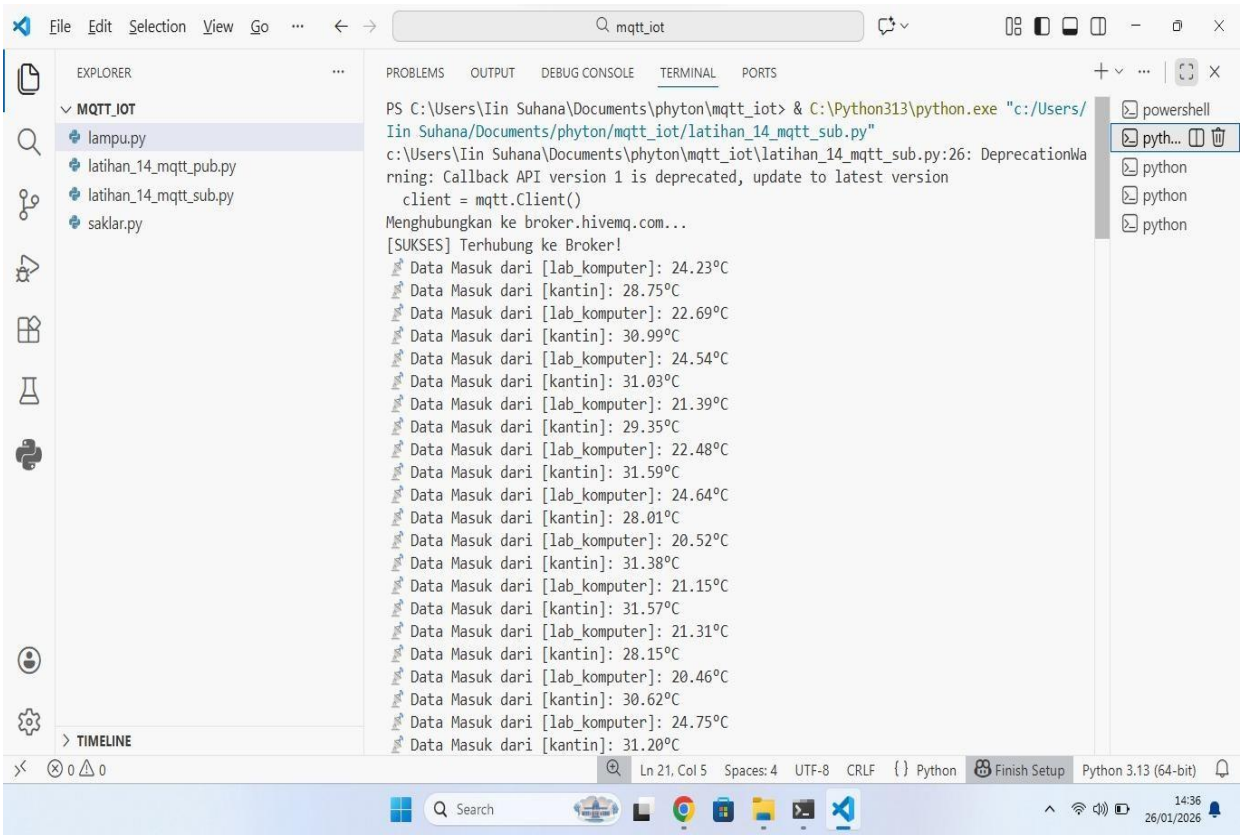
BAB XIV

ARSITEKTUR SISTEM TERDISTRIBUSI & IoT (MQTT)

Arsitektur sistem terdistribusi adalah desain sistem dimana komponen-komponen aplikasi berjalan pada beberapa komputer/node berbeda yang saling terhubung melalui jarigan dan bekerja seolah-olah satu sistem.

HASIL:



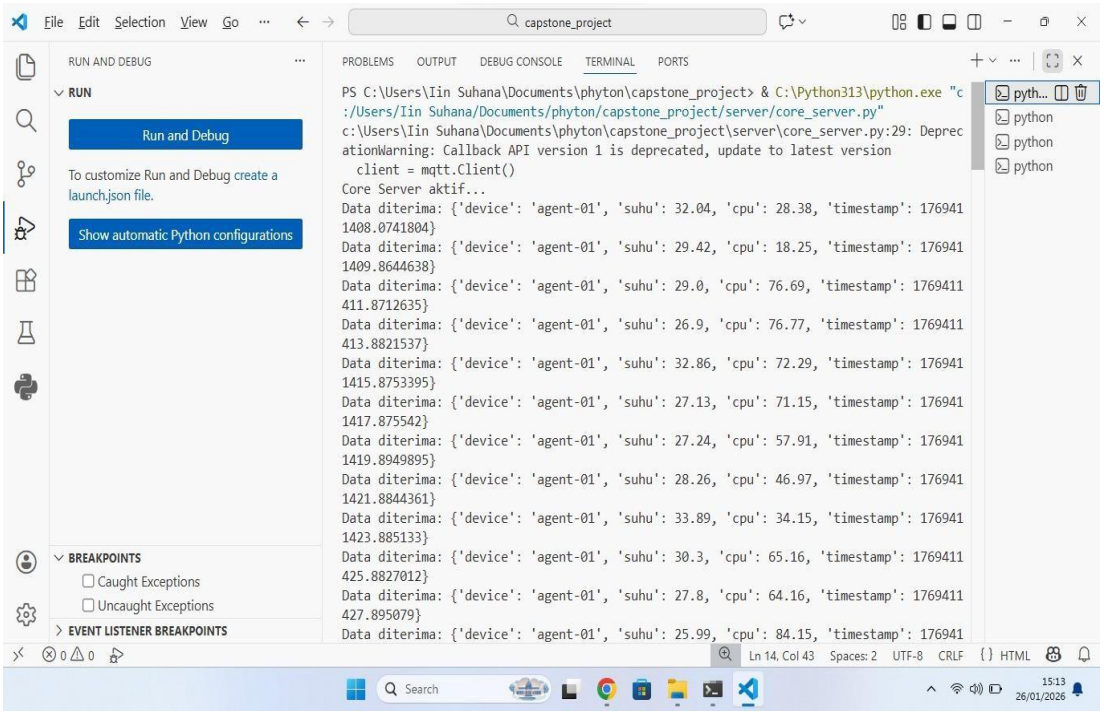

File Edit Selection View Go
mqtt_iot
EXPLORER
MQTT_IOT
lampu.py
latihan_14_mqtt_pub.py
latihan_14_mqtt_sub.py
saklar.py
TIMELINE
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
PS C:\Users\Iin Suhana\Documents\phyton\mqtt_iot> & C:\Python313\python.exe "c:/Users/Iin Suhana/Documents/phyton/mqtt_iot/latihan_14_mqtt_sub.py"
c:\Users\Iin Suhana\Documents\phyton\mqtt_iot\latihan_14_mqtt_sub.py:26: DeprecationWarning: Callback API version 1 is deprecated, update to latest version
client = mqtt.Client()
Menghubungkan ke broker.hivemq.com...
[SUKSES] Terhubung ke Broker!
Data Masuk dari [lab_komputer]: 24.23°C
Data Masuk dari [kantin]: 28.75°C
Data Masuk dari [lab_komputer]: 22.69°C
Data Masuk dari [kantin]: 30.99°C
Data Masuk dari [lab_komputer]: 24.54°C
Data Masuk dari [kantin]: 31.03°C
Data Masuk dari [lab_komputer]: 21.39°C
Data Masuk dari [kantin]: 29.35°C
Data Masuk dari [lab_komputer]: 22.48°C
Data Masuk dari [kantin]: 31.59°C
Data Masuk dari [lab_komputer]: 24.64°C
Data Masuk dari [kantin]: 28.01°C
Data Masuk dari [lab_komputer]: 20.52°C
Data Masuk dari [kantin]: 31.38°C
Data Masuk dari [lab_komputer]: 21.15°C
Data Masuk dari [kantin]: 31.57°C
Data Masuk dari [lab_komputer]: 21.31°C
Data Masuk dari [kantin]: 28.15°C
Data Masuk dari [lab_komputer]: 20.46°C
Data Masuk dari [kantin]: 30.62°C
Data Masuk dari [lab_komputer]: 24.75°C
Data Masuk dari [kantin]: 31.20°C
powershell
pyth...
python
python
python
Ln 21, Col 5 Spaces: 4 UTF-8 CRLF Python Finish Setup Python 3.13 (64-bit)
Search
14:36
26/01/2026

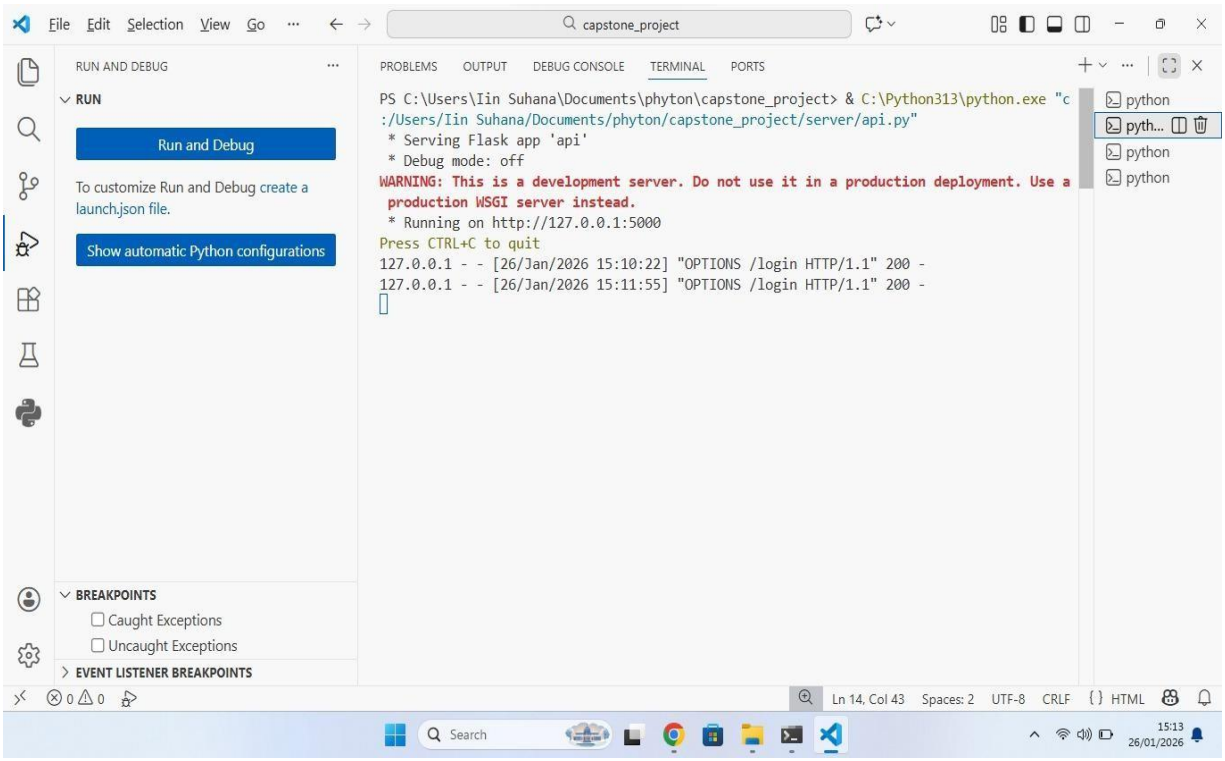
BAB XV

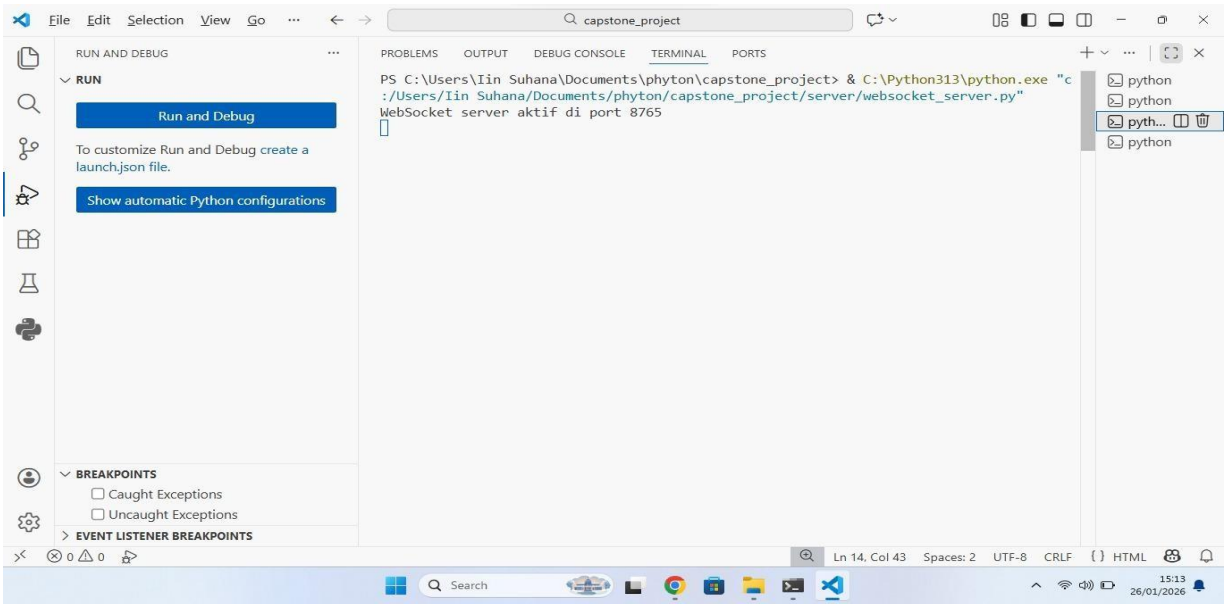
PENUTUP & PROYEK AKHIR (Capstone Project)

Bab penutup merangkum seluruh materi pemograman jaringan yang telah dipelajari dari bab awal hingga bab lanjutan. Seluruh konsep tersebut diintegrasikan dalam proyek akhir atau capstone project.

HASIL:




File Edit Selection View Go
capstone_project
RUN AND DEBUG
RUN
Run and Debug
To customize Run and Debug create a launch.json file.
Show automatic Python configurations
BREAKPOINTS
Caught Exceptions
Uncaught Exceptions
EVENT LISTENER BREAKPOINTS
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
PS C:\Users\Iin Suhana\Documents\phyton\capstone_project> & C:\Python313\python.exe "c
:/Users/Iin Suhana/Documents/phyton/capstone_project/server/api.py"
* Serving Flask app 'api'
* Debug mode: off
WARNING: This is a development server. Do not use it in a production deployment. Use a
production WSGI server instead.
* Running on http://127.0.0.1:5000
Press CTRL+C to quit
127.0.0.1 - - [26/Jan/2026 15:10:22] "OPTIONS /login HTTP/1.1" 200 -
127.0.0.1 - - [26/Jan/2026 15:11:55] "OPTIONS /login HTTP/1.1" 200 -
python
pyth...
python
python
Ln 14, Col 43 Spaces: 2 UTF-8 CRLF HTML
Search
15:13
26/01/2026


File Edit Selection View Go
capstone_project
RUN AND DEBUG
RUN
Run and Debug
To customize Run and Debug create a launch.json file.
Show automatic Python configurations
BREAKPOINTS
Caught Exceptions
Uncaught Exceptions
EVENT LISTENER BREAKPOINTS
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
PS C:\Users\Iin Suhana\Documents\phyton\capstone_project> & C:\Python313\python.exe "c
:/Users/Iin Suhana/Documents/phyton/capstone_project/server/websocket_server.py"
WebSocket server aktif di port 8765
python
python
pyth...
python
Ln 14, Col 43 Spaces: 2 UTF-8 CRLF HTML
Search
15:13
26/01/2026