

LAPORAN PRAKTIKUM PEMROGRAMAN JARINGAN



Disusun oleh:

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MATA KULIAH : PEMROGRAMAN JARINGAN

FAKULTAS ILMU KOMPUTER

PROGRAM STUDI TEKNIK INFORMATIKA

UNIVERSITAS INDONESIA TIMUR

MAKASSAR

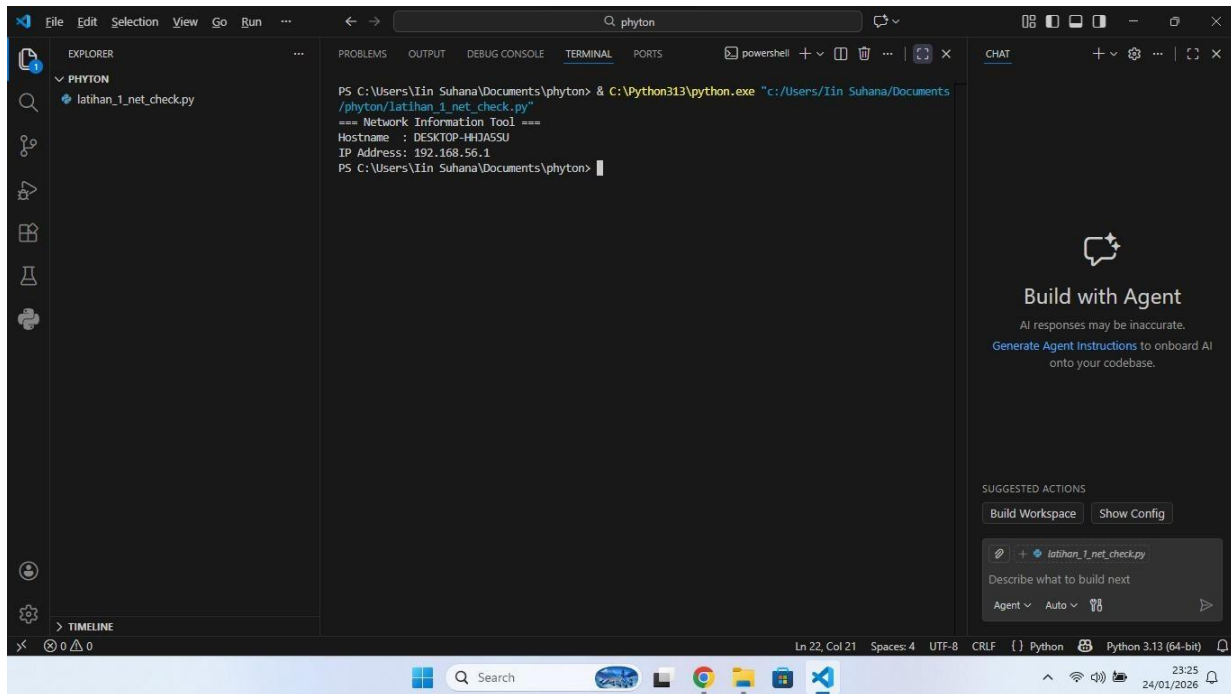
2026

BAB I

KONSEP DASAR PEMOGRAMAN JARINGAN

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

HASIL:



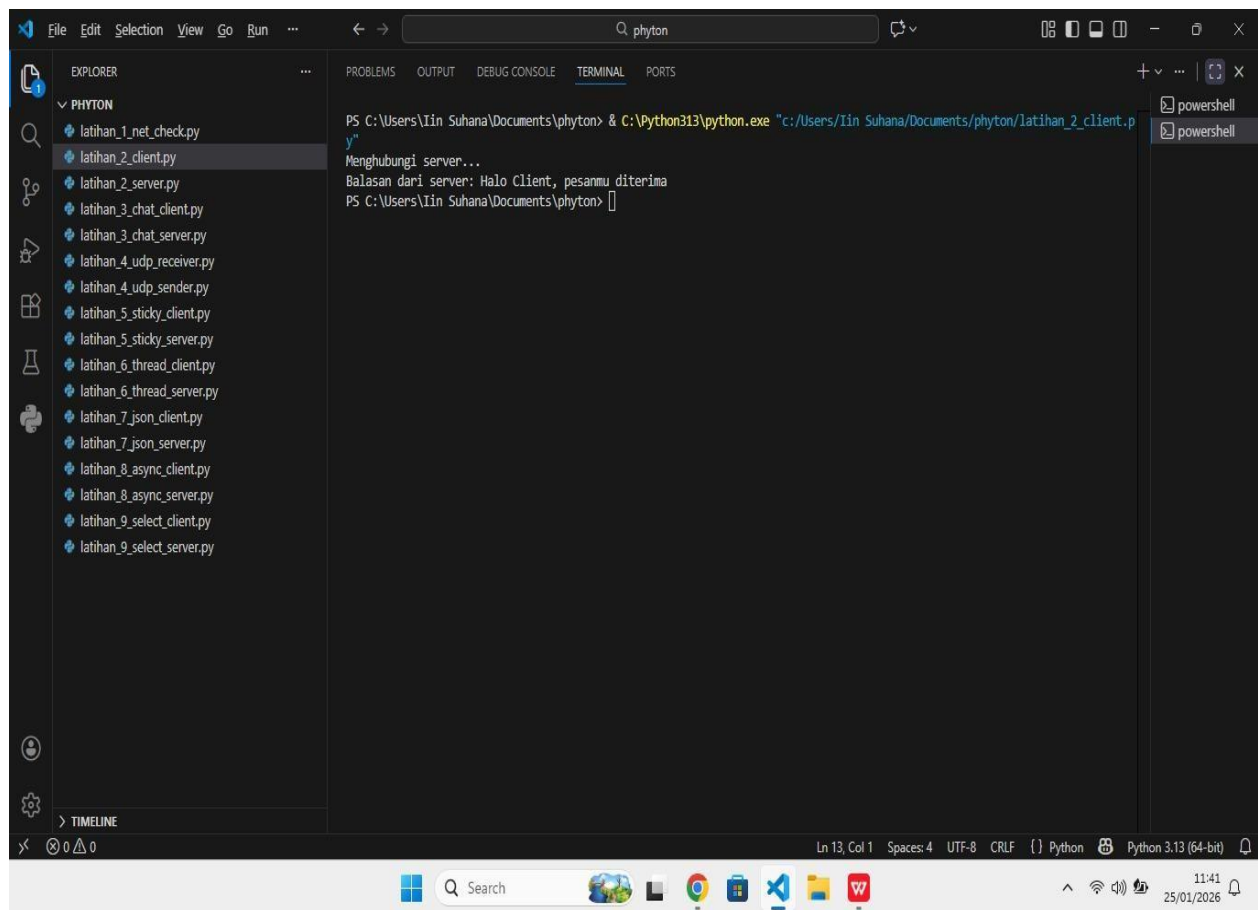
The screenshot displays the Visual Studio Code interface with a dark theme. The Explorer pane on the left shows a file named `latihan_1_net_check.py` under a `PHYTON` folder. The Terminal pane in the center shows the command `PS C:\Users\Iin_Suhana\Documents\phyton> & C:\Python313\python.exe "c:/Users/Iin_Suhana/Documents/phyton/latihan_1_net_check.py"` and its output: `=== Network Information Tool ===`, `Hostname : DESKTOP-HHJASSU`, `IP Address: 192.168.56.1`, and `PS C:\Users\Iin_Suhana\Documents\phyton>`. The Chat pane on the right features a "Build with Agent" section with a warning that "AI responses may be inaccurate" and a button to "Generate Agent Instructions to onboard AI onto your codebase." Below this, there are "SUGGESTED ACTIONS" including "Build Workspace" and "Show Config", and a section for "latihan_1_net_check.py" with a prompt to "Describe what to build next" and an "Agent" dropdown set to "Auto". The status bar at the bottom indicates the current position as "Ln 22, Col 21" and the file encoding as "UTF-8".

BAB II

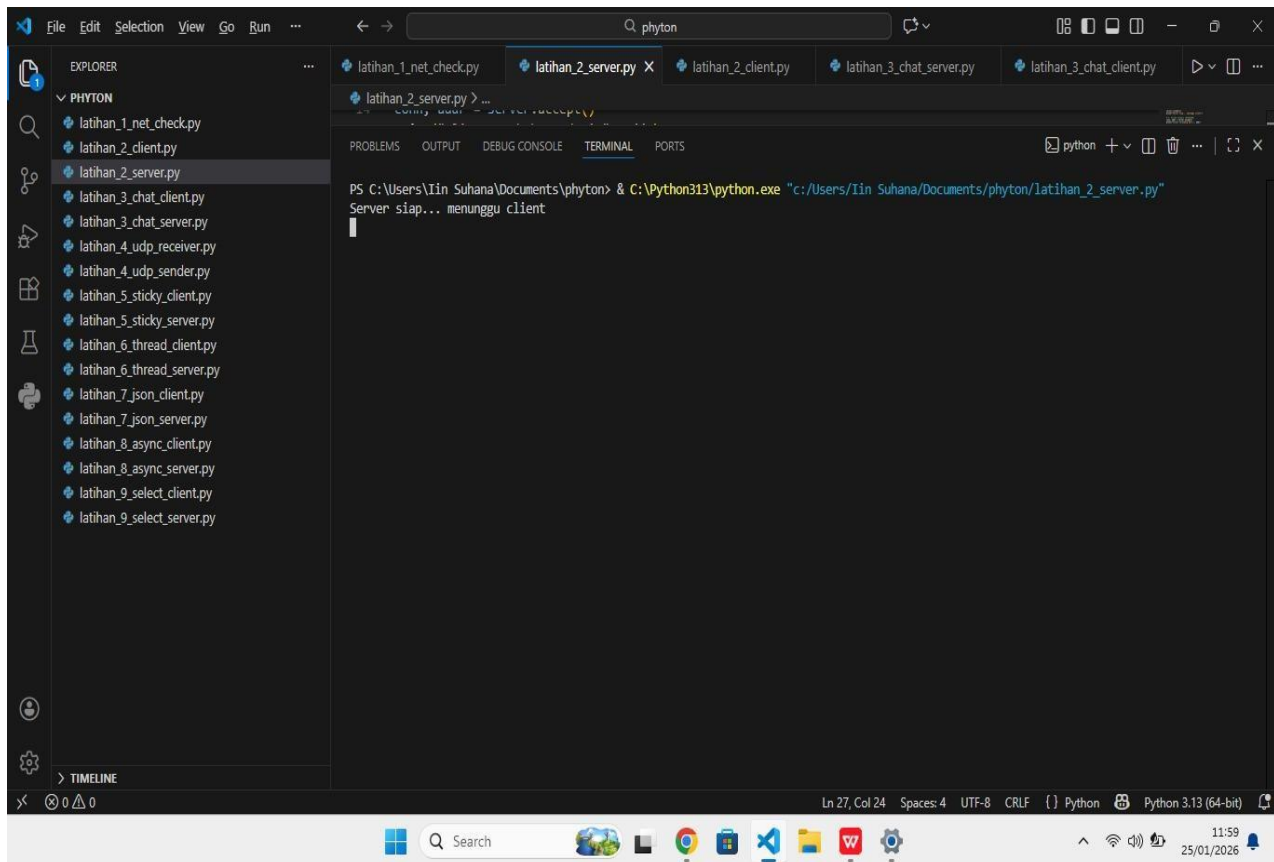
SOCKET API DASAR

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 ...
Q python
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
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
PS C:\Users\Iin Suhana\Documents\phyton> & C:\Python313\python.exe "c:/Users/Iin Suhana/Documents/phyton/latihan_2_client.py"
Menghubungi server...
Balasan dari server: Halo Client, pesanmu diterima
PS C:\Users\Iin Suhana\Documents\phyton>
Ln 13, Col 1 Spaces: 4 UTF-8 CRLF {} Python Python 3.13 (64-bit)
```

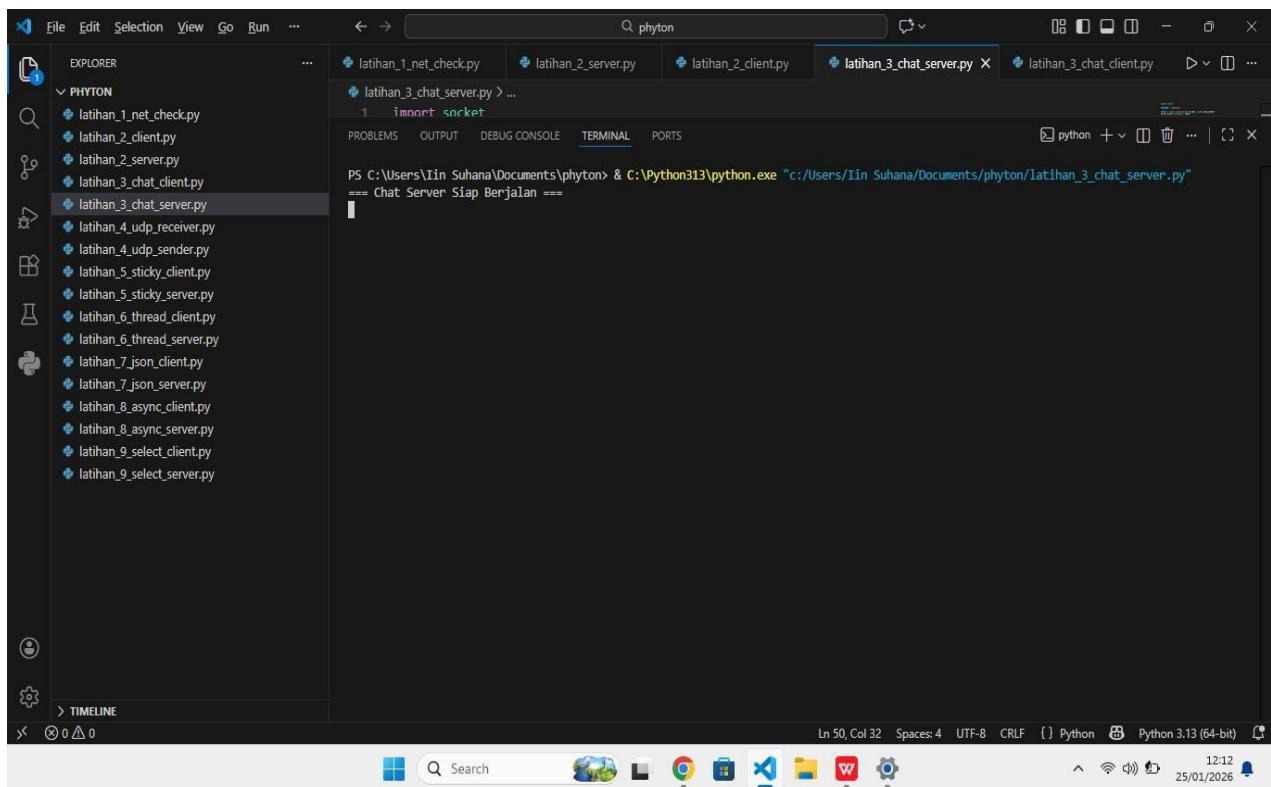


BAB IV

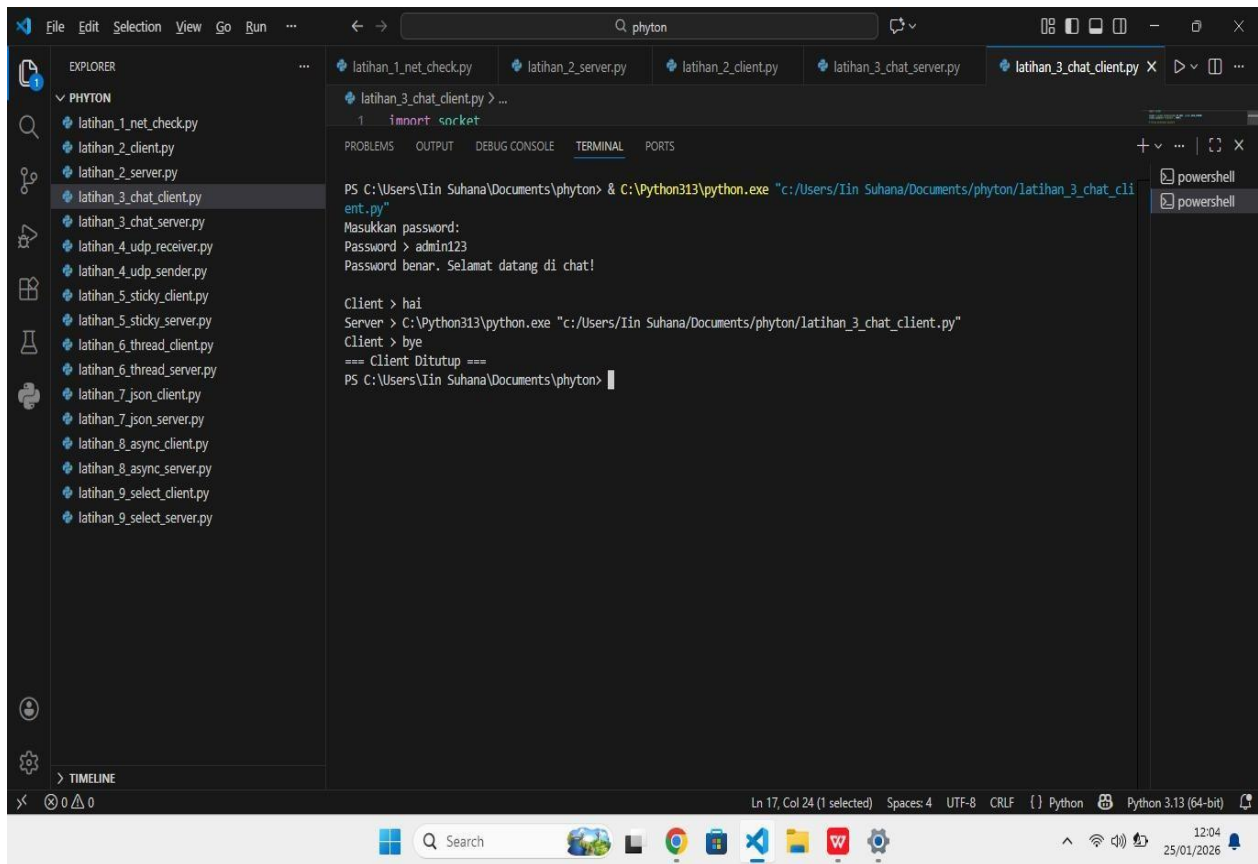
PROTOKOL TCP (APLIKASI CHAT)

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

HASIL:



The screenshot shows a Python IDE with a file explorer on the left containing various Python files. The main editor displays the code for 'latihan_3_chat_server.py', which includes the line `import socket`. Below the editor, the terminal window shows the command `PS C:\Users\Iin Suhana\Documents\phyton> & C:\Python313\python.exe "c:/Users/Iin Suhana/Documents/phyton/latihan_3_chat_server.py"` and the output `=== Chat Server Siap Berjalan ===`. The status bar at the bottom indicates the file is at line 50, column 32, using UTF-8 encoding, and the Python 3.13 (64-bit) interpreter is active.

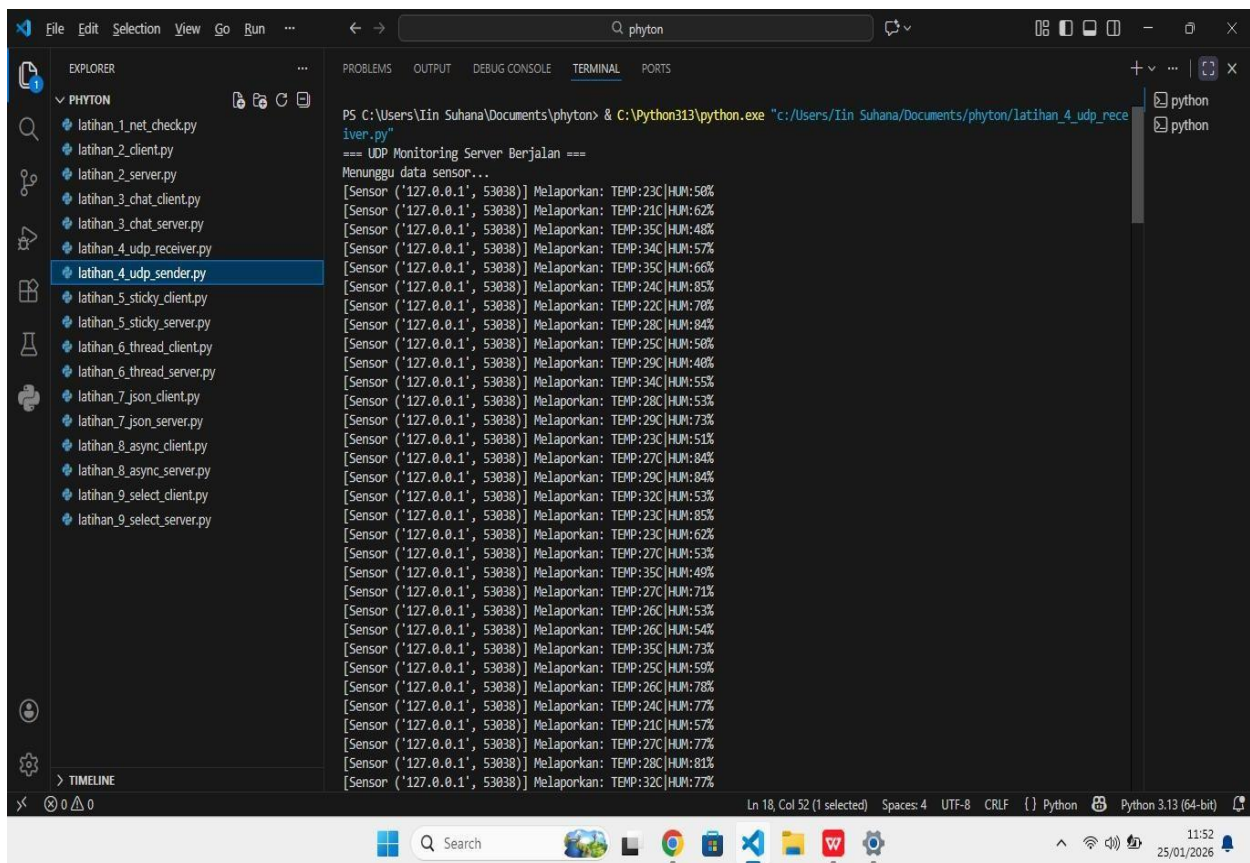


BAB IV

PROTOKOL UDP (STREAMING & BROADCASTING)

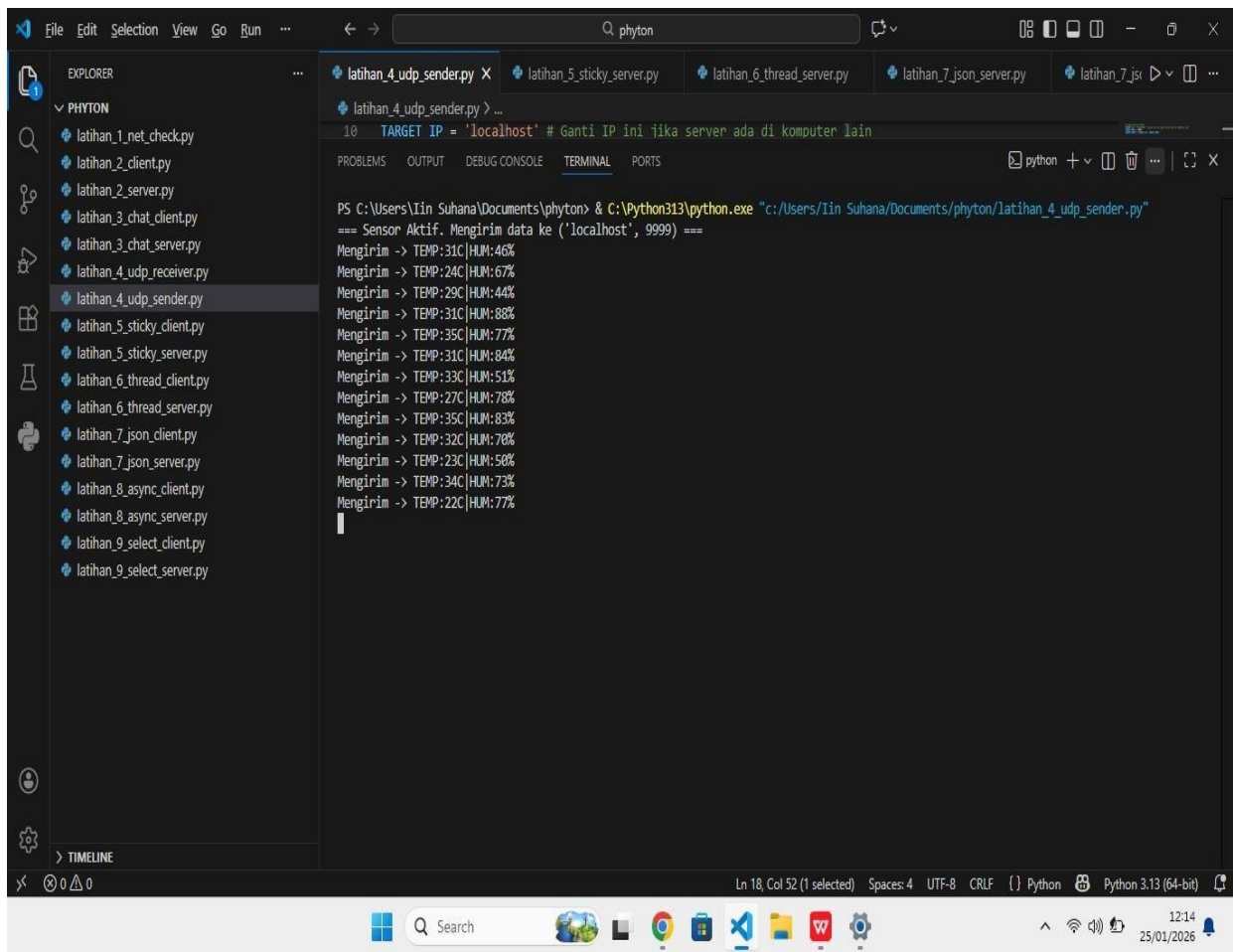
UDP (User Datagram Protocol) adalah protokol komunikasi jaringan yang tidak berorientasi koneksi. Artinya, UDP tidak membangun koneksi terlebih dahulu sebelum mengirim data. Data dikirim dalam bentuk paket tanpa jaminan apakah paket tersebut sampai ke tujuan atau tidak

HASIL:



The screenshot shows a Visual Studio Code editor with a Python project named 'PHYTON'. The file explorer on the left lists various Python files, including 'latihan_4_udp_receiver.py' which is currently selected. The terminal window on the right shows the command prompt running 'python latihan_4_udp_receiver.py'. The output of the script is a continuous stream of sensor data reports, each containing temperature and humidity readings for multiple sensors. The data is formatted as follows:

```
PS C:\Users\Iin Suhana\Documents\phyton> & C:\Python313\python.exe "c:/Users/Iin Suhana/Documents/phyton/latihan_4_udp_receiver.py"
=== UDP Monitoring Server Berjalan ===
Menunggu data sensor...
[Sensor ('127.0.0.1', 53038)] Melaporkan: TEMP:23C|HUM:50%
[Sensor ('127.0.0.1', 53038)] Melaporkan: TEMP:21C|HUM:62%
[Sensor ('127.0.0.1', 53038)] Melaporkan: TEMP:35C|HUM:48%
[Sensor ('127.0.0.1', 53038)] Melaporkan: TEMP:34C|HUM:57%
[Sensor ('127.0.0.1', 53038)] Melaporkan: TEMP:35C|HUM:66%
[Sensor ('127.0.0.1', 53038)] Melaporkan: TEMP:24C|HUM:85%
[Sensor ('127.0.0.1', 53038)] Melaporkan: TEMP:22C|HUM:70%
[Sensor ('127.0.0.1', 53038)] Melaporkan: TEMP:28C|HUM:84%
[Sensor ('127.0.0.1', 53038)] Melaporkan: TEMP:25C|HUM:50%
[Sensor ('127.0.0.1', 53038)] Melaporkan: TEMP:29C|HUM:40%
[Sensor ('127.0.0.1', 53038)] Melaporkan: TEMP:34C|HUM:55%
[Sensor ('127.0.0.1', 53038)] Melaporkan: TEMP:28C|HUM:53%
[Sensor ('127.0.0.1', 53038)] Melaporkan: TEMP:29C|HUM:73%
[Sensor ('127.0.0.1', 53038)] Melaporkan: TEMP:23C|HUM:51%
[Sensor ('127.0.0.1', 53038)] Melaporkan: TEMP:27C|HUM:84%
[Sensor ('127.0.0.1', 53038)] Melaporkan: TEMP:29C|HUM:84%
[Sensor ('127.0.0.1', 53038)] Melaporkan: TEMP:32C|HUM:53%
[Sensor ('127.0.0.1', 53038)] Melaporkan: TEMP:23C|HUM:85%
[Sensor ('127.0.0.1', 53038)] Melaporkan: TEMP:23C|HUM:62%
[Sensor ('127.0.0.1', 53038)] Melaporkan: TEMP:27C|HUM:53%
[Sensor ('127.0.0.1', 53038)] Melaporkan: TEMP:35C|HUM:49%
[Sensor ('127.0.0.1', 53038)] Melaporkan: TEMP:27C|HUM:71%
[Sensor ('127.0.0.1', 53038)] Melaporkan: TEMP:26C|HUM:53%
[Sensor ('127.0.0.1', 53038)] Melaporkan: TEMP:26C|HUM:54%
[Sensor ('127.0.0.1', 53038)] Melaporkan: TEMP:35C|HUM:73%
[Sensor ('127.0.0.1', 53038)] Melaporkan: TEMP:25C|HUM:59%
[Sensor ('127.0.0.1', 53038)] Melaporkan: TEMP:26C|HUM:78%
[Sensor ('127.0.0.1', 53038)] Melaporkan: TEMP:24C|HUM:77%
[Sensor ('127.0.0.1', 53038)] Melaporkan: TEMP:21C|HUM:57%
[Sensor ('127.0.0.1', 53038)] Melaporkan: TEMP:27C|HUM:77%
[Sensor ('127.0.0.1', 53038)] Melaporkan: TEMP:28C|HUM:81%
[Sensor ('127.0.0.1', 53038)] Melaporkan: TEMP:32C|HUM:77%
```

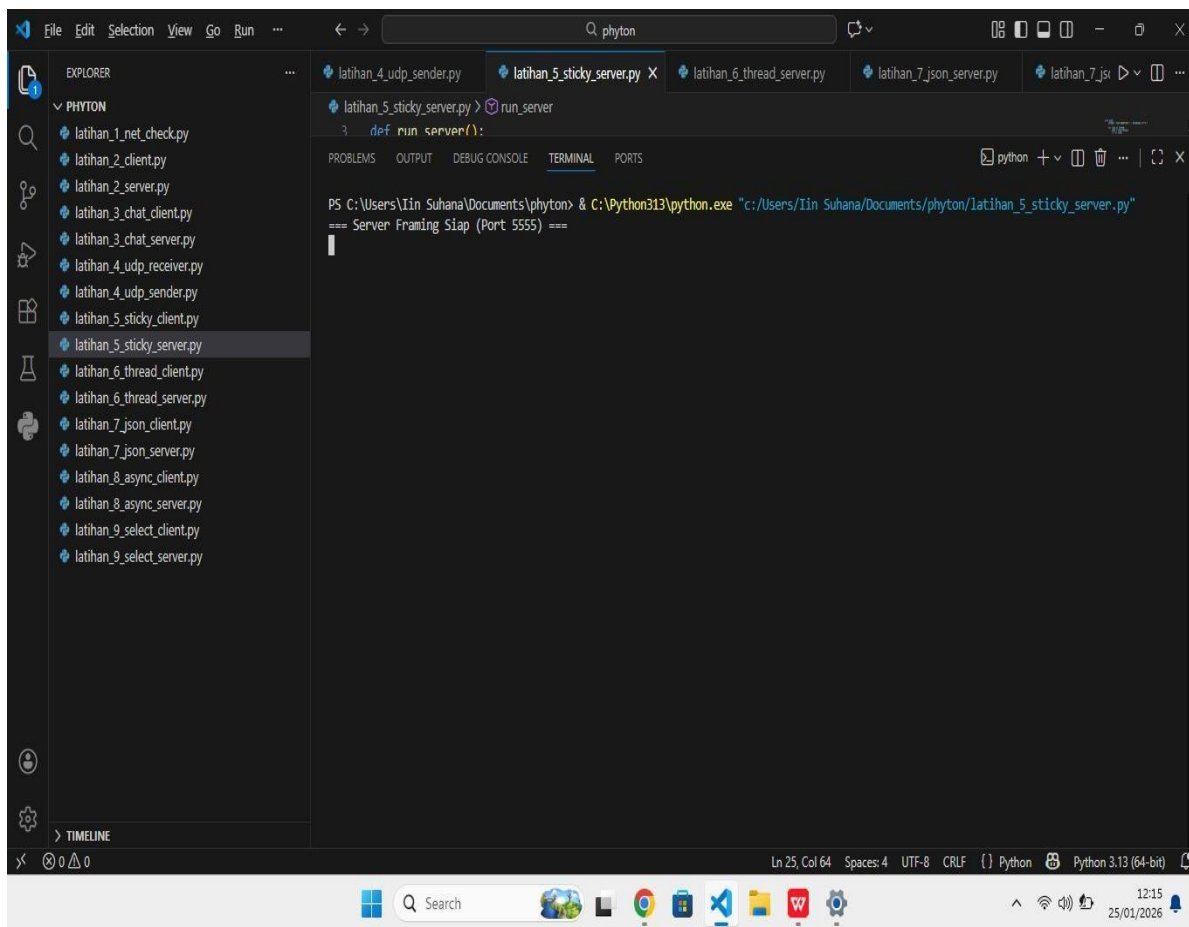


BAB V

ERROR HANDLING & FRAMING DATA

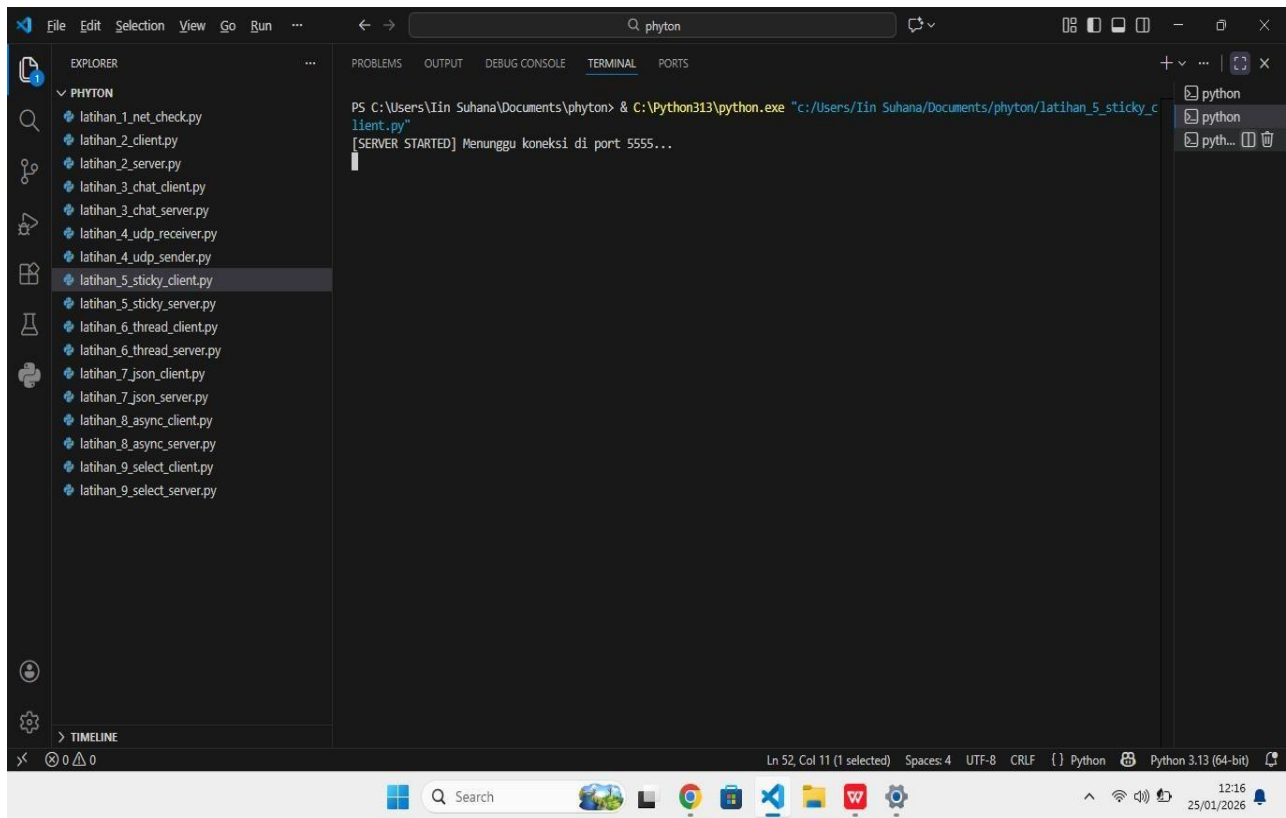
Error handling adalah proses penanganan kesalahan yang terjadi selama komunikasi jaringan. Kesalahan dapat terjadi karena gangguan jaringan, koneksi terputus, atau data yang tidak sesuai format.

HASIL:



The screenshot shows a Python IDE with a file explorer on the left containing various Python files. The main editor displays the code for `latihan_5_sticky_server.py`, which includes a `run_server` function. The terminal at the bottom shows the command `python.exe "c:/Users/Iin Suhana/Documents/phyton/latihan_5_sticky_server.py"` being executed, resulting in the output `=== Server Framing Siap (Port 5555) ===`. The status bar at the bottom indicates the file is at line 25, column 64, with 4 spaces, using UTF-8 encoding and CRLF line endings.

```
File Edit Selection View Go Run ...  
latihan_4_udp_sender.py latihan_5_sticky_server.py X latihan_6_thread_server.py latihan_7_json_server.py latihan_7_jsi ...  
latihan_5_sticky_server.py > run_server  
3 def run_server():  
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS  
python +v ...  
PS C:\Users\Iin Suhana\Documents\phyton> & C:\Python313\python.exe "c:/Users/Iin Suhana/Documents/phyton/latihan_5_sticky_server.py"  
=== Server Framing Siap (Port 5555) ===  
Ln 25, Col 64 Spaces: 4 UTF-8 CRLF Python Python 3.13 (64-bit)
```

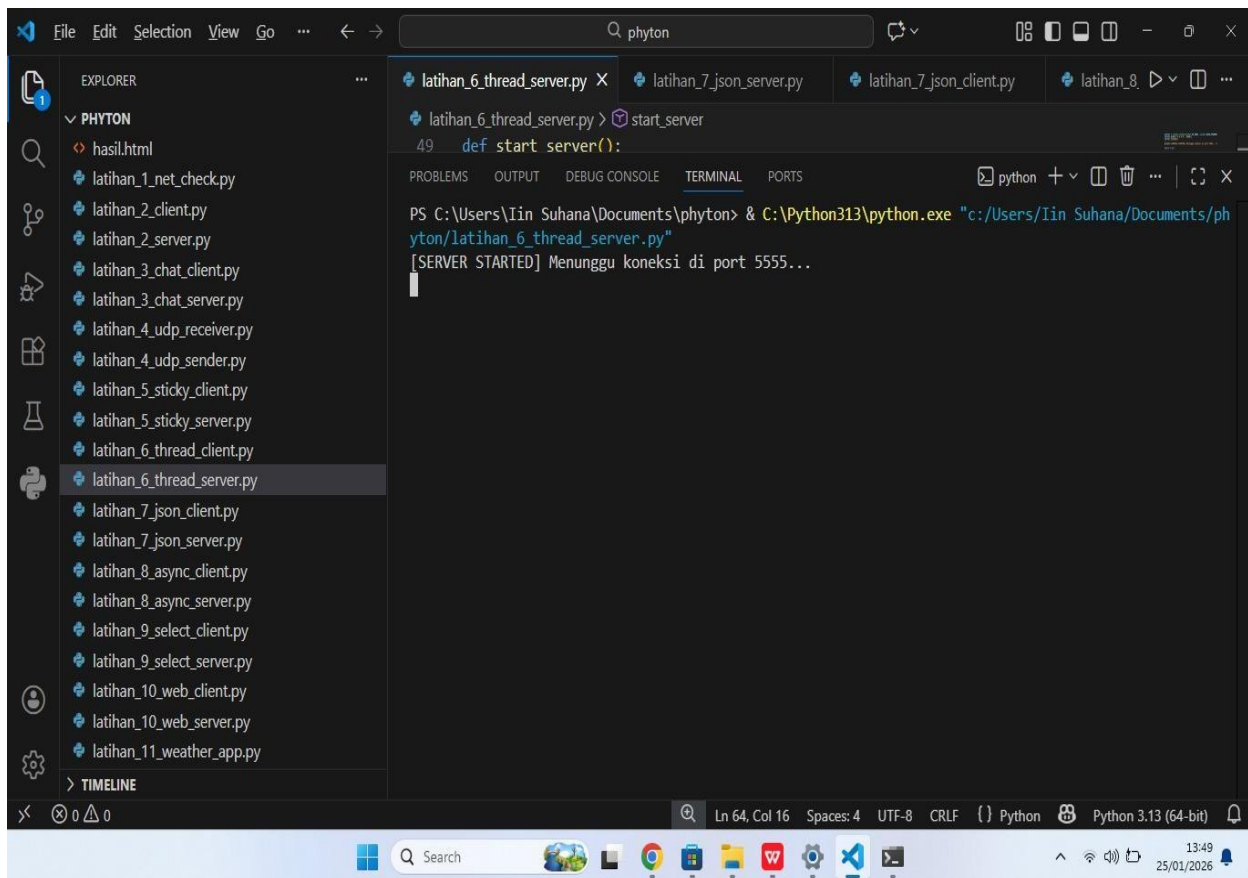


BAB VI

CONCURRENCY PART I (THREADING)

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

HASIL:

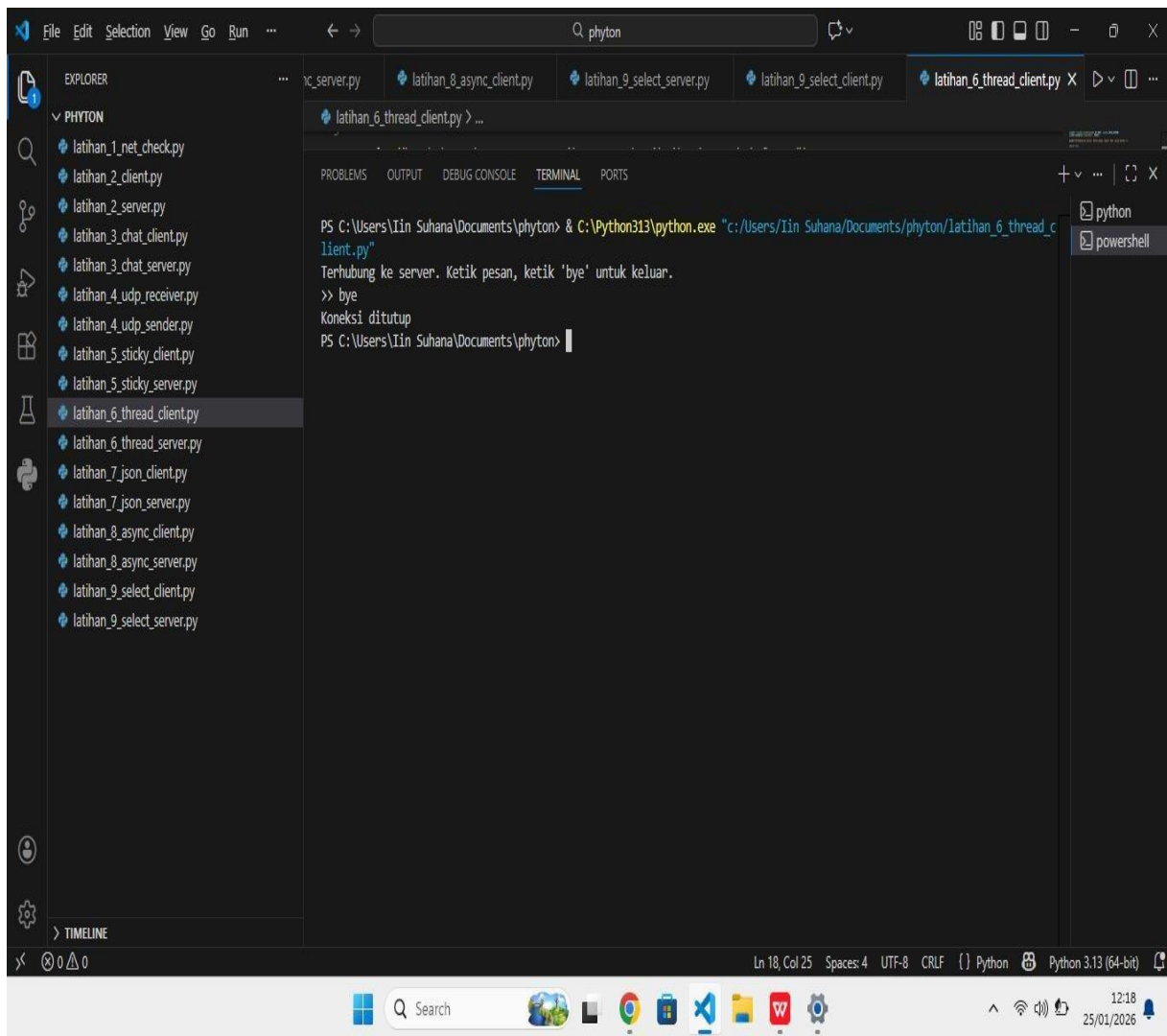


The screenshot shows the Visual Studio Code interface. On the left, the Explorer pane displays a file tree for a project named 'PYTHON'. The file 'latihan_6_thread_server.py' is selected. The main editor area shows the code for 'latihan_6_thread_server.py', with the 'start_server' function defined. The terminal pane at the bottom shows the command to run the script and its output.

```
def start_server():
```

```
PS C:\Users\Iin Suhana\Documents\python> & C:\Python313\python.exe "c:/Users/Iin Suhana/Documents/python/latihan_6_thread_server.py"
```

```
[SERVER STARTED] Menunggu koneksi di port 5555...
```

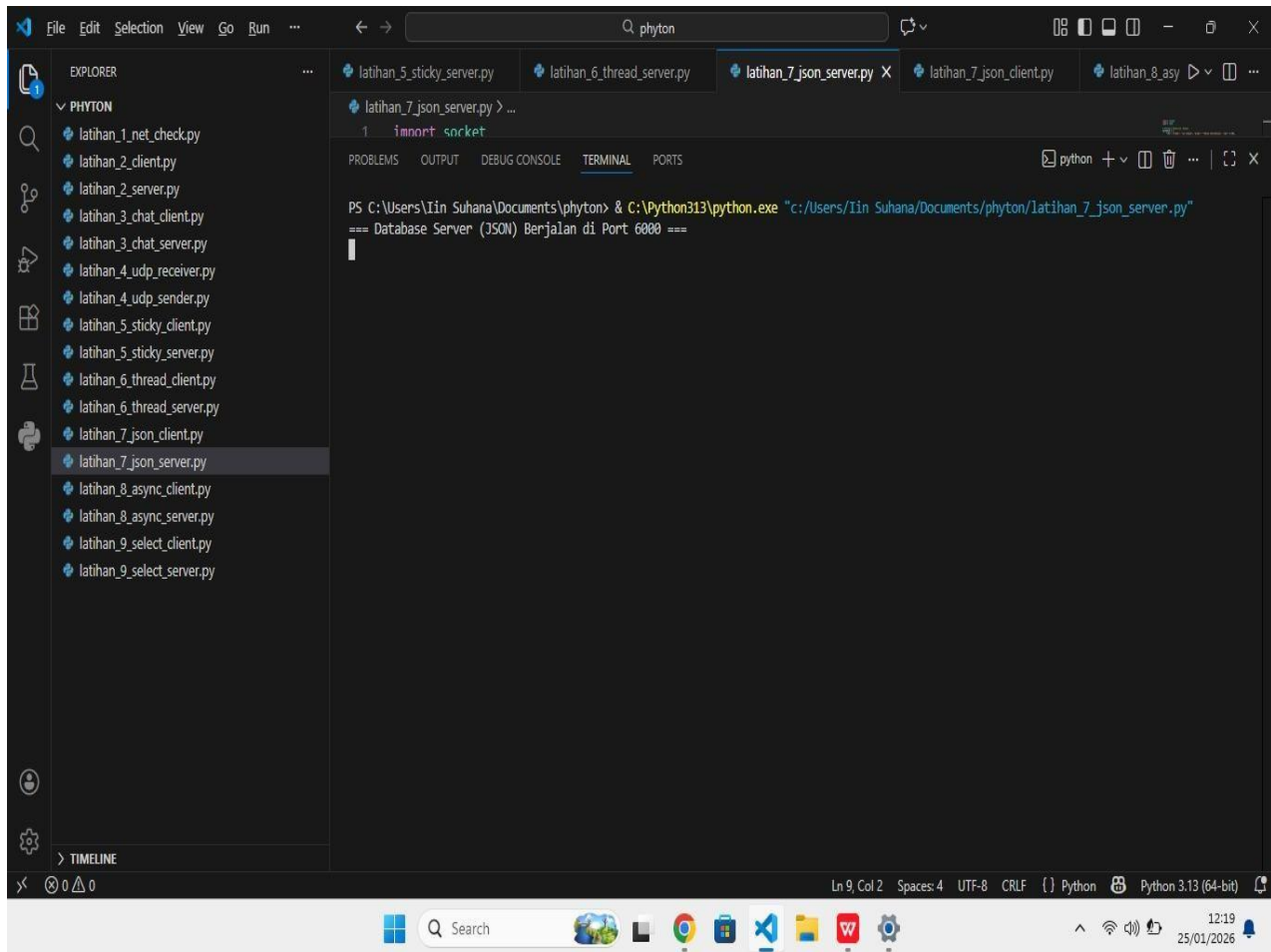


BAB VII

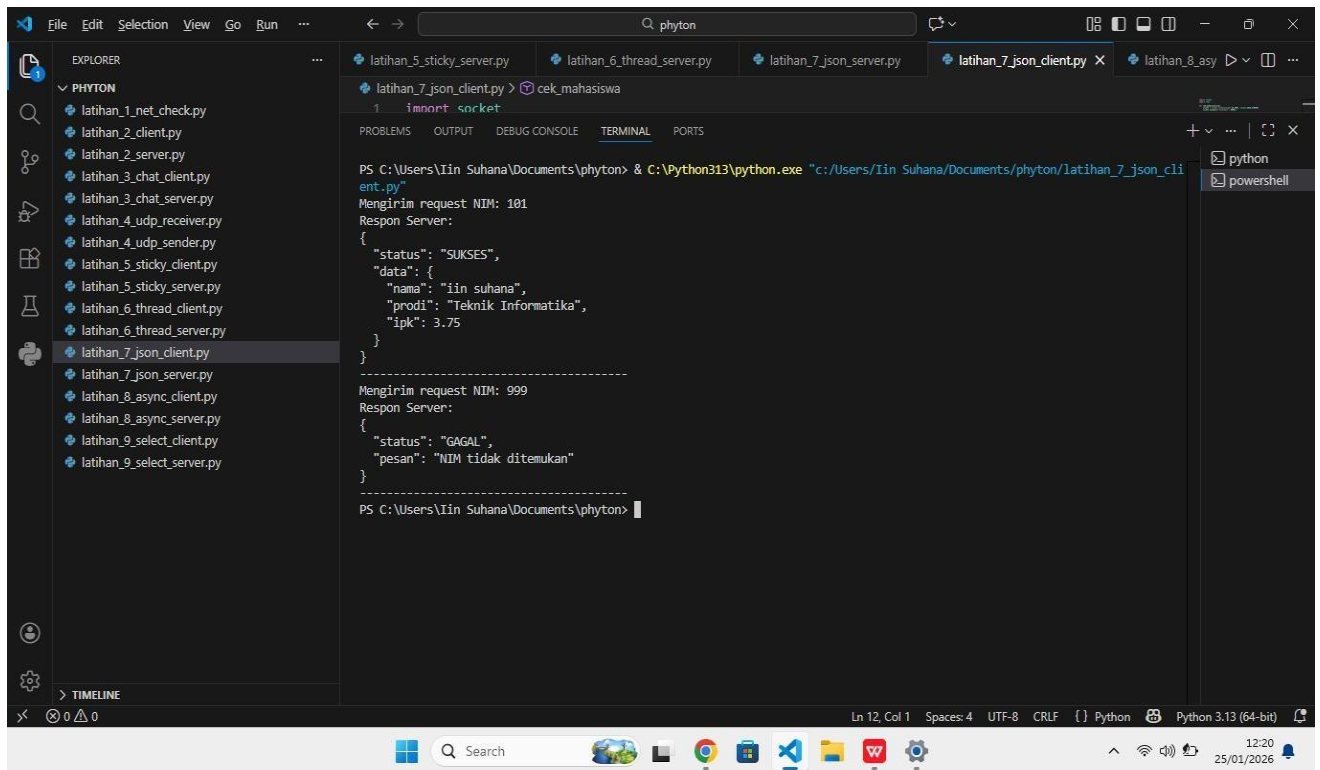
SERIALISASI DATA (JSON & PICKLE)

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

HASIL:



```
File Edit Selection View Go Run ...  
latihan_5_sticky_server.py latihan_6_thread_server.py latihan_7_json_server.py X latihan_7_json_client.py latihan_8_asy  
latihan_7_json_server.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_7_json_server.py"  
=== Database Server (JSON) Berjalan di Port 6000 ===  
Ln 9, Col 2 Spaces 4 UTF-8 CRLF Python Python 3.13 (64-bit)
```

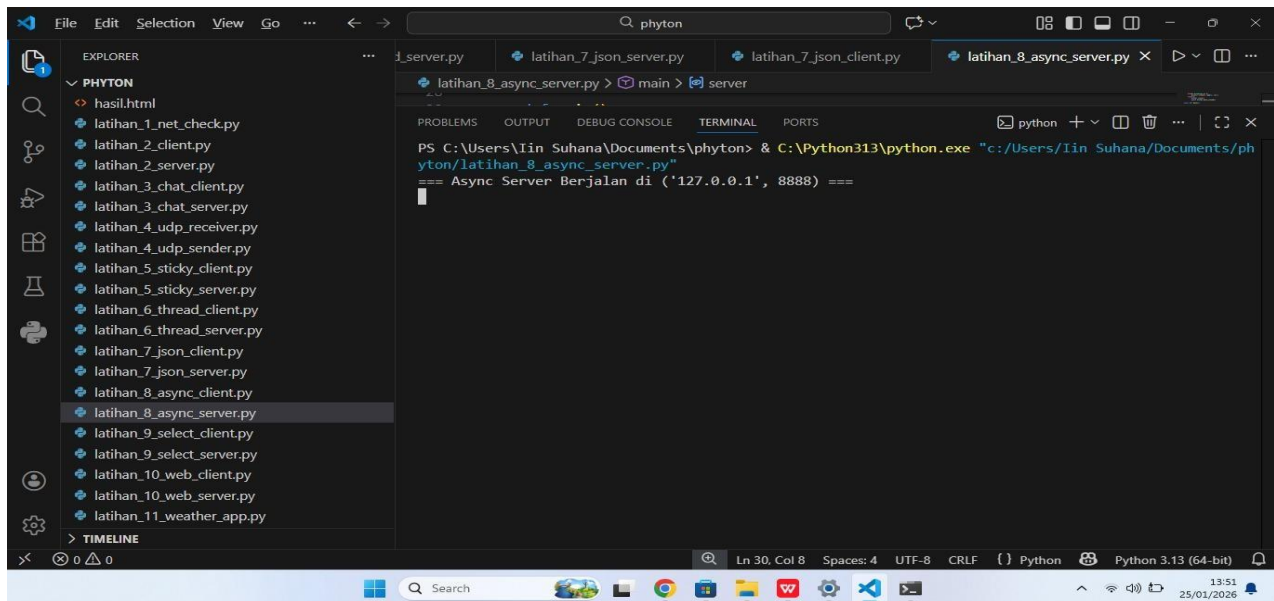


BAB VIII

ASYNCHRONOUS I/O (CONCURRENCY PART II)

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

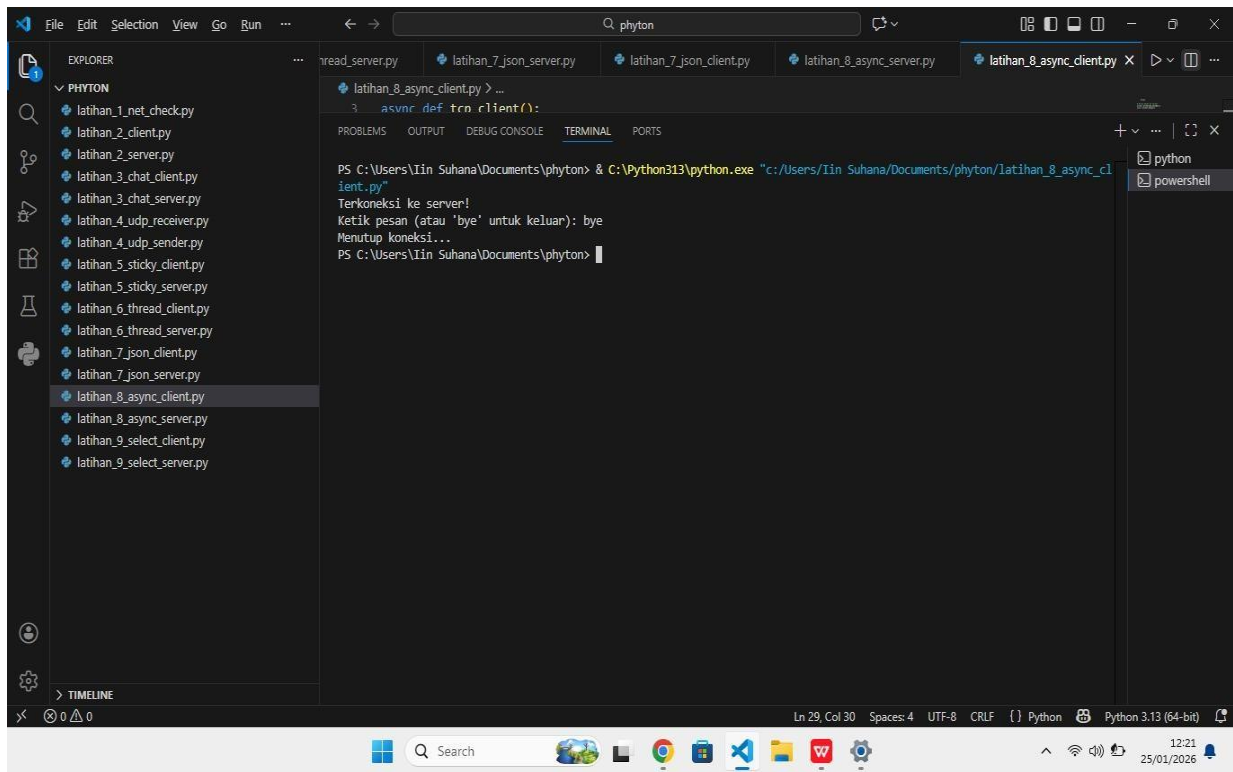
HASIL:



The screenshot shows a Python IDE with a file explorer on the left and a terminal at the bottom. The file explorer lists various Python files, including `latihan_8_async_server.py`, which is currently selected. The terminal window shows the command to run the script and its output:

```
PS C:\Users\Iin Suhana\Documents\phyton> & C:\Python313\python.exe "c:/Users/Iin Suhana/Documents/phyton/latihan_8_async_server.py"
=== Async Server Berjalan di ('127.0.0.1', 8888) ===
```

The status bar at the bottom indicates the file is at line 30, column 8, using UTF-8 encoding and CRLF line endings, with Python 3.13 (64-bit) installed.

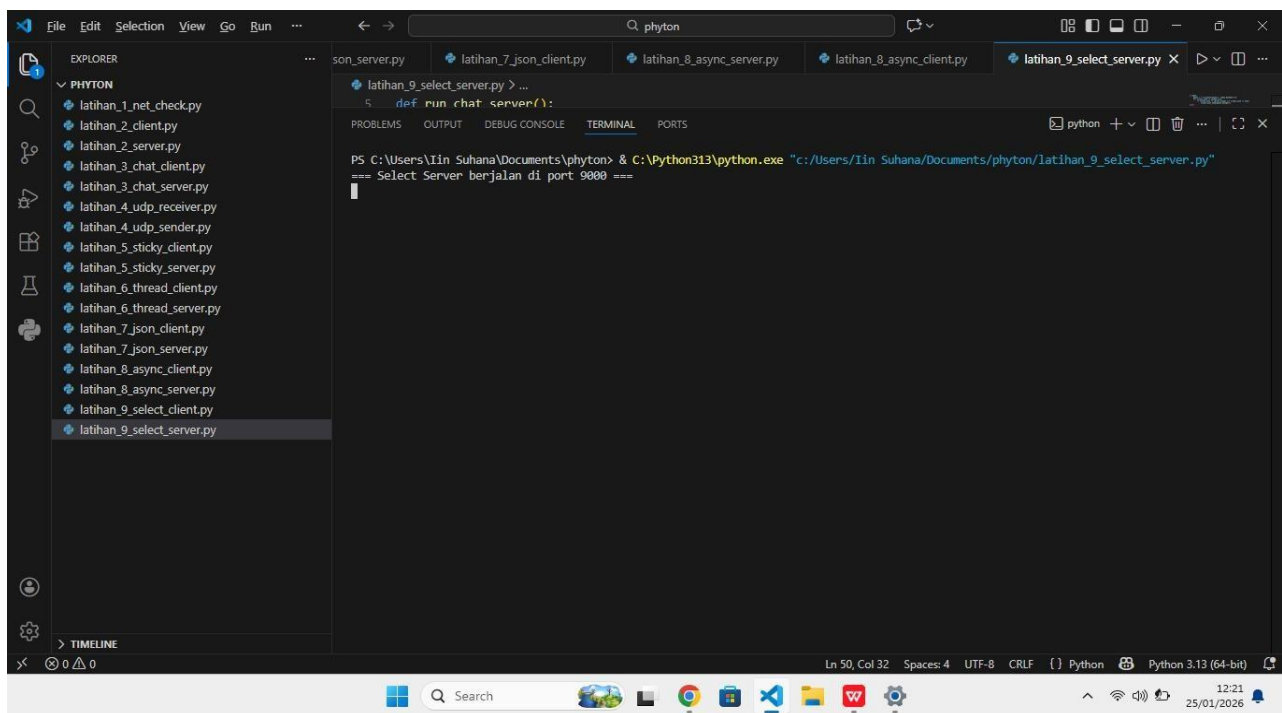


BAB IX

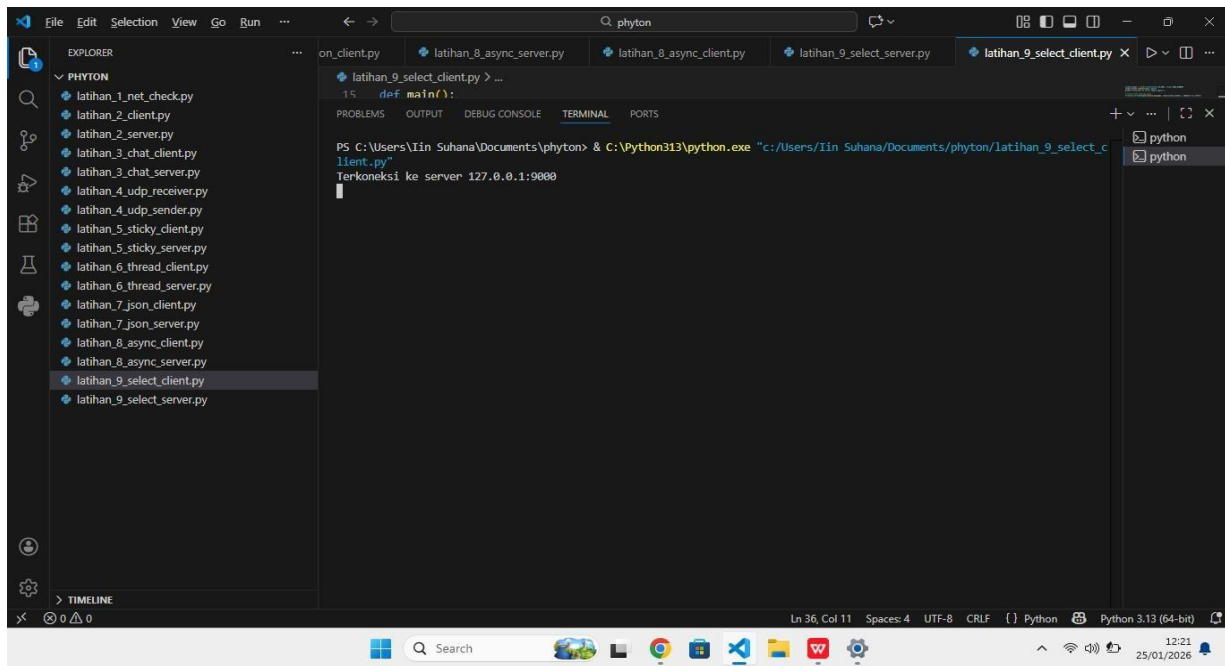
I/O MULTIPLEXING (SELECT & POLL)

Select digunakan untuk memantau banyak socket dalam satu waktu.

HASIL:



```
File Edit Selection View Go Run ...  
python  
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  
Ln 50, Col 32 Spaces: 4 UTF-8 CRLF Python Python 3.13 (64-bit)  
PS C:\Users\Iin Suhana\Documents\phyton> & C:\Python313\python.exe "c:/Users/Iin Suhana/Documents/phyton/latihan_9_select_server.py"  
=== Select Server berjalan di port 9000 ===
```

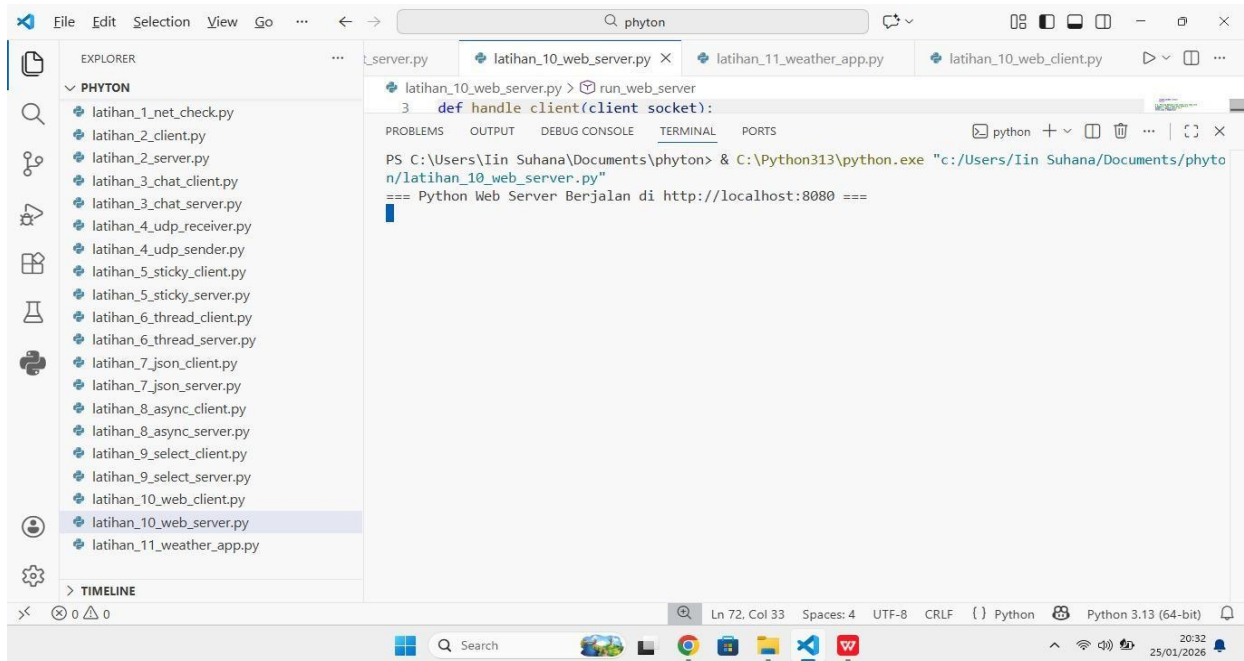


BAB X

PROTOKOL HTTP & WEB SERVER

HTTP adalah protokol komunikasi yang digunakan pada web.

HASIL:



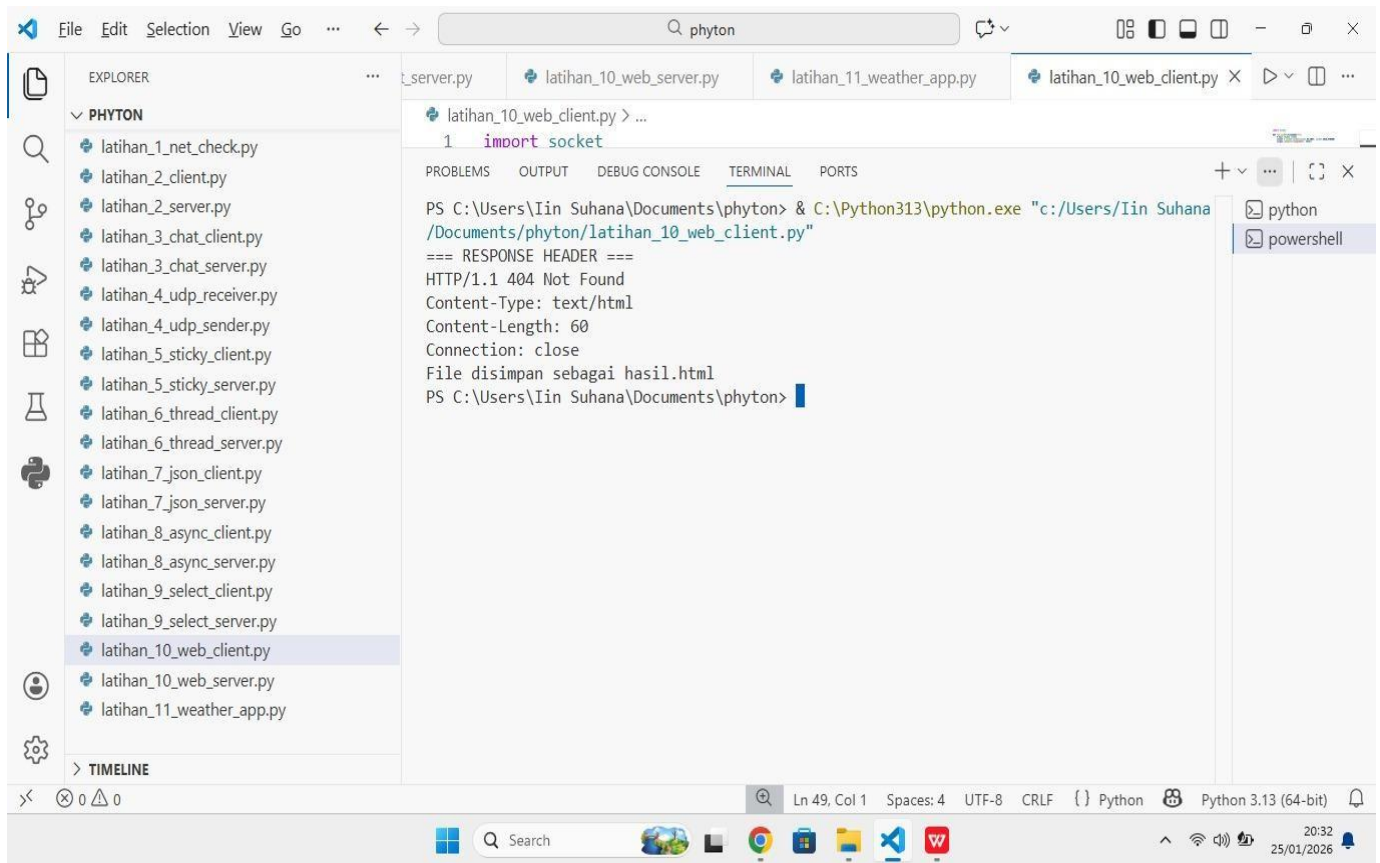
The screenshot shows a Python IDE with a file explorer on the left and a terminal window on the right. The file explorer lists several Python files, including `latihan_10_web_server.py`, which is selected. The terminal window shows the command `python latihan_10_web_server.py` being executed, and the output is `Python Web Server Berjalan di http://localhost:8080`. The terminal also shows the code `def handle_client(client socket):` in the background.

BAB XI

REST API & WEB SERVICES

REST API adalah layanan web berbasis HTTP untuk pertukaran data.

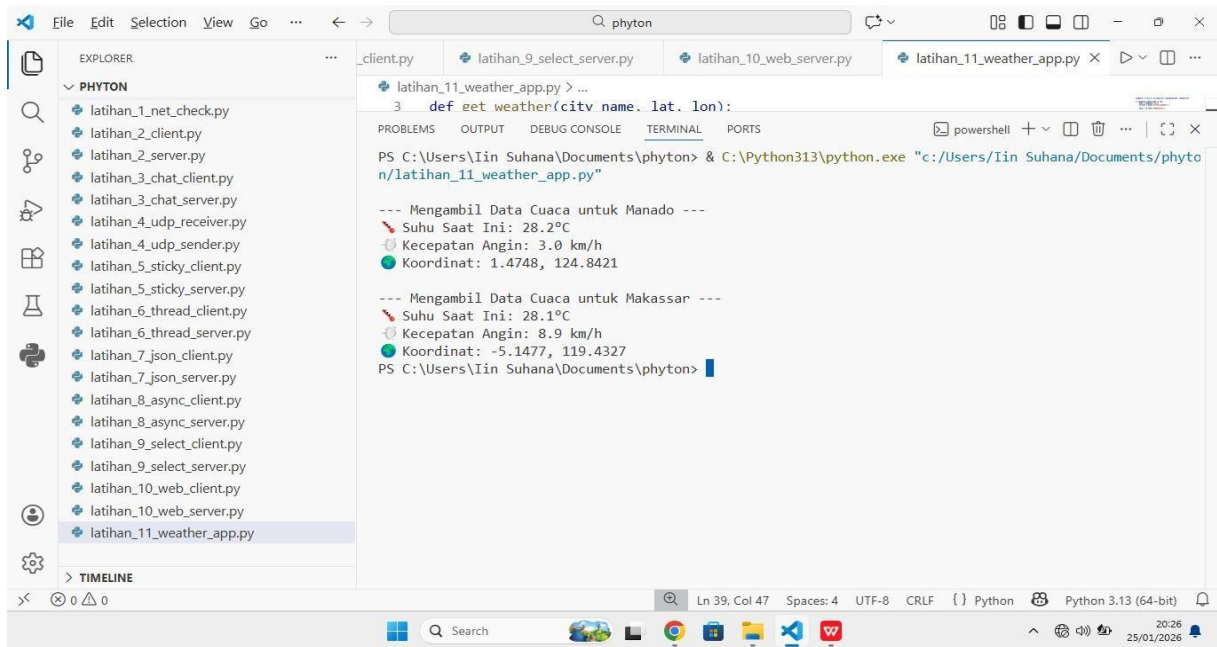
HASIL:



The screenshot displays a Python IDE interface with the following components:

- EXPLORER:** A list of Python files under the 'PHYTON' folder, including `latihan_1_net_check.py` through `latihan_11_weather_app.py`. The file `latihan_10_web_client.py` is selected.
- Editor:** Shows the code for `latihan_10_web_client.py`, which includes the line `1 import socket`.
- TERMINAL:** Displays the command prompt output for running the script:

```
PS C:\Users\Iin Suhana\Documents\phyton> & C:\Python313\python.exe "c:/Users/Iin Suhana /Documents/phyton/latihan_10_web_client.py"
=== RESPONSE HEADER ===
HTTP/1.1 404 Not Found
Content-Type: text/html
Content-Length: 60
Connection: close
File disimpan sebagai hasil.html
PS C:\Users\Iin Suhana\Documents\phyton>
```
- STATUS BAR:** Indicates the current position is 'Ln 49, Col 1' with 'Spaces: 4', 'UTF-8', 'CRLF' line endings, and 'Python 3.13 (64-bit)'.

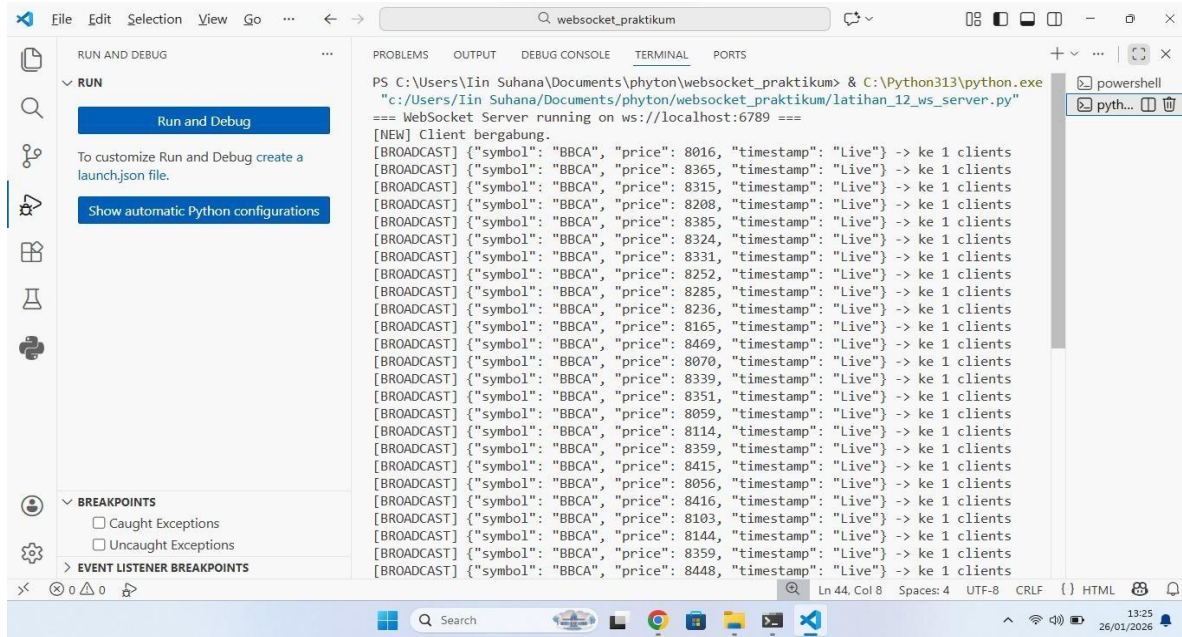


BAB XII

REAL TIME COMMUNICATION (WEB SOCKET)

WebSocket memungkinkan komunikasi dua arah secara real-time.

HASIL:



The screenshot shows a Visual Studio Code editor window with the file 'websocket_praktikum'. The terminal output displays the following:

```
PS C:\Users\Iin Suhana\Documents\phyton\websocket_praktikum> & C:\Python313\python.exe "c:/Users/Iin Suhana/Documents/phyton/websocket_praktikum/latihan_12_ws_server.py"
=== WebSocket Server running on ws://localhost:6789 ===
[NEW] Client bergabung.
[BROADCAST] {"symbol": "BBCA", "price": 8016, "timestamp": "Live"} -> ke 1 clients
[BROADCAST] {"symbol": "BBCA", "price": 8365, "timestamp": "Live"} -> ke 1 clients
[BROADCAST] {"symbol": "BBCA", "price": 8315, "timestamp": "Live"} -> ke 1 clients
[BROADCAST] {"symbol": "BBCA", "price": 8208, "timestamp": "Live"} -> ke 1 clients
[BROADCAST] {"symbol": "BBCA", "price": 8385, "timestamp": "Live"} -> ke 1 clients
[BROADCAST] {"symbol": "BBCA", "price": 8324, "timestamp": "Live"} -> ke 1 clients
[BROADCAST] {"symbol": "BBCA", "price": 8331, "timestamp": "Live"} -> ke 1 clients
[BROADCAST] {"symbol": "BBCA", "price": 8252, "timestamp": "Live"} -> ke 1 clients
[BROADCAST] {"symbol": "BBCA", "price": 8285, "timestamp": "Live"} -> ke 1 clients
[BROADCAST] {"symbol": "BBCA", "price": 8236, "timestamp": "Live"} -> ke 1 clients
[BROADCAST] {"symbol": "BBCA", "price": 8165, "timestamp": "Live"} -> ke 1 clients
[BROADCAST] {"symbol": "BBCA", "price": 8469, "timestamp": "Live"} -> ke 1 clients
[BROADCAST] {"symbol": "BBCA", "price": 8070, "timestamp": "Live"} -> ke 1 clients
[BROADCAST] {"symbol": "BBCA", "price": 8339, "timestamp": "Live"} -> ke 1 clients
[BROADCAST] {"symbol": "BBCA", "price": 8351, "timestamp": "Live"} -> ke 1 clients
[BROADCAST] {"symbol": "BBCA", "price": 8059, "timestamp": "Live"} -> ke 1 clients
[BROADCAST] {"symbol": "BBCA", "price": 8114, "timestamp": "Live"} -> ke 1 clients
[BROADCAST] {"symbol": "BBCA", "price": 8359, "timestamp": "Live"} -> ke 1 clients
[BROADCAST] {"symbol": "BBCA", "price": 8415, "timestamp": "Live"} -> ke 1 clients
[BROADCAST] {"symbol": "BBCA", "price": 8056, "timestamp": "Live"} -> ke 1 clients
[BROADCAST] {"symbol": "BBCA", "price": 8416, "timestamp": "Live"} -> ke 1 clients
[BROADCAST] {"symbol": "BBCA", "price": 8103, "timestamp": "Live"} -> ke 1 clients
[BROADCAST] {"symbol": "BBCA", "price": 8144, "timestamp": "Live"} -> ke 1 clients
[BROADCAST] {"symbol": "BBCA", "price": 8359, "timestamp": "Live"} -> ke 1 clients
[BROADCAST] {"symbol": "BBCA", "price": 8448, "timestamp": "Live"} -> ke 1 clients
```

The left sidebar shows the 'RUN AND DEBUG' panel with a 'Run and Debug' button and a 'Show automatic Python configurations' button. The 'BREAKPOINTS' section is expanded, showing 'Caught Exceptions' and 'Uncaught Exceptions' checkboxes. The 'EVENT LISTENER BREAKPOINTS' section is also expanded. The bottom status bar shows 'Ln 44, Col 8', 'Spaces: 4', 'UTF-8', 'CRLF', and 'HTML'.

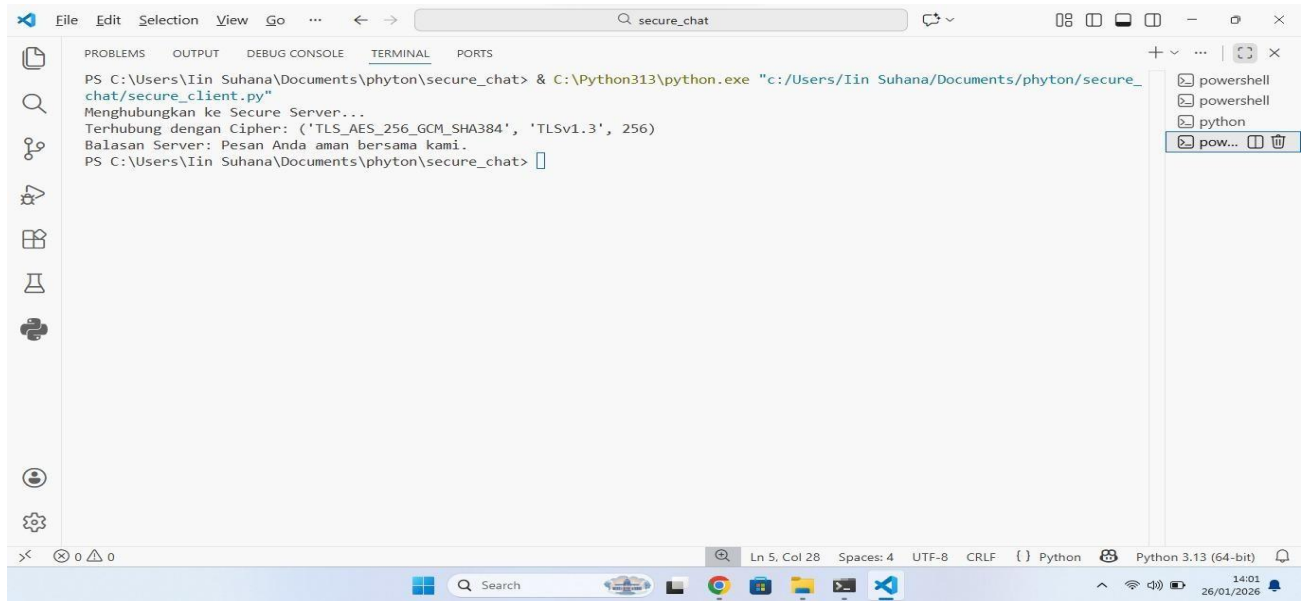


BAB XIII

KEAMANAN JARINGAN (NETWORK SECURITY)

Keamanan jaringan bertujuan melindungi data dan sitem.

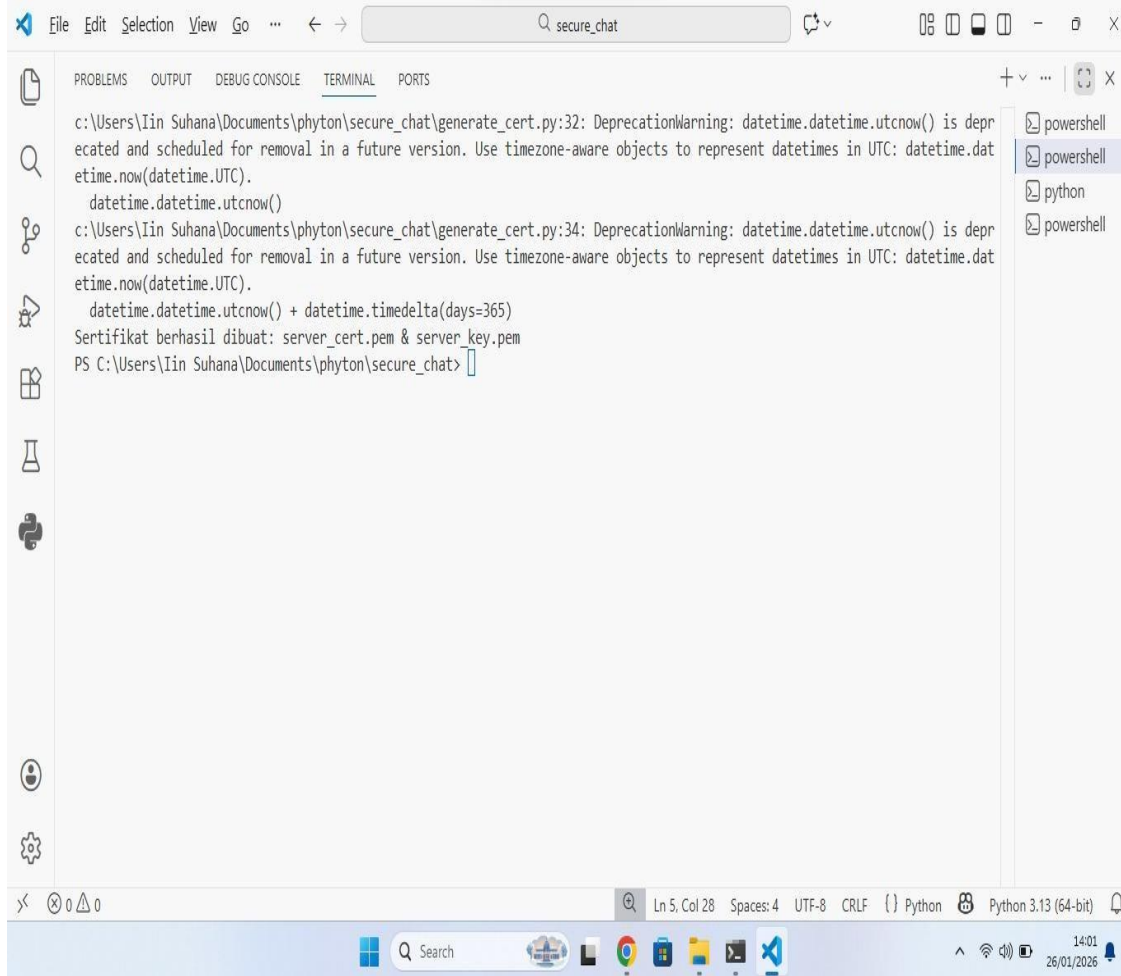
HASIL:



The screenshot shows a Windows terminal window with the title bar "secure_chat". The terminal output is as follows:

```
PS C:\Users\Iin Suhana\Documents\phyton\secure_chat> & C:\Python313\python.exe "c:/Users/Iin Suhana/Documents/phyton/secure_chat/secure_client.py"
Menghubungkan ke Secure Server...
Terhubung dengan Cipher: ('TLS_AES_256_GCM_SHA384', 'TLSv1.3', 256)
Balasan Server: Pesan Anda aman bersama kami.
PS C:\Users\Iin Suhana\Documents\phyton\secure_chat>
```

The terminal window is part of a PowerShell session, as indicated by the "powershell" label in the taskbar. The taskbar also shows the Windows Start button, a search bar, and several application icons including Chrome, File Explorer, and the terminal itself. The system clock in the bottom right corner shows the time as 14:01 on 26/01/2026.

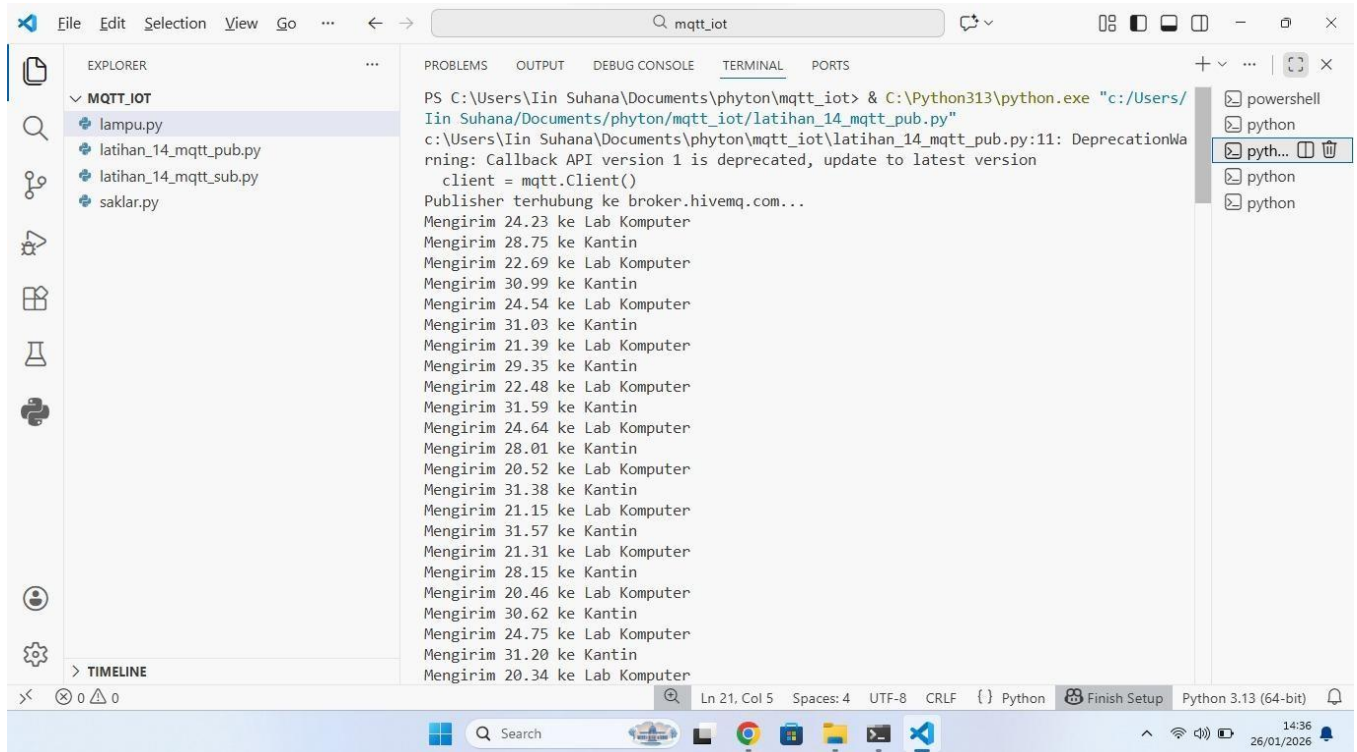


BAB XIV

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 jaringan dan bekerja seolah-olah satu sistem.

HASIL:



```
PS C:\Users\Iin Suhana\Documents\phyton\mqtt_iot> & C:\Python313\python.exe "c:/Users/Iin Suhana/Documents/phyton/mqtt_iot/latihan_14_mqtt_pub.py"
c:\Users\Iin Suhana\Documents\phyton\mqtt_iot\latihan_14_mqtt_pub.py:11: DeprecationWarning: Callback API version 1 is deprecated, update to latest version
  client = mqtt.Client()
Publisher terhubung ke broker.hivemq.com...
Mengirim 24.23 ke Lab Komputer
Mengirim 28.75 ke Kantin
Mengirim 22.69 ke Lab Komputer
Mengirim 30.99 ke Kantin
Mengirim 24.54 ke Lab Komputer
Mengirim 31.03 ke Kantin
Mengirim 21.39 ke Lab Komputer
Mengirim 29.35 ke Kantin
Mengirim 22.48 ke Lab Komputer
Mengirim 31.59 ke Kantin
Mengirim 24.64 ke Lab Komputer
Mengirim 28.01 ke Kantin
Mengirim 20.52 ke Lab Komputer
Mengirim 31.38 ke Kantin
Mengirim 21.15 ke Lab Komputer
Mengirim 31.57 ke Kantin
Mengirim 21.31 ke Lab Komputer
Mengirim 28.15 ke Kantin
Mengirim 20.46 ke Lab Komputer
Mengirim 30.62 ke Kantin
Mengirim 24.75 ke Lab Komputer
Mengirim 31.20 ke Kantin
Mengirim 20.34 ke Lab Komputer
```

```
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
```

Ln 21, Col 5 Spaces: 4 UTF-8 CRLF {} Python Finish Setup Python 3.13 (64-bit)

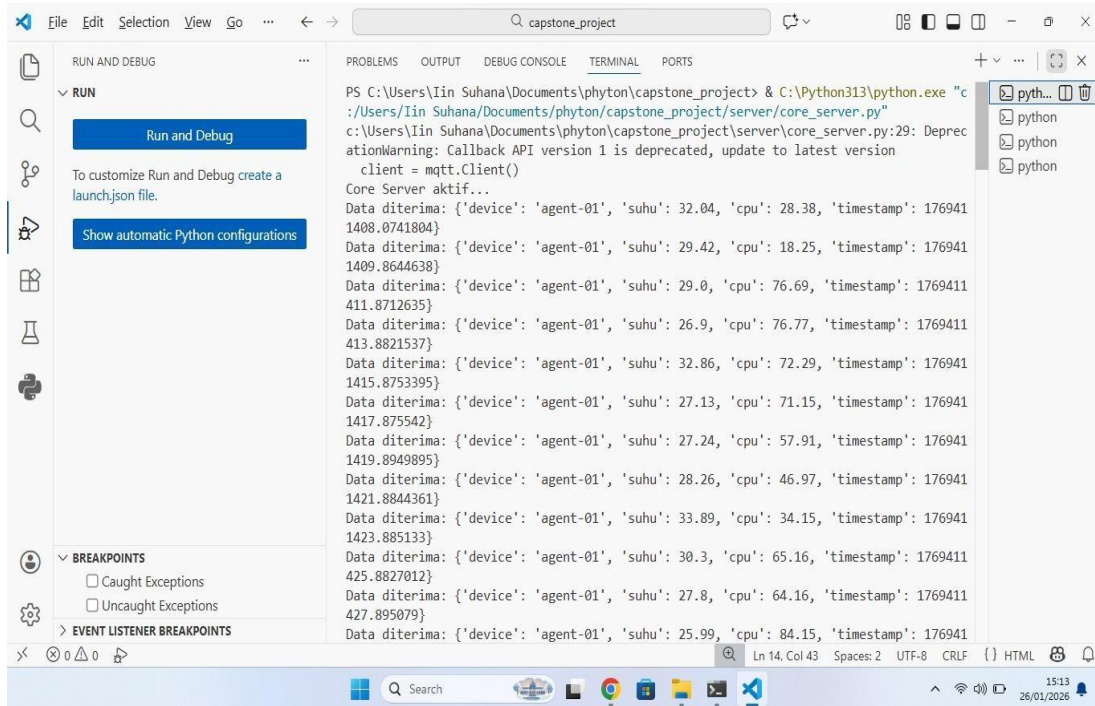
14:36 26/01/2026

BAB XV

PENUTUP & PROYEK AKHIR (Capstone Project)

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

HASIL:



```
PS C:\Users\Iin Suhana\Documents\phyton\capstone_project> & C:\Python313\python.exe "c
:/Users/Iin Suhana/Documents/phyton/capstone_project/server/core_server.py"
c:\Users\Iin Suhana\Documents\phyton\capstone_project\server\core_server.py:29: Deprec
ationWarning: Callback API version 1 is deprecated, update to latest version
  client = mqtt.Client()
Core Server aktif...
Data diterima: {'device': 'agent-01', 'suhu': 32.04, 'cpu': 28.38, 'timestamp': 176941
1408.0741804}
Data diterima: {'device': 'agent-01', 'suhu': 29.42, 'cpu': 18.25, 'timestamp': 176941
1409.8644638}
Data diterima: {'device': 'agent-01', 'suhu': 29.0, 'cpu': 76.69, 'timestamp': 1769411
411.8712635}
Data diterima: {'device': 'agent-01', 'suhu': 26.9, 'cpu': 76.77, 'timestamp': 1769411
413.8821537}
Data diterima: {'device': 'agent-01', 'suhu': 32.86, 'cpu': 72.29, 'timestamp': 176941
1415.8753395}
Data diterima: {'device': 'agent-01', 'suhu': 27.13, 'cpu': 71.15, 'timestamp': 176941
1417.875542}
Data diterima: {'device': 'agent-01', 'suhu': 27.24, 'cpu': 57.91, 'timestamp': 176941
1419.8949895}
Data diterima: {'device': 'agent-01', 'suhu': 28.26, 'cpu': 46.97, 'timestamp': 176941
1421.8844361}
Data diterima: {'device': 'agent-01', 'suhu': 33.89, 'cpu': 34.15, 'timestamp': 176941
1423.885133}
Data diterima: {'device': 'agent-01', 'suhu': 30.3, 'cpu': 65.16, 'timestamp': 1769411
425.8827012}
Data diterima: {'device': 'agent-01', 'suhu': 27.8, 'cpu': 64.16, 'timestamp': 1769411
427.895079}
Data diterima: {'device': 'agent-01', 'suhu': 25.99, 'cpu': 84.15, 'timestamp': 176941
```

