

## **ASSIGNMENT 7:**

### **Module 16: Building Database Apps with PostgreSQL & Python**

**Description:** For this assignment, you are required to:

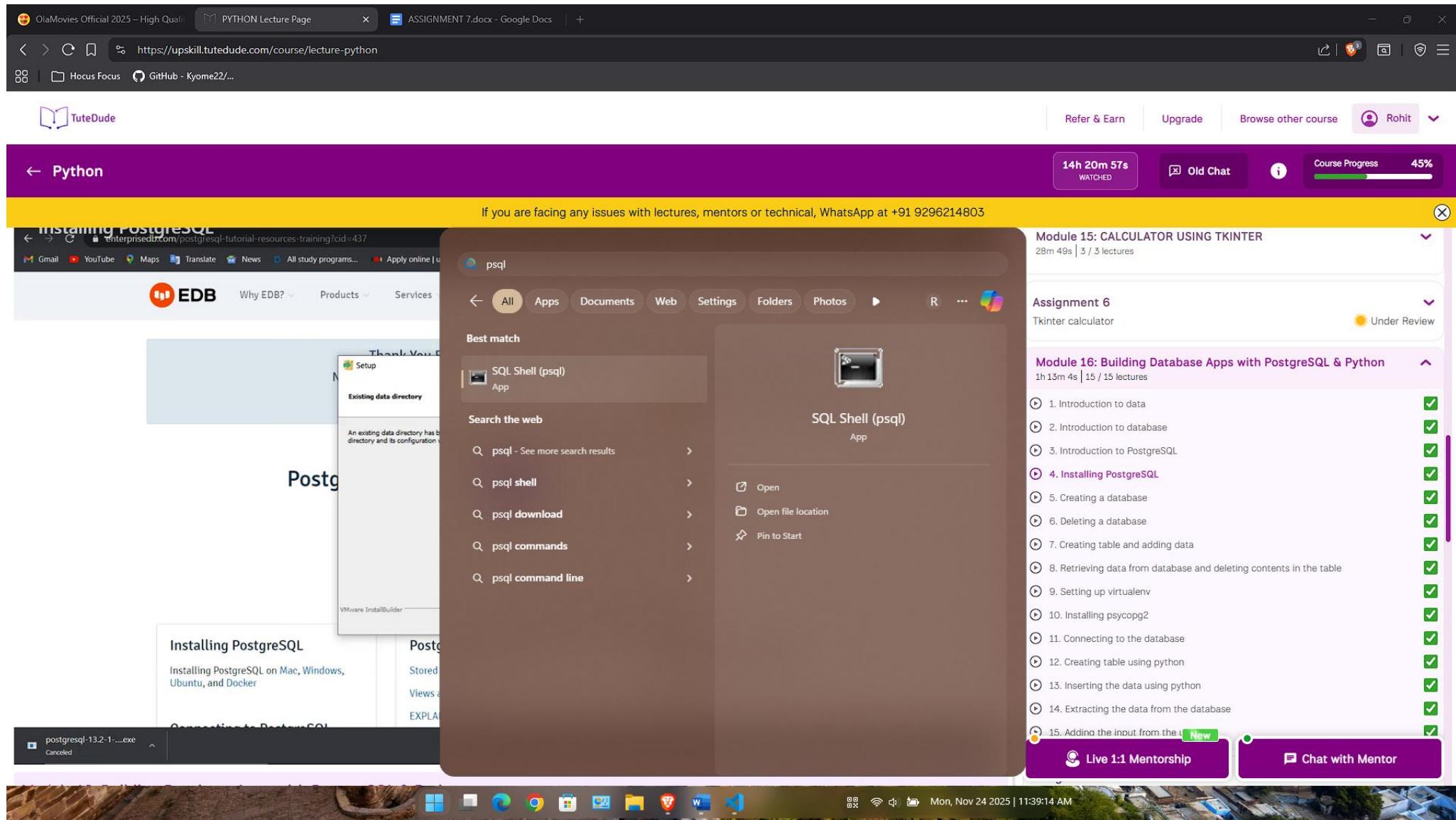
1. Complete all course lectures within the module, ensuring you follow the concepts taught in each session.
2. Implement all practical exercises provided in the course lectures. **Each practical task should be executed and the results properly documented.**
- 3. Take complete, unedited screenshots of each practical output along with the corresponding code.** Ensure that the following are visible in your screenshots:
  - The full code you executed.
  - The output displayed on your system, including the system timestamp.
  - No cropping or editing should be done on the screenshots. Any attempt to crop or modify the screenshots will result in your submission being considered invalid, and you will be required to resubmit it.

**Submission:** You should either:

- Zip the folder containing all your practical screenshots, **or**
- Prepare a PDF containing all the screenshots and code.

Ensure the screenshots are organized clearly and in the correct order according to the sequence of lectures and practicals. Lastly, upload it to drive and then submit the accessible link (make sure to enable sharing access).

# 1. Installed PostgreSQL



## 2. Creating a database

```
SQL Shell (psql)      x + v      - o x
Port [5432]:          + v
Username [postgres]:
Password for user postgres:

psql (18.1)
WARNING: Console code page (437) differs from Windows code page (1252)
         8-bit characters might not work correctly. See psql reference
         page "Notes for Windows users" for details.
Type "help" for help.

postgres=# \l
              List of databases
   Name    | Owner | Encoding | Locale Provider | Collate           | Ctype            | Locale | ICU Rules | Access privileges
---+-----+-----+-----+-----+-----+-----+-----+-----+-----+
postgres | postgres | UTF8 | libc | English_India.1252 | English_India.1252 |          |          |          |
student  | postgres | UTF8 | libc | English_India.1252 | English_India.1252 |          |          |          |
template0 | postgres | UTF8 | libc | English_India.1252 | English_India.1252 |          |          |          |
template1 | postgres | UTF8 | libc | English_India.1252 | English_India.1252 |          |          |          |
(4 rows)

postgres=# create database demodb;
CREATE DATABASE
postgres=# \l
              List of databases
   Name    | Owner | Encoding | Locale Provider | Collate           | Ctype            | Locale | ICU Rules | Access privileges
---+-----+-----+-----+-----+-----+-----+-----+-----+
demodb  | postgres | UTF8 | libc | English_India.1252 | English_India.1252 |          |          |          |
postgres | postgres | UTF8 | libc | English_India.1252 | English_India.1252 |          |          |          |
student  | postgres | UTF8 | libc | English_India.1252 | English_India.1252 |          |          |          |
template0 | postgres | UTF8 | libc | English_India.1252 | English_India.1252 |          |          |          |
template1 | postgres | UTF8 | libc | English_India.1252 | English_India.1252 |          |          |          |
(5 rows)

postgres=# \c demodb
You are now connected to database "demodb" as user "postgres".
demodb=|
```



Mon, Nov 24 2025 | 11:44:51 AM

### 3. Deleting a database

```
SQL Shell (psql) x + v

demodb postgres UTF8 libc English_India.1252 English_India.1252 | | | | |
postgres postgres UTF8 libc English_India.1252 English_India.1252 | | | | |
student postgres UTF8 libc English_India.1252 English_India.1252 | | | | |
template0 postgres UTF8 libc English_India.1252 English_India.1252 | | | =c/postgres + |
template1 postgres UTF8 libc English_India.1252 English_India.1252 | | | =c/postgres + |
(5 rows)

postgres=# \c demodb
You are now connected to database "demodb" as user "postgres".
demodb=# create databse test;
ERROR: syntax error at or near "databse"
LINE 1: create databse test;
          ^
demodb=# create database test;
CREATE DATABASE
demodb=# \l
              List of databases
   Name    | Owner     | Encoding | Locale Provider | Collate           | Ctype            | Locale          | ICU Rules      | Access privileges
---+-----+-----+-----+-----+-----+-----+-----+-----+
demodb  postgres  UTF8  libc  English_India.1252  English_India.1252 | | | |
postgres  postgres  UTF8  libc  English_India.1252  English_India.1252 | | | |
student  postgres  UTF8  libc  English_India.1252  English_India.1252 | | | |
template0  postgres  UTF8  libc  English_India.1252  English_India.1252 | | | =c/postgres + |
template1  postgres  UTF8  libc  English_India.1252  English_India.1252 | | | =c/postgres + |
test      postgres  UTF8  libc  English_India.1252  English_India.1252 | | | postres=CTc/postgres
(6 rows)

demodb=# drop database test;
DROP DATABASE
demodb=# \l
              List of databases
   Name    | Owner     | Encoding | Locale Provider | Collate           | Ctype            | Locale          | ICU Rules      | Access privileges
---+-----+-----+-----+-----+-----+-----+-----+-----+
demodb  postgres  UTF8  libc  English_India.1252  English_India.1252 | | | |
postgres  postgres  UTF8  libc  English_India.1252  English_India.1252 | | | |
student  postgres  UTF8  libc  English_India.1252  English_India.1252 | | | |
template0  postgres  UTF8  libc  English_India.1252  English_India.1252 | | | =c/postgres + |
template1  postgres  UTF8  libc  English_India.1252  English_India.1252 | | | =c/postgres + |
(5 rows)

demodb=# |
```

#### 4. Creating table and adding data

```
SQL Shell (psql)      x + v
Server [localhost]:
Database [postgres]:
Port [5432]:
Username [postgres]:
Password for user postgres:

psql (18.1)
WARNING: Console code page (437) differs from Windows code page (1252)
          8-bit characters might not work correctly. See psql reference
          page "Notes for Windows users" for details.
Type "help" for help.

postgres=# \
invalid command \
Try \? for help.
postgres=# \l
              List of databases
  Name   |  Owner   | Encoding | Locale Provider | Collate           | Ctype            | Locale | ICU Rules | Access privileges
  -----+-----+-----+-----+-----+-----+-----+-----+-----+
postgres | postgres | UTF8    | libc        | English_India.1252 | English_India.1252 |         |         | =c/postgres      +
template0 | postgres | UTF8    | libc        | English_India.1252 | English_India.1252 |         |         | postgres=CTc/postgres
template1 | postgres | UTF8    | libc        | English_India.1252 | English_India.1252 |         |         | =c/postgres      +
                                         |             |             |                 |                  |                  |         |         | postgres=CTc/postgres
(3 rows)

postgres=# create database student;
CREATE DATABASE
postgres=# \c student
You are now connected to database "student" as user "postgres".
student=# create table students(name text, rank int, age int);
CREATE TABLE
student=# \d
              List of relations
 Schema |   Name   | Type  |  Owner
-----+-----+-----+-----+
 public | students | table | postgres
(1 row)

student=# insert into students(name, rank, age) values('Ronak', 04, 25);
INSERT 0 1
student=# insert into students(name, rank, age) values('Jatin', 06, 24);
INSERT 0 1
student=#
```



Mon, Nov 24 2025 | 09:50:12 PM

## 5. Retrieving data from database and deleting contents in he table

```
SQL Shell (psql) x + v (1 row)

student=# select * from students where age=25;
 name | rank | age
-----+-----+
 Ronak |    4 |  25
(1 row)

student=# select rank from students where age=25;
 rank
-----
 4
(1 row)

student=# select rank from students where name='Jatin';
ERROR: column "jatin" does not exist
LINE 1: select rank from students where name='Jatin';
          ^
student=# select rank from students where name='Jatin';
 rank
-----
 6
(1 row)

student=# truncate table students;
TRUNCATE TABLE
student=# \d
      List of relations
 Schema |   Name   | Type  | Owner
-----+-----+-----+
 public | students | table | postgres
(1 row)

student=# select 8 from students;
?column?
-----
(0 rows)

student=# select * from students;
 name | rank | age
-----+-----+
(0 rows)

student=# |
```

## 6. Virtual Environment Setup



A screenshot of a Windows command prompt window titled "C:\Windows\System32\cmd.e". The window contains the following text:

```
E:\TuteDude\Python\Assignment 7>ls
Task1.py  env

E:\TuteDude\Python\Assignment 7>cd env

E:\TuteDude\Python\Assignment 7\env>cd scripts

E:\TuteDude\Python\Assignment 7\env\Scripts>activate
(env) E:\TuteDude\Python\Assignment 7\env\Scripts>deactivate
E:\TuteDude\Python\Assignment 7\env\Scripts>activate
(env) E:\TuteDude\Python\Assignment 7\env\Scripts>
(env) E:\TuteDude\Python\Assignment 7\env\Scripts>
(env) E:\TuteDude\Python\Assignment 7\env\Scripts>
(env) E:\TuteDude\Python\Assignment 7\env\Scripts>
(env) E:\TuteDude\Python\Assignment 7\env\Scripts>deactivate
E:\TuteDude\Python\Assignment 7\env\Scripts>
E:\TuteDude\Python\Assignment 7\env\Scripts>
E:\TuteDude\Python\Assignment 7\env\Scripts>
E:\TuteDude\Python\Assignment 7\env\Scripts>
```

The system tray at the bottom shows icons for battery, signal, and a small red notification. The date and time are displayed as "Mon, Nov 24 2025 | 10:05:25 PM".

## 7. Installing psycopg2

```
C:\Windows\System32\cmd.e > ls  
E:\TuteDude\Python\Assignment 7>ls  
Task1.py env  
E:\TuteDude\Python\Assignment 7>cd env  
E:\TuteDude\Python\Assignment 7\env>cd scripts  
E:\TuteDude\Python\Assignment 7\env\Scripts>activate  
(env) E:\TuteDude\Python\Assignment 7\env\Scripts>deactivate  
E:\TuteDude\Python\Assignment 7\env\Scripts>activate  
(env) E:\TuteDude\Python\Assignment 7\env\Scripts>  
(env) E:\TuteDude\Python\Assignment 7\env\Scripts>  
(env) E:\TuteDude\Python\Assignment 7\env\Scripts>  
(env) E:\TuteDude\Python\Assignment 7\env\Scripts>  
(env) E:\TuteDude\Python\Assignment 7\env\Scripts>deactivate  
E:\TuteDude\Python\Assignment 7\env\Scripts>  
E:\TuteDude\Python\Assignment 7\env\Scripts>  
E:\TuteDude\Python\Assignment 7\env\Scripts>  
E:\TuteDude\Python\Assignment 7\env\Scripts>pip show psycopg2  
Name: psycopg2  
Version: 2.9.11  
Summary: psycopg2 - Python-PostgreSQL Database Adapter  
Home-page: https://psycopg.org/  
Author: Federico Di Gregorio  
Author-email: fog@initd.org  
License: LGPL with exceptions  
Location: E:\TuteDude\Python\Assignment 7\env\Lib\site-packages  
Requires:  
Required-by:  
  
E:\TuteDude\Python\Assignment 7\env\Scripts>pip show psycopg2-binary  
WARNING: Package(s) not found: psycopg2-binary  
E:\TuteDude\Python\Assignment 7\env\Scripts>
```

## 8. Connecting to database

The screenshot shows a Visual Studio Code (VS Code) interface with the following details:

- File Explorer (Left):** Shows a tree view of files and folders. Under the "Assignment 7" folder, there are sub-folders "env", "Lib", "Scripts", ".gitignore", "CACHEDIR.TAG", "pyvenv.cfg", "Task1.py", "Test.py", and ".gitignore".
- Code Editor (Top Center):** Displays a Python script named "Test.py" with the following code:

```
1 import psycopg2
2 conn = psycopg2.connect(dbname="postgres", user="postgres", password="admin", host="localhost", port="5432")
3
4 print('Connected Successfully')
```
- Terminal (Bottom Left):** Shows the output of running "pip show psycopg2" in a Windows cmd window. The output includes:

```
E:\TuteDude\Python\Assignment 7\env\Scripts>
E:\TuteDude\Python\Assignment 7\env\Scripts>
E:\TuteDude\Python\Assignment 7\env\Scripts>
E:\TuteDude\Python\Assignment 7\env\Scripts>pip show psycopg2
Name: psycopg2
Version: 2.9.11
Summary: psycopg2 - Python-PostgreSQL Database Adapter
Home-page: https://psycopg.org/
Author: Federico Di Gregorio
Author-email: fog@initd.org
License: LGPL with exceptions
Location: E:\TuteDude\Python\Assignment 7\env\Lib\site-packages
Requires:
Required-by:
```
- Terminal (Bottom Right):** Shows the execution of "python Test.py" in a terminal window. The output shows an error for opening the file "Test.py" and then successfully connects to the database.

```
E:\TuteDude\Python\Assignment 7\env\Scripts>pip show psycopg2-binary
WARNING: Package(s) not found: psycopg2-binary
PS E:\TuteDude\Python\Assignment 7\env\Scripts>python Test.py
PS E:\TuteDude\Python\Assignment 7\env\Scripts>python.exe: can't open file 'E:\\\\TuteDude\\\\Python\\\\Assignment 7\\\\env\\\\Scripts\\\\Test.py': [Errno 2] No such file or directory
Micros(c) E:\TuteDude\Python\Assignment 7\env\Scripts>cd..
E:\TuteDude\Python\Assignment 7\env>cd..
E:\TuteDude\Python\Assignment 7>python Test.py
Connected Successfully

E:\TuteDude\Python\Assignment 7>
```
- Status Bar (Bottom):** Shows the current file is "main\* (0 21)", status bar icons, and the date/time "Mon, Nov 24 2025 | 10:10:17 PM".

## 9. Creating table using Python

The screenshot shows a Windows desktop environment with a Visual Studio Code (VS Code) window open. The VS Code interface includes:

- File Bar:** File, Edit, Selection, View, Go, Run, Terminal, Help.
- Search Bar:** Python.
- Explorer:** Shows a file tree with a folder named "Assignment 7" containing "env" and "Lib". Other folders like "Assignment 1" through "Assignment 6" and "README.md" are also visible under "PYTHON".
- Editor:** A code editor with tabs for "Task1.py Assignment 6", "Test.py", ".gitignore", "Task1.py Assignment 7", and "README.md". The "Test.py" tab is active, displaying the following Python code:

```
1 import psycopg2
2 conn = psycopg2.connect(dbname="postgres", user="postgres", password="admin", host="localhost", port="5432")
3
4 cursor = conn.cursor()
5 cursor.execute(''create table employees(Name Text, ID Int, Age Int);''')
6 print('Table Created Successfully')
7
8 conn.commit()
9 conn.close
```

Below the code editor is a terminal window titled "C:\Windows\System32\cmd.e" showing the output of running the script:

```
E:\TuteDude\Python\Assignment 7>python Test.py
Connected Successfully

E:\TuteDude\Python\Assignment 7>python Test.py
Table Created Successfully

E:\TuteDude\Python\Assignment 7>
```

A modal window titled "SQL Shell (psql)" is open, connected to a PostgreSQL database. It displays the following SQL session:

```
Server [localhost]:
Database [postgres]:
Port [5432]:
Username [postgres]:
Password for user postgres:

psql (18.1)
WARNING: Console code page (437) differs from Windows code page (1252)
         8-bit characters might not work correctly. See psql reference
         page "Notes for Windows users" for details.
Type "help" for help.

postgres=# \d
Did not find any relations.
postgres=# \d
      List of relations
 Schema |   Name   | Type  | Owner
-----+----------+-----+-----
 public | employees | table | postgres
(1 row)

postgres=# |
```

The status bar at the bottom of the VS Code window shows: Ln 8, Col 14, Spaces: 4, UTF-8, CRLF, Python, 3.13.8. The system tray icons include signal strength, battery, and a date/time stamp: Mon, Nov 24 2025 | 10:29:36 PM.

## 10. Inserting the data using Python

The screenshot shows a Windows desktop environment with a Visual Studio Code (VS Code) window open in the foreground and a Command Prompt window (cmd.exe) open below it.

**VS Code (Top Window):**

- File Explorer:** Shows a project structure under "Assignment 7" containing files like "Assignment 1", "Assignment 2", "Assignment 3", "Assignment 4", "Assignment 5", "Assignment 6", "README.md", "Task1.py", "Test.py", and ".gitignore".
- Code Editor:** Displays Python code for creating a database table and inserting data into it using the psycopg2 library.
- Terminal:** Shows the command "python Test.py" being run, resulting in the output "Data Added Successfully".
- SQL Shell (psql):** A floating terminal window showing the creation of a table named "employees" and its contents.

**Command Prompt (Bottom Window):**

- Shows the command "E:\TuteDude\Python> & C:/Users/User/App" followed by "PS E:\TuteDude\Python> cd '.\Assignment 7'" and "PS E:\TuteDude\Python\Assignment 7> cmd".
- Shows the Microsoft Windows command prompt with the message "(c) Microsoft Corporation. All rights reserved."
- Shows the command "E:\TuteDude\Python\Assignment 7>python Test.py" being run, resulting in the output "Data Added Successfully".

**System Tray:** Shows icons for battery, signal, and system status.

**Bottom Status Bar:** Shows the file "Task1.py" is 3.13.8 lines long, with 17 columns and 4 spaces, in UTF-8 encoding.

## 11. Extracting the data from database

The screenshot shows a Microsoft Visual Studio Code (VS Code) interface with the following details:

- File Explorer (Left):** Shows a project structure under "Assignment 7". The "PYTHON" folder contains "Assignment 1" through "Assignment 6", "README.md", "Task1.py", "Test.py", ".gitignore", and "Assignment 6.zip".
- Code Editor (Center):** Displays Python code for inserting data into a PostgreSQL database and extracting it. The code uses the `psycopg2` library.

```
13 def data():
14     cursor.execute('''insert into employees(Name, ID, Age) values('Sam', 1, 26);''')
15     print('Data Added Successfully')
16
17     conn.commit()
18     conn.close()
19
20
21
22
23 def extract():
24     conn = psycopg2.connect(dbname="postgres", user="postgres", password="admin", host="localhost", port="5432")
25
26     cursor = conn.cursor()
27     cursor.execute('''select * from employees;''')
28     show = cursor.fetchone()
29     print(show[2])
30
31     conn.commit()
32     conn.close()
33
34 extract()
```

- Terminal (Bottom):** Shows the output of running the `Test.py` script multiple times, displaying the inserted data ('Sam', 1, 26) and the extracted age (1).

```
E:\TuteDude\Python\Assignment 7>python Test.py
('Sam', 1, 26)

E:\TuteDude\Python\Assignment 7>python Test.py
Sam

E:\TuteDude\Python\Assignment 7>python Test.py
1

E:\TuteDude\Python\Assignment 7>python Test.py
26

E:\TuteDude\Python\Assignment 7>
```

- Status Bar (Bottom):** Shows the current file is "main" (Ln 29, Col 17), spaces used (Spaces: 4), encoding (UTF-8), line endings (CRLF), language (Python), and version (3.13.8).

## 12. Adding the input from user

The screenshot shows a Windows desktop environment with a Visual Studio Code (VS Code) window open. The terminal tab in VS Code displays the execution of a Python script named `Test.py`. The script prompts the user for an employee's name, ID, and age, and then adds this data to a PostgreSQL database table named `employees`. After the data is added, the script prints "Data Added Successfully". The output of the `Test.py` script is:

```
E:\TuteDude\Python\Assignment 7>python Test.py
Data Added Successfully

E:\TuteDude\Python\Assignment 7>python Test.py
Enter the name of the employee: John
Enter ID number of the employee: 02
Enter age of the employee: 35
Data Added Successfully

E:\TuteDude\Python\Assignment 7>
```

Below the terminal, a `SQL Shell (psql)` window is open, showing the contents of the `employees` table. The table has three columns: `name`, `id`, and `age`. It contains two rows of data: one row for 'Sam' (id 1, age 26) and one row for 'John' (id 2, age 35). The SQL shell also shows a command to select all data from the `employees` table.

```
8-bit characters might not work correctly. See psql reference
page "Notes for Windows users" for details.
Type "help" for help.

postgres=# \d
Did not find any relations.
postgres=# \d
      List of relations
 Schema |   Name    | Type  | Owner
-----+-----+-----+
 public | employees | table | postgres
(1 row)

postgres=# select * from employees;
 name | id | age
-----+---+---
 Sam  | 1  | 26
(1 row)

postgres=# select * from employees;
 name | id | age
-----+---+---
 Sam  | 1  | 26
 John | 2  | 35
(2 rows)

postgres=|
```

The bottom status bar of the desktop shows the date and time as "Mon, Nov 24 2025 | 10:42:54 PM".