Configuration for PostgreSQL Database

1. Docker

1.1 Getting started: https://docs.docker.com/engine/install/

1.2 Download: https://docs.docker.com/desktop/setup/install/windows-install/

2. Pull Postgresql

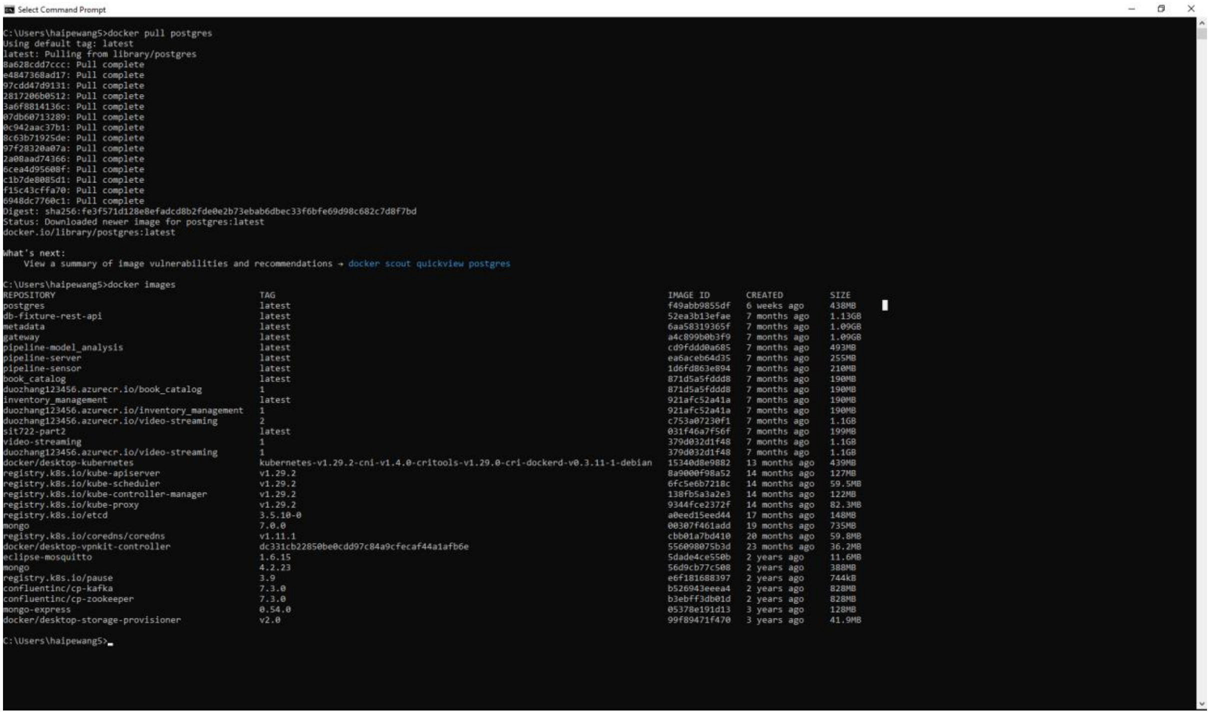
2.1 Getting started: https://www.postgresql.org/about/

2.2 Pull Docker Image Using CLI

docker pull postgres

docker images

2.3 Results



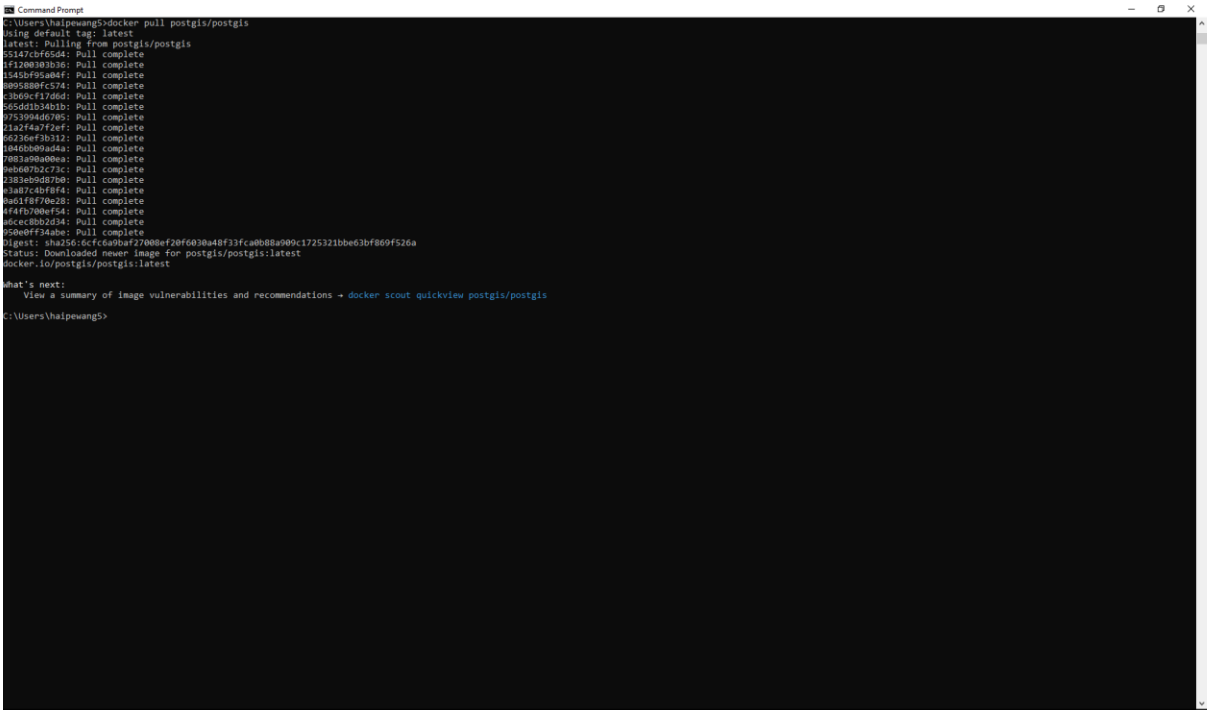
```
C:\Users\haipewang5>docker pull postgres
Using default tag: latest
latest: Pulling from library/postgres
8a628cdd7ccc: Pull complete
e4847368ad17: Pull complete
97cdd47d9131: Pull complete
2817206b0512: Pull complete
3a6f8814136c: Pull complete
07db60713289: Pull complete
0c942aac37b1: Pull complete
8c63b71925de: Pull complete
97f28320a07a: Pull complete
2a08aad74366: Pull complete
6cea4d95608f: Pull complete
c1b7de8085d1: Pull complete
f15c43cffa70: Pull complete
6948dc7760c1: Pull complete
Digest: sha256:fe3f571d128e8efadcd8b2fde0e2b73ebab6dbec33f6bfe69d98c682c7d8f7bd
Status: Downloaded newer image for postgres:latest
docker.io/library/postgres:latest

What's next:
    View a summary of image vulnerabilities and recommendations → docker scout quickview postgres

C:\Users\haipewang5>docker images
REPOSITORY                                       TAG                                                                           IMAGE ID       CREATED         SIZE
postgres                                         latest                                                                        f49abb9855df   6 weeks ago     438MB
db-fixture-rest-api                              latest                                                                        52ea3b13efae   7 months ago    1.13GB
metadata                                         latest                                                                        6aa58319365f   7 months ago    1.09GB
gateway                                          latest                                                                        a4c899b0b3f9   7 months ago    1.09GB
pipeline-model_analysis                          latest                                                                        cd9fddd0a685   7 months ago    493MB
pipeline-server                                  latest                                                                        ea6aceb64d35   7 months ago    255MB
pipeline-sensor                                  latest                                                                        1d6fd863e894   7 months ago    210MB
book_catalog                                     latest                                                                        871d5a5fddd8   7 months ago    190MB
duozhang123456.azurecr.io/book_catalog           1                                                                             871d5a5fddd8   7 months ago    190MB
inventory_management                             latest                                                                        921afc52a41a   7 months ago    190MB
duozhang123456.azurecr.io/inventory_management   1                                                                             921afc52a41a   7 months ago    190MB
duozhang123456.azurecr.io/video-streaming        2                                                                             c753a07230f1   7 months ago    1.1GB
sit722-part2                                     latest                                                                        031f46a7f56f   7 months ago    199MB
video-streaming                                  1                                                                             379d032d1f48   7 months ago    1.1GB
duozhang123456.azurecr.io/video-streaming        1                                                                             379d032d1f48   7 months ago    1.1GB
docker/desktop-kubernetes                        kubernetes-v1.29.2-cni-v1.4.0-critools-v1.29.0-cri-dockerd-v0.3.11-1-debian   15340d8e9882   13 months ago   439MB
registry.k8s.io/kube-apiserver                   v1.29.2                                                                       8a9000f98a52   14 months ago   127MB
registry.k8s.io/kube-scheduler                   v1.29.2                                                                       6fc5e6b7218c   14 months ago   59.5MB
registry.k8s.io/kube-controller-manager          v1.29.2                                                                       138fb5a3a2e3   14 months ago   122MB
registry.k8s.io/kube-proxy                       v1.29.2                                                                       9344fce2372f   14 months ago   82.3MB
registry.k8s.io/etcd                             3.5.10-0                                                                      a0eed15eed44   17 months ago   148MB
mongo                                            7.0.0                                                                         00307f461add   19 months ago   735MB
registry.k8s.io/coredns/coredns                  v1.11.1                                                                       cbb01a7bd410   20 months ago   59.8MB
docker/desktop-vpnkit-controller                 dc331cb22850be0cdd97c84a9cfecaf44a1afb6e                                      556098075b3d   23 months ago   36.2MB
eclipse-mosquitto                                1.6.15                                                                        5dade4ce550b   2 years ago     11.6MB
mongo                                            4.2.23                                                                        56d9cb77c508   2 years ago     388MB
registry.k8s.io/pause                            3.9                                                                           e6f181688397   2 years ago     744kB
confluentinc/cp-kafka                            7.3.0                                                                         b526943eeea4   2 years ago     828MB
confluentinc/cp-zookeeper                        7.3.0                                                                         b3ebff3db01d   2 years ago     828MB
mongo-express                                    0.54.0                                                                        05378e191d13   3 years ago     128MB
docker/desktop-storage-provisioner               v2.0                                                                          99f89471f470   3 years ago     41.9MB

C:\Users\haipewang5>
```

3. PostGIS for extension

3.1 Getting started: https://postgis.net/documentation/getting_started/

3.2 Pull Docker Image Using CLI: https://hub.docker.com/r/postgis/postgis/

docker pull postgis/postgis



```
C:\Users\haipewang5>docker pull postgis/postgis
Using default tag: latest
latest: Pulling from postgis/postgis
55147cbf65d4: Pull complete
1f1200303b36: Pull complete
1545bf95a04f: Pull complete
8095880fc574: Pull complete
c3b69cf17d6d: Pull complete
565dd1b34b1b: Pull complete
9753994d6705: Pull complete
21a2f4a7f2ef: Pull complete
66236ef3b312: Pull complete
1046bb09ad4a: Pull complete
7083a90a00ea: Pull complete
9eb607b2c73c: Pull complete
2383eb9d87b0: Pull complete
e3a87c4bf8f4: Pull complete
0a61f8f70e28: Pull complete
4f4fb700ef54: Pull complete
a6cec8bb2d34: Pull complete
950e0ff34abe: Pull complete
Digest: sha256:6cfc6a9baf27008ef20f6030a48f33fca0b88a909c1725321bbe63bf869f526a
Status: Downloaded newer image for postgis/postgis:latest
docker.io/postgis/postgis:latest

What's next:
    View a summary of image vulnerabilities and recommendations → docker scout quickview postgis/postgis

C:\Users\haipewang5>
```

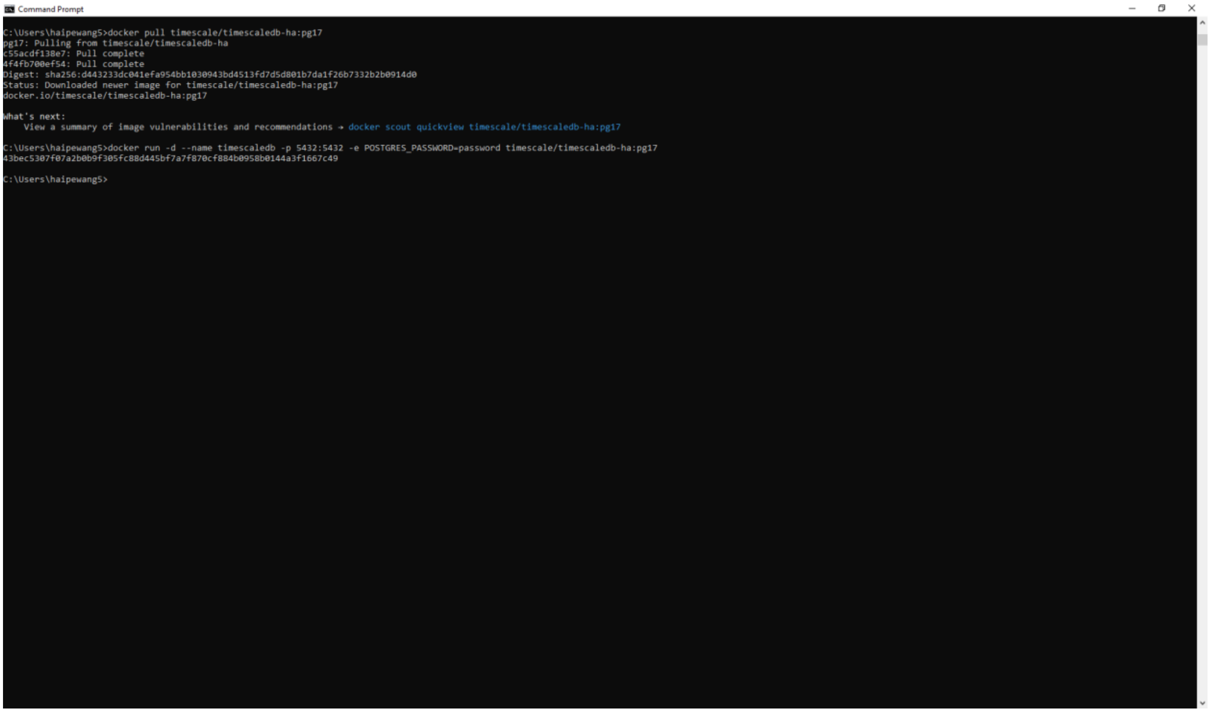
4. TimescaleDB for extension

4.1 Getting started: https://docs.timescale.com/self-hosted/latest/install/installation-windows/

4.2 Pull Docker Image Using CLI: https://docs.timescale.com/self-hosted/latest/install/installation-docker/

docker pull timescale/timescaledb-ha:pg17

4.3 Results



```
C:\Users\haipewang5>docker pull timescale/timescaledb-ha:pg17
pg17: Pulling from timescale/timescaledb-ha
c55acdf138e7: Pull complete
4f4fb700ef54: Pull complete
Digest: sha256:d443233dc041efa954bb1030943bd4513fd7d5d801b7da1f26b7332b2b0914d0
Status: Downloaded newer image for timescale/timescaledb-ha:pg17
docker.io/timescale/timescaledb-ha:pg17

What's next:
    View a summary of image vulnerabilities and recommendations → docker scout quickview timescale/timescaledb-ha:pg17

C:\Users\haipewang5>docker run -d --name timescaledb -p 5432:5432 -e POSTGRES_PASSWORD=password timescale/timescaledb-ha:pg17
43bec5307f07a2b0b9f305fc88d445bf7a7f870cf884b0958b0144a3f1667c49

C:\Users\haipewang5>
```

5. Create database with images

5.1 Run the PostgreSQL Container

```
docker run -d --name postgresql_postgis_timescale -e POSTGRES_USE=postgres -e
POSTGRES_PASSWORD=123456 -e POSTGRES_DB=IOT -p 5432:5432 -v
/data:/var/lib/postgresql/data timescale/timescaledb-ha:pg17
```

5.2 Verify the Container is Running

```
docker ps -a
```

5.3 Copy SQL file to Docker

```
docker cp DatabaseForPostgresql.sql postgresql_postgis_timescale:/DatabaseForPostgresql.sql
```

5.4 Create the database

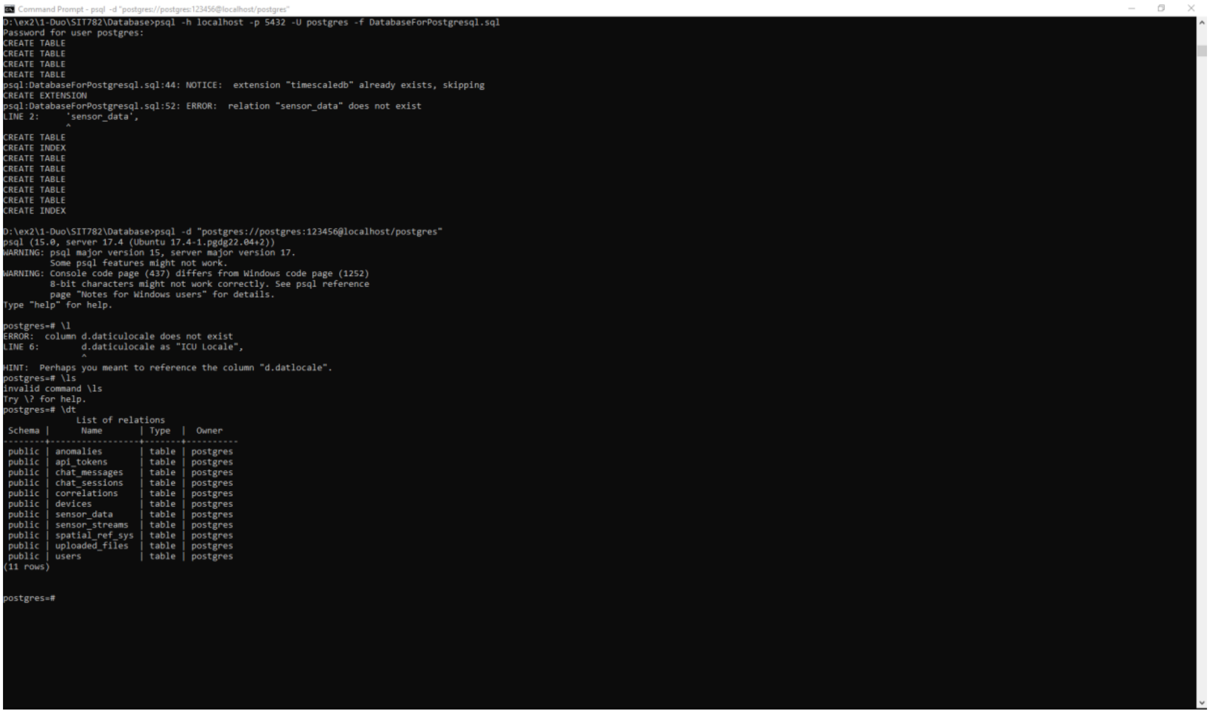
```
psql -h localhost -p 5432 -U postgres -f DatabaseForPostgresql.sql
```

5.5 Connect to a database on your PostgreSQL instance

```
psql -d "postgres://postgres:123456@localhost/postgres"
```

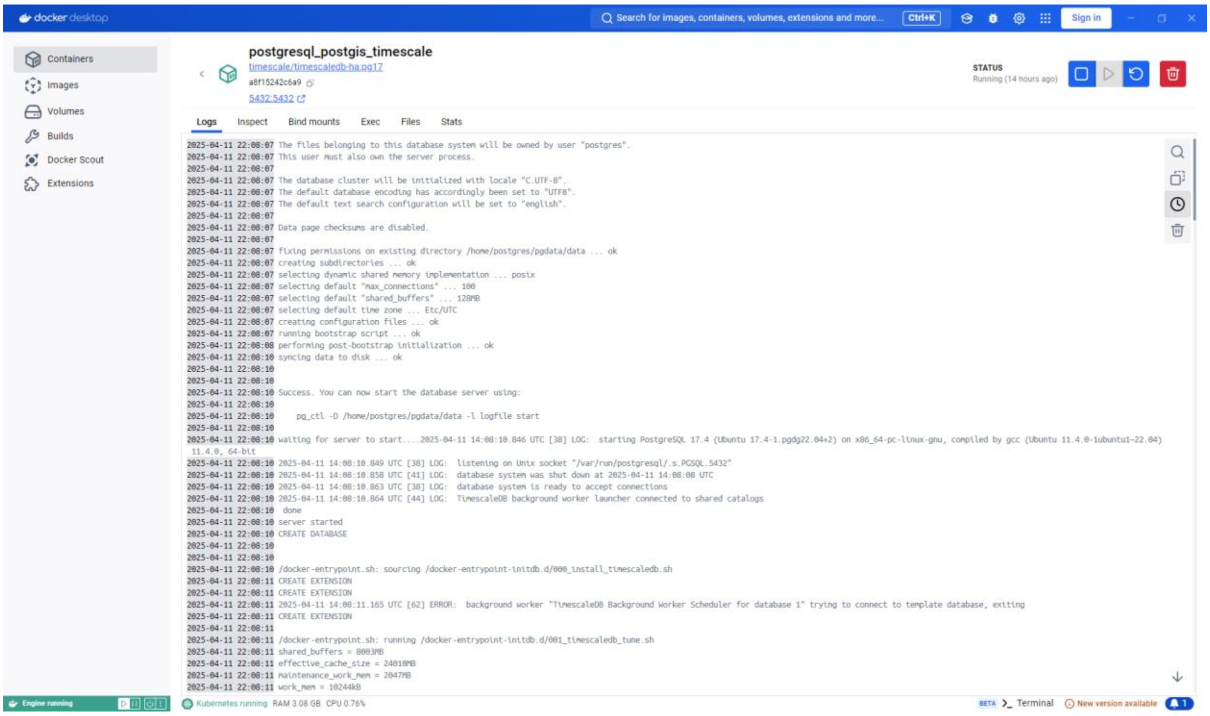
5.6 Results

Check all tables with \dt



Command Prompt - psql -d "postgres://postgres:123456@localhost/postgres"

```
D:\ex2\1-Duo\SIT782\Database>psql -h localhost -p 5432 -U postgres -f DatabaseForPostgresql.sql
Password for user postgres:
CREATE TABLE
CREATE TABLE
CREATE TABLE
CREATE TABLE
psql:DatabaseForPostgresql.sql:44: NOTICE:  extension "timescaledb" already exists, skipping
CREATE EXTENSION
psql:DatabaseForPostgresql.sql:52: ERROR:  relation "sensor_data" does not exist
LINE 2:     'sensor_data',
            ^
CREATE TABLE
CREATE INDEX
CREATE TABLE
CREATE TABLE
CREATE TABLE
CREATE TABLE
CREATE TABLE
CREATE INDEX

D:\ex2\1-Duo\SIT782\Database>psql -d "postgres://postgres:123456@localhost/postgres"
psql (15.0, server 17.4 (Ubuntu 17.4-1.pgdg22.04+2))
WARNING: psql major version 15, server major version 17.
         Some psql features might not work.
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
ERROR:  column d.daticulocale does not exist
LINE 6:         d.daticulocale as "ICU Locale",
                ^
HINT:  Perhaps you meant to reference the column "d.datlocale".
postgres=# \ls
invalid command \ls
Try \? for help.
postgres=# \dt
              List of relations
 Schema |       Name       | Type  |  Owner
--------+------------------+-------+----------
 public | anomalies        | table | postgres
 public | api_tokens       | table | postgres
 public | chat_messages    | table | postgres
 public | chat_sessions    | table | postgres
 public | correlations     | table | postgres
 public | devices          | table | postgres
 public | sensor_data      | table | postgres
 public | sensor_streams   | table | postgres
 public | spatial_ref_sys  | table | postgres
 public | uploaded_files   | table | postgres
 public | users            | table | postgres
(11 rows)


postgres=#
```



```
2025-04-11 22:08:07 The files belonging to this database system will be owned by user "postgres".
2025-04-11 22:08:07 This user must also own the server process.
2025-04-11 22:08:07
2025-04-11 22:08:07 The database cluster will be initialized with locale "C.UTF-8".
2025-04-11 22:08:07 The default database encoding has accordingly been set to "UTF8".
2025-04-11 22:08:07 The default text search configuration will be set to "english".
2025-04-11 22:08:07
2025-04-11 22:08:07 Data page checksums are disabled.
2025-04-11 22:08:07
2025-04-11 22:08:07 fixing permissions on existing directory /home/postgres/pgdata/data ... ok
2025-04-11 22:08:07 creating subdirectories ... ok
2025-04-11 22:08:07 selecting dynamic shared memory implementation ... posix
2025-04-11 22:08:07 selecting default "max_connections" ... 100
2025-04-11 22:08:07 selecting default "shared_buffers" ... 128MB
2025-04-11 22:08:07 selecting default time zone ... Etc/UTC
2025-04-11 22:08:07 creating configuration files ... ok
2025-04-11 22:08:07 running bootstrap script ... ok
2025-04-11 22:08:08 performing post-bootstrap initialization ... ok
2025-04-11 22:08:10 syncing data to disk ... ok
2025-04-11 22:08:10
2025-04-11 22:08:10
2025-04-11 22:08:10 Success. You can now start the database server using:
2025-04-11 22:08:10
2025-04-11 22:08:10     pg_ctl -D /home/postgres/pgdata/data -l logfile start
2025-04-11 22:08:10
2025-04-11 22:08:10 waiting for server to start....2025-04-11 14:08:10.846 UTC [38] LOG:  starting PostgreSQL 17.4 (Ubuntu 17.4-1.pgdg22.04+2) on x86_64-pc-linux-gnu, compiled by gcc (Ubuntu 11.4.0-1ubuntu1~22.04)
 11.4.0, 64-bit
2025-04-11 22:08:10 2025-04-11 14:08:10.849 UTC [38] LOG:  listening on Unix socket "/var/run/postgresql/.s.PGSQL.5432"
2025-04-11 22:08:10 2025-04-11 14:08:10.858 UTC [41] LOG:  database system was shut down at 2025-04-11 14:08:08 UTC
2025-04-11 22:08:10 2025-04-11 14:08:10.863 UTC [38] LOG:  database system is ready to accept connections
2025-04-11 22:08:10 2025-04-11 14:08:10.864 UTC [44] LOG:  TimescaleDB background worker launcher connected to shared catalogs
2025-04-11 22:08:10  done
2025-04-11 22:08:10 server started
2025-04-11 22:08:10 CREATE DATABASE
2025-04-11 22:08:10
2025-04-11 22:08:10
2025-04-11 22:08:10 /docker-entrypoint.sh: sourcing /docker-entrypoint-initdb.d/000_install_timescaledb.sh
2025-04-11 22:08:11 CREATE EXTENSION
2025-04-11 22:08:11 CREATE EXTENSION
2025-04-11 22:08:11 2025-04-11 14:08:11.165 UTC [62] ERROR:  background worker "TimescaleDB Background Worker Scheduler for database 1" trying to connect to template database, exiting
2025-04-11 22:08:11 CREATE EXTENSION
2025-04-11 22:08:11
2025-04-11 22:08:11 /docker-entrypoint.sh: running /docker-entrypoint-initdb.d/001_timescaledb_tune.sh
2025-04-11 22:08:11 shared_buffers = 8003MB
2025-04-11 22:08:11 effective_cache_size = 24010MB
2025-04-11 22:08:11 maintenance_work_mem = 2047MB
2025-04-11 22:08:11 work_mem = 10244kB
```