Assignment 5 - Postgres, Go, and Dockers

1. **(10 points)** Download, install, and configure postgres server on your machine. The installer and instructions are available on their website i.e. https://www.postgresql.org/download/ . While doing this setup, you may come across errors and issues, you should document/explain any such errors and their resolutions.

Postgres installed successfully in my mac os machine. However, we faced the below issue while creating new localhost server in pgadmin tool.

Issue 1: Unable to connect to server. connection failed: 1). port 5432 failed: FATAL: role 'postgres' does not exist.
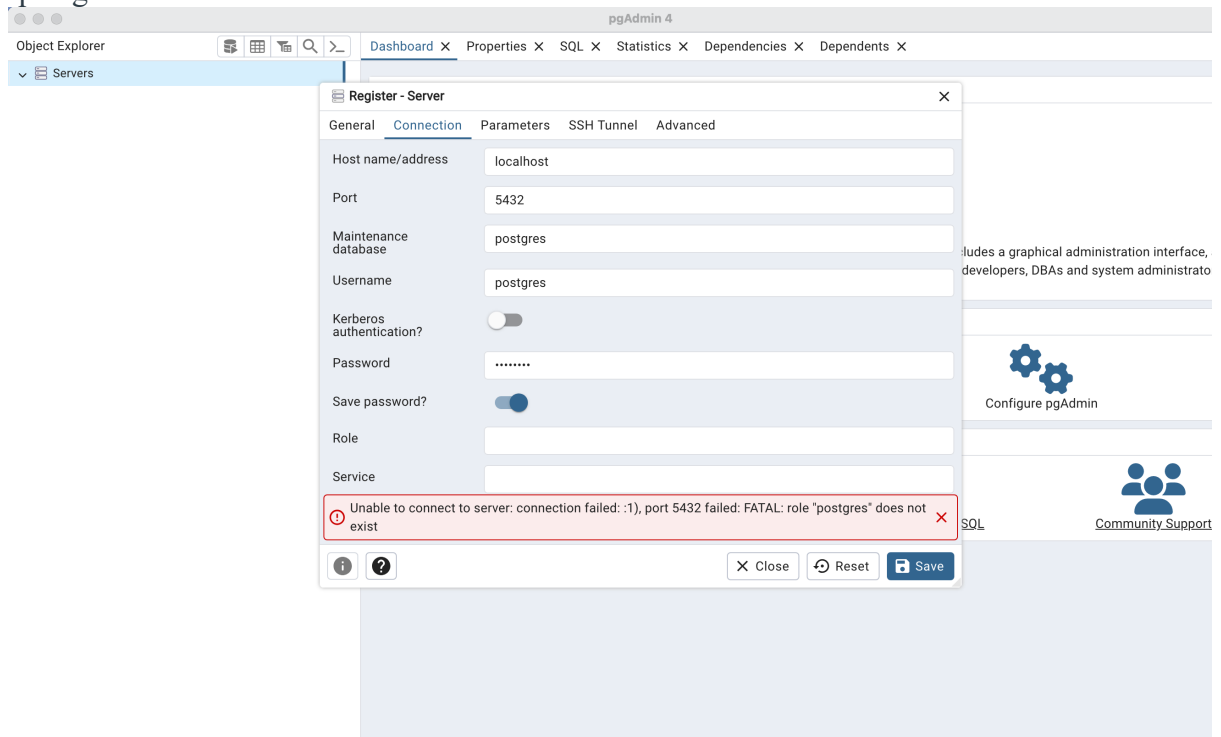

Fig 1: Error screenshot while creating new localhost server.

Solution: To solve this issue we have to execute below commands in terminal which creates **postgres** user and then restarted the postgresql service.

```
createuser -s postgres
brew services restart postgresql
```

Fig 2: Command executed on terminal to solve issue.

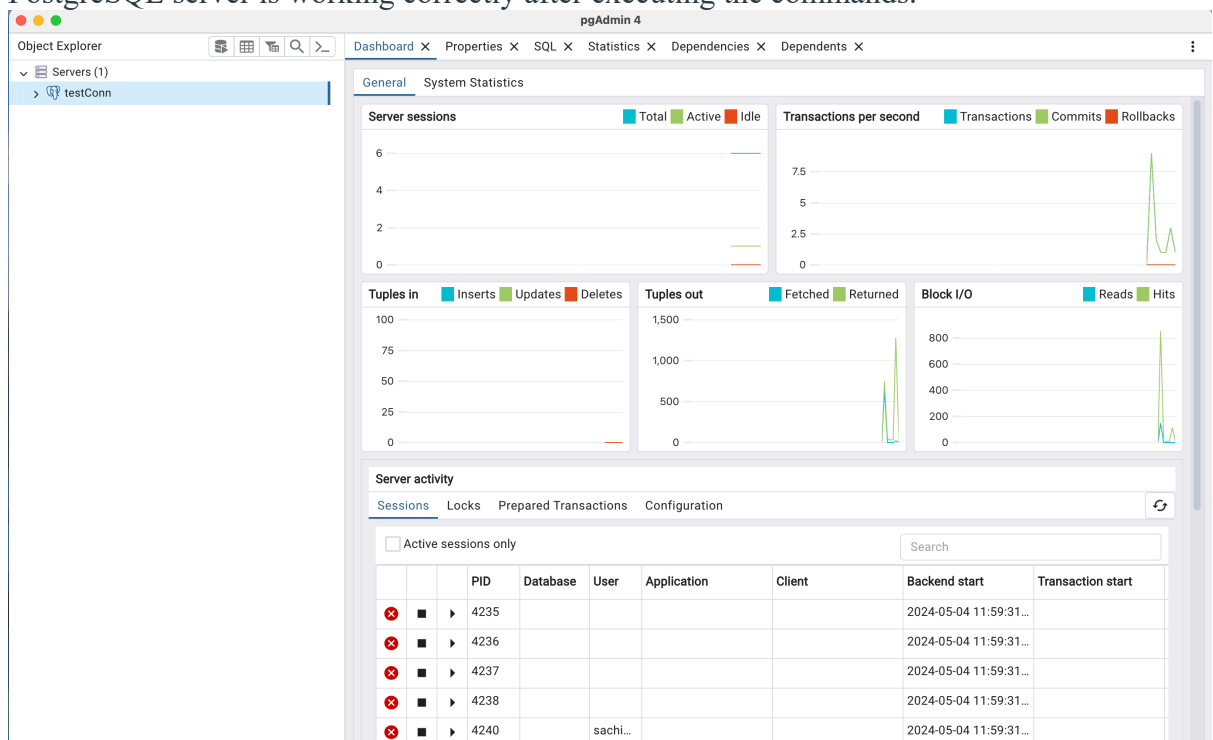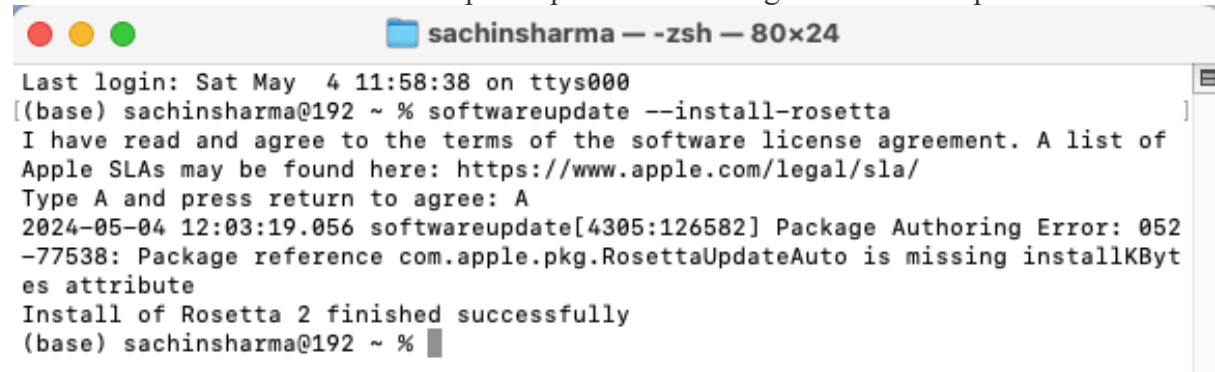PostgreSQL server is working correctly after executing the commands.

Fig 3: PostgreSQL is working correctly on pgadmin tool.

2. **(10 points)** Download, install, and configure Docker desktop on your machine. https://docs.docker.com/ contains all the necessary information, lots of YouTube videos are also available that provide the instructions to do so. While doing this setup, you may come across errors and issues, you should document/explain any such errors and their resolutions.

We have to installed Rosetta 2 as a pre-requisite for running Docker desktop.

Fig 4: Rosetta 2 installed successfully as a requirement for docker desktop.

Docker Desktop is running without any issue. Attaching below screenshot:
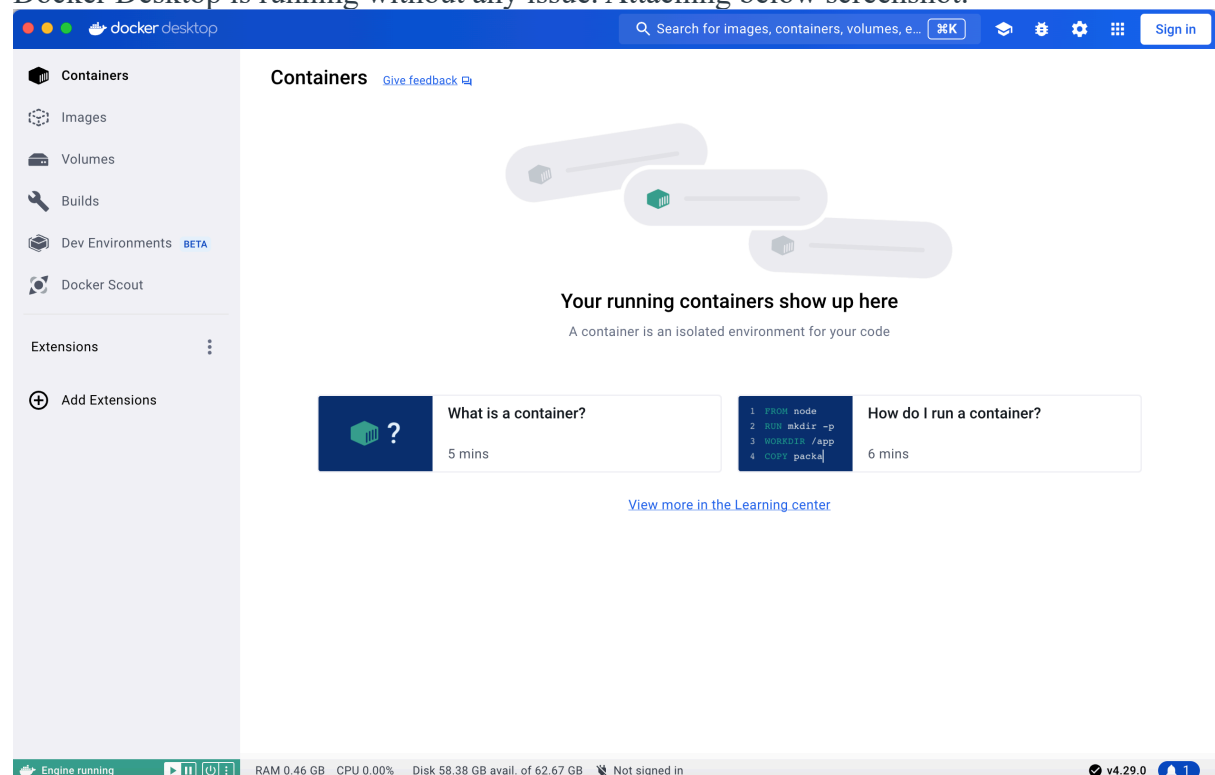

Fig 4: Docker desktop is running successfully.

3. **(5 Points)** Build Docker/Container Postgres image by executing the following command:
   docker-compose up --build
We faced the below issue while running the docker-compose up command.
Issue: Error response from deamon: Ports are not available: exposing port TCP 0.0.0.0:5433 -> 0.0.0.0: listen tcp 0.0.0.0:5433: bind: address already in use.

Fig 5: Docker build error due to port in use.

We resolve this issue by changing the port to change **"5433:5432"** to **"5434:5432"** in the **ports** section of the **postgres** service in yaml file. After that we re-run the docker-compose up command and we could see our docker is now running. Attaching below screenshot:

```
postgres  | creating configuration files ... ok
postgres  | running bootstrap script ... ok
postgres  | performing post-bootstrap initialization ... ok
postgres  | initdb: warning: enabling "trust" authentication for local connectio
nsView in Docker Desktop   w Enable Watch
postgres  | initdb: hint: You can change this by editing pg_hba.conf or using th
e option -A, or --auth-local and --auth-host, the next time you run initdb.
postgres  | syncing data to disk ... ok
postgres  |
postgres  |
postgres  | Success. You can now start the database server using:
postgres  |
postgres  |     pg_ctl -D /var/lib/postgresql/data -l logfile start
postgres  |
postgres  | waiting for server to start....2024-05-04 10:22:18.793 UTC [49] LOG:
  starting PostgreSQL 16.2 (Debian 16.2-1.pgdg120+2) on aarch64-unknown-linux-gn
u, compiled by gcc (Debian 12.2.0-14) 12.2.0, 64-bit
postgres  | 2024-05-04 10:22:18.793 UTC [49] LOG:  listening on Unix socket "/va
r/run/postgresql/.s.PGSQL.5432"able Watch
postgres  | 2024-05-04 10:22:18.797 UTC [52] LOG:  database system was shut down
 at 2024-05-04 10:22:18 UTCw Enable Watch
postgres  | 2024-05-04 10:22:18.800 UTC [49] LOG:  database system is ready to a
ccept connectionsDesktop   w Enable Watch
postgres  |   done
postgres  | server started
postgres  | CREATE DATABASE
postgres  |
postgres  |
postgres  | /usr/local/bin/docker-entrypoint.sh: ignoring /docker-entrypoint-ini
tdb.d/*in Docker Desktop   w Enable Watch
postgres  |
postgres  | 2024-05-04 10:22:19.088 UTC [49] LOG:  received fast shutdown reques
t View in Docker Desktop   w Enable Watch
postgres  | waiting for server to shut down....2024-05-04 10:22:19.089 UTC [49]
LOG:  aborting any active transactionstch
postgres  | 2024-05-04 10:22:19.089 UTC [49] LOG:  background worker "logical re
plication launcher" (PID 55) exited with exit code 1
postgres  | 2024-05-04 10:22:19.090 UTC [50] LOG:  shutting down
postgres  | 2024-05-04 10:22:19.090 UTC [50] LOG:  checkpoint starting: shutdown
 immediateDocker Desktop   w Enable Watch
postgres  | 2024-05-04 10:22:19.196 UTC [50] LOG:  checkpoint complete: wrote 92
3 buffers (5.6%); 0 WAL file(s) added, 0 removed, 0 recycled; write=0.087 s, syn
c=0.017 s, total=0.107 s; sync files=301, longest=0.001 s, average=0.001 s; dist
ance=4257 kB, estimate=4257 kB; lsn=0/1912FE8, redo lsn=0/1912FE8
postgres  | 2024-05-04 10:22:19.207 UTC [49] LOG:  database system is shut down
postgres  |   done
postgres  | server stopped
postgres  |
postgres  | PostgreSQL init process complete; ready for start up.
postgres  |
postgres  | 2024-05-04 10:22:19.309 UTC [1] LOG:  starting PostgreSQL 16.2 (Debi
an 16.2-1.pgdg120+2) on aarch64-unknown-linux-gnu, compiled by gcc (Debian 12.2.
0-14) 12.2.0, 64-bit
postgres  | 2024-05-04 10:22:19.309 UTC [1] LOG:  listening on IPv4 address "0.0
.0.0", port 5432 Desktop   w Enable Watch
postgres  | 2024-05-04 10:22:19.309 UTC [1] LOG:  listening on IPv6 address "::"
, port 5432ocker Desktop   w Enable Watch
postgres  | 2024-05-04 10:22:19.310 UTC [1] LOG:  listening on Unix socket "/var
/run/postgresql/.s.PGSQL.5432"nable Watch
postgres  | 2024-05-04 10:22:19.314 UTC [65] LOG:  database system was shut down
 at 2024-05-04 10:22:19 UTCw Enable Watch
postgres  | 2024-05-04 10:22:19.319 UTC [1] LOG:  database system is ready to ac
cept connections Desktop   w Enable Watch

 v View in Docker Desktop   w Enable Watch
```
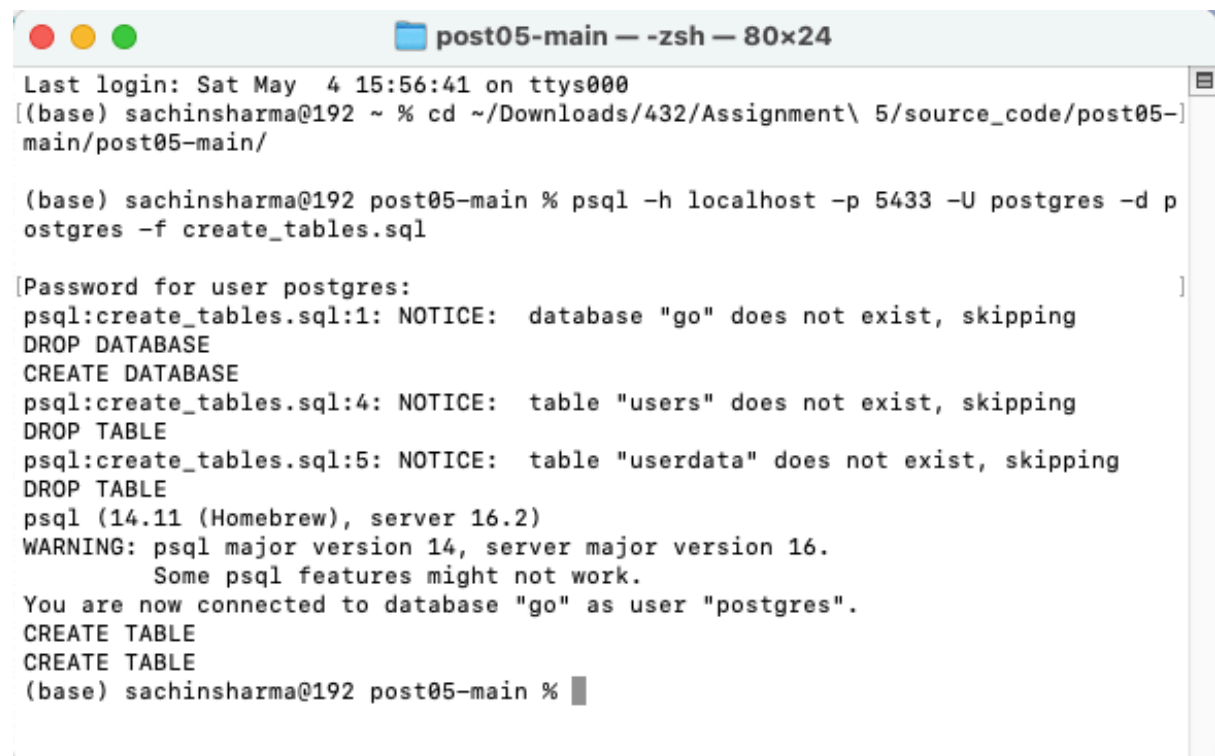
Fig 6: Docker running using docker-compose up --build

4. **(5 Points)** Use **psql** to execute the following command from the command window/terminal to create the go database and Users and UserData tables. Keep in mind that your local path may be different from the one given below (*"C:\Program Files\PostgreSQL\13\bin\psql")* and also depending on your operating system the command should be modified e.g. backslash to forward slash on mac etc.

"C:\Program Files\PostgreSQL\13\bin\psql" -h localhost -p 5433 -U postgres < create_tables.sql

We executed the command on our mac os by changing the local path and created go database and created Users and UserData tables. Attaching below commands and screenshot:

```
cd ~/Downloads/432/Assignment\ 5/source_code/post05-main/post05-main/
psql -h localhost -p 5433 -U postgres -d postgres -f create_tables.sql
```


Fig 7: Database and Tables created by executing psql command on create_tables.sql fille.
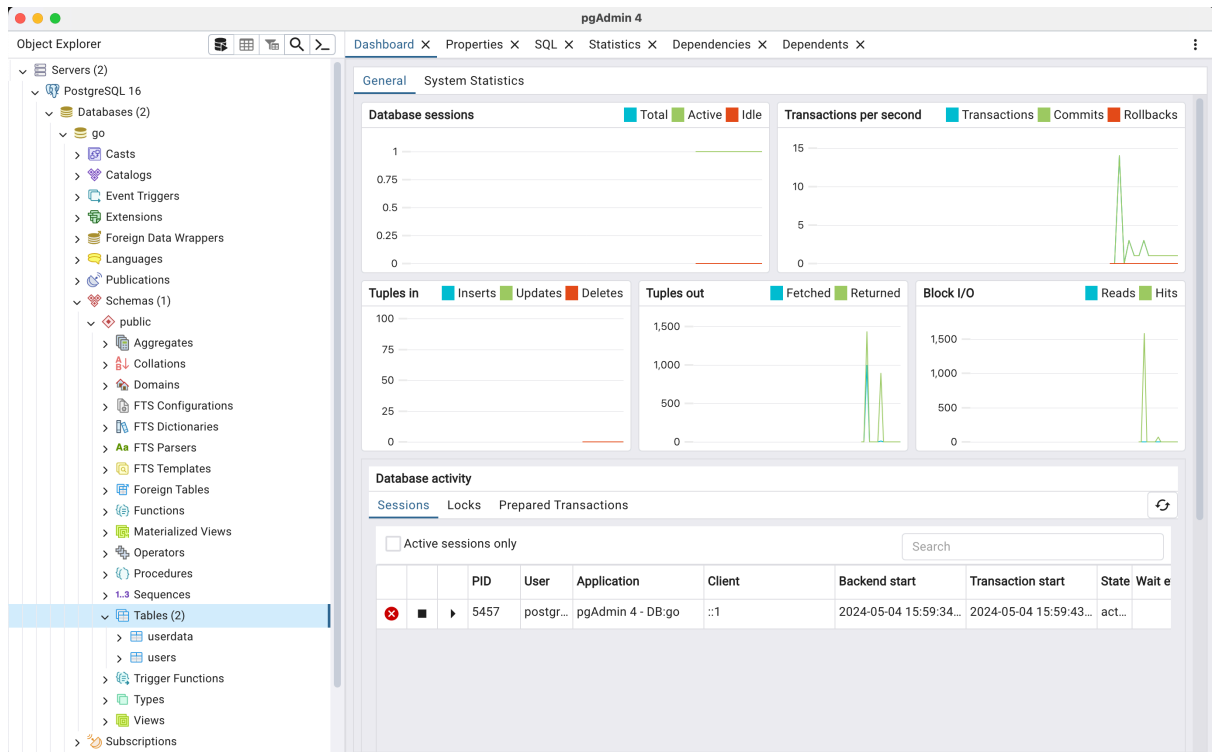
Fig 8: pgAdmin tool screenshot where we can see **go** database and 2 tables.

5. **(5 Points)** Run the following Go program 5 times:

go run postGO.go

We faced the below issue while running the postGo.go program.

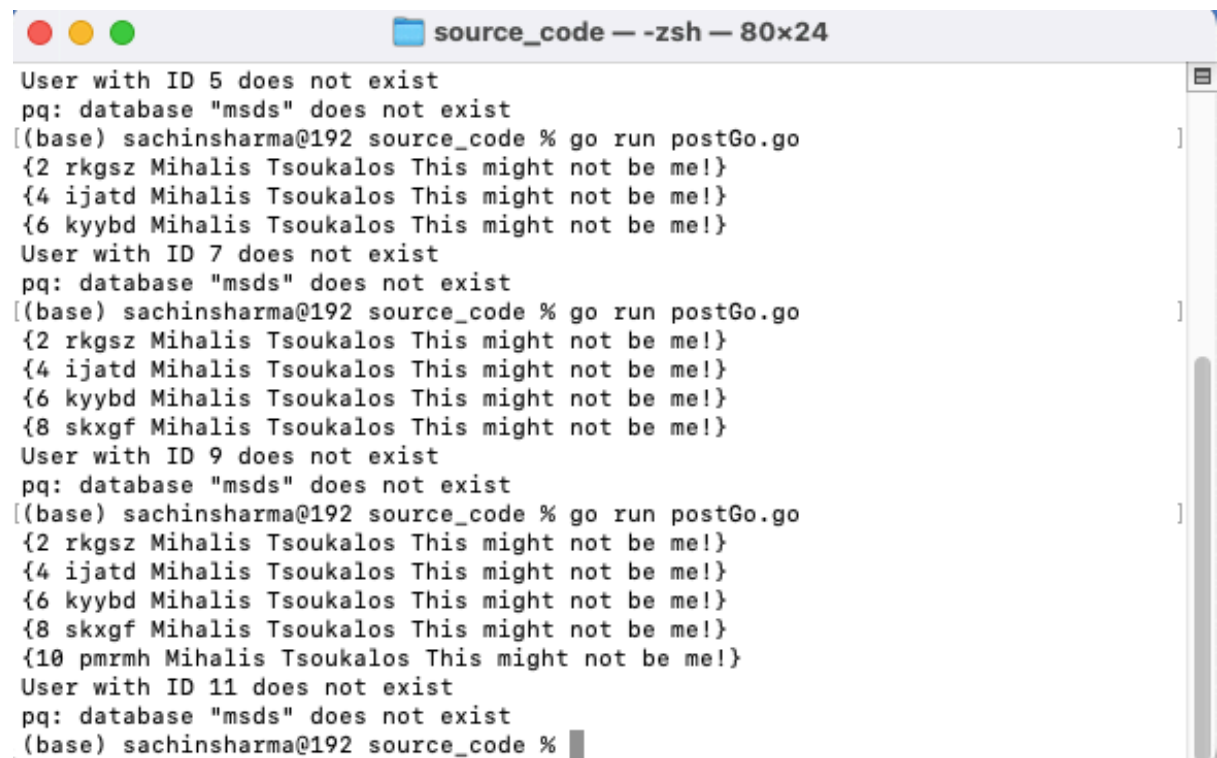**Issue:** Dial tcp: lookup port=2345 does not exist while, executing the go run postGo.go.

Fig 9: Error screenshot contains no such host while executing postGo.go file.

We solve this issue by correcting the port no and other connection details in simpleex.go file which is inside utils folder.
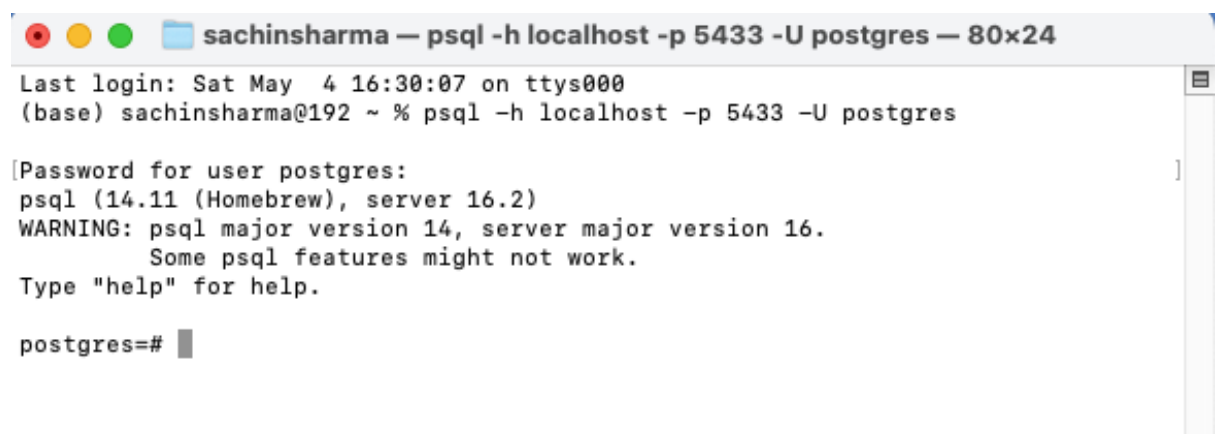

```
User with ID 5 does not exist
pq: database "msds" does not exist
[(base) sachinsharma@192 source_code % go run postGo.go
{2 rkgsz Mihalis Tsoukalos This might not be me!}
{4 ijatd Mihalis Tsoukalos This might not be me!}
{6 kyybd Mihalis Tsoukalos This might not be me!}
User with ID 7 does not exist
pq: database "msds" does not exist
[(base) sachinsharma@192 source_code % go run postGo.go
{2 rkgsz Mihalis Tsoukalos This might not be me!}
{4 ijatd Mihalis Tsoukalos This might not be me!}
{6 kyybd Mihalis Tsoukalos This might not be me!}
{8 skxgf Mihalis Tsoukalos This might not be me!}
User with ID 9 does not exist
pq: database "msds" does not exist
[(base) sachinsharma@192 source_code % go run postGo.go
{2 rkgsz Mihalis Tsoukalos This might not be me!}
{4 ijatd Mihalis Tsoukalos This might not be me!}
{6 kyybd Mihalis Tsoukalos This might not be me!}
{8 skxgf Mihalis Tsoukalos This might not be me!}
{10 pmrmh Mihalis Tsoukalos This might not be me!}
User with ID 11 does not exist
pq: database "msds" does not exist
(base) sachinsharma@192 source_code %
```

Fig 10: Executed the postGo.go program 5 times.

6. **(5 Points)** Use **psql** to execute the following commands from the command prompt to inspect the tables in the go database and Users and UserData tables:

    a. "C:\Program Files\PostgreSQL\13\bin\psql" -h localhost -p 5433 -U postgres


```
Last login: Sat May  4 16:30:07 on ttys000
(base) sachinsharma@192 ~ % psql -h localhost -p 5433 -U postgres

[Password for user postgres:
psql (14.11 (Homebrew), server 16.2)
WARNING: psql major version 14, server major version 16.
         Some psql features might not work.
Type "help" for help.

postgres=#
```

Fig 11: Screenshot of connecting postgresql server using terminal.

    b. \l

Fig 12: Screenshot of terminal where we list all databases in PostgreSQL.

c. \c go

Fig 13: Screenshot of terminal where we selected go database.

d. \dt

Fig 14: Screenshot of terminal where we listed all tables for go database.

e.   select * from userdata;

Fig 15: All records of userdata table.

7. **(5 Points)** Modify the provided Go programs as follows.

   a. Create a **database** with the name **MSDS**

Fig 16: We created a database named **MSDS.**

   b. Create a table in this database, name it **MSDSCourseCatalog**

Fig 17: Created a table msdscoursecatalog inside msds database.

c. Insert **5 MSDS courses entries** that have the
    following MSDSCourse structure:

type MSDSCourse struct {

CID string `json:"courseI_D`

CNAME string `json:"course_name"`

CPREREQ string `json:"prerequisite"`

}


```
source_code — -zsh — 80×24

Last login: Sat May  4 16:43:00 on ttys000
[(base) sachinsharma@192 ~ % cd Downloads
[(base) sachinsharma@192 Downloads % cd 432
[(base) sachinsharma@192 432 % cd Assignment\ 5
[(base) sachinsharma@192 Assignment 5 % cd source_code
[(base) sachinsharma@192 source_code % go run postGo.go
 {14 cvvqg Mihalis Tsoukalos This might not be me!}
 {16 ahrkr Mihalis Tsoukalos This might not be me!}
 {18 zemlt Mihalis Tsoukalos This might not be me!}
 {20 vpxyw Mihalis Tsoukalos This might not be me!}
 {22 ubsaj Mihalis Tsoukalos This might not be me!}
 {24 nlghs Mihalis Tsoukalos This might not be me!}
 {26 gksji Mihalis Tsoukalos This might not be me!}
 {28 nyxed Mihalis Tsoukalos This might not be me!}
 {30 uwubk Mihalis Tsoukalos This might not be me!}
 {32 vmtty Mihalis Tsoukalos This might not be me!}
User with ID 33 does not exist
Course Added in msdscoursecatalog:  applied statistics with r
Course Added in msdscoursecatalog:  database systems
Course Added in msdscoursecatalog:  foundations of data engineering
Course Added in msdscoursecatalog:  natural language processing
Course Added in msdscoursecatalog:  capstone project
(base) sachinsharma@192 source_code % []
```

Fig 18: Inserted 5 courses records as per the MSDSCourse struct into database.

8. **(5 Points)** Use **psql** commands to demonstrate the content of the
    MSDSCourseCatalog table after your run.

```
●  ●  ●    📁 sachinsharma — psql -h localhost -p 5433 -U postgres — 80×24

[postgres=# \c msds
 psql (14.11 (Homebrew), server 16.2)
 WARNING: psql major version 14, server major version 16.
          Some psql features might not work.
 You are now connected to database "msds" as user "postgres".
[msds=# \dt
             List of relations
  Schema |        Name        | Type  | Owner
 --------+--------------------+-------+----------
  public | msdscoursecatalog  | table | postgres
 (1 row)

[msds=# select * from msdscoursecatalog;
    cid   |              cname              | cprereq
 ---------+---------------------------------+---------
  MSDS401 | applied statistics with r       | MSDS400
  MSDS420 | database systems                | MSDS402
  MSDS432 | foundations of data engineering | MSDS420
  MSDS453 | natural language processing     | MSDS422
  MSDS498 | capstone project                | MSDS453
 (5 rows)

 msds=# ▊
```
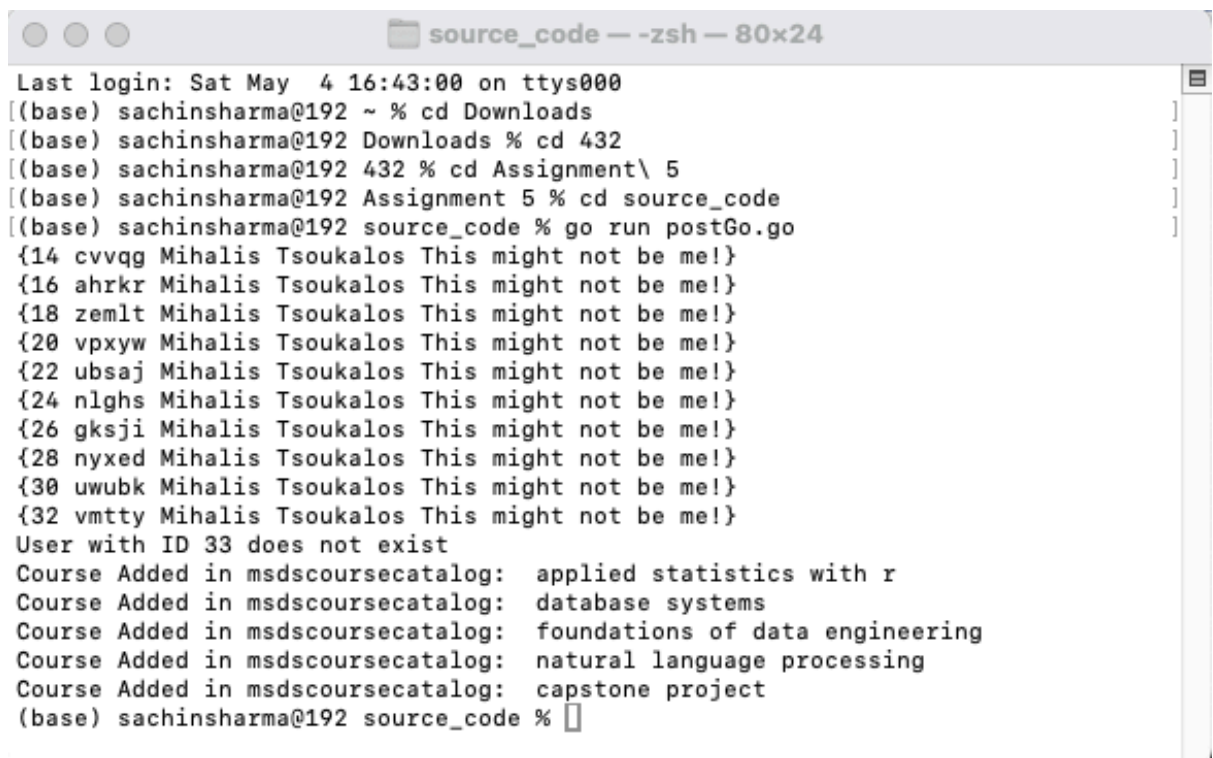
Fig 19: Selected all records of msdscoursecatalog table inside msds database.