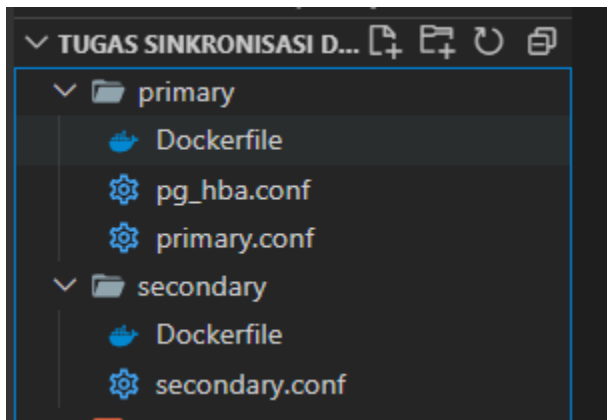


Nama : Alpian Roymundus Siringo-ringo

NIM : 11211009

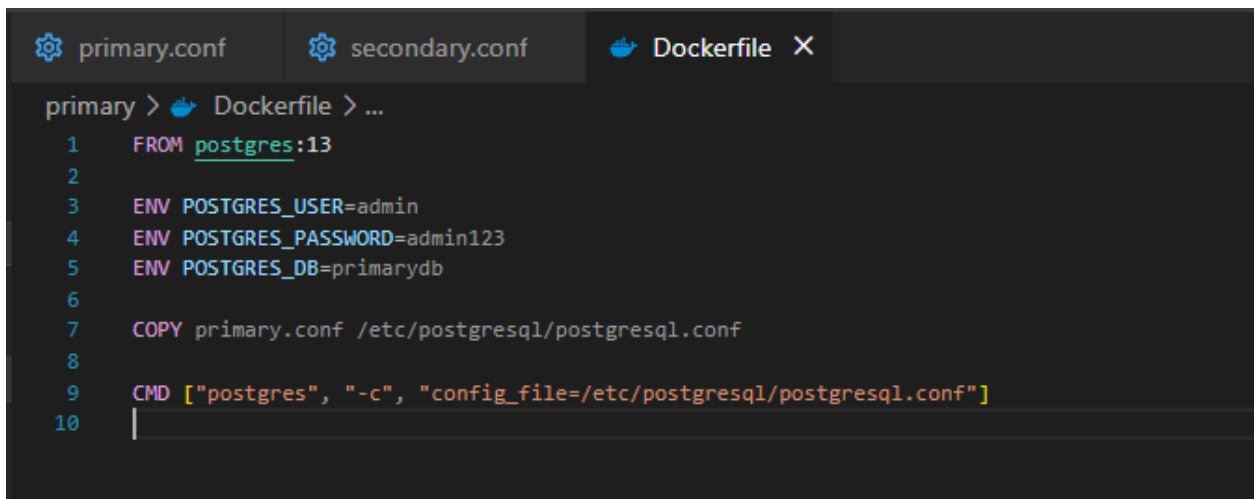
Tugas Sinkronisasi dan Replikasi menggunakan Dockerfile Sistem Terdistribusi A

1. Siapkan struktur folder untuk menyusun Dockerfile dan file konfigurasi



2. Mengatur Primary Node

- Isi dari Primary-Dockerfile



- Isi dari primary/primary.conf

```
primary > primary.conf
1 listen_addresses = '*'
2
3 wal_level = replica
4 max_wal_senders = 10
5 wal_keep_size = 64
6 archive_mode = on
7 archive_command = 'cp %p /var/lib/postgresql/data/archive/%f'
8
```

File ini mengatur PostgreSQL sebagai Primary Node dan mengaktifkan replikasi.

- Buat Docker Image untuk Primary Node:

```
PS C:\Users\alpia\Documents\Materi dan Tugas Kuliah\Semester 7\Sistem Terdistribusi\Tugas Sinkronisasi dan Replikasi> cd primary
PS C:\Users\alpia\Documents\Materi dan Tugas Kuliah\Semester 7\Sistem Terdistribusi\Tugas Sinkronisasi dan Replikasi\primary> docker build -t primary-db
ERROR: "docker buildx build" requires exactly 1 argument.
See 'docker buildx build --help'.

Usage: docker buildx build [OPTIONS] PATH | URL | -

Start a build
PS C:\Users\alpia\Documents\Materi dan Tugas Kuliah\Semester 7\Sistem Terdistribusi\Tugas Sinkronisasi dan Replikasi\primary> docker build -t primary-db .
[*] Building 0.3s (7/7) FINISHED
=> [internal] load build definition from Dockerfile
=> transferring dockerfile: 269B
=> WARN: SecretsUsedInArgOrEnv: Do not use ARG or ENV instructions for sensitive data (ENV "POSTGRES_PASSWORD") (line 4)
=> [internal] load metadata for docker.io/library/postgres:13
=> [internal] load .dockerignore
=> transferring context: 2B
=> [internal] load build context
=> transferring context: 212B
=> CACHED [1/2] FROM docker.io/library/postgres:13
=> [2/2] COPY primary.conf /etc/postgresql/postgresql.conf
=> exporting to image
```

- Isi dari primary/pg_hba.conf

```
primary > pg_hba.conf
1  # TYPE DATABASE USER ADDRESS METHOD
2
3  # "local" is for Unix domain socket connections only
4  local all all trust
5
6  # IPv4 local connections:
7  host all all 127.0.0.1/32 trust
8
9  # IPv6 local connections:
10 host all all ::1/128 trust
11
12 # Allow replication connections from the Secondary Node
13 # Gantilah '0.0.0.0/0' dengan IP atau subnet yang lebih spesifik untuk keamanan
14 host replication admin 0.0.0.0/0 md5
15
16 # Aturan ini memungkinkan semua pengguna untuk mengakses database dari jaringan yang sama
17 # namun, bisa dikurangi dengan hanya mengizinkan akses dari Secondary Node.
18 host all all 0.0.0.0/0 md5
19
```

3. Mengatur Secondary Node

- Isi dari secondary/Dockerfile

```
secondary > Dockerfile > ...
1  FROM postgres:13
2
3  ENV POSTGRES_USER=admin
4  ENV POSTGRES_PASSWORD=admin123
5  ENV POSTGRES_DB=secondarydb
6
7  COPY secondary.conf /etc/postgresql/postgresql.conf
8
9  CMD ["postgres", "-c", "config_file=/etc/postgresql/postgresql.conf"]
10
```

- Isi dari secondary/secondary.conf

```
secondary > secondary.conf
1  primary_conninfo = 'host=primary-db port=5432 user=replicator password=replicator_password'
2  hot_standby = on
3
```

- Build Docker Image untuk secondary image

[illegible]

4. Menjalankan Container

- Menjalankan primary node

```
PS C:\Users\alpia\Documents\Materi dan Tugas Kuliah\Semester 7\Sistem Terdistribusi\Tugas Sinkronisasi dan Replikasi\secondary> docker run -d --name primary-db primary-db
de099de32fc4996818c4446bd5c504a1821c00a37f3be3322bc05fccc846999f
PS C:\Users\alpia\Documents\Materi dan Tugas Kuliah\Semester 7\Sistem Terdistribusi\Tugas Sinkronisasi dan Replikasi\secondary> |
```

- Menjalankan Primary Node dalam jaringan ini dan menjalankan Secondary Node (dalam jaringan yang sama):

```
8d6eb089236b50ab5958b8e1f8ad723b9b2094598ed4873b85b06b061d6cf292
docker: Error response from daemon: network pg-replication-net not found.
PS C:\Users\alpia\Documents\Materi dan Tugas Kuliah\Semester 7\Sistem Terdistribusi\Tugas Sinkronisasi dan Replikasi\secondary> docker network create pg-replication-net
6faf758e526fec39ff574f55f2d2268bf3358f06a99347128f2f3c4c0feled2
PS C:\Users\alpia\Documents\Materi dan Tugas Kuliah\Semester 7\Sistem Terdistribusi\Tugas Sinkronisasi dan Replikasi\secondary> docker run -d --name primary-db --network pg-replication-net primary-db
docker: Error response from daemon: Conflict. The container name "/primary-db" is already in use by container "8d6eb089236b50ab5958b8e1f8ad723b9b2094598ed4873b85b06b061d6cf292". You have to remove (or rename) that container to be able to reuse that name.
See 'docker run --help'.
PS C:\Users\alpia\Documents\Materi dan Tugas Kuliah\Semester 7\Sistem Terdistribusi\Tugas Sinkronisasi dan Replikasi\secondary> docker run -d --name primary-db --network pg-replication-net primary-db
57d6e4ea2914ec1324aff353a552b136e58e99f4ba664f4ca24b8dc94252c9ae
PS C:\Users\alpia\Documents\Materi dan Tugas Kuliah\Semester 7\Sistem Terdistribusi\Tugas Sinkronisasi dan Replikasi\secondary> docker run -d --name secondary-db --network pg-replication-net secondary-db
8648ad58f57393d605680fa7c36d044a28e9029235413ea3974770206bd540ed
PS C:\Users\alpia\Documents\Materi dan Tugas Kuliah\Semester 7\Sistem Terdistribusi\Tugas Sinkronisasi dan Replikasi\secondary> |
```

5. Pengujian Replikasi

- a. Akses primary node dan masukan data:

```
PS C:\Users\alpia\Documents\Materi dan Tugas Kuliah\Semester 7\Sistem Terdistribusi\Tugas Sinkronisasi dan Replikasi\secondary> docker exec -it primary-db psql -U admin -d primarydb -c "CREATE TABLE test_table (id SERIAL PRIMARY KEY, data TEXT);"
>> docker exec -it primary-db psql -U admin -d primarydb -c "INSERT INTO test_table (data) VALUES ('Replication Test Data');"
CREATE TABLE

What's next:
  Try Docker Debug for seamless, persistent debugging tools in any container or image → docker debug primary-db
  Learn more at https://docs.docker.com/go/debug-cli/
INSERT 0 1

What's next:
  Try Docker Debug for seamless, persistent debugging tools in any container or image → docker debug primary-db
  Learn more at https://docs.docker.com/go/debug-cli/
PS C:\Users\alpia\Documents\Materi dan Tugas Kuliah\Semester 7\Sistem Terdistribusi\Tugas Sinkronisasi dan Replikasi\secondary> docker exec -it secondary-db psql -U admin -d secondarydb -c "SELECT * FROM test_table;"
ERROR: relation "test_table" does not exist
LINE 1: SELECT * FROM test_table;
                        ^
```

- b. Verifikasi Data Replikasi di Secondary Node:

```
PS C:\Users\alpia\Documents\Materi dan Tugas Kuliah\Semester 7\Sistem Terdistribusi\Tugas Sinkronisasi dan Replikasi\secondary> docker exec -it primary-db psql -U admin -d primarydb -c "SELECT * FROM test_table;"
 id | data
-----+-----
  1 | Replication Test Data
  2 | Replication Test Data
(2 rows)

What's next:
  Try Docker Debug for seamless, persistent debugging tools in any container or image → docker debug primary-db
  Learn more at https://docs.docker.com/go/debug-cli/
PS C:\Users\alpia\Documents\Materi dan Tugas Kuliah\Semester 7\Sistem Terdistribusi\Tugas Sinkronisasi dan Replikasi\secondary> docker restart secondary-db
secondary-db
PS C:\Users\alpia\Documents\Materi dan Tugas Kuliah\Semester 7\Sistem Terdistribusi\Tugas Sinkronisasi dan Replikasi\secondary> docker exec -it secondary-db psql -U admin -d secondarydb -c "SELECT * FROM test_table;"
ERROR: relation "test_table" does not exist
LINE 1: SELECT * FROM test_table;
                        ^

What's next:
```