1. PostgreSQL

a. Installer le SGBD PostgreSQL sur la VM

```
root@vps-a44da87a:~# apt update
Hit:1 http://nova.clouds.archive.ubuntu.com/ubuntu focal InRelease
Get:2 http://nova.clouds.archive.ubuntu.com/ubuntu focal-updates InRelease [114 kB]
Get:3 http://nova.clouds.archive.ubuntu.com/ubuntu focal-backports InRelease [101 kB]
Get:4 http://security.ubuntu.com/ubuntu focal-security InRelease [114 kB]
Get:5 http://nova.clouds.archive.ubuntu.com/ubuntu focal-updates/main amd64 Packages [1346 kB]
Get:6 http://nova.clouds.archive.ubuntu.com/ubuntu focal-updates/main Translation-en [276 kB]
Get:7 http://nova.clouds.archive.ubuntu.com/ubuntu focal-updates/main amd64 c-n-f Metadata [14.6 kB]
Get:8 http://nova.clouds.archive.ubuntu.com/ubuntu focal-updates/universe amd64 Packages [876 kB]
Get:9 http://nova.clouds.archive.ubuntu.com/ubuntu focal-updates/universe Translation-en [190 kB]
Get:10 http://security.ubuntu.com/ubuntu focal-security/main amd64 Packages [1026 kB]
Get:11 http://security.ubuntu.com/ubuntu focal-security/main Translation-en [191 kB]
Get:12 http://security.ubuntu.com/ubuntu focal-security/main amd64 c-n-f Metadata [9048 B]
Get:13 http://security.ubuntu.com/ubuntu focal-security/universe amd64 Packages [663 kB]
Get:14 http://security.ubuntu.com/ubuntu focal-security/universe Translation-en [111 kB]
Fetched 5030 kB in 2s (2803 kB/s)
Reading package lists... Done
Building dependency tree
Reading state information... Done
1 package can be upgraded. Run 'apt list --upgradable' to see it.
root@vps-a44da87a:~#
```

```
root@vps-a44da87a:~# apt install postgresql postgresql-contrib
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  libllvm10 libpq5 postgresql-12 postgresql-client-12 postgresql-client-common postgresql-common ssl-cert sysstat
Suggested packages:
  postgresql-doc postgresql-doc-12 libjson-perl openssl-blacklist isag
The following NEW packages will be installed:
  libllvm10 libpq5 postgresql postgresql-12 postgresql-client-12 postgresql-client-common postgresql-common postgresql-contrib ssl-cert sysstat
0 upgraded, 10 newly installed, 0 to remove and 1 not upgraded.
Need to get 30.6 MB of archives.
After this operation, 122 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://nova.clouds.archive.ubuntu.com/ubuntu focal/main amd64 libllvm10 amd64 1:10.0.0-4ubuntu1 [15.3 MB]
Get:2 http://nova.clouds.archive.ubuntu.com/ubuntu focal-updates/main amd64 libpq5 amd64 12.9-0ubuntu0.20.04.1 [117 kB]
Get:3 http://nova.clouds.archive.ubuntu.com/ubuntu focal-updates/main amd64 postgresql-client-common all 214ubuntu0.1 [28.2 kB]
Get:4 http://nova.clouds.archive.ubuntu.com/ubuntu focal-updates/main amd64 postgresql-client-12 amd64 12.9-0ubuntu0.20.04.1 [1047 kB]
Get:5 http://nova.clouds.archive.ubuntu.com/ubuntu focal/main amd64 ssl-cert all 1.0.39 [17.0 kB]
Get:6 http://nova.clouds.archive.ubuntu.com/ubuntu focal-updates/main amd64 postgresql-common all 214ubuntu0.1 [169 kB]
Get:7 http://nova.clouds.archive.ubuntu.com/ubuntu focal-updates/main amd64 postgresql-12 amd64 12.9-0ubuntu0.20.04.1 [13.5 MB]
Get:8 http://nova.clouds.archive.ubuntu.com/ubuntu focal-updates/main amd64 postgresql all 12+214ubuntu0.1 [3924 B]
Get:9 http://nova.clouds.archive.ubuntu.com/ubuntu focal-updates/main amd64 postgresql-contrib all 12+214ubuntu0.1 [3932 B]
Get:10 http://nova.clouds.archive.ubuntu.com/ubuntu focal-updates/main amd64 sysstat amd64 12.2.0-2ubuntu0.1 [448 kB]
```

```
root@vps-a44da87a:~# ps -ef | grep postgres
postgres   49472       1  0 10:08 ?        00:00:00 /usr/lib/postgresql/12/bin/postgres -D /var/lib/postgresql/12/main -c config_file=/etc/postgresql/12/main/postgresql.conf
postgres   49474   49472  0 10:08 ?        00:00:00 postgres: 12/main: checkpointer
postgres   49475   49472  0 10:08 ?        00:00:00 postgres: 12/main: background writer
postgres   49476   49472  0 10:08 ?        00:00:00 postgres: 12/main: walwriter
postgres   49477   49472  0 10:08 ?        00:00:00 postgres: 12/main: autovacuum launcher
postgres   49478   49472  0 10:08 ?        00:00:00 postgres: 12/main: stats collector
postgres   49479   49472  0 10:08 ?        00:00:00 postgres: 12/main: logical replication launcher
root       50963   50953  0 10:13 pts/2    00:00:00 grep --color=auto postgres
root@vps-a44da87a:~# cd /etc/postgresql/12/main
root@vps-a44da87a:/etc/postgresql/12/main# ll
total 64
drwxr-xr-x 3 postgres postgres  4096 Nov 25 10:08 ./
drwxr-xr-x 3 postgres postgres  4096 Nov 25 10:08 ../
drwxr-xr-x 2 postgres postgres  4096 Nov 25 10:08 conf.d/
-rw-r--r-- 1 postgres postgres   315 Nov 25 10:08 environment
-rw-r--r-- 1 postgres postgres   143 Nov 25 10:08 pg_ctl.conf
-rw-r----- 1 postgres postgres  4933 Nov 25 10:08 pg_hba.conf
-rw-r----- 1 postgres postgres  1636 Nov 25 10:08 pg_ident.conf
-rw-r--r-- 1 postgres postgres 26898 Nov 25 10:08 postgresql.conf
-rw-r--r-- 1 postgres postgres   317 Nov 25 10:08 start.conf
root@vps-a44da87a:/etc/postgresql/12/main#
```

Sur le fichier : postgresql.conf

```
# - Connection Settings -

listen_addresses = '*'          # what IP address(es) to listen on;
                                        # comma-separated list of addresses;
                                        # defaults to 'localhost'; use '*' for all
                                        # (change requires restart)
port = 5432                             # (change requires restart)
max_connections = 100                   # (change requires restart)
#superuser_reserved_connections = 3     # (change requires restart)
unix_socket_directories = '/var/run/postgresql' # comma-separated list of directories
                                        # (change requires restart)
#unix_socket_group = ''                 # (change requires restart)
#unix_socket_permissions = 0777         # begin with 0 to use octal notation
                                        # (change requires restart)
#bonjour = off                          # advertise server via Bonjour
                                        # (change requires restart)
#bonjour_name = ''                      # defaults to the computer name
                                        # (change requires restart)

# - TCP settings -
# see "man 7 tcp" for details

#tcp_keepalives_idle = 0                # TCP_KEEPIDLE, in seconds;
                                        # 0 selects the system default
#tcp_keepalives_interval = 0            # TCP_KEEPINTVL, in seconds;
                                        # 0 selects the system default
#tcp_keepalives_count = 0               # TCP_KEEPCNT;
                                        # 0 selects the system default
#tcp_user_timeout = 0                   # TCP_USER_TIMEOUT, in milliseconds;
                                        # 0 selects the system default

# - Authentication -

#authentication_timeout = 1min          # 1s-600s
#password_encryption = md5              # md5 or scram-sha-256
#db_user_namespace = off
```

Sur le fichier : pg_hba.conf

```
# "host" records.  In that case you will also need to make PostgreSQL
# listen on a non-local interface via the listen_addresses
# configuration parameter, or via the -i or -h command line switches.




# DO NOT DISABLE!
# If you change this first entry you will need to make sure that the
# database superuser can access the database using some other method.
# Noninteractive access to all databases is required during automatic
# maintenance (custom daily cronjobs, replication, and similar tasks).
#
# Database administrative login by Unix domain socket
local   all             postgres                                peer

# TYPE  DATABASE        USER            ADDRESS                 METHOD

# "local" is for Unix domain socket connections only
local   all             all                                     peer
# IPv4 local connections:
host    all             all             0.0.0.0/0           trust
# IPv6 local connections:
host    all             all             ::1/128                 md5
# Allow replication connections from localhost, by a user with the
# replication privilege.
local   replication     all                                     peer
-- INSERT --
```

Demarrer postgres

```
root@vps-a44da87a:/etc/postgresql/12/main# systemctl start postgresql.service
root@vps-a44da87a:/etc/postgresql/12/main# systemctl status postgresql.service
● postgresql.service - PostgreSQL RDBMS
     Loaded: loaded (/lib/systemd/system/postgresql.service; enabled; vendor preset: enabled)
     Active: active (exited) since Thu 2021-11-25 10:08:41 UTC; 19min ago
   Main PID: 49156 (code=exited, status=0/SUCCESS)
      Tasks: 0 (limit: 2286)
     Memory: 0B
     CGroup: /system.slice/postgresql.service

Nov 25 10:08:41 vps-a44da87a systemd[1]: Starting PostgreSQL RDBMS...
Nov 25 10:08:41 vps-a44da87a systemd[1]: Finished PostgreSQL RDBMS.
root@vps-a44da87a:/etc/postgresql/12/main#
```

b. Se connecter en ligne de commande sur la base

```
root@vps-a44da87a:/etc/postgresql/12/main# psql -h 152.228.174.90 -p 5432 -U postgres -d postgres
psql (12.9 (Ubuntu 12.9-0ubuntu0.20.04.1))
SSL connection (protocol: TLSv1.3, cipher: TLS_AES_256_GCM_SHA384, bits: 256, compression: off)
Type "help" for help.

postgres=#
```

c. Se connecter avec pgadmin

```
postgres=# create user pgadmin with encrypted password 'admin' LOGIN CREATEDB Superuser;
CREATE ROLE
postgres=# \q
root@vps-a44da87a:/etc/postgresql/12/main# psql -h 152.228.174.90 -p 5432 -U pgadmin -d postgres
psql (12.9 (Ubuntu 12.9-0ubuntu0.20.04.1))
SSL connection (protocol: TLSv1.3, cipher: TLS_AES_256_GCM_SHA384, bits: 256, compression: off)
Type "help" for help.

postgres=# \du
                                   List of roles
 Role name |                         Attributes                         | Member of
-----------+------------------------------------------------------------+-----------
 pgadmin   | Superuser, Create DB                                       | {}
 postgres  | Superuser, Create role, Create DB, Replication, Bypass RLS | {}

postgres=#
```

d. Créer une base donnée en lui donnant le nom ICE et owner ETL et se connecter en ligne de commande sur cette base ICE

```
root@vps-a44da87a:/etc/postgresql/12/main# psql -h 152.228.174.90 -p 5432 -U postgres -d postgres
psql (12.9 (Ubuntu 12.9-0ubuntu0.20.04.1))
SSL connection (protocol: TLSv1.3, cipher: TLS_AES_256_GCM_SHA384, bits: 256, compression: off)
Type "help" for help.

postgres=# create user etl with encrypted password 'etl' LOGIN CREATEDB Superuser;
CREATE ROLE
postgres=# \du
                                   List of roles
 Role name |                         Attributes                         | Member of
-----------+------------------------------------------------------------+-----------
 etl       | Superuser, Create DB                                       | {}
 pgadmin   | Superuser, Create DB                                       | {}
 postgres  | Superuser, Create role, Create DB, Replication, Bypass RLS | {}

postgres=#
```

```
root@vps-a44da87a:/etc/postgresql/12/main# psql -h 152.228.174.90 -U etl -d postgres
psql (12.9 (Ubuntu 12.9-0ubuntu0.20.04.1))
SSL connection (protocol: TLSv1.3, cipher: TLS_AES_256_GCM_SHA384, bits: 256, compression: off)
Type "help" for help.

postgres=# create database ICE;
CREATE DATABASE
postgres=# \c ice
SSL connection (protocol: TLSv1.3, cipher: TLS_AES_256_GCM_SHA384, bits: 256, compression: off)
You are now connected to database "ice" as user "etl".
ice=#
```

```
ice=# \l
                                 List of databases
   Name    |  Owner   | Encoding | Collate |  Ctype  |   Access privileges
-----------+----------+----------+---------+---------+-----------------------
 ice       | etl      | UTF8     | C.UTF-8 | C.UTF-8 |
 postgres  | postgres | UTF8     | C.UTF-8 | C.UTF-8 |
 template0 | postgres | UTF8     | C.UTF-8 | C.UTF-8 | =c/postgres          +
           |          |          |         |         | postgres=CTc/postgres
 template1 | postgres | UTF8     | C.UTF-8 | C.UTF-8 | =c/postgres          +
           |          |          |         |         | postgres=CTc/postgres
(4 rows)

ice=#
ribing to the professional edition here: https://mobaxterm.mobatek.net
```

e. Créer un schéma EXP dans la base ICE , puis créer deux tables facture (id, prix), client (id, nom, prénom, ville) dans ce schéma

```
ice=# create schema EXP;
CREATE SCHEMA
ice=# \dn
  List of schemas
  Name  |  Owner
--------+----------
 exp    | etl
 public | postgres
(2 rows)

ice=#
```

```
ice=# create table exp.facture ( id int , facture varchar );
CREATE TABLE
ice=#
```

```
ice=# create table exp.client ( id int , nom varchar , prenom varchar, ville varchar ) ;
CREATE TABLE
ice=# \dt
```

f. Insérer 3 lignes dans chacune des tables

```
ice=# INSERT INTO exp.facture VALUES(0, 'facture1');
INSERT 0 1
ice=# INSERT INTO exp.facture VALUES(1, 'facture2');
INSERT 0 1
ice=# INSERT INTO exp.facture VALUES(2, 'facture3');
INSERT 0 1
ice=# select * from exp.facture;
 id | facture
----+----------
  0 | facture1
  1 | facture2
  2 | facture3
(3 rows)
```

```
ice=# INSERT INTO exp.client VALUES(0, 'nom1', 'prenom1', 'ville1');
INSERT 0 1
ice=# INSERT INTO exp.client VALUES(1, 'nom2', 'prenom2', 'ville2');
INSERT 0 1
ice=# INSERT INTO exp.client VALUES(2, 'nom3', 'prenom3', 'ville3');
INSERT 0 1
ice=# select * from exp.client;
 id | nom  | prenom  | ville
----+------+---------+--------
  0 | nom1 | prenom1 | ville1
  1 | nom2 | prenom2 | ville2
  2 | nom3 | prenom3 | ville3
(3 rows)

ice=#
```

g. Exporter la schéma EXP, puis le supprimer, ensuite l'importer à nouveau
L'export :

```
root@vps-a44da87a:~# su postgres
postgres@vps-a44da87a:/root$ cd
postgres@vps-a44da87a:~$ pg_dump -U postgres -F p -n exp -f export.sql ice
postgres@vps-a44da87a:~$
postgres@vps-a44da87a:~$
postgres@vps-a44da87a:~$
```

Suppression :

```
postgres@vps-a44da87a:~$ psql -h 152.228.174.90 -U etl -d postgres
psql (12.9 (Ubuntu 12.9-0ubuntu0.20.04.1))
SSL connection (protocol: TLSv1.3, cipher: TLS_AES_256_GCM_SHA384, bits: 256, compression: off)
Type "help" for help.

postgres=# \c ice
SSL connection (protocol: TLSv1.3, cipher: TLS_AES_256_GCM_SHA384, bits: 256, compression: off)
You are now connected to database "ice" as user "etl".
ice=# drop schema exp cascade;
NOTICE:  drop cascades to 2 other objects
DETAIL:  drop cascades to table exp.facture
drop cascades to table exp.client
DROP SCHEMA
ice=# \dn
  List of schemas
  Name  |  Owner
--------+----------
 public | postgres
(1 row)

ice=#
```

L'import :

```
postgres@vps-a44da87a:~$ psql -U postgres -d ice < export.sql
SET
SET
SET
SET
SET
 set_config
------------

(1 row)

SET
SET
SET
SET
CREATE SCHEMA
ALTER SCHEMA
SET
SET
CREATE TABLE
ALTER TABLE
CREATE TABLE
ALTER TABLE
COPY 3
COPY 3
```

```
postgres@vps-a44da87a:~$ psql -h 152.228.174.90 -U etl -d postgres
psql (12.9 (Ubuntu 12.9-0ubuntu0.20.04.1))
SSL connection (protocol: TLSv1.3, cipher: TLS_AES_256_GCM_SHA384, bits: 256, compression: off)
Type "help" for help.

postgres=# \dn
  List of schemas
  Name  |  Owner
--------+----------
 public | postgres
(1 row)

postgres=# \c ice
SSL connection (protocol: TLSv1.3, cipher: TLS_AES_256_GCM_SHA384, bits: 256, compression: off)
You are now connected to database "ice" as user "etl".
ice=# \dn
  List of schemas
  Name  |  Owner
--------+----------
 exp    | etl
 public | postgres
(2 rows)

ice=#
```

h. Exporter la base ICE , puis la supprimer, ensuite l'importer à nouveau

```
postgres@vps-a44da87a:~$ pg_dump -U postgres -Fc -f base.sql ice
postgres@vps-a44da87a:~$ ll
```

```
postgres=# drop database ice;
DROP DATABASE
postgres=#
```

```
postgres=# \l
                                  List of databases
   Name    |  Owner   | Encoding | Collate |  Ctype  |   Access privileges
-----------+----------+----------+---------+---------+-----------------------
 postgres  | postgres | UTF8     | C.UTF-8 | C.UTF-8 |
 template0 | postgres | UTF8     | C.UTF-8 | C.UTF-8 | =c/postgres          +
           |          |          |         |         | postgres=CTc/postgres
 template1 | postgres | UTF8     | C.UTF-8 | C.UTF-8 | =c/postgres          +
           |          |          |         |         | postgres=CTc/postgres
(3 rows)
```

```
postgres@vps-a44da87a:~$ psql -U postgres < bkp_ice.sql
SET
SET
SET
SET
SET
 set_config
------------

(1 row)

SET
SET
SET
SET
CREATE SCHEMA
ALTER SCHEMA
```

```
HINT:  COPY FROM instructs the PostgreSQL server process to read a file. You may want a client-side facility such as psql's
 \copy.
ALTER TABLE
ALTER TABLE
postgres@vps-010e86e8:~$ psql
psql (12.9 (Ubuntu 12.9-0ubuntu0.20.04.1))
Type "help" for help.

postgres=# \l
                                  List of databases
   Name    |  Owner   | Encoding | Collate |  Ctype  |   Access privileges
-----------+----------+----------+---------+---------+-----------------------
 ice       | etl      | UTF8     | C.UTF-8 | C.UTF-8 |
 postgres  | postgres | UTF8     | C.UTF-8 | C.UTF-8 |
 template0 | postgres | UTF8     | C.UTF-8 | C.UTF-8 | =c/postgres          +
           |          |          |         |         | postgres=CTc/postgres
 template1 | postgres | UTF8     | C.UTF-8 | C.UTF-8 | =c/postgres          +
           |          |          |         |         | postgres=CTc/postgres
(4 rows)
```