PostgreSQL Installation Methods

➢ Package Manager (Yum) Installation:

It is the simplest method of installation using the system's package manager. By default is installs the latest version or installs the any version that is by default available on your OS.

Steps:-

1. Update the system (command: sudo yum update or sudo dnf update)

```
[root@localhost ~]# sudo yum update -y
Last metadata expiration check: 2:07:32 ago on Friday 31 January 2025 11:29:53 AM.
Dependencies resolved.
================================================================================
 Package                          Architecture   Version              Repository
================================================================================
Installing:
 kernel                           x86_64         5.14.0-554.el9       baseos
Upgrading:
 NetworkManager                   x86_64         1:1.51.6-1.el9       baseos
 NetworkManager-adsl              x86_64         1:1.51.6-1.el9       baseos
 NetworkManager-bluetooth         x86_64         1:1.51.6-1.el9       baseos
 NetworkManager-config-server     noarch         1:1.51.6-1.el9       baseos
 NetworkManager-libnm             x86_64         1:1.51.6-1.el9       baseos
 NetworkManager-team              x86_64         1:1.51.6-1.el9       baseos
 NetworkManager-tui               x86_64         1:1.51.6-1.el9       baseos
 NetworkManager-wifi              x86_64         1:1.51.6-1.el9       baseos
 NetworkManager-wwan              x86_64         1:1.51.6-1.el9       baseos
```

2. Install PostgreSQL
(command:sudo yum install postgresql-server postgresql-contrib -y)

```
[root@localhost ~]# yum install postgresql-server
Last metadata expiration check: 0:01:52 ago on Thursday 30 January 2025 12:51:33 PM.
Dependencies resolved.
================================================================================
 Package                      Architecture     Version          Repository
================================================================================
Installing:
 postgresql-server            x86_64           13.18-1.el9      appstream
Installing dependencies:
 postgresql                   x86_64           13.18-1.el9      appstream
 postgresql-private-libs      x86_64           13.18-1.el9      appstream

Transaction Summary
================================================================================
Install  3 Packages

Total download size: 7.5 M
Installed size: 29 M
Is this ok [y/N]: y
Downloading Packages:
(1/3): postgresql-private-libs-13.18-1.el9.x86_64.rpm            72 kB/s | 137 kB
```

3. Initialize PostgreSQL Database
(command : sudo postgresql-setup --initdb)

```
[root@localhost ~]# postgresql-setup initdb
WARNING: using obsoleted argument syntax, try --help
WARNING: arguments transformed to: postgresql-setup --initdb --unit postgresql
 * Initializing database in '/var/lib/pgsql/data'
 * Initialized, logs are in /var/lib/pgsql/initdb_postgresql.log
```

4. Start PostgreSQL Service
(command: systemctl start postgresql)

5. Enable PostgreSQL to Start on Boot
(command: systemctl enable postgresql)

```
[root@localhost ~]# systemctl start postgresql.service
[root@localhost ~]# systemctl enable postgresql.service
Created symlink /etc/systemd/system/multi-user.target.wants/postgresql.service → /usr/lib/systemd/system/postgresql.service.
[root@localhost ~]# systemctl status postgresql.service
● postgresql.service - PostgreSQL database server
     Loaded: loaded (/usr/lib/systemd/system/postgresql.service; enabled; preset: disabled)
     Active: active (running) since Thu 2025-01-30 16:48:09 IST; 16s ago
   Main PID: 47025 (postmaster)
      Tasks: 8 (limit: 4296)
     Memory: 31.1M
        CPU: 113ms
     CGroup: /system.slice/postgresql.service
             ├─47025 /usr/bin/postmaster -D /var/lib/pgsql/data
             ├─47026 "postgres: logger "
             ├─47028 "postgres: checkpointer "
             ├─47029 "postgres: background writer "
             ├─47030 "postgres: walwriter "
             ├─47031 "postgres: autovacuum launcher "
             ├─47032 "postgres: stats collector "
             └─47033 "postgres: logical replication launcher "
```

6. **Switch to postgres user**
   (if user is not exist create a user as postgres)

7. **Take Access to PostgreSQL using psql**

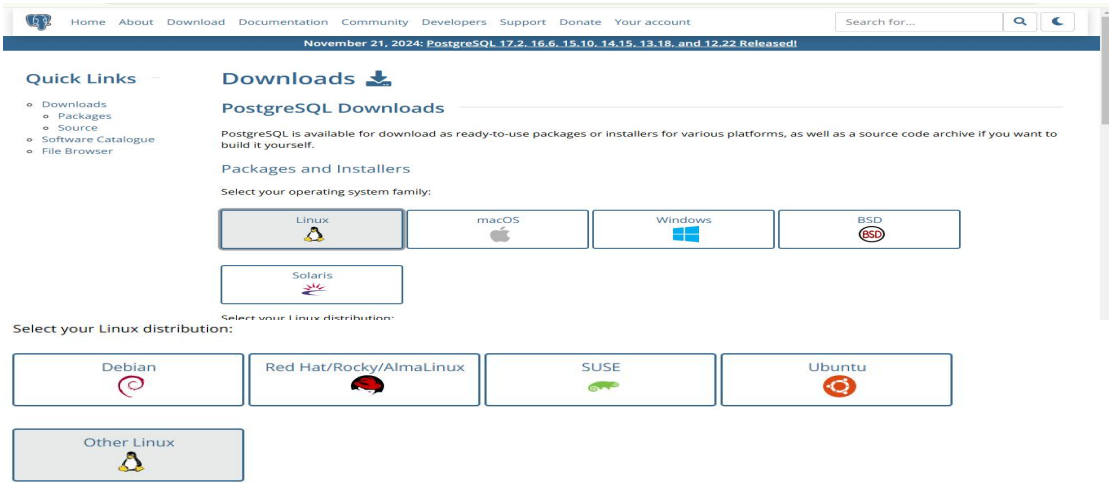
```
[root@localhost ~]# su - postgres
[postgres@localhost ~]$ psql
psql (13.18)
Type "help" for help.

postgres=#
```

➢ Repository (rpm) installation :

This method involves installing PostgreSQL from the PostgreSQL Global Development Group (PGDG) repository.

Steps:-

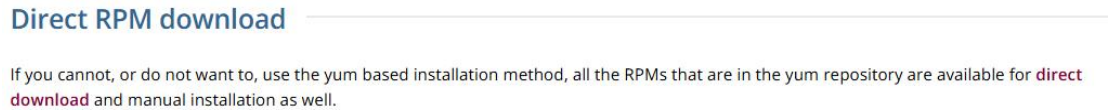
1. **Go to the official site of the postgresql.org .**
2. **Select your OS (operating system) & linux distribution.**



3. **select version**

4. **Select the repo package link and Download**

5. **To download the necessary packages Go to Direct Rpm download click on direct download link**



6. **Download the all the necessary packages listed below.**

i. Postgresql server package
ii. Postgresql libraries package
iii. Postgresql contrib packages
iv. Postgresql global development packages
v. Postgresql development(devel) packages

```
[root@localhost ~]# wget https://download.postgresql.org/pub/repos/yum/13/redhat/rhel-9-x86_64/postgresql13-server-13.18-1PGDG.rhel9.x86_64.rpm
--2025-02-04 08:55:05--  https://download.postgresql.org/pub/repos/yum/13/redhat/rhel-9-x86_64/postgresql13-server-13.18-1PGDG.rhel9.x86_64.rpm
Resolving download.postgresql.org (download.postgresql.org)... 217.196.149.55, 147.75.85.69, 87.238.57.227, ...
Connecting to download.postgresql.org (download.postgresql.org)|217.196.149.55|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 5912600 (5.6M) [application/x-redhat-package-manager]
Saving to: 'postgresql13-server-13.18-1PGDG.rhel9.x86_64.rpm'

postgresql13-server-13.18-1PGDG.rhel9.x86 100%[=============================================================================================>]   5.64M  2.3
```

```
[root@localhost ~]# wget https://download.postgresql.org/pub/repos/yum/13/redhat/rhel-9-x86_64/postgresql13-libs-13.18-1PGDG.rhel9.x86_64.rpm
--2025-02-04 08:54:40--  https://download.postgresql.org/pub/repos/yum/13/redhat/rhel-9-x86_64/postgresql13-libs-13.18-1PGDG.rhel9.x86_64.rpm
Resolving download.postgresql.org (download.postgresql.org)... 147.75.85.69, 87.238.57.227, 72.32.157.246, ...
Connecting to download.postgresql.org (download.postgresql.org)|147.75.85.69|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 787725 (769K) [application/x-redhat-package-manager]
Saving to: 'postgresql13-libs-13.18-1PGDG.rhel9.x86_64.rpm'

postgresql13-libs-13.18-1PGDG.rhel9.x86_6 100%[=============================================================================================>] 769.26K  1.02MB/s
```

```
[root@localhost ~]# wget https://download.postgresql.org/pub/repos/yum/13/redhat/rhel-9-x86_64/postgresql13-13.18-1PGDG.rhel9.x86_64.rpm
--2025-02-04 09:09:38--  https://download.postgresql.org/pub/repos/yum/13/redhat/rhel-9-x86_64/postgresql13-13.18-1PGDG.rhel9.x86_64.rpm
Resolving download.postgresql.org (download.postgresql.org)... 72.32.157.246, 147.75.85.69, 87.238.57.227, ...
Connecting to download.postgresql.org (download.postgresql.org)|72.32.157.246|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 1437036 (1.4M) [application/x-redhat-package-manager]
Saving to: 'postgresql13-13.18-1PGDG.rhel9.x86_64.rpm'

postgresql13-13.18-1PGDG.rhel9.x86_64.rpm 100%[=============================================================================================>]
```

```
[root@localhost ~]# wget https://download.postgresql.org/pub/repos/yum/13/redhat/rhel-9-x86_64/postgresql13-devel-13.18-1PGDG.rhel9.x86_64.rpm
--2025-02-04 08:54:20--  https://download.postgresql.org/pub/repos/yum/13/redhat/rhel-9-x86_64/postgresql13-devel-13.18-1PGDG.rhel9.x86_64.rpm
Resolving download.postgresql.org (download.postgresql.org)... 217.196.149.55, 72.32.157.246, 87.238.57.227, ...
Connecting to download.postgresql.org (download.postgresql.org)|217.196.149.55|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 5101171 (4.9M) [application/x-redhat-package-manager]
Saving to: 'postgresql13-devel-13.18-1PGDG.rhel9.x86_64.rpm'

postgresql13-devel-13.18-1PGDG.rhel9.x86_ 100%[=============================================================================================>]   4.86M  3

2025-02-04 08:54:23 (3.82 MB/s) - 'postgresql13-devel-13.18-1PGDG.rhel9.x86_64.rpm' saved [5101171/5101171]
```

7. Install all the downloaded packages using rpm command (command: rpm -ivh packages) Install it sequence wise!

i. Repo package

```
[root@localhost ~]# rpm -ivh pgdg-redhat-repo-latest.noarch.rpm
warning: pgdg-redhat-repo-latest.noarch.rpm: Header V4 RSA/SHA256 Signature, key ID 08b40d20: NOKEY
Verifying...                          ################################# [100%]
Preparing...                          ################################# [100%]
Updating / installing...
   1:pgdg-redhat-repo-42.0-46PGDG     ################################# [100%]
```

ii. Libs package

```
[root@localhost ~]# rpm -ivh postgresql13-libs-13.18-1PGDG.rhel9.x86_64.rpm
warning: postgresql13-libs-13.18-1PGDG.rhel9.x86_64.rpm: Header V4 RSA/SHA256 Signature, key ID 08b40d20: NOKEY
Verifying...                          ################################# [100%]
Preparing...                          ################################# [100%]
Updating / installing...
   1:postgresql13-libs-13.18-1PGDG.rhe################################# [100%]
```

iii. PGDG package

```
[root@localhost ~]# rpm -ivh postgresql13-13.18-1PGDG.rhel9.x86_64.rpm
warning: postgresql13-13.18-1PGDG.rhel9.x86_64.rpm: Header V4 RSA/SHA256 Signature, key ID 08b40d20: NOKEY
Verifying...                          ################################# [100%]
Preparing...                          ################################# [100%]
Updating / installing...
   1:postgresql13-13.18-1PGDG.rhel9   ################################# [100%]
```

iv. Server package

```
[root@localhost ~]# rpm -ivh postgresql13-server-13.18-1PGDG.rhel9.x86_64.rpm
warning: postgresql13-server-13.18-1PGDG.rhel9.x86_64.rpm: Header V4 RSA/SHA256 Signature, key ID 08b40d20: NOKEY
Verifying...                          ################################# [100%]
Preparing...                          ################################# [100%]
Updating / installing...
   1:postgresql13-server-13.18-1PGDG.r################################# [100%]
```

v. Devel package

```
[root@localhost ~]# rpm -ivh postgresql13-devel-13.18-1PGDG.rhel9.x86_64.rpm
warning: postgresql13-devel-13.18-1PGDG.rhel9.x86_64.rpm: Header V4 RSA/SHA256 Signature, key ID 08b40d20: NOKEY
Verifying...                          ################################# [100%]
Preparing...                          ################################# [100%]
Updating / installing...
   1:postgresql13-devel-13.18-1PGDG.rh################################# [100%]
```

8. **Initialize the Database Cluster:**
   (command: /usr/pgsql-13/bin/postgresql-<version>-setup initdb)

```
[root@localhost ~]# sudo /usr/pgsql-13/bin/postgresql-13-setup initdb
Initializing database ... OK

[root@localhost ~]#
```

9. **Enable PostgreSQL to Start on Boot**
10. **Start PostgreSQL Service.**

```
[root@localhost ~]# systemctl enable postgresql-13.service
Created symlink /etc/systemd/system/multi-user.target.wants/postgresql-13.service → /usr/lib/systemd/system/postgresql-13.service.
[root@localhost ~]# systemctl start postgresql-13.service
[root@localhost ~]# systemctl status postgresql-13.service
● postgresql-13.service - PostgreSQL 13 database server
     Loaded: loaded (/usr/lib/systemd/system/postgresql-13.service; enabled; preset: disabled)
     Active: active (running) since Tue 2025-02-04 10:11:28 IST; 7s ago
       Docs: https://www.postgresql.org/docs/13/static/
    Process: 50951 ExecStartPre=/usr/pgsql-13/bin/postgresql-13-check-db-dir ${PGDATA} (code=exited, status=0/SUCCESS)
   Main PID: 50956 (postmaster)
      Tasks: 8 (limit: 4296)
     Memory: 16.8M
        CPU: 60ms
     CGroup: /system.slice/postgresql-13.service
             ├─50956 /usr/pgsql-13/bin/postmaster -D /var/lib/pgsql/13/data/
             ├─50957 "postgres: logger "
             ├─50959 "postgres: checkpointer "
             ├─50960 "postgres: background writer "
             ├─50961 "postgres: walwriter "
             ├─50962 "postgres: autovacuum launcher "
             ├─50963 "postgres: stats collector "
             ├─50964 "postgres: logical replication launcher "
```

8. **Switch to postgres user**
   (if user is not exist create a user as postgres)

9. **Take Access to PostgreSQL using psql**

```
[root@localhost ~]# su - postgres
[postgres@localhost ~]$ psql
psql (13.18)
Type "help" for help.

postgres=#
```

➢ Source code installation:

source code installation provides greater flexibility and control, especially if you need to enable specific configurations or customizations.

Steps:

1. Install the required development tools and libraries:
Install gcc, readline, zlib.

```
[root@localhost postgresql-15.3]# yum install readline*
Last metadata expiration check: 1:57:19 ago on Thursday 30 January 2025 04:30:51 PM.
Package readline-8.1-4.el9.x86_64 is already installed.
Dependencies resolved.
==========================================================================================
 Package                  Architecture        Version                     Repository
==========================================================================================
Installing:
 readline-devel           x86_64              8.1-4.el9                   appstream
Installing dependencies:
 ncurses-c++-libs         x86_64              6.2-10.20210508.el9         appstream
 ncurses-devel            x86_64              6.2-10.20210508.el9         appstream

Transaction Summary
==========================================================================================
Install  3 Packages
```

```
[root@localhost postgresql-15.3]# yum install gcc
Last metadata expiration check: 1:59:36 ago on Thursday 30 January 2025 04:30:51 PM.
Dependencies resolved.
==========================================================================================
 Package                  Architecture        Version                Repository        Siz
==========================================================================================
Installing:
 gcc                      x86_64              11.5.0-2.el9           appstream          32
Upgrading:
 glibc                    x86_64              2.34-153.el9           baseos            2.0
 glibc-all-langpacks      x86_64              2.34-153.el9           baseos             18
 glibc-common             x86_64              2.34-153.el9           baseos            304
 glibc-gconv-extra        x86_64              2.34-153.el9           baseos            1.7
 glibc-langpack-en        x86_64              2.34-153.el9           baseos            655
Installing dependencies:
 glibc-devel              x86_64              2.34-153.el9           appstream          32
 glibc-headers            x86_64              2.34-153.el9           appstream         538
 kernel-headers           x86_64              5.14.0-554.el9         appstream         3.1
 libxcrypt-devel          x86_64              4.4.18-3.el9           appstream          29
 make                     x86_64              1:4.3-8.el9            baseos            536
```

2. Download Source Code
(command: wget <source code link>)

```
[root@localhost ~]# wget https://ftp.postgresql.org/pub/source/v15.3/postgresql-15.3.tar.bz2
--2025-01-30 18:18:40--  https://ftp.postgresql.org/pub/source/v15.3/postgresql-15.3.tar.bz2
Resolving ftp.postgresql.org (ftp.postgresql.org)... 217.196.149.55, 72.32.157.246, 87.238.57.227, ...
Connecting to ftp.postgresql.org (ftp.postgresql.org)|217.196.149.55|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 22819107 (22M) [application/octet-stream]
Saving to: 'postgresql-15.3.tar.bz2'

postgresql-15.3.tar.bz2          8%[=====>                          ]  1.94M  242KB/s   et
```

3. Extract the Tar file
(command: tar -xvf postgresql-<version>.tar.gz)

```
[root@localhost ~]# tar -xvf postgresql-15.3
postgresql-15.3/doc/src/sgml/ref/drop_type.sgml
postgresql-15.3/doc/src/sgml/ref/drop_group.sgml
postgresql-15.3/doc/src/sgml/ref/rollback_to.sgml
postgresql-15.3/doc/src/sgml/ref/alter_aggregate.sgml
postgresql-15.3/doc/src/sgml/ref/pg_isready.sgml
postgresql-15.3/doc/src/sgml/ref/drop_statistics.sgml
postgresql-15.3/doc/src/sgml/ref/create_policy.sgml
postgresql-15.3/doc/src/sgml/ref/alter_view.sgml
postgresql-15.3/doc/src/sgml/ref/savepoint.sgml
postgresql-15.3/doc/src/sgml/ref/begin.sgml
postgresql-15.3/doc/src/sgml/ref/pg_config-ref.sgml
postgresql-15.3/doc/src/sgml/ref/select.sgml
```

4. After extracting you will a new directory of your postgresql version is created
Go to that directory.

```
[root@localhost ~]# ls
anaconda-ks.cfg  postgresql-15.3  postgresql-15.3.tar.bz2
[root@localhost ~]#
```

5. Execute the configure file . (command: ./configure)

If you didn't installed the required libraries before the postgresql installation , It will show you an error message for that library . install it and again execute the configure file.

If you don't need the libraries you can skip using a flag --without-name of that library.

```
[root@localhost postgresql-15.3]# ls
aclocal.m4  config  configure  configure.ac  contrib  COPYRIGHT  doc  GNUmakefile.in  HISTORY  INSTALL  Makefile  README  src
[root@localhost postgresql-15.3]# ./configure
checking build system type... x86_64-pc-linux-gnu
checking host system type... x86_64-pc-linux-gnu
checking which template to use... linux
checking whether NLS is wanted... no
checking for default port number... 5432
checking for block size... 8kB
checking for segment size... 1GB
checking for WAL block size... 8kB
checking for gcc... gcc
checking whether the C compiler works... yes
checking for C compiler default output file name... a.out
checking for suffix of executables...
checking whether we are cross compiling... no
checking for suffix of object files... o
checking whether we are using the GNU C compiler... yes
```

6. Compile PostgreSQL (command: make)

If you try to execute this step executing the configure file it will show an error.

```
[root@localhost postgresql-15.3]# make
make -C ./src/backend generated-headers
make[1]: Entering directory '/root/postgresql-15.3/src/backend'
make -C catalog distprep generated-header-symlinks
make[2]: Entering directory '/root/postgresql-15.3/src/backend/catalog'
make[2]: Nothing to be done for 'distprep'.
prereqdir=`cd './' >/dev/null && pwd` && \
cd '../../../src/include/catalog/' && for file in pg_proc_d.h pg_type_d.h pg_attribute_d.h pg_class_d.h pg_attrdef_d.h pg_constraint_d.h pg_inh
_operator_d.h pg_opfamily_d.h pg_opclass_d.h pg_am_d.h pg_amop_d.h pg_amproc_d.h pg_language_d.h pg_largeobject_metadata_d.h pg_largeobject_d.h
istic_d.h pg_statistic_ext_d.h pg_statistic_ext_data_d.h pg_rewrite_d.h pg_trigger_d.h pg_event_trigger_d.h pg_description_d.h pg_cast_d.h pg_e
pg_conversion_d.h pg_depend_d.h pg_database_d.h pg_db_role_setting_d.h pg_tablespace_d.h pg_authid_d.h pg_auth_members_d.h pg_shdepend_d.h pg_s
nfig_d.h pg_ts_config_map_d.h pg_ts_dict_d.h pg_ts_parser_d.h pg_ts_template_d.h pg_extension_d.h pg_foreign_data_wrapper_d.h pg_foreign_server
pg_foreign_table_d.h pg_policy_d.h pg_replication_origin_d.h pg_default_acl_d.h pg_init_privs_d.h pg_seclabel_d.h pg_shseclabel_d.h pg_collatio
h pg_partitioned_table_d.h pg_range_d.h pg_transform_d.h pg_sequence_d.h pg_publication_d.h pg_publication_namespace_d.h pg_publication_rel_d.h
```

7. Install PostgreSQL (command: make install)

```
[root@localhost postgresql-15.3]# make install
make -C ./src/backend generated-headers
make[1]: Entering directory '/root/postgresql-15.3/src/backend'
make -C catalog distprep generated-header-symlinks
make[2]: Entering directory '/root/postgresql-15.3/src/backend/catalog'
make[2]: Nothing to be done for 'distprep'.
make[2]: Nothing to be done for 'generated-header-symlinks'.
make[2]: Leaving directory '/root/postgresql-15.3/src/backend/catalog'
make -C utils distprep generated-header-symlinks
make[2]: Entering directory '/root/postgresql-15.3/src/backend/utils'
```

8. Initialize PostgreSQL Database

```
[postgres@localhost ~]$ /usr/local/pgsql/bin/initdb -D /usr/local/pgsql/data
The files belonging to this database system will be owned by user "postgres".
This user must also own the server process.

The database cluster will be initialized with locale "en_IN.UTF-8".
The default database encoding has accordingly been set to "UTF8".
The default text search configuration will be set to "english".

Data page checksums are disabled.

fixing permissions on existing directory /usr/local/pgsql/data ... ok
creating subdirectories ... ok
selecting dynamic shared memory implementation ... posix
selecting default max_connections ... 100
selecting default shared_buffers ... 128MB
selecting default time zone ... Asia/Kolkata
creating configuration files ... ok
running bootstrap script ... ok
performing post-bootstrap initialization ... ok
syncing data to disk ... ok

initdb: warning: enabling "trust" authentication for local connections
initdb: hint: You can change this by editing pg_hba.conf or using the option -A, or --auth-local and --auth-host

Success. You can now start the database server using:
```

9. Start the postgrsql service

```
[postgres@localhost ~]$  /usr/local/pgsql/bin/pg_ctl -D /usr/local/pgsql/data -l logfile start
waiting for server to start.... done
server started
[postgres@localhost ~]$
```

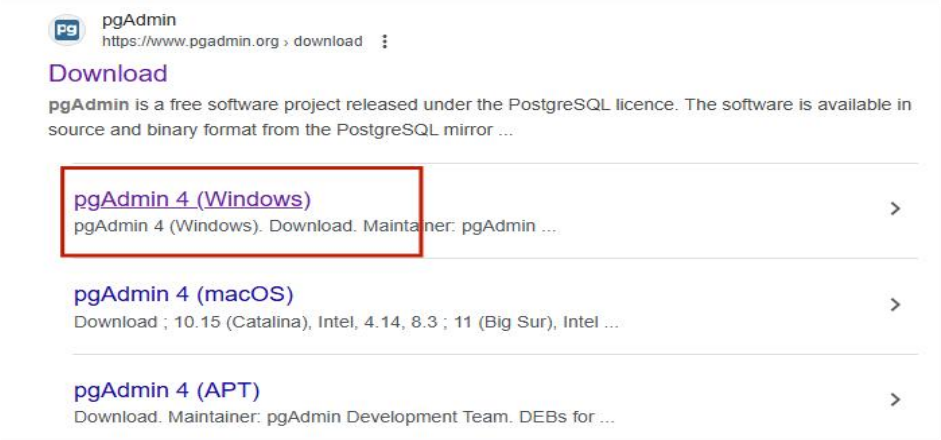
10. Take Access to PostgreSQL using psql

```
[postgres@localhost ~]$ /usr/local/pgsql/bin/psql
psql (15.3)
Type "help" for help.

postgres=#
```

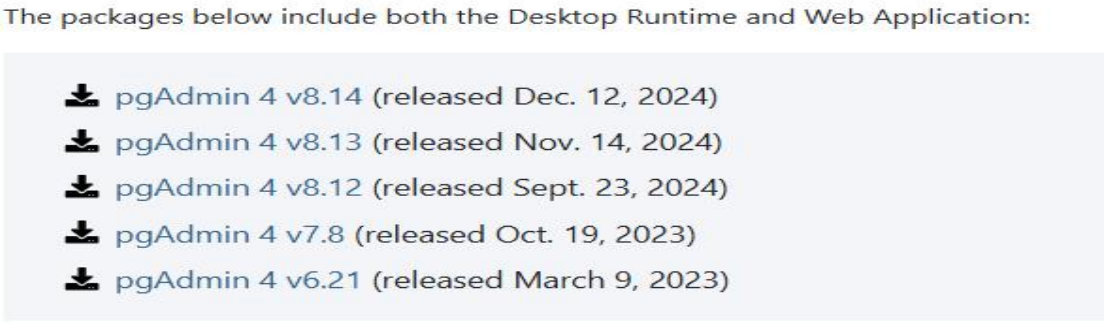
➢ GUI Based Installation :

Steps:

1. **Install the postgresql server on OS using any method**
2. **Download the pgAdmin Tool from the browser**

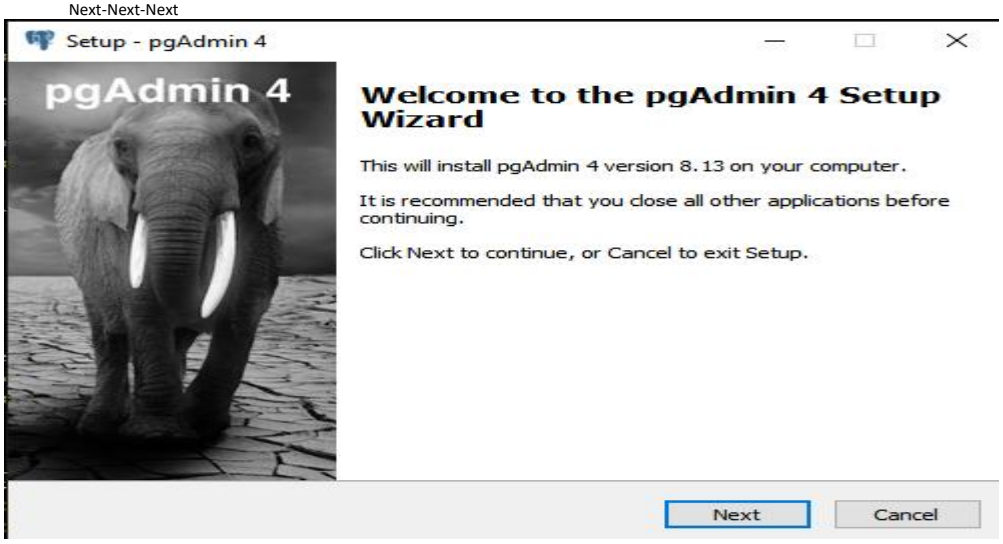


3. **Select version**



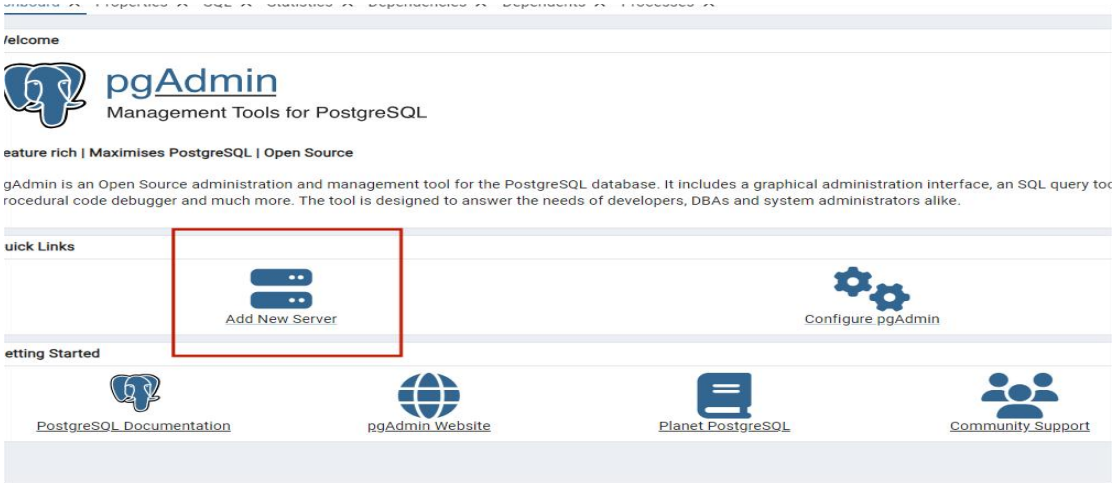
4. **Install pgAdmin (GUI Tool):**

Next-Next-Next

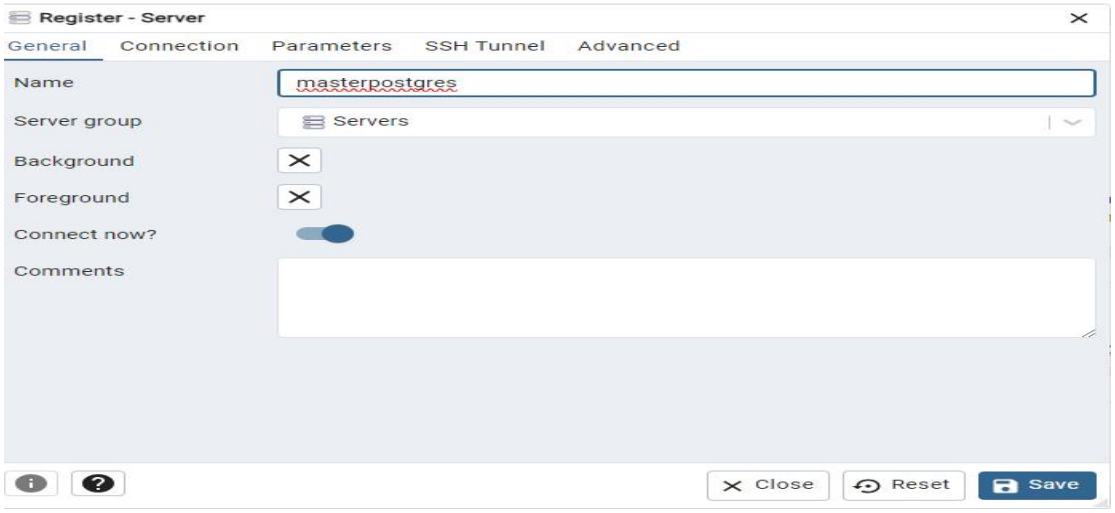


5. Connect the Database

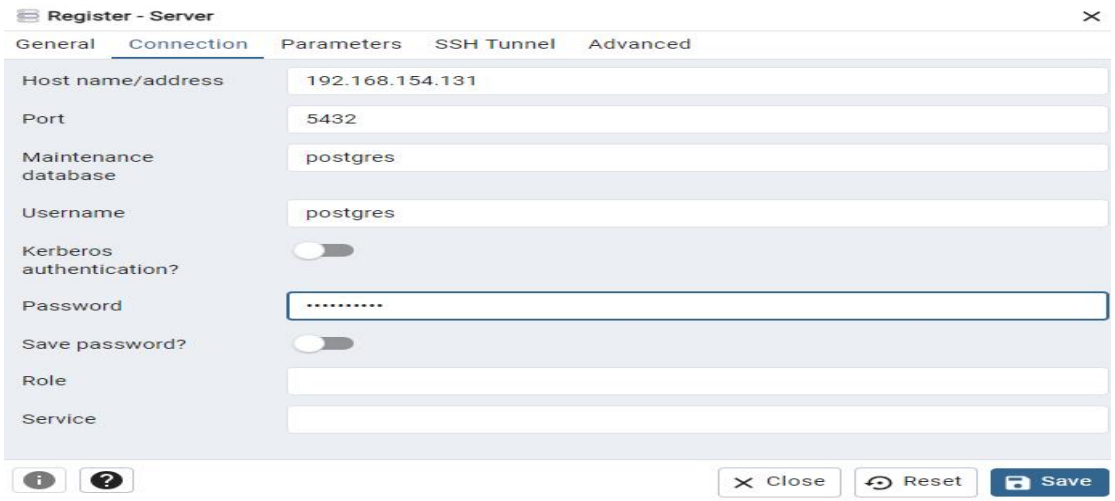
i. Click on Add new server



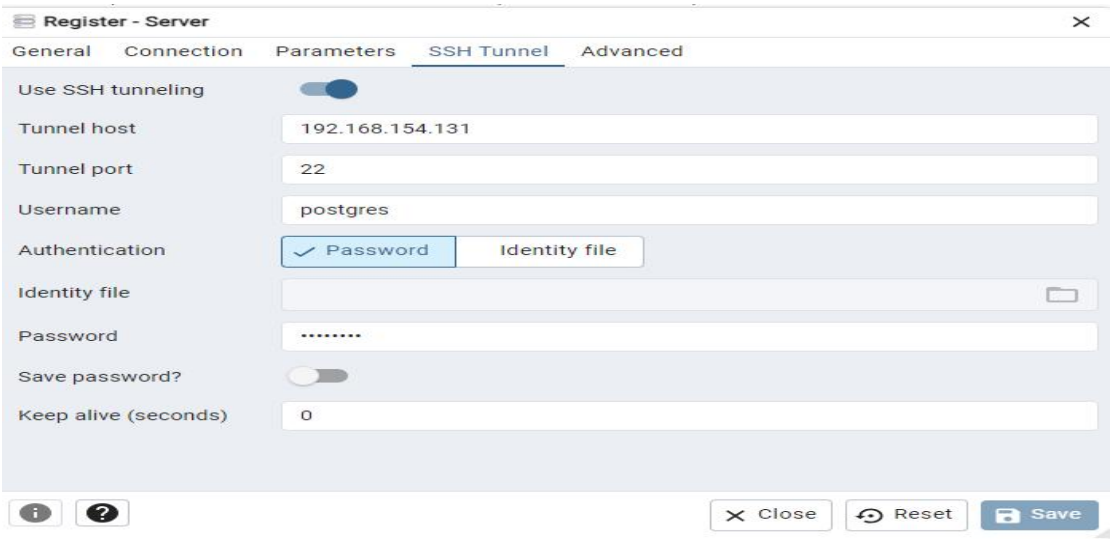
ii. Give any name to the server



iii. Next, go on the connection tab & fill the details (hostname/ip address , port no, username,password**)**



iv. Go to ssh tunnel fill details (Host IP , username, password**)**



v. Save & and get connected to the database