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Day 1 - installation , and Basic settings

PostgreSQL installation , and Basic settings

Installing the repository

I will be installing the postgresql 16 on ubuntu 24 , to obtain the repository details first we will do the best parties

I will create 2 directory one for data directory for PostgreSQL and one for backup

The diretcorys will be mounted on separate mount point other than postgresql

first lets start by installing postgresql 16
you can get the steps from the followqing link base on ethe os you are using the follwoing link PostgreSQL: Downloads

for ubuntu the steps are the following

```
sudo apt install curl ca-certificates
sudo install -d /usr/share/postgresql-common/pgdg
sudo curl -o /usr/share/postgresql-common/pgdg/apt.postgresql.org.asc --fail
https://www.postgresql.org/media/keys/ACCC4CF8.asc
. /etc/os-release
sudo sh -c "echo 'deb [signed-by=/usr/share/postgresql-common/pgdg/apt.postgresql.org.asc]
https://apt.postgresql.org/pub/repos/apt $VERSION_CODENAME-pgdg main' > /etc/apt/sources.list.d/pgdg.list"
sudo apt update
sudo apt -y install postgresql-16
```

```
ahmed@postgresql-16-test:~$ sudo apt install curl ca-certificates
[sudo] password for ahmed:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
curl is already the newest version (8.5.0-2ubuntu10.6).
curl set to manually installed.
ca-certificates is already the newest version (20240203).
ca-certificates set to manually installed.
0 upgraded, 0 newly installed, 0 to remove and 167 not upgraded.
ahmed@postgresql-16-test:~$ sudo install -d /usr/share/postgresql-common/pgdg
ahmed@postgresql-16-test:~$ sudo curl -o /usr/share/postgresql-common/pgdg/apt.p
ostgresql.org.asc --fail https://www.postgresql.org/media/keys/ACCC4CF8.asc
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100  4812  100  4812    0     0   1795      0  0:00:02  0:00:02 --:--:--  1794
ahmed@postgresql-16-test:~$ sudo sh -c "echo 'deb [signed-by=/usr/share/postgres
ql-common/pgdg/apt.postgresql.org.asc] https://apt.postgresql.org/pub/repos/apt
$VERSION_CODENAME-pgdg main' > /etc/apt/sources.list.d/pgdg.list"
ahmed@postgresql-16-test:~$ sudo apt update
Hit:1 http://security.ubuntu.com/ubuntu noble-security InRelease
Hit:2 http://archive.ubuntu.com/ubuntu noble InRelease
Hit:3 http://archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:4 http://archive.ubuntu.com/ubuntu noble-backports InRelease
Ign:5 https://apt.postgresql.org/pub/repos/apt -pgdg InRelease
Err:6 https://apt.postgresql.org/pub/repos/apt -pgdg Release
  404  Not Found [IP: 199.232.83.52 443]
Reading package lists... Done
E: The repository 'https://apt.postgresql.org/pub/repos/apt -pgdg Release' does not have a Release file.
N: Updating from such a repository can't be done securely, and is therefore disabled by default.
N: See apt-secure(8) manpage for repository creation and user configuration details.
```

```
ahmed@postgresql-16-test:/$ sudo apt install postgresql-16
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  libcommon-sense-perl libjson-perl libjson-xs-perl libllvm17t64 libpq5 libtypes-serialiser-perl postgresql-client-16 postgresql-client-common postgresql-common ssl-cert
Suggested packages:
  postgresql-doc-16
The following NEW packages will be installed:
  libcommon-sense-perl libjson-perl libjson-xs-perl libllvm17t64 libpq5 libtypes-serialiser-perl postgresql-16 postgresql-client-16 postgresql-client-common postgresql-common ssl-cert
0 upgraded, 11 newly installed, 0 to remove and 167 not upgraded.
Need to get 43.6 MB of archives.
After this operation, 175 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://archive.ubuntu.com/ubuntu noble/main amd64 libjson-perl all 4.10000-1 [81.9 kB]
Get:2 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 postgresql-client-common all 257build1.1 [36.4 kB]
Get:3 http://archive.ubuntu.com/ubuntu noble/main amd64 ssl-cert all 1.1.2ubuntu1 [17.8 kB]
Get:4 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 postgresql-common all 257build1.1 [161 kB]
Get:5 http://archive.ubuntu.com/ubuntu noble/main amd64 libcommon-sense-perl amd64 3.75-3build3 [20.4 kB]
Get:6 http://archive.ubuntu.com/ubuntu noble/main amd64 libtypes-serialiser-perl all 1.01-1 [11.6 kB]
Get:7 http://archive.ubuntu.com/ubuntu noble/main amd64 libjson-xs-perl amd64 4.030-2build3 [83.6 kB]
Get:8 http://archive.ubuntu.com/ubuntu noble/main amd64 libllvm17t64 amd64 1:17.0.6-9ubuntu1 [26.2 MB]
Get:9 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 libpq5 amd64 16.9-0ubuntu0.24.04.1 [143 kB]
Get:10 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 postgresql-client-16 amd64 16.9-0ubuntu0.24.04.1 [1,294 kB]
Get:11 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 postgresql-16 amd64 16.9-0ubuntu0.24.04.1 [15.5 MB]
Fetched 43.6 MB in 6s (7,070 kB/s)
Preconfiguring packages ...
Selecting previously unselected package libjson-perl.
(Reading database ... 83957 files and directories currently installed.)
Preparing to unpack .../00-libjson-perl_4.10000-1_all.deb ...
Unpacking libjson-perl (4.10000-1) ...
Selecting previously unselected package postgresql-client-common.
Preparing to unpack .../01-postgresql-client-common_257build1.1_all.deb ...
Unpacking postgresql-client-common (257build1.1) ...
Selecting previously unselected package ssl-cert.
Preparing to unpack .../02-ssl-cert_1.1.2ubuntu1_all.deb ...
Unpacking ssl-cert (1.1.2ubuntu1) ...
Selecting previously unselected package postgresql-common.
Preparing to unpack .../03-postgresql-common_257build1.1_all.deb ...
Adding 'diversion of /usr/bin/pg_config to /usr/bin/pg_config.libpq-dev by postgresql-common'
Unpacking postgresql-common (257build1.1) ...
Selecting previously unselected package libcommon-sense-perl:amd64.
Preparing to unpack .../04-libcommon-sense-perl_3.75-3build3_amd64.deb ...
Unpacking libcommon-sense-perl:amd64 (3.75-3build3) ...
Selecting previously unselected package libtypes-serialiser-perl.
```

now we will create the directory's for PostgreSQL data and PostgreSQL backup

first change directory to root directory and create two directory

```
cd /
sudo mkdir data
sudo mkdir backup
```

now change the permission and owner of the two directory's to user `postgres`

```
chown -R postgres:postgres data/ backup/
chmod 600 data/ backup/
```

```
ahmed@postgresql-16-test:/$ chown -R postgres:postgres data/ backup/
chown: changing ownership of 'data/': Operation not permitted
chown: changing ownership of 'backup/': Operation not permitted
ahmed@postgresql-16-test:/$ sudo chown -R postgres:postgres data/ backup/
ahmed@postgresql-16-test:/$ chmod 600 data/ backup/
chmod: changing permissions of 'data/': Operation not permitted
chmod: changing permissions of 'backup/': Operation not permitted
ahmed@postgresql-16-test:/$ sudo chmod 600 data/ backup/
```

now we will mount two directory with separate disks
to do that I have 2 disk on vm I will format them
to show disk on vm use command `lsblk -f`

```
ahmed@postgresql-16-test:~$ lsblk -f
NAME                      FSTYPE      FSVER    LABEL UUID                                   FSAVAIL FSUSE% MOUNTPOINTS
sda
├─sda1
├─sda2                    ext4        1.0            660b5322-1590-4b3a-825b-a0f4f322e941      1.7G     5% /boot
└─sda3                    LVM2_member LVM2 001       fxbhAO-xvv9-p9Cb-35JG-rJV2-3E4X-0pa8Z2
  └─ubuntu--vg-ubuntu--lv ext4        1.0            7547df43-a056-44e1-97c2-8f60aed88caa      8.4G    37% /
sdb
sdc
sr0
```

sdb and sdc don't have uuid so the need to format them

```
mkfs.xfs /dev/sdb
mkfs.xfs /dev/sdc
```

```
ahmed@postgresql-16-test:/$ sudo mkfs.xfs /dev/sdb
meta-data=/dev/sdb               isize=512    agcount=4, agsize=2097152 blks
         =                       sectsz=512   attr=2, projid32bit=1
         =                       crc=1        finobt=1, sparse=1, rmapbt=1
         =                       reflink=1    bigtime=1 inobtcount=1 nrext64=0
data     =                       bsize=4096   blocks=8388608, imaxpct=25
         =                       sunit=0      swidth=0 blks
naming   =version 2              bsize=4096   ascii-ci=0, ftype=1
log      =internal log           bsize=4096   blocks=16384, version=2
         =                       sectsz=512   sunit=0 blks, lazy-count=1
realtime =none                   extsz=4096   blocks=0, rtextents=0
Discarding blocks...Done.
ahmed@postgresql-16-test:/$ sudo mkfs.xfs /dev/sdc
meta-data=/dev/sdc               isize=512    agcount=4, agsize=2097152 blks
         =                       sectsz=512   attr=2, projid32bit=1
         =                       crc=1        finobt=1, sparse=1, rmapbt=1
         =                       reflink=1    bigtime=1 inobtcount=1 nrext64=0
data     =                       bsize=4096   blocks=8388608, imaxpct=25
         =                       sunit=0      swidth=0 blks
naming   =version 2              bsize=4096   ascii-ci=0, ftype=1
log      =internal log           bsize=4096   blocks=16384, version=2
         =                       sectsz=512   sunit=0 blks, lazy-count=1
realtime =none                   extsz=4096   blocks=0, rtextents=0
Discarding blocks...Done.
```

now we can mount the two disk on data and backup directory

```
sudo mount /dev/sdb data/
 sudo mount /dev/sdc backup/
df -h
```

```
ahmed@postgresql-16-test:/$ lsblk -f
NAME                      FSTYPE      FSVER    LABEL UUID                                   FSAVAIL FSUSE% MOUNTPOINTS
sda
├─sda1
├─sda2                    ext4        1.0            660b5322-1590-4b3a-825b-a0f4f322e941      1.7G     5% /boot
└─sda3                    LVM2_member LVM2 001       fxbhAO-xvv9-p9Cb-35JG-rJV2-3E4X-Opa8Z2
  └─ubuntu--vg-ubuntu--lv ext4        1.0            7547df43-a056-44e1-97c2-8f60aed88caa      8.3G    38% /
sdb                       xfs                        530c831b-069e-48c9-875c-3f81203cd1e0     31.3G     2% /data
sdc                       xfs                        7b18d93c-73f1-4f5e-839b-80702531f532     31.3G     2% /backup
sr0
ahmed@postgresql-16-test:/$ df -h
Filesystem                         Size  Used Avail Use% Mounted on
tmpfs                              382M  1.1M  381M   1% /run
/dev/mapper/ubuntu--vg-ubuntu--lv   15G  5.7G  8.3G  41% /
tmpfs                              1.9G     0  1.9G   0% /dev/shm
tmpfs                              5.0M     0  5.0M   0% /run/lock
/dev/sda2                          2.0G  100M  1.7G   6% /boot
tmpfs                              382M   12K  382M   1% /run/user/1000
/dev/sdb                            32G  659M   32G   3% /data
/dev/sdc                            32G  659M   32G   3% /backup
ahmed@postgresql-16-test:/$ pg_createcluster 16 main
```

setup the database cluster

next step require to drop the default database cluster and create another database cluster on new dedicated directory 'data' to hold all the data for PostgreSQL insisted of the default data directory that PostgreSQL select

start by viewing the current DB cluster by using the following command `pg_lscluster`

```
ahmed@postgresql-16-test:/$ pg_lsclusters
Ver Cluster Port Status Owner    Data directory              Log file
16  main    5432 online postgres /var/lib/postgresql/16/main /var/log/postgresql/postgresql-16-main.log
ahmed@postgresql-16-test:/$ pg_ctlcluster stop 16 main
```

the default directory is at this location /var/lib/postgresql/16/main we drop it and create new one

next stop the cluster by suing the following command note the info from using the previous command `pg_lscluster` the cluster name is `16 main`

```
sudo pg_ctlcluster stop 16 main
```

```
ahmed@postgresql-16-test:/$ sudo pg_ctlcluster stop 16 main
ahmed@postgresql-16-test:/$ pg_ctlcluster stop 16 main
Error: You must run this program as the cluster owner (postgres) or root
ahmed@postgresql-16-test:/$ pg_lsclusters
Ver Cluster Port Status Owner    Data directory              Log file
16  main    5432 down   postgres /var/lib/postgresql/16/main /var/log/postgresql/postgresql-16-main.log
```

now create new cluster that will put all its data in in dedicated data dir

```
pg_createcluster 16 main --start-conf=auto -p  5432  -D data/ --start
```

syntax option expiation

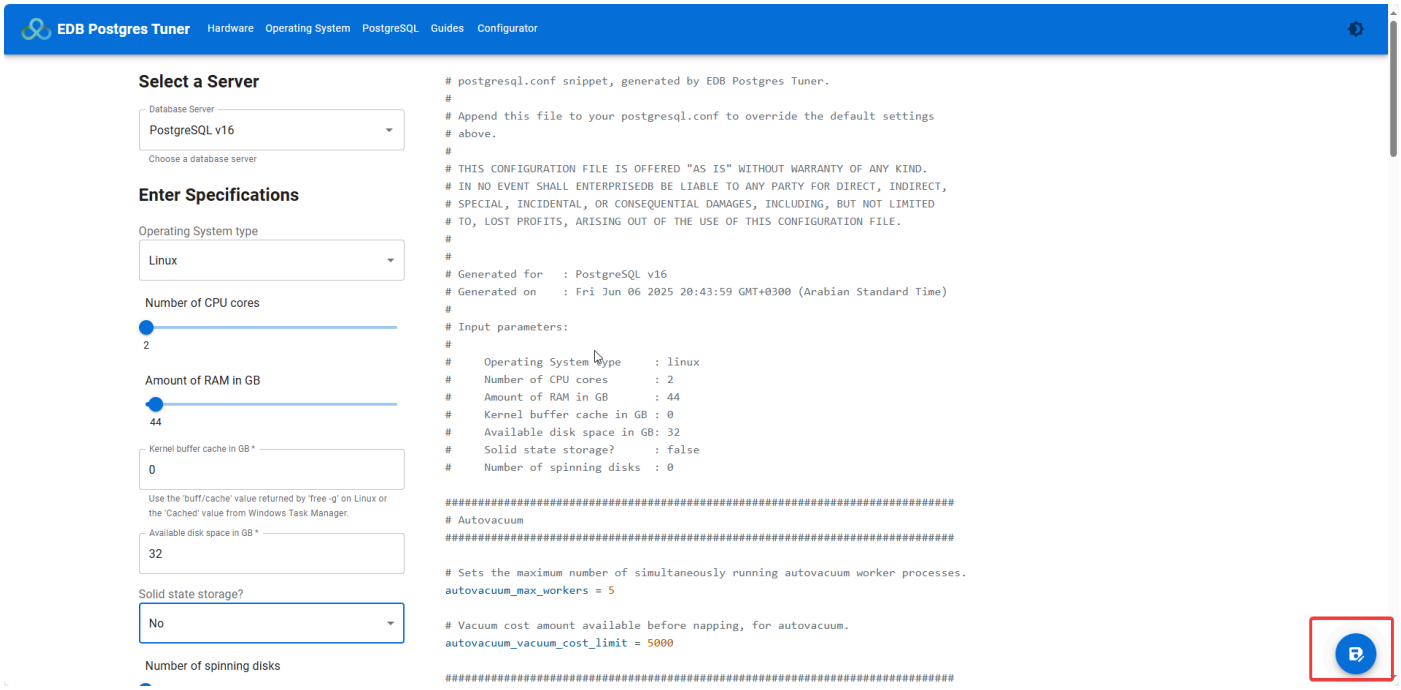
- `--start-conf = auto` means that cluster will start automatically with the start of the services
- `-p 5432` -p defend the port for database cluster
- `-D` option to define the data directory path
- `--start` this option will start the cluster once its created

```
error: could not create configuration directory; you might need to run this program with root privileges
ahmed@postgresql-16-test:/$ sudo pg_createcluster 16 main --start-conf=auto -p  5432  -D data/ --start
creating new PostgreSQL cluster 16/main ...
/usr/lib/postgresql/16/bin/initdb -D data/ --auth-local peer --auth-host scram-sha-256 --no-instructions
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_US.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 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 ... Etc/UTC
creating configuration files ... ok
running bootstrap script ... ok
performing post-bootstrap initialization ... ok
syncing data to disk ... ok
Ver Cluster Port Status Owner    Data directory Log file
16  main    5432 online postgres data/          /var/log/postgresql/postgresql-16-main.log
ahmed@postgresql-16-test:/$ ls
```

Optimizing PostgreSQL setting

the default setting is not fit for most of server spec that PostgreSQL will settle in it need to be changed to use server spec
EDB has great website that will ask you questionnaire and then give you the best setting for PostgreSQL base on the server specs

[PostgreSQL Configurator]



once you fill the server specs download the configuration and then upload it to the server

before that make sure to take copy of `postgresql.conf` by copy it to another directory

now append the uploaded configuration to `postgresql.conf` file

```
my-postgresql.conf >> /etc/postgresql/16/main/postgresql.conf
```

restart the cluster and confirm its working fine .

```
sudo pg_ctlcluster 16 main restart
```

```
root@postgresql-16-test:/etc/postgresql/16/main# sudo pg_ctlcluster 16 main restart
root@postgresql-16-test:/etc/postgresql/16/main# pg_lsclusters
Ver Cluster Port Status Owner     Data directory Log file
16  main    5432 online <unknown> data/          log/postgresql-%Y-%m-%d_%H%M%S.log
```

now we have successfully installed PostgreSQL 16 with best practices and changes its configuration to best match the server spec for optimal performance

MySQL installation , and Basic settings

Installing the repository

i will be installing MySQL community edition on rocky Linux and also set data directory to be at different dedicated directory and dedicated directory for backup

first lets start by installing mysql 8 community edition

go to the following website and download the repository for desire os you are using MySQL :: Download MySQL Yum Repository

you can use `wget` to download it on the server

next install the repository using the following command

```
sudo yum localinstall  mysql84-community-release-el8-1.noarch.rpm
```

```
[ahmed@localhost ~]$ sudo yum localinstall  mysql84-community-release-el8-1.noarch.rpm

We trust you have received the usual lecture from the local System
Administrator. It usually boils down to these three things:

    #1) Respect the privacy of others.
    #2) Think before you type.
    #3) With great power comes great responsibility.

[sudo] password for ahmed:
Rocky Linux 8 - AppStream
Rocky Linux 8 - BaseOS
Rocky Linux 8 - Extras
Dependencies resolved.
==========================================================================================================================================
 Package                                                 Architecture                           Version
==========================================================================================================================================
Installing:
 mysql84-community-release                               noarch                                 el8-1

Transaction Summary
==========================================================================================================================================
Install  1 Package

Total size: 15 k
Installed size: 17 k
Is this ok [y/N]: y
Downloading Packages:
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
  Preparing        :
  Installing       : mysql84-community-release-el8-1.noarch
  Running scriptlet: mysql84-community-release-el8-1.noarch
   Warning: native mysql package from platform vendor seems to be enabled.
    Please consider to disable this before installing packages from repo.mysql.com.
    Run: yum module -y disable mysql

  Verifying        : mysql84-community-release-el8-1.noarch
```

in rocky Linux you need to disable the MySQL module already excite on the os by using the following command

```
sudo yum module -y disable mysql
```

now install MySQL 8 community server

```
sudo yum install mysql-community-server
```

```
mysql-community-client-plugins.x86_64   mysql-community-libs-compat.x86_64     mysql-connector-c++-debugsource.x86_64   mysql-connector-odbc-debugsource.x86_64   mysql-connector-python.x86_64
mysql-community-client.x86_64           mysql-community-libs.x86_64            mysql-connector-c++-devel.x86_64         mysql-connector-odbc-setup.x86_64         mysql-router-community.x86_64
mysql-community-common.x86_64           mysql-community-server-debug.x86_64    mysql-connector-c++-jdbc.x86_64          mysql-connector-odbc.x86_64               mysql-selinux.noarch
mysql-community-debugsource.x86_64      mysql-community-server.x86_64          mysql-connector-c++.x86_64               mysql-connector-python3-cext.x86_64       mysql-shell-debugsource.x86_64
mysql-community-devel.x86_64            mysql-community-test.x86_64            mysql-connector-java.noarch              mysql-connector-python3.x86_64            mysql-shell.x86_64
mysql-community-icu-data-files.x86_64   mysql-connector-c++-compat.x86_64      mysql-connector-j.noarch                 mysql-connector-python-cext.x86_64        mysqlx-connector-python3.x86_64
[ahmed@localhost ~]$ sudo yum install mysql
mysql-community-client-plugins.x86_64   mysql-community-libs-compat.x86_64     mysql-connector-c++-debugsource.x86_64   mysql-connector-odbc-debugsource.x86_64   mysql-connector-python.x86_64
mysql-community-client.x86_64           mysql-community-libs.x86_64            mysql-connector-c++-devel.x86_64         mysql-connector-odbc-setup.x86_64         mysql-router-community.x86_64
mysql-community-common.x86_64           mysql-community-server-debug.x86_64    mysql-connector-c++-jdbc.x86_64          mysql-connector-odbc.x86_64               mysql-selinux.noarch
mysql-community-debugsource.x86_64      mysql-community-server.x86_64          mysql-connector-c++.x86_64               mysql-connector-python3-cext.x86_64       mysql-shell-debugsource.x86_64
mysql-community-devel.x86_64            mysql-community-test.x86_64            mysql-connector-java.noarch              mysql-connector-python3.x86_64            mysql-shell.x86_64
mysql-community-icu-data-files.x86_64   mysql-connector-c++-compat.x86_64      mysql-connector-j.noarch                 mysql-connector-python-cext.x86_64        mysqlx-connector-python3.x86_64
[ahmed@localhost ~]$ sudo yum install mysql-community-server
Last metadata expiration check: 0:01:23 ago on Fri 06 Jun 2025 09:03:37 PM +03.
Dependencies resolved.
==========================================================================================================================================
 Package                              Architecture      Version                                        Repository                  Size
==========================================================================================================================================
Installing:
 mysql-community-server               x86_64            8.4.5-1.el8                                    mysql-8.4-lts-community     61 M
Installing dependencies:
 mysql-community-client               x86_64            8.4.5-1.el8                                    mysql-8.4-lts-community     15 M
 mysql-community-client-plugins       x86_64            8.4.5-1.el8                                    mysql-8.4-lts-community    4.6 M
 mysql-community-common               x86_64            8.4.5-1.el8                                    mysql-8.4-lts-community    692 k
 mysql-community-icu-data-files       x86_64            8.4.5-1.el8                                    mysql-8.4-lts-community    2.2 M
 mysql-community-libs                 x86_64            8.4.5-1.el8                                    mysql-8.4-lts-community    1.5 M
 perl-Carp                            noarch            1.42-396.el8                                   baseos                      29 k
 perl-Data-Dumper                     x86_64            2.167-399.el8                                  baseos                      57 k
 perl-Digest                          noarch            1.17-395.el8                                   appstream                   26 k
 perl-Digest-MD5                      x86_64            2.55-396.el8                                   appstream                   36 k
 perl-Encode                          x86_64            4:2.97-3.el8                                   baseos                     1.5 M
 perl-Errno                           x86_64            1.28-422.el8                                   baseos                      75 k
 perl-Exporter                        noarch            5.72-396.el8                                   baseos                      33 k
 perl-File-Path                       noarch            2.15-2.el8                                     baseos                      37 k
 perl-File-Temp                       noarch            0.230.600-1.el8                                baseos                      62 k
 perl-Getopt-Long                     noarch            1:2.50-4.el8                                   baseos                      62 k
 perl-HTTP-Tiny                       noarch            0.074-3.el8                                    baseos                      58 k
 perl-IO                              x86_64            1.38-422.el8                                   baseos                     141 k
 perl-IO-Socket-IP                    noarch            0.39-5.el8                                     appstream                   46 k
 perl-IO-Socket-SSL                   noarch            2.066-4.module+el8.9.0+1517+e71a7a62           appstream                  297 k
 perl-MIME-Base64                     x86_64            3.15-396.el8                                   baseos                      30 k
 perl-Mozilla-CA                      noarch            20160104-7.module+el8.9.0+1521+0101edce        appstream                   14 k
 perl-Net-SSLeay                      x86_64            1.88-2.module+el8.9.0+1517+e71a7a62            appstream                  378 k
 perl-PathTools                       x86_64            3.74-1.el8                                     baseos                      89 k
 perl-Pod-Escapes                     noarch            1:1.07-395.el8                                 baseos                      19 k
 perl-Pod-Perldoc                     noarch            3.28-396.el8                                   baseos                      85 k
 perl-Pod-Simple                      noarch            1:3.35-395.el8                                 baseos                     212 k
 perl-Pod-Usage                       noarch            4:1.69-395.el8                                 baseos                      33 k
 perl-Scalar-List-Utils               x86_64            3:1.49-2.el8                                   baseos                      67 k
 perl-Socket                          x86_64            4:2.027-3.el8                                  baseos                      58 k
 perl-Storable                        x86_64            1:3.11-3.el8                                   baseos                      97 k
 perl-Term-ANSIColor                  noarch            4.06-396.el8                                   baseos                      45 k
 perl-Term-Cap                        noarch            1.17-395.el8                                   baseos                      22 k
 perl-Text-ParseWords                 noarch            3.30-395.el8                                   baseos                      17 k
 perl-Text-Tabs+Wrap                  noarch            2013.0523-395.el8                              baseos                      23 k
 perl-Time-Local                      noarch            1:1.280-1.el8                                  baseos                      32 k
 perl-URI                             noarch            1.73-3.el8                                     appstream                  115 k
 perl-Unicode-Normalize               x86_64            1.25-396.el8                                   baseos                      81 k
```

create directory `data` and `backup` and adjust the permission

```
sudo mkdir  data  backup
 sudo chown -R mysql:mysql backup/ data/
```

```
[ahmed@localhost /]$ sudo mkdir  data  backup
[ahmed@localhost /]$ ls
backup  bin  boot  data  dev  etc  home  lib  lib64  media  mnt  opt  proc  root  run  sbin  srv  sys  tmp  usr  var
[ahmed@localhost /]$ chown -R mysql:mysql backup/ data/
chown: changing ownership of 'backup/': Operation not permitted
chown: changing ownership of 'data/': Operation not permitted
[ahmed@localhost /]$ sudo chown -R mysql:mysql backup/ data/
[ahmed@localhost /]$ ll
total 24
drwxr-xr-x.   2 mysql mysql    6 Jun  6 21:07 backup
lrwxrwxrwx.   1 root  root     7 Oct 11  2021 bin -> usr/bin
dr-xr-xr-x.   5 root  root  4096 Jun  6 20:03 boot
drwxr-xr-x.   2 mysql mysql    6 Jun  6 21:07 data
drwxr-xr-x.  21 root  root  3140 Jun  6 20:03 dev
drwxr-xr-x. 105 root  root  8192 Jun  6 21:06 etc
drwxr-xr-x.   3 root  root    19 Jun  6 19:44 home
lrwxrwxrwx.   1 root  root     7 Oct 11  2021 lib -> usr/lib
lrwxrwxrwx.   1 root  root     9 Oct 11  2021 lib64 -> usr/lib64
drwxr-xr-x.   2 root  root     6 Oct 11  2021 media
drwxr-xr-x.   2 root  root     6 Oct 11  2021 mnt
drwxr-xr-x.   2 root  root     6 Oct 11  2021 opt
dr-xr-xr-x. 128 root  root     0 Jun  6 20:03 proc
dr-xr-x---.   2 root  root   114 Jun  6 19:45 root
drwxr-xr-x.  38 root  root  1060 Jun  6 21:06 run
lrwxrwxrwx.   1 root  root     8 Oct 11  2021 sbin -> usr/sbin
drwxr-xr-x.   2 root  root     6 Oct 11  2021 srv
dr-xr-xr-x.  13 root  root     0 Jun  6 20:03 sys
drwxrwxrwt.   8 root  root  4096 Jun  6 21:07 tmp
drwxr-xr-x.  12 root  root   144 Jun  6 19:35 usr
drwxr-xr-x.  21 root  root  4096 Jun  6 20:03 var
```

disable selinux and reboot the server by editing configuration file located at /etc/selinux/config

obtain the random root password from MySQL log

```
cat /var/log/mysqld.log
```

```
[root@localhost ~]# cat /var/log/mysqld.log
2025-06-06T18:14:54.203912Z 0 [System] [MY-015017] [Server] MySQL Server Initialization - start.
2025-06-06T18:14:54.207167Z 0 [System] [MY-013169] [Server] /usr/sbin/mysqld (mysqld 8.4.5) initializing of server in progress as process 1546
2025-06-06T18:14:54.264056Z 1 [System] [MY-013576] [InnoDB] InnoDB initialization has started.
2025-06-06T18:14:55.045675Z 1 [System] [MY-013577] [InnoDB] InnoDB initialization has ended.
2025-06-06T18:14:57.533423Z 6 [Note] [MY-010454] [Server] A temporary password is generated for root@localhost: hMWz+%Ftt3d4
2025-06-06T18:15:00.734661Z 0 [System] [MY-015018] [Server] MySQL Server Initialization - end.
2025-06-06T18:15:00.793036Z 0 [System] [MY-015015] [Server] MySQL Server - start.
2025-06-06T18:15:01.077424Z 0 [System] [MY-010116] [Server] /usr/sbin/mysqld (mysqld 8.4.5) starting as process 1588
2025-06-06T18:15:01.110076Z 1 [System] [MY-013576] [InnoDB] InnoDB initialization has started.
2025-06-06T18:15:02.119969Z 1 [System] [MY-013577] [InnoDB] InnoDB initialization has ended.
2025-06-06T18:15:02.819716Z 0 [Warning] [MY-010068] [Server] CA certificate ca.pem is self signed.
2025-06-06T18:15:02.819782Z 0 [System] [MY-013602] [Server] Channel mysql_main configured to support TLS. Encrypted connections are now supported for this channel.
2025-06-06T18:15:02.886732Z 0 [System] [MY-010931] [Server] /usr/sbin/mysqld: ready for connections. Version: '8.4.5'  socket: '/var/lib/mysql/mysql.sock'  port: 3306  MySQL Community Server - GPL.
2025-06-06T18:15:02.886754Z 0 [System] [MY-011323] [Server] X Plugin ready for connections. Bind-address: '::' port: 33060, socket: /var/run/mysqld/mysqlx.sock
```

run `mysql_secure_installation` to configure the passwords for root and disable gest users

use the password for root obtained from log to continue the guide

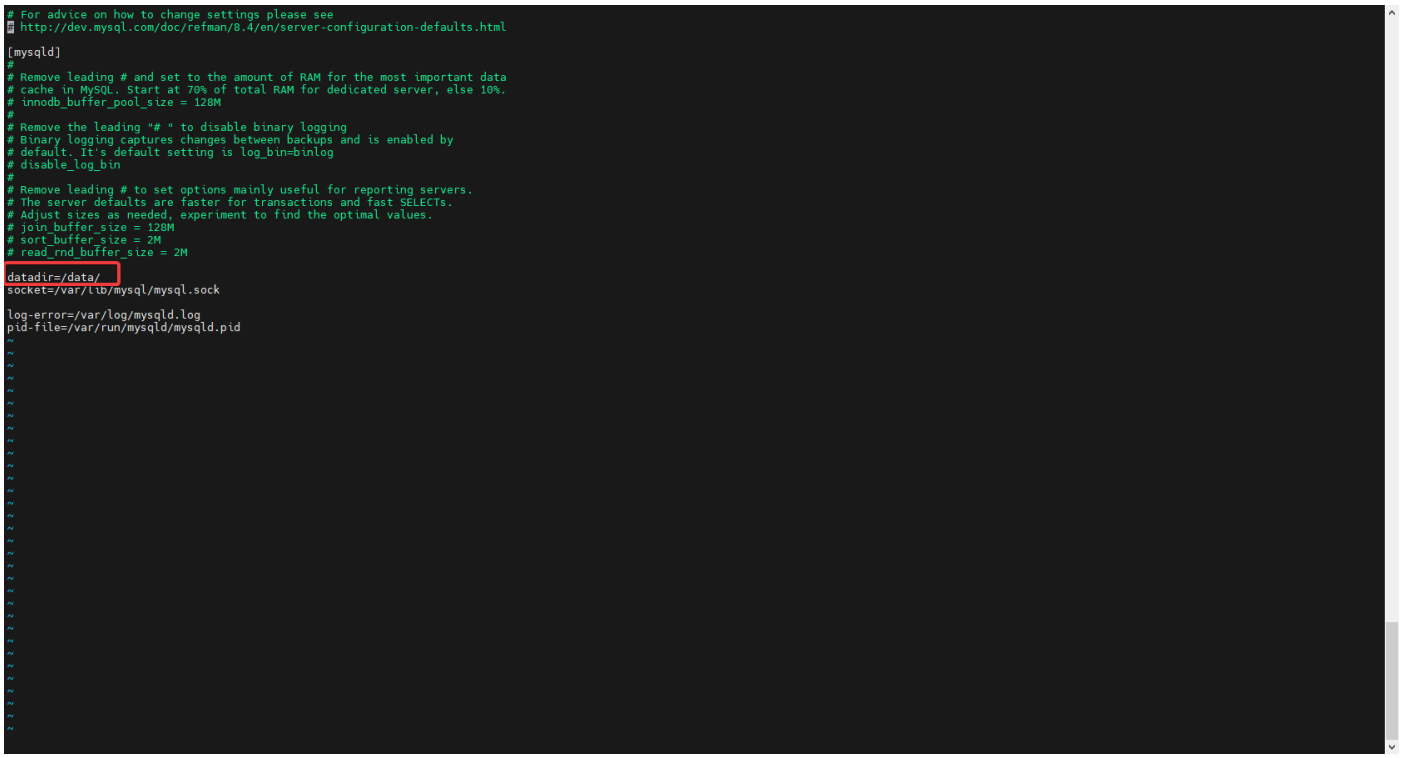
```
[root@localhost ~]# mysql_secure_installation

Securing the MySQL server deployment.

Enter password for user root:

The existing password for the user account root has expired. Please set a new password.

New password:

Re-enter new password:
The 'validate_password' component is installed on the server.
The subsequent steps will run with the existing configuration
of the component.
Using existing password for root.

Estimated strength of the password: 100
Change the password for root ? ((Press y|Y for Yes, any other key for No) : n

 ... skipping.
By default, a MySQL installation has an anonymous user,
allowing anyone to log into MySQL without having to have
a user account created for them. This is intended only for
testing, and to make the installation go a bit smoother.
You should remove them before moving into a production
environment.

Remove anonymous users? (Press y|Y for Yes, any other key for No) : y
Success.


Normally, root should only be allowed to connect from
'localhost'. This ensures that someone cannot guess at
the root password from the network.

Disallow root login remotely? (Press y|Y for Yes, any other key for No) : n

 ... skipping.
By default, MySQL comes with a database named 'test' that
anyone can access. This is also intended only for testing,
and should be removed before moving into a production
environment.


Remove test database and access to it? (Press y|Y for Yes, any other key for No) : y
 - Dropping test database...
Success.

 - Removing privileges on test database...
Success.

Reloading the privilege tables will ensure that all changes
made so far will take effect immediately.

Reload privilege tables now? (Press y|Y for Yes, any other key for No) : y
Success.

All done!
[root@localhost ~]#
```

now we will change the data dir to go to dedicated directory `data` we have created recently both `data` and `backup` reside in separate mount point

```
[root@localhost /]# df -h
Filesystem            Size  Used Avail Use% Mounted on
devtmpfs              1.8G     0  1.8G   0% /dev
tmpfs                 1.8G     0  1.8G   0% /dev/shm
tmpfs                 1.8G   17M  1.8G   1% /run
tmpfs                 1.8G     0  1.8G   0% /sys/fs/cgroup
/dev/mapper/rl-root    28G  3.4G   25G  12% /
/dev/sda1            1014M  231M  784M  23% /boot
tmpfs                 357M     0  357M   0% /run/user/1000
/dev/sdb               32G  261M   32G   1% /data
/dev/sdc               32G  261M   32G   1% /backup
```

go to my.cnf file and change data dir to new diretcory

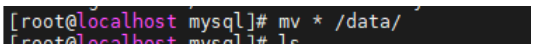
```
sudo vi /etc/my.cnf
```



stop MySQL services and move the content of data dir. to new directory

additionally make sure to apply permission for new data directly again for owner of directory to be mysql

```
systemctl stop mysqld

cd var/lib/mysql/

mv * /data/

chown -R mysql:mysql data/

systemctl start mysqld
```



```
[root@localhost /]# chown -R mysql:mysql data/
[root@localhost /]# ll
total 28
drwxr-xr-x    2 root  root     6 Jun  6 21:21 backup
lrwxrwxrwx.   1 root  root     7 Oct 11  2021 bin -> usr/bin
dr-xr-xr-x.   5 root  root  4096 Jun  6 20:03 boot
drwxr-xr-x    7 mysql mysql 4096 Jun  6 21:25 data
drwxr-xr-x   21 root  root  3140 Jun  6 21:14 dev
drwxr-xr-x. 105 root  root  8192 Jun  6 21:28 etc
drwxr-xr-x.   3 root  root    19 Jun  6 19:44 home
lrwxrwxrwx.   1 root  root     7 Oct 11  2021 lib -> usr/lib
lrwxrwxrwx.   1 root  root     9 Oct 11  2021 lib64 -> usr/lib64
drwxr-xr-x.   2 root  root     6 Oct 11  2021 media
drwxr-xr-x.   2 root  root     6 Oct 11  2021 mnt
drwxr-xr-x.   2 root  root     6 Oct 11  2021 opt
dr-xr-xr-x  148 root  root     0 Jun  6 21:14 proc
dr-xr-x---.   2 root  root   114 Jun  6 19:45 root
drwxr-xr-x   37 root  root  1040 Jun  6 21:14 run
lrwxrwxrwx.   1 root  root     8 Oct 11  2021 sbin -> usr/sbin
drwxr-xr-x.   2 root  root     6 Oct 11  2021 srv
dr-xr-xr-x   13 root  root     0 Jun  6 21:14 sys
drwxrwxrwt.   8 root  root  4096 Jun  6 21:29 tmp
drwxr-xr-x.  12 root  root   144 Jun  6 19:35 usr
drwxr-xr-x.  21 root  root  4096 Jun  6 20:03 var
[root@localhost /]# systemctl start mysqld
[root@localhost /]# systemctl status mysqld
● mysqld.service - MySQL Server
   Loaded: loaded (/usr/lib/systemd/system/mysqld.service; enabled; vendor preset: disabled)
   Active: active (running) since Fri 2025-06-06 21:29:42 +03; 12s ago
     Docs: man:mysqld(8)
           http://dev.mysql.com/doc/refman/en/using-systemd.html
  Process: 2120 ExecStartPre=/usr/bin/mysqld_pre_systemd (code=exited, status=0/SUCCESS)
 Main PID: 2149 (mysqld)
```

now the data dir. is setup in different directory for better storage management and to avoid MySQL overlapping storage with the os

MySQL configuration tuning

now last section we need to tune MySQL to work better with sever specs

pt-variable-advisor which will run diagnosis on the server analyze it and give you the recommended parameter need to be changes

you can download it by using `wget percona.com/get/percona-toolkit.rpm` then install it using `yum localinstall`

to run it `pt-variable-advisor localhost`

```
[root@localhost /]# pt-variable-advisor localhost
# WARN delay_key_write: MyISAM index blocks are never flushed until necessary.

# WARN innodb_buffer_pool_size: The InnoDB buffer pool size is unconfigured.

# WARN innodb_log_file_size: The InnoDB log file size is set to its default value, which is not usable on production systems.

# WARN key_buffer_size: The key buffer size is set to its default value, which is not good for most production systems.

# NOTE sort_buffer_size-1: The sort_buffer_size variable should generally be left at its default unless an expert determines it is necessary to change it.

# NOTE innodb_data_file_path: Auto-extending InnoDB files can consume a lot of disk space that is very difficult to reclaim later.

# WARN myisam_recover_options: myisam_recover_options should be set to some value such as BACKUP,FORCE to ensure that table corruption is noticed.

[root@localhost /]# ^C
[root@localhost /]#
```

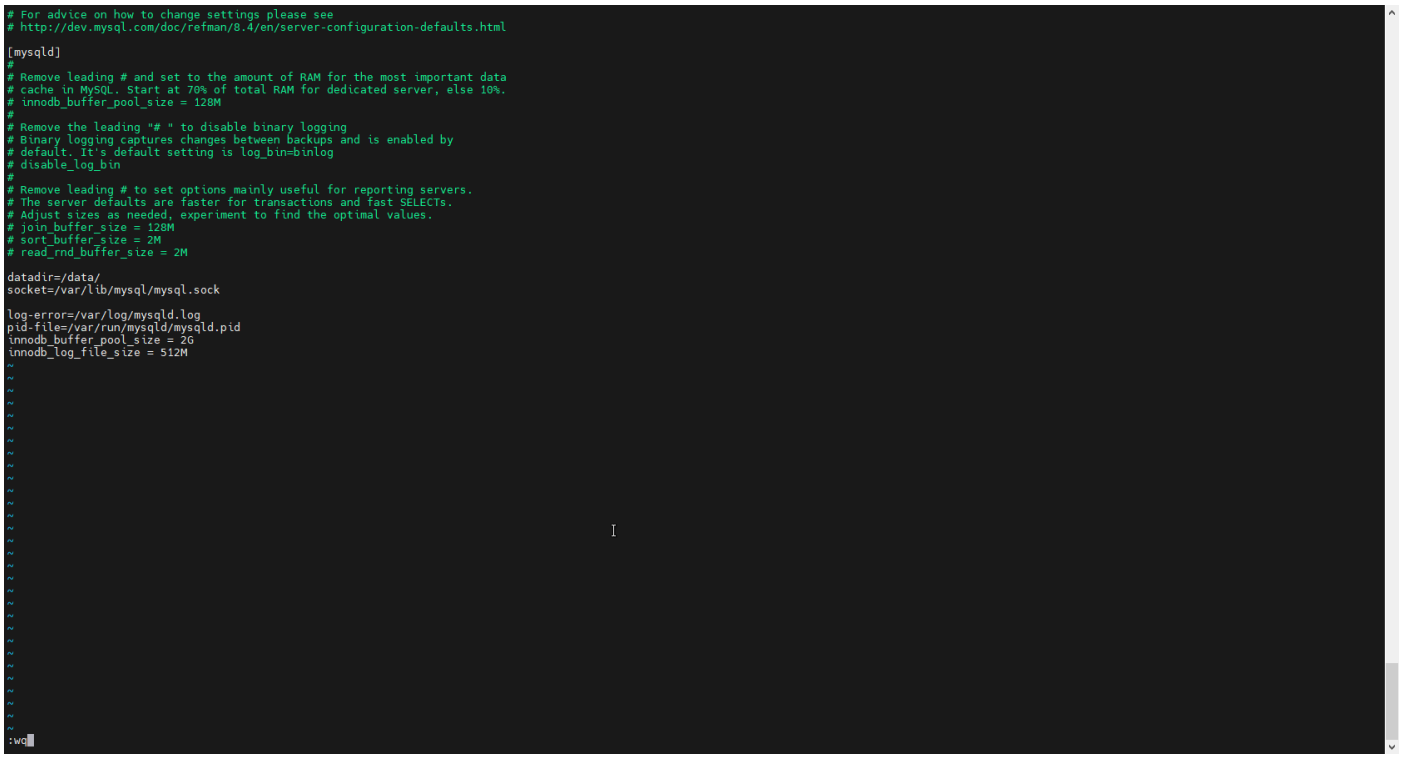
most of parameter is regarding adjusting buffer pool size we have 4gb RAM in the server so we will set up to use 70% of the server memory

for innodb_log_file_size set it to use 25% of buffer pool size you defined These are the transaction logs, crucial for data durability and write performance. The default size is too small for any real workload. A larger log file size improves performance by reducing how frequently the system needs to flush data to disk.

```
[mysqld]
innodb_buffer_pool_size = 2G
innodb_log_file_size = 512M
```

open `my.cnf` and add the parameter above the restart MySQL services

```
sudo vi /etc/my.cnf

systemctl restart mysqld
```



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