Deploy Django Backend on EC2 Instance

Architecture Components

- **Instance 1 (Database):** PostgreSQL on EC2 instance
- **Instance 2 (Backend):** Django application on EC2 instance

Configuring Instance 1 (Database)

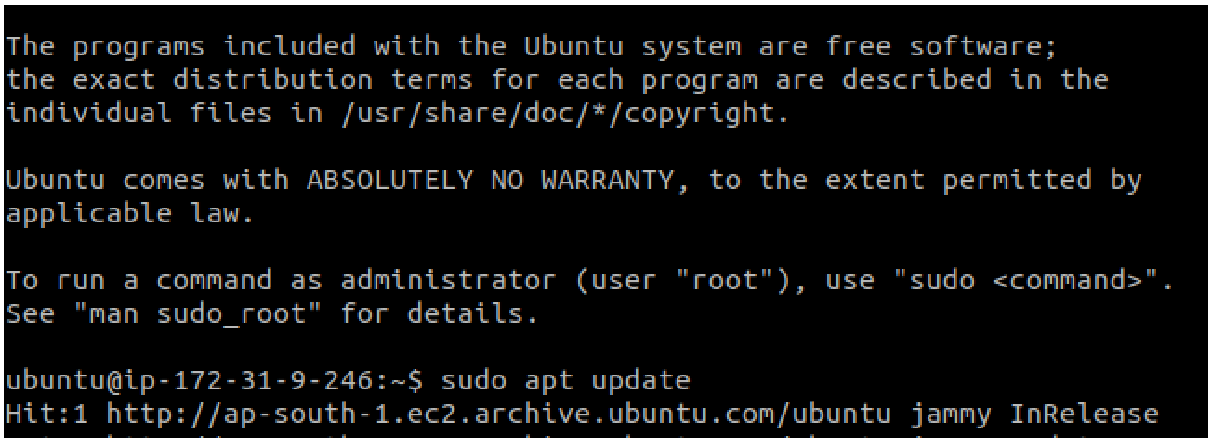
Connect to the Database EC2 Instance

ssh -i path_to_your_key.pem ubuntu@your_database_instance_public_ip

Note: Alternatively, you can use Putty

Update package index

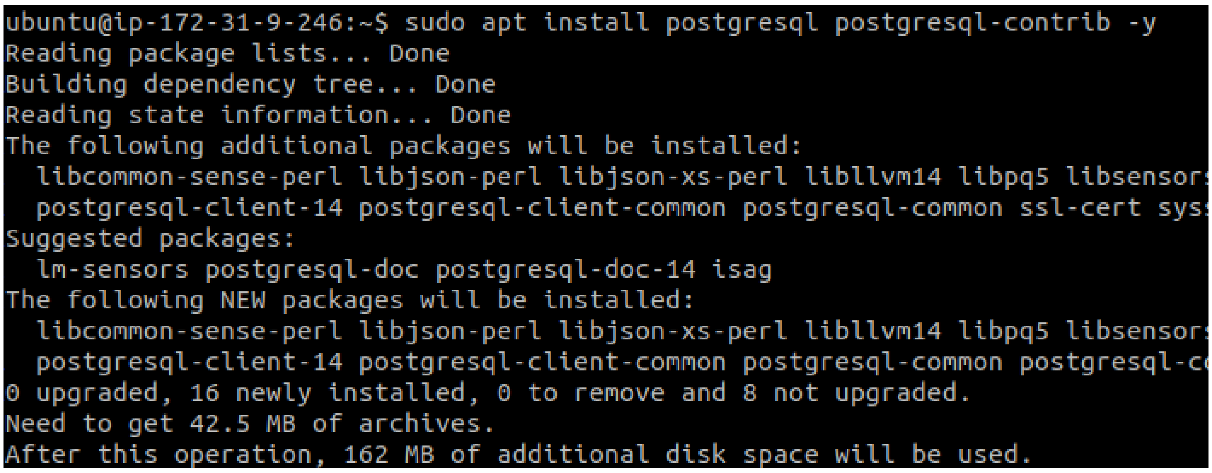
sudo apt update



```
The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

ubuntu@ip-172-31-9-246:~$ sudo apt update
Hit:1 http://ap-south-1.ec2.archive.ubuntu.com/ubuntu jammy InRelease
```

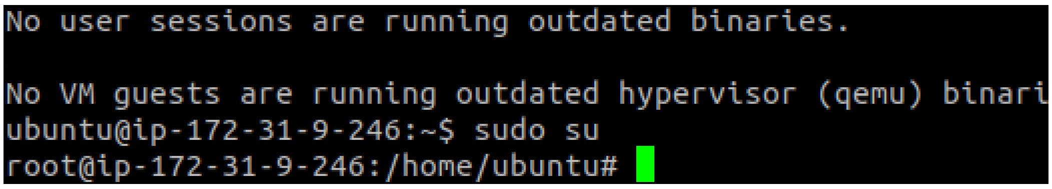
Install PostgreSQL

sudo apt update sudo apt install postgresql postgresql-contrib -y


```
ubuntu@ip-172-31-9-246:~$ sudo apt install postgresql postgresql-contrib -y
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 libllvm14 libpq5 libsensor
  postgresql-client-14 postgresql-client-common postgresql-common ssl-cert sys
Suggested packages:
  lm-sensors postgresql-doc postgresql-doc-14 isag
The following NEW packages will be installed:
  libcommon-sense-perl libjson-perl libjson-xs-perl libllvm14 libpq5 libsensor
  postgresql-client-14 postgresql-client-common postgresql-common postgresql-c
0 upgraded, 16 newly installed, 0 to remove and 8 not upgraded.
Need to get 42.5 MB of archives.
After this operation, 162 MB of additional disk space will be used.
```

Switch to root user

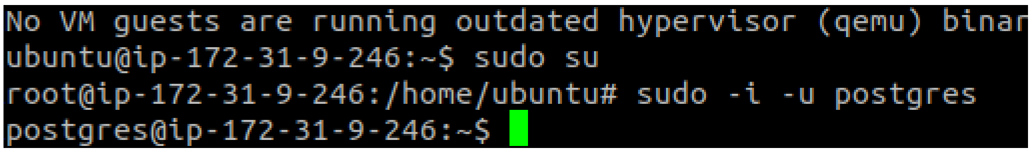
Sudo su


```
No user sessions are running outdated binaries.

No VM guests are running outdated hypervisor (qemu) binari
ubuntu@ip-172-31-9-246:~$ sudo su
root@ip-172-31-9-246:/home/ubuntu#
```

Create a new User

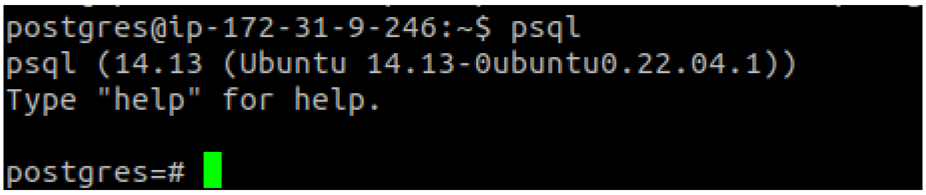
Creating a new user for postgresql with the name postgres

sudo -i -u postgres

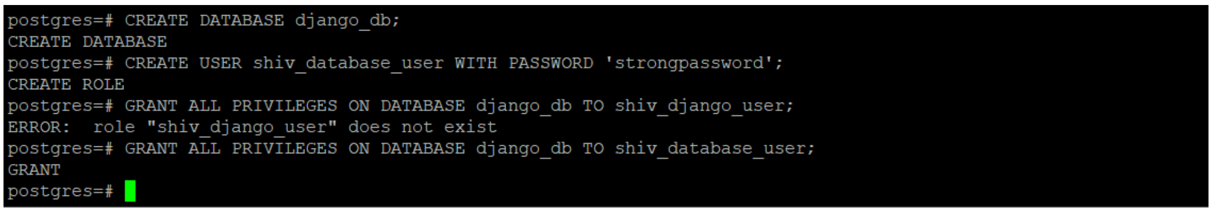

```
No VM guests are running outdated hypervisor (qemu) binar
ubuntu@ip-172-31-9-246:~$ sudo su
root@ip-172-31-9-246:/home/ubuntu# sudo -i -u postgres
postgres@ip-172-31-9-246:~$
```

Access the Postgresql

psql


```
postgres@ip-172-31-9-246:~$ psql
psql (14.13 (Ubuntu 14.13-0ubuntu0.22.04.1))
Type "help" for help.

postgres=#
```

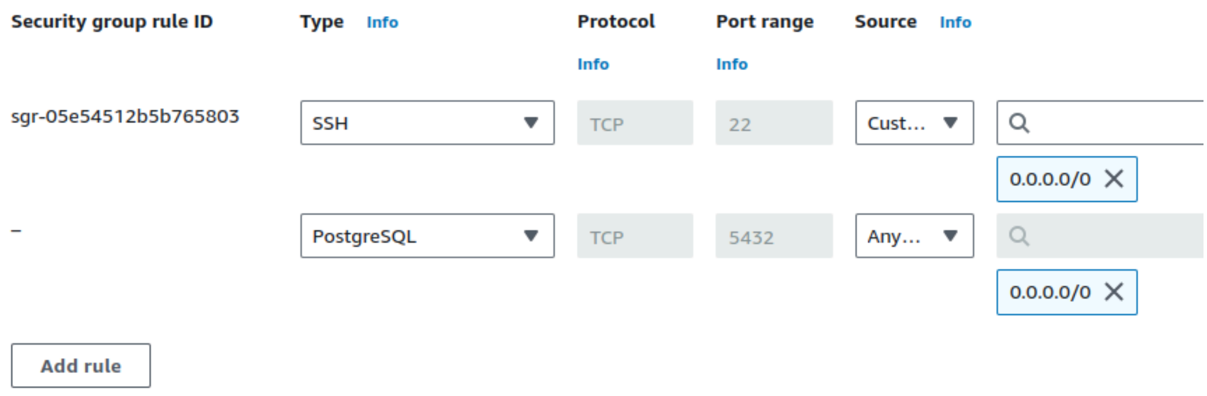
Create Database, User and Grant Privileges



```
postgres=# CREATE DATABASE django_db;
CREATE DATABASE
postgres=# CREATE USER shiv_database_user WITH PASSWORD 'strongpassword';
CREATE ROLE
postgres=# GRANT ALL PRIVILEGES ON DATABASE django_db TO shiv_django_user;
ERROR:  role "shiv_django_user" does not exist
postgres=# GRANT ALL PRIVILEGES ON DATABASE django_db TO shiv_database_user;
GRANT
postgres=#
```

Configure EC2 Security Group

Open the TCP port Postgresql which is the port 5432

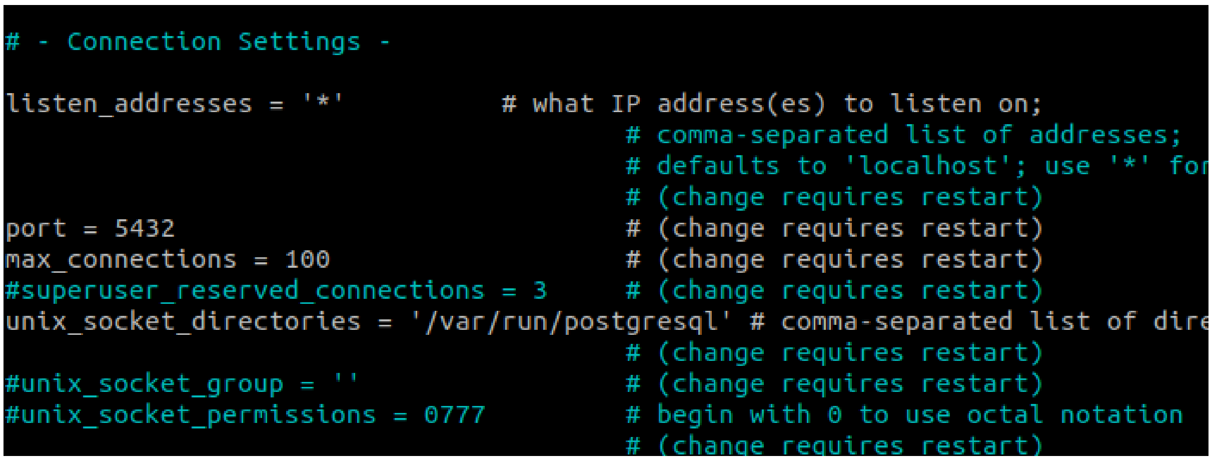


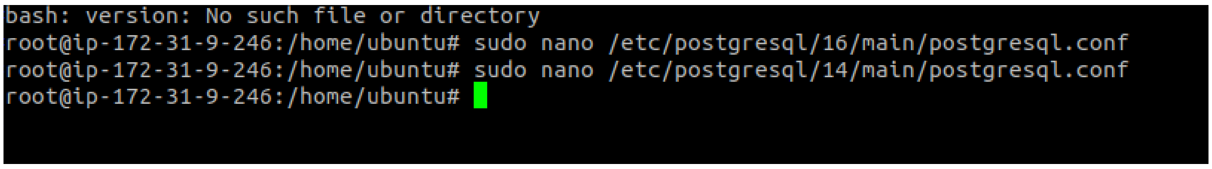
Security group rule ID	Type	Protocol	Port range	Source	
sgr-05e54512b5b765803	SSH	TCP	22	Cust...	0.0.0.0/0
–	PostgreSQL	TCP	5432	Any...	0.0.0.0/0

Configure postgresql.conf

```
sudo nano /etc/postgresql/14/main/postgresql.conf
```

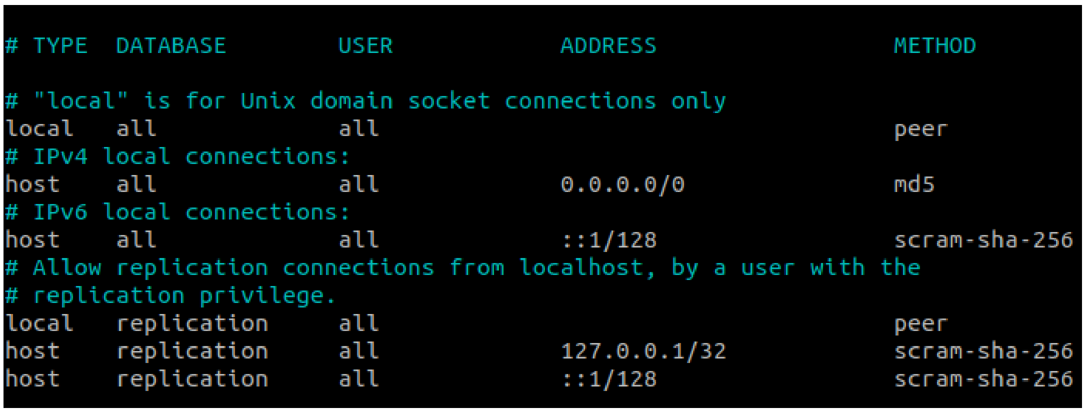
By default, PostgreSQL listens on localhost only. To allow remote connections, Find the line with `listen_addresses` and change it to listen_addresses = '*'

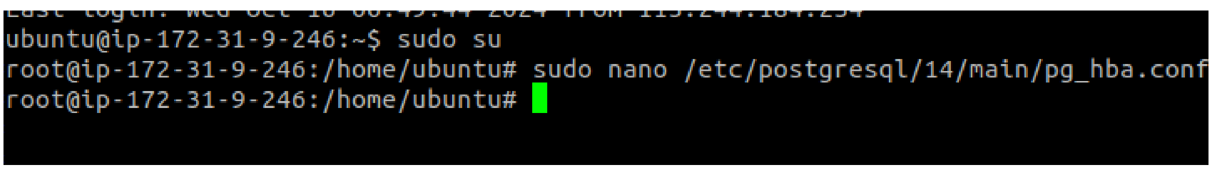

```
# - Connection Settings -

listen_addresses = '*'          # what IP address(es) to listen on;
                                        # comma-separated list of addresses;
                                        # defaults to 'localhost'; use '*' for
                                        # (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 dire
                                        # (change requires restart)
#unix_socket_group = ''                 # (change requires restart)
#unix_socket_permissions = 0777         # begin with 0 to use octal notation
                                        # (change requires restart)
```


```
bash: version: No such file or directory
root@ip-172-31-9-246:/home/ubuntu# sudo nano /etc/postgresql/16/main/postgresql.conf
root@ip-172-31-9-246:/home/ubuntu# sudo nano /etc/postgresql/14/main/postgresql.conf
root@ip-172-31-9-246:/home/ubuntu#
```

Configure pg_hba.conf

sudo nano /etc/postgresql/14/main/pg_hba.conf
Add the following line at the end of the file to allow connections from any IP:
host   all   all   0.0.0.0/0   md5


```
# 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               md5
# IPv6 local connections:
host    all             all             ::1/128                 scram-sha-256
# Allow replication connections from localhost, by a user with the
# replication privilege.
local   replication     all                                     peer
host    replication     all             127.0.0.1/32            scram-sha-256
host    replication     all             ::1/128                 scram-sha-256
```


```
ubuntu@ip-172-31-9-246:~$ sudo su
root@ip-172-31-9-246:/home/ubuntu# sudo nano /etc/postgresql/14/main/pg_hba.conf
root@ip-172-31-9-246:/home/ubuntu#
```

Enable PostgreSQL to start on boot

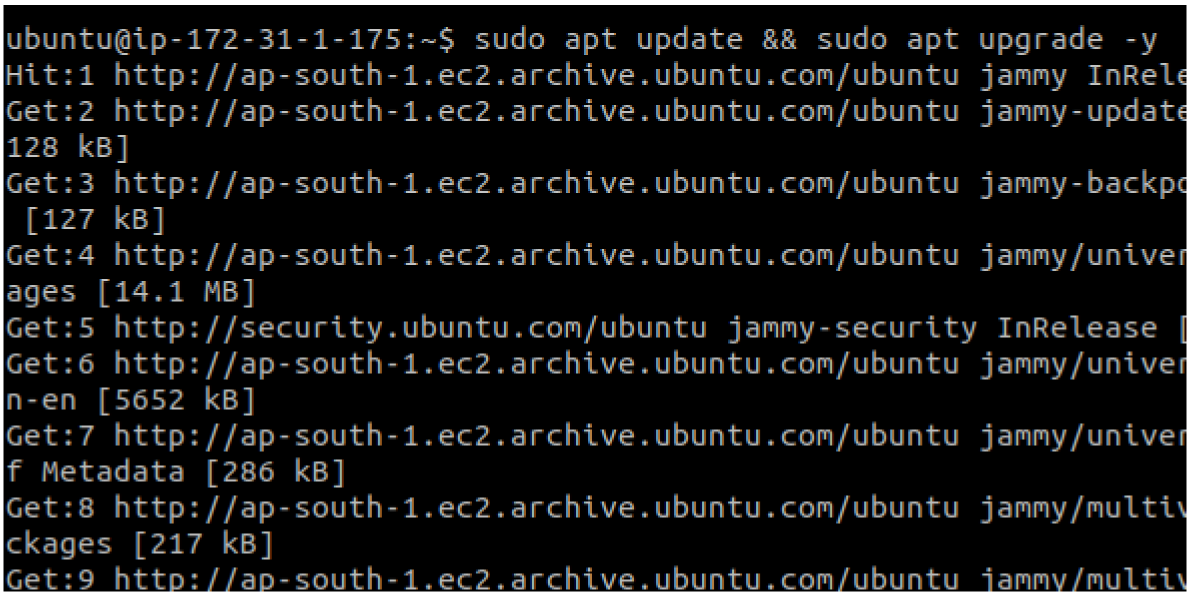
To Enable PostgreSQL to run on ec2 instance startup

sudo systemctl enable postgresql

Configuring Instance 2 (Backend)

Update package index

sudo apt update && sudo apt upgrade -y

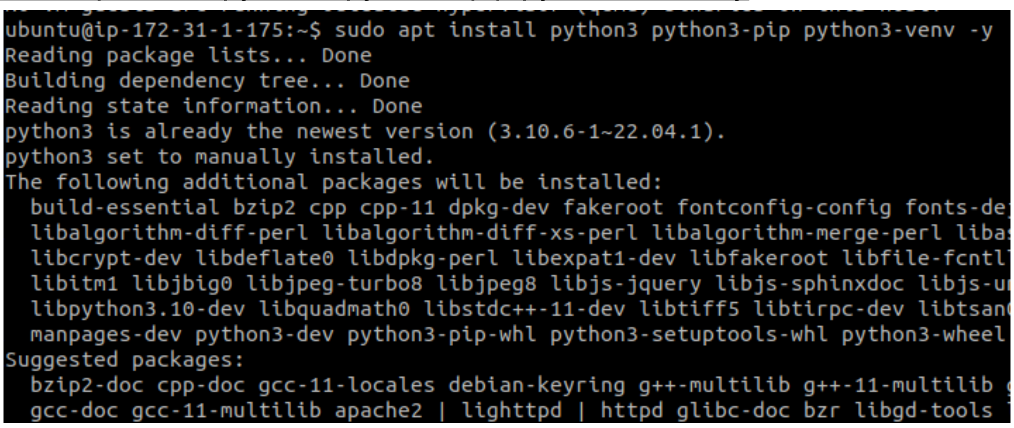


```
ubuntu@ip-172-31-1-175:~$ sudo apt update && sudo apt upgrade -y
Hit:1 http://ap-south-1.ec2.archive.ubuntu.com/ubuntu jammy InRele
Get:2 http://ap-south-1.ec2.archive.ubuntu.com/ubuntu jammy-update
128 kB]
Get:3 http://ap-south-1.ec2.archive.ubuntu.com/ubuntu jammy-backpo
 [127 kB]
Get:4 http://ap-south-1.ec2.archive.ubuntu.com/ubuntu jammy/univer
ages [14.1 MB]
Get:5 http://security.ubuntu.com/ubuntu jammy-security InRelease [
Get:6 http://ap-south-1.ec2.archive.ubuntu.com/ubuntu jammy/univer
n-en [5652 kB]
Get:7 http://ap-south-1.ec2.archive.ubuntu.com/ubuntu jammy/univer
f Metadata [286 kB]
Get:8 http://ap-south-1.ec2.archive.ubuntu.com/ubuntu jammy/multiv
ckages [217 kB]
Get:9 http://ap-south-1.ec2.archive.ubuntu.com/ubuntu jammy/multiv
```

Install Python and pip

Django requires Python, so install Python and pip (Python’s package installer)

sudo apt install python3 python3-pip python3-venv -y

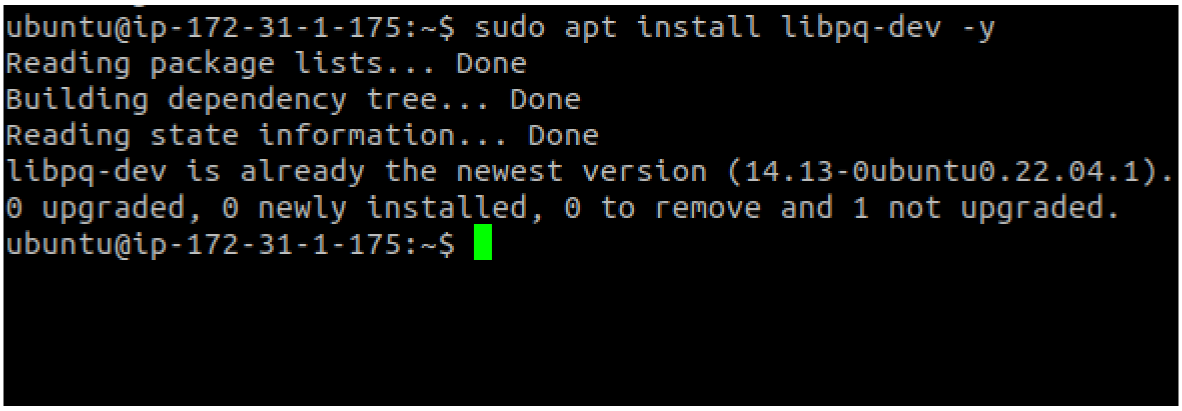


```
ubuntu@ip-172-31-1-175:~$ sudo apt install python3 python3-pip python3-venv -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
python3 is already the newest version (3.10.6-1~22.04.1).
python3 set to manually installed.
The following additional packages will be installed:
  build-essential bzip2 cpp cpp-11 dpkg-dev fakeroot fontconfig-config fonts-de
  libalgorithm-diff-perl libalgorithm-diff-xs-perl libalgorithm-merge-perl liba
  libcrypt-dev libdeflate0 libdpkg-perl libexpat1-dev libfakeroot libfile-fcntl
  libitm1 libjbig0 libjpeg-turbo8 libjpeg8 libjs-jquery libjs-sphinxdoc libjs-u
  libpython3.10-dev libquadmath0 libstdc++-11-dev libtiff5 libtirpc-dev libtsan
  manpages-dev python3-dev python3-pip-whl python3-setuptools-whl python3-wheel
Suggested packages:
  bzip2-doc cpp-doc gcc-11-locales debian-keyring g++-multilib g++-11-multilib
  gcc-doc gcc-11-multilib apache2 | lighttpd | httpd glibc-doc bzr libgd-tools
```

Install PostgreSQL Development Libraries

Install PostgreSQL development headers and libraries (necessary for connecting Django to PostgreSQL)

sudo apt install libpq-dev -y

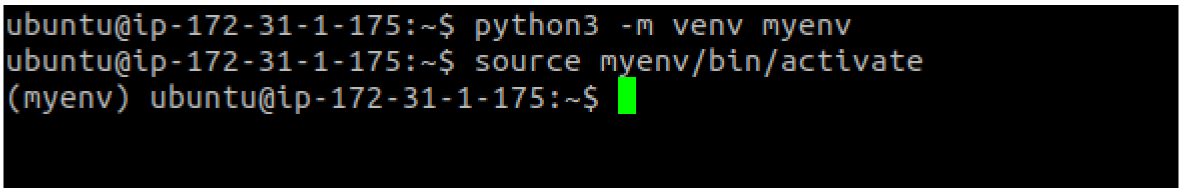


```
ubuntu@ip-172-31-1-175:~$ sudo apt install libpq-dev -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
libpq-dev is already the newest version (14.13-0ubuntu0.22.04.1).
0 upgraded, 0 newly installed, 0 to remove and 1 not upgraded.
ubuntu@ip-172-31-1-175:~$
```

Set Up a Python Virtual Environment

It’s best practice to use a virtual environment for your Django app to manage dependencies

```
python3 -m venv myenv
source myenv/bin/activate
```

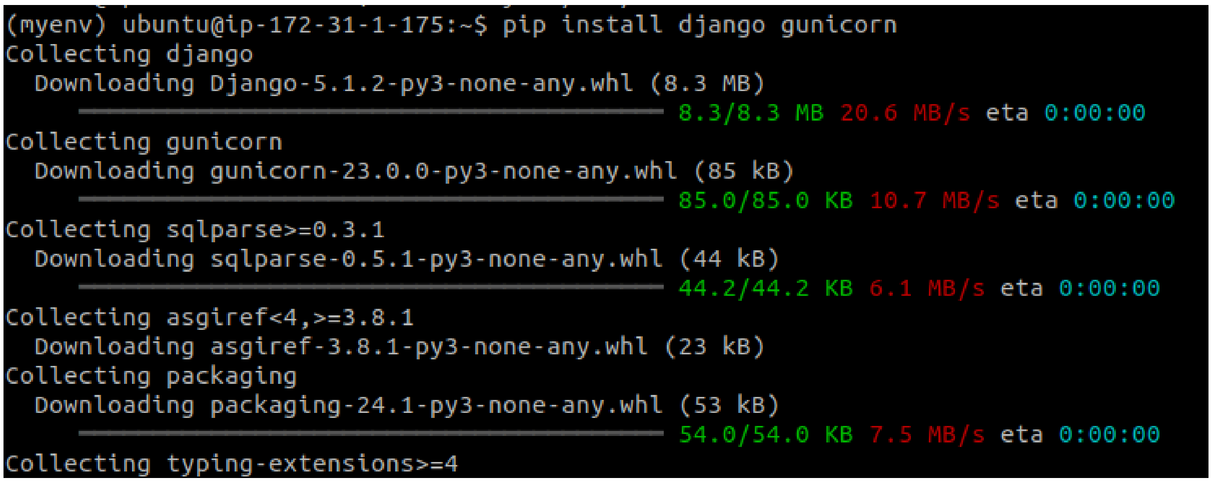


```
ubuntu@ip-172-31-1-175:~$ python3 -m venv myenv
ubuntu@ip-172-31-1-175:~$ source myenv/bin/activate
(myenv) ubuntu@ip-172-31-1-175:~$
```

Install Django and Gunicorn

Install Django and Gunicorn (the production WSGI server)

```
pip install django gunicorn
```

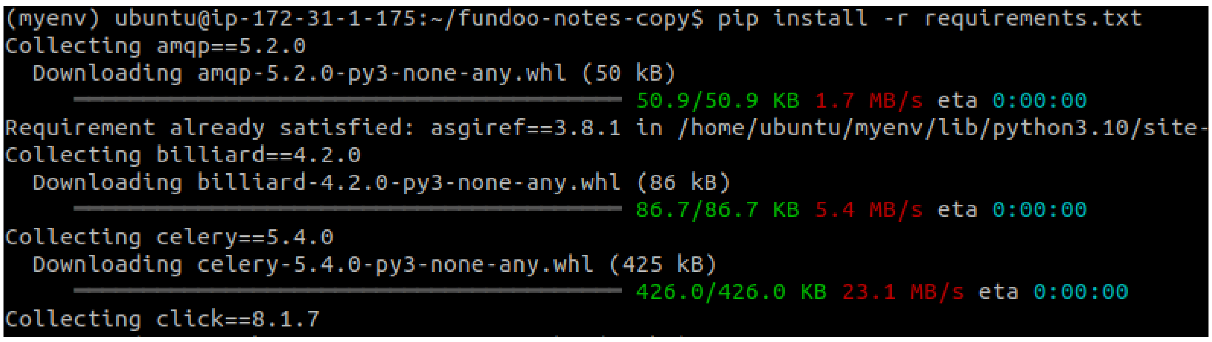


```
(myenv) ubuntu@ip-172-31-1-175:~$ pip install django gunicorn
Collecting django
  Downloading Django-5.1.2-py3-none-any.whl (8.3 MB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 8.3/8.3 MB 20.6 MB/s eta 0:00:00
Collecting gunicorn
  Downloading gunicorn-23.0.0-py3-none-any.whl (85 kB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 85.0/85.0 KB 10.7 MB/s eta 0:00:00
Collecting sqlparse>=0.3.1
  Downloading sqlparse-0.5.1-py3-none-any.whl (44 kB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 44.2/44.2 KB 6.1 MB/s eta 0:00:00
Collecting asgiref<4,>=3.8.1
  Downloading asgiref-3.8.1-py3-none-any.whl (23 kB)
Collecting packaging
  Downloading packaging-24.1-py3-none-any.whl (53 kB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 54.0/54.0 KB 7.5 MB/s eta 0:00:00
Collecting typing-extensions>=4
```

Clone the Django project from Github

```
git clone -b <branch-name> <repo-link>
```

Install requirements.txt



```
(myenv) ubuntu@ip-172-31-1-175:~/fundoo-notes-copy$ pip install -r requirements.txt
Collecting amqp==5.2.0
  Downloading amqp-5.2.0-py3-none-any.whl (50 kB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 50.9/50.9 KB 1.7 MB/s eta 0:00:00
Requirement already satisfied: asgiref==3.8.1 in /home/ubuntu/myenv/lib/python3.10/site-
Collecting billiard==4.2.0
  Downloading billiard-4.2.0-py3-none-any.whl (86 kB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 86.7/86.7 KB 5.4 MB/s eta 0:00:00
Collecting celery==5.4.0
  Downloading celery-5.4.0-py3-none-any.whl (425 kB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 426.0/426.0 KB 23.1 MB/s eta 0:00:00
Collecting click==8.1.7
```

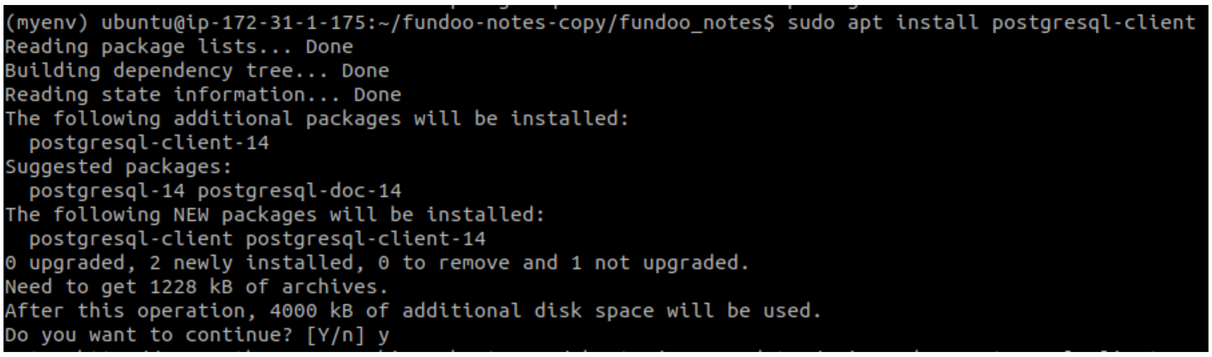
Configure PostgreSQL in Django Settings

```
(myenv)
ubuntu@ip-172-31-1-175:~/fundoo-notes-copy/fundoo_notes/fundoo_notes$ nano
settings.py
```

Allow all host and Change databases settings

```
DATABASES = {
    'default': {
        'ENGINE': 'django.db.backends.postgresql',
        'NAME': 'django_db',
        'USER': 'shiv_database_user',
        'PASSWORD': 'strongpassword',
        'HOST': 'your_postgres_ec2_instance_private_ip',  # Use private IP of EC2
instance 1
        'PORT': '5432',
    }
}
```

Install Postgresql Client



```
(myenv) ubuntu@ip-172-31-1-175:~/fundoo-notes-copy/fundoo_notes$ sudo apt install postgresql-client
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  postgresql-client-14
Suggested packages:
  postgresql-14 postgresql-doc-14
The following NEW packages will be installed:
  postgresql-client postgresql-client-14
0 upgraded, 2 newly installed, 0 to remove and 1 not upgraded.
Need to get 1228 kB of archives.
After this operation, 4000 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
```

Test the Connection with Database

Test the database connection with the following command

```
psql -U shiv_database_user -d fundoo_db -h 172.31.9.246
```

Migrate the Database

```
python manage.py migrate
```

Run Django Locally to Test

```
python manage.py runserver 0.0.0.0:8000
```

Configure the daemon service file

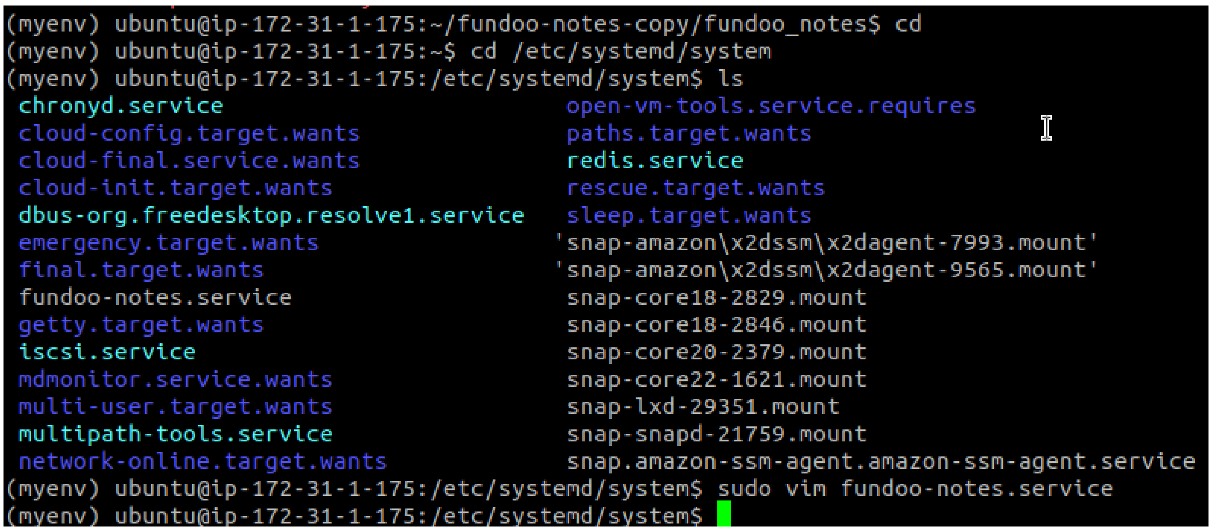
We will create a service file so that the django app can run in the background

Create a Service File:
The service files are usually located in `/etc/systemd/system/`. You'll create your custom service file there.

```
sudo nano /etc/systemd/system/<name>.service
```

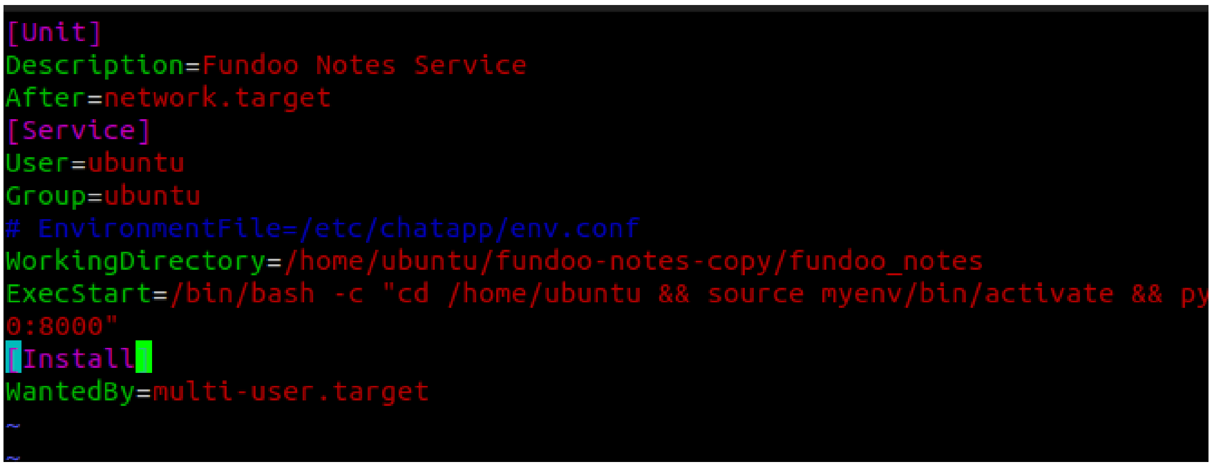
Define the Service Configuration

```
sudo vim fundoo-service.service
```



```
(myenv) ubuntu@ip-172-31-1-175:~/fundoo-notes-copy/fundoo_notes$ cd
(myenv) ubuntu@ip-172-31-1-175:~$ cd /etc/systemd/system
(myenv) ubuntu@ip-172-31-1-175:/etc/systemd/system$ ls
 chronyd.service                          open-vm-tools.service.requires
 cloud-config.target.wants                paths.target.wants
 cloud-final.service.wants                redis.service
 cloud-init.target.wants                  rescue.target.wants
 dbus-org.freedesktop.resolve1.service    sleep.target.wants
 emergency.target.wants                  'snap-amazon\x2dssm\x2dagent-7993.mount'
 final.target.wants                      'snap-amazon\x2dssm\x2dagent-9565.mount'
 fundoo-notes.service                     snap-core18-2829.mount
 getty.target.wants                       snap-core18-2846.mount
 iscsi.service                            snap-core20-2379.mount
 mdmonitor.service.wants                  snap-core22-1621.mount
 multi-user.target.wants                  snap-lxd-29351.mount
 multipath-tools.service                  snap-snapd-21759.mount
 network-online.target.wants              snap.amazon-ssm-agent.amazon-ssm-agent.service
(myenv) ubuntu@ip-172-31-1-175:/etc/systemd/system$ sudo vim fundoo-notes.service
(myenv) ubuntu@ip-172-31-1-175:/etc/systemd/system$
```

`Description`: A short description of your service.
`After`: Defines when the service should start, such as after the network is up.
`User`: The user that will run the service (typically your system user).
`Group`: The group for file permissions.
`WorkingDirectory`: The location where your project files reside.
`ExecStart`: The command to start your application (in this case, Gunicorn).
`Restart=always`: Automatically restarts the service if it crashes.
`Environment`: Use to define environment variables like Django settings.



```
[Unit]
Description=Fundoo Notes Service
After=network.target
[Service]
User=ubuntu
Group=ubuntu
# EnvironmentFile=/etc/chatapp/env.conf
WorkingDirectory=/home/ubuntu/fundoo-notes-copy/fundoo_notes
ExecStart=/bin/bash -c "cd /home/ubuntu && source myenv/bin/activate && py
0:8000"
[Install]
WantedBy=multi-user.target
~
~
```

Reload the systemd Daemon

After creating the service file, reload `systemd` to recognize the new service.

```
sudo systemctl daemon-reload
```

Start the Service

sudo systemctl start fundoo-service

Enable the Service to Start on Boot

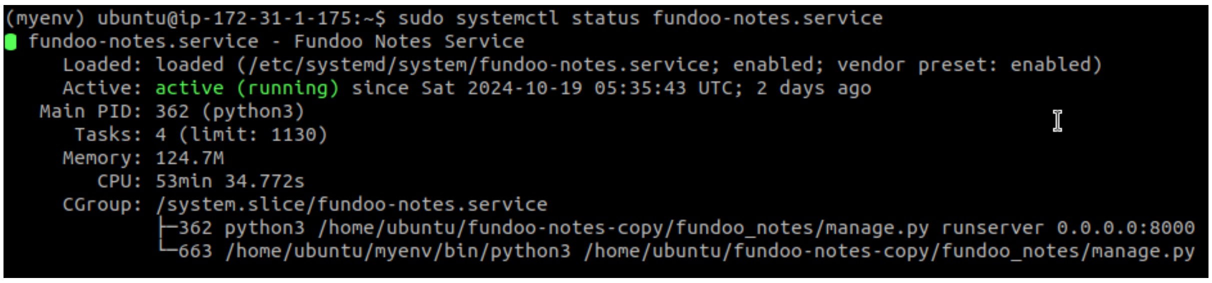
To ensure the service starts automatically at boot

sudo systemctl enable fundoo-service

Check the Status of the Service

Verify that the service is running correctly

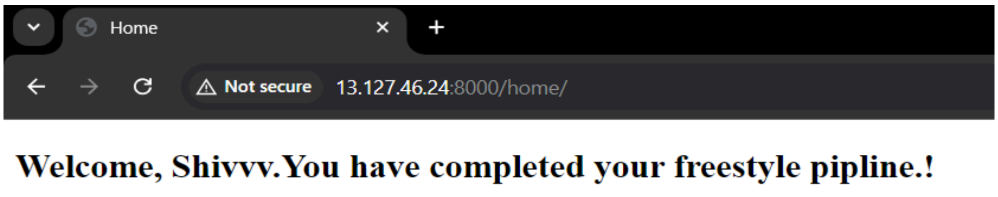
sudo systemctl status fundoo-service



```
(myenv) ubuntu@ip-172-31-1-175:~$ sudo systemctl status fundoo-notes.service
● fundoo-notes.service - Fundoo Notes Service
     Loaded: loaded (/etc/systemd/system/fundoo-notes.service; enabled; vendor preset: enabled)
     Active: active (running) since Sat 2024-10-19 05:35:43 UTC; 2 days ago
   Main PID: 362 (python3)
      Tasks: 4 (limit: 1130)
     Memory: 124.7M
        CPU: 53min 34.772s
     CGroup: /system.slice/fundoo-notes.service
             ├─362 python3 /home/ubuntu/fundoo-notes-copy/fundoo_notes/manage.py runserver 0.0.0.0:8000
             └─663 /home/ubuntu/myenv/bin/python3 /home/ubuntu/fundoo-notes-copy/fundoo_notes/manage.py
```

Verify Deployment

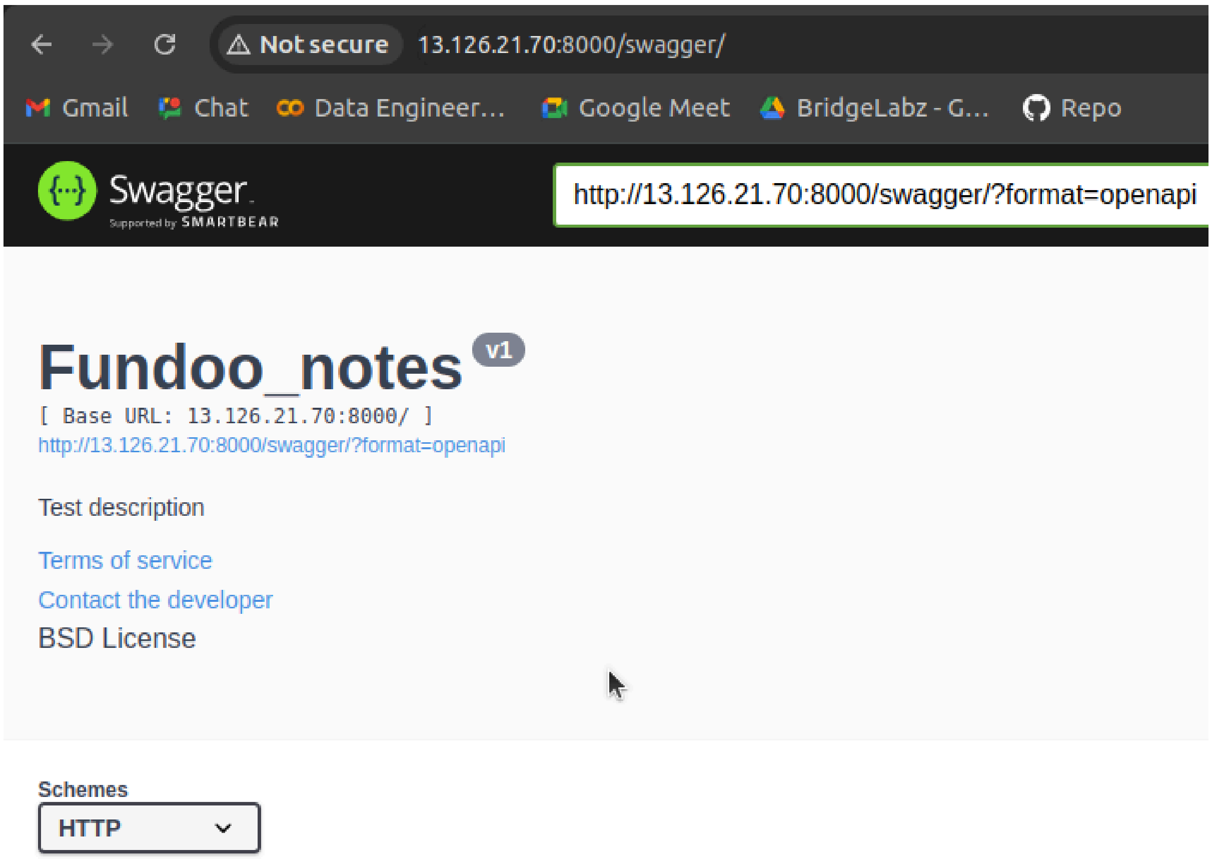
Once the setup is complete, verify that your Django application is running correctly by accessing it via its public IP address or domain name.



Welcome, Shivvv.You have completed your freestyle pipline.!

Perform API testing

We can perform api testing using swagger to confirm our applications is running perfectly



Fundoo_notes v1

[Base URL: 13.126.21.70:8000/]

http://13.126.21.70:8000/swagger/?format=openapi

Test description

Terms of service

Contact the developer

BSD License

Schemes

HTTP