Python

Creating a Django App on Ubuntu Server

3 years ago • by Connor Bode

Django is a common platform for developing websites, web applications and web APIs. There are many advantages to using the Django framework for your project as your tool and if you're not sure it's the right fit, you need only to look to the many big name brands using Django in their stack.

Deploying Django to a production environment for the first time can be a daunting task. Often, developers will launch a Linux instance on the cloud for their production environment.

In this tutorial, we'll show you how to launch Django in production, using a fresh Ubuntu instance.

We'll assume that all of your editing is done on the server, and that you're running the commands as root.

For this tutorial, we're using Ubuntu 18.04.2 LTS

Creating a user for the project

We'll create a new user, django, for running our application. This provides a slight security benefit.

To create the new user:

```
useradd -m django
```

The `-m flag` creates a new home directory: `/home/django`.

Setting up the Python environment

First things first: update your package lists with `apt-get update`

Ubuntu 18.04 ships with Python 3.6, but it doesn't ship with pip, which you'll need to install your dependencies.

```
apt-get install python3-pip
```

Now that we have pip, let's create a virtual environment. Virtual environments help to avoid conflicts with Python packages used by Linux.

```
pip3 install virtualenv
cd /home/django
virtualenv env
```

Now you've created a virtual Python 3.6 environment in the `/home/django/env` folder which can be activated with the following command:Now that we have pip, let's create a virtual environment. Virtual environments help to avoid conflicts with Python packages used by Linux.

```
source /home/django/env/bin/activate
```

Setting up the Django project

For this tutorial, we'll create a temporary Django project. If you're deploying your own code, you'll have to upload it to the server instead. We'll be operating in the home directory, /home/django.Setting up the Django project

Let's create the Django project:

```
cd /home/django
source env/bin/activate
pip install django
django-admin startproject tutorial
```

Verify things are working by running:

```
cd tutorial
python manage.py runserver 0.0.0.0:80
```

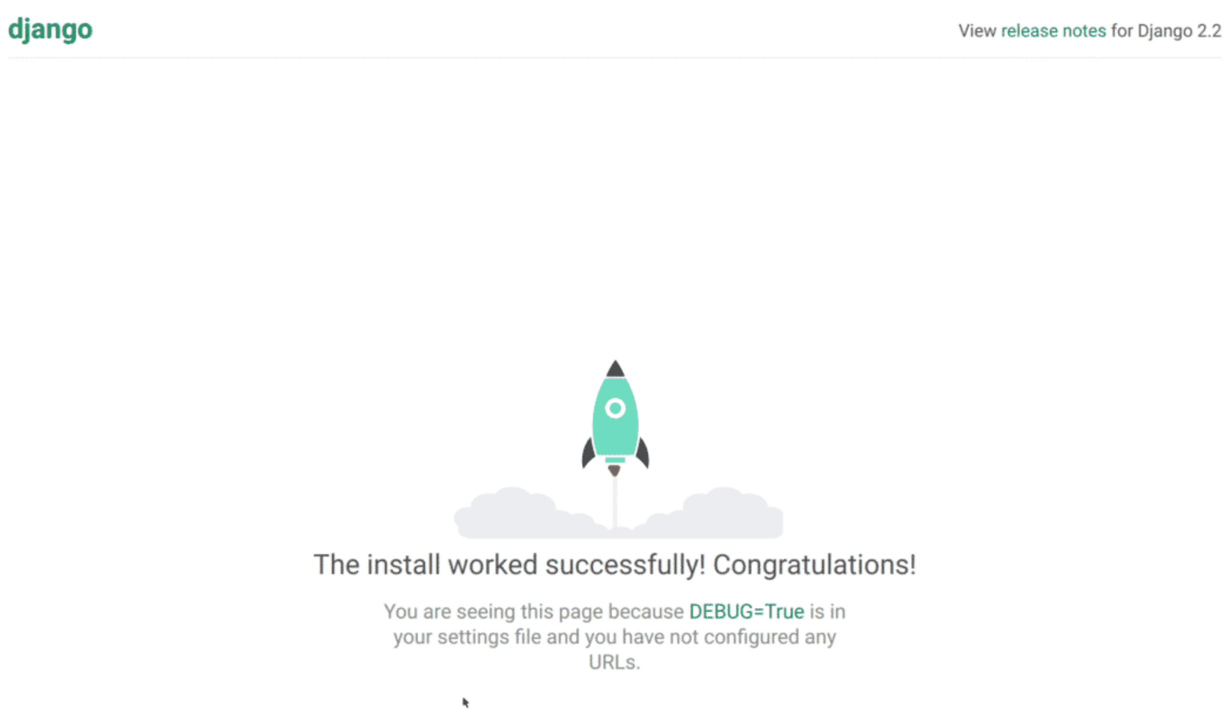
Our Ubuntu instance is running at 178.128.229.34 so we'll connect to that url and Verify things are working by running:

You'll likely see something like this:

To fix this, we'll edit `/home/django/tutorial/tutorial/settings.py`. Find `ALLOWED_HOSTS = []` and set it to:

```
ALLOWED_HOSTS = [
'178.128.229.34' # replace this with your server's IP address
 or the domain name you're using to connect
]
```

Now let's go back to **http://178.128.229.34**:



The install worked successfully! Congratulations!

You are seeing this page because DEBUG=True is in your settings file and you have not configured any URLs.

Great! We're online!

Setting up PostgreSQL, the database

By default, Django uses a SQLite3 database. Unfortunately, SQLite3 does not allow concurrent writes. If your website only ever has one user editing data, and the rest of the visitors are just reading pages, then this might be appropriate. But if you have multiple people editing data at the same time you likely want to use a different backend.

Common choices are PostgreSQL and Mysql. We'll go with PostgreSQL for this tutorial.

Start by installing PostgreSQL:

```
apt-get install postgresql
```

Then launch psql, a database shell. By default, only the postgres user is able to connect to the database so we'll first have to authenticate as that user:

```
su - postgres
psql
```

Next, we need a database and a user to access that database:

```
create database tutorial;
create user tutorial_user with encrypted password 'tutorial_password';
grant all privileges on database tutorial to tutorial_user;
```

Now, type exit or press Ctrl-D twice: once to exit psql, and once to log out of the postgresuser's shell.

Great! Now we have our database and user set up. Let's verify we can log in to our database.

We'll try to open up a database shell, this time logging in to the database we created with the user we created:

```
psql -Ututorial_user -dtutorial -h127.0.0.1 -W
```

At the prompt, enter the password we created: `tutorial_password`.

If you see a database shell, you've been successful. If you see any errors, you'll have to go back and figure out what's wrong.

Connecting Django to the database

To get Django connected to the database, we first need to install the Python PostgreSQL adapter:

```
pip install psycopg2-binary
```

Then, let's open up `/home/django/tutorial/tutorial/settings.py`and configure the connection.

Find your current database connection; if you didn't modify it, it might look something like this:

```
DATABASES = {
'default': {
'ENGINE': 'django.db.backends.sqlite3',
'NAME': os.path.join(BASE_DIR, 'db.sqlite3'),
}
}
```

To connect to PostgreSQL, we'll replace it with the following:

```
DATABASES = {
'default': {
'ENGINE': 'django.db.backends.postgresql_psycopg2',
'NAME': 'tutorial',
'USER': 'tutorial_user',
'PASSWORD': 'tutorial_password',
'HOST': '127.0.0.1',
'PORT': '5432',
}
}
```

Let's test the connection:

```
cd /home/django/tutorial
python manage.py runserver 0.0.0.0:80
```

You should again be able to visit your website (for us at http://178.128.229.34/, but replace that with your IP or hostname).

If all is well, we can continue.

Setting up nginx, the web server

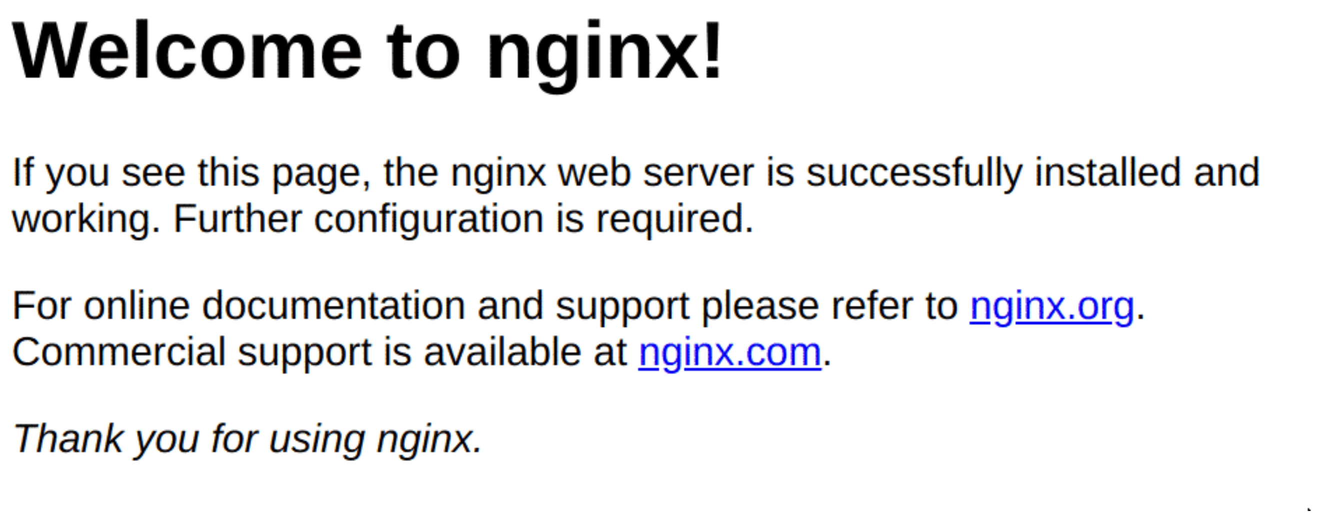
When you run `python manage.py runserver`, you're using Django's development server. This is great for local development, but as with SQLite3, it's not really suited for production.

Common choices for production web servers are nginx and Apache. For this tutorial, we will use nginx.

Install nginx using the following:

```
apt-get install nginx
```

Now, if everything has worked well, nginx should be running on port 80. Go ahead and check out you website; you should see:



Welcome to nginx!

If you see this page, the nginx web server is successfully installed and working. Further configuration is required.

For online documentation and support please refer to nginx.org.
Commercial support is available at nginx.com.

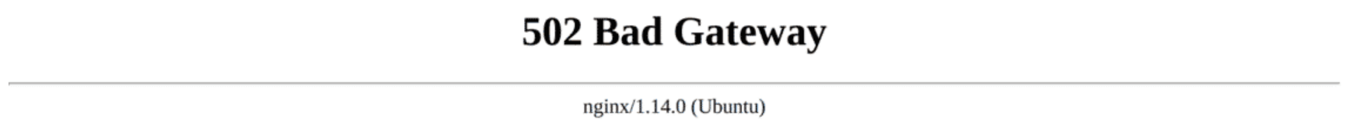
Thank you for using nginx.

Great, so nginx is up and running! Next we'll need to configure it to communicate with Django. Open up the nginx configuration file, located at /etc/nginx/sites-available/default. Let's replace the file with the following:

```
upstream django {
server 127.0.0.1:8000;
}

server {
listen 80;

location / {
try_files $uri @send_to_django;
}

location @send_to_django {
proxy_set_header Host $http_host;
proxy_redirect off;
proxy_pass http://django;
}
}
```

Test the configuration file by running nginx -t. If everything is ok, we can reload by running nginx -s reload.

Now, if you visit your site you will see the following:



502 Bad Gateway

nginx/1.14.0 (Ubuntu)

Whenever you see this, it means that nginx was unable to pass the request to the upstream process. At the moment, it's because it's trying to pass the request to 127.0.0.1:8000 but there is no process listening at that address.

Let's start the Django development server and try again:

```
cd /home/django/tutorial
python manage.py runserver 127.0.0.1:8000
```

and again visit your website. You should see your Django application.

Mounting Django on Gunicorn

Remember, we don’t want to use our Django development server in production. Instead, we’ll use a Web Server Gateway Interface (WSGI) server to run Django. Nginx will pass the request to the WSGI server, which is running Django.

Common choices for a WSGI server are Gunicorn and uWSGI. For this tutorial we will use Gunicorn.

Let’s install Gunicorn:

```
pip install gunicorn
```

Next, we can start gunicorn as follows:

```
cd /home/django/tutorial
gunicorn tutorial.wsgi
```

Now you should be able to visit your website and see your application running properly.

Running Gunicorn as a service

There are a few issues with running gunicorn like this:

1. If we close the SSH session, the gunicorn process will stop.
2. If the server reboots, the gunicorn process won’t start.
3. The process is running as root. If hackers find an exploit in our app’s code, they’ll be able to run commands as root. We don’t want this; but that’s why we created the djangouser!

To solve these problems, we’re going to run Gunicorn as a systemd service.

```
cd /home/django
mkdir bin
cd /home/django/bin
touch start-server.sh
```

In start-server.sh:

```
cd /home/django
source env/bin/activate
cd tutorial
gunicorn tutorial.wsgi
```

Now you can test the script:

```
cd /home/django/bin
bash start-server.sh
# visit your website, it should be running
```

Now we create the systemd service for Gunicorn.

Create /etc/systemd/system/gunicorn.serviceas follows:

```
[Unit]
Description=Gunicorn
After=network.target

[Service]
Type=simple
User=django
ExecStart=/home/django/bin/start-server.sh
Restart=on-failure

[Install]
WantedBy=multi-user.target
```

Now, let’s enable the service & start it

```
systemctl enable gunicorn
systemctl start gunicorn
```

You should be able to see your website at the moment.

We can turn gunicorn off as follows:

```
systemctl stop gunicorn
```

And you should see a 502 Bad Gateway.

Finally, let's check the boot cycle:

```
systemctl start gunicorn
reboot now
```

When your machine comes back online, you should see your website is up.

Static files

If you visit the Django admin panel on your website at /admin/ (for us, it's http://178.128.229.34/admin/), you'll notice static files aren't loading properly.

We'll need to create a new folder for static files:

```
cd /home/django
mkdir static
```

Then, we tell Django that's where it should put the static files by editing /home/django/tutorial/tutorial/settings.py, and adding:

```
STATIC_ROOT = '/home/django/static/'
```

Now we can gather the static files:

```
cd /home/django
source env/bin/activate
cd tutorial
python manage.py collectstatic
```

Finally, we need to tell nginx to serve those static files.

Let’s open up /etc/nginx/sites-available/default and add the following directly above your location / block:

```
location /static/ {
root /home/django;
try_files $uri =404;
}
```

The whole file should now look like this:

```
upstream django {
server 127.0.0.1:8000;
}

server {
listen 80;

location /static/ {
root /home/django;
try_files $uri =404;
}

location / {
try_files $uri @send_to_django;
}

location @send_to_django {
proxy_set_header Host $http_host;
proxy_redirect off;
proxy_pass http://django;
}
}
```

We can reload the file using nginx -s reload

And voila! Your static files will now be working fully.

Conclusion

At this point, your Django app is working properly. If you have some special requirements, you might need to set up a cache like Redis or a message queue like Rabbit MQ. You might also want to set up continuous deployment as the deployment procedure might take a while.

Another important step is to take the appropriate steps to secure your Ubuntu machine. Otherwise, you might find your server misbehaving!

Good luck!

#django

ABOUT THE AUTHOR

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Connor Bode is a software developer specializing in building web and mobile apps. He is the owner of the app development agency app development agency matix.io, located in Montreal, Canada. Connor can be found online on Twitter @connorbode.

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