

Quickstart: Compose and Django

Estimated reading time: 8 minutes

This quick-start guide demonstrates how to use Docker Compose to set up and run a simple Django/PostgreSQL app. Before starting, install Compose (</compose/install/>).

Define the project components

For this project, you need to create a Dockerfile, a Python dependencies file, and a `docker-compose.yml` file. (You can use either a `.yaml` or `.yml` extension for this file.)

1. Create an empty project directory.

You can name the directory something easy for you to remember. This directory is the context for your application image. The directory should only contain resources to build that image.

2. Create a new file called `Dockerfile` in your project directory.

The Dockerfile defines an application's image content via one or more build commands that configure that image. Once built, you can run the image in a container. For more information on `Dockerfile`, see the Docker user guide (</get-started/>) and the Dockerfile reference (</engine/reference/builder/>).

3. Add the following content to the `Dockerfile`.

```
FROM python:3
ENV PYTHONUNBUFFERED=1
WORKDIR /code
COPY requirements.txt /code/
RUN pip install -r requirements.txt
COPY . /code/
```

This `Dockerfile` starts with a Python 3 parent image (<https://hub.docker.com/r/library/python/tags/3/>). The parent image is modified by adding a new `code` directory. The parent image is further modified by installing the Python requirements defined in the `requirements.txt` file.

4. Save and close the `Dockerfile`.
5. Create a `requirements.txt` in your project directory.

This file is used by the `RUN pip install -r requirements.txt` command in your `Dockerfile`.

6. Add the required software in the file.

```
Django>=3.0,<4.0
psycopg2-binary>=2.8
```

7. Save and close the `requirements.txt` file.
8. Create a file called `docker-compose.yml` in your project directory.

The `docker-compose.yml` file describes the services that make your app. In this example those services are a web server and database. The compose file also describes which Docker images these services use, how they link together, any volumes they might need to be mounted inside the containers. Finally, the `docker-compose.yml` file describes which ports these services expose. See the `docker-compose.yml` reference (</compose/compose-file/>) for more information on how this file works.

9. Add the following configuration to the file.

```
version: "3.9"

services:
  db:
    image: postgres
    environment:
      - POSTGRES_DB=postgres
      - POSTGRES_USER=postgres
      - POSTGRES_PASSWORD=postgres
  web:
    build: .
    command: python manage.py runserver 0.0.0.0:8000
    volumes:
      - ./code
    ports:
      - "8000:8000"
    depends_on:
      - db
```

This file defines two services: The `db` service and the `web` service.

✔ **Note:**

This uses the build in development server to run your application on port 8000. Do not use this in a production environment. For more information, see Django documentation (<https://docs.djangoproject.com/en/3.1/intro/tutorial01/#the-development-server>).

10. Save and close the `docker-compose.yml` file.

Create a Django project

In this step, you create a Django starter project by building the image from the build context defined in the previous procedure.

1. Change to the root of your project directory.
2. Create the Django project by running the `docker-compose run (/compose/reference/run/)` command as follows.

```
$ sudo docker-compose run web django-admin startproject composeexample .
```

This instructs Compose to run `django-admin startproject composeexample` in a container, using the `web` service's image and configuration. Because the `web` image doesn't exist yet, Compose builds it from the current directory, as specified by the `build: .` line in `docker-compose.yml`.

Once the `web` service image is built, Compose runs it and executes the `django-admin startproject` command in the container. This command instructs Django to create a set of files and directories representing a Django project.

3. After the `docker-compose` command completes, list the contents of your project.

```
$ ls -l

drwxr-xr-x 2 root    root    composeexample
-rw-rw-r-- 1 user    user    docker-compose.yml
-rw-rw-r-- 1 user    user    Dockerfile
-rwxr-xr-x 1 root    root    manage.py
-rw-rw-r-- 1 user    user    requirements.txt
```

If you are running Docker on Linux, the files `django-admin` created are owned by `root`. This happens because the container runs as the `root` user. Change the ownership of the new files.

```
$ sudo chown -R $USER:$USER .
```

If you are running Docker on Mac or Windows, you should already have ownership of all files, including those generated by `django-admin`. List the files just to verify this.

```
$ ls -l

total 32
-rw-r--r--  1 user  staff  145 Feb 13 23:00 Dockerfile
drwxr-xr-x  6 user  staff  204 Feb 13 23:07 composeexample
-rw-r--r--  1 user  staff  159 Feb 13 23:02 docker-compose.yml
-rwxr-xr-x  1 user  staff  257 Feb 13 23:07 manage.py
-rw-r--r--  1 user  staff   16 Feb 13 23:01 requirements.txt
```

Connect the database

In this section, you set up the database connection for Django.

1. In your project directory, edit the `composeexample/settings.py` file.
2. Replace the `DATABASES = ...` with the following:

```
# settings.py

DATABASES = {
    'default': {
        'ENGINE': 'django.db.backends.postgresql',
        'NAME': 'postgres',
        'USER': 'postgres',
        'PASSWORD': 'postgres',
        'HOST': 'db',
        'PORT': 5432,
    }
}
```

These settings are determined by the postgres (https://hub.docker.com/_/postgres) Docker image specified in `docker-compose.yml`.

3. Save and close the file.
4. Run the `docker-compose up (/compose/reference/up/)` command from the top level directory for your project.

```
$ docker-compose up

djangosample_db_1 is up-to-date
Creating djangosample_web_1 ...
Creating djangosample_web_1 ... done
Attaching to djangosample_db_1, djangosample_web_1
db_1   | The files belonging to this database system will be owned by user "postgres"
db_1   | This user must also own the server process.
db_1   |
db_1   | The database cluster will be initialized with locale "en_US.utf8".
db_1   | The default database encoding has accordingly been set to "UTF8".
db_1   | The default text search configuration will be set to "english".
. . .

web_1  | July 30, 2020 - 18:35:38
web_1  | Django version 3.0.8, using settings 'composeexample.settings'
web_1  | Starting development server at http://0.0.0.0:8000/
web_1  | Quit the server with CONTROL-C.
```

At this point, your Django app should be running at port `8000` on your Docker host. On Docker Desktop for Mac and Docker Desktop for Windows, go to `http://localhost:8000` on a web browser to see the Django welcome page.





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.

✔ **Note:**

On certain platforms (Windows 10), you might need to edit `ALLOWED_HOSTS` inside `settings.py` and add your Docker host name or IP address to the list. For demo purposes, you can set the value to:

```
ALLOWED_HOSTS = ['*']
```

This value is **not** safe for production usage. Refer to the Django documentation (<https://docs.djangoproject.com/en/1.11/ref/settings/#allowed-hosts>) for more information.

5. List running containers.

In another terminal window, list the running Docker processes with the `docker container ls` command.

```
$ docker ps
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS
def85eff5f51	django_web	"python3 manage.py..."	10 minutes ago	Up 9 minutes	0.0.0.0:80->80
678ce61c79cc	postgres	"docker-entrypoint..."	20 minutes ago	Up 9 minutes	5432->5432

6. Shut down services and clean up by using either of these methods:

- Stop the application by typing `ctrl-c` in the same shell in where you started it:

```
Gracefully stopping... (press Ctrl+C again to force)
Killing test_web_1 ... done
Killing test_db_1 ... done
```

- Or, for a more elegant shutdown, switch to a different shell, and run `docker-compose down` (`/compose/reference/down/`) from the top level of your Django sample project directory.

```
vmb at mymachine in ~/sandbox/django
$ docker-compose down

Stopping django_web_1 ... done
Stopping django_db_1 ... done
Removing django_web_1 ... done
Removing django_web_run_1 ... done
Removing django_db_1 ... done
Removing network django_default
```

Once you've shut down the app, you can safely remove the Django project directory (for example, `rm -rf django`).

More Compose documentation

- [User guide \(/compose/\)](/compose/)
- [Installing Compose \(/compose/install/\)](/compose/install/)
- [Getting Started \(/compose/gettingstarted/\)](/compose/gettingstarted/)
- [Command line reference \(/compose/reference/\)](/compose/reference/)
- [Compose file reference \(/compose/compose-file/\)](/compose/compose-file/)
- [Sample apps with Compose \(/compose/samples-for-compose/\)](/compose/samples-for-compose/)

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