

Volumes

■ Outcomes

- 1.1 Access a shell prompt and issue commands with correct syntax
- 2.1 Configure container engines, create, and manage containers
- 2.3 Build a container image
- 2.4 Create and backup container volumes
- 2.5 Deploy a database in a container

■ Background

In this exercise you will have to opportunity to create a new volume, run a container with a volume mounted, create data on a volume, and back up a volume.

■ Creating a Volume

Create a volume with the `docker volume create` command and check to see if it is there with the `docker volume ls` command:

```
$ docker volume create db-data
db-data
$ docker volume ls
DRIVER      VOLUME NAME
local      db-data
```



Docker volumes are stored in `/var/lib/docker/volumes/<volume-name>`. If you're not running Docker natively (in Linux) that means your volumes live in that folder in a virtual drive used by your Docker Linux VM. That makes them pretty tough to get to without using Docker!

■ Running PostgreSQL

Now let's run a postgres container in the background with our volume mounted in `/var/lib/postgresql/data`, which is the path where the PostgreSQL database information is stored by default:

```
$ docker run -d --mount source=db-data,target=/var/lib/postgresql/data -e \ ❶ ❷
POSTGRES_PASSWORD=changeme postgres
26618a503c688c19728c87190beb7497f68b6e7d350b09e3eae7f2f71b1c8738 ❸
$ docker ps ❹
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS \
26618a503c68	postgres	"docker-entrypoint.s..."	28 seconds ago	Up 28 seconds	5432/tcp \

```
gifted_montalcini
```

- ❶ The `\` character is a line continuation. It means that the text below it, starting with "POSTGRES_PASSWORD", is actually on the same line but it couldn't fit on the screen.

② Here's an explanation of some of the options and arguments:

- `-d` run in the background (daemon)
- `--mount source=db-data,target=/var/lib/postgresql/data` mount the `exercise4-db` local volume in the `/var/lib/postgresql/data` directory of the container
- `-e POSTGRES_PASSWORD=changeme` set the environment variable for the postgres password to `changeme`. PostgreSQL won't start without a password.
- `postgres` run the postgres image

③ Your output may be slightly different if you don't have the `postgres` image available locally.

④ This is just to confirm that it's running

You can also check the logs to see how things went with `docker logs <CONTAINER ID>` where `<CONTAINER ID>` is the id from your `ps` command.

■ Creating a New Database

The easiest way to create a new database on our running container would be with the `psql` command. Fortunately the `psql` command is already on our container so we can `exec` it from there. Let's connect to our database and put some data in there:

```
$ docker exec -it <CONTAINER_ID> psql --username=postgres ①
psql (16.1 (Debian 16.1-1.pgdg120+1))
Type "help" for help.

postgres=# CREATE DATABASE top_secret; ②
CREATE DATABASE
postgres=# \c top_secret
You are now connected to database "top_secret" as user "postgres".
top_secret=# CREATE TABLE spies (name VARCHAR(64));
CREATE TABLE
top_secret=# INSERT INTO spies (name) VALUES ('Bob');
INSERT 0 1
top_secret=# \q ③
```

① Here is an explanation of the options:

- `exec` run a command on an already running container
- `-it` run interactively
- `<CONTAINER ID>` your container id as listed in the `ps` output above
- `psql` run the `psql` command (command line SQL client)
- `--username=postgres` this argument is passed to the `psql` command, it says you want to connect as the default postgres user

② These `psql` commands create a bit of data for us to use

③ `\q` exits `psql`

■ Backing up the Database Directory

Now we will start another container, that uses the same volume as our postgres container. On the new container we will use the `tar` command to make a compressed archive the database directory:

```
$ docker run --rm --volumes-from 26618a503c68 -v "$(pwd):/backup" ubuntu \ ❶
tar caf /backup/db-backup.tar.gz /var/lib/postgresql
tar: Removing leading '/' from member names
$ ls
```

Directory: C:\Users\rxt1077\temp\

Mode	LastWriteTime	Length	Name
----	-----	-----	----
-a----	9/19/2024 5:32 PM	6749916	db-backup.tar.gz ❷

❶ This is a long command, so let's take it argument-by-argument:

run start a new container and run a command on it

--rm don't archive this container when we are done, it's temporary

--volumes-from <CONTAINER ID> give us the same volumes at the same mountpoints as our running postgres container

-v "\$(pwd):/backup" bind mount the local working directory to **/backup** on the container we are creating

ubuntu use the **ubuntu** base image

tar caf /backup/db-backup.tar.gz /var/lib/postgresql This is the command that is run on the container. It [creates a compressed tar archive](#) from the database directory and writes it to **/backup/db-backup.tar.gz**.

❷ Here's our backup in the directory where we were working on the host machine.

■ Deliverables

Submit your **db-backup.tar.gz** file as your work for this exercise.

■ Resources

- [Docker Documentation: Use volumes](#)
- [Docker Hub: postgres](#)