HOW TO RUN MONGODB AS A DOCKER CONTAINER

MongoDB and Docker containers

Since MongoDB is among the most popular NoSQL databases today, you may find it necessary to run MongoDB as a Docker container. In this article, you'll learn:

- The Benefits of using MongoDB in a Docker container
- How to install Docker
- How to install Docker Compose
- How to configure MongoDB as a Docker container
- How to establish external connections to MongoDB containers
- How to set up advanced Docker containers for MongoDB

At the end of this tutorial, we will look at advanced configurations that give you a glimpse of the extensibility of a containerized project. We will create a self-containing project with a MongoDB instance and Mongo Express web interface on a dedicated network, and Docker volume to maximize the portability of the project.

Let's get started.

(This article is part of our MongoDB Guide. Use the right-hand menu to navigate.)

Benefits of using MongoDB in a Docker container

Docker is a tool to easily use containers to create, deploy, and run applications. A container is a standard unit of software that puts applications and all its dependencies in a single package. The

value of such containers is that the software can run on any server platform, regardless of its hardware or configuration.

You can use Docker to run MongoDB instances. When you set up MongoDB Docker container instances, you can create a portable and extensible NoSQL database. This containerized MongoDB instance behaves exactly like a non-containerized MongoDB instance, without the worry of the server configuration.

Installing Docker

We will start this tutorial by setting up a simple Docker installation to run containers on a Ubuntu-based server. We can get the Docker installation packages from the official Docker repository. Here are the installation steps:

1. Update existing packages.

```
sudo apt update && sudo apt upgrade -y
```

```
barry@ubser001 ~
$ sudo apt update && sudo apt upgrade -y
Hit:1 http://us.archive.ubuntu.com/ubuntu focal InRelease
Hit:2 http://us.archive.ubuntu.com/ubuntu focal-updates InRelease
Hit:3 https://download.docker.com/linux/ubuntu focal InRelease
Hit:4 http://us.archive.ubuntu.com/ubuntu focal-backports InRelease
Hit:5 http://us.archive.ubuntu.com/ubuntu focal-security InRelease
Reading package lists... Done
Building dependency tree
Reading state information... Done
All packages are up to date.
Reading package lists... Done
Building dependency tree
Reading state information... Done
Calculating upgrade... Done
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
```

2. Install prerequisite packages.

```
sudo apt install apt-transport-https ca-certificates curl software-properties-common
```

```
barry@ubser001 ~
$ sudo apt install apt-transport-https ca-certificates curl software-properties-common
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  python3-certifi python3-requests python3-requests-unixsocket
Suggested packages:
  python3-cryptography python3-openssl python3-socks
The following NEW packages will be installed:
  apt-transport-https ca-certificates curl python3-certifi python3-requests
  python3-requests-unixsocket software-properties-common
0 upgraded, 7 newly installed, 0 to remove and 0 not upgraded.
Need to get 529 kB of archives.
After this operation, 1,774 kB of additional disk space will be used.
Do you want to continue? [Y/n] Y
```

3. Add the GPG key from the official Docker repository.

```
curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo apt-key add -
```

```
barry@ubser001 ~
$ curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo apt-key add -
OK
```

4. Add the official Docker repository to APT sources.

```
sudo add-apt-repository
"deb  https://download.docker.com/linux/ubuntu $(lsb_release -cs) stable"
```

```
barry@ubser001 ~
$ sudo add-apt-repository \
"deb [arch=amd64] https://download.docker.com/linux/ubuntu $(lsb_release -cs) stable"
Hit:1 http://us.archive.ubuntu.com/ubuntu focal InRelease
Hit:2 http://us.archive.ubuntu.com/ubuntu focal-updates InRelease
Hit:3 http://us.archive.ubuntu.com/ubuntu focal-backports InRelease
Get:4 https://download.docker.com/linux/ubuntu focal InRelease [36.2 kB]
Hit:5 http://us.archive.ubuntu.com/ubuntu focal-security InRelease
Get:6 https://download.docker.com/linux/ubuntu focal/stable amd64 Packages [4,226 B]
Fetched 40.4 kB in 2s (26.0 kB/s)
Reading package lists... Done
```

5. Update the Ubuntu package list.

```
sudo apt update
```

```
barry@ubser001 ~
$ sudo apt update
Hit:1 http://us.archive.ubuntu.com/ubuntu focal InRelease
Hit:2 http://us.archive.ubuntu.com/ubuntu focal-updates InRelease
Hit:3 http://us.archive.ubuntu.com/ubuntu focal-backports InRelease
Hit:4 https://download.docker.com/linux/ubuntu focal InRelease
Hit:5 http://us.archive.ubuntu.com/ubuntu focal-security InRelease
Reading package lists... Done
Building dependency tree
Reading state information... Done
All packages are up to date.
```

6. Verify the Docker repository.

```
apt-cache policy docker-ce
```

```
barry@ubser001 ~
$ apt-cache policy docker-ce
docker-ce:
  Installed: (none)
  Candidate: 5:19.03.14~3-0~ubuntu-focal
  Version table:
     5:19.03.14~3-0~ubuntu-focal 500
        500 https://download.docker.com/linux/ubuntu focal/stable amd64 Packages
     5:19.03.13~3-0~ubuntu-focal 500
        500 https://download.docker.com/linux/ubuntu focal/stable amd64 Packages
     5:19.03.12~3-0~ubuntu-focal 500
        500 https://download.docker.com/linux/ubuntu focal/stable amd64 Packages
     5:19.03.11~3-0~ubuntu-focal 500
        500 https://download.docker.com/linux/ubuntu focal/stable amd64 Packages
     5:19.03.10~3-0~ubuntu-focal 500
        500 https://download.docker.com/linux/ubuntu focal/stable amd64 Packages
     5:19.03.9~3-0~ubuntu-focal 500
        500 https://download.docker.com/linux/ubuntu focal/stable amd64 Packages
```

7. Install the Docker community edition.

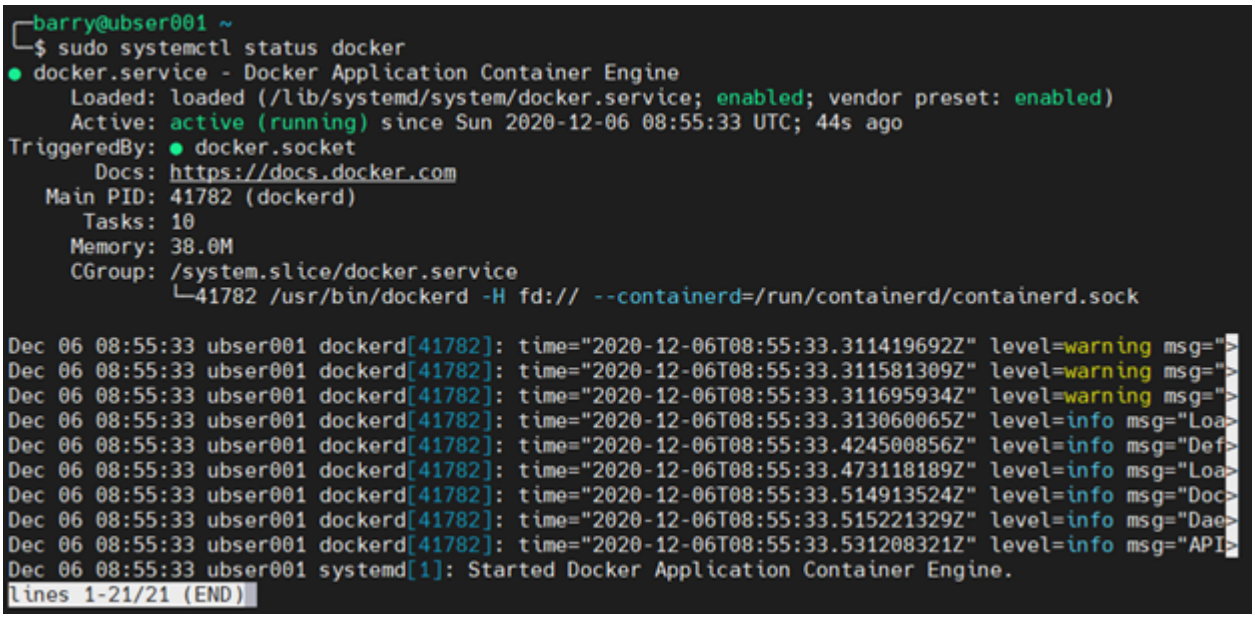
```
sudo apt install docker-ce
```

```
barry@ubser001 ~
$ sudo apt install docker-ce
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  aufs-tools cgroupfs-mount containerd.io docker-ce-cli pigz
The following NEW packages will be installed:
  aufs-tools cgroupfs-mount containerd.io docker-ce docker-ce-cli pigz
0 upgraded, 6 newly installed, 0 to remove and 0 not upgraded.
Need to get 91.5 MB of archives.
After this operation, 413 MB of additional disk space will be used.
Do you want to continue? [Y/n] Y
```

8. Check the

status of the installation with the following command. If the service status returns active (running), Docker is successfully installed and active on the system.

```
sudo systemctl status docker
```



Installing Docker Compose

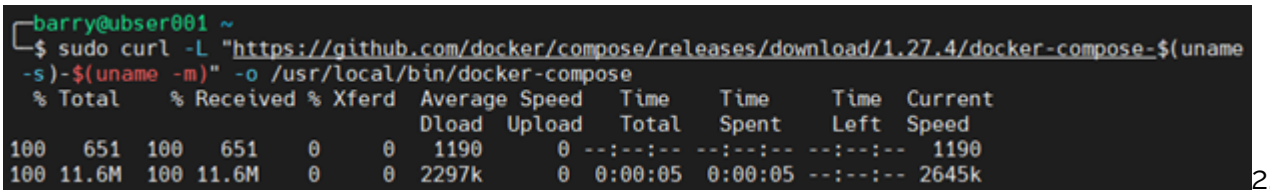
We can use the command line interface (CLI) to create and manage Docker containers. Using CLI can be tedious when dealing with multiple containers and configurations.

Instead, you can use Docker Compose to take multiple containers and integrate them into a single application. It uses the YAML format to create the Compose files that can be easily executed using docker-compose up or down commands that will create or remove all the containers and configurations within a Compose file, respectively.

Let's install Docker Compose on the Ubuntu server.

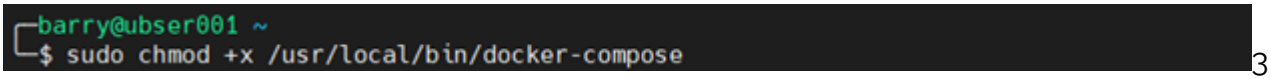
1. Install the current stable release of Docker Compose.

```
sudo curl -L
"https://github.com/docker/compose/releases/download/1.27.4/docker-compose-$(
uname -s)-$(uname -m)" -o /usr/local/bin/docker-compose
```



2. Apply executable permissions for the downloaded binary.

```
>sudo chmod +x /usr/local/bin/docker-compose
```



3. Verify the Docker Compose installation.

```
docker-compose --version
```

```
barry@ubser001 ~
$ docker-compose --version
docker-compose version 1.27.4, build 40524192
```

Setting up MongoDB using a Docker Compose container

This section explains how to set up a MongoDB container using a Docker Compose file.

Before we create the Compose file, let's search for the official MongoDB container image using the search command.

```
sudo docker search mongodb
```

```
barry@ubser001 ~
$ sudo docker search mongodb
NAME                              DESCRIPTION                                     STARS               OFFICIAL
mongo                             MongoDB document databases provide high avai…   7363                [OK]
mongo-express                     Web-based MongoDB admin interface, written w…   823                 [OK]
```

The search results show us that an official MongoDB container image called "mongo" exists in the Docker container registry.

By default, the MongoDB container stores the databases within the /data/db directory within the container.

Create a Docker Compose directory to hold MongoDB

Next, we need to create a directory called "mongodb" to hold the Docker Compose file. We will create another directory called "database" inside the "mongodb" directory to map to the database location of the container and enable local access to the database. We use the -pv operator to create those parent folders.

```
>mkdir -pv mongodb/database
```

```
barry@ubser001 ~
$ mkdir -pv mongodb/database
mkdir: created directory 'mongodb'
mkdir: created directory 'mongodb/database'
```

The following docker-compose.yml file will be created within the "mongodb" directory to construct the MongoDB container.

docker-compose.yml

```
version: "3.8"
services:
mongodb:
image : mongo
container_name: mongodb
environment:
- PUID=1000
- PGID=1000
volumes:
- /home/barry/mongodb/database:/data/db
ports:
- 27017:27017
```

```
restart: unless-stopped
```

We used version 3.8 to create the above Compose file. The Compose file version directly correlates to:

- Which options are available within the Compose file.
- The minimum supported Docker Engine version.

In this case, It's Docker engine 19.03.0 or newer.

MongoDB service within the Docker container

In the Compose file, we have created a service called "mongodb" using the Docker image "mongo." We have named the container "mongodb" and mapped the database folder within the container to the local database folder (/home/barry/mongodb/database.) These kinds of mappings are known as bind-mount volumes.

The environment variables are used to define the "user" and "group" of the container. Finally, we mapped the local port 27017 to internal port 27017. Then the restart policy is set to restart unless stopped by the user.

Here's the file structure of the project:

```
tree mongodb
```

```
barry@ubser001 ~
$ tree mongodb
mongodb
├── database
└── docker-compose.yml

1 directory, 1 file
```

Starting the MongoDB Docker container

Go to the "mongodb" folder and run the docker-compose up command to start the MongoDB container. The -d operator runs the detached container as a background process.

```
sudo docker-compose up -d
```

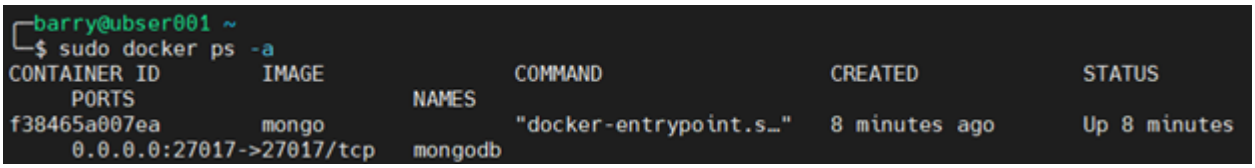
```
barry@ubser001 ~/mongodb
$ sudo docker-compose up -d
[sudo] password for barry:
Creating network "mongodb_default" with the default driver
Pulling mongo (mongo:)...
latest: Pulling from library/mongo
f22ccc0b8772: Pull complete
3cf8fb62ba5f: Pull complete
e80c964ece6a: Pull complete
329e632c35b3: Pull complete
3e1bd1325a3d: Pull complete
4aa6e3d64a4a: Pull complete
035bca87b778: Pull complete
874e4e43cb00: Pull complete
08cb97662b8b: Pull complete
f623ce2ba1e1: Pull complete
f100ac278196: Pull complete
461b064aece5: Pull complete
Digest: sha256:00878f3d8e0a61997f2ea67351934b815a77c5ff8985df3ec041bca1c88258f4
Status: Downloaded newer image for mongo:latest
Creating mongodb ... done
```

The up

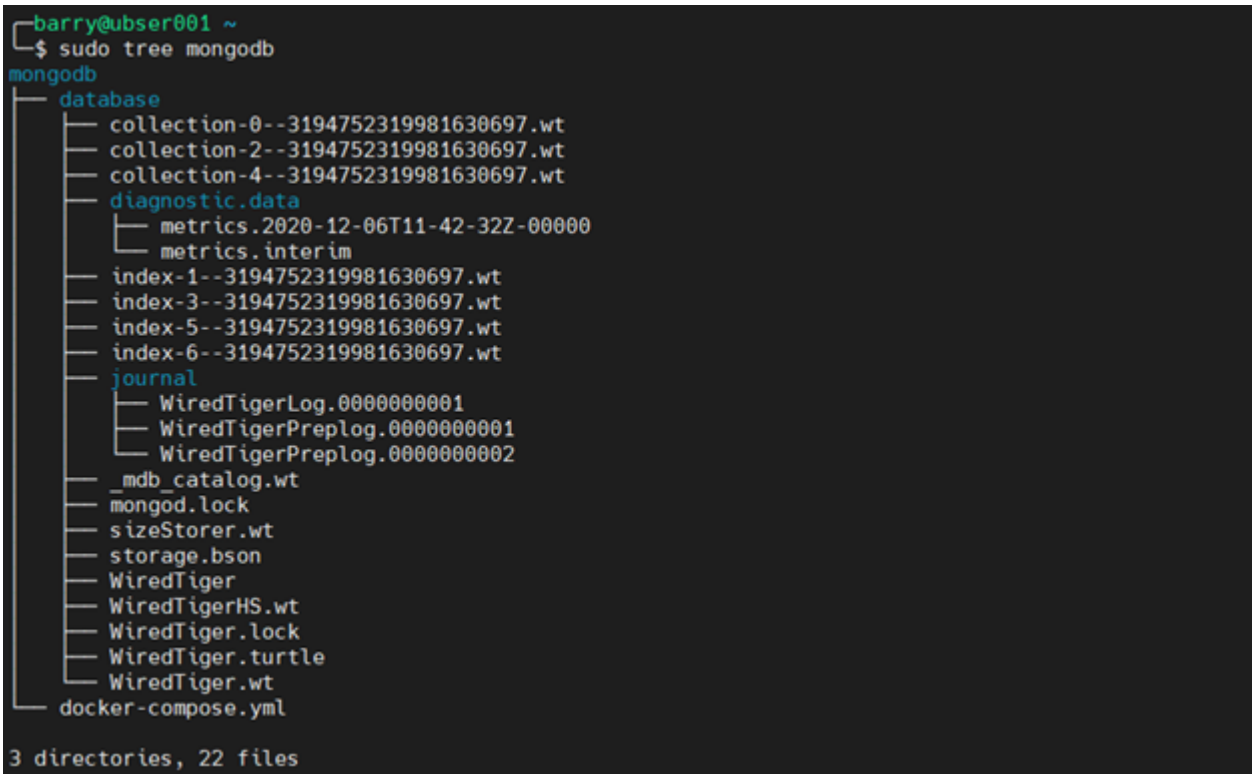
command will pull the “mongo” image from the Docker registry and create the container using the given parameters in the docker-compose.yml file.

Let’s verify if the container is running and the local folder is populated by using the following commands. The -a operator will display all the containers within the system regardless of their status.

```
sudo docker ps -a
```




```
sudo tree mongodb
```



Interacting with MongoDB in a Docker container

Using the Docker exec command, we can access the terminal of the MongoDB container. Since the container runs in a detached mode, we will use the Docker interactive terminal to establish the connection.

```
sudo docker exec -it mongodb bash
```

```
barry@ubser001 ~
$ sudo docker exec -it mongodb bash
root@f38465a007ea:/# mongo
MongoDB shell version v4.4.2
connecting to: mongodb://127.0.0.1:27017/?compressors=disabled&gssapiServiceName=mongodb
Implicit session: session { "id" : UUID("5fb25459-bbcd-4c89-97c3-cd4d5609a2ff") }
MongoDB server version: 4.4.2
Welcome to the MongoDB shell.
For interactive help, type "help".
For more comprehensive documentation, see
        https://docs.mongodb.com/
Questions? Try the MongoDB Developer Community Forums
        https://community.mongodb.com
---
The server generated these startup warnings when booting:
        2020-12-06T11:42:32.453+00:00: Using the XFS filesystem is strongly recommended with the Wir
edTiger storage engine. See http://dochub.mongodb.org/core/prodnotes-filesystem
        2020-12-06T11:42:32.964+00:00: Access control is not enabled for the database. Read and writ
e access to data and configuration is unrestricted
---
---
        Enable MongoDB's free cloud-based monitoring service, which will then receive and display
        metrics about your deployment (disk utilization, CPU, operation statistics, etc).

        The monitoring data will be available on a MongoDB website with a unique URL accessible to y
ou
        and anyone you share the URL with. MongoDB may use this information to make product
        improvements and to suggest MongoDB products and deployment options to you.

        To enable free monitoring, run the following command: db.enableFreeMonitoring()
        To permanently disable this reminder, run the following command: db.disableFreeMonitoring()
---
>
```

In the container's bash terminal, we call the mongo command to access MongoDB. For this MongoDB Docker Compose example, we will create a database called "food" and a collection called "fruits," along with three documents.

1. Switch the database.

```
use food
```

2. Create the collection.

```
db.createCollection("fruits")
```

3. Insert documents

```
db.fruits.insertMany()
```

```
> use food
switched to db food
> db.createCollection("fruits")
{ "ok" : 1 }
> db.fruits.insertMany([
... {name: "apple", origin: "usa", price: 5},
... {name: "orange", origin: "italy", price: 3},
... {name: "mango", origin: "malaysia", price: 3}
... ])
{
        "acknowledged" : true,
        "insertedIds" : [
                ObjectId("5fcccd5c79274820ab6c3b54"),
                ObjectId("5fcccd5c79274820ab6c3b55"),
                ObjectId("5fcccd5c79274820ab6c3b56")
        ]
}
>
```

Search for the

documents using the find command.

`db.fruits.find().pretty()`

```
> db.fruits.find().pretty()
{
        "_id" : ObjectId("5fcccd5c79274820ab6c3b54"),
        "name" : "apple",
        "origin" : "usa",
        "price" : 5
}
{
        "_id" : ObjectId("5fcccd5c79274820ab6c3b55"),
        "name" : "orange",
        "origin" : "italy",
        "price" : 3
}
{
        "_id" : ObjectId("5fcccd5c79274820ab6c3b56"),
        "name" : "mango",
        "origin" : "malaysia",
        "price" : 3
}
>
```

The MongoDB container will act like any normal MongoDB installation, with no concerns about the underlying software and hardware configuration. Using the exit command, we can exit both the MongoDB shell and container shell.

```
> exit
bye
root@f38465a007ea:/# exit
exit
barry@ubser001 ~
$
```

External connections to MongoDB container

While creating the MongoDB container, we mapped the internal MongoDB port to the corresponding port in the server, exposing the MongoDB container to external networks.

The following MongoDB Docker Compose example demonstrates how we can connect to the container from an external endpoint by simply pointing the mongo command to the appropriate server and port.

`mongo 10.10.10.60:27017`

```
barry@mongodb04:~$ mongo 10.10.10.60:27017
MongoDB shell version v4.4.2
connecting to: mongodb://10.10.10.60:27017/test?compressors=disabled&gssapiServiceName=mongodb
Implicit session: session { "id" : UUID("0912297b-c0d7-4219-b76d-eb33689127ae") }
MongoDB server version: 4.4.2
---
The server generated these startup warnings when booting:
        2020-12-06T11:42:32.453+00:00: Using the XFS filesystem is strongly recommended with the WiredTiger stor
age engine. See http://dochub.mongodb.org/core/prodnotes-filesystem
        2020-12-06T11:42:32.964+00:00: Access control is not enabled for the database. Read and write access to
data and configuration is unrestricted
---
---
        Enable MongoDB's free cloud-based monitoring service, which will then receive and display
        metrics about your deployment (disk utilization, CPU, operation statistics, etc).

        The monitoring data will be available on a MongoDB website with a unique URL accessible to you
        and anyone you share the URL with. MongoDB may use this information to make product
        improvements and to suggest MongoDB products and deployment options to you.

        To enable free monitoring, run the following command: db.enableFreeMonitoring()
        To permanently disable this reminder, run the following command: db.disableFreeMonitoring()
---
>
```

The find

command in our MongoDB Docker Compose example will search for the fruits collection and its documents to verify that we are connected to the MongoDB container.

```
show databases
use food
show collections
db.fruits.find().pretty()
```

```
> show databases
admin   0.000GB
config  0.000GB
food    0.000GB
local   0.000GB
> use food
switched to db food
> show collections
fruits
> db.fruits.find().pretty()
{
        "_id" : ObjectId("5fcccd5c79274820ab6c3b54"),
        "name" : "apple",
        "origin" : "usa",
        "price" : 5
}
{
        "_id" : ObjectId("5fcccd5c79274820ab6c3b55"),
        "name" : "orange",
        "origin" : "italy",
        "price" : 3
}
{
        "_id" : ObjectId("5fcccd5c79274820ab6c3b56"),
        "name" : "mango",
        "origin" : "malaysia",
        "price" : 3
}
>
```

Data resilience and recreating the MongoDB Docker container

We've mapped the database to a local folder so that, even if you remove the container, you can use the saved data in the local folder to recreate a new MongoDB container.

Let's test that. We'll:

1. Remove the container using the docker-compose down.
2. Delete the associated images.
3. Recreate a new MongoDB database using the Compose file and local database files.

Remove the MongoDB container.

```
sudo docker-compose down
```

```
barry@ubser001 ~/mongodb
$ sudo docker-compose down
[sudo] password for barry:
Stopping mongodb ... done
Removing mongodb ... done
Removing network mongodb_default
```

Remove the local mongo image.

```
sudo docker rmi mongo
```

```
barry@ubser001 ~
$ sudo docker rmi mongo
Untagged: mongo:latest
Untagged: mongo@sha256:00878f3d8e0a61997f2ea67351934b815a77c5ff8985df3ec041bca1c88258f4
Deleted: sha256:60930105324282947c57d98729be68394062249ab347e4afc78e0cab9777a4eb
Deleted: sha256:d3c340b9fb3756edbf106bc38081447ee3a362ec2cef54d2cb9496310d211f55
Deleted: sha256:df411d930f08ff19c01fff7498a7c161ffe353027d1ee0be99aef4150ef2f237
Deleted: sha256:9da06454ee6eff2960465ba510f4180810bd95d22caa65d958923aeccaa12a12
Deleted: sha256:4fc8092849352849654c290a66285e0b989f01e73a95f869a8ee9bb2eadaebf6
Deleted: sha256:4545ce32b03c37edb33aedeac6ad411047ed6dd94650697e2465db1a86507f93
Deleted: sha256:9abb615f3c3c97191bf206d3228b5bd0978e370394e71984a0d183efb0e0bd9c
Deleted: sha256:eb6c9f1a2a53c149123b96a258dcd25c29b0b8c1709b8a326bc6b9ebaa43dec8
Deleted: sha256:1acc9a7abd496942e1469e91d2f7d2b7d9e0c696f2b392ef1e85d2eaef91e96b
Deleted: sha256:2589aa72cefbcd28ecbf0798bf2ca438af965daedbbb434e8f92d4bb2d689831
Deleted: sha256:9459b6a89846db0723e467610b841e6833dbb2aae6133319a91f2f70c388afac
Deleted: sha256:9a9311f7fcddf94f7476ce89f9703e8360e8cf347ef486a280735f5cf98888cd
Deleted: sha256:b43408d5f11b7b2faf048ae4eb25c296536c571fb2f937b4f1c3883386e93d64
```

Verify the local database files.

From the output below, we can identify that even though we removed the containers, the data mapped to a local directory did not get removed.

```
sudo tree mongodb
```

```
barry@ubser001 ~
$ sudo tree mongodb
mongodb
├── database
│   ├── collection-0--3194752319981630697.wt
│   ├── collection-11--3194752319981630697.wt
│   ├── collection-2--3194752319981630697.wt
│   ├── collection-4--3194752319981630697.wt
│   ├── diagnostic.data
│   │   └── metrics.2020-12-06T11-42-32Z-00000
│   ├── index-12--3194752319981630697.wt
│   ├── index-1--3194752319981630697.wt
│   ├── index-3--3194752319981630697.wt
│   ├── index-5--3194752319981630697.wt
│   ├── index-6--3194752319981630697.wt
│   ├── journal
│   │   ├── WiredTigerLog.0000000001
│   │   ├── WiredTigerPreplog.0000000001
│   │   └── WiredTigerPreplog.0000000002
│   ├── _mdb_catalog.wt
│   ├── mongod.lock
│   ├── sizeStorer.wt
│   ├── storage.bson
│   ├── WiredTiger
│   ├── WiredTigerHS.wt
│   ├── WiredTiger.lock
│   ├── WiredTiger.turtle
│   └── WiredTiger.wt
└── docker-compose.yml

3 directories, 23 files
```

Recreate a new MongoDB Docker container.

Now, we will recreate the container using the original docker-compose.yml file. We execute the following command in the “mongodb” folder.

```
sudo docker-compose up -d
```

```
barry@ubser001 ~/mongodb
$ sudo docker-compose up -d
Creating network "mongodb_default" with the default driver
Pulling mongo (mongo:)...
latest: Pulling from library/mongo
f22ccc0b8772: Pull complete
3cf8fb62ba5f: Pull complete
e80c964ece6a: Pull complete
329e632c35b3: Pull complete
3e1bd1325a3d: Pull complete
4aa6e3d64a4a: Pull complete
035bca87b778: Pull complete
874e4e43cb00: Pull complete
08cb97662b8b: Pull complete
f623ce2ba1e1: Pull complete
f100ac278196: Pull complete
461b064aece5: Pull complete
Digest: sha256:00878f3d8e0a61997f2ea67351934b815a77c5ff8985df3ec041bca1c88258f4
Status: Downloaded newer image for mongo:latest
Creating mongodb ... done
```

Verify the data in the MongoDB container.

Let's now access the bash shell in the container and check for the "fruits" collections.

```
sudo docker exec -it mongodb bash
```

```
barry@ubser001 ~/mongodb
$ sudo docker exec -it mongodb bash
root@e1c300bfe465:/# mongo
MongoDB shell version v4.4.2
connecting to: mongodb://127.0.0.1:27017/?compressors=disabled&gssapiServiceName=mongodb
Implicit session: session { "id" : UUID("dd9841d4-bbcf-4e04-b25b-2ff8755d670f") }
MongoDB server version: 4.4.2
```

```
show databases
use food
db.fruits.find().pretty()
```

```
> show databases
admin   0.000GB
config  0.000GB
food    0.000GB
local   0.000GB
> use food
switched to db food
> db.fruits.find().pretty()
{
        "_id" : ObjectId("5fcccd5c79274820ab6c3b54"),
        "name" : "apple",
        "origin" : "usa",
        "price" : 5
}
{
        "_id" : ObjectId("5fcccd5c79274820ab6c3b55"),
        "name" : "orange",
        "origin" : "italy",
        "price" : 3
}
{
        "_id" : ObjectId("5fcccd5c79274820ab6c3b56"),
        "name" : "mango",
        "origin" : "malaysia",
        "price" : 3
}
>
```

The result indicates we created the new container with the local database information associated with the new container.

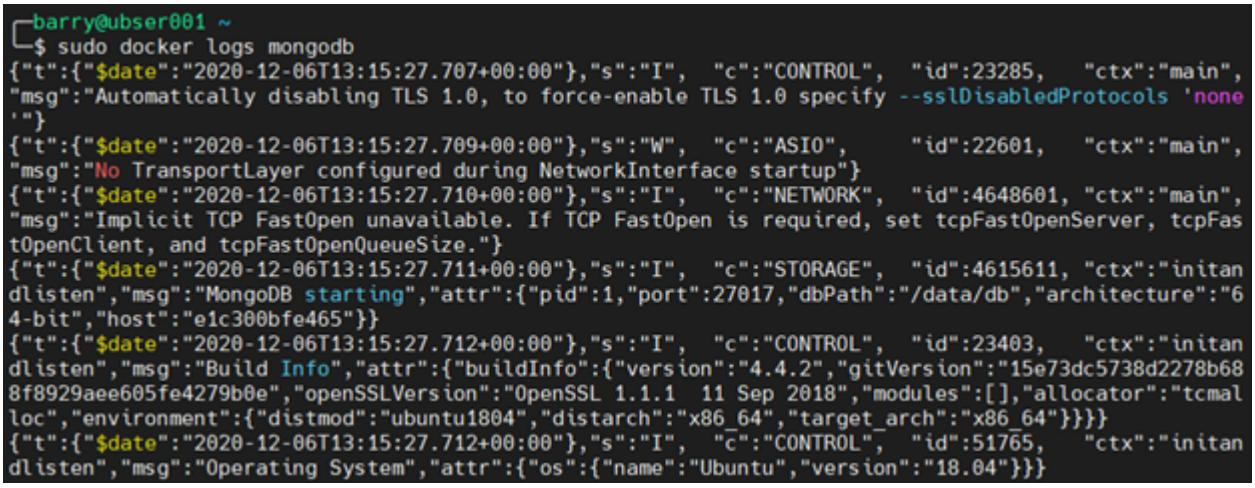
Additionally, we can simply move the container by moving the local folder structure to a new server

and creating a container using the docker-compose.yml file. You can use Docker volumes instead of locally saving the data to increase the portability of the database.

Monitoring the MongoDB container log files

Every container creates logs that you can use to monitor and debug the container. We can access the container logs using the Docker logs command with the container name to be monitored.

```
sudo docker logs mongodb
```



Setting up advanced Docker containers for MongoDB

In this section, we'll create a secure MongoDB container that requires a username and password to access the database.

In earlier MongoDB Docker Compose examples, we mapped the database data to a local folder. This method is tedious and requires manual intervention when moving the Docker container. Using Docker volumes, we can create Docker-native, persistent volumes that you can easily transfer between Docker installations.

Although we can use the CLI to manipulate the MongoDB instance, a graphical user interface (GUI) is more convenient.

Mongo Express is a web-based MongoDB administration interface that also can be run as a containerized application.

The docker-compose file comes in handy as a single YAML file that captures all the requirements.

docker-compose.yml

```
version: "3.8"
services:
mongodb:
image: mongo
container_name: mongodb
environment:
- MONGO_INITDB_ROOT_USERNAME=root
- MONGO_INITDB_ROOT_PASSWORD=pass12345
volumes:
```

```
- mongodb-data:/data/db
networks:
- mongodb_network
ports:
- 27017:27017
healthcheck:
test: echo 'db.runCommand("ping").ok' | mongo 10.10.10.60:27017/test --quiet
interval: 30s
timeout: 10s
retries: 3
restart: unless-stopped
mongo-express:
image: mongo-express
container_name: mongo-express
environment:
- ME_CONFIG_MONGODB_SERVER=mongodb
- ME_CONFIG_MONGODB_ENABLE_ADMIN=true
- ME_CONFIG_MONGODB_ADMINUSERNAME=root
- ME_CONFIG_MONGODB_ADMINPASSWORD=pass12345
- ME_CONFIG_BASICAUTH_USERNAME=admin
- ME_CONFIG_BASICAUTH_PASSWORD=admin123
volumes:
- mongodb-data
depends_on:
- mongodb
networks:
- mongodb_network
ports:
- 8081:8081
healthcheck:
test: wget --quiet --tries=3 --spider http://admin:admin123@10.10.10.60:8081
|| exit 1
interval: 30s
timeout: 10s
retries: 3
restart: unless-stopped
volumes:
mongodb-data:
name: mongodb-data
networks:
mongodb_network:
name: mongodb_network
```

Now, let's break down the Compose file given above. First, we have created two services:

- mongodb
- mongo-express

mongodb service

We configured the root username and password of the “mongodb” container using the following environment variables:

- MONGO_INITDB_ROOT_USERNAME
- MONGO_INITDB_ROOT_PASSWORD

We mapped the data volume to mongodb-data Docker volume, and defined the network as mongodb_network, while opening port 27017.

mongo-express service

The environment variables of the mongo-express container are:

- ME_CONFIG_MONGODB_SERVER – MongoDB service (mongodb)
- ME_CONFIG_MONGODB_ENABLE_ADMIN – Enable access to all databases as admin
- ME_CONFIG_MONGODB_ADMINUSERNAME – Admin username of the MongoDB database
- ME_CONFIG_MONGODB_ADMINPASSWORD – Admin password of the MongoDB database
- ME_CONFIG_BASICAUTH_USERNAME – Mongo-Express web interface access username
- ME_CONFIG_BASICAUTH_PASSWORD – Mongo-Express web interface access password

Additionally, we configured the mongo-express service to depend on the mongodb service. We assigned the network the same mongodb_network, and mapped the volumes to mongodb-data volume. We exposed the port 8081 to allow access to the web interface.

We can monitor both services using Docker health checks. The mongodb service will ping the MongoDB database, while the mongo-express service will try to access the web page using the given credentials.

Finally, we defined a volume called “mongodb-data” and a network called “mongodb_network” for the project.

Start the Docker Compose file.

```
sudo docker-compose up -d
```

```
barry@ubser001 ~/mongodb
$ sudo docker-compose up -d
Creating network "mongodb_network" with the default driver
Creating volume "mongodb-data" with default driver
Pulling mongodb (mongo:)...
latest: Pulling from library/mongo
f22ccc0b8772: Pull complete
3cf8fb62ba5f: Pull complete
e80c964ece6a: Pull complete
329e632c35b3: Pull complete
3e1bd1325a3d: Pull complete
4aa6e3d64a4a: Pull complete
035bca87b778: Pull complete
874e4e43cb00: Pull complete
08cb97662b8b: Pull complete
f623ce2ba1e1: Pull complete
f100ac278196: Pull complete
461b064aece5: Pull complete
Digest: sha256:00878f3d8e0a61997f2ea67351934b815a77c5ff8985df3ec041bca1c88258f4
Status: Downloaded newer image for mongo:latest
Pulling mongo-express (mongo-express:)...
latest: Pulling from library/mongo-express
cbdbe7a5bc2a: Pull complete
da41a38d96d0: Pull complete
3d6d69ed0edb: Pull complete
13618797e148: Pull complete
3a213630ced6: Pull complete
2880b14e420a: Pull complete
9eeb754ce0e7: Pull complete
0b93e97917be: Pull complete
Digest: sha256:4d219ac97564f6de664c15040bb8eabe8951562d13bbb4ca8bb978995f393d02
Status: Downloaded newer image for mongo-express:latest
Creating mongodb ... done
Creating mongo-express ... done
barry@ubser001 ~/mongodb
$
```

The above output contains no errors, so we can assume that all the services are created successfully. Because we have added health checks for both services, we can verify it by using the Docker ps command.

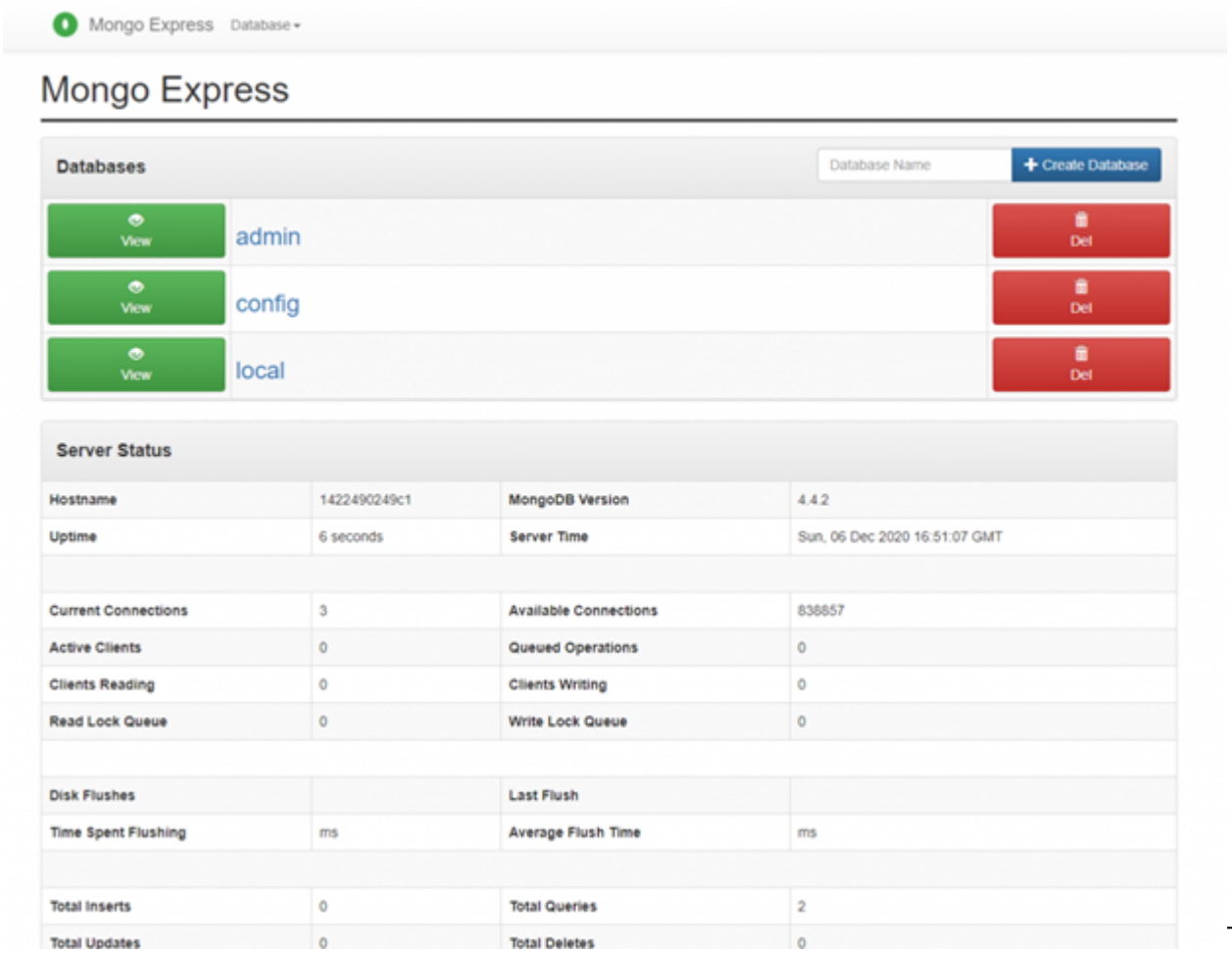
```
sudo docker ps -a
```

```
barry@ubser001 ~/mongodb
$ sudo docker ps -a
CONTAINER ID        IMAGE               COMMAND                  CREATED             STATUS
   PORTS                                       NAMES
925ac02406d9        mongo-express       "tini -- /docker-ent…"   12 minutes ago      Up 12 minutes (healthy)
   0.0.0.0:8081->8081/tcp                      mongo-express
636eec4b6e12        mongo               "docker-entrypoint.s…"   12 minutes ago      Up 12 minutes (healthy)
   0.0.0.0:27017->27017/tcp                    mongodb
```

The Docker ps command prints the health status of the container. This health status is only available if you have defined a health check for the container.

Monitoring with Mongo Express

Now, let's go to the Mongo Express web interface using the server IP (http://10.10.10.60:8081.)



The Mongo Express interface provides a convenient way to interact with the MongoDB database. The Mongo Express interface also provides an overview status of the MongoDB server instance, providing a simple monitoring functionality.

Conclusion

We created this Docker MongoDB tutorial because of the popularity of MongoDB among NoSQL databases and the benefits you can achieve by using it in a Docker container.

Using MongoDB in Docker containers creates consistent development and production environments for smoother deployments. Unlike virtual machines, Docker containers demand fewer resources.

With a mastery of simple and advanced Docker containers, your software development processes can be far more efficient and trouble-free.