Intermediate Docker Commands

INTERMEDIATE DOCKER

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Docker refresher

- Docker is a container runtime
- Is designed to run and manage various containerized applications on Windows, Mac, and Linux
- Can run containers using pre-built images, or create our own
- Dockerfiles are text files used to Docker container images
- Containers are instances of a given Docker image

The DataCamp **Introduction to Docker course** is a pre-requisite to this course

Docker commands

- `docker run`
- `docker stop`
- `docker build`

- `docker --help`
  - Provides a list of potential Docker commands
- `docker COMMAND --help`
  - `docker run --help`
    - Provides options for the `docker run` command

Temporary containers

- Docker containers are usually created with `docker run`
- Containers remain even after stopping / exiting
- Often want to run a container instance and remove it immediately upon exit
  - Development
  - Testing
  - Scripts

- `docker run --rm`

```
docker run --rm alpine:latest
/bin/sh
```

- Referenced as 'clean-up' or 'remove'

docker ps

- Used for determining name, id, status, and other attributes of containers on a given machine running Docker
- Use the `-a` flag to get more information about existing containers
  - `docker ps -a`
- Will cover how to get extremely detailed information about containers later in the course

```
$ docker ps -a
CONTAINER ID   IMAGE     COMMAND                  CREATED              STATUS
588bb3a3134e   nginx     "/docker-entrypoint.…"   49 seconds ago       Up 47 seconds
8a0578a9b33c   ubuntu    "/bin/bash"              About a minute ago   Exited (0) About a minute ago
```

Let's practice!

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Mounting the host filesystem

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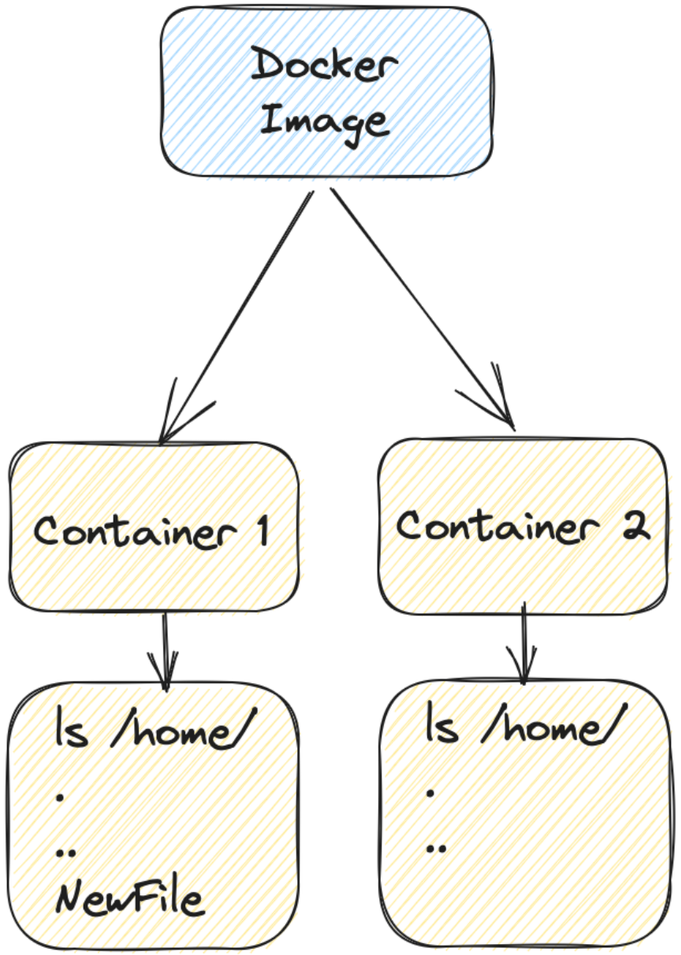
Container filesystems

- Container instances each have their own filesystem
  - Based off the image the container was created with
- Any changes are tied to that specific container instance
- Any changes are maintained across restarts
  - For that instance **only**
- New containers only have the data in the image, not instance specific changes



Sharing files or directories

- Can attach specific files or directories to containers
- Allows for persistence of data, without maintaining a specific container
- Can upgrade container to new version but safely keep data / changes
- Known as **bind-mount**
- Can be read-only or read/write
- Note: When files or directories are attached to a container, they are not accessible to the host until the container is shutdown

Using the -v option

- bind-mounts most often use the `-v` flag
- `-v <source>:<destination>`
- Multiple `-v` commands permitted
- Can also use the `--mount` option
- Note: bind-mount **hides** any content already present in the destination directory

```
docker run -v ~/html:/var/www/html \
       nginx
```

```
docker run
       -v ~/pgdata:/opt/data \
       -v ~/pg.conf:/etc/pg.conf \
       postgresql
```

Let's practice!

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Persistent volumes

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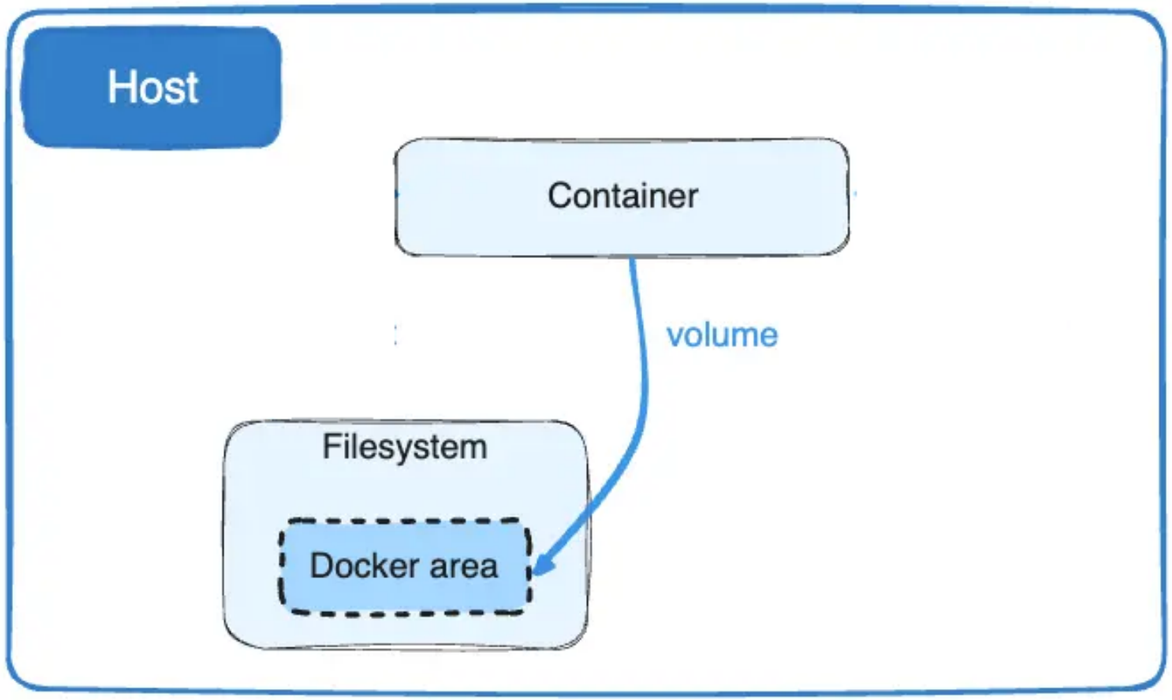
What is a volume?

- **Volumes** are an option to store data in Docker, unrelated to the container image **or** host filesystem
- Are managed from the command line (or API)
- Can share with multiple containers
- Higher performance than file share / bind mounts
- Exist until removed



[1] Image modified from https://docs.docker.com

Managing volumes

- `docker volume`
- `docker volume create <volumename>`
- `docker volume ls` or
  `docker volume list`
- `docker volume inspect`
  - Provides assorted metadata about the volume, including Name, Mountpoint, Options, and so forth
- `docker volume rm`

Volume creation example

```
bash> docker volume create sqldata
```

```
sqldata
```

```
bash> docker volume ls
```

```
DRIVER    VOLUME NAME
local     2f2b7f710551e004dcdd9edf4cad31c37826b428de12f1c04ca02305d216ab00
local     14da7ff0c6eb29f644e6f9f9d59bbcf56b3699c04881dd7cbcaa9ecd6bef239c
local     150aa3c5c7aee30ffd1ec7ecf39f03989bf561536a9413ebed96ffbaa537d103
local     sqldata
...
```

Volume inspect example

```
bash> volume inspect sqldata
[
    {
        "CreatedAt": "2024-01-27T04:27:51Z",
        "Driver": "local",
        "Labels": null,
        "Mountpoint": "/var/lib/docker/volumes/sqldata/_data",
        "Name": "sqldata",
        "Options": null,
        "Scope": "local"
    }
]
```

Attaching volumes

- Uses the `-v` command
  - `docker run -v <volumename>:<destination path>:<options>`
  - Volume name is name of existing volume
  - Destination path is the location the volume will be mounted (such as /data)
  - Options are optional comma-separated list of values such as `ro` for read-only.
- `--mount` exists as with bind-mounts

```
$ docker run -v sqldata:/data postgres
```

Drivers

- Methods of storing Docker volumes
- Can include:
  - Local filesystem (default)
  - NFS (Unix filesharing)
  - SMB / CIFS (Windows filesharing)

Let's practice!

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