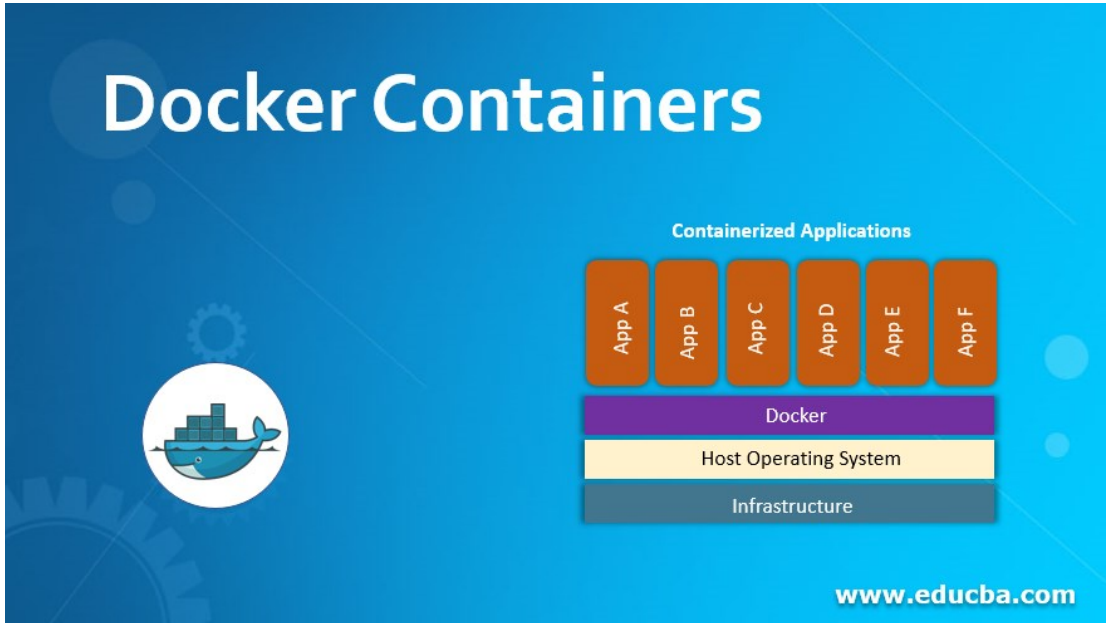
Docker Basics

Justin Post

Docker Containers

Docker - a 'container' to easily transport your code/program to others

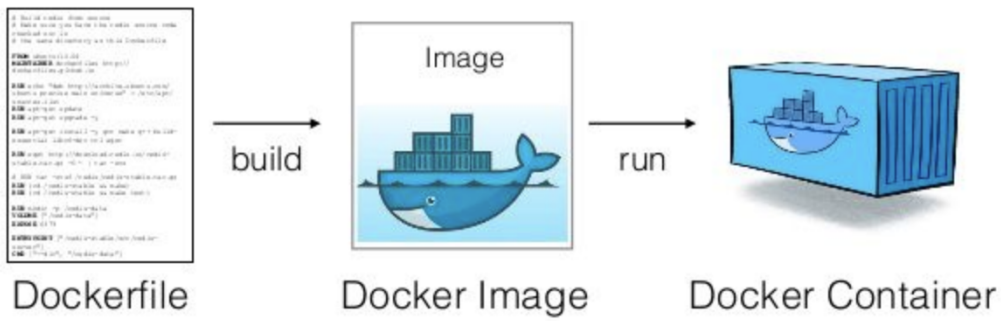
- Includes all relevant files (specific python install, specific packages, etc.)
- No chance of surprise bugs!



Docker Containers

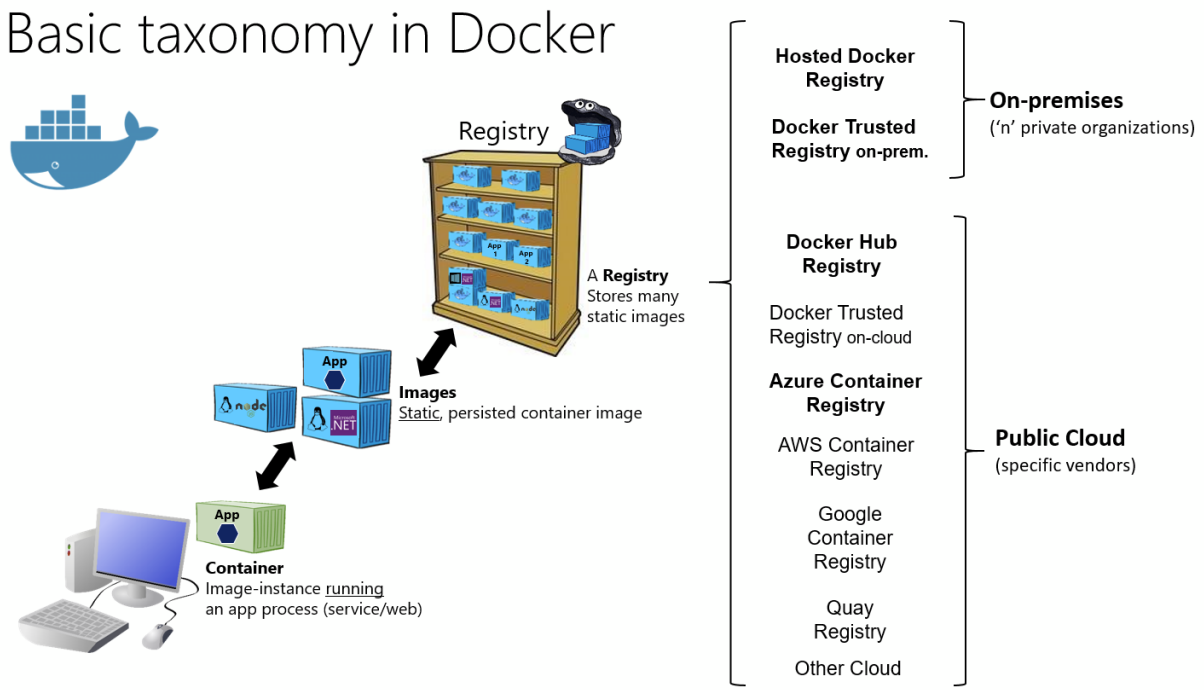
Run on a linux kernel

- `Dockerfile` specifies how to build a docker **image**
- Once built, you can run or deploy the image, creating a container



Docker

We'll just use pre-built images and run them locally on our machine!



Steps to Using Docker

1. Install docker desktop
2. Download (pull) a base image
    - We'll use the `r-base` image to start
3. Run the image to create a container
    - We'll do this locally via the command line (or terminal)!
    - Usually deploy containers on a cloud (like AWS).
    - Often done user a container management system like kubernetes
4. Shut down the container

1. Installing Docker

Go to Docker's website to install `docker desktop`

- Once installed, open docker desktop (may take a few minutes to load)
- Open a **terminal**
  - Windows: Type `cmd` into your start menu
  - Mac: Go to Launchpad and type `terminal`
- Type `docker --version` and hit enter
- Type `docker run hello-world` and hit enter

2. Download a Docker Image

What's happening there?

Docker looks for an image called `hello-world` locally

- Didn't find it, downloads it from **docker hub**
- Runs a container (instance of that image) that prints its message to you

Download our image of interest via

- `docker pull r-base`
- Will take a minute to download! Once done

3/4. Creating our Container

- To run our image we can use `docker run _image_`
  - Open command prompt (with docker desktop running)
  - Submit `docker run -ti --rm r-base` to the console
  - `--rm` says remove the container when we close it

Launch RStudio via Docker

- Let's go through an example where we load RStudio through docker!

Steps:

- 1. Grab `rocker/rstudio` image
- 1. Create container with

```
docker run --rm -ti -e DISABLE_AUTH=true -p 127.0.0.1:8888:8888 rocker/rstudio
```

- 1. Use CTRL/CMD + C, `docker kill _container_name_`, or docker desktop to stop the container

Launch RStudio via Docker

- May want additional functionality via options! To access a local directory, we can mount the current working directory of our terminal:
  - (Windows via command prompt)
    ```
    docker run --rm -ti -e DISABLE_AUTH=true -p 127.0.0.1:8888:8888 %cd%:/home/rstudio/work rocker/rstudio
    ```
  - (Mac via terminal)
    ```
    docker run --rm -ti -e DISABLE_AUTH=true -p 127.0.0.1:8888:8888 -v ${PWD}:/home/rstudio/work rocker/rstudio
    ```
    - `-ti` allows us to run commands inside the container
    - `-p 127.0.0.1:8888:8888` exposes a port so we can access things via the browser
    - `-v path_to_folder:/home/rstudio/work` mounts a local folder for us to use in the container
    - `--rm` removes the container when we exit
    - `-e` sets an environment variable (so we don't have to log in)

Useful Command Line Commands

- `cd` - change directory
- `cd ..` - move up a folder
- `ls` - list files in current directory
- `start .` or `open .` - open a folder view in your current directory
- `touch file_name.ext` - create a new file
- lots more!

Useful Docker Commands to Know

- `docker pull _image_` - Download an image
- `docker image ls` - Check which images you have
- `docker run _image_` - Create an instance of the image (a container)
- `docker container ls` - Check which containers are currently running
- `docker kill _container_` - Stop a currently running container

Recap

To avoid install issues when sharing software, we'll use everything through a docker container!

Common steps:

- Start docker desktop (wait for it to fully start!)
- `docker run ...`
- Open our web browser to the appropriate place
- Close command prompt/terminal to shut down container