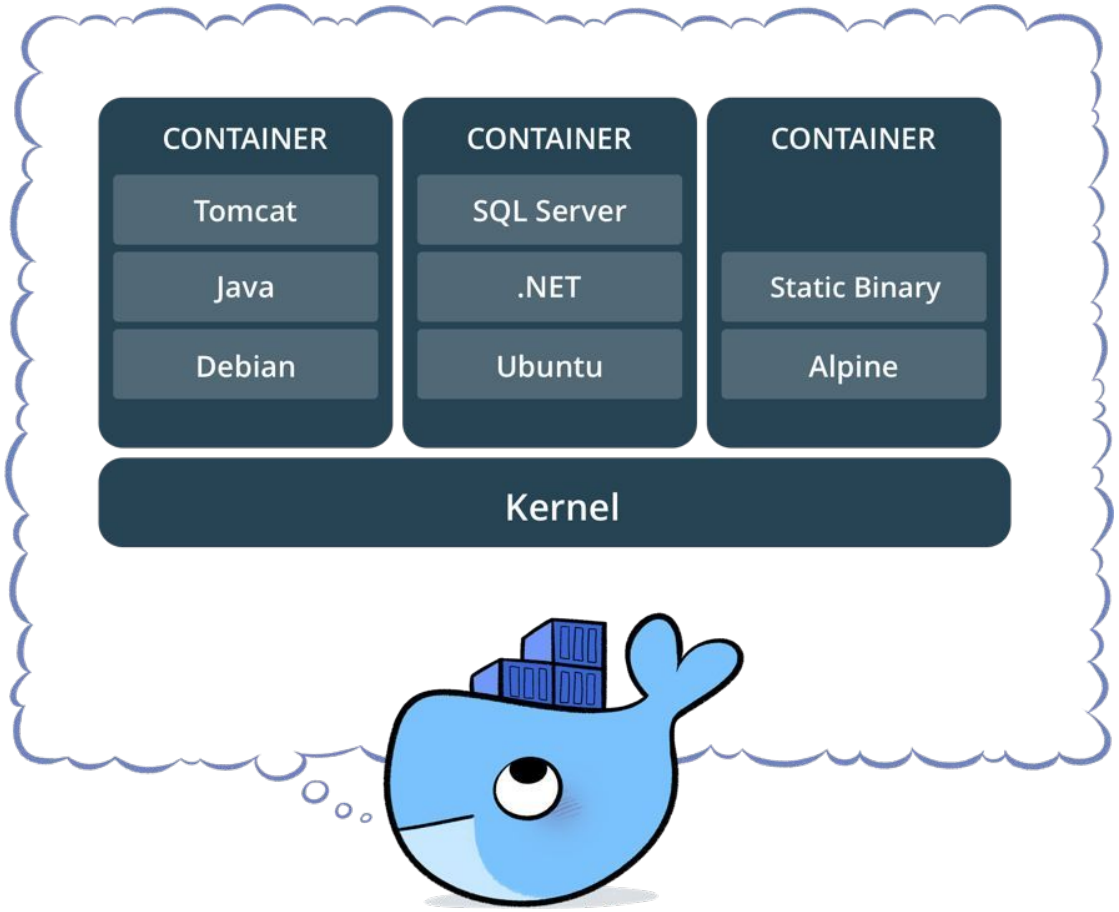
Presentation – 3

Docker containers

Test on VMs

- Google form with test:

What is a container?

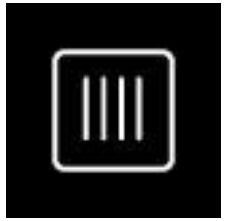


- Standardized packaging for software and dependencies
- Isolated applications sharing the same OS kernel
- Supported on Linux and Windows

Terminology

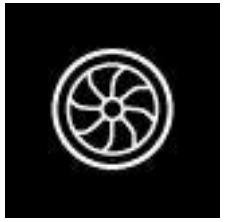
Docker Image

The basis of a Docker container. Represents a full application



Docker Container

The standard unit in which the application service resides and executes



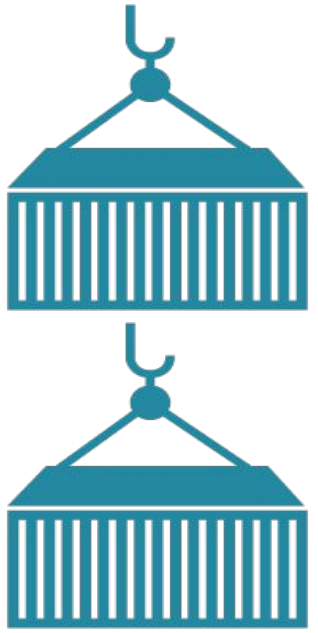
Docker Engine

Creates, ships and runs Docker containers deployable on a physical or virtual, host locally, in a datacenter or cloud service provider

Registry Service (Docker Hub (Public) or Docker Trusted Registry (Private))

Cloud or server-based storage and distribution service for your images

Images and Containers



Docker Image

Examples: Nginx web server, DB server, Nodejs Application

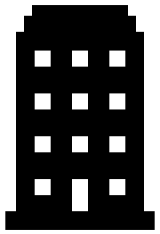
Docker Containers

Each container is created from an image

Docker containers are NOT VMs

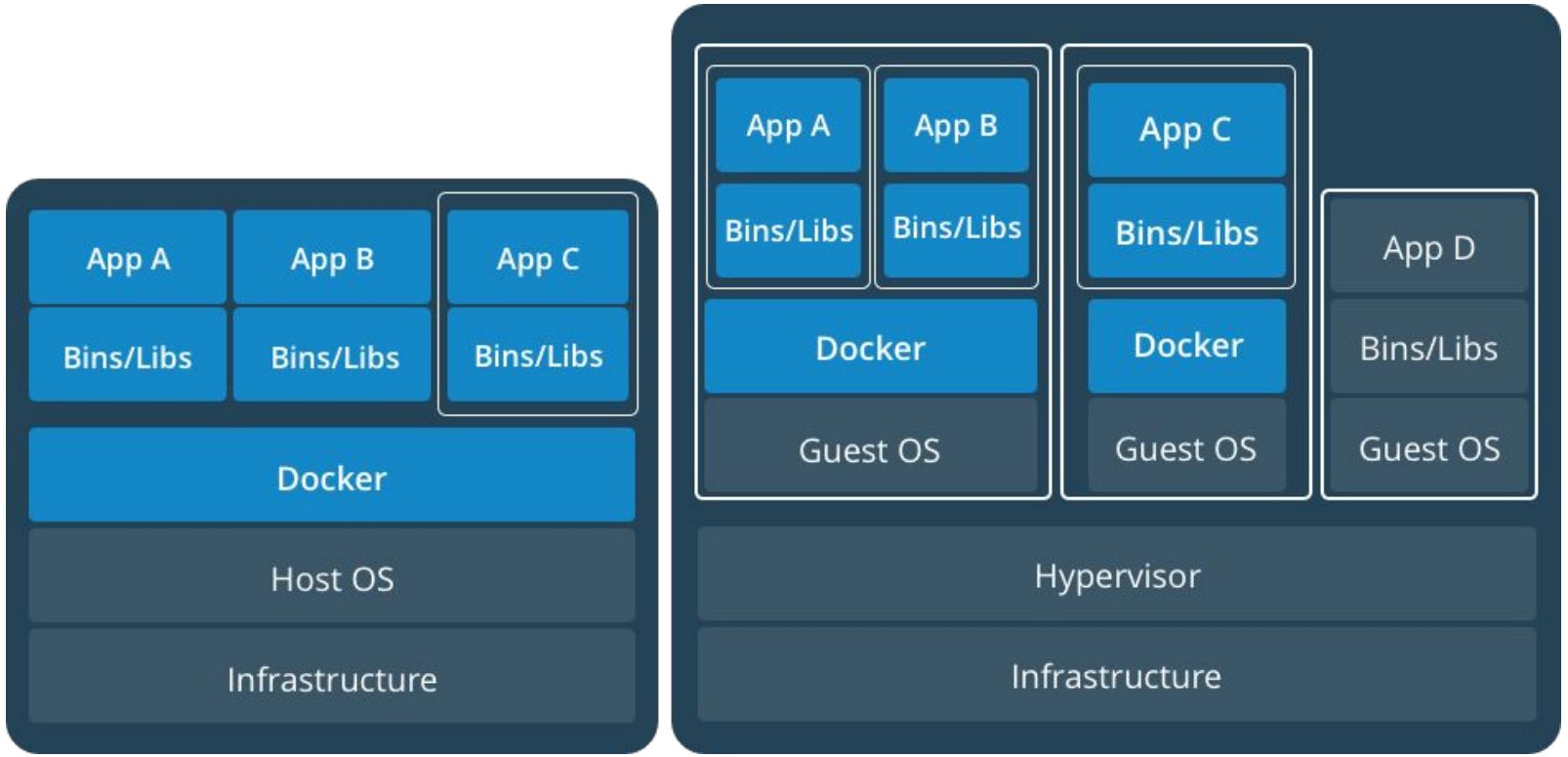
- Fundamentally different architectures
- Easy to manage
- No need to install separate OS

Virtual machine

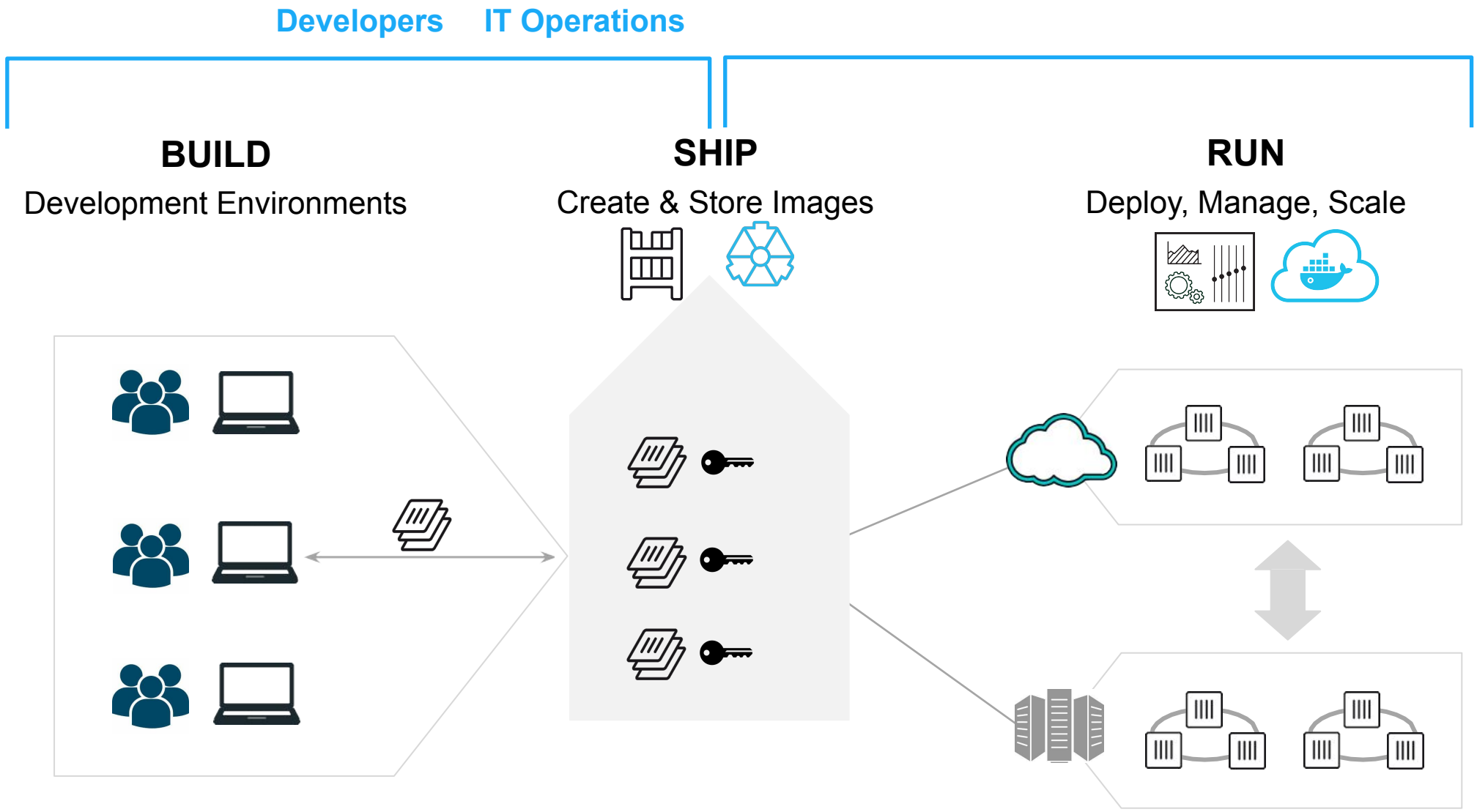


Containers on one host machine

Docker can work on virtual machines



Using Docker: Build, Ship, Run Workflow



Basic Docker Commands

```
$ docker image pull node:latest

$ docker image ls
$ docker container run –d –p 5000:5000 --name node node:latest

$ docker container ps


$ docker container stop node(or <container id>)

$ docker container rm node (or <container id>)

$ docker image rmi (or <image id>)

$ docker build –t node:2.0 .

$ docker image push node:2.0

$ docker --help
```

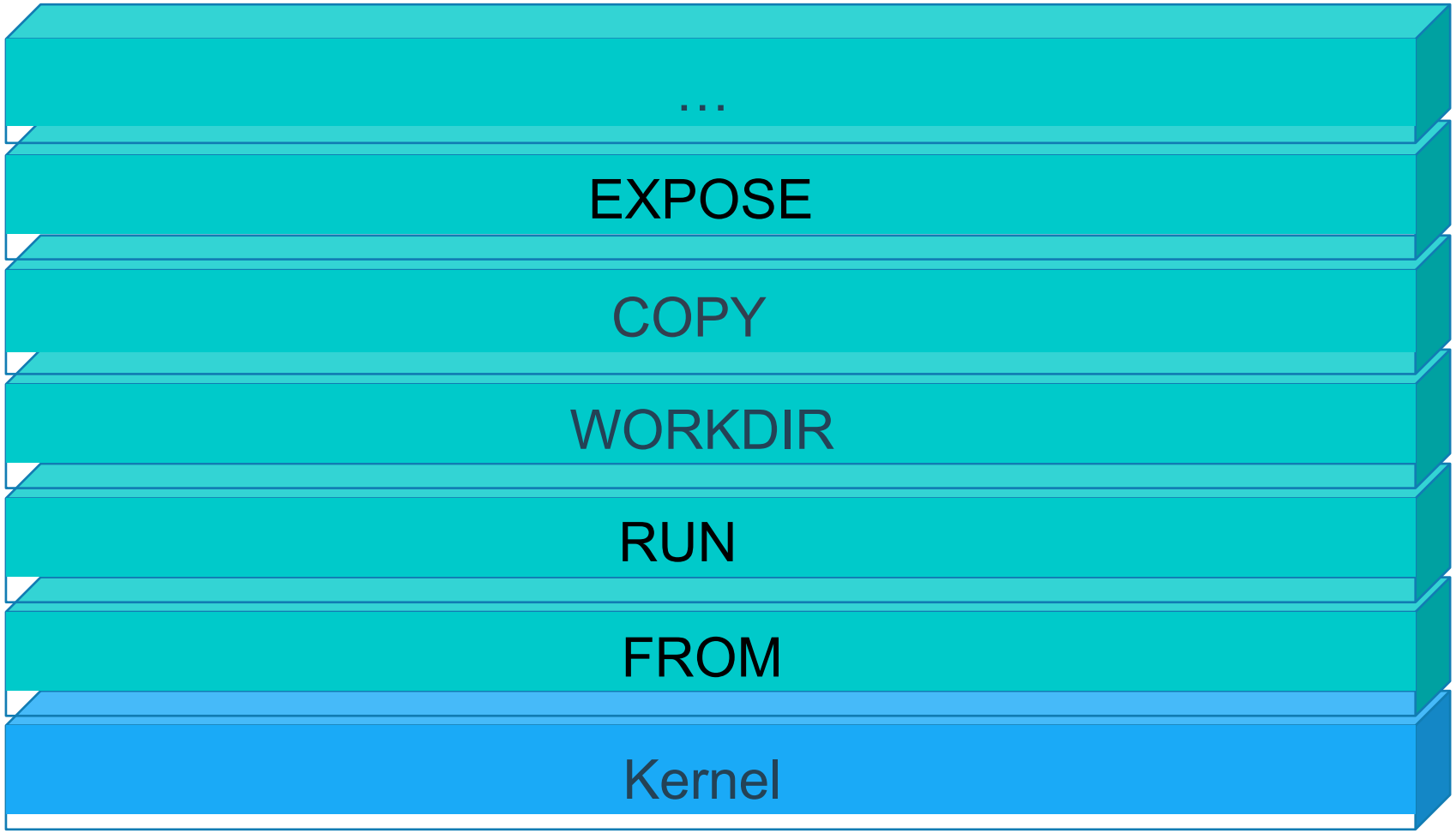
Image can be easily created with **dockerfile**

Dockerfile

```
# Create image based on the official Node 6 image from dockerhub
FROM node:latest

# Create a directory where our app will be placed
RUN mkdir -p /usr/src/app

# Change directory so that our commands run inside this new directory
WORKDIR /usr/src/app

# Copy dependency definitions
COPY package.json /usr/src/app

# Install dependecies
RUN npm install

# Get all the code needed to run the app
COPY . /usr/src/app

# Expose the port the app runs in
EXPOSE 4200

# Serve the app
CMD ["npm", "start"]
```

- Instructions on how to build a Docker image
- Looks very similar to “native” commands
- Important to optimize your Dockerfile

Each Dockerfile Command Creates a Layer



Docker Volumes – how to avoid data loss?

- Volumes mount a directory on the host into the container at a specific location

- Can be used to share (and persist) data between containers
  - Directory persists after the container is deleted
    - Unless you explicitly delete it

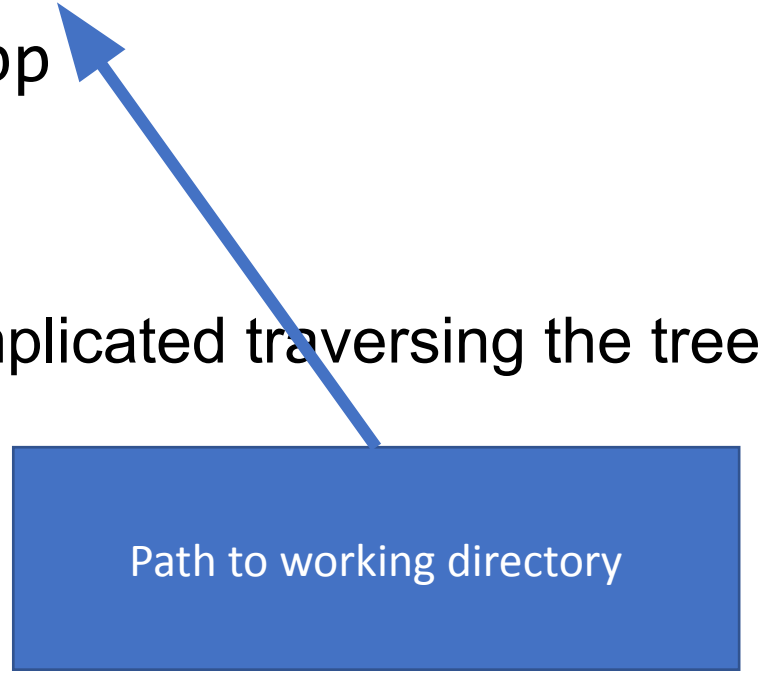
- Can be created in a Dockerfile or via CLI

Attaching a container directly to you source code folder

- You can mount local source code into a running container

```
docker container run -v
$(pwd):/usr/src/app/  myapp
```

- Improve performance
  - As directory structures get complicated traversing the tree can slow system performance
- Data persistence



Other topics to study at home and on practice classes

- Networking
  - How to connect containers on the same host. They will not see one another if network is not configured
- Docker compose
  - How to create a package of several containers.

Practice and homework

- Practice:
  - Basic operations in docker

- Homework:
  - Use docker compose to create a software package containing:
    - A database server
    - A web site that is connected to the database