

# Docker lecture #1

## Введение в Docker

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# План лекций



TEL-RAN  
by Starta Institute

## Docker

1. Docker intro. How docker works?
2. What do we have: containers, images, volumes, networks, registries
3. Run simple images/ using CLI and extensions
4. Using docker for easy database access
5. Volumes and connecting them - run with nginx
6. Write simple Dockerfile for python backend. Port binding
7. Write Dockerfile for frontend (build step and run container).
8. Write docker-compose to start whole app (talking about network inside docker)

3

# MAIN TOPIC

# Контейнер для приложений

- Изолированное окружение (файловая система, процессы, сеть)
- Конфигурационные файлы
- Зависимости
- Стартовый скрипт



# Docker Inc.



2013 — Опубликован код Docker под открытой лицензией Apache 2.0  
(Community Edition)

Enterprise Edition — Проприетарная лицензия Docker Inc.

# Контейнерная изоляция



Open Container Initiative (OCI)



Linux Containers (LXC)

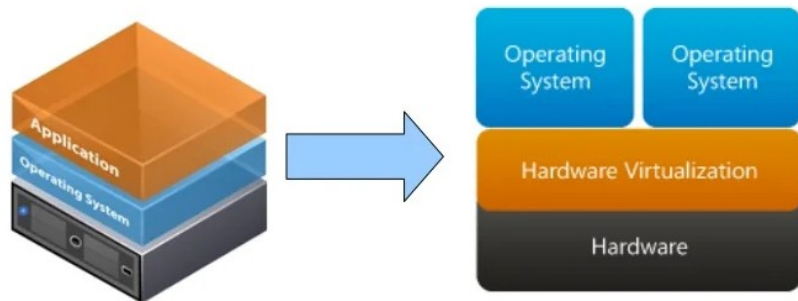


Solaris Containers

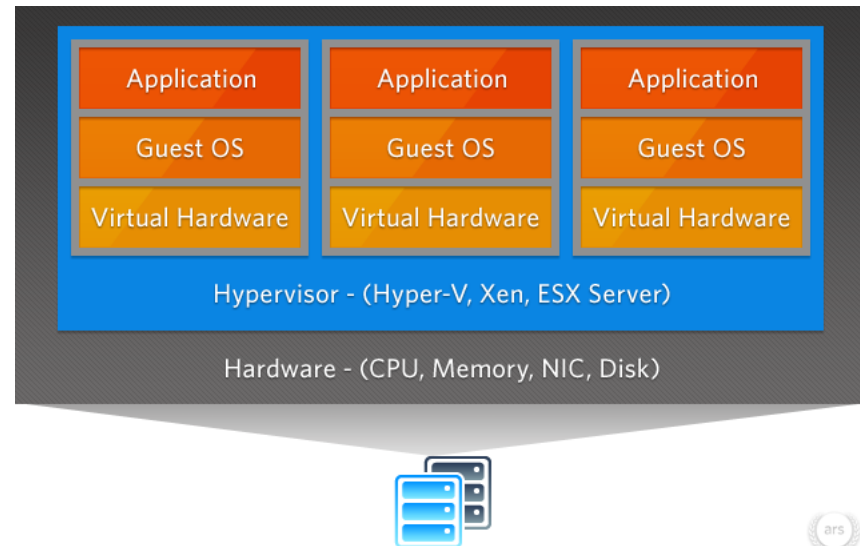
FreeBSD jail



# Виртуализация

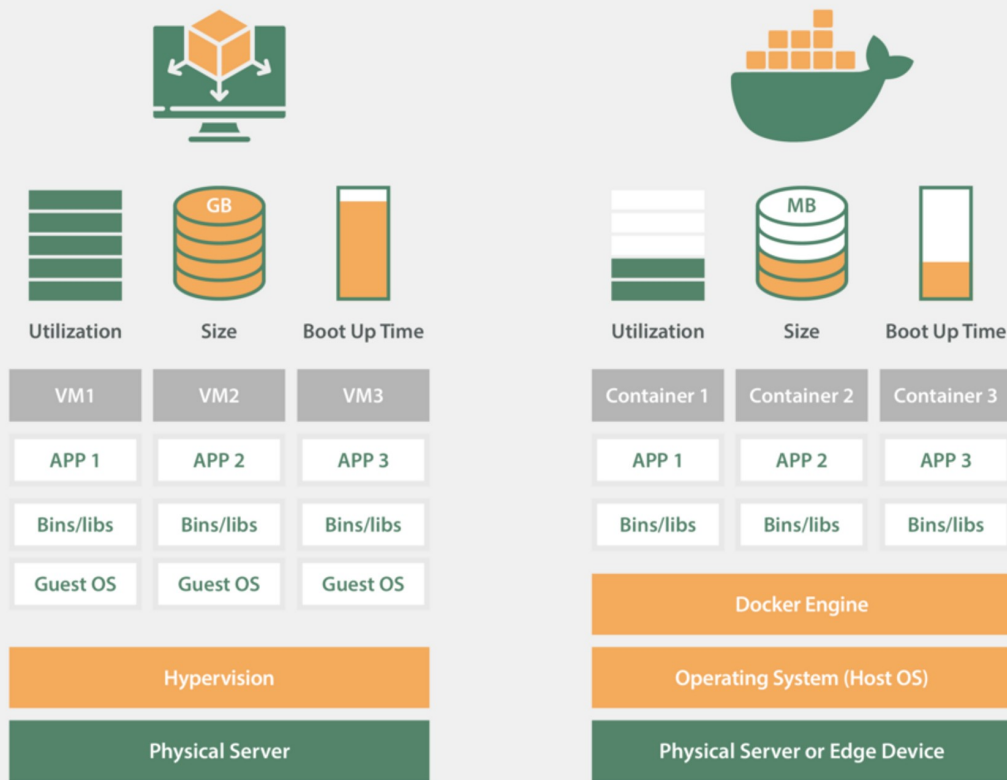


- VMware ESXi
- Microsoft Hyper-V
- Linux KVM
- XEN



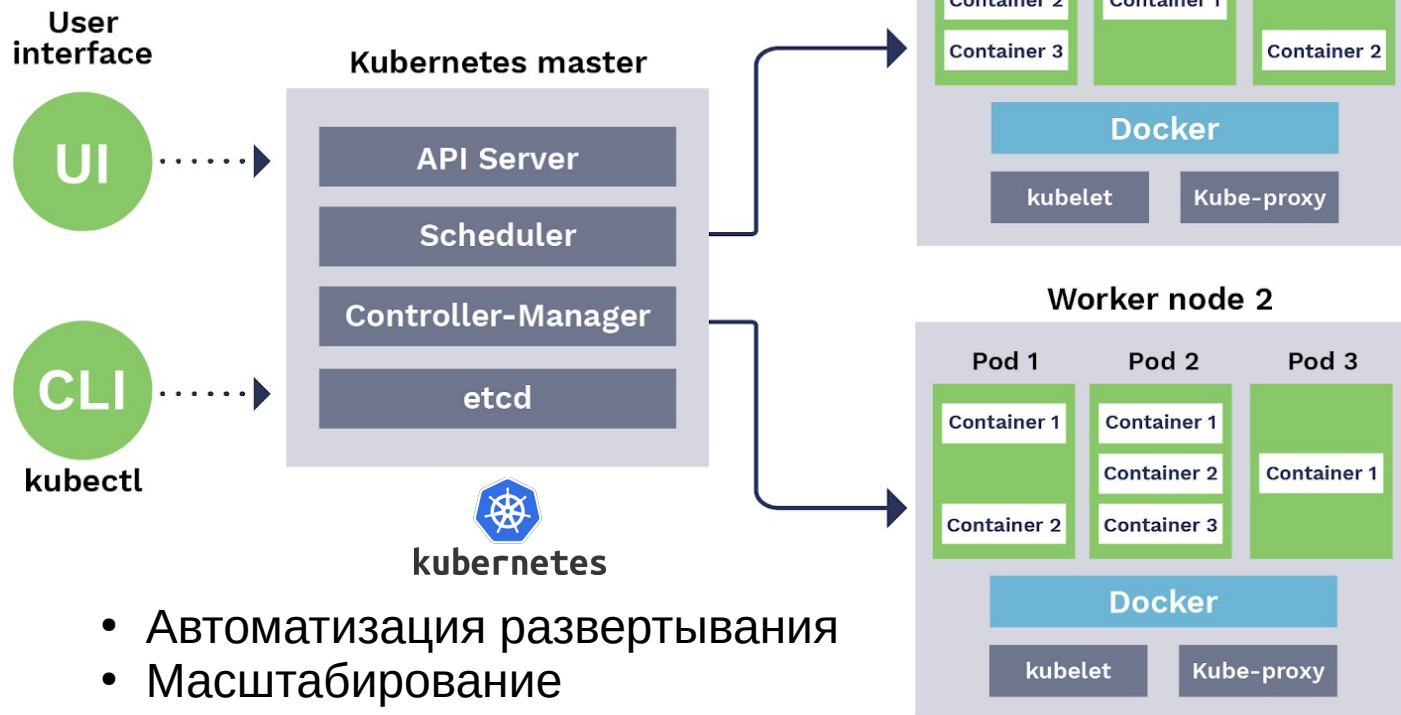
# Контейнерная изоляция

## Virtual Machine vs. Docker



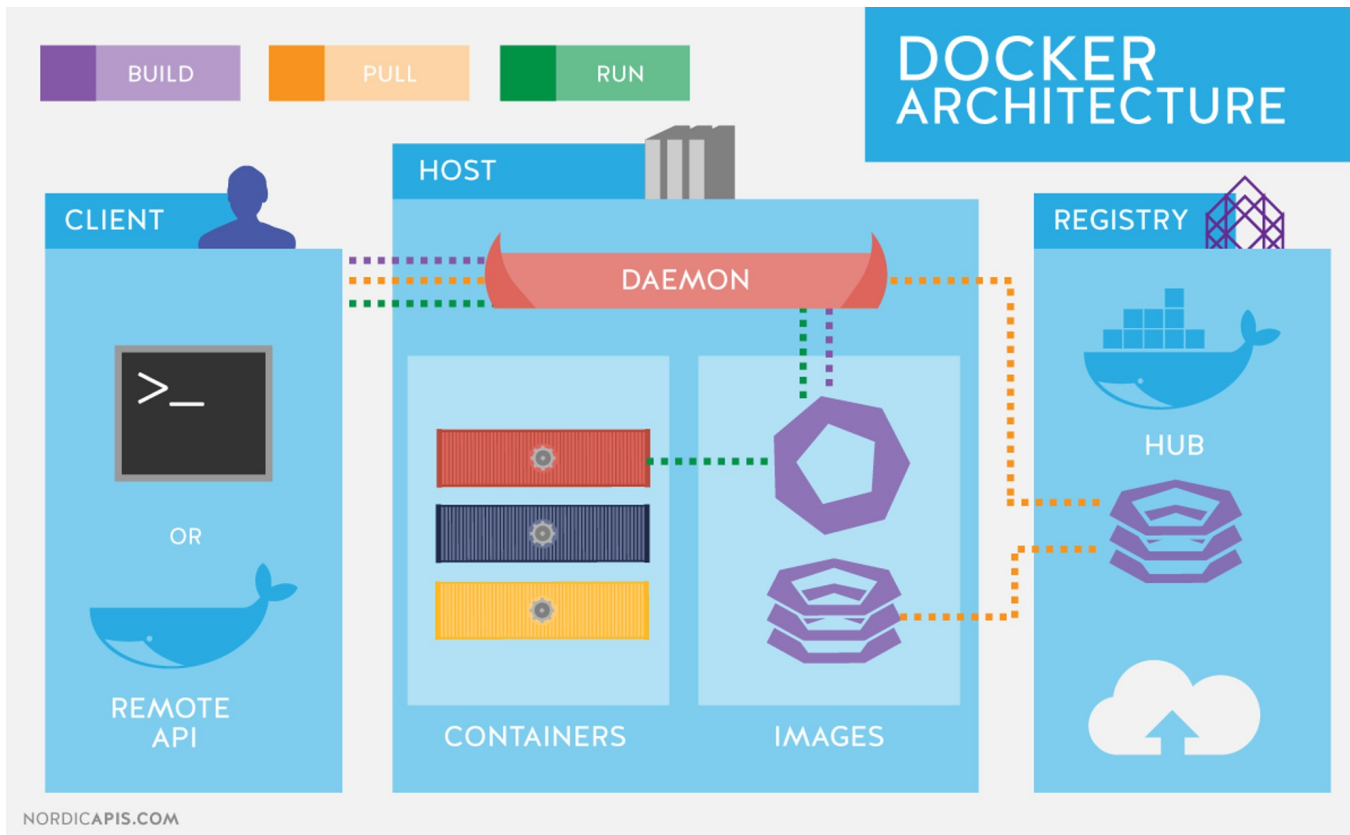


# Kubernetes architecture



- Автоматизация развертывания
- Масштабирование
- Координация

# Docker architecture



# Архитектура Docker

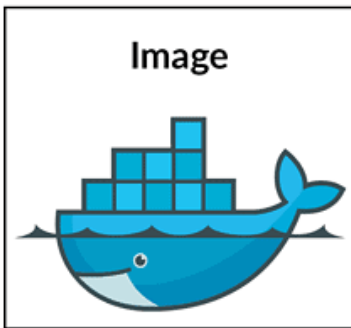
Инструкция для  
создания образа

Шаблон для создания  
контейнеров

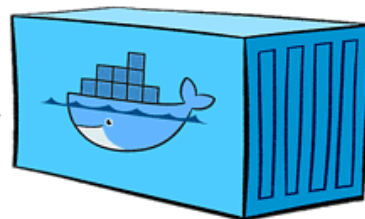
Экземпляр образа  
на котором выполняются  
процессы

```
FROM alpine:latest
RUN apk add --no-cache curl
WORKDIR /app
COPY . /app
RUN curl -sL https://raw.githubusercontent.com/docker/cli/master/contrib/compose/compose.py -o /usr/local/bin/compose.py
RUN chmod +x /usr/local/bin/compose.py
ENTRYPOINT ["compose", "up", "-d"]
```

Dockerfile

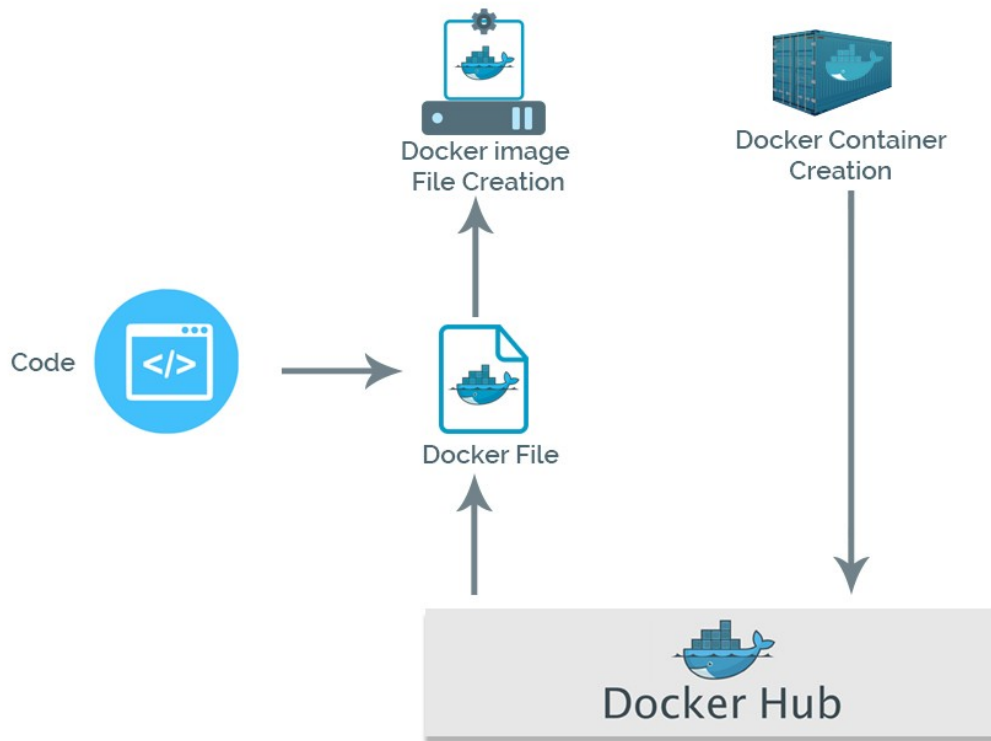


Docker Image

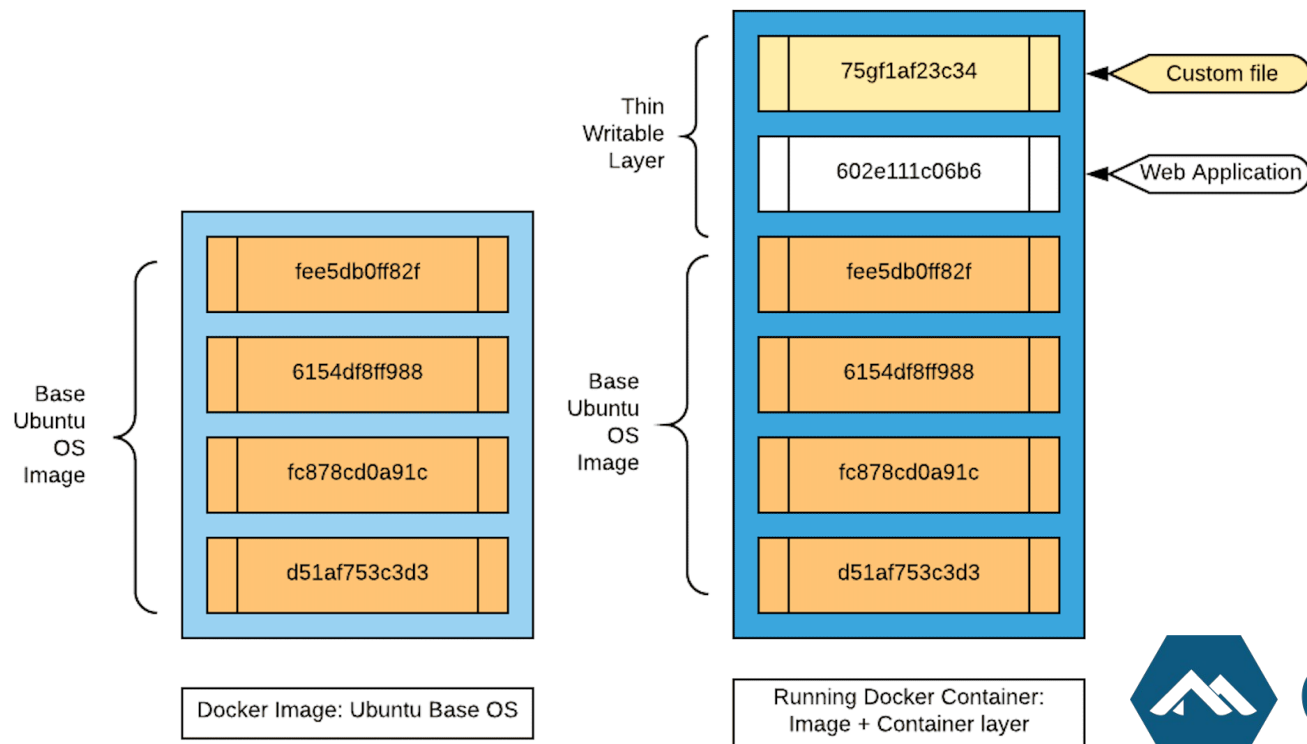


Docker Container

# Docker architecture




# Container layers



alpine  
linux

# Docker Hub



https://hub.docker.com/

 docker hub


redis

Explore Pricing Sign In Register

Explore Official Images redis

 **redis**  DOCKER OFFICIAL IMAGE · 1B+ · 10K+

Redis is an open source key-value store that functions as a data structure server.

docker pull redis 

Overview Tags

## Quick reference

- Maintained by:  
the Docker Community
- Where to get help:  
the Docker Community Slack, Server Fault, Unix & Linux, or Stack Overflow

## Supported tags and respective Dockerfile links

- 7.2-rc1, 7.2-rc, 7.2-rc1-bullseye, 7.2-rc-bullseye
- 7.2-rc1-alpine, 7.2-rc-alpine, 7.2-rc1-alpine3.17, 7.2-rc-alpine3.17

## Recent Tags

latest bullseye 7.2-rc1-bullseye 7.2-rc1

7.2-rc-bullseye 7.2-rc 7.0.10-bullseye 7.0.10

7.0-bullseye 7.0

## About Official Images

Docker Official Images are a curated set of Docker open source and drop-in solution repositories.

## Why Official Images?

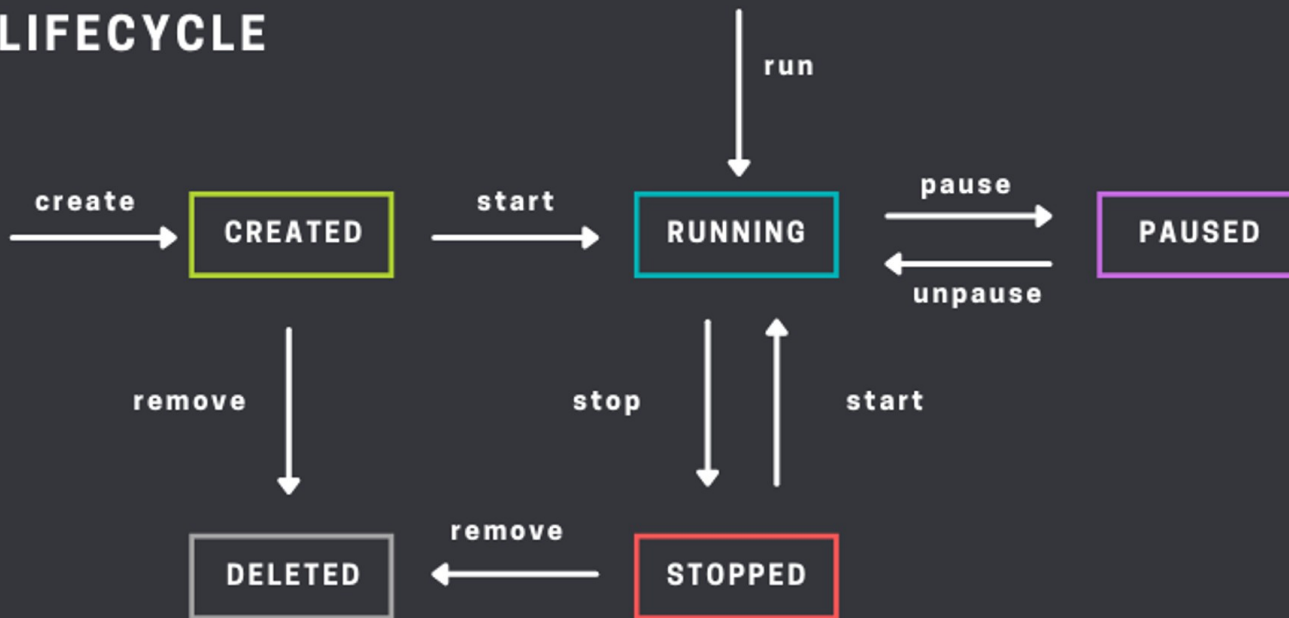
These images have clear documentation, promote



# Жизненный цикл контейнера

## DOCKER CONTAINER LIFECYCLE

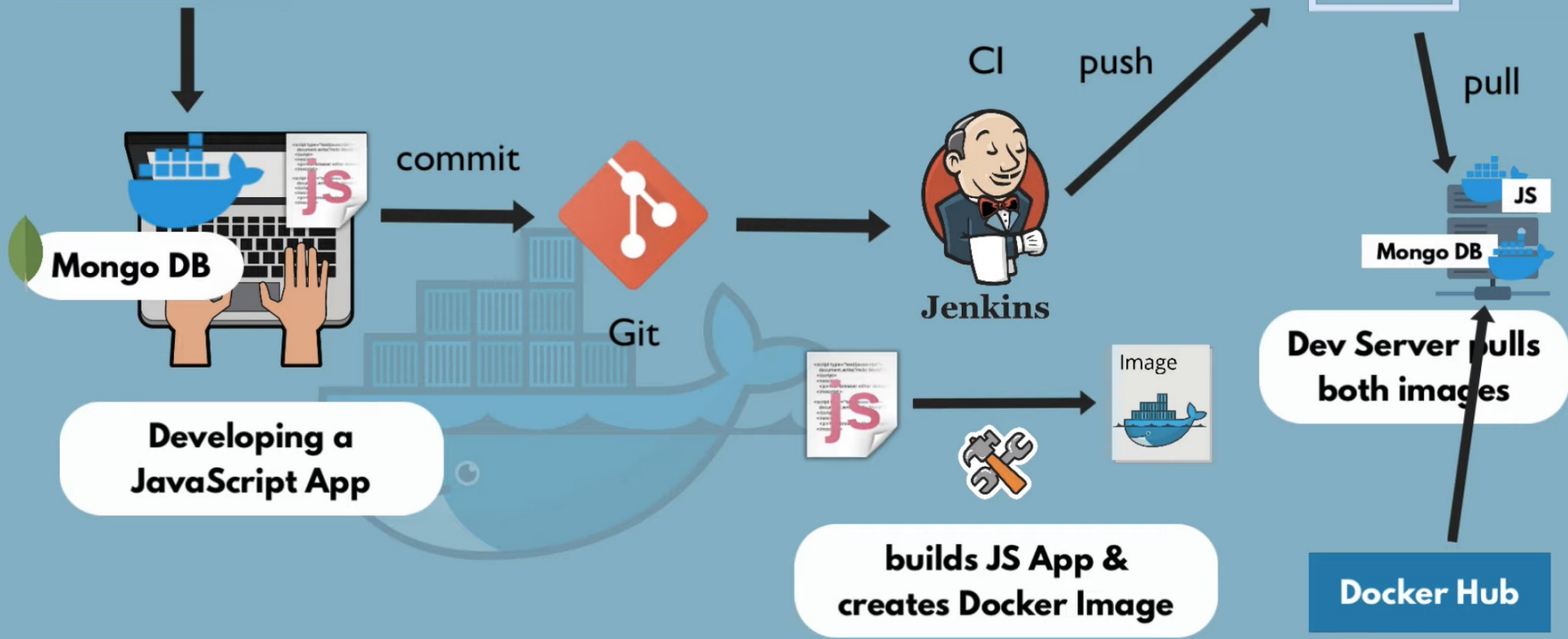
LINUX  
HANDBOOK



# Workflow with Docker

Docker Hub

Docker Repository





# Тест

В чем преимущество контейнеров Docker перед виртуальной машиной?

1. Контейнер меньше «весит»
2. Контейнер быстрее запускается
3. Контейнер требует меньше ресурсов
4. Все пункты 1-3 верны



# Answer

4. Все пункты 1-3 верны

# Установка Docker Desktop

<https://docs.docker.com/desktop/>

1. Double-click Docker Desktop Installer.exe to run the installer.

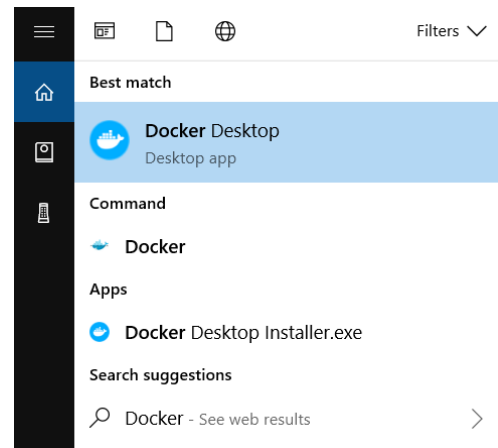
If you haven't already downloaded the installer (Docker Desktop Installer.exe), you can get it from Docker Hub. It typically downloads to your Downloads folder, or you can run it from the recent downloads bar at the bottom of your web browser.

2. When prompted, ensure the **Use WSL 2 instead of Hyper-V** option on the Configuration page is selected or not depending on your choice of backend.

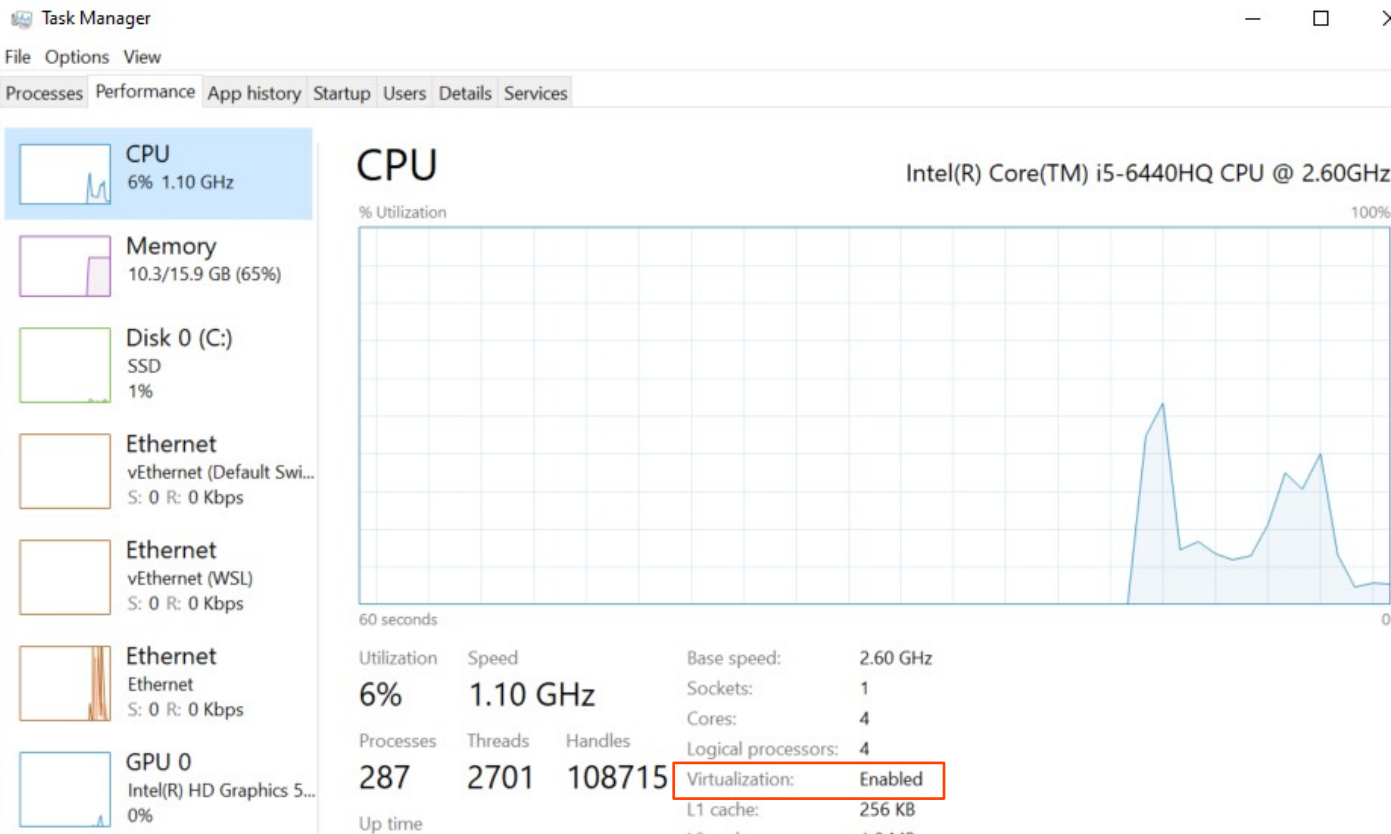
If your system only supports one of the two options, you will not be able to select which backend to use.

3. Follow the instructions on the installation wizard to authorize the installer and proceed with the install.

4. When the installation is successful, click Close to complete the installation process.



# Windows virtualization support



# docker run hello-world

```
$ docker -v  
Docker version 20.10.24, build 297e128
```

```
$ docker run hello-world  
Unable to find image 'hello-world:latest' locally  
latest: Pulling from library/hello-world  
2db29710123e: Pull complete  
Digest: sha256:4e83453afed1b4fa1a3500525091dbfca6ce1e66903fd4c01ff015dbcb1ba33e  
Status: Downloaded newer image for hello-world:latest  
  
Hello from Docker!  
This message shows that your installation appears to be working correctly.
```

# Pull images from Docker Hub

<https://hub.docker.com/>

```
docker pull <image>           # pull image from docker hub
```

```
docker pull image:version
```

```
docker images                 # list local images
```

```
docker create --name <name> <image> # create container <name>
```

```
docker start <name>
```

```
docker run <image>           # pull, create container and start
```

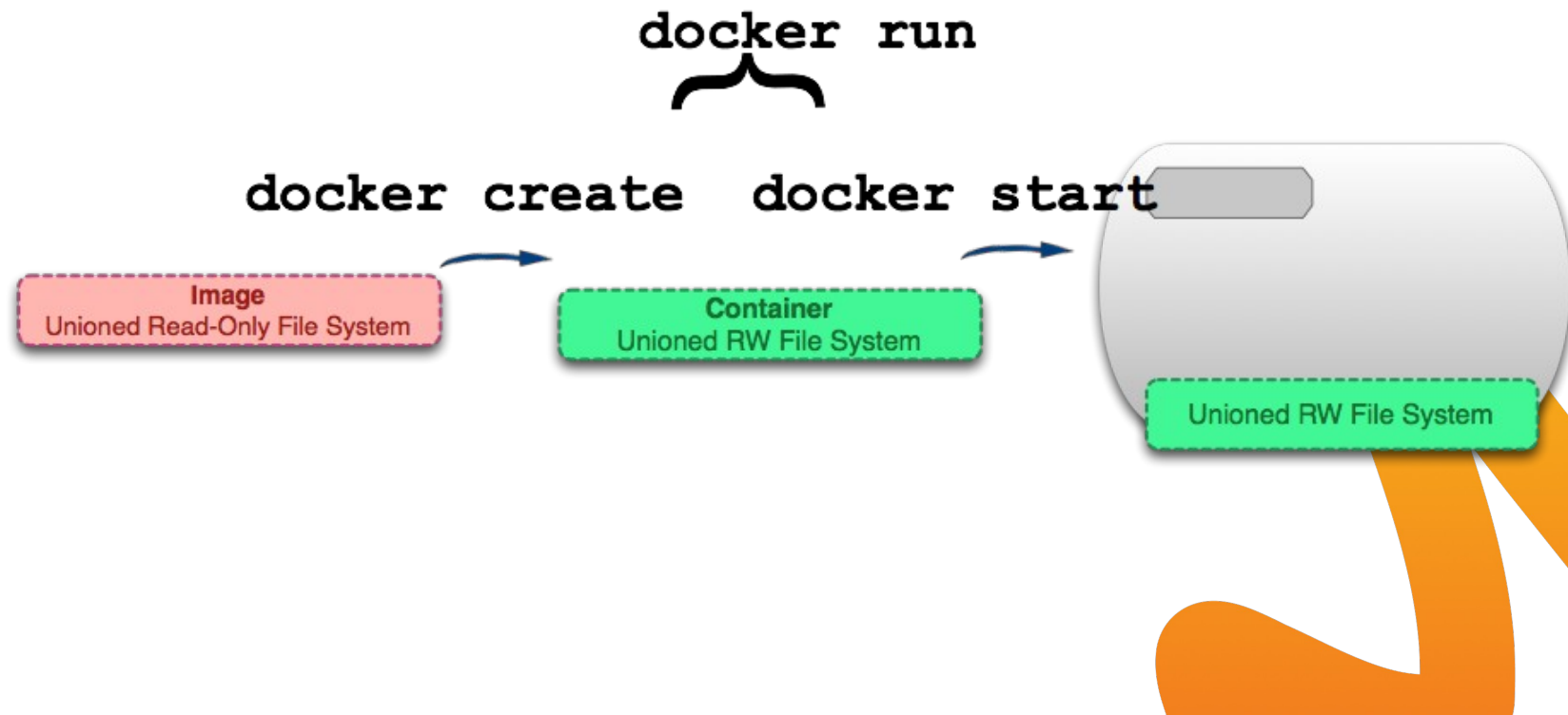
```
docker run -d <image>        # detached mode
```

```
docker run -d --rm <image>    # remove after stop
```

```
docker ps                   # running containers
```

```
docker ps -a               # list all containers running and stopped
```

# Создание и запуск контейнера



# Run containers



```
docker stop <container id>           # or container name
docker start <container id>
```

```
docker logs <container id> | <container name>
docker logs <container id> -f          # log stream
```

---

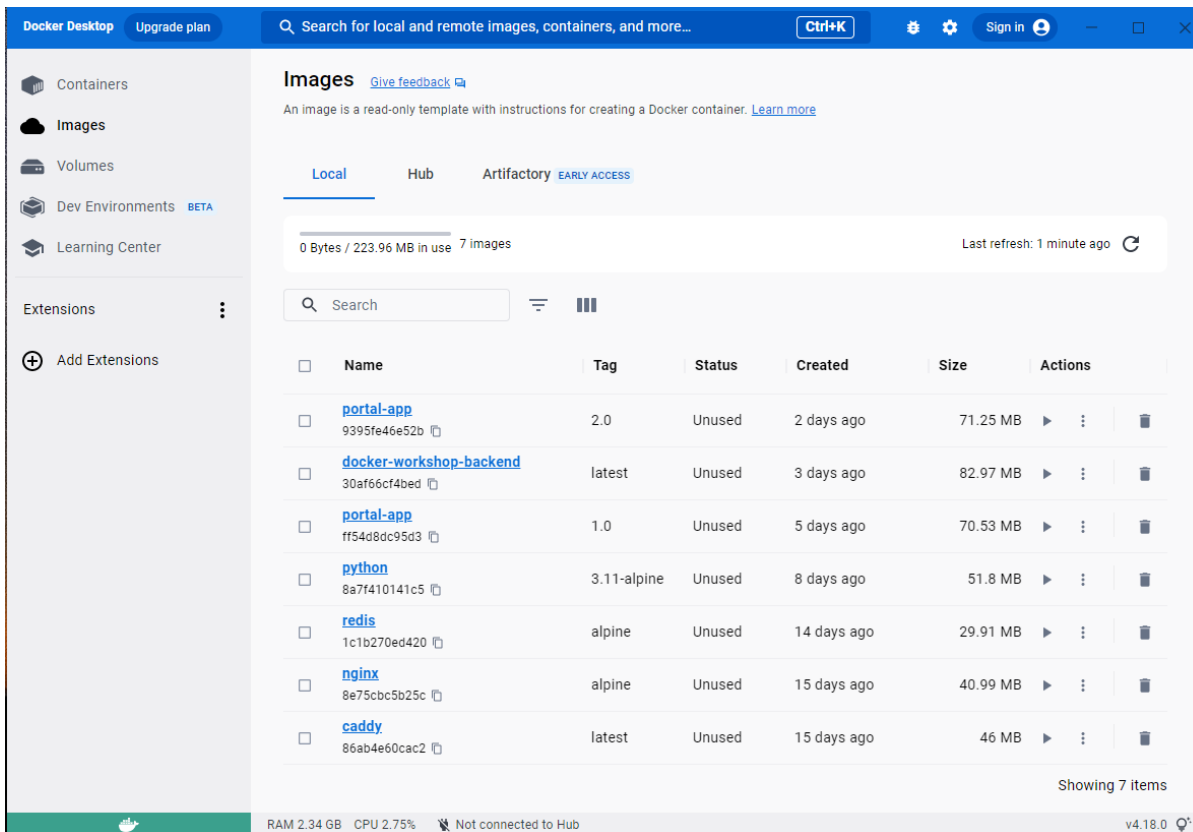
```
docker rmi <image id>                 # remove image
```

```
docker rm <container id>              # remove container
docker rm -f <container id>          # kill and remove
```

```
docker container prune                # remove all stopped containers
```



# Docker Desktop



**Docker Desktop** Upgrade plan Search for local and remote images, containers, and more... Ctrl+K Sign in

Containers  
Images  
Volumes  
Dev Environments BETA  
Learning Center

Extensions  
Add Extensions

## Images

An image is a read-only template with instructions for creating a Docker container. [Learn more](#)

Local Hub Artifactory EARLY ACCESS

0 Bytes / 223.96 MB in use 7 images Last refresh: 1 minute ago

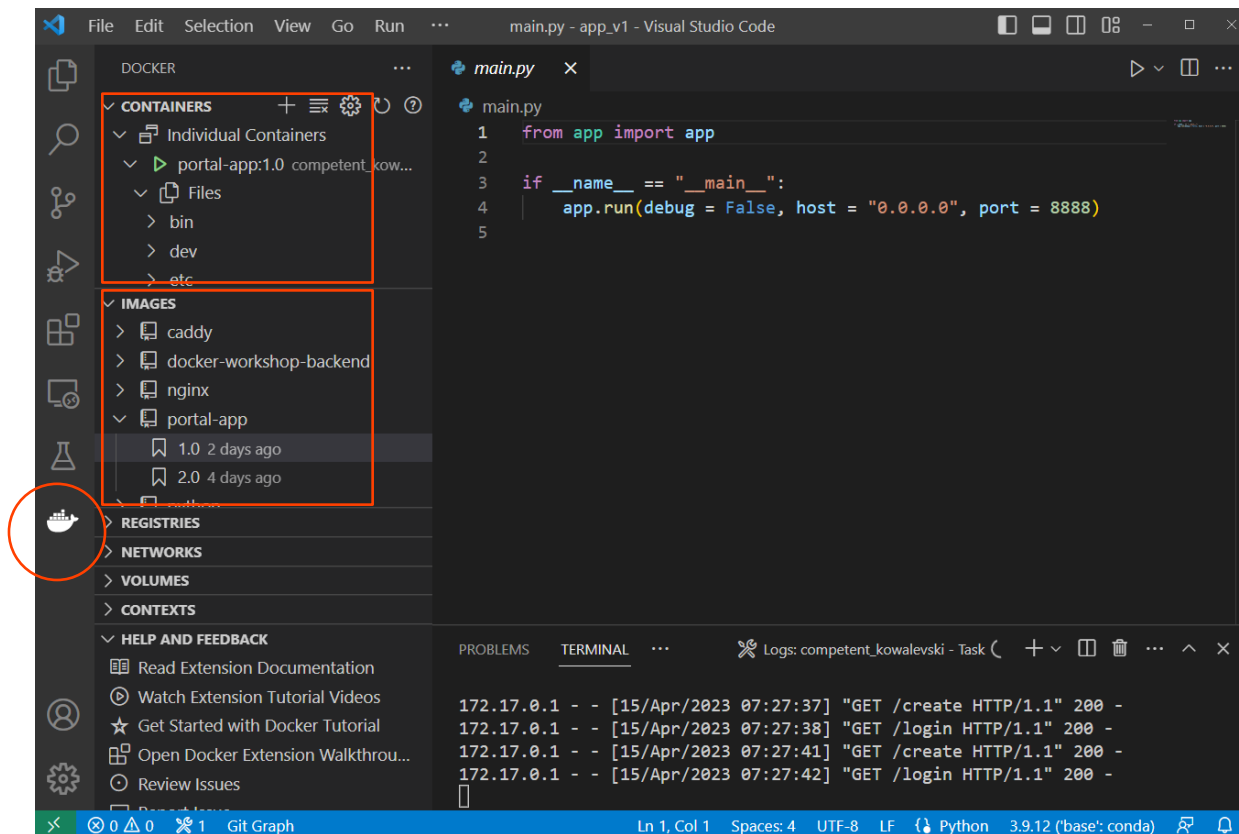
Search

<input type="checkbox"/>	Name	Tag	Status	Created	Size	Actions
<input type="checkbox"/>	<a href="#">portal-app</a> 9395fe46e52b	2.0	Unused	2 days ago	71.25 MB	
<input type="checkbox"/>	<a href="#">docker-workshop-backend</a> 30af66cf4bed	latest	Unused	3 days ago	82.97 MB	
<input type="checkbox"/>	<a href="#">portal-app</a> ff54d8dc95d3	1.0	Unused	5 days ago	70.53 MB	
<input type="checkbox"/>	<a href="#">python</a> 8a7f410141c5	3.11-alpine	Unused	8 days ago	51.8 MB	
<input type="checkbox"/>	<a href="#">redis</a> 1c1b270ed420	alpine	Unused	14 days ago	29.91 MB	
<input type="checkbox"/>	<a href="#">nginx</a> 8e75cbc5b25c	alpine	Unused	15 days ago	40.99 MB	
<input type="checkbox"/>	<a href="#">caddy</a> 86ab4e60cac2	latest	Unused	15 days ago	46 MB	

Showing 7 items

RAM 2.34 GB CPU 2.75% Not connected to Hub v4.18.0

# VSCode Docker extension



3

# MAIN TOPIC QUESTIONS

# Домашнее задание #1

1. Установить docker на ваш ПК

<https://docs.docker.com/desktop/>

Установка и обновление WSL2:

<https://learn.microsoft.com/en-us/windows/wsl/install-manual>

Включение функций виртуализации:

<https://docs.docker.com/desktop/troubleshoot/topics/#virtualization>

Включение виртуализации в BIOS:

<https://bce.berkeley.edu/enabling-virtualization-in-your-pc-bios.html>

2. Запустить в консоли команду:

```
docker run hello-world
```



# 6 QUESTIONS

Спасибо!

 Оставьте отзыв

