Основы работы с Docker.

Как не сойти с ума от туториалов.

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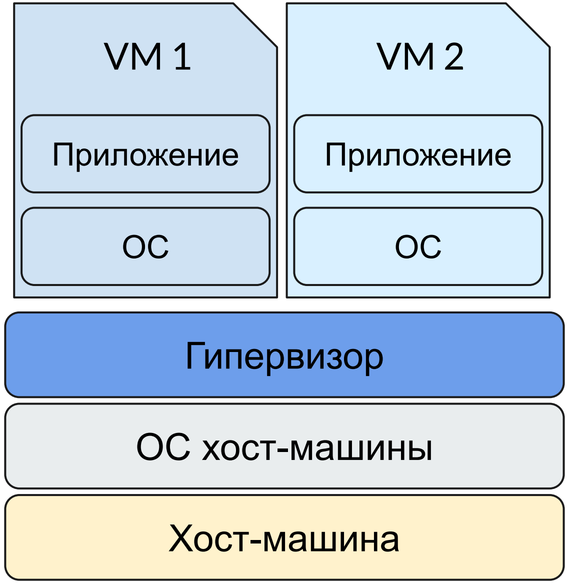
Что такое Docker?

Docker — это открытая платформа для разработки, доставки и запуска приложений.

Небольшой экскурс в историю



VM 1

Приложение

ОС

VM 2

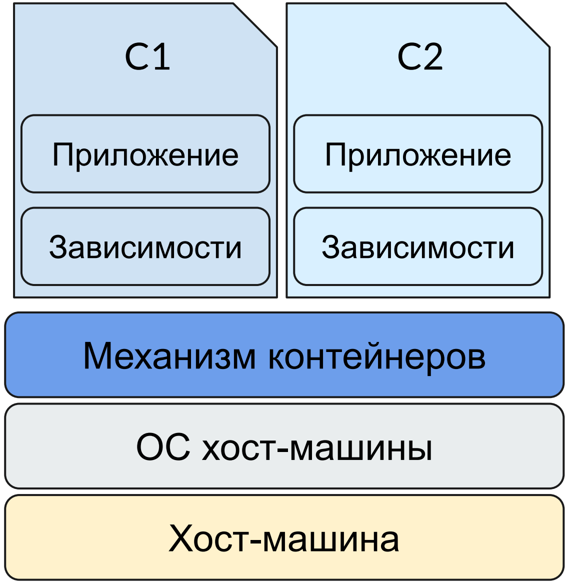
Приложение

ОС

Гипервизор

ОС хост-машины

Хост-машина



C1

Приложение

Зависимости

C2

Приложение

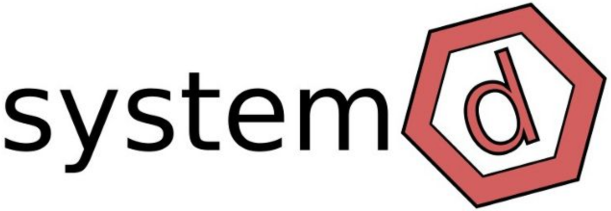
Зависимости

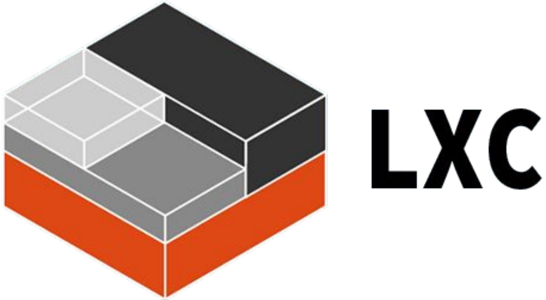
Механизм контейнеров

ОС хост-машины

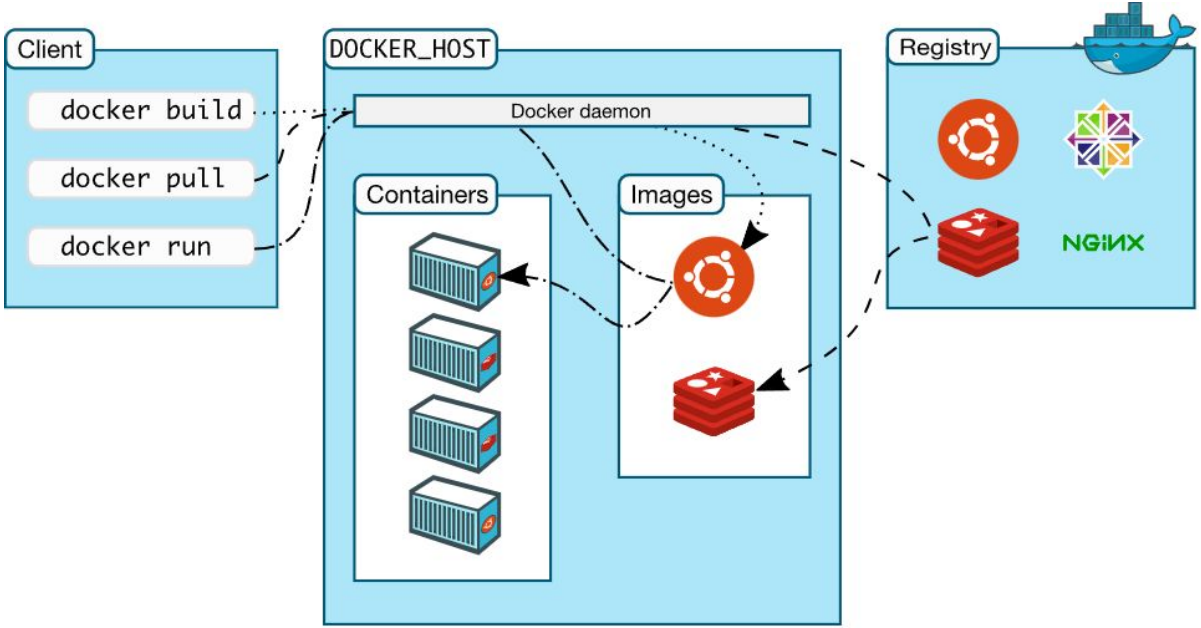
Хост-машина

Яркие представители виртуализации.

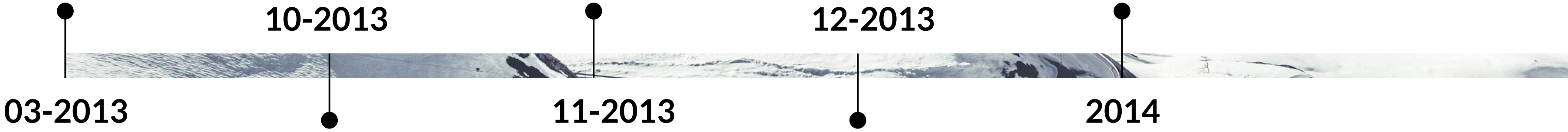




Эра Docker


Client
docker build
docker pull
docker run
DOCKER_HOST
Docker daemon
Containers
Images
Registry
NGiNX

История Docker



03-2013

Код Docker был опубликован под лицензией Apache 2.0 компанией dotCloud. В октябре этого же года они переименовываются в Docker, но сохраняют название своей PaaS-платформы (dotCloud).

10-2013

Выпущен релиз Havana, в котором реализована поддержка Docker (как драйвер для OpenStack Nova).

11-2013

Частичная поддержка Docker включена в дистрибутив Red Hat Enterprise Linux версии 6.5 и полная — в 20-ю версию дистрибутива Fedora, ранее было достигнуто соглашение с Red Hat о включении с 2014 года Docker в тиражируемую платформу OpenShift.

12-2013

Объявлено о поддержке развертывания Docker-контейнеров в среде Google Compute Engine.

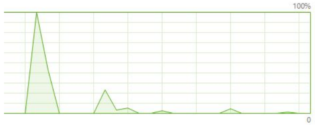
2014

Ведутся работы по включению поддержки Docker в среду управления фреймворка распределенных приложений Hadoop.

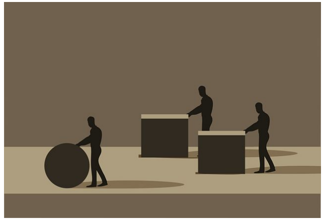
Основные преимущества Docker:

Легковесность

Эффективность использования ресурсов



Переносимость



Скорость развертывания

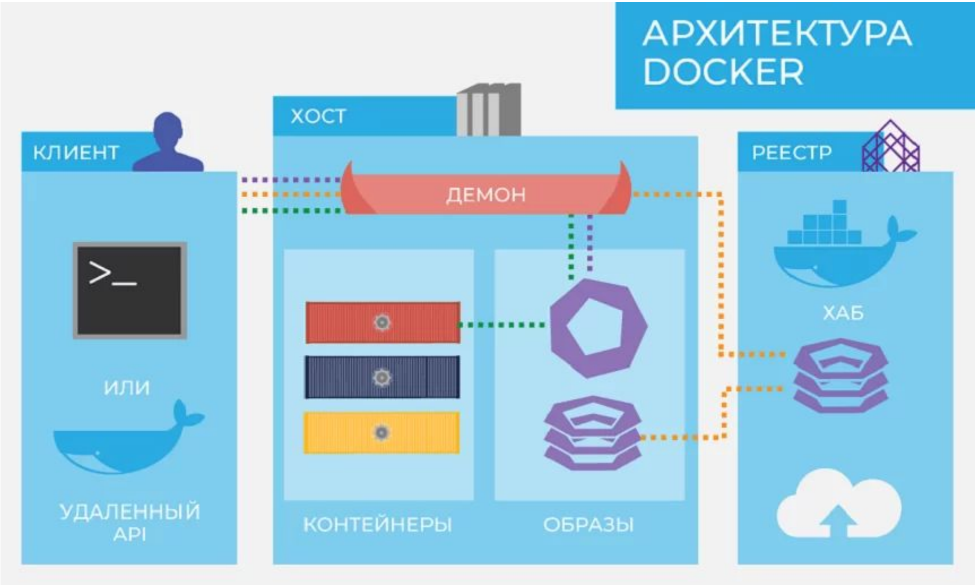
Архитектура и компоненты Docker

- Сервер или демон Docker.
- Клиент Docker
- Docker Desktop
- Реестр Docker. Известные репозитории: Docker Hub, Azure Container Registry, GitHub Container Registry.

- Файл Dockerfile
- Docker Machine
- Docker Swarm
- Docker Compose

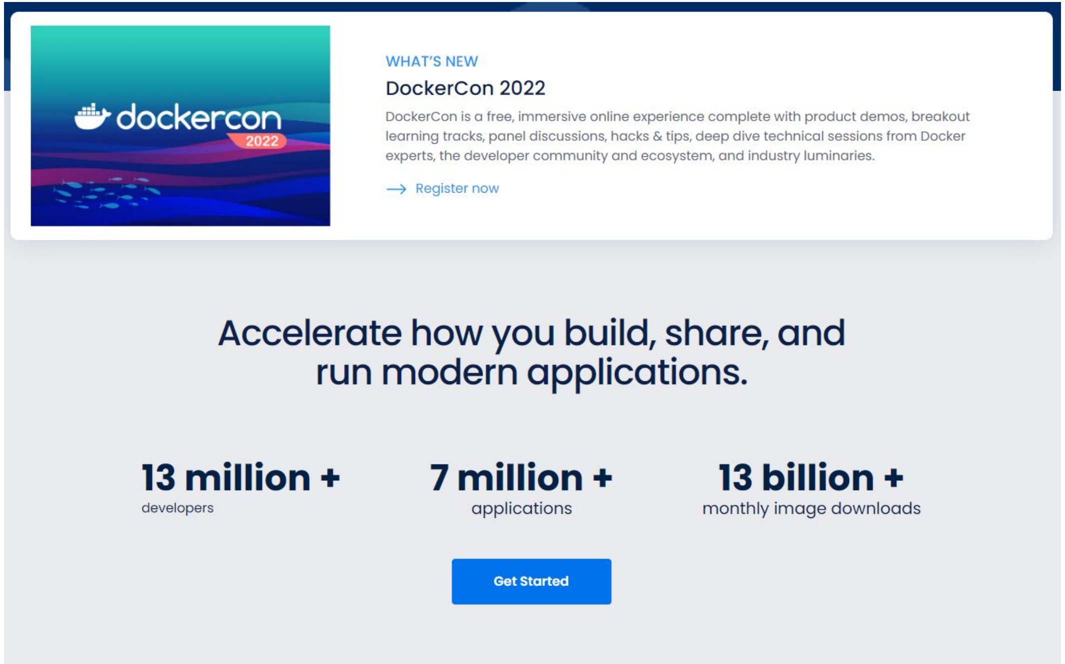
Объекты Docker

- Images (Образы)
- Containers (Контейнеры)



Установка Docker на Windows 10

https://www.docker.com/



WHAT'S NEW

DockerCon 2022

DockerCon is a free, immersive online experience complete with product demos, breakout learning tracks, panel discussions, hacks & tips, deep dive technical sessions from Docker experts, the developer community and ecosystem, and industry luminaries.

→ Register now

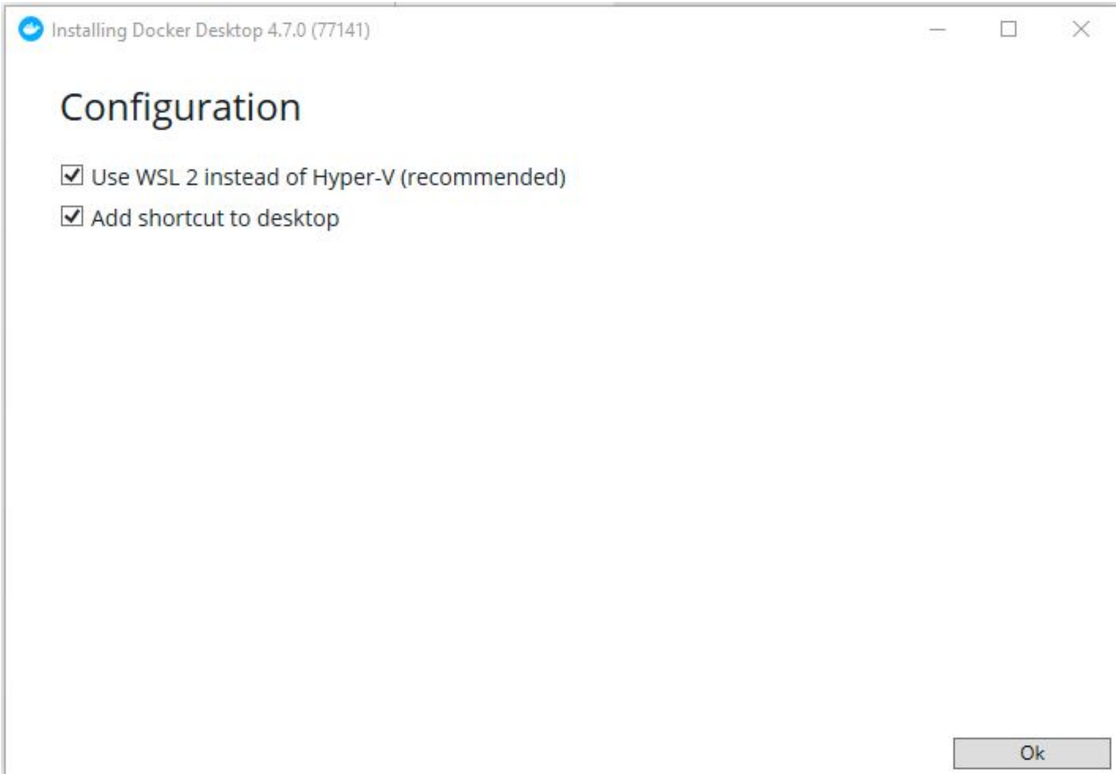
Accelerate how you build, share, and run modern applications.

13 million + developers

7 million + applications

13 billion + monthly image downloads

Установка Docker на Windows 10

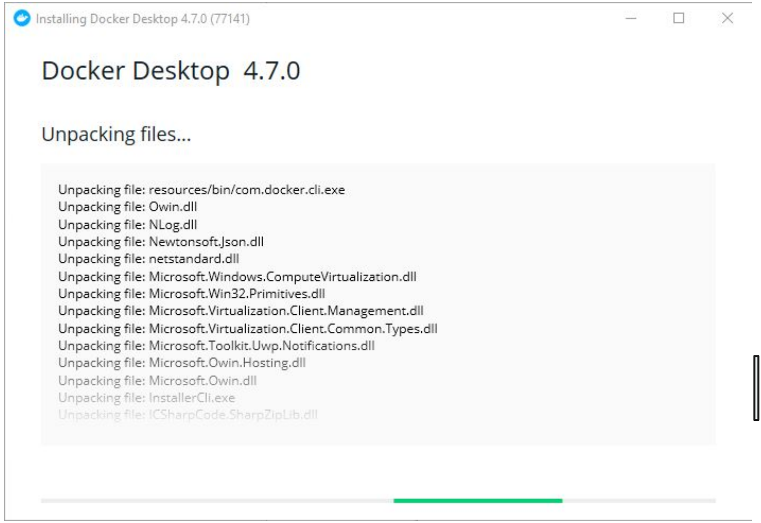


Configuration

☑ Use WSL 2 instead of Hyper-V (recommended)

☑ Add shortcut to desktop

Установка Docker на Windows 10

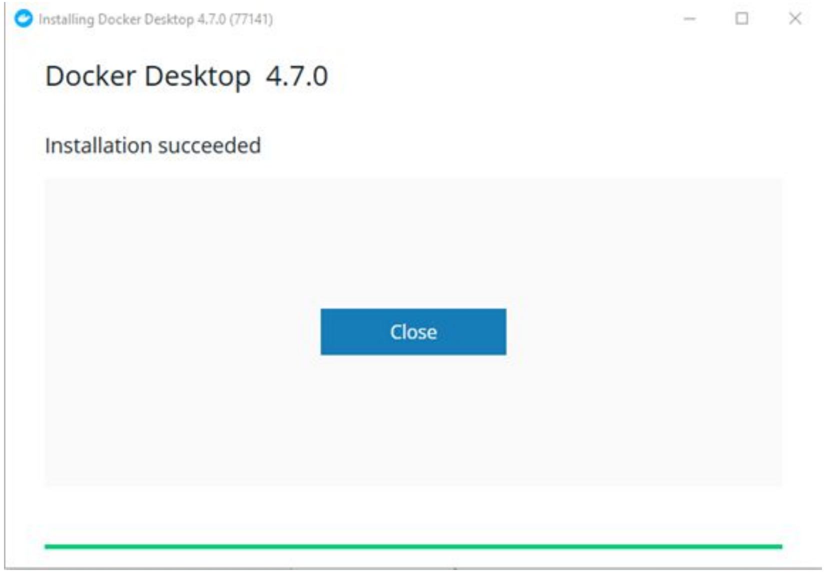


Installing Docker Desktop 4.7.0 (77141)

Docker Desktop 4.7.0

Unpacking files...

```
Unpacking file: resources/bin/com.docker.cli.exe
Unpacking file: Owin.dll
Unpacking file: NLog.dll
Unpacking file: Newtonsoft.Json.dll
Unpacking file: netstandard.dll
Unpacking file: Microsoft.Windows.ComputeVirtualization.dll
Unpacking file: Microsoft.Win32.Primitives.dll
Unpacking file: Microsoft.Virtualization.Client.Management.dll
Unpacking file: Microsoft.Virtualization.Client.Common.Types.dll
Unpacking file: Microsoft.Toolkit.Uwp.Notifications.dll
Unpacking file: Microsoft.Owin.Hosting.dll
Unpacking file: Microsoft.Owin.dll
Unpacking file: InstallerCli.exe
Unpacking file: ICSharpCode.SharpZipLib.dll
```

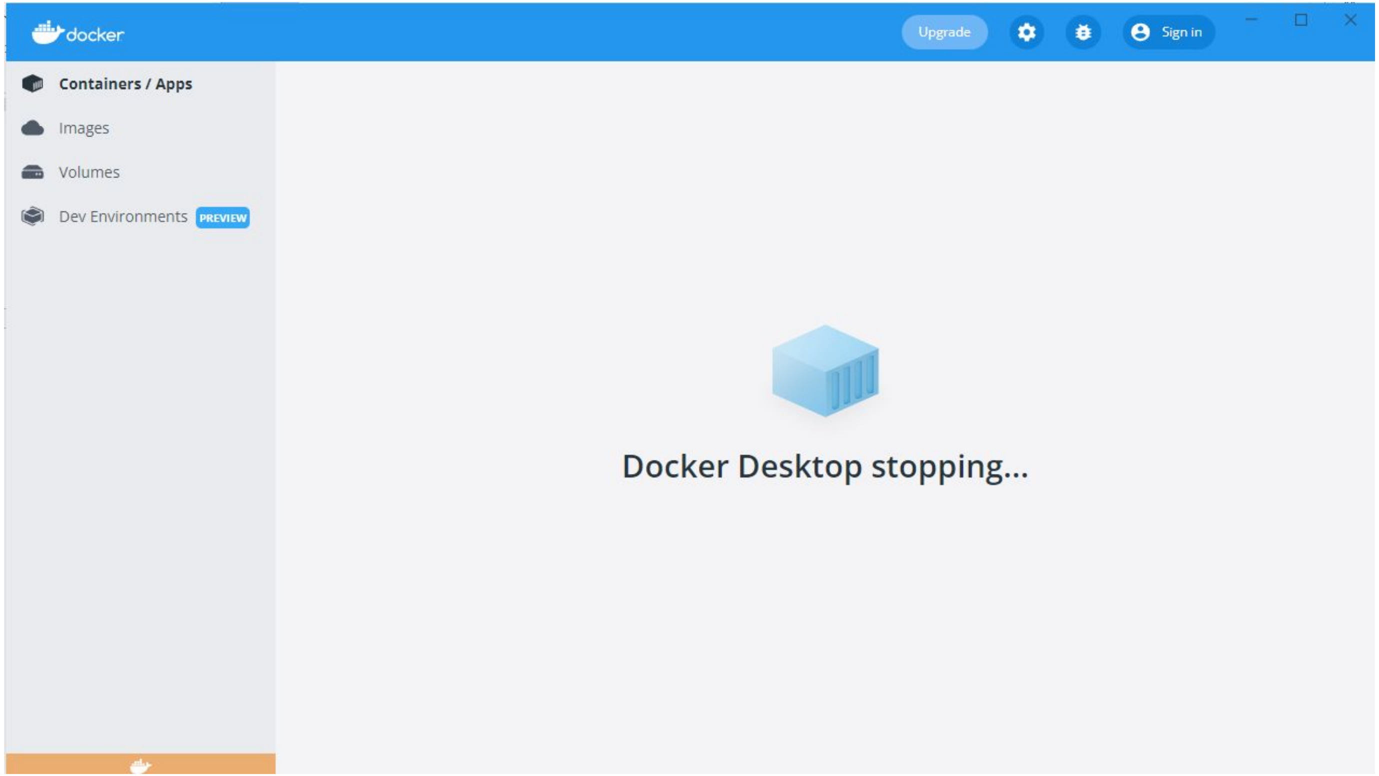


Installing Docker Desktop 4.7.0 (77141)

Docker Desktop 4.7.0

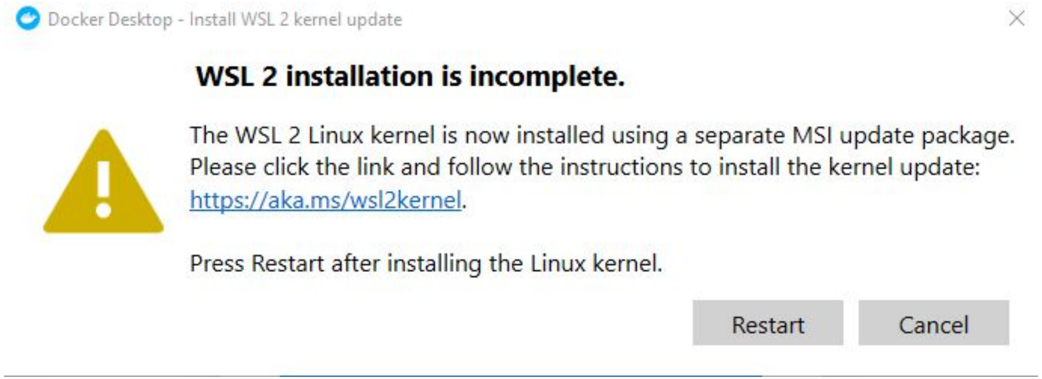
Installation succeeded

Установка Docker на Windows 10



Docker Desktop stopping...

Установка Docker на Windows 10



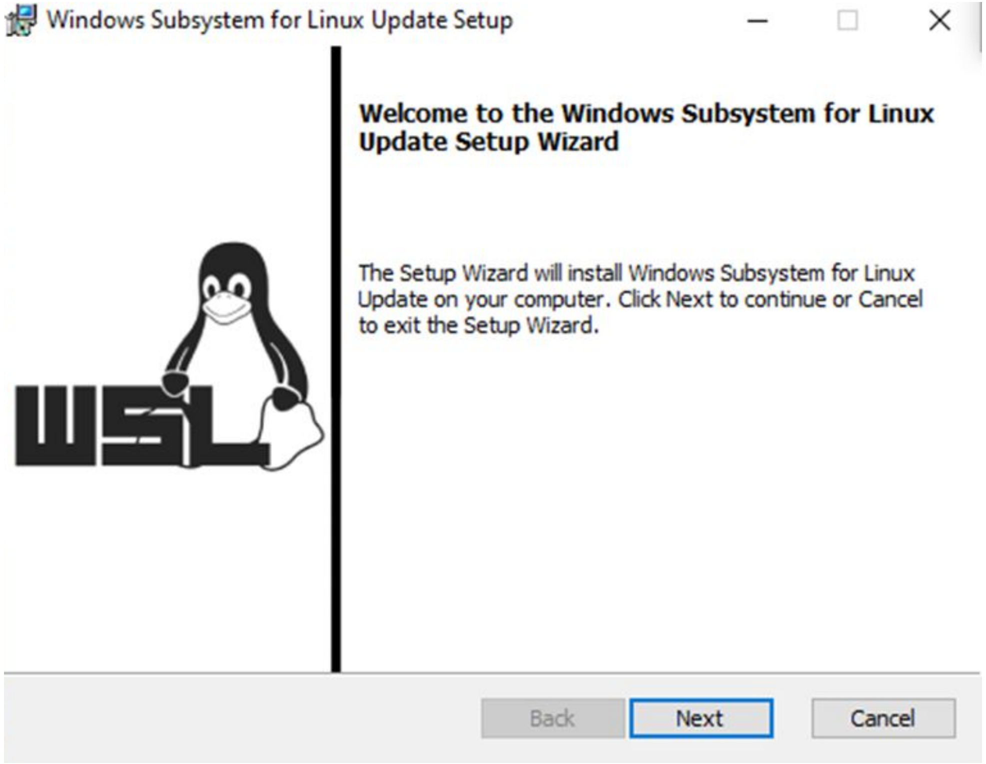
WSL 2 installation is incomplete.

The WSL 2 Linux kernel is now installed using a separate MSI update package. Please click the link and follow the instructions to install the kernel update: https://aka.ms/wsl2kernel.

Press Restart after installing the Linux kernel.

Действия по установке для старых версий WSL вручную | Microsoft Docs

Установка Docker на Windows 10

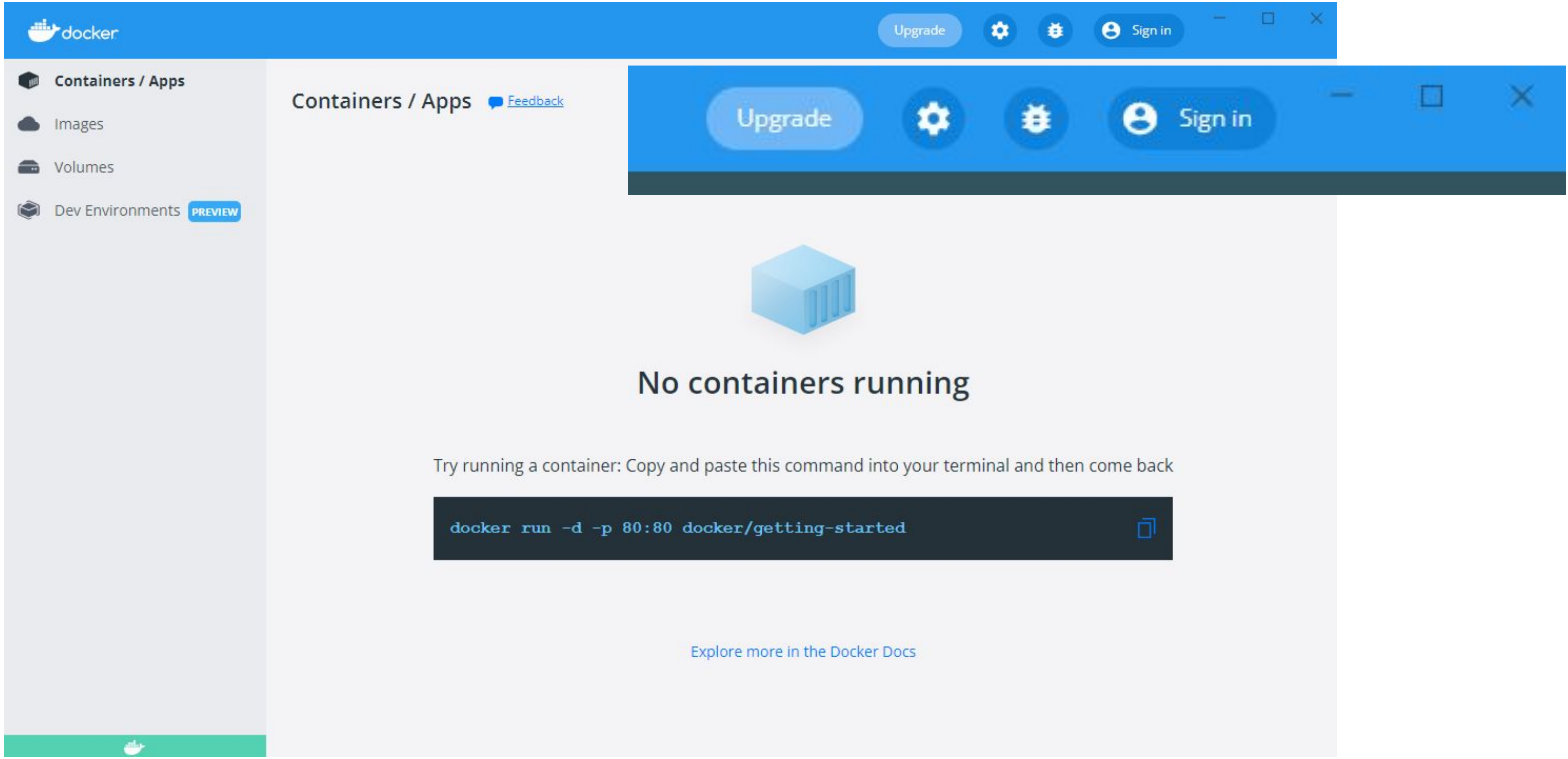


Windows Subsystem for Linux Update Setup

Welcome to the Windows Subsystem for Linux Update Setup Wizard

The Setup Wizard will install Windows Subsystem for Linux Update on your computer. Click Next to continue or Cancel to exit the Setup Wizard.

Установка Docker на Windows 10



Containers / Apps

No containers running

Try running a container: Copy and paste this command into your terminal and then come back

```
docker run -d -p 80:80 docker/getting-started
```

Explore more in the Docker Docs

Основные команды.

1 | docker search [OPTIONS] term

2 | docker pull image:tag

3 | docker images [OPTIONS]

4 | docker rmi [OPTIONS] image [image, image,…]

5 | docker run [OPTIONS] image:tag [commands, args]

6 | docker ps [OPTIONS]

7 | docker logs [OPTIONS] container

8 | docker restart [OPTIONS] container

9 | docker attach [OPTIONS] container

10 | docker rm [OPTIONS] container_id

11 | docker inspect [OPTIONS] container/image

12 | docker rename container new_name

13 | docker exec [OPTIONS] container COMMAND [args, …]

14 | docker cp [OPTIONS] container:src_path dest_path

15 | docker pause/unpause container [container…]

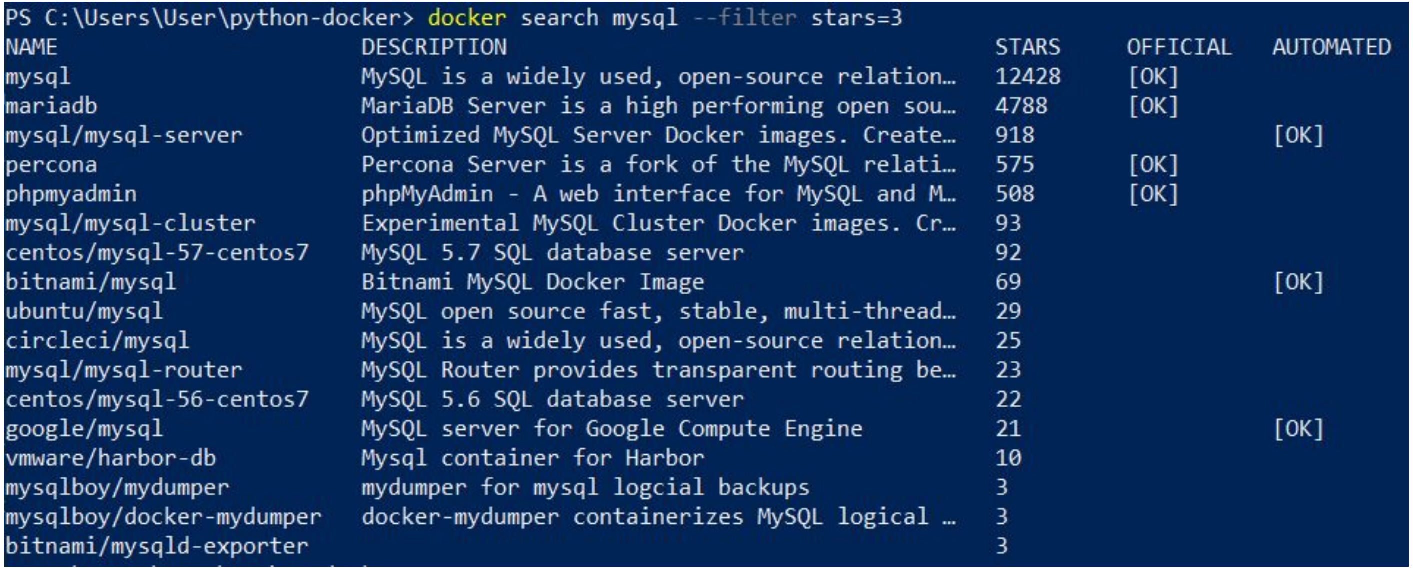
16 | docker create [OPTIONS] image [COMMAND] [args….]

17 | docker commit [OPTIONS] container [repository:tag]

18 | docker diff container

docker search [option] term

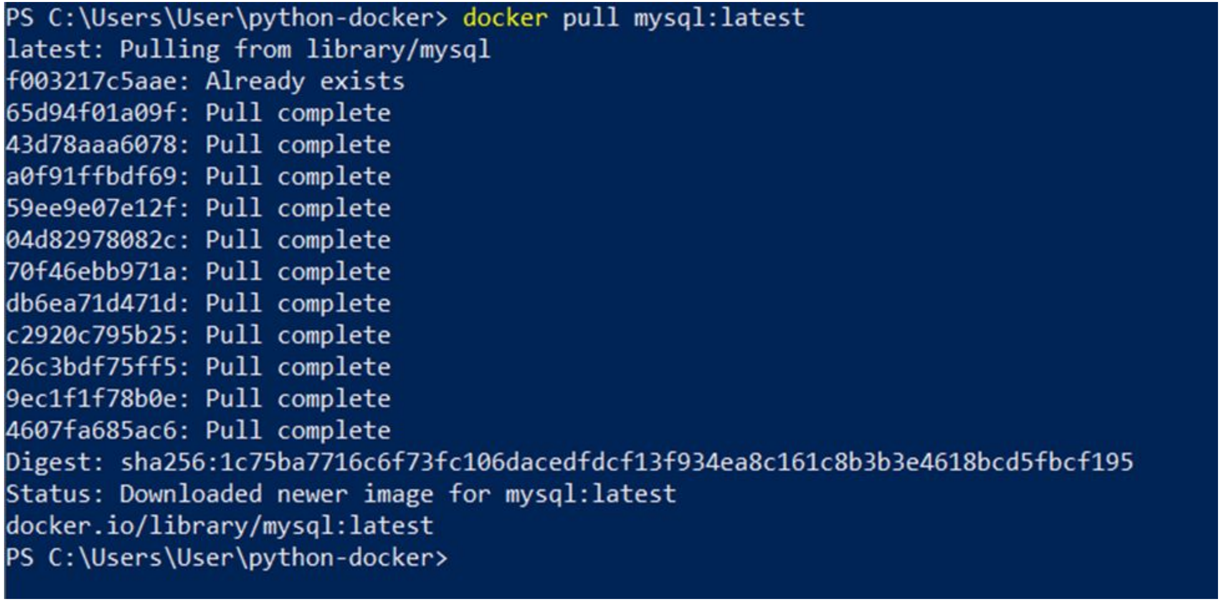
```
docker search mysql --filter stars=3
```



```
PS C:\Users\User\python-docker> docker search mysql --filter stars=3
NAME                       DESCRIPTION                                     STARS     OFFICIAL   AUTOMATED
mysql                      MySQL is a widely used, open-source relation…   12428     [OK]
mariadb                    MariaDB Server is a high performing open sou…   4788      [OK]
mysql/mysql-server         Optimized MySQL Server Docker images. Create…   918                  [OK]
percona                    Percona Server is a fork of the MySQL relati…   575       [OK]
phpmyadmin                 phpMyAdmin - A web interface for MySQL and M…   508       [OK]
mysql/mysql-cluster        Experimental MySQL Cluster Docker images. Cr…   93
centos/mysql-57-centos7    MySQL 5.7 SQL database server                   92
bitnami/mysql              Bitnami MySQL Docker Image                      69                   [OK]
ubuntu/mysql               MySQL open source fast, stable, multi-thread…   29
circleci/mysql             MySQL is a widely used, open-source relation…   25
mysql/mysql-router         MySQL Router provides transparent routing be…   23
centos/mysql-56-centos7    MySQL 5.6 SQL database server                   22
google/mysql               MySQL server for Google Compute Engine          21                   [OK]
vmware/harbor-db           Mysql container for Harbor                      10
mysqlboy/mydumper          mydumper for mysql logcial backups              3
mysqlboy/docker-mydumper   docker-mydumper containerizes MySQL logical …   3
bitnami/mysqld-exporter                                                    3
```

docker pull image:tag

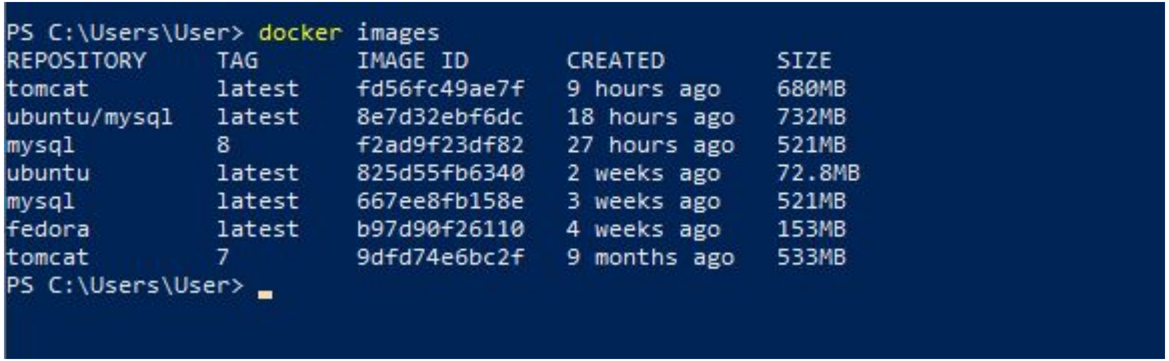
2 | docker pull mysql:latest



```
PS C:\Users\User\python-docker> docker pull mysql:latest
latest: Pulling from library/mysql
f003217c5aae: Already exists
65d94f01a09f: Pull complete
43d78aaa6078: Pull complete
a0f91ffbdf69: Pull complete
59ee9e07e12f: Pull complete
04d82978082c: Pull complete
70f46ebb971a: Pull complete
db6ea71d471d: Pull complete
c2920c795b25: Pull complete
26c3bdf75ff5: Pull complete
9ec1f1f78b0e: Pull complete
4607fa685ac6: Pull complete
Digest: sha256:1c75ba7716c6f73fc106dacedfdcf13f934ea8c161c8b3b3e4618bcd5fbcf195
Status: Downloaded newer image for mysql:latest
docker.io/library/mysql:latest
PS C:\Users\User\python-docker>
```

docker images [OPTIONS]

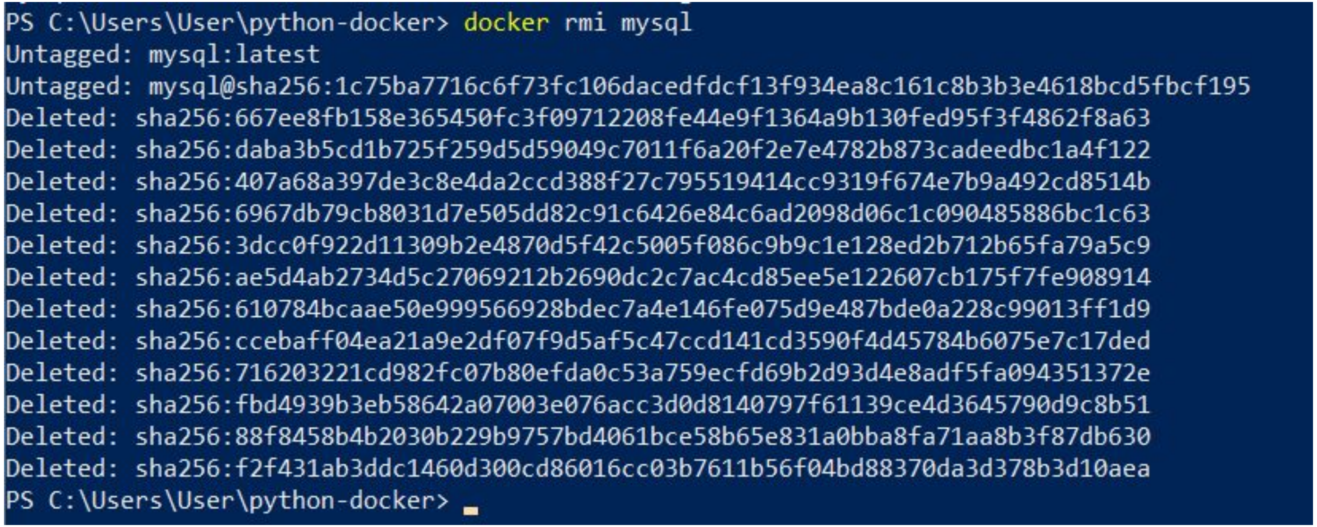
3 | docker images



```
PS C:\Users\User> docker images
REPOSITORY      TAG        IMAGE ID       CREATED         SIZE
tomcat          latest     fd56fc49ae7f   9 hours ago     680MB
ubuntu/mysql    latest     8e7d32ebf6dc   18 hours ago    732MB
mysql           8          f2ad9f23df82   27 hours ago    521MB
ubuntu          latest     825d55fb6340   2 weeks ago     72.8MB
mysql           latest     667ee8fb158e   3 weeks ago     521MB
fedora          latest     b97d90f26110   4 weeks ago     153MB
tomcat          7          9dfd74e6bc2f   9 months ago    533MB
PS C:\Users\User>
```

docker rmi [OPTIONS] image [image, image,...]

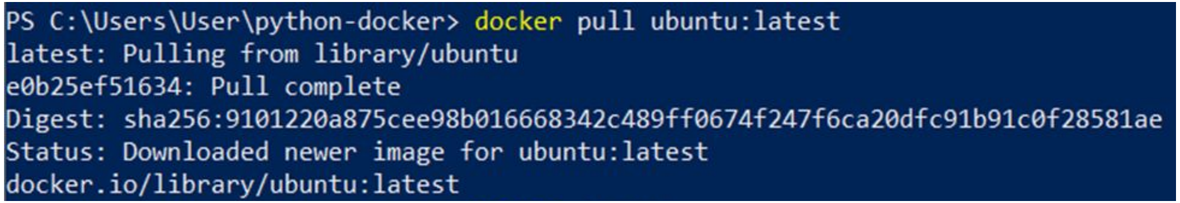
4 | docker rmi mysql



```
PS C:\Users\User\python-docker> docker rmi mysql
Untagged: mysql:latest
Untagged: mysql@sha256:1c75ba7716c6f73fc106dacedfdcf13f934ea8c161c8b3b3e4618bcd5fbcf195
Deleted: sha256:667ee8fb158e365450fc3f09712208fe44e9f1364a9b130fed95f3f4862f8a63
Deleted: sha256:daba3b5cd1b725f259d5d59049c7011f6a20f2e7e4782b873cadeedbc1a4f122
Deleted: sha256:407a68a397de3c8e4da2ccd388f27c795519414cc9319f674e7b9a492cd8514b
Deleted: sha256:6967db79cb8031d7e505dd82c91c6426e84c6ad2098d06c1c090485886bc1c63
Deleted: sha256:3dcc0f922d11309b2e4870d5f42c5005f086c9b9c1e128ed2b712b65fa79a5c9
Deleted: sha256:ae5d4ab2734d5c27069212b2690dc2c7ac4cd85ee5e122607cb175f7fe908914
Deleted: sha256:610784bcaae50e999566928bdec7a4e146fe075d9e487bde0a228c99013ff1d9
Deleted: sha256:ccebaff04ea21a9e2df07f9d5af5c47ccd141cd3590f4d45784b6075e7c17ded
Deleted: sha256:716203221cd982fc07b80efda0c53a759ecfd69b2d93d4e8adf5fa094351372e
Deleted: sha256:fbd4939b3eb58642a07003e076acc3d0d8140797f61139ce4d3645790d9c8b51
Deleted: sha256:88f8458b4b2030b229b9757bd4061bce58b65e831a0bba8fa71aa8b3f87db630
Deleted: sha256:f2f431ab3ddc1460d300cd86016cc03b7611b56f04bd88370da3d378b3d10aea
PS C:\Users\User\python-docker>
```

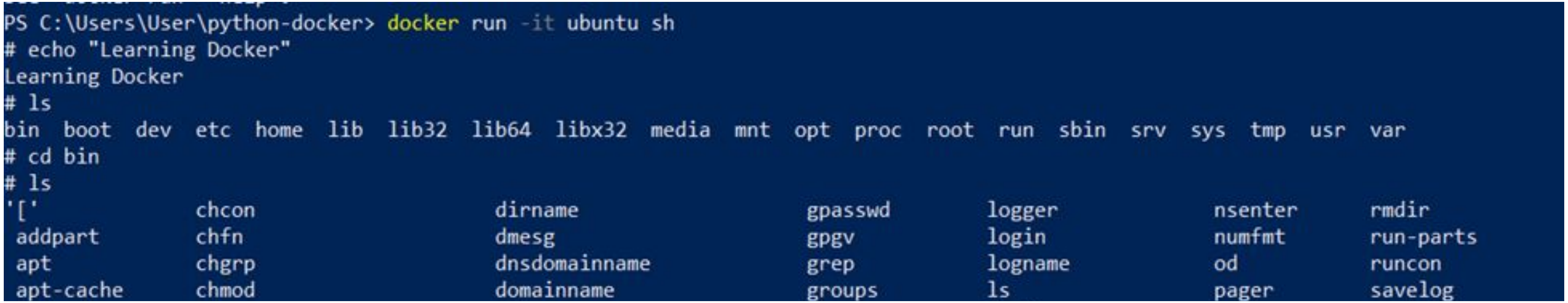
docker run [OPTIONS] image:tag [commands, args]

2 | docker pull ubuntu:latest



```
PS C:\Users\User\python-docker> docker pull ubuntu:latest
latest: Pulling from library/ubuntu
e0b25ef51634: Pull complete
Digest: sha256:9101220a875cee98b016668342c489ff0674f247f6ca20dfc91b91c0f28581ae
Status: Downloaded newer image for ubuntu:latest
docker.io/library/ubuntu:latest
```

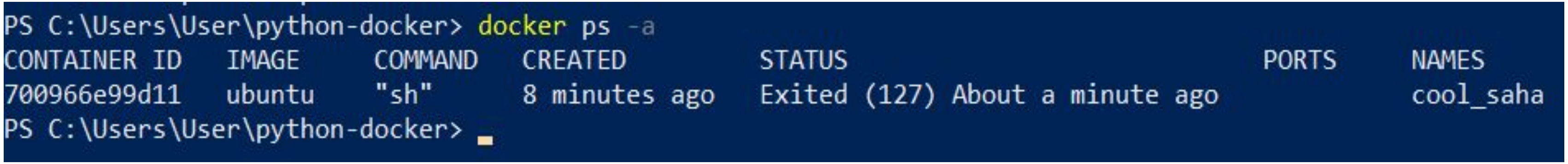
5 | docker run –it ubuntu sh



```
PS C:\Users\User\python-docker> docker run -it ubuntu sh
# echo "Learning Docker"
Learning Docker
# ls
bin  boot  dev  etc  home  lib  lib32  lib64  libx32  media  mnt  opt  proc  root  run  sbin  srv  sys  tmp  usr  var
# cd bin
# ls
'['              chcon                    dirname                   gpasswd        logger              nsenter      rmdir
 addpart         chfn                     dmesg                     gpgv           login               numfmt       run-parts
 apt             chgrp                    dnsdomainname             grep           logname             od           runcon
 apt-cache       chmod                    domainname                groups         ls                  pager        savelog
```

docker ps [OPTIONS]

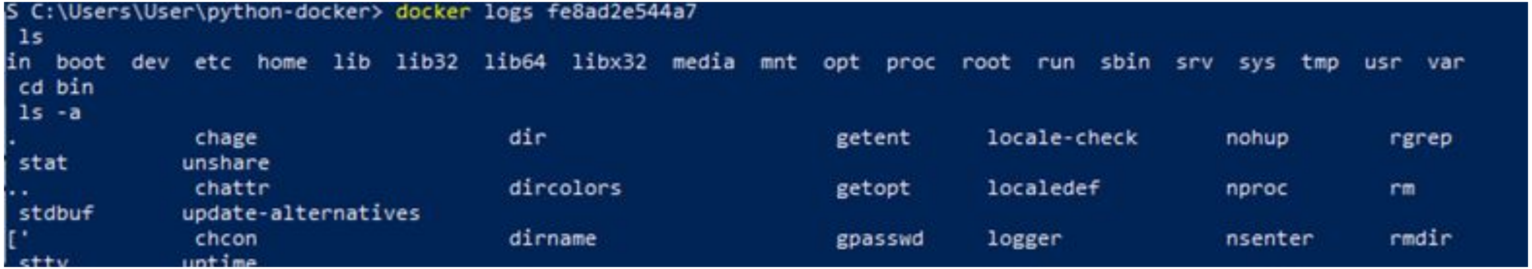
6 | docker ps -a



```
PS C:\Users\User\python-docker> docker ps -a
CONTAINER ID   IMAGE     COMMAND   CREATED         STATUS                       PORTS     NAMES
700966e99d11   ubuntu    "sh"      8 minutes ago   Exited (127) About a minute ago          cool_saha
PS C:\Users\User\python-docker> _
```

docker logs [OPTIONS] container

7 | docker logs fe8ad2e544a7

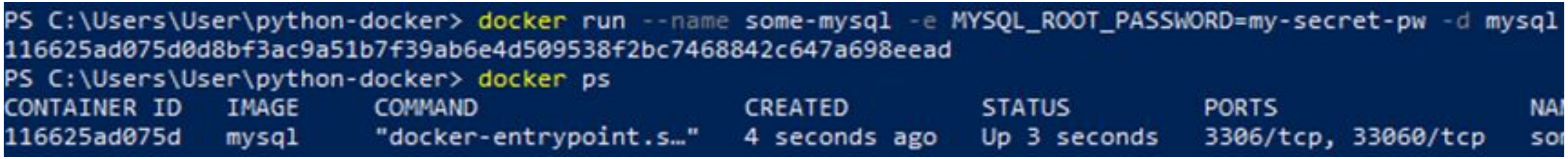


```
S C:\Users\User\python-docker> docker logs fe8ad2e544a7
 ls
in  boot  dev  etc  home  lib  lib32  lib64  libx32  media  mnt  opt  proc  root  run  sbin  srv  sys  tmp  usr  var
 cd bin
 ls -a
.             chage                    dir                       getent      locale-check      nohup       rgrep
 stat        unshare
..            chattr                   dircolors                 getopt      localedef         nproc       rm
 stdbuf      update-alternatives
['            chcon                    dirname                   gpasswd     logger            nsenter     rmdir
 stty        uptime
```

docker logs [OPTIONS] container

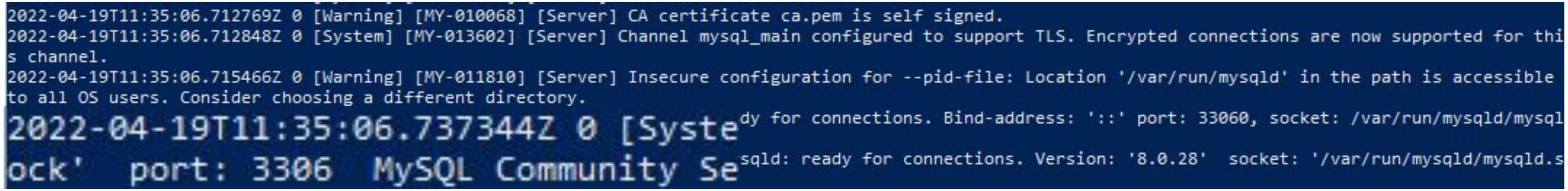
2 | docker pull mysql:latest

5 | docker run --name some-mysql -e MYSQL_ROOT_PASSWORD=my-secret-pw -d mysql



```
PS C:\Users\User\python-docker> docker run --name some-mysql -e MYSQL_ROOT_PASSWORD=my-secret-pw -d mysql
116625ad075d0d8bf3ac9a51b7f39ab6e4d509538f2bc7468842c647a698eead
PS C:\Users\User\python-docker> docker ps
CONTAINER ID   IMAGE     COMMAND                  CREATED          STATUS          PORTS                 NA
116625ad075d   mysql     "docker-entrypoint.s…"   4 seconds ago    Up 3 seconds    3306/tcp, 33060/tcp   so
```

7 | docker logs 116625ad075d

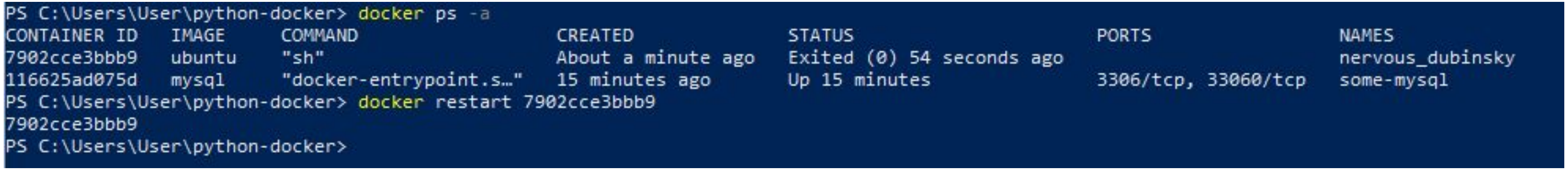


```
2022-04-19T11:35:06.712769Z 0 [Warning] [MY-010068] [Server] CA certificate ca.pem is self signed.
2022-04-19T11:35:06.712848Z 0 [System] [MY-013602] [Server] Channel mysql_main configured to support TLS. Encrypted connections are now supported for thi
s channel.
2022-04-19T11:35:06.715466Z 0 [Warning] [MY-011810] [Server] Insecure configuration for --pid-file: Location '/var/run/mysqld' in the path is accessible
to all OS users. Consider choosing a different directory.
2022-04-19T11:35:06.737344Z 0 [Systedy for connections. Bind-address: '::' port: 33060, socket: /var/run/mysqld/mysql
ock'  port: 3306  MySQL Community Sesqld: ready for connections. Version: '8.0.28'  socket: '/var/run/mysqld/mysqld.s
```

docker restart [OPTIONS] container

6 | docker ps -a

8 | docker restart 7092cce3bbb9



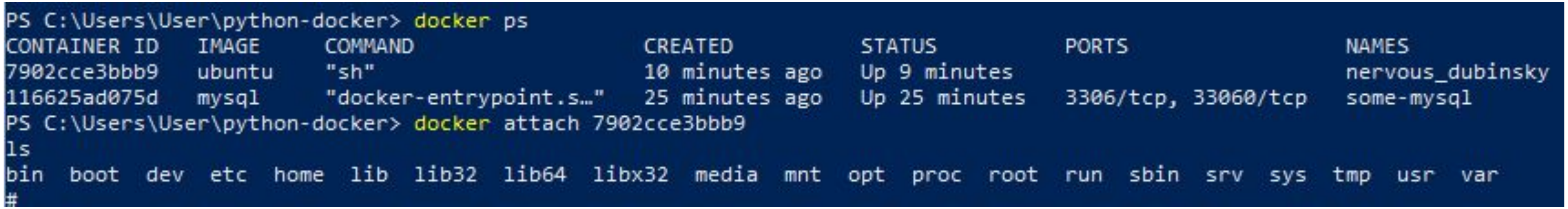
```
PS C:\Users\User\python-docker> docker ps -a
CONTAINER ID   IMAGE     COMMAND                  CREATED              STATUS                       PORTS                 NAMES
7902cce3bbb9   ubuntu    "sh"                     About a minute ago   Exited (0) 54 seconds ago                          nervous_dubinsky
116625ad075d   mysql     "docker-entrypoint.s…"   15 minutes ago       Up 15 minutes                3306/tcp, 33060/tcp   some-mysql
PS C:\Users\User\python-docker> docker restart 7902cce3bbb9
7902cce3bbb9
PS C:\Users\User\python-docker>
```

6 | docker ps -a

docker attach [OPTIONS] container

6 | docker ps -a

9 | docker attach 7092cce3bbb9

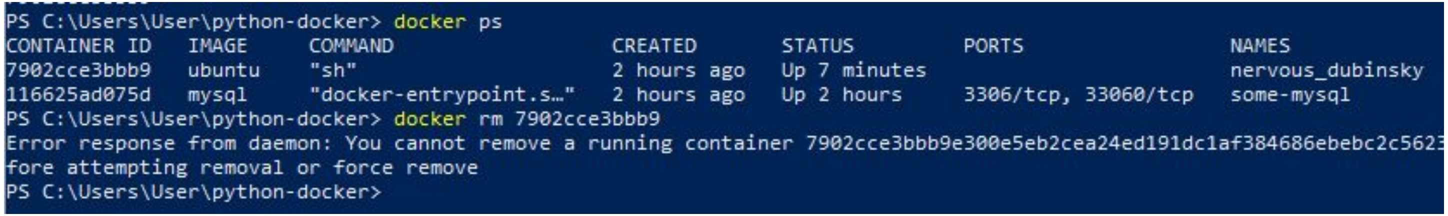


```
PS C:\Users\User\python-docker> docker ps
CONTAINER ID   IMAGE     COMMAND                  CREATED          STATUS          PORTS                 NAMES
7902cce3bbb9   ubuntu    "sh"                     10 minutes ago   Up 9 minutes                          nervous_dubinsky
116625ad075d   mysql     "docker-entrypoint.s…"   25 minutes ago   Up 25 minutes   3306/tcp, 33060/tcp   some-mysql
PS C:\Users\User\python-docker> docker attach 7902cce3bbb9
ls
bin  boot  dev  etc  home  lib  lib32  lib64  libx32  media  mnt  opt  proc  root  run  sbin  srv  sys  tmp  usr  var
#
```

docker rm [OPTIONS] container_id

10.1 | docker stop 7092cce3bbb9

10 | docker rm 7092cce3bbb9



```
PS C:\Users\User\python-docker> docker ps
CONTAINER ID   IMAGE     COMMAND                  CREATED         STATUS         PORTS                 NAMES
7902cce3bbb9   ubuntu    "sh"                     2 hours ago     Up 7 minutes                         nervous_dubinsky
116625ad075d   mysql     "docker-entrypoint.s…"   2 hours ago     Up 2 hours     3306/tcp, 33060/tcp   some-mysql
PS C:\Users\User\python-docker> docker rm 7902cce3bbb9
Error response from daemon: You cannot remove a running container 7902cce3bbb9e300e5eb2cea24ed191dc1af384686ebebc2c5623
fore attempting removal or force remove
PS C:\Users\User\python-docker>
```

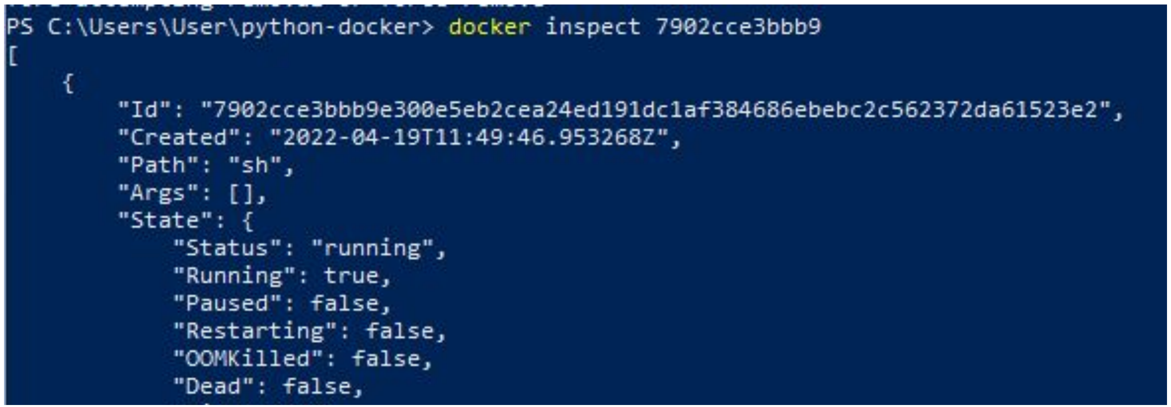
docker stop $(docker ps -a -q) - остановить все контейнеры

docker rm $(docker ps -a -q) - удалить все контейнеры

docker rmi $(docker images -q) - удалить все образы

docker inspect [OPTIONS] container/image

11 | docker inspect 7092cce3bbb9



```
PS C:\Users\User\python-docker> docker inspect 7902cce3bbb9
[
    {
        "Id": "7902cce3bbb9e300e5eb2cea24ed191dc1af384686ebebc2c562372da61523e2",
        "Created": "2022-04-19T11:49:46.953268Z",
        "Path": "sh",
        "Args": [],
        "State": {
            "Status": "running",
            "Running": true,
            "Paused": false,
            "Restarting": false,
            "OOMKilled": false,
            "Dead": false,
```

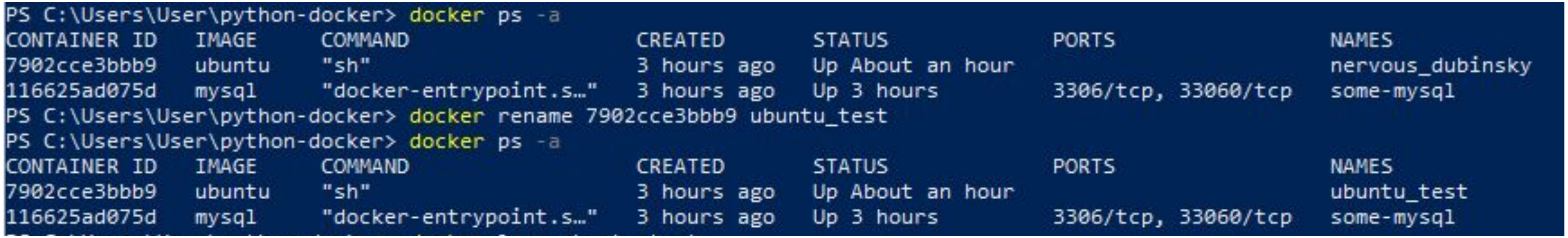
11 | docker inspect --format ='{{.Name}}' container_id

11 | docker inspect --format='{{range .NetworkSettings.Networks}}{{.IPAddress}}{{end}}' container_id

11 | docker inspect --format='{{.NetworkSettings.IPAddress}}' container_id

docker rename container new_name

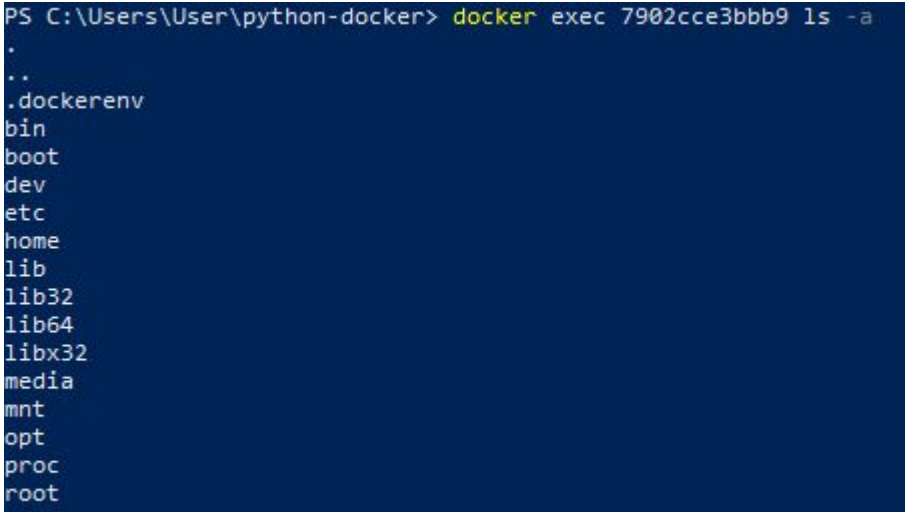
12 | docker rename 7092cce3bbb9 ubuntu_test



```
PS C:\Users\User\python-docker> docker ps -a
CONTAINER ID   IMAGE     COMMAND                  CREATED         STATUS              PORTS                 NAMES
7902cce3bbb9   ubuntu    "sh"                     3 hours ago     Up About an hour                          nervous_dubinsky
116625ad075d   mysql     "docker-entrypoint.s…"   3 hours ago     Up 3 hours          3306/tcp, 33060/tcp   some-mysql
PS C:\Users\User\python-docker> docker rename 7902cce3bbb9 ubuntu_test
PS C:\Users\User\python-docker> docker ps -a
CONTAINER ID   IMAGE     COMMAND                  CREATED         STATUS              PORTS                 NAMES
7902cce3bbb9   ubuntu    "sh"                     3 hours ago     Up About an hour                          ubuntu_test
116625ad075d   mysql     "docker-entrypoint.s…"   3 hours ago     Up 3 hours          3306/tcp, 33060/tcp   some-mysql
```

docker exec [OPTIONS] container COMMAND [args, ...]

13 | docker exec 7902cce3bbb9 ls –a

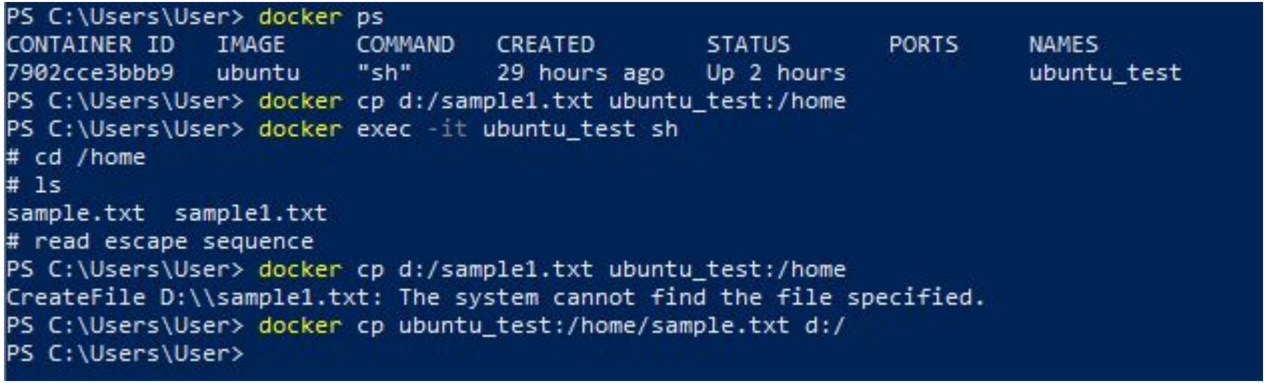


```
PS C:\Users\User\python-docker> docker exec 7902cce3bbb9 ls -a
.
..
.dockerenv
bin
boot
dev
etc
home
lib
lib32
lib64
libx32
media
mnt
opt
proc
root
```

docker cp [OPTIONS] container:src_path dest_path

14 | docker cp d:/sample.txt ubuntu_test:/home

13 | docker exec -it ubuntu_test sh



```
PS C:\Users\User> docker ps
CONTAINER ID   IMAGE     COMMAND   CREATED          STATUS         PORTS     NAMES
7902cce3bbb9   ubuntu    "sh"      29 hours ago     Up 2 hours               ubuntu_test
PS C:\Users\User> docker cp d:/sample1.txt ubuntu_test:/home
PS C:\Users\User> docker exec -it ubuntu_test sh
# cd /home
# ls
sample.txt  sample1.txt
# read escape sequence
PS C:\Users\User> docker cp d:/sample1.txt ubuntu_test:/home
CreateFile D:\\sample1.txt: The system cannot find the file specified.
PS C:\Users\User> docker cp ubuntu_test:/home/sample.txt d:/
PS C:\Users\User>
```

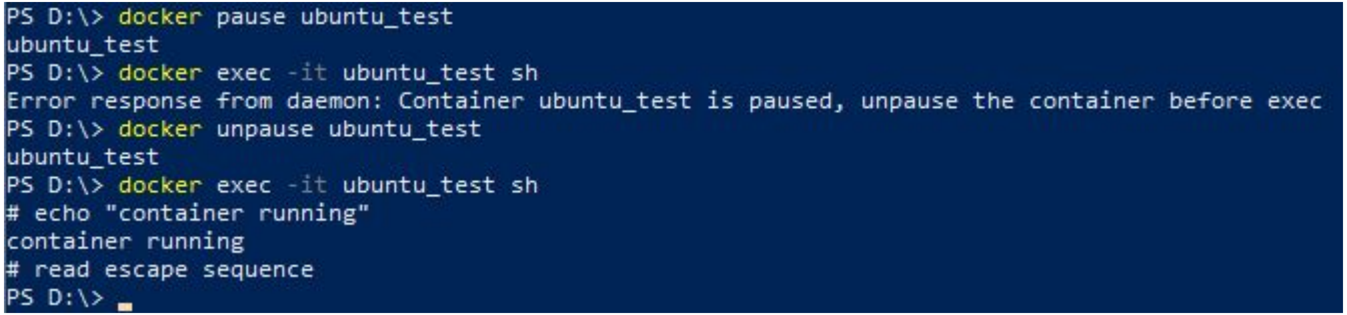
14 | docker cp ubuntu_test:/home/sample.txt d:/

docker pause/unpause container [container...]

15 | docker pause ubuntu_test

13 | docker exec -it ubuntu_test sh

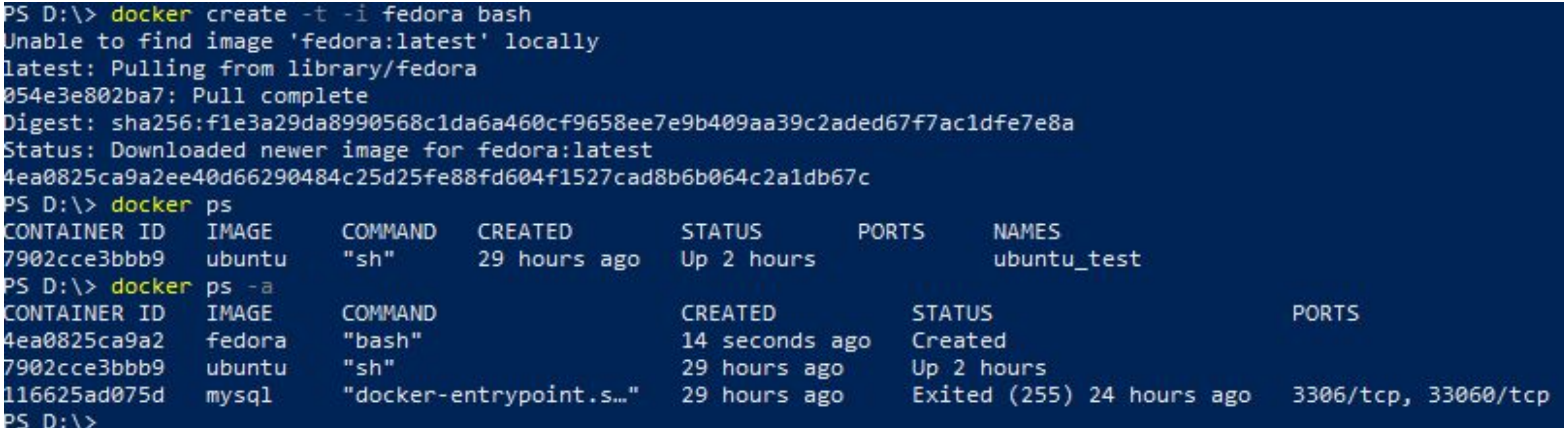
15 | docker pause ubuntu_test



```
PS D:\> docker pause ubuntu_test
ubuntu_test
PS D:\> docker exec -it ubuntu_test sh
Error response from daemon: Container ubuntu_test is paused, unpause the container before exec
PS D:\> docker unpause ubuntu_test
ubuntu_test
PS D:\> docker exec -it ubuntu_test sh
# echo "container running"
container running
# read escape sequence
PS D:\> _
```

docker create [OPTIONS] image [COMMAND] [args....]

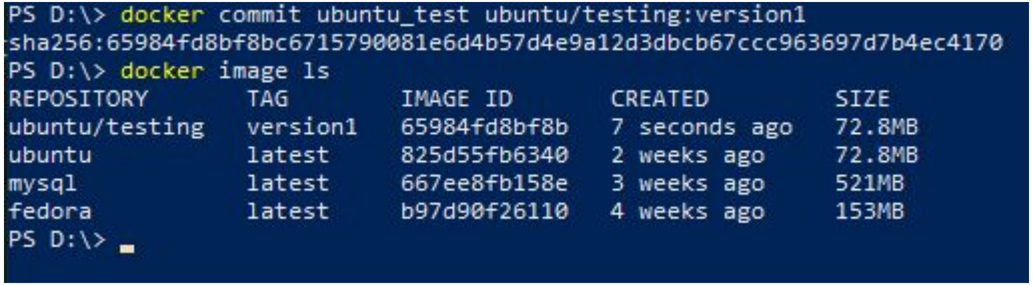
16 | docker create -t -i fedora bash



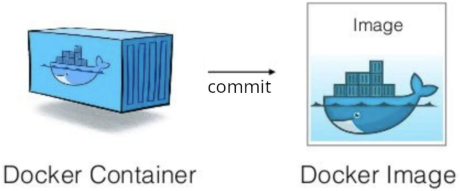
```
PS D:\> docker create -t -i fedora bash
Unable to find image 'fedora:latest' locally
latest: Pulling from library/fedora
054e3e802ba7: Pull complete
Digest: sha256:f1e3a29da8990568c1da6a460cf9658ee7e9b409aa39c2aded67f7ac1dfe7e8a
Status: Downloaded newer image for fedora:latest
4ea0825ca9a2ee40d66290484c25d25fe88fd604f1527cad8b6b064c2a1db67c
PS D:\> docker ps
CONTAINER ID   IMAGE     COMMAND   CREATED          STATUS         PORTS      NAMES
7902cce3bbb9   ubuntu    "sh"      29 hours ago     Up 2 hours                ubuntu_test
PS D:\> docker ps -a
CONTAINER ID   IMAGE     COMMAND                  CREATED          STATUS                      PORTS
4ea0825ca9a2   fedora    "bash"                   14 seconds ago   Created
7902cce3bbb9   ubuntu    "sh"                     29 hours ago     Up 2 hours
116625ad075d   mysql     "docker-entrypoint.s…"   29 hours ago     Exited (255) 24 hours ago   3306/tcp, 33060/tcp
PS D:\>
```

docker commit [OPTIONS] container [repository:tag]

17 | docker commit ubuntu_test ubuntu/testing:version1

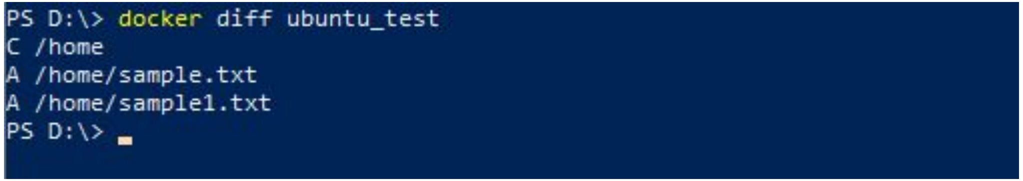


```
PS D:\> docker commit ubuntu_test ubuntu/testing:version1
sha256:65984fd8bf8bc6715790081e6d4b57d4e9a12d3dbcb67ccc963697d7b4ec4170
PS D:\> docker image ls
REPOSITORY       TAG        IMAGE ID       CREATED          SIZE
ubuntu/testing   version1   65984fd8bf8b   7 seconds ago    72.8MB
ubuntu           latest     825d55fb6340   2 weeks ago      72.8MB
mysql            latest     667ee8fb158e   3 weeks ago      521MB
fedora           latest     b97d90f26110   4 weeks ago      153MB
PS D:\> _
```



docker diff container

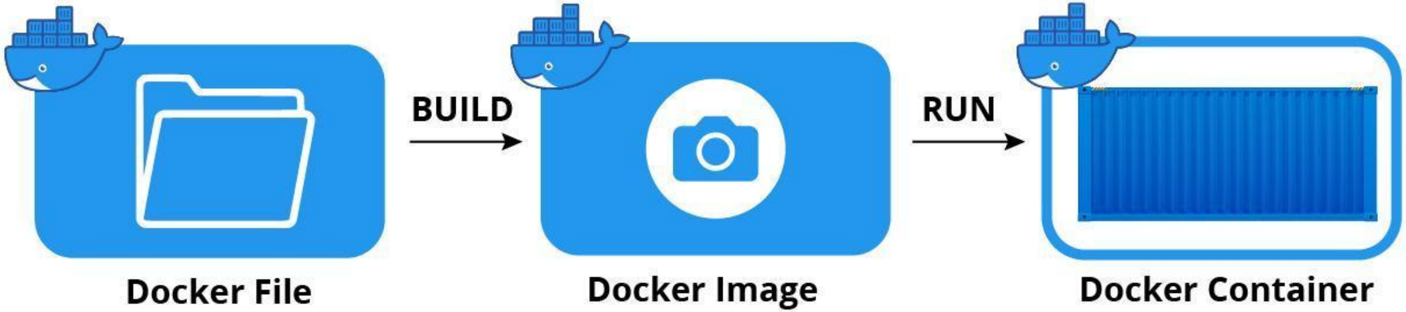
18 | docker diff ubuntu_test



```
PS D:\> docker diff ubuntu_test
C /home
A /home/sample.txt
A /home/sample1.txt
PS D:\> _
```

docker

Dockerfile



Dockerfile

- файл Dockerfile должен начинаться с инструкции **FROM**, определяющий стартовый образ;
- инструкция FROM поддерживает переменные, объявленные в инструкции **ARG**. Это единственная инструкция, которая может стоять перед FROM:

```
ARG OS_VERSION = 20.04
FROM UBUNTU:${OS_VERSION}
```

- строки комментариев должны начинаться с **#**.
- инструкции имеют синтаксис **instruction arguments**;
- инструкции выполняются последовательно сверху вниз;
- вместе с файлом Dockerfile демону Docker передаются все файлы, находящиеся в этом каталоге.

Dockerfile. Основные инструкции

1 | FROM image - является обязательной

2 | ENTRYPOINT filename

3 | ADD from_path to_path

4 | ENV MySQL_ROOT_PASSWORD mypassword

5 | MAINTAINER author@domain.com

6 | RUN command [command…]

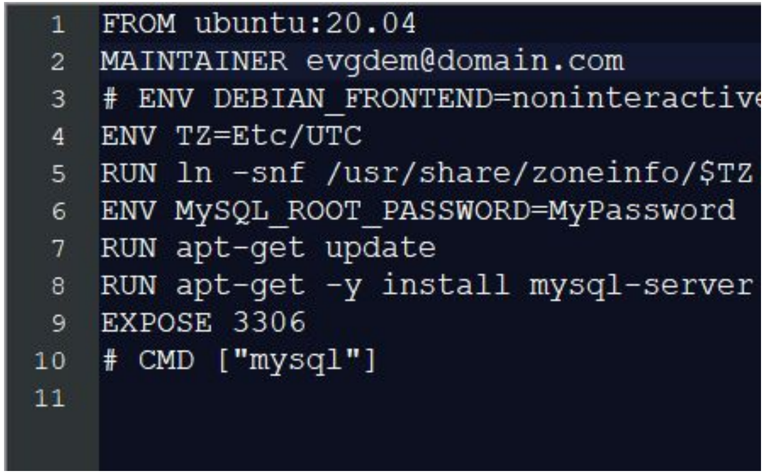
7 | USER

8 | WORKDIR

9 | VOLUME

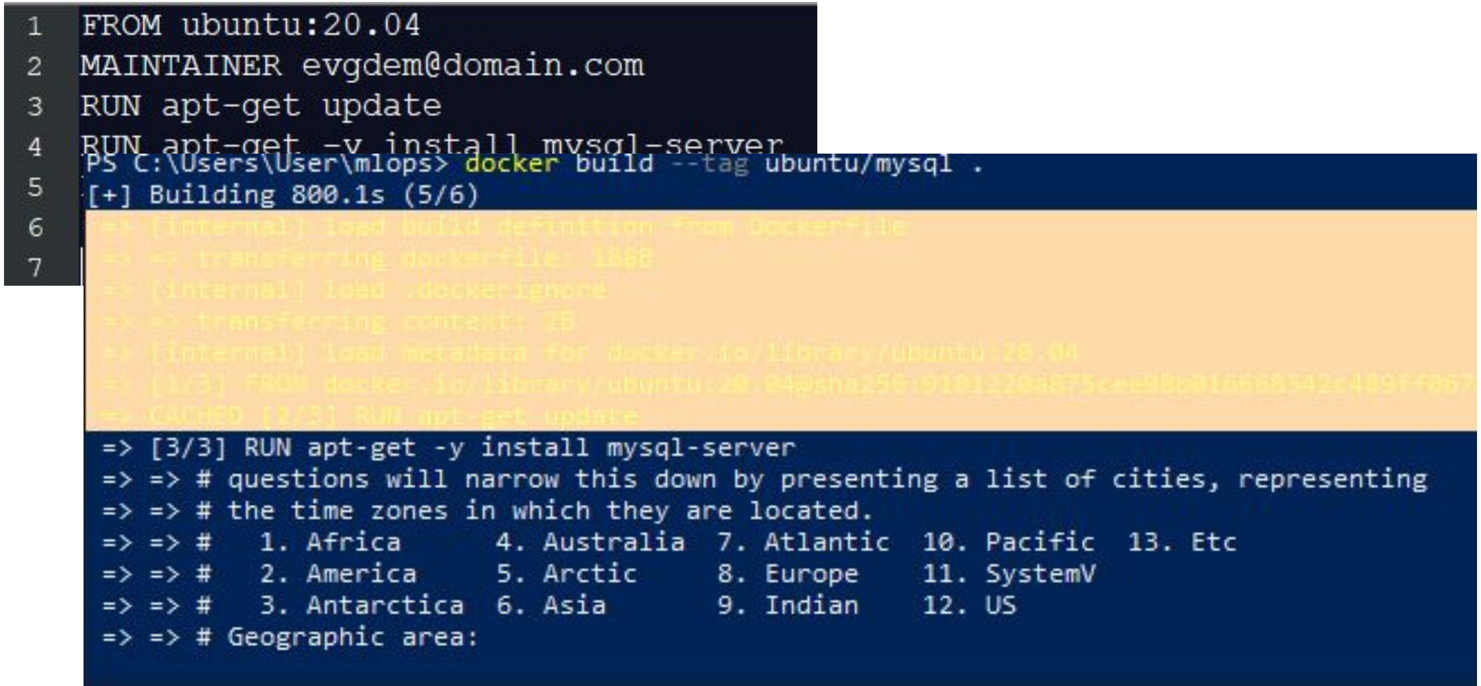
7 | EXPOSE 33060

8 | CMD ["python3", "-m" , "flask", "run", "--host=0.0.0.0"]



```
FROM ubuntu:20.04
MAINTAINER evgdem@domain.com
# ENV DEBIAN_FRONTEND=noninteractive
ENV TZ=Etc/UTC
RUN ln -snf /usr/share/zoneinfo/$TZ
ENV MySQL_ROOT_PASSWORD=MyPassword
RUN apt-get update
RUN apt-get -y install mysql-server
EXPOSE 3306
# CMD ["mysql"]

```

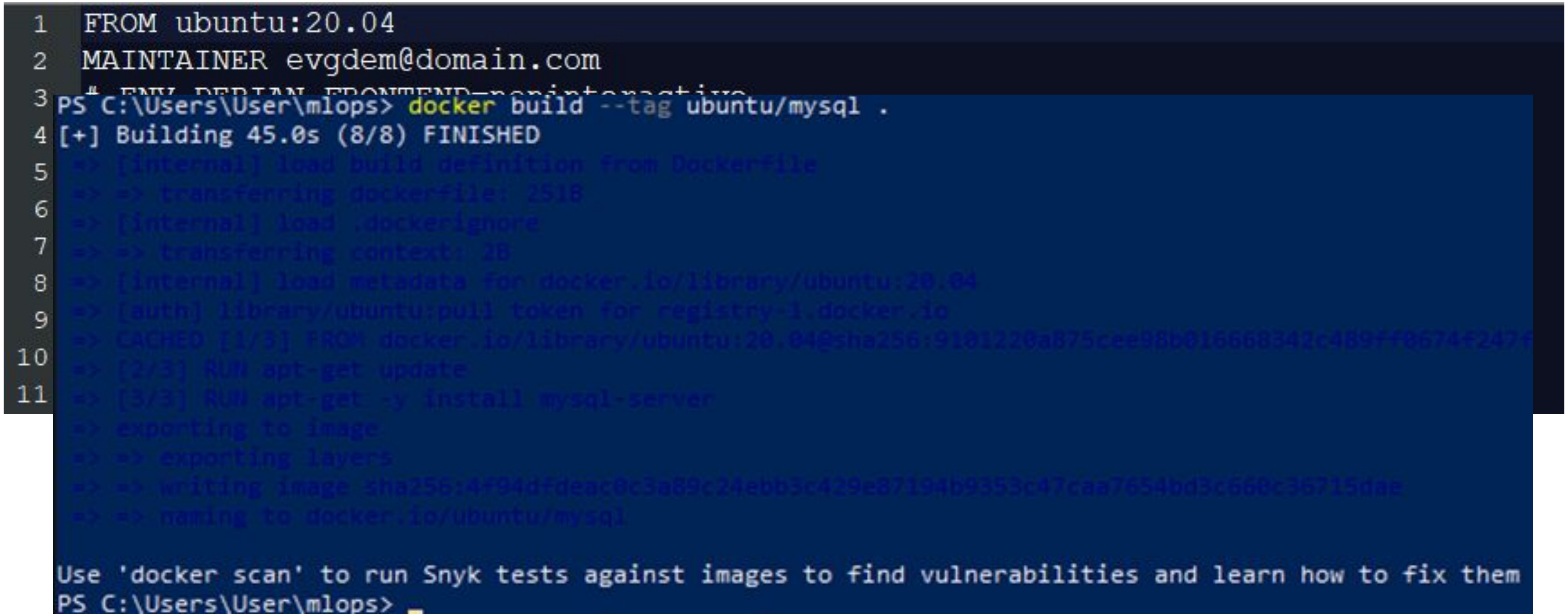
Делаем по инструкции



```
FROM ubuntu:20.04
MAINTAINER evgdem@domain.com
RUN apt-get update
RUN apt-get -y install mysql-server
```

```
PS C:\Users\User\mlops> docker build --tag ubuntu/mysql .
[+] Building 800.1s (5/6)
 => [internal] load build definition from Dockerfile
 => => transferring dockerfile: 188B
 => [internal] load .dockerignore
 => => transferring context: 2B
 => [internal] load metadata for docker.io/library/ubuntu:20.04
 => [1/3] FROM docker.io/library/ubuntu:20.04@sha256:9101220a875cee98b016668342c489ff867
 => CACHED [2/3] RUN apt-get update
 => [3/3] RUN apt-get -y install mysql-server
 => => # questions will narrow this down by presenting a list of cities, representing
 => => # the time zones in which they are located.
 => => #   1. Africa      4. Australia  7. Atlantic  10. Pacific  13. Etc
 => => #   2. America     5. Arctic     8. Europe    11. SystemV
 => => #   3. Antarctica  6. Asia       9. Indian    12. US
 => => # Geographic area:
```

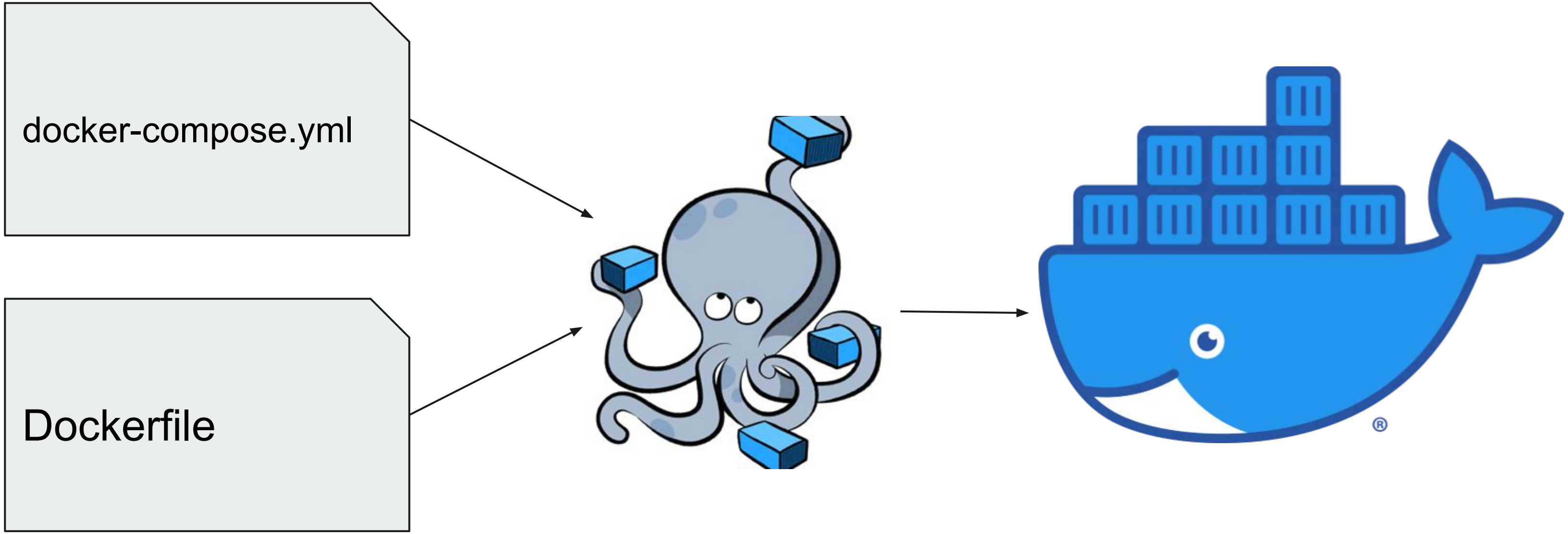
Гуглим и смешиваем варианты



```
FROM ubuntu:20.04
MAINTAINER evgdem@domain.com
# ENV DEBIAN_FRONTEND=noninteractive
```

```
PS C:\Users\User\mlops> docker build --tag ubuntu/mysql .
[+] Building 45.0s (8/8) FINISHED
 => [internal] load build definition from Dockerfile
 => => transferring dockerfile: 251B
 => [internal] load .dockerignore
 => => transferring context: 2B
 => [internal] load metadata for docker.io/library/ubuntu:20.04
 => [auth] library/ubuntu:pull token for registry-1.docker.io
 => CACHED [1/3] FROM docker.io/library/ubuntu:20.04@sha256:9101220a875cee98b016668342c489ff0674f247f
 => [2/3] RUN apt-get update
 => [3/3] RUN apt-get -y install mysql-server
 => exporting to image
 => => exporting layers
 => => writing image sha256:4f94dfdeac0c3a89c24ebb3c429e87194b9353c47caa7654bd3c668c36715dae
 => => naming to docker.io/ubuntu/mysql

Use 'docker scan' to run Snyk tests against images to find vulnerabilities and learn how to fix them
PS C:\Users\User\mlops> _
```

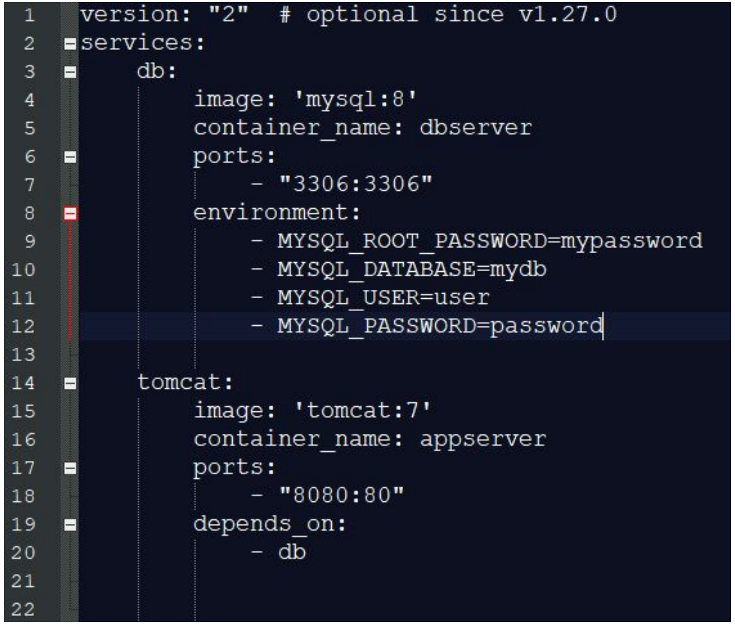
Docker Compose



docker-compose.yml

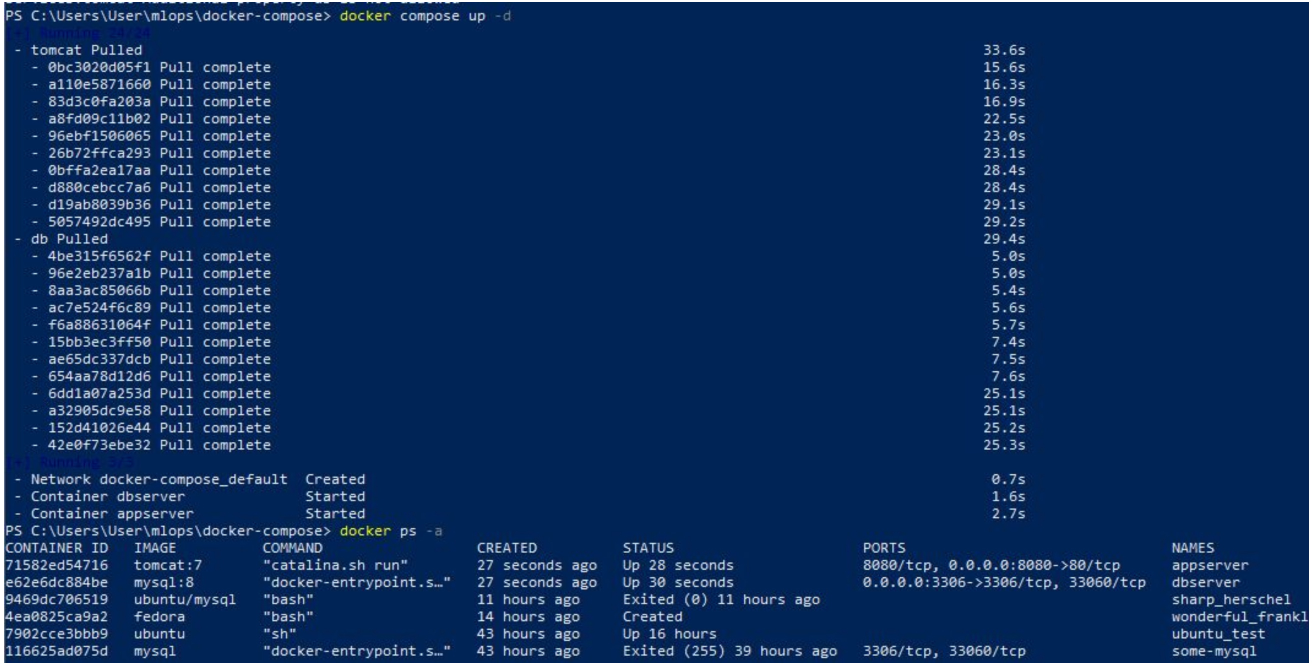
Dockerfile

docker-compose.yml



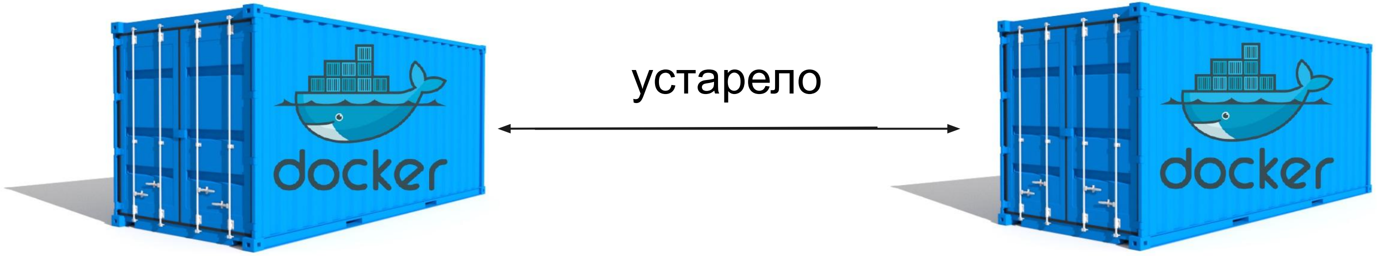
```yaml
version: "2"  # optional since v1.27.0
services:
    db:
        image: 'mysql:8'
        container_name: dbserver
        ports:
            - "3306:3306"
        environment:
            - MYSQL_ROOT_PASSWORD=mypassword
            - MYSQL_DATABASE=mydb
            - MYSQL_USER=user
            - MYSQL_PASSWORD=password

    tomcat:
        image: 'tomcat:7'
        container_name: appserver
        ports:
            - "8080:80"
        depends_on:
            - db


```

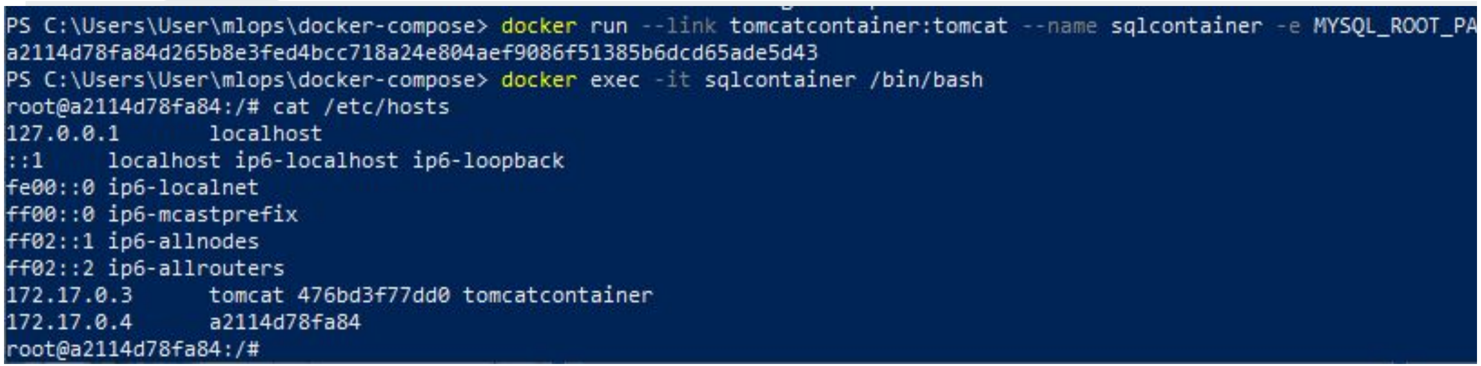
docker compose up -d



```
PS C:\Users\User\mlops\docker-compose> docker compose up -d
[+] Running 24/24
 - tomcat Pulled                                                                                                  33.6s
   - 0bc3020d05f1 Pull complete                                                                                   15.6s
   - a110e5871660 Pull complete                                                                                   16.3s
   - 83d3c0fa203a Pull complete                                                                                   16.9s
   - a8fd09c11b02 Pull complete                                                                                   22.5s
   - 96ebf1506065 Pull complete                                                                                   23.0s
   - 26b72ffca293 Pull complete                                                                                   23.1s
   - 0bffa2ea17aa Pull complete                                                                                   28.4s
   - d880cebcc7a6 Pull complete                                                                                   28.4s
   - d19ab8039b36 Pull complete                                                                                   29.1s
   - 5057492dc495 Pull complete                                                                                   29.2s
 - db Pulled                                                                                                      29.4s
   - 4be315f6562f Pull complete                                                                                    5.0s
   - 96e2eb237a1b Pull complete                                                                                    5.0s
   - 8aa3ac85066b Pull complete                                                                                    5.4s
   - ac7e524f6c89 Pull complete                                                                                    5.6s
   - f6a88631064f Pull complete                                                                                    5.7s
   - 15bb3ec3ff50 Pull complete                                                                                    7.4s
   - ae65dc337dcb Pull complete                                                                                    7.5s
   - 654aa78d12d6 Pull complete                                                                                    7.6s
   - 6dd1a07a253d Pull complete                                                                                   25.1s
   - a32905dc9e58 Pull complete                                                                                   25.1s
   - 152d41026e44 Pull complete                                                                                   25.2s
   - 42e0f73ebe32 Pull complete                                                                                   25.3s
[+] Running 3/3
 - Network docker-compose_default  Created                                                                         0.7s
 - Container dbserver              Started                                                                         1.6s
 - Container appserver             Started                                                                         2.7s
PS C:\Users\User\mlops\docker-compose> docker ps -a
CONTAINER ID   IMAGE          COMMAND                  CREATED          STATUS                      PORTS                               NAMES
71582ed54716   tomcat:7       "catalina.sh run"        27 seconds ago   Up 28 seconds               8080/tcp, 0.0.0.0:8080->80/tcp      appserver
e62e6dc884be   mysql:8        "docker-entrypoint.s…"   27 seconds ago   Up 30 seconds               0.0.0.0:3306->3306/tcp, 33060/tcp   dbserver
9469dc706519   ubuntu/mysql   "bash"                   11 hours ago     Exited (0) 11 hours ago                                         sharp_herschel
4ea0825ca9a2   fedora         "bash"                   14 hours ago     Created                                                         wonderful_frankl
7902cce3bbb9   ubuntu         "sh"                     43 hours ago     Up 16 hours                                                     ubuntu_test
116625ad075d   mysql          "docker-entrypoint.s…"   43 hours ago     Exited (255) 39 hours ago   3306/tcp, 33060/tcp                 some-mysql
```

Поддержка сети в контейнерах



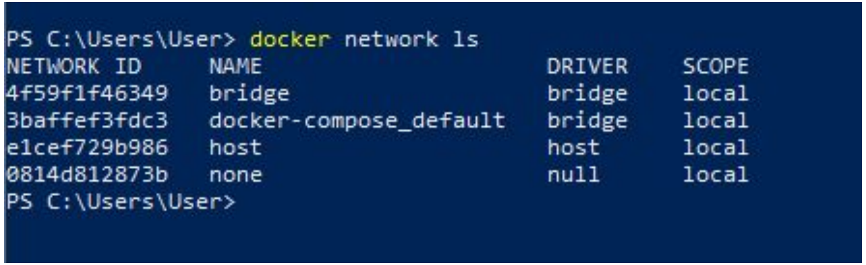


```
PS C:\Users\User\mlops\docker-compose> docker run --link tomcatcontainer:tomcat --name sqlcontainer -e MYSQL_ROOT_PA
a2114d78fa84d265b8e3fed4bcc718a24e804aef9086f51385b6dcd65ade5d43
PS C:\Users\User\mlops\docker-compose> docker exec -it sqlcontainer /bin/bash
root@a2114d78fa84:/# cat /etc/hosts
127.0.0.1       localhost
::1     localhost ip6-localhost ip6-loopback
fe00::0 ip6-localnet
ff00::0 ip6-mcastprefix
ff02::1 ip6-allnodes
ff02::2 ip6-allrouters
172.17.0.3      tomcat 476bd3f77dd0 tomcatcontainer
172.17.0.4      a2114d78fa84
root@a2114d78fa84:/#
```

Варианты подключения к сети по умолчанию

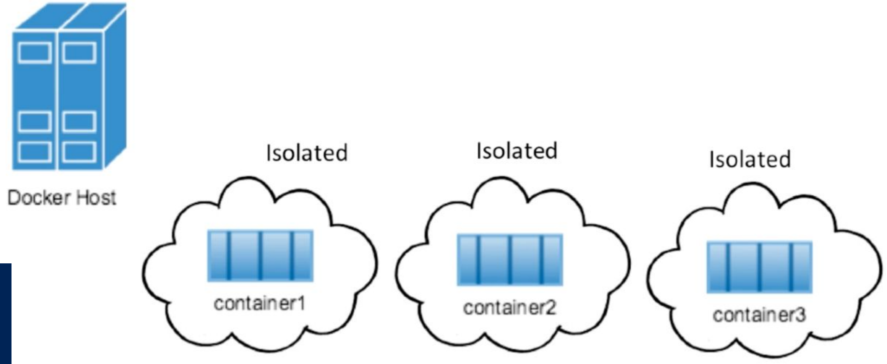
none

Отсутствие поддержки сетевых взаимодействий. Получает стек и пространство имен для контейнера без сетевого взаимодействия. Поддержка петлевого интерфейса 127.0.0.1.



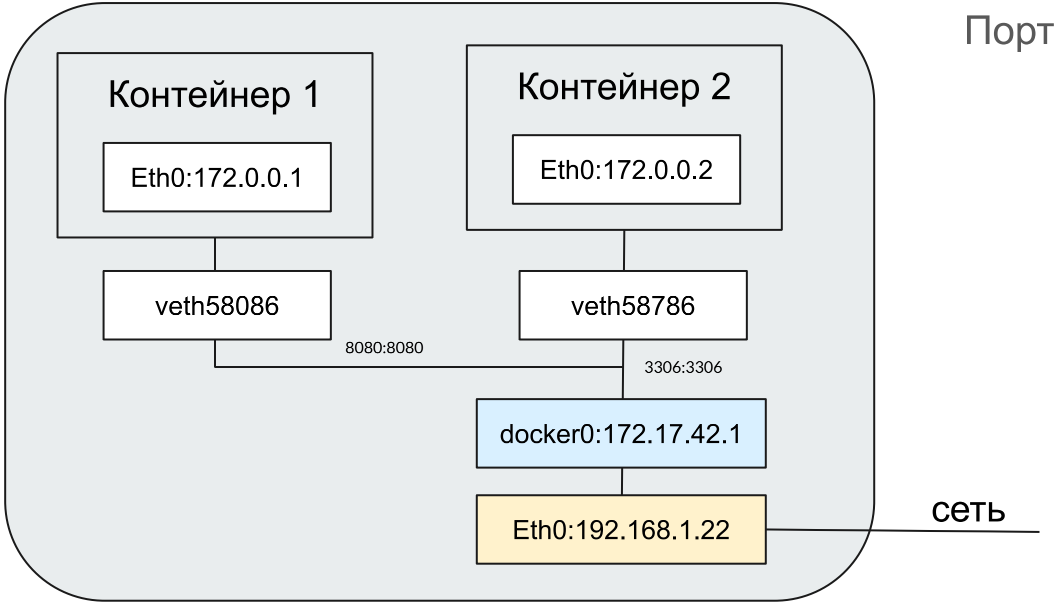
```
PS C:\Users\User> docker network ls
NETWORK ID     NAME                      DRIVER    SCOPE
4f59f1f46349   bridge                    bridge    local
3baffef3fdc3   docker-compose_default    bridge    local
e1cef729b986   host                      host      local
0814d812873b   none                      null      local
PS C:\Users\User>
```

None Network



Варианты подключения к сети по умолчанию

host

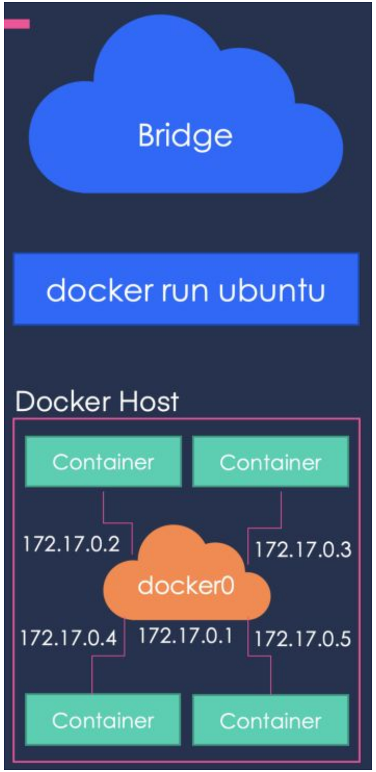


Контейнер и хост-машина используют общее пространство имен.
Порты отображаются один к одному.

Варианты подключения к сети по умолчанию

bridge (docker0)

Используется по умолчанию. Создает внутреннюю скрытую сеть для взаимодействия между контейнерами. Есть возможность организовать отображение для доступа к контейнерам извне.



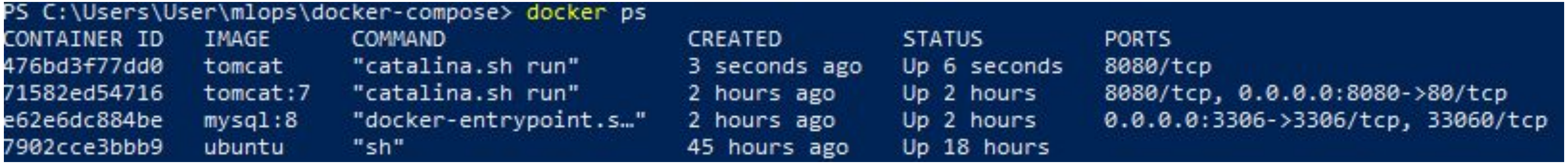
Варианты подключения к сети по умолчанию

docker-compose_default

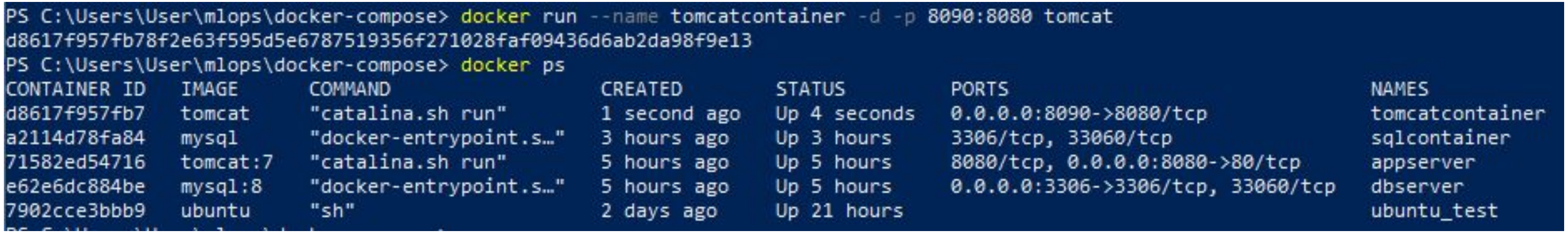
По умолчанию Compose устанавливает единую сеть для вашего приложения. Каждый контейнер для службы присоединяется к сети по умолчанию и доступен другим контейнерам в этой сети, а также может быть обнаружен ими по имени хоста, идентичному имени контейнера.
Теперь каждый контейнер может искать имя хоста web или db и возвращать IP-адрес соответствующего контейнера.
Например, код веб-приложения может подключиться к URL-адресу **postgres://db:5432** и начать использовать базу данных Postgres.

Сопоставление портов

docker run --name tomcatcontainer -d -p 8090:8080 tomcat



```
PS C:\Users\User\mlops\docker-compose> docker ps
CONTAINER ID   IMAGE      COMMAND                  CREATED          STATUS          PORTS
476bd3f77dd0   tomcat     "catalina.sh run"        3 seconds ago    Up 6 seconds    8080/tcp
71582ed54716   tomcat:7   "catalina.sh run"        2 hours ago      Up 2 hours      8080/tcp, 0.0.0.0:8080->80/tcp
e62e6dc884be   mysql:8    "docker-entrypoint.s…"   2 hours ago      Up 2 hours      0.0.0.0:3306->3306/tcp, 33060/tcp
7902cce3bbb9   ubuntu     "sh"                     45 hours ago     Up 18 hours
```



```
PS C:\Users\User\mlops\docker-compose> docker run --name tomcatcontainer -d -p 8090:8080 tomcat
d8617f957fb78f2e63f595d5e6787519356f271028faf09436d6ab2da98f9e13
PS C:\Users\User\mlops\docker-compose> docker ps
CONTAINER ID   IMAGE      COMMAND                  CREATED         STATUS         PORTS                               NAMES
d8617f957fb7   tomcat     "catalina.sh run"        1 second ago    Up 4 seconds   0.0.0.0:8090->8080/tcp              tomcatcontainer
a2114d78fa84   mysql      "docker-entrypoint.s…"   3 hours ago     Up 3 hours     3306/tcp, 33060/tcp                 sqlcontainer
71582ed54716   tomcat:7   "catalina.sh run"        5 hours ago     Up 5 hours     8080/tcp, 0.0.0.0:8080->80/tcp      appserver
e62e6dc884be   mysql:8    "docker-entrypoint.s…"   5 hours ago     Up 5 hours     0.0.0.0:3306->3306/tcp, 33060/tcp   dbserver
7902cce3bbb9   ubuntu     "sh"                     2 days ago      Up 21 hours                                        ubuntu_test
```

Спасибо!