Министерство образования Республики Беларусь

Учреждение образования «Белорусский государственный университет информатики и радиоэлектроники»

Факультет компьютерных систем и сетей

Кафедра информатики

Дисциплина: Избранные главы информатики

ОТЧЕТ
к лабораторной работе
на тему

Работа с Docker

БГУИР КП 1-40 04 01

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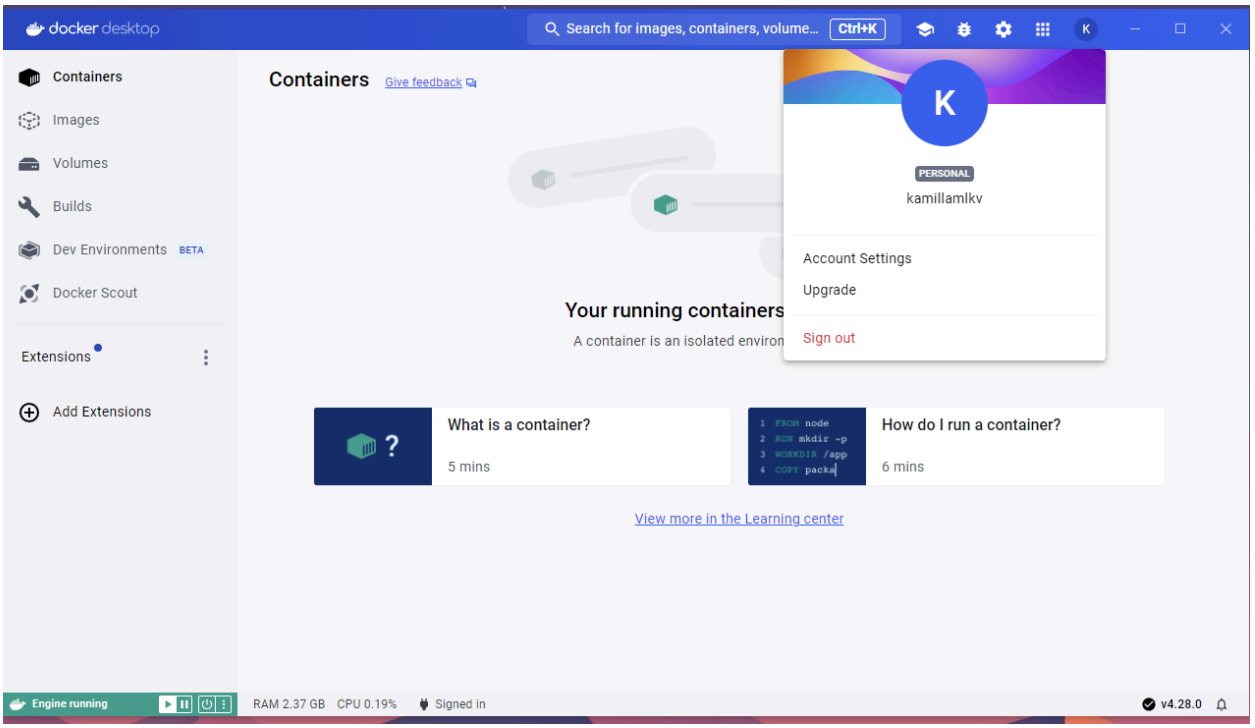
Цель: Познакомиться с возможностями и получить практические навыки работы с Docker.

Задание 1. Подготовьте рабочее окружение в соответствии с типом вашей операционной системы (установите Docker, выполните базовую настройку).




```
C:\Users\Камила>docker

Usage:  docker [OPTIONS] COMMAND

A self-sufficient runtime for containers

Common Commands:
  run         Create and run a new container from an image
  exec        Execute a command in a running container
  ps          List containers
  build       Build an image from a Dockerfile
  pull        Download an image from a registry
  push        Upload an image to a registry
  images      List images
  login       Log in to a registry
  logout      Log out from a registry
  search      Search Docker Hub for images
  version     Show the Docker version information
  info        Display system-wide information
```

```
Management Commands:
  builder     Manage builds
  buildx*     Docker Buildx (Docker Inc., v0.12.1-desktop.4)
  compose*    Docker Compose (Docker Inc., v2.24.6-desktop.1)
  container   Manage containers
  context     Manage contexts
  debug*      Get a shell into any image or container. (Docker Inc., 0.0.24)
  dev*        Docker Dev Environments (Docker Inc., v0.1.0)
  extension*  Manages Docker extensions (Docker Inc., v0.2.22)
  feedback*   Provide feedback, right in your terminal! (Docker Inc., v1.0.4)
  image       Manage images
  init*       Creates Docker-related starter files for your project (Docker Inc., v1.0.1)
  manifest    Manage Docker image manifests and manifest lists
  network     Manage networks
  plugin      Manage plugins
  sbom*       View the packaged-based Software Bill Of Materials (SBOM) for an image (Anchore Inc., 0.6.0)
  scout*      Docker Scout (Docker Inc., v1.5.0)
  system      Manage Docker
  trust       Manage trust on Docker images
  volume      Manage volumes

Swarm Commands:
  swarm       Manage Swarm

Commands:
  attach      Attach local standard input, output, and error streams to a running container
```

```
Swarm Commands:
  swarm       Manage Swarm

Commands:
  attach      Attach local standard input, output, and error streams to a running container
  commit      Create a new image from a container's changes
  cp          Copy files/folders between a container and the local filesystem
  create      Create a new container
  diff        Inspect changes to files or directories on a container's filesystem
  events      Get real time events from the server
  export      Export a container's filesystem as a tar archive
  history     Show the history of an image
  import      Import the contents from a tarball to create a filesystem image
  inspect     Return low-level information on Docker objects
  kill        Kill one or more running containers
  load        Load an image from a tar archive or STDIN
  logs        Fetch the logs of a container
  pause       Pause all processes within one or more containers
  port        List port mappings or a specific mapping for the container
  rename      Rename a container
  restart     Restart one or more containers
  rm          Remove one or more containers
  rmi         Remove one or more images
  save        Save one or more images to a tar archive (streamed to STDOUT by default)
  start       Start one or more stopped containers
  stats       Display a live stream of container(s) resource usage statistics
  stop        Stop one or more running containers
  tag         Create a tag TARGET_IMAGE that refers to SOURCE_IMAGE
  top         Display the running processes of a container
  unpause     Unpause all processes within one or more containers
  update      Update configuration of one or more containers
  wait        Block until one or more containers stop, then print their exit codes
```

```
C:\Users\Камила>docker version
Client:
 Cloud integration: v1.0.35+desktop.11
 Version:           25.0.3
 API version:       1.44
 Go version:        go1.21.6
 Git commit:        4debf41
 Built:             Tue Feb  6 21:13:02 2024
 OS/Arch:           windows/amd64
 Context:           default

Server: Docker Desktop 4.28.0 (139021)
 Engine:
  Version:          25.0.3
  API version:      1.44 (minimum version 1.24)
  Go version:       go1.21.6
  Git commit:       f417435
  Built:            Tue Feb  6 21:14:25 2024
  OS/Arch:          linux/amd64
  Experimental:     false
 containerd:
  Version:          1.6.28
  GitCommit:        ae07eda36dd25f8a1b98dfbf587313b99c0190bb
 runc:
  Version:          1.1.12
  GitCommit:        v1.1.12-0-g51d5e94
 docker-init:
  Version:          0.19.0
  GitCommit:        de40ad0
```

Задание 2. Изучите простейшие консольные команды и возможности Docker Desktop (см. лекцию), создать собственный контейнер docker/getting-started, открыть в браузере и изучить tutorial.

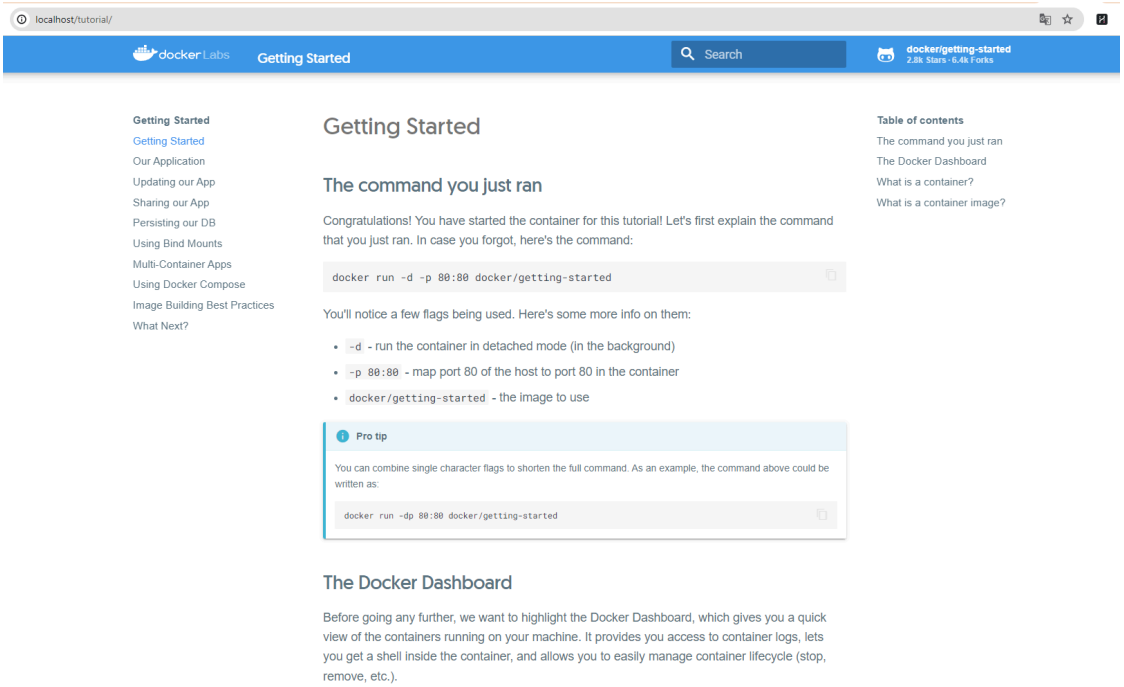
```
C:\Users\Камила>docker images
REPOSITORY                TAG       IMAGE ID       CREATED        SIZE
docker/welcome-to-docker  latest    c1f619b6477e   4 months ago   18.6MB
```

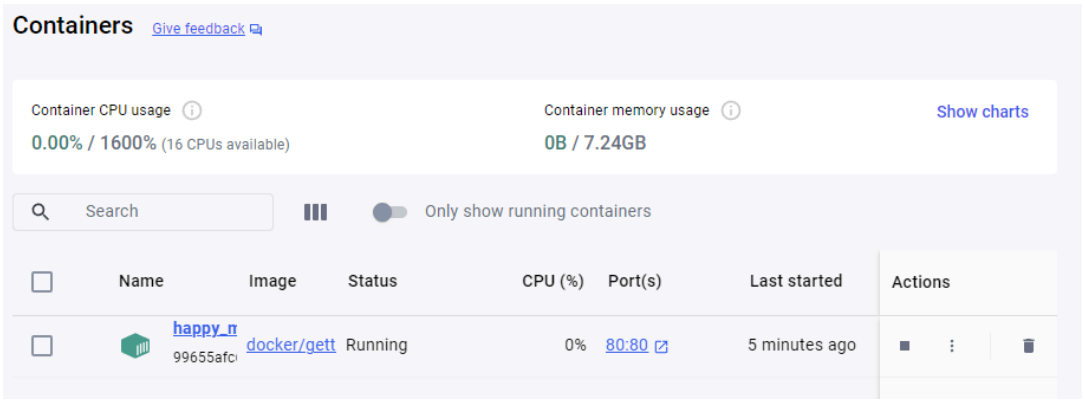
```
C:\Users\Камила>docker ps
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS     NAMES
```

```
C:\Users\Камила>docker pull docker/getting-started
Using default tag: latest
latest: Pulling from docker/getting-started
c158987b0551: Pull complete
1e35f6679fab: Pull complete
cb9626c74200: Pull complete
b6334b6ace34: Pull complete
f1d1c9928c82: Pull complete
9b6f639ec6ea: Pull complete
ee68d3549ec8: Pull complete
33e0cbbb4673: Pull complete
4f7e34c2de10: Pull complete
Digest: sha256:d79336f4812b6547a53e735480dde67f8f8f7071b414fbd9297609ffb989abc1
Status: Downloaded newer image for docker/getting-started:latest
docker.io/docker/getting-started:latest

What's Next?
  View a summary of image vulnerabilities and recommendations → docker scout quickview docker/getting-started

C:\Users\Камила>docker images
REPOSITORY                TAG       IMAGE ID       CREATED        SIZE
docker/welcome-to-docker  latest    c1f619b6477e   4 months ago   18.6MB
docker/getting-started    latest    3e4394f6b72f   14 months ago  47MB
```

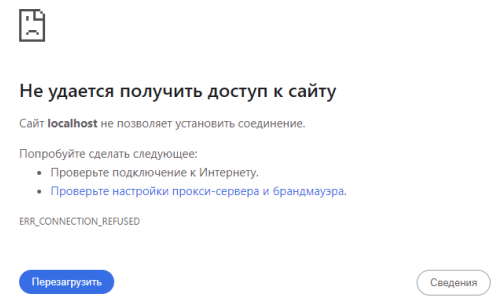
```
C:\Users\Камила>docker run -d -p 80:80 docker/getting-started
99655afc66629fb1fd191b63d40c32fd9df1e17bfc1bf845d56654b05655f1ff

C:\Users\Камила>docker ps
CONTAINER ID   IMAGE                  COMMAND                  CREATED          STATUS          PORTS                NAMES
99655afc6662   docker/getting-started   "/docker-entrypoint.…"   10 seconds ago   Up 8 seconds   0.0.0.0:80->80/tcp   happy_mclaren
```

http://localhost

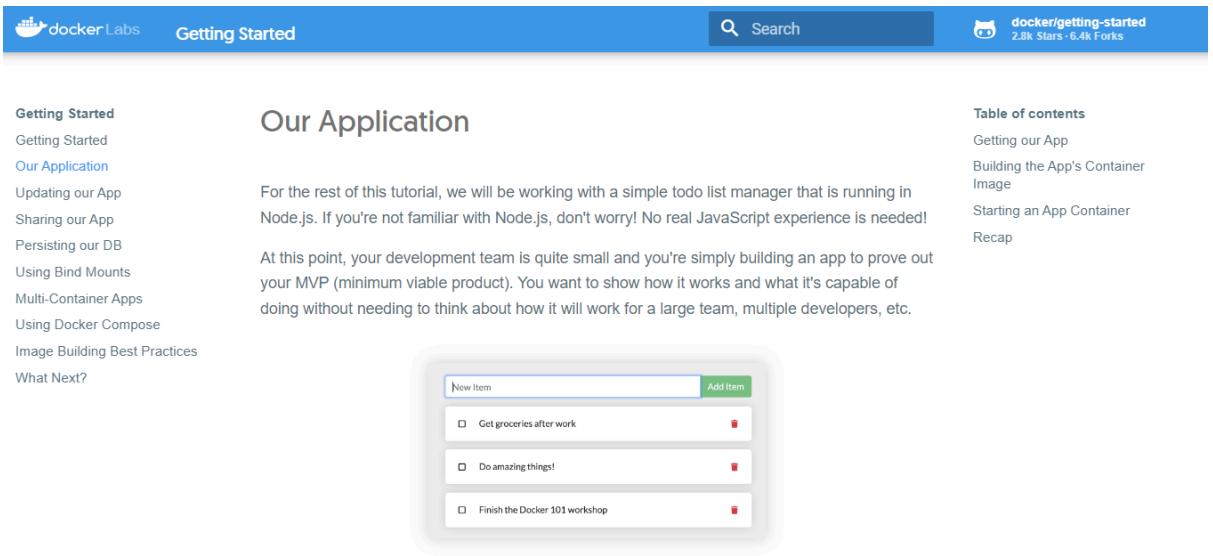





```
C:\Users\Камила>docker stop  happy_mclaren
happy_mclaren
```



```
C:\Users\Камила>docker start happy_mclaren
happy_mclaren
```



Задание 3. Создайте docker image, который запускает скрипт с использованием функций из https://github.com/smartiqaorg/geometric_lib.

a. Способ передачи данных – переменные окружения.
b. Создать Dockerfile для реализации сборки собственных Docker образов
c. Использовать его для создания контейнера. Протестировать использование контейнера

Скрипт:

```python
import math
import os

radius = float(os.environ['radius'])
side_length = float(os.environ['side_length'])

def circle_area(r):
    return math.pi * r * r

def circle_perimeter(r):
    return 2 * math.pi * r

def square_area(a):
    return a * a

def square_perimeter(a):
    return 4 * a

print("Circle area: ", circle_area(radius))
print("Square area: ", square_area(side_length))
print("Circle perimeter: ", circle_perimeter(radius))
print("Square perimeter: ", square_perimeter(side_length))
```

Dockerfile:

```
FROM python:3.8

WORKDIR /app

COPY GeometricLib.py /app/

#RUN pip install -r requirements.txt

CMD ["python", "GeometricLib.py"]
```

Создание образа с помощью команды docker build -t python_img .

```
C:\Users\Камила\Documents\253505\3 семестр\ТВ\Task\Python_Task>docker images
REPOSITORY                TAG       IMAGE ID       CREATED          SIZE
docker/welcome-to-docker   latest    c1f619b6477e   4 months ago     18.6MB
docker/getting-started     latest    3e4394f6b72f   14 months ago    47MB

[+] Building 1.5s (9/9) FINISHED                                                                                    docker:default
 => [internal] load build definition from Dockerfile                                                                          0.0s
 => => transferring dockerfile: 177B                                                                                          0.0s
 => [internal] load metadata for docker.io/library/python:3.8                                                                 1.4s
 => [auth] library/python:pull token for registry-1.docker.io                                                                 0.0s
 => [internal] load .dockerignore                                                                                             0.0s
 => => transferring context: 2B                                                                                               0.0s
 => [1/3] FROM docker.io/library/python:3.8@sha256:23e62414c3310930888bb1690b7f723f52f7ab3a26ff9671e9747f60d169ee96           0.0s
 => [internal] load build context                                                                                             0.0s
 => => transferring context: 564B                                                                                             0.0s
 => CACHED [2/3] WORKDIR /app                                                                                                 0.0s
 => [3/3] COPY GeometricLib.py /app/                                                                                          0.0s
 => exporting to image                                                                                                        0.0s
 => => exporting layers                                                                                                       0.0s
 => => writing image sha256:8dbc508c2fc734e9e69da03214438ff3d019156da6404a7dc901a83636940c3f                                  0.0s
 => => naming to docker.io/library/python_img                                                                                 0.0s

View build details: docker-desktop://dashboard/build/default/default/z9p48wi2lliy8vxciz1jwkzij

What's Next?
  View a summary of image vulnerabilities and recommendations → docker scout quickview
```

Name	Tag	Status	Created	Size	Actions
python_img 8dbc508c2fc7	latest	Unused	22 seconds ag	997.63 MB	
docker/welcome-to-docker c1f619b6477e	latest	Unused	4 months ago	18.55 MB	
docker/getting-started 3e4394f6b72f	latest	In use	1 year ago	46.95 MB	

Запуск контейнера на основе созданного образа с передачей данных:

```
C:\Users\Камила\Documents\253505\3 семестр\ТВ\Task\Python_Task>docker run --rm -e radius=2 -e side_length=4 python_img
Circle area:  12.566370614359172
Square area:  16.0
Circle perimeter:  12.566370614359172
Square perimeter:  16.0
```

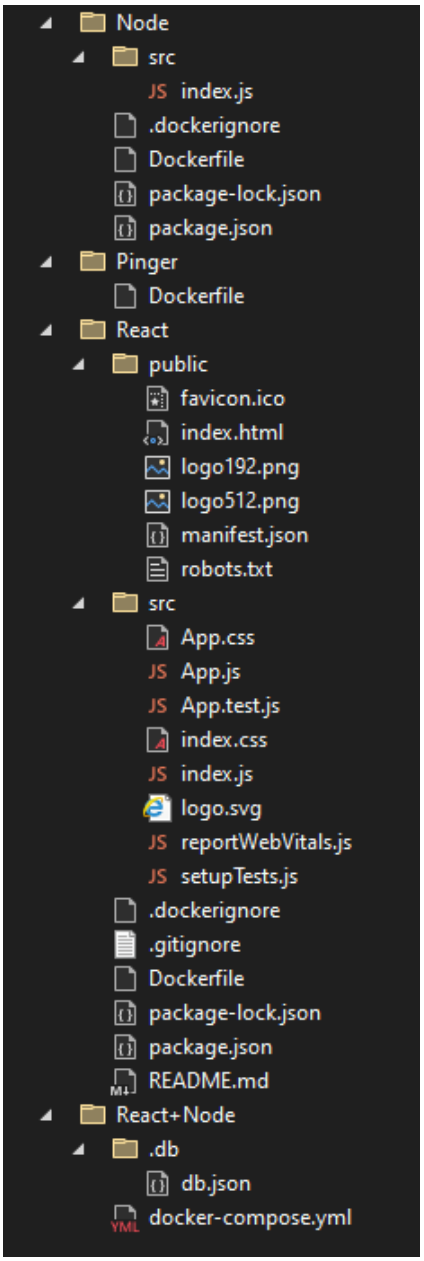
```
C:\Users\Камила\Documents\253505\3 семестр\ТВ\Task\Python_Task>docker run --rm -e radius=2.5 -e side_length=7.6 python_img
Circle area:  19.634954084936208
Square area:  57.76
Circle perimeter:  15.707963267948966
Square perimeter:  30.4
```

Здесь используется флаг rm для автоматического удаления контейнера после его завершения, а также флаг e для передачи значений переменных окружения.

Задание 4-5. Скачать любой доступный проект с GitHub с произвольным стеком технологий или использовать свой, ранее разработанный. Создать для него необходимый контейнер, используя Docker Compose для управления многоконтейнерными приложениями. Запустить проект в контейнере. Настроить сети и тома для обеспечения связи между контейнерами и сохранения данных.

Ссылка на проект GitHub:
https://github.com/abduvik/just-enough-series/tree/master
Стек технологий: Node+React

Структура проекта и файл docker-compose:



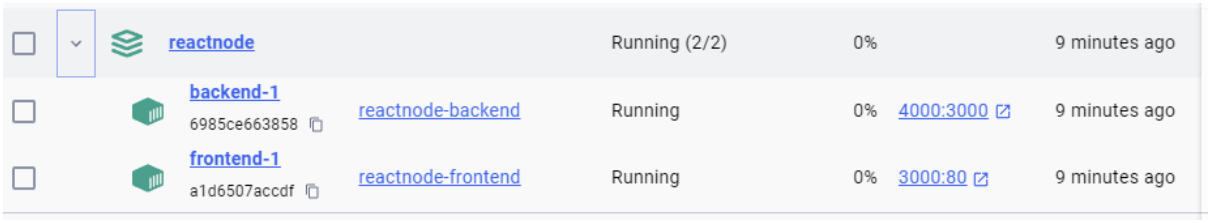
```
C:\Users\Камила\Documents\253505\4 семестр\ИГИ\LR2>cd React+Node

C:\Users\Камила\Documents\253505\4 семестр\ИГИ\LR2\React+Node>docker ps
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS     NAMES
```

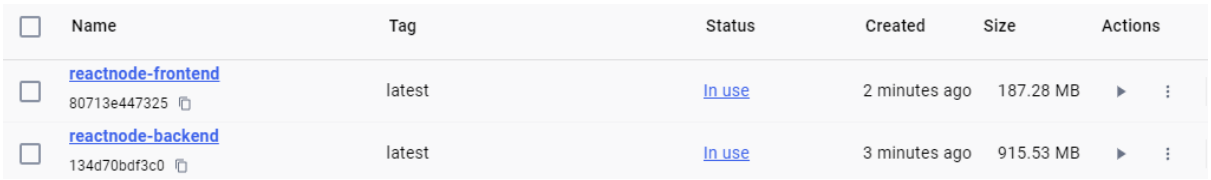
```
C:\Users\Камила\Documents\253505\4 семестр\ИГИ\LR2\React+Node>docker compose up -d
2024/03/16 09:45:12 http2: server: error reading preface from client //./pipe/docker_engine: file has already been closed
[+] Building 41.4s (9/10)                                                                                    docker:default
 => [backend 1/4] FROM docker.io/library/node:16@sha256:f77a1aef2da8d83e45ec990f45df50f1a286c5fe8bbfb8c6e4246c63  37.2s
 => => resolve docker.io/library/node:16@sha256:f77a1aef2da8d83e45ec990f45df50f1a286c5fe8bbfb8c6e4246c6389705c0b   0.0s
 => => sha256:c94b82f9827cab6e421b350965a9ef11b25b13ffbd1030536203d541f55dcbe2 2.00kB / 2.00kB                    0.0s
[+] Building 89.4s (23/23) FINISHED                                                                          docker:default
 => [backend internal] load build definition from Dockerfile                                                      0.0s
 => => transferring dockerfile: 135B                                                                              0.0s
 => [frontend internal] load metadata for docker.io/library/node:16                                               2.9s
 => [backend auth] library/node:pull token for registry-1.docker.io                                               0.0s
 => [backend internal] load .dockerignore                                                                         0.0s
 => => transferring context: 64B                                                                                  0.0s
 => CACHED [frontend build 1/6] FROM docker.io/library/node:16@sha256:f77a1aef2da8d83e45ec990f45df50f1a286c5fe8b  37.2s
 => => resolve docker.io/library/node:16@sha256:f77a1aef2da8d83e45ec990f45df50f1a286c5fe8bbfb8c6e4246c6389705c0b   0.0s
 => => sha256:c94b82f9827cab6e421b350965a9ef11b25b13ffbd1030536203d541f55dcbe2 2.00kB / 2.00kB                    0.0s
 => => sha256:7e9bf114588c05b2df612b083b96582f3b8dbf51647aa6138a50d09d42df2454 17.58MB / 17.58MB                  3.6s
 => => sha256:ffd9397e94b74abcb54e514f1430e00f604328d1f895eadbd482f08cc02444e5 51.89MB / 51.89MB                 16.0s
 => => sha256:f77a1aef2da8d83e45ec990f45df50f1a286c5fe8bbfb8c6e4246c6389705c0b 776B / 776B                        0.0s
 => => sha256:1ddc7e4055fdb6f6bf31063b593befda814294f9f904b6ddfc21ab1513bafa8e 7.23kB / 7.23kB                    0.0s
 => => sha256:311da6c465ea1576925360eba391bcd32dece9be95960a0bc9ffcb25fe712017 50.50MB / 50.50MB                 12.3s
 => => sha256:513d779256048c961239af5f500589330546b072775217272e19ffae1635e98e 191.90MB / 191.90MB              31.4s
 => => extracting sha256:311da6c465ea1576925360eba391bcd32dece9be95960a0bc9ffcb25fe712017                         1.9s
 => => sha256:ae3b95bbaa61ce24cefdd89e7c74d6fbd7713b2bcae93af47063d06bd7e02172 4.20kB / 4.20kB                    12.6s
 => => sha256:0e421f66aff42bb069dffc26af6d132194b22a1082b08c5ef7cd69c627783c04 34.79MB / 34.79MB                  20.3s
 => => extracting sha256:7e9bf114588c05b2df612b083b96582f3b8dbf51647aa6138a50d09d42df2454                         0.4s
 => => extracting sha256:ffd9397e94b74abcb54e514f1430e00f604328d1f895eadbd482f08cc02444e5                         1.9s
 => => sha256:ca266fd6192108b67fb57b74753a8c4ca5d8bd458baae3d4df7ce9f42dedcc1d 2.27MB / 2.27MB                    17.4s
 => => sha256:ee7d78be1eb92caf6ae84fc3af736b23eca018d5dedc967ae5bdee6d7082403b 450B / 450B                        17.6s
 => => extracting sha256:513d779256048c961239af5f500589330546b072775217272e19ffae1635e98e                         4.5s
 => => extracting sha256:ae3b95bbaa61ce24cefdd89e7c74d6fbd7713b2bcae93af47063d06bd7e02172                         0.0s
 => => extracting sha256:0e421f66aff42bb069dffc26af6d132194b22a1082b08c5ef7cd69c627783c04                         0.9se => => extracting sha256:c
a266fd6192108b67fb57b74753a8c4ca5d8bd458baae3d4df7ce9f42dedcc1d                                                  0.0s
 => => extracting sha256:ee7d78be1eb92caf6ae84fc3af736b23eca018d5dedc967ae5bdee6d7082403b                         0.0se => [backend internal] loa
d build context                                                                                                  0.0s
```

```
 => => writing image sha256:134d70bdf3c08e40ef7561241a53ccaa016fd52872e443602bb67ac86502c40c                      0.0s
 => => naming to docker.io/library/reactnode-backend                                                              0.0s
 => [frontend internal] load build definition from Dockerfile                                                     0.0s
 => => transferring dockerfile: 226B                                                                              0.0s
 => [frontend internal] load metadata for docker.io/library/nginx:latest                                          1.6s
 => [frontend auth] library/nginx:pull token for registry-1.docker.io                                             0.0s
 => [frontend internal] load .dockerignore                                                                        0.0s
 => => transferring context: 64B                                                                                  0.0s
 => [frontend stage-1 1/2] FROM docker.io/library/nginx:latest@sha256:6db391d1c0cfb30588ba0bf72ea999404f2764febf0  7.5s
 => => resolve docker.io/library/nginx:latest@sha256:6db391d1c0cfb30588ba0bf72ea999404f2764febf0f1f196acd5867ac7e  0.0s
 => => sha256:6db391d1c0cfb30588ba0bf72ea999404f2764febf0f1f196acd5867ac7efa7e 9.85kB / 9.85kB                    0.0s
 => => sha256:e78b137be3552e1f36d84cb01c533a23febe4c48f6fcdff5d5b26a45a636053b 41.39MB / 41.39MB                  6.6s
 => => sha256:52478f8cd6a142fd462f0a7614a7bb064e969a4c083648235d6943c786df8cc7 2.29kB / 2.29kB                    0.0s
 => => sha256:92b11f67642b62bbb98e7e49169c346b30e20cd3c1c034d31087e46924b9312e 7.02kB / 7.02kB                    0.0s
 => => sha256:8a1e25ce7c4f75e372e9884f8f7b1bedcfe4a7a7d452eb4b0a1c7477c9a90345 29.12MB / 29.12MB                  3.2s
 => => sha256:39fc875bd2b2e4f867e8e5cc5ad43bd5d6650ddeaf8c28b04f374f7fbca085f3 624B / 624B                        0.6s
 => => sha256:035788421403127b57e688a82706198331f06545a955b526f89f2bf53f52b078 954B / 954B                        0.8s
 => => sha256:87c3fb37cbf2f763f67f3b270aa0785ca05a2caedac399b4bfeedfd0ccd77d87 392B / 392B                        1.3s
 => => sha256:c5cdd1ce752da415a6563d9432e1ee718b2f4ba353ee2bb7c8ce2aa78d5b4ee1 1.21kB / 1.21kB                    1.5s
 => => sha256:33952c5995320e59a81112f411bfb02e097562a72c12e85828da51132ace47cd 1.40kB / 1.40kB                    1.7s
 => => extracting sha256:8a1e25ce7c4f75e372e9884f8f7b1bedcfe4a7a7d452eb4b0a1c7477c9a90345                          1.0s
 => => extracting sha256:e78b137be3552e1f36d84cb01c533a23febe4c48f6fcdff5d5b26a45a636053b                         0.6s
 => => extracting sha256:39fc875bd2b2e4f867e8e5cc5ad43bd5d6650ddeaf8c28b04f374f7fbca085f3                         0.0s
 => => extracting sha256:035788421403127b57e688a82706198331f06545a955b526f89f2bf53f52b078                         0.0s
 => => extracting sha256:87c3fb37cbf2f763f67f3b270aa0785ca05a2caedac399b4bfeedfd0ccd77d87                         0.0s
 => => extracting sha256:c5cdd1ce752da415a6563d9432e1ee718b2f4ba353ee2bb7c8ce2aa78d5b4ee1                         0.0s
 => => extracting sha256:33952c5995320e59a81112f411bfb02e097562a72c12e85828da51132ace47cd                         0.0s
 => [frontend internal] load build context                                                                        0.1s
 => => transferring context: 1.24MB                                                                               0.0s
 => [frontend build 2/6] RUN apt-get update                                                                      18.4s
 => [frontend build 3/6] WORKDIR /usr/src/                                                                        0.0s
 => [frontend build 4/6] COPY . .                                                                                 0.0s
 => [frontend build 5/6] RUN npm install                                                                         20.7s
 => [frontend build 6/6] RUN npm run build                                                                        6.6s
 => [frontend stage-1 2/2] COPY --from=Build /usr/src/build /usr/share/nginx/html                                 0.0s
 => [frontend] exporting to image                                                                                 0.0s
 => => exporting layers                                                                                           0.0s
 => => writing image sha256:80713e4473258c55f2d7b5a7e0a66044b0cde3cd21ac63cb841f6c75b6cad191                      0.0s
 => => naming to docker.io/library/reactnode-frontend                                                             0.0s
```

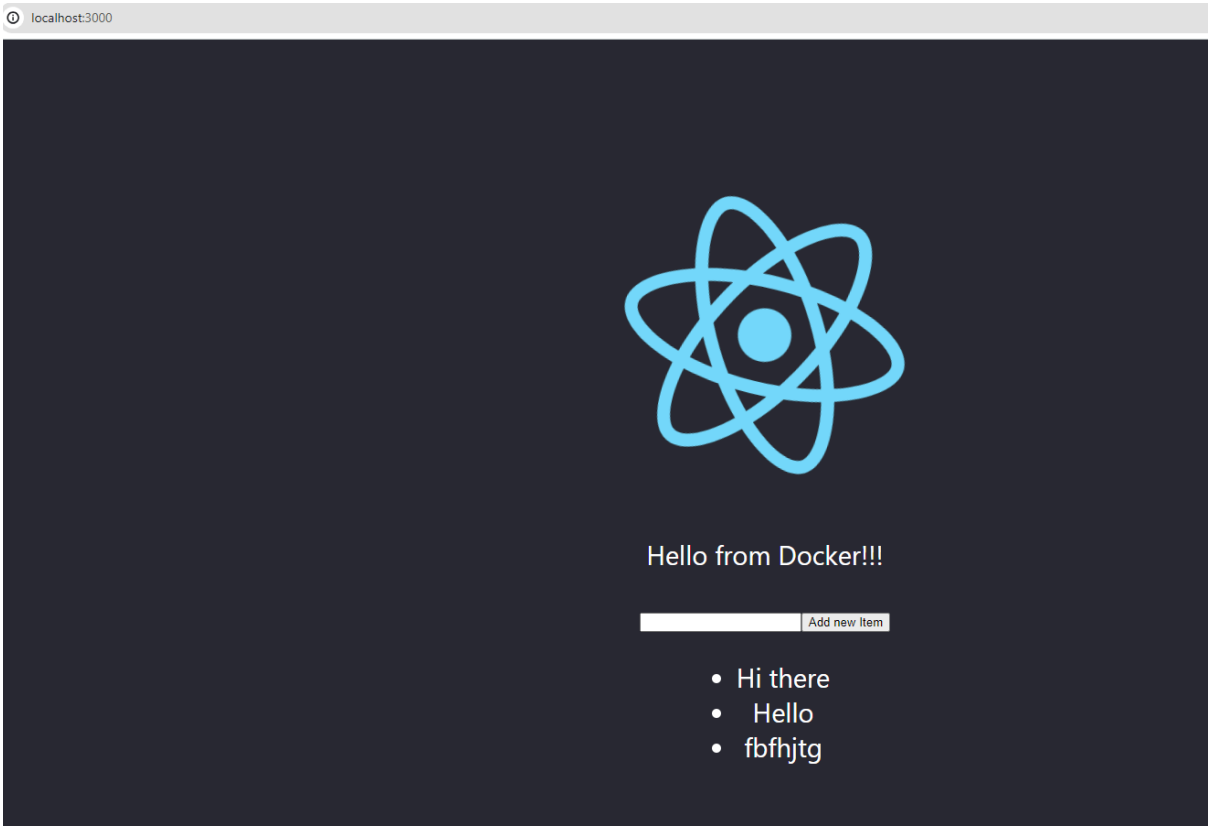
```
[+] Running 2/3
 - Network reactnode_default        Created                                                                      0.8s
 ⠿ Container reactnode-backend-1    Started                                                                      0.5s
 ⠿ Container reactnode-frontend-1   Started                                                                      0.8s
```

```
C:\Users\Камила\Documents\253505\4 семестр\ИГИ\LR2\React+Node>docker ps
CONTAINER ID   IMAGE              COMMAND                  CREATED         STATUS         PORTS                    NAMES
c9406725a6d5   reactnode-frontend   "/docker-entrypoint.…"   7 seconds ago   Up 6 seconds   0.0.0.0:3000->80/tcp     reactnode-frontend-1
a343c8578c78   reactnode-backend    "docker-entrypoint.s…"   7 seconds ago   Up 6 seconds   0.0.0.0:4000->3000/tcp   reactnode-backend-1
```



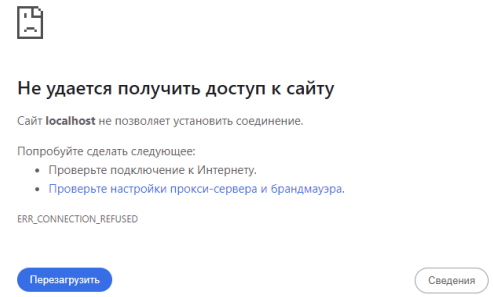


Работа программы:



Остановим контейнер:

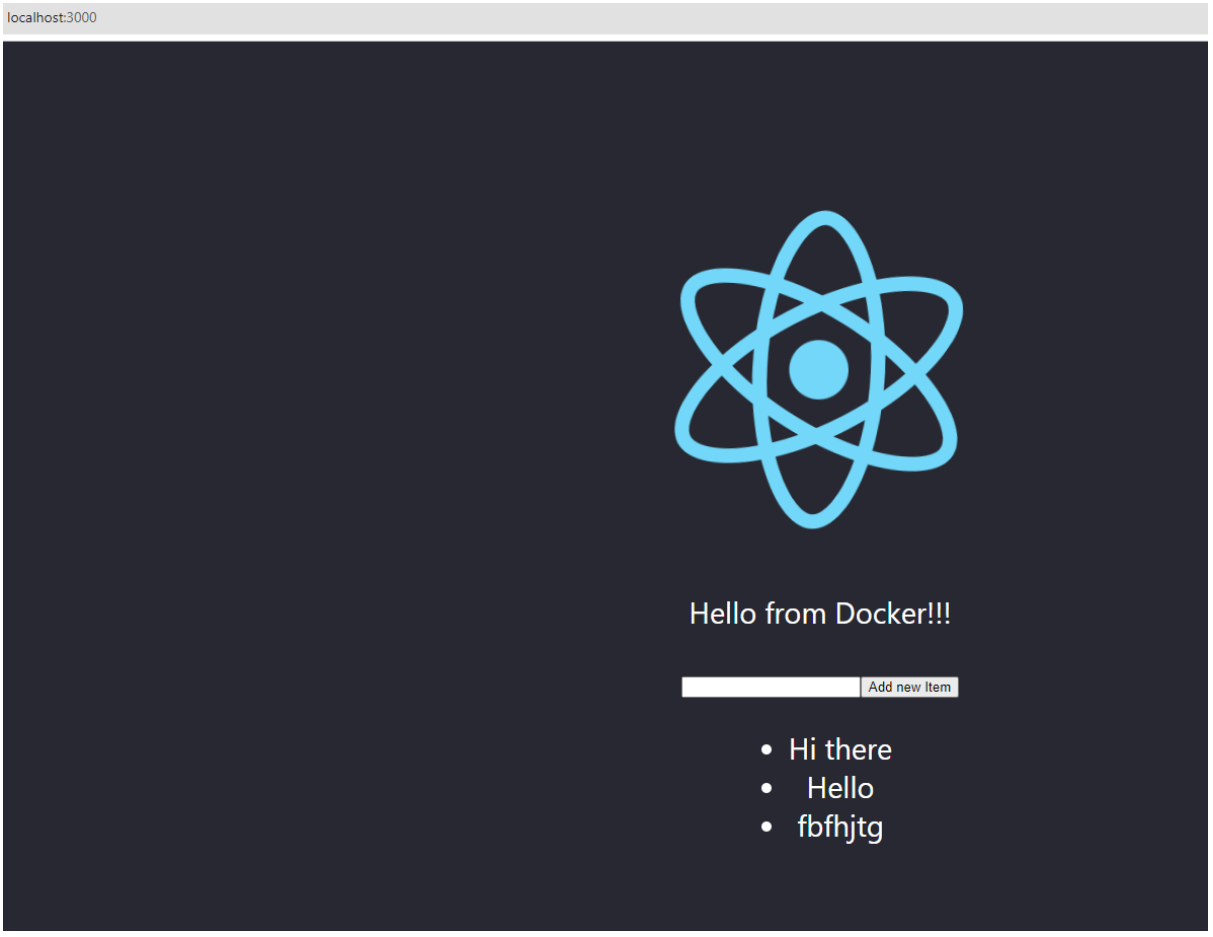
```
C:\Users\Камила\Documents\253505\4 семестр\ИГИ\LR2\React+Node>docker compose down
[+] Running 3/3
 ⠿ Container reactnode-frontend-1  Removed
 ⠿ Container reactnode-backend-1   Removed
 ⠿ Network reactnode_default       Removed
```



Запустим снова:

```
C:\Users\Камила\Documents\253505\4 семестр\ИГИ\LR2\React+Node>docker compose up -d
[+] Running 2/3
 - Network reactnode_default       Created
 ⠿ Container reactnode-backend-1   Started
 ⠿ Container reactnode-frontend-1  Started
```

Как видим, данные были сохранены благодаря использованию docker volumes:



Стек технологий: WordPress+MySQL

```yaml
version: "3.7"

services:
  wordpress:
    image: wordpress:6.0.0-php8.0
    restart: always
    ports:
      - "3000:80"
    volumes:
      - "./dist/wp:/var/www/html"
    networks:
      - wordpress-network
    links:
      - db
    environment:
      WORDPRESS_DB_HOST: db
      WORDPRESS_DB_USER: wp_db_user
      WORDPRESS_DB_PASSWORD: wp_db_pass
      WORDPRESS_DB_NAME: wp_db
      WORDPRESS_DEBUG: 1

  db:
    image: mysql:5.7
    restart: always
    environment:
      MYSQL_DATABASE: wp_db
      MYSQL_USER: wp_db_user
      MYSQL_PASSWORD: wp_db_pass
      MYSQL_RANDOM_ROOT_PASSWORD: '1234'
    networks:
      - wordpress-network
    volumes:
      - ./dist/host/.db:/var/lib/mysql

networks:
  wordpress-network:
```

```
C:\Users\Камила\Documents\253505\4 семестр\ИГИ\LR2>cd WordPress

C:\Users\Камила\Documents\253505\4 семестр\ИГИ\LR2\WordPress>docker ps
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS     NAMES

C:\Users\Камила\Documents\253505\4 семестр\ИГИ\LR2\WordPress>docker compose up
[+] Running 3/3
 ⠿ Network wordpress_wordpress-network  Created                                                    0.0s
 ⠿ Container wordpress-db-1             Created                                                    0.0s
 ⠿ Container wordpress-wordpress-1      Created                                                    0.0s
Attaching to db-1, wordpress-1
db-1          | 2024-03-16 08:37:17+00:00 [Note] [Entrypoint]: Entrypoint script for MySQL Server 5.7.44-1.el7 started.
db-1          | 2024-03-16 08:37:18+00:00 [Note] [Entrypoint]: Switching to dedicated user 'mysql'
db-1          | 2024-03-16 08:37:18+00:00 [Note] [Entrypoint]: Entrypoint script for MySQL Server 5.7.44-1.el7 started.
db-1          | 2024-03-16 08:37:18+00:00 [Note] [Entrypoint]: Initializing database files
db-1          | 2024-03-16T08:37:18.211135Z 0 [Warning] TIMESTAMP with implicit DEFAULT value is deprecated. Please use -
-explicit_defaults_for_timestamp server option (see documentation for more details).
db-1          | 2024-03-16T08:37:18.216670Z 0 [Warning] Setting lower_case_table_names=2 because file system for /var/lib
/mysql/ is case insensitive
wordpress-1   | WordPress not found in /var/www/html - copying now...
db-1          | 2024-03-16T08:37:18.948239Z 0 [Warning] InnoDB: New log files created, LSN=45790
db-1          | 2024-03-16T08:37:19.080253Z 0 [Warning] InnoDB: Creating foreign key constraint system tables.
db-1          | 2024-03-16T08:37:19.091737Z 0 [Warning] No existing UUID has been found, so we assume that this is the fi
rst time that this server has been started. Generating a new UUID: 66854898-e370-11ee-9cfa-0242ac120002.
db-1          | 2024-03-16T08:37:19.094968Z 0 [Warning] Gtid table is not ready to be used. Table 'mysql.gtid_executed' c
```

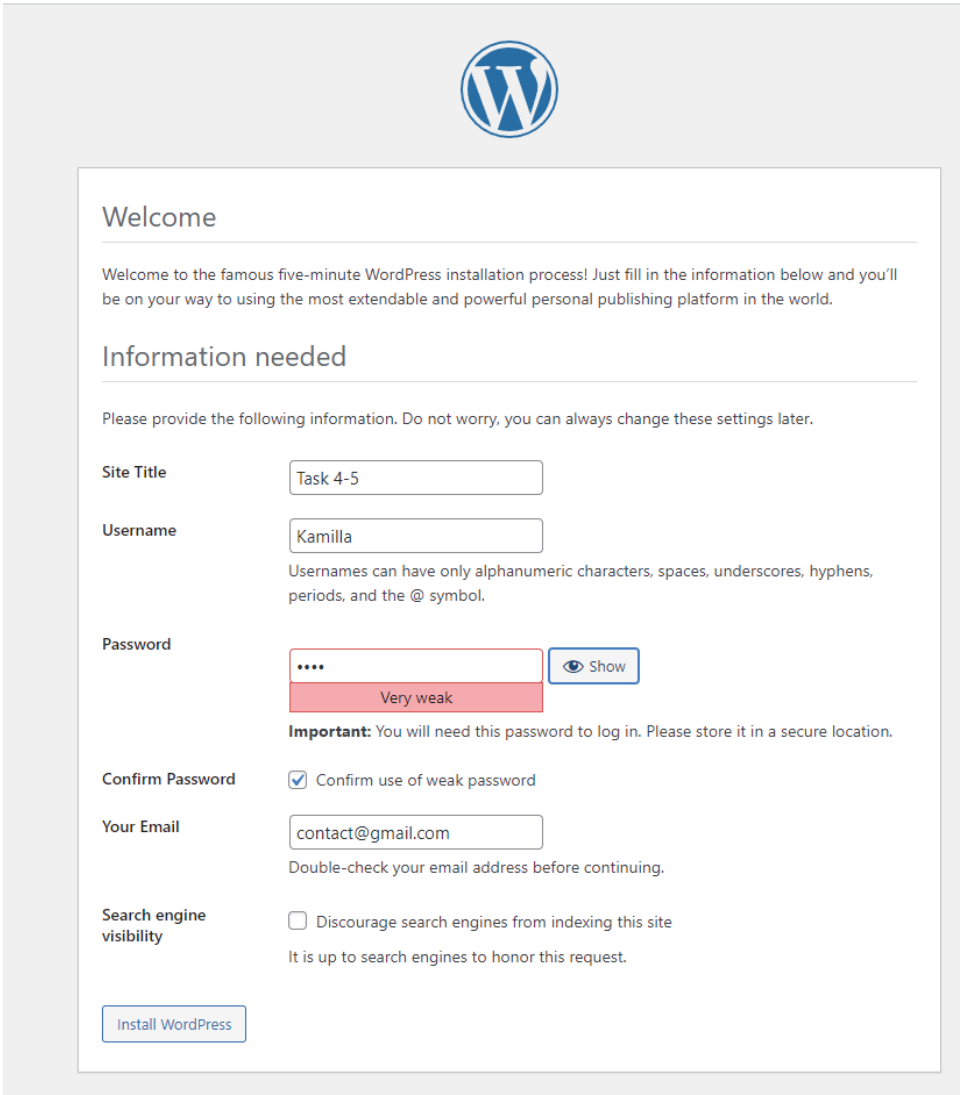
```
C:\Users\Камила\Documents\253505\4 семестр\ИГИ\LR2\WordPress>docker ps
CONTAINER ID   IMAGE                COMMAND                  CREATED         STATUS         PORTS                    NAMES
52d62ddd613a   wordpress:6.0.0-php8.0   "docker-entrypoint.s…"   4 minutes ago   Up 4 minutes   0.0.0.0:3000->80/tcp   wordpress-wordpress-1
0f36c8ed7c6c   mysql:5.7            "docker-entrypoint.s…"   4 minutes ago   Up 4 minutes   3306/tcp, 33060/tcp      wordpress-db-1
```

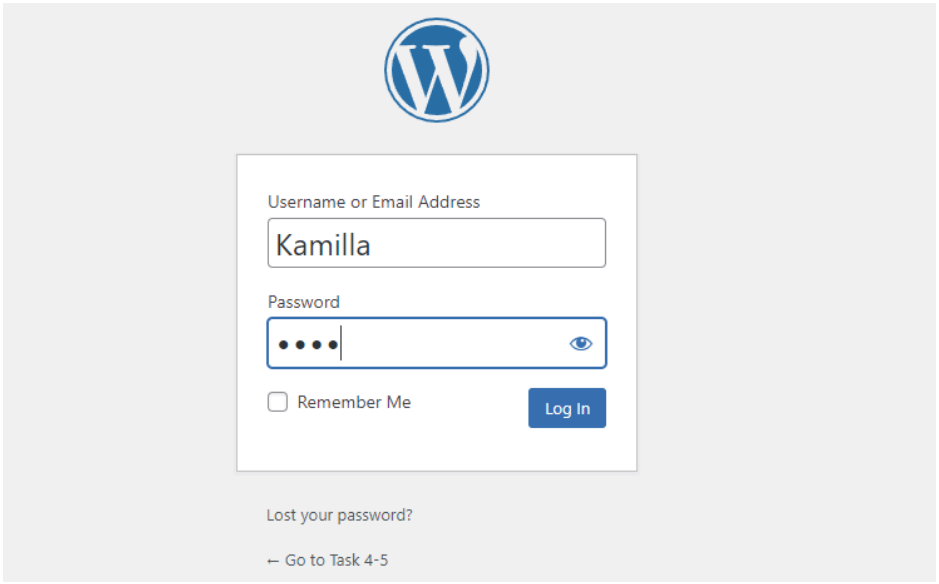
Подробная информация о контейнере:

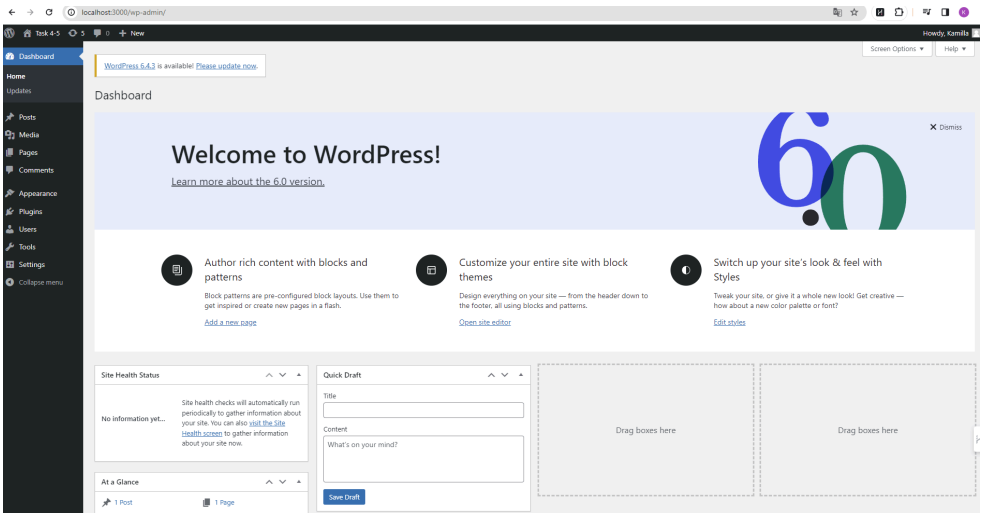
```
C:\Users\Камила\Documents\253505\4 семестр\ИГИ\LR2\WordPress>docker inspect wordpress-wordpress-1
[
    {
        "Id": "52d62ddd613af77eeef6f0f4739121d76a1b810c325f184900f5dfcafd72f155",
        "Created": "2024-03-16T08:37:17.570652152Z",
        "Path": "docker-entrypoint.sh",
        "Args": [
            "apache2-foreground"
        ],
        "State": {
            "Status": "running",
            "Running": true,
            "Paused": false,
            "Restarting": false,
            "OOMKilled": false,
            "Dead": false,
            "Pid": 1299,
            "ExitCode": 0,
            "Error": "",
```

```
"Networks": {
    "wordpress_wordpress-network": {
```

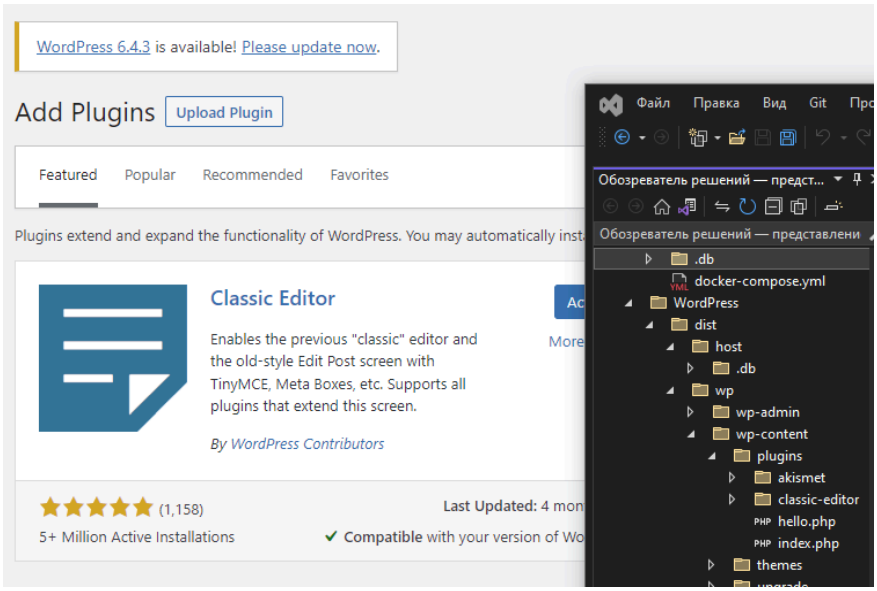
localhost:3000







Добавим плагин Classic Editor:



Остановим контейнер:

```
C:\Users\Камила\Documents\253505\4 семестр\ИГИ\LR2\WordPress>docker compose down
[+] Running 3/3
 ⠿ Container wordpress-wordpress-1      Removed
 ⠿ Container wordpress-db-1             Removed
 ⠿ Network wordpress_wordpress-network  Removed
```

Не удается получить доступ к сайту

Сайт **localhost** не позволяет установить соединение.

Попробуйте сделать следующее:

- Проверьте подключение к Интернету.
- Проверьте настройки прокси-сервера и брандмауэра.

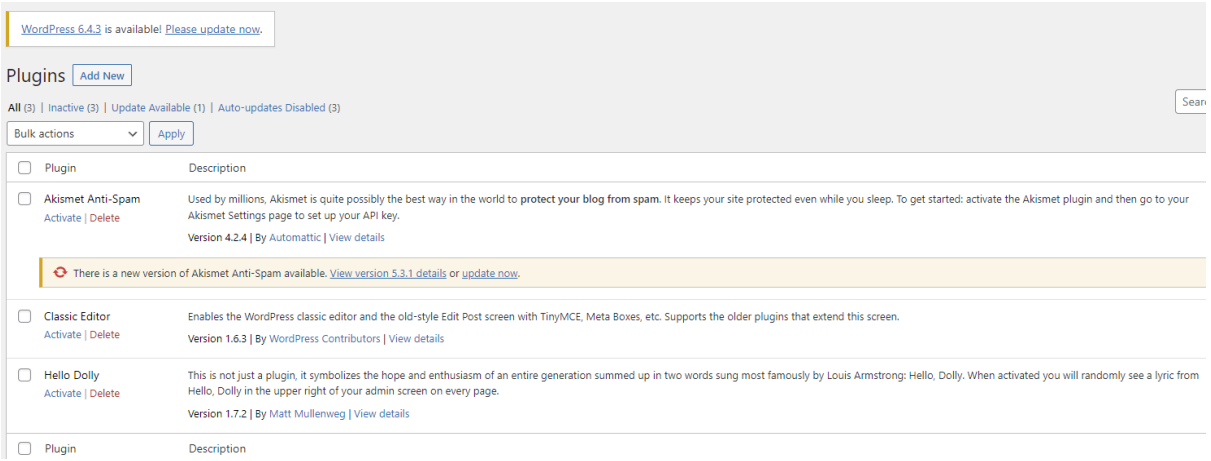
ERR_CONNECTION_REFUSED

Перезагрузить

Снова запустим:

```
C:\Users\Камила\Documents\253505\4 семестр\ИГИ\LR2\WordPress>docker compose up
[+] Running 3/3
 ⠿ Network wordpress_wordpress-network  Created                                                                                                0.0s
 ⠿ Container wordpress-db-1             Created                                                                                                0.0s
 ⠿ Container wordpress-wordpress-1      Created                                                                                                0.0s
Attaching to db-1, wordpress-1
db-1         | 2024-03-16 09:05:06+00:00 [Note] [Entrypoint]: Entrypoint script for MySQL Server 5.7.44-1.el7 started.
db-1         | 2024-03-16 09:05:06+00:00 [Note] [Entrypoint]: Switching to dedicated user 'mysql'
db-1         | 2024-03-16 09:05:06+00:00 [Note] [Entrypoint]: Entrypoint script for MySQL Server 5.7.44-1.el7 started.
wordpress-1  | AH00558: apache2: Could not reliably determine the server's fully qualified domain name, using 172.21.0.3. Set the 'ServerName' directive glo
bally to suppress this message
wordpress-1  | AH00558: apache2: Could not reliably determine the server's fully qualified domain name, using 172.21.0.3. Set the 'ServerName' directive glo
bally to suppress this message
wordpress-1  | [Sat Mar 16 09:05:06.572719 2024] [mpm_prefork:notice] [pid 1] AH00163: Apache/2.4.53 (Debian) PHP/8.0.21 configured -- resuming normal opera
tions
```

Видим, что внесенные изменения были сохранены:



Задание 6. Разместите результат в созданный репозиторий в DockerHub.

```
C:\Users\Камила\Documents\253505\4 семестр\ИГИ\LR2>docker images
REPOSITORY                  TAG             IMAGE ID       CREATED         SIZE
reactnode-frontend          latest          80713e447325   3 hours ago     187MB
reactnode-backend           latest          134d70bdf3c0   3 hours ago     916MB
python_img                  latest          8dbc508c2fc7   2 days ago      998MB
mysql                       5.7             5107333e08a8   3 months ago    501MB
docker/welcome-to-docker    latest          c1f619b6477e   4 months ago    18.6MB
docker/getting-started      latest          3e4394f6b72f   14 months ago   47MB
wordpress                   6.0.0-php8.0    f181bc34ed90   20 months ago   616MB
```

```
C:\Users\Камила\Documents\253505\4 семестр\ИГИ\LR2>docker tag reactnode-frontend kamillamlkv/reactnode-frontend:latest

C:\Users\Камила\Documents\253505\4 семестр\ИГИ\LR2>docker images
REPOSITORY                        TAG             IMAGE ID       CREATED         SIZE
kamillamlkv/reactnode-frontend    latest          80713e447325   3 hours ago     187MB
reactnode-frontend                latest          80713e447325   3 hours ago     187MB
reactnode-backend                 latest          134d70bdf3c0   3 hours ago     916MB
python_img                        latest          8dbc508c2fc7   2 days ago      998MB
mysql                             5.7             5107333e08a8   3 months ago    501MB
docker/welcome-to-docker          latest          c1f619b6477e   4 months ago    18.6MB
docker/getting-started            latest          3e4394f6b72f   14 months ago   47MB
wordpress                         6.0.0-php8.0    f181bc34ed90   20 months ago   616MB

C:\Users\Камила\Documents\253505\4 семестр\ИГИ\LR2>docker push kamillamlkv/reactnode-frontend:latest
The push refers to repository [docker.io/kamillamlkv/reactnode-frontend]
1e10337ffa43: Pushed
fd31601f0be4: Mounted from library/nginx
93b4c8c4ac05: Mounted from library/nginx
b7df9f234b50: Mounted from library/nginx
ab75a0b61bd1: Mounted from library/nginx
c1b1bf2f95dc: Mounted from library/nginx
4d99aab1eed4: Mounted from library/nginx
a483da8ab3e9: Mounted from library/nginx
```

```
C:\Users\Камила\Documents\253505\4 семестр\ИГИ\LR2>docker tag reactnode-backend kamillamlkv/reactnode-backend:latest

C:\Users\Камила\Documents\253505\4 семестр\ИГИ\LR2>docker images
REPOSITORY                        TAG             IMAGE ID       CREATED         SIZE
kamillamlkv/reactnode-frontend    latest          80713e447325   3 hours ago     187MB
reactnode-frontend                latest          80713e447325   3 hours ago     187MB
kamillamlkv/reactnode-backend     latest          134d70bdf3c0   3 hours ago     916MB
reactnode-backend                 latest          134d70bdf3c0   3 hours ago     916MB
python_img                        latest          8dbc508c2fc7   2 days ago      998MB
mysql                             5.7             5107333e08a8   3 months ago    501MB
docker/welcome-to-docker          latest          c1f619b6477e   4 months ago    18.6MB
docker/getting-started            latest          3e4394f6b72f   14 months ago   47MB
wordpress                         6.0.0-php8.0    f181bc34ed90   20 months ago   616MB

C:\Users\Камила\Documents\253505\4 семестр\ИГИ\LR2>docker push kamillamlkv/reactnode-backend:latest
The push refers to repository [docker.io/kamillamlkv/reactnode-backend]
9a0244d7a570: Pushed
2613906a9066: Pushed
e44d80117a38: Pushed
be322b479aee: Mounted from library/node
d41bcd3a037b: Mounted from library/node
fe0d845e767b: Mounted from library/node
f25ec1d93a58: Mounted from library/node
794ce8b1b516: Mounted from library/node
3220beed9b06: Mounted from library/node
684f82921421: Mounted from library/node
9af5f53e8f62: Mounted from library/node
latest: digest: sha256:94683fe7f20bb3e17f860a98890afe87d30f8aec9dd66d25af028914d932731e size: 2630
```

```
C:\Users\Камила\Documents\253505\4 семестр\ИГИ\LR2>docker tag mysql:5.7 kamillamlkv/mysql:v5.7

C:\Users\Камила\Documents\253505\4 семестр\ИГИ\LR2>docker images
REPOSITORY                      TAG           IMAGE ID       CREATED         SIZE
kamillamlkv/reactnode-frontend  latest        80713e447325   3 hours ago     187MB
reactnode-frontend              latest        80713e447325   3 hours ago     187MB
kamillamlkv/reactnode-backend   latest        134d70bdf3c0   3 hours ago     916MB
reactnode-backend               latest        134d70bdf3c0   3 hours ago     916MB
python_img                      latest        8dbc508c2fc7   2 days ago      998MB
kamillamlkv/mysql               v5.7          5107333e08a8   3 months ago    501MB
mysql                           5.7           5107333e08a8   3 months ago    501MB
docker/welcome-to-docker        latest        c1f619b6477e   4 months ago    18.6MB
docker/getting-started          latest        3e4394f6b72f   14 months ago   47MB
wordpress                       6.0.0-php8.0  f181bc34ed90   20 months ago   616MB

C:\Users\Камила\Documents\253505\4 семестр\ИГИ\LR2>docker push kamillamlkv/mysql:v5.7
The push refers to repository [docker.io/kamillamlkv/mysql]
441e16cac4fe: Mounted from library/mysql
73cb62467b8f: Mounted from library/mysql
337ec6bae222: Mounted from library/mysql
532b66f4569d: Mounted from library/mysql
0d9e9a9ce9e4: Mounted from library/mysql
4555572a6bb2: Mounted from library/mysql
8527ccd6bd85: Mounted from library/mysql
d76a5f910f6b: Mounted from library/mysql
8b2952eb02aa: Mounted from library/mysql
7ff7abf4911b: Mounted from library/mysql
cff044e18624: Mounted from library/mysql
v5.7: digest: sha256:4b6c4935195233bc10b617df3cc725a9ddd5a7f10351a7bf573bea0b5ded7649 size: 2618
```

```
C:\Users\Камила\Documents\253505\4 семестр\ИГИ\LR2>docker tag wordpress:6.0.0-php8.0 kamillamlkv/wordpress:6.0.0-php8.0

C:\Users\Камила\Documents\253505\4 семестр\ИГИ\LR2>docker images
REPOSITORY                      TAG           IMAGE ID       CREATED         SIZE
reactnode-frontend              latest        80713e447325   3 hours ago     187MB
kamillamlkv/reactnode-frontend  latest        80713e447325   3 hours ago     187MB
kamillamlkv/reactnode-backend   latest        134d70bdf3c0   3 hours ago     916MB
reactnode-backend               latest        134d70bdf3c0   3 hours ago     916MB
python_img                      latest        8dbc508c2fc7   2 days ago      998MB
kamillamlkv/mysql               v5.7          5107333e08a8   3 months ago    501MB
mysql                           5.7           5107333e08a8   3 months ago    501MB
docker/welcome-to-docker        latest        c1f619b6477e   4 months ago    18.6MB
docker/getting-started          latest        3e4394f6b72f   14 months ago   47MB
kamillamlkv/wordpress           6.0.0-php8.0  f181bc34ed90   20 months ago   616MB
wordpress                       6.0.0-php8.0  f181bc34ed90   20 months ago   616MB

C:\Users\Камила\Documents\253505\4 семестр\ИГИ\LR2>docker push kamillamlkv/wordpress:6.0.0-php8.0
```

kamillamlkv Edit profile

Community User · Joined March 11, 2024

Repositories | Starred | Contributed

Displaying 1 to 4 repositories

kamillamlkv/wordpress ⬇0 · ☆0

By kamillamlkv · Updated a few seconds ago

Image

kamillamlkv/mysql ⬇0 · ☆0

By kamillamlkv · Updated 2 minutes ago

Image

kamillamlkv/reactnode-backend ⬇0 · ☆0

By kamillamlkv · Updated 10 minutes ago

Image

kamillamlkv/reactnode-frontend ⬇0 · ☆0

By kamillamlkv · Updated 15 minutes ago

Image

Задание 7. Выполните следующие действия с целью изучить особенности сетевого взаимодействия:

1. Получить информацию о всех сетях, работающих на текущем хосте и подробности о каждом типе сети

```
C:\Users\Камила>docker network ls
NETWORK ID     NAME                            DRIVER    SCOPE
60cbdbae525c   bridge                          bridge    local
ec428abbc511   host                            host      local
c986c7c272de   none                            null      local
ff6d8ca5b1dc   wordpress_wordpress-network     bridge    local
```

```
C:\Users\Камила>docker network inspect none
[
    {
        "Name": "none",
        "Id": "c986c7c272de060b85dd66b68e641d74bb82745adcb27b65319ae3e3140087b1",
        "Created": "2024-03-11T20:13:06.24023633Z",
        "Scope": "local",
        "Driver": "null",
        "EnableIPv6": false,
        "IPAM": {
            "Driver": "default",
            "Options": null,
            "Config": null
        },
        "Internal": false,
        "Attachable": false,
        "Ingress": false,
        "ConfigFrom": {
            "Network": ""
        },
        "ConfigOnly": false,
        "Containers": {},
        "Options": {},
        "Labels": {}
    }
]
```

```
C:\Users\Камила>docker network inspect bridge
[
    {
        "Name": "bridge",
        "Id": "60cbdbae525c52ec26992c644d03a00d08c6607e45bb9661fe9c8105d13f8c24",
        "Created": "2024-03-16T08:31:11.759099046Z",
        "Scope": "local",
        "Driver": "bridge",
        "EnableIPv6": false,
        "IPAM": {
            "Driver": "default",
            "Options": null,
            "Config": [
                {
                    "Subnet": "172.17.0.0/16",
                    "Gateway": "172.17.0.1"
                }
            ]
        },
        "Internal": false,
        "Attachable": false,
        "Ingress": false,
        "ConfigFrom": {
            "Network": ""
        },
        "ConfigOnly": false,
        "Containers": {},
        "Options": {
            "com.docker.network.bridge.default_bridge": "true",
            "com.docker.network.bridge.enable_icc": "true",
            "com.docker.network.bridge.enable_ip_masquerade": "true",
            "com.docker.network.bridge.host_binding_ipv4": "0.0.0.0",
            "com.docker.network.bridge.name": "docker0",
            "com.docker.network.driver.mtu": "1500"
        },
        "Labels": {}
    }
]
```

```
C:\Users\Камила>docker network inspect host
[
    {
        "Name": "host",
        "Id": "ec428abbc511311a70b75c4c8555c4cd7191a5793a0ccb947971d2ba49812bbb",
        "Created": "2024-03-11T20:13:06.247939786Z",
        "Scope": "local",
        "Driver": "host",
        "EnableIPv6": false,
        "IPAM": {
            "Driver": "default",
            "Options": null,
            "Config": null
        },
        "Internal": false,
        "Attachable": false,
        "Ingress": false,
        "ConfigFrom": {
            "Network": ""
        },
        "ConfigOnly": false,
        "Containers": {},
        "Options": {},
        "Labels": {}
    }
]
```

2. Создать свою собственную сеть bridge, проверить, создана ли она, запустить Docker-контейнер в созданной сети, вывести о ней всю информацию(включая IP-адрес контейнера), отключить сеть от контейнера.

```
C:\Users\Камила>docker network create -d bridge test_net
a20863d6b2dc38d31966d7a9549b7a1ecf2d8b2c94137e23a77feca57efaf6c2

C:\Users\Камила>docker network ls
NETWORK ID     NAME       DRIVER    SCOPE
cd1e8f1f3579   bridge     bridge    local
ec428abbc511   host       host      local
c986c7c272de   none       null      local
a20863d6b2dc   test_net   bridge    local
```

```
C:\Users\Камила>docker pull python
Using default tag: latest
latest: Pulling from library/python
71215d55680c: Already exists
3cb8f9c23302: Already exists
5f899db30843: Already exists
567db630df8d: Already exists
d68cd2123173: Already exists
63941d09e532: Pull complete
097431623722: Pull complete
09527fa4de8d: Pull complete
Digest: sha256:336461f63f4eb1100e178d5acbfea3d1a5b2a53dea88aa0f9b8482d4d02e981c
Status: Downloaded newer image for python:latest
docker.io/library/python:latest
```

```
C:\Users\Камила>docker run --network test_net --name python_test -it python
Python 3.12.2 (main, Mar 12 2024, 11:02:14) [GCC 12.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>> help
Type help() for interactive help, or help(object) for help about object.
>>> help()
Welcome to Python 3.12's help utility! If this is your first time using
Python, you should definitely check out the tutorial at
https://docs.python.org/3.12/tutorial/.

Enter the name of any module, keyword, or topic to get help on writing
Python programs and using Python modules.  To get a list of available
modules, keywords, symbols, or topics, enter "modules", "keywords",
"symbols", or "topics".

Each module also comes with a one-line summary of what it does; to list
the modules whose name or summary contain a given string such as "spam",
enter "modules spam".

To quit this help utility and return to the interpreter,
enter "q" or "quit".
```

```
C:\Users\Камила>docker network inspect test_net
[
    {
        "Name": "test_net",
        "Id": "a20863d6b2dc38d31966d7a9549b7a1ecf2d8b2c94137e23a77feca57efaf6c2",
        "Created": "2024-03-16T18:36:01.883676739Z",
        "Scope": "local",
        "Driver": "bridge",
        "EnableIPv6": false,
        "IPAM": {
            "Driver": "default",
            "Options": {},
            "Config": [
                {
                    "Subnet": "172.19.0.0/16",
                    "Gateway": "172.19.0.1"
                }
            ]
        },
        "Internal": false,
        "Attachable": false,
        "Ingress": false,
        "ConfigFrom": {
            "Network": ""
        },
        "ConfigOnly": false,
        "Containers": {
            "d5d594f8cb056d590daeb66be919344c338b02c28b6c1775bf679e10ea0c17a2": {
                "Name": "python_test",
                "EndpointID": "3e04e39dc1e84cfda4b26455d07cd3127bb08cc54d1a70b39f99ef3b8d59b7bf",
                "MacAddress": "02:42:ac:13:00:02",
                "IPv4Address": "172.19.0.2/16",
                "IPv6Address": ""
            }
        },
        "Options": {},
        "Labels": {}
    }
]
```

```
C:\Users\Камила>docker network disconnect test_net python_test

C:\Users\Камила>docker network inspect test_net
[
    {
        "Name": "test_net",
        "Id": "a20863d6b2dc38d31966d7a9549b7a1ecf2d8b2c94137e23a77feca57efaf6c2",
        "Created": "2024-03-16T18:36:01.883676739Z",
        "Scope": "local",
        "Driver": "bridge",
        "EnableIPv6": false,
        "IPAM": {
            "Driver": "default",
            "Options": {},
            "Config": [
                {
                    "Subnet": "172.19.0.0/16",
                    "Gateway": "172.19.0.1"
                }
            ]
        },
        "Internal": false,
        "Attachable": false,
        "Ingress": false,
        "ConfigFrom": {
            "Network": ""
        },
        "ConfigOnly": false,
        "Containers": {},
        "Options": {},
        "Labels": {}
    }
]
```

3. Создать еще одну сеть bridge, вывести о ней всю информацию, запустить в ней три контейнера, подключиться к любому из контейнеров и пропинговать два других из оболочки контейнера, убедиться, что между контейнерами происходит общение по IP-адресу.

```
C:\Users\Камила>docker network create -d bridge third_net
a5ae3b9b69b6a233c2fcb36bbf515389cb7a9220051d9418b4d57306e88c7341

C:\Users\Камила>docker network ls
NETWORK ID     NAME        DRIVER    SCOPE
cd1e8f1f3579   bridge      bridge    local
ec428abbc511   host        host      local
c986c7c272de   none        null      local
a20863d6b2dc   test_net    bridge    local
a5ae3b9b69b6   third_net   bridge    local
```

```
C:\Users\Камила>docker network inspect third_net
[
    {
        "Name": "third_net",
        "Id": "a5ae3b9b69b6a233c2fcb36bbf515389cb7a9220051d9418b4d57306e88c7341",
        "Created": "2024-03-16T19:06:23.964099318Z",
        "Scope": "local",
        "Driver": "bridge",
        "EnableIPv6": false,
        "IPAM": {
            "Driver": "default",
            "Options": {},
            "Config": [
                {
                    "Subnet": "172.20.0.0/16",
                    "Gateway": "172.20.0.1"
                }
            ]
        },
        "Internal": false,
        "Attachable": false,
        "Ingress": false,
        "ConfigFrom": {
            "Network": ""
        },
        "ConfigOnly": false,
        "Containers": {},
        "Options": {},
        "Labels": {}
    }
]
```

Запуск трех контейнеров:

```
C:\Users\Камила>docker run --name first_container --network third_net -d -it python
67ba619b84e9f5a5a44a65ed762424b9bbe3abdd867556f9367479ed588b223a

C:\Users\Камила>docker run --name second_container --network third_net -d -it python
a3784417f585d6ec8e755c7e6b6d9d1ef6f6edfe14b98f0aa6375d65d32af0b9

C:\Users\Камила>docker run --name third_container --network third_net -d -it python
341ea9f7f55e2351cc2b2ddcc8fda78cdf6a5b2cb24c512fd3fc134ea0b0f58d

C:\Users\Камила>docker ps
CONTAINER ID   IMAGE     COMMAND     CREATED          STATUS          PORTS     NAMES
341ea9f7f55e   python    "python3"   3 seconds ago    Up 3 seconds              third_container
a3784417f585   python    "python3"   16 seconds ago   Up 15 seconds             second_container
67ba619b84e9   python    "python3"   42 seconds ago   Up 42 seconds             first_container
```

Подключение к первому контейнеру:

```
C:\Users\Камила>docker exec -it first_container sh
```

```
# apt-get update
Get:1 http://deb.debian.org/debian bookworm InRelease [151 kB]
Get:2 http://deb.debian.org/debian bookworm-updates InRelease [55.4 kB]
Get:3 http://deb.debian.org/debian-security bookworm-security InRelease [48.0 kB]
Get:4 http://deb.debian.org/debian bookworm/main amd64 Packages [8786 kB]
Get:5 http://deb.debian.org/debian bookworm-updates/main amd64 Packages [12.7 kB]
Get:6 http://deb.debian.org/debian-security bookworm-security/main amd64 Packages [146 kB]
Fetched 9200 kB in 4s (2162 kB/s)
Reading package lists... Done
# apt-get install inetutils-ping
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following NEW packages will be installed:
  inetutils-ping
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 86.0 kB of archives.
After this operation, 218 kB of additional disk space will be used.
Get:1 http://deb.debian.org/debian bookworm/main amd64 inetutils-ping amd64 2:2.4-2+deb12u1 [86.0 kB]
Fetched 86.0 kB in 0s (305 kB/s)
debconf: delaying package configuration, since apt-utils is not installed
Selecting previously unselected package inetutils-ping.
(Reading database ... 23974 files and directories currently installed.)
Preparing to unpack .../inetutils-ping_2%3a2.4-2+deb12u1_amd64.deb ...
Unpacking inetutils-ping (2:2.4-2+deb12u1) ...
Setting up inetutils-ping (2:2.4-2+deb12u1) ...
# ping 8.8.8.8
```

Пинг по имени:

```
# ping second_container
PING second_container (172.20.0.3): 56 data bytes
64 bytes from 172.20.0.3: icmp_seq=0 ttl=64 time=0.362 ms
64 bytes from 172.20.0.3: icmp_seq=1 ttl=64 time=0.134 ms
64 bytes from 172.20.0.3: icmp_seq=2 ttl=64 time=0.124 ms
64 bytes from 172.20.0.3: icmp_seq=3 ttl=64 time=0.152 ms
64 bytes from 172.20.0.3: icmp_seq=4 ttl=64 time=0.128 ms
64 bytes from 172.20.0.3: icmp_seq=5 ttl=64 time=0.170 ms
64 bytes from 172.20.0.3: icmp_seq=6 ttl=64 time=0.168 ms
64 bytes from 172.20.0.3: icmp_seq=7 ttl=64 time=0.151 ms
64 bytes from 172.20.0.3: icmp_seq=8 ttl=64 time=0.174 ms
64 bytes from 172.20.0.3: icmp_seq=9 ttl=64 time=0.106 ms
64 bytes from 172.20.0.3: icmp_seq=10 ttl=64 time=0.183 ms
64 bytes from 172.20.0.3: icmp_seq=11 ttl=64 time=0.327 ms
64 bytes from 172.20.0.3: icmp_seq=12 ttl=64 time=0.166 ms
64 bytes from 172.20.0.3: icmp_seq=13 ttl=64 time=0.105 ms
64 bytes from 172.20.0.3: icmp_seq=14 ttl=64 time=0.141 ms
64 bytes from 172.20.0.3: icmp_seq=15 ttl=64 time=0.130 ms
64 bytes from 172.20.0.3: icmp_seq=16 ttl=64 time=0.107 ms
64 bytes from 172.20.0.3: icmp_seq=17 ttl=64 time=0.119 ms
64 bytes from 172.20.0.3: icmp_seq=18 ttl=64 time=0.118 ms
64 bytes from 172.20.0.3: icmp_seq=19 ttl=64 time=0.121 ms
64 bytes from 172.20.0.3: icmp_seq=20 ttl=64 time=0.120 ms
64 bytes from 172.20.0.3: icmp_seq=21 ttl=64 time=0.133 ms
64 bytes from 172.20.0.3: icmp_seq=22 ttl=64 time=0.132 ms
64 bytes from 172.20.0.3: icmp_seq=23 ttl=64 time=0.162 ms
64 bytes from 172.20.0.3: icmp_seq=24 ttl=64 time=0.157 ms
64 bytes from 172.20.0.3: icmp_seq=25 ttl=64 time=0.163 ms
^C--- second_container ping statistics ---
26 packets transmitted, 26 packets received, 0% packet loss
round-trip min/avg/max/stddev = 0.105/0.156/0.362/0.059 ms
```

```
# ping third_container
PING third_container (172.20.0.4): 56 data bytes
64 bytes from 172.20.0.4: icmp_seq=0 ttl=64 time=0.336 ms
64 bytes from 172.20.0.4: icmp_seq=1 ttl=64 time=0.135 ms
64 bytes from 172.20.0.4: icmp_seq=2 ttl=64 time=0.135 ms
^C--- third_container ping statistics ---
3 packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max/stddev = 0.135/0.202/0.336/0.095 ms
#
```

Пинг по IP-адресу:

```
C:\Users\Камила>docker exec -it first_container sh
# ping 172.20.0.3
sh: 1: эшping: not found
# ping 172.20.0.3
PING 172.20.0.3 (172.20.0.3): 56 data bytes
64 bytes from 172.20.0.3: icmp_seq=0 ttl=64 time=0.211 ms
64 bytes from 172.20.0.3: icmp_seq=1 ttl=64 time=0.150 ms
64 bytes from 172.20.0.3: icmp_seq=2 ttl=64 time=0.162 ms
^C--- 172.20.0.3 ping statistics ---
3 packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max/stddev = 0.150/0.174/0.211/0.026 ms
# ping 172.20.0.4
PING 172.20.0.4 (172.20.0.4): 56 data bytes
64 bytes from 172.20.0.4: icmp_seq=0 ttl=64 time=0.229 ms
64 bytes from 172.20.0.4: icmp_seq=1 ttl=64 time=0.155 ms
64 bytes from 172.20.0.4: icmp_seq=2 ttl=64 time=0.151 ms
^C--- 172.20.0.4 ping statistics ---
3 packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max/stddev = 0.151/0.178/0.229/0.036 ms
#
```

4. Создать свою собственную сеть overlay, проверить, создана ли она, вывести о ней всю информацию.

```
C:\Users\Камила>docker swarm init
Swarm initialized: current node (ohhixlug6u234b99g3xk5r9rm) is now a manager.

To add a worker to this swarm, run the following command:

    docker swarm join --token SWMTKN-1-3qh0no6kgdrgd5ev22dqrbqx4nunuwy2egjz63fy0uh8j8toxi-49v2xyro833t77ax1xzpqlpl1 192.168.65.3:2377

To add a manager to this swarm, run 'docker swarm join-token manager' and follow the instructions.
```

```
C:\Users\Камила>docker network ls
NETWORK ID     NAME              DRIVER    SCOPE
cd1e8f1f3579   bridge            bridge    local
ae3ecbbd79b6   docker_gwbridge   bridge    local
ec428abbc511   host              host      local
nj3uc1ff4rm4   ingress           overlay   swarm
c986c7c272de   none              null      local
a20863d6b2dc   test_net          bridge    local
a5ae3b9b69b6   third_net         bridge    local
```

```
C:\Users\Камила>docker network create -d overlay overnet
idnnbup83gzxe66dltwofc4io

C:\Users\Камила>docker network ls
NETWORK ID     NAME              DRIVER    SCOPE
cd1e8f1f3579   bridge            bridge    local
ae3ecbbd79b6   docker_gwbridge   bridge    local
ec428abbc511   host              host      local
nj3uc1ff4rm4   ingress           overlay   swarm
c986c7c272de   none              null      local
idnnbup83gzx   overnet           overlay   swarm
a20863d6b2dc   test_net          bridge    local
a5ae3b9b69b6   third_net         bridge    local
```

```
C:\Users\Камила>docker network inspect overnet
[
    {
        "Name": "overnet",
        "Id": "idnnbup83gzxe66dltwofc4io",
        "Created": "2024-03-16T20:18:09.576171242Z",
        "Scope": "swarm",
        "Driver": "overlay",
        "EnableIPv6": false,
        "IPAM": {
            "Driver": "default",
            "Options": null,
            "Config": [
                {
                    "Subnet": "10.0.1.0/24",
                    "Gateway": "10.0.1.1"
                }
            ]
        },
        "Internal": false,
        "Attachable": false,
        "Ingress": false,
        "ConfigFrom": {
            "Network": ""
        },
        "ConfigOnly": false,
        "Containers": null,
        "Options": {
            "com.docker.network.driver.overlay.vxlanid_list": "4097"
        },
        "Labels": null
    }
]
```

5. Создать еще одну сеть overlay, проверить, создана ли она, вывести о ней всю информацию, удалить сеть.

```
C:\Users\Камила>docker network create -d overlay other_overnet
1unp27f4ui4ru8lsmvb9lnni2

C:\Users\Камила>docker network ls
NETWORK ID     NAME              DRIVER    SCOPE
cd1e8f1f3579   bridge            bridge    local
ae3ecbbd79b6   docker_gwbridge   bridge    local
ec428abbc511   host              host      local
nj3uc1ff4rm4   ingress           overlay   swarm
c986c7c272de   none              null      local
1unp27f4ui4r   other_overnet     overlay   swarm
idnnbup83gzx   overnet           overlay   swarm
a20863d6b2dc   test_net          bridge    local
a5ae3b9b69b6   third_net         bridge    local

C:\Users\Камила>docker network inspect other_overnet
[
    {
        "Name": "other_overnet",
        "Id": "1unp27f4ui4ru8lsmvb9lnni2",
        "Created": "2024-03-16T20:21:01.872020202Z",
        "Scope": "swarm",
        "Driver": "overlay",
        "EnableIPv6": false,
        "IPAM": {
            "Driver": "default",
            "Options": null,
            "Config": [
                {
                    "Subnet": "10.0.2.0/24",
                    "Gateway": "10.0.2.1"
                }
            ]
        },
        "Internal": false,
        "Attachable": false,
        "Ingress": false,
        "ConfigFrom": {
            "Network": ""
        },
        "ConfigOnly": false,
        "Containers": null,
        "Options": {
            "com.docker.network.driver.overlay.vxlanid_list": "4098"
        },
        "Labels": null
    }
]
```

```
C:\Users\Камила>docker network rm other_overnet
other_overnet

C:\Users\Камила>docker network ls
NETWORK ID     NAME              DRIVER    SCOPE
cd1e8f1f3579   bridge            bridge    local
ae3ecbbd79b6   docker_gwbridge   bridge    local
ec428abbc511   host              host      local
nj3uc1ff4rm4   ingress           overlay   swarm
c986c7c272de   none              null      local
idnnbup83gzx   overnet           overlay   swarm
a20863d6b2dc   test_net          bridge    local
a5ae3b9b69b6   third_net         bridge    local
```

6. Попробовать создать сеть host.

```
C:\Users\Камила>docker network create -d host try_host
Error response from daemon: only one instance of "host" network is allowed
```

Демонстрация некоторых команд:

1. pause, unpause

```
C:\Users\Камила>docker ps
CONTAINER ID   IMAGE     COMMAND     CREATED             STATUS             PORTS     NAMES
341ea9f7f55e   python    "python3"   About an hour ago   Up About an hour             third_container
a3784417f585   python    "python3"   About an hour ago   Up About an hour             second_container
67ba619b84e9   python    "python3"   About an hour ago   Up About an hour             first_container

C:\Users\Камила>docker pause first_container
first_container

C:\Users\Камила>docker ps
CONTAINER ID   IMAGE     COMMAND     CREATED             STATUS                      PORTS     NAMES
341ea9f7f55e   python    "python3"   About an hour ago   Up About an hour                      third_container
a3784417f585   python    "python3"   About an hour ago   Up About an hour                      second_container
67ba619b84e9   python    "python3"   About an hour ago   Up About an hour (Paused)             first_container

C:\Users\Камила>docker unpause first_container
first_container

C:\Users\Камила>docker ps
CONTAINER ID   IMAGE     COMMAND     CREATED             STATUS             PORTS     NAMES
341ea9f7f55e   python    "python3"   About an hour ago   Up About an hour             third_container
a3784417f585   python    "python3"   About an hour ago   Up About an hour             second_container
67ba619b84e9   python    "python3"   About an hour ago   Up About an hour             first_container
```

2. restart

```
C:\Users\Камила>docker stop second_container
second_container

C:\Users\Камила>docker ps
CONTAINER ID   IMAGE     COMMAND     CREATED             STATUS             PORTS     NAMES
341ea9f7f55e   python    "python3"   About an hour ago   Up About an hour             third_container
67ba619b84e9   python    "python3"   About an hour ago   Up About an hour             first_container

C:\Users\Камила>docker restart second_container
second_container

C:\Users\Камила>docker ps
CONTAINER ID   IMAGE     COMMAND     CREATED             STATUS             PORTS     NAMES
341ea9f7f55e   python    "python3"   About an hour ago   Up About an hour             third_container
a3784417f585   python    "python3"   About an hour ago   Up 3 seconds                 second_container
67ba619b84e9   python    "python3"   About an hour ago   Up About an hour             first_container
```

3. logs

```
C:\Users\Камила>docker logs --until=2s third_container
Python 3.12.2 (main, Mar 12 2024, 11:02:14) [GCC 12.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
```