

Лабораторная работа №2

по дисциплине ИГИ

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Задание 2.

Изучение простейших консольных команд и возможностей Docker Desktop, создание собственного контейнера docker/getting-started.

```
MacBook-Air-Daniil-2:253501_SHUMSKI_27 llymuk$ docker create -p 8080:80 docker/getting-started
Unable to find image 'docker/getting-started:latest' locally
latest: Pulling from docker/getting-started
261da4162673: Pull complete
a60aada4c44a: Pull complete
2f61404bb4b8: Pull complete
fa3f58a317be: Pull complete
476bb2a1cc22: Pull complete
33a28b928e89: Pull complete
a879581b8e12: Pull complete
d0193f05f10f: Pull complete
14f901bbf056: Pull complete
Digest: sha256:d79336f4812b6547a53e735480dde67f8f8f7071b414fbd9297609ffb989abc1
Status: Downloaded newer image for docker/getting-started:latest
cd1bd9a8bd598e396c54ccdc3c10c65cc67806be42d47eacbc5654eb8a44952b
```

```
MacBook-Air-Daniil-2:253501_SHUMSKI_27 llymuk$ docker start cd1bd9a8bd59
cd1bd9a8bd59
MacBook-Air-Daniil-2:253501_SHUMSKI_27 llymuk$ docker ps
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
cd1bd9a8bd59	docker/getting-started	"/docker-entrypoint..."	3 minutes ago	Up 38 seconds	0.0.0.0:8080->80/tcp	clever_dirac

Задание 3.

Изучение простейших консольных команд и возможностей Docker Desktop, создание собственного контейнера docker/getting-started.

a, b. Создание файла Dockerfile. Необходимый образ: python

```
IGI > LR2 > Dockerfile > ...
1 FROM python
2
3 WORKDIR /app
4 COPY ./geometric_lib ./geometric_lib
5 COPY ./main.py .
6
7 CMD ["python3", "main.py"]
```

c.

```
MacBook-Air-Daniil-2:LR2 llymuk$ docker build -t my-image .
[+] Building 0.1s (9/9) FINISHED                                docker:desktop-linux
=> [internal] load build definition from Dockerfile             0.0s
=> => transferring dockerfile: 144B                             0.0s
=> [internal] load metadata for docker.io/library/python:latest 0.0s
=> [internal] load .dockerignore                               0.0s
=> => transferring context: 2B                                   0.0s
=> [1/4] FROM docker.io/library/python:latest                 0.0s
=> [internal] load build context                               0.0s
=> => transferring context: 3.12kB                               0.0s
=> CACHED [2/4] WORKDIR /app                                   0.0s
=> CACHED [3/4] COPY ./geometric_lib ./geometric_lib          0.0s
=> [4/4] COPY ./main.py .                                     0.0s
=> exporting to image                                          0.0s
=> => exporting layers                                          0.0s
=> => writing image sha256:6e4429716629f434b58c6ddc1bddb47bb5a5b393a850f8c40cb2 0.0s
=> => naming to docker.io/library/my-image                     0.0s

View build details: docker-desktop://dashboard/build/desktop-linux/desktop-linux/xe7irdvab3psx7rxv58brx01g

What's Next?
View a summary of image vulnerabilities and recommendations → docker scout quickview
MacBook-Air-Daniil-2:LR2 llymuk$ docker run -it my-image
Enter the side length: 12
Area of square: 144
Area of inscribed circle: 113.09733552923255
MacBook-Air-Daniil-2:LR2 llymuk$
```

Задание 4, 5.

Загрузка проекта содержащего веб-приложение Grafana и БД Prometheus. Запуск проекта.

```
MacBook-Air-Daniil-2:prometheus-grafana llymuk$ docker-compose up -d
[+] Running 2/3
  :: Network prometheus-grafana_default Created                                0.3s
  ✓ Container prometheus Started                                              0.3s
  ✓ Container grafana Started                                                 0.3s
```

CONTAINER ID	NAME	CPU %	MEM USAGE / LIMIT	MEM %	NET I/O	BLOCK I/O	PIDS
0431ed5f2a89	grafana	0.04%	53.27MiB / 3.831GiB	1.36%	14.8kB / 3.41kB	0B / 21.4MB	14
0ccc80714641	prometheus	0.00%	26.3MiB / 3.831GiB	0.67%	1.46kB / 0B	0B / 12.3kB	11

```
IGI > LR2 > prometheus-grafana > compose.yaml
1  services:
2    prometheus:
3      image: prom/prometheus
4      container_name: prometheus
5      command:
6        - '--config.file=/etc/prometheus/prometheus.yml'
7      ports:
8        - 9090:9090
9      restart: unless-stopped
10     volumes:
11       - ./prometheus:/etc/prometheus
12       - prom_data:/prometheus
13   grafana:
14     image: grafana/grafana
15     container_name: grafana
16     ports:
17       - 3000:3000
18     restart: unless-stopped
19     environment:
20       - GF_SECURITY_ADMIN_USER=admin
21       - GF_SECURITY_ADMIN_PASSWORD=grafana
22     volumes:
23       - ./grafana:/etc/grafana/provisioning/datasources
24   volumes:
25     prom_data:
26
```

Выгрузка образов проекта на DockerHub в приватный репозиторий.

Внесение изменений в образ, коммит и пуш.

```

● MacBook-Air-Daniil-2:prometheus-grafana lliymuk$ docker push lliymuk/igi-lr2:my-grafana
The push refers to repository [docker.io/lliymuk/igi-lr2]
c35b389809ef: Pushed
77832a4f850d: Layer already exists
5fe3a0c77ad1: Layer already exists
e03717b39049: Layer already exists
27c154187285: Layer already exists
98d18dd2d990: Layer already exists
6adab53a3ca7: Layer already exists
8d700f1a9d30: Layer already exists
36073466dabc: Layer already exists
49a16216108d: Layer already exists
5f4d9fc4d98d: Layer already exists
my-grafana: digest: sha256:2ee3e766e0bb887e4ccceafc17acf8b6f29319f47b97cb97497eb4938c84e79b size: 2621
● MacBook-Air-Daniil-2:prometheus-grafana lliymuk$ docker push lliymuk/igi-lr2:my-prom
The push refers to repository [docker.io/lliymuk/igi-lr2]
0b97920edb7d: Layer already exists
ce07ced914a8: Layer already exists
2cb2c39faa1d: Layer already exists
f5da85ad9538: Layer already exists
005b5c7c00db: Layer already exists
f7fc59e36d29: Layer already exists
8e03dc8686ff: Layer already exists
61b2ebbd14e0: Layer already exists
d02ba6c1d167: Layer already exists
2c810c0985bf: Layer already exists
e6d95b698944: Layer already exists
f86c5e3025ef: Layer already exists
my-prom: digest: sha256:d6e7e0351738a51dc438c726150a57e9a212e9b1bce1919f802583e7fd1ff0d6 size: 2824

```

Задание 7.

Информацию о всех сетях можно получить при помощи команды `docker network ls`.

А подробности – `docker network inspect <network>`

```
MacBook-Air-Daniil-2:prometheus-grafana lliymuk$ docker network create --driver bridge --subnet 172.10.0.0/16 --ip-range 172.10.240.0/20 my-bridge
85d8c0ae8f7a9a56cd6f4c13419772df43a966155427a60255a6e19d826da895
MacBook-Air-Daniil-2:prometheus-grafana lliymuk$ docker network ls
NETWORK ID          NAME                DRIVER              SCOPE
9dcff05aec03        bridge              bridge              local
7b6b02bdb26f        host                host                local
85d8c0ae8f7a        my-bridge           bridge              local
9fc12edb4592        none                null                local
bc8514d10404        postgres_default    bridge              local
e231f4d2bd45        safe_bsuir_bot_default bridge              local
```

Создание собственной сети `my-bridge`, подключение контейнеров к сети в файле `compose.yml`

```
IGI > LR2 > prometheus-grafana > compose.yml
1  services:
2    prometheus:
3      image: lliymuk/igi-lr2:my-prom
4      container_name: prometheus
5      command:
6        - '--config.file=/etc/prometheus/prometheus.yml'
7      ports:
8        - 9090:9090
9      restart: unless-stopped
10     volumes:
11       - ./prometheus:/etc/prometheus
12       - prom_data:/prometheus
13     networks:
14       - my-bridge
15   grafana:
16     image: lliymuk/igi-lr2:my-grafana
17     container_name: grafana
18     ports:
19       - 3000:3000
20     restart: unless-stopped
21     environment:
22       - GF_SECURITY_ADMIN_USER=admin
23       - GF_SECURITY_ADMIN_PASSWORD=grafana
24     volumes:
25       - ./grafana:/etc/grafana/provisioning/datasources
26   volumes:
27     prom_data:
28
29   networks:
30     my-bridge:
31       name: my-bridge
32       external: true
```

Вся информация про my-bridge.

```
MacBook-Air-Daniil-2:prometheus-grafana lllymuk$ docker network inspect my-bridge
[
  {
    "Name": "my-bridge",
    "Id": "85d8c0ae8f7a9a56cd6f4c13419772df43a966155427a60255a6e19d826da895",
    "Created": "2024-03-05T22:47:32.532178553Z",
    "Scope": "local",
    "Driver": "bridge",
    "EnableIPv6": false,
    "IPAM": {
      "Driver": "default",
      "Options": {},
      "Config": [
        {
          "Subnet": "172.10.0.0/16",
          "IPRange": "172.10.240.0/20"
        }
      ]
    },
    "Internal": false,
    "Attachable": false,
    "Ingress": false,
    "ConfigFrom": {
      "Network": ""
    },
    "ConfigOnly": false,
    "Containers": {
      "95d9c8de276afc1ea7c597f0d2e6b452ae6b5893c3543f6ac11445d28eb4f4e5": {
        "Name": "prometheus",
        "EndpointID": "f268cd06c7ef5786d23f1dcd1159b356f5337331c4ad62f70c47fb623cf0dc1",
        "MacAddress": "02:42:ac:0a:f0:01",
        "IPv4Address": "172.10.240.1/16",
        "IPv6Address": ""
      }
    },
    "Options": {},
    "Labels": {}
  }
]
```

Отключение контейнера от сети.

```
MacBook-Air-Daniil-2:prometheus-grafana lllymuk$ docker network disconnect my-bridge prometheus
MacBook-Air-Daniil-2:prometheus-grafana lllymuk$ docker network inspect my-bridge
[
  {
    "Name": "my-bridge",
    "Id": "85d8c0ae8f7a9a56cd6f4c13419772df43a966155427a60255a6e19d826da895",
    "Created": "2024-03-05T22:47:32.532178553Z",
    "Scope": "local",
    "Driver": "bridge",
    "EnableIPv6": false,
    "IPAM": {
      "Driver": "default",
      "Options": {},
      "Config": [
        {
          "Subnet": "172.10.0.0/16",
          "IPRange": "172.10.240.0/20"
        }
      ]
    },
    "Internal": false,
    "Attachable": false,
    "Ingress": false,
    "ConfigFrom": {
      "Network": ""
    },
    "ConfigOnly": false,
    "Containers": {},
    "Options": {},
    "Labels": {}
  }
]
```

Запуск контейнера с образом Ubuntu и подключение контейнера к созданной сети.

```
See "docker start --help".
MacBook-Air-Daniil-2:prometheus-grafana llymuk$ docker start computer -i
^C
MacBook-Air-Daniil-2:prometheus-grafana llymuk$ docker network connect --ip 172.9.0.3 uninon-bridge computer
MacBook-Air-Daniil-2:prometheus-grafana llymuk$
```

Пинг Grafana и Prometheus.

```
root@9307f51686c3:/# ping grafana-host
PING grafana-host (172.9.240.2) 56(84) bytes of data.
64 bytes from grafana.uninon-bridge (172.9.240.2): icmp_seq=1 ttl=64 time=5.12 ms
64 bytes from grafana.uninon-bridge (172.9.240.2): icmp_seq=2 ttl=64 time=0.134 ms
64 bytes from grafana.uninon-bridge (172.9.240.2): icmp_seq=3 ttl=64 time=0.269 ms
64 bytes from grafana.uninon-bridge (172.9.240.2): icmp_seq=4 ttl=64 time=0.267 ms
^C
--- grafana-host ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3056ms
rtt min/avg/max/mdev = 0.134/1.446/5.117/2.119 ms
root@9307f51686c3:/# ping prometheus-host
PING prometheus-host (172.9.240.1) 56(84) bytes of data.
64 bytes from prometheus.uninon-bridge (172.9.240.1): icmp_seq=1 ttl=64 time=1.52 ms
64 bytes from prometheus.uninon-bridge (172.9.240.1): icmp_seq=2 ttl=64 time=0.194 ms
64 bytes from prometheus.uninon-bridge (172.9.240.1): icmp_seq=3 ttl=64 time=0.201 ms
^C
--- prometheus-host ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2044ms
rtt min/avg/max/mdev = 0.194/0.639/1.524/0.625 ms
root@9307f51686c3:/#
```

Создание сети Overlay, вывод информации.

```
MacBook-Air-Daniil-2:prometheus-grafana llymuk$ docker swarm init
Swarm initialized: current node (55nuw2lxzshuqdz7vsfliz6vy) is now a manager.

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

    docker swarm join --token SWMTKN-1-3tpuu9t6d8tqa7zyin089xz4yj7dza6wfxs4xim9sacu7hjsxbd-0wu57gksztlk9cl4zyuqkrktk 192.168.65.3:2377

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

MacBook-Air-Daniil-2:prometheus-grafana llymuk$ docker network create --driver overlay my-overlay1
i48mwangoskymvun45lgzxwli
MacBook-Air-Daniil-2:prometheus-grafana llymuk$ docker network inspect my-overlay1
[
  {
    "Name": "my-overlay1",
    "Id": "i48mwangoskymvun45lgzxwli",
    "Created": "2024-03-05T23:30:45.606831794Z",
    "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
  }
]
```

Создание второй сети Overlay и вывод информации.

А также выход из созданного кластера.

```
MacBook-Air-Daniil-2:prometheus-grafana llymuk$ docker network create --driver overlay my-overlay2
vi06hpkw81kdx79d16k7ciddu
MacBook-Air-Daniil-2:prometheus-grafana llymuk$ docker network inspect my-overlay2
[
  {
    "Name": "my-overlay2",
    "Id": "vi06hpkw81kdx79d16k7ciddu",
    "Created": "2024-03-05T23:32:28.012058508Z",
    "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
  }
]
MacBook-Air-Daniil-2:prometheus-grafana llymuk$

MacBook-Air-Daniil-2:prometheus-grafana llymuk$ docker swarm leave --force
Node left the swarm.
MacBook-Air-Daniil-2:prometheus-grafana llymuk$
```


Попытка создания сети типа Host.

```
⊗ MacBook-Air-Daniil-2:prometheus-grafana llymuk$ docker network create --driver host my-host
Error response from daemon: only one instance of "host" network is allowed
● MacBook-Air-Daniil-2:prometheus-grafana llymuk$ docker network ls
NETWORK ID          NAME                DRIVER              SCOPE
9dcff05aec03        bridge              bridge              local
08027198ac35        docker_gwbridge     bridge              local
7b6b02bdb26f        host                host                local
9fc12edb4592        none                null                local
bc8514d10404        postgres_default    bridge              local
e231f4d2bd45        safe_bsuir_bot_default bridge              local
c21c22327e42        uninon-bridge       bridge              local
○ MacBook-Air-Daniil-2:prometheus-grafana llymuk$
```