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Лабораторная работа 1 по Облачным и туманным вычислениям

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Выполнение

Приложение

Напишем простое flask приложение

```
from flask import Flask
import redis
import os

app = Flask(__name__)

redis_host = os.getenv("REDIS_HOST", "localhost")
r = redis.Redis(host=redis_host, port=6379,
decode_responses=True)
@app.route("/")
def hello():
    count = r.incr("hits")
    return f"<h1>Количество посещений: {count}</h1>"

if __name__ == "__main__":
    app.run(host="0.0.0.0", port=8080)
```

Dockerfile и docker-compose.yml

```
FROM python:3.10.19-slim-trixie

WORKDIR /app

COPY requirements.txt .
RUN pip install --no-cache-dir -r requirements.txt

COPY app.py .

EXPOSE 5000

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

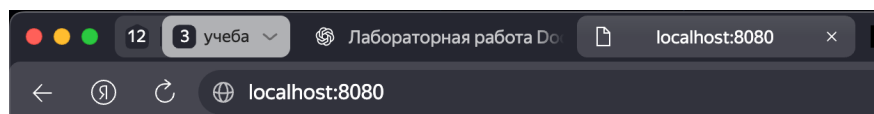
```
version: "3.9"

services:
  frontend:
    build: .
    ports:
      - "8080:8080"
    environment:
      - REDIS_HOST=redis
    depends_on:
      - redis

  redis:
    image: redis:7-
  alpiperts:
    - "6379:6379"
```

Запустим командой docker compose up

```
Terminal Local x + v
redis-1 | 1:M 17 Jan 2026 21:58:10.050 * Server initialized
redis-1 | 1:M 17 Jan 2026 21:58:10.050 * Loading RDB produced by version 7.4.7
redis-1 | 1:M 17 Jan 2026 21:58:10.050 * RDB age 12 seconds
redis-1 | 1:M 17 Jan 2026 21:58:10.050 * RDB memory usage when created 0.98 Mb
redis-1 | 1:M 17 Jan 2026 21:58:10.050 * Done loading RDB, keys loaded: 1, keys expired: 0.
redis-1 | 1:M 17 Jan 2026 21:58:10.050 * DB loaded from disk: 0.000 seconds
redis-1 | 1:M 17 Jan 2026 21:58:10.050 * Ready to accept connections tcp
frontend-1 | * Serving Flask app 'app'
frontend-1 | * Debug mode: off
frontend-1 | WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server inste
frontend-1 | * Running on all addresses (0.0.0.0)
frontend-1 | * Running on http://127.0.0.1:5000
frontend-1 | * Running on http://10.89.15.5:5000
frontend-1 | Press CTRL+C to quit
```



Количество посещений: 6

Инициализация swarm

```
permission denied while trying to connect to the Docker daemon socket at unix:///var/run/docker.sock: Post http://%2Fvar%2Frun%2Fdocker.sock/
azat222@compute-vm-2-2-40-ssd-1759532797367:~/clouds$ sudo docker swarm init
Swarm initialized: current node (iole3bzruga8a7hoehjtkiaj) is now a manager.

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

    docker swarm join --token SWMTKN-1-66htbqw186w17h10ddwxvj8oxsqlkimper09mk3p8ih8fk7v2i-8b8wk3uptin2u3f63uudwdsxj 10.128.0.12:2377

To add a manager to this swarm, run 'docker swarm join-token manager' and follow the instructions.
azat222@compute-vm-2-2-40-ssd-1759532797367:~/clouds$ docker node ls
permission denied while trying to connect to the Docker daemon socket at unix:///var/run/docker.sock: Get "http://%2Fvar%2Frun%2Fdocker.sock/v
azat222@compute-vm-2-2-40-ssd-1759532797367:~/clouds$ sudo docker node ls
ID                HOSTNAME          STATUS    AVAILABILITY  MANAGER STATUS  ENGINE VERSION
iole3bzruga8a7hoehjtkiaj *   compute-vm-2-2-40-ssd-1759532797367   Ready        Active          Leader           28.5.2
azat222@compute-vm-2-2-40-ssd-1759532797367:~/clouds$
```

Соберем образ

```
sudo docker build -t flask-counter:1.0 .
```

Добавим образ в compose файл

```
version: "3.9"

services:
  frontend:
    build: .
    image: flask-counter:1.0
    ports:
      - "8080:8080"
    environment:
      - REDIS_HOST=redis
    depends_on:
      - redis
  redis:
    image: redis:7-alpine
    ports:
      - "6379:6379"
```

Запустим контейнеры

```
sudo docker stack deploy -c docker-compose.yml lab1
```

```
azat222@compute-vm-2-2-40-ssd-1759532797367:~/clouds$ sudo docker service ls
ID                NAME                MODE                REPLICAS    IMAGE                PORTS
afd983e9eyhd     lab1_frontend       replicated          1/1         flask-counter:1.0    *:8080->8080/tcp
2vx2eyha0rgp     lab1_redis          replicated          1/1         redis:7-alpine       *:6379->6379/tcp
azat222@compute-vm-2-2-40-ssd-1759532797367:~/clouds$ sudo docker service ps lab1_frontend
ID                NAME                IMAGE                NODE                DESIRED STATE    CURRENT STATE    ERROR          PORTS
hhf73j0so245     lab1_frontend.1     flask-counter:1.0    compute-vm-2-2-40-ssd-1759532797367   Running           Running about a minute ago
azat222@compute-vm-2-2-40-ssd-1759532797367:~/clouds$
```

```
azat222@compute-vm-2-2-40-ssd-1759532797367:~/clouds$ curl 127.0.0.1:8080
<h1>Количество посещений: 1</h1>azat222@compute-vm-2-2-40-ssd-1759532797367:~/clouds$ curl 127.0.0.1:8080
<h1>Количество посещений: 2</h1>azat222@compute-vm-2-2-40-ssd-1759532797367:~/clouds$ curl 127.0.0.1:8080
```

Self-healing

```
azat222@compute-vm-2-2-40-ssd-1759532797367:~/clouds$ curl 127.0.0.1:8080
<h1>Конечное посещение: 4</h1>azat222@compute-vm-2-2-40-ssd-1759532797367:~/clouds$ sudo docker ps
CONTAINER ID   IMAGE          COMMAND                  CREATED        STATUS        PORTS          NAMES
fc282861d155   flask-counter:1.0  "python app.py"         6 minutes ago  Up 6 minutes  5000/tcp       lab1_frontend.1.5p6ooyx1ffvx7o1ghxlr3d7wr
c4440c7       redis:7-alpine    "docker-entrypoint.s..." 6 minutes ago  Up 6 minutes  6379/tcp       lab1_redis.1.qwpjevkvf7zqo7seq2a6ecf8kf

azat222@compute-vm-2-2-40-ssd-1759532797367:~/clouds$ sudo docker kill fc282861d155
fc282861d155
azat222@compute-vm-2-2-40-ssd-1759532797367:~/clouds$ sudo docker ps
CONTAINER ID   IMAGE          COMMAND                  CREATED        STATUS        PORTS          NAMES
327dcaf37fe9   flask-counter:1.0  "python app.py"         4 seconds ago  Up Less than a second  5000/tcp       lab1_frontend.1.2womvjygnhuejxgw4uicvgju
cf00bd44d0c7   redis:7-alpine    "docker-entrypoint.s..." 7 minutes ago  Up 7 minutes    6379/tcp       lab1_redis.1.~dpjevkvf7zqo7seq2a6ecf8kf

azat222@compute-vm-2-2-40-ssd-1759532797367:~/clouds$
```

Масштабирование

```
azat222@compute-vm-2-2-40-ssd-1759532797367:~/clouds$ sudo docker service scale lab1_frontend=5
lab1_frontend scaled to 5
overall progress: 5 out of 5 tasks
1/5: running [=====>]
2/5: running [=====>]
3/5: running [=====>]
4/5: running [=====>]
5/5: running [=====>]
Verify: Service lab1_frontend converged
azat222@compute-vm-2-2-40-ssd-1759532797367:~/clouds$ sudo docker ps
CONTAINER ID   IMAGE          COMMAND                  CREATED        STATUS        PORTS          NAMES
0b9d76301b97   flask-counter:1.0  "python app.py"         17 seconds ago  Up 17 seconds  5000/tcp       lab1_frontend.5.vrim9ry27qepm2ly2ra2uug86
c5281a9d4755   flask-counter:1.0  "python app.py"         17 seconds ago  Up 17 seconds  5000/tcp       lab1_frontend.4.4ajlqo4uzby7oy8c6b18tm7sa
522ae9d07cf4   flask-counter:1.0  "python app.py"         17 seconds ago  Up 17 seconds  5000/tcp       lab1_frontend.2.1120aeqe1w3egguz0dvarglsh
c1feb6e1f14d   flask-counter:1.0  "python app.py"         17 seconds ago  Up 17 seconds  5000/tcp       lab1_frontend.3.zkaqu73j7km756097con3dsgd
327dcaf37fe9   flask-counter:1.0  "python app.py"         2 minutes ago  Up 2 minutes   5000/tcp       lab1_frontend.1.2womvjygnhuejxgw4uicvgju
cf00bd44d0c7   redis:7-alpine    "docker-entrypoint.s..." 9 minutes ago  Up 9 minutes    6379/tcp       lab1_redis.1.qwpjevkvf7zqo7seq2a6ecf8kf
```

Вывод

В лабораторной работе я написал простое Flask приложение и познакомился с docker swarm