Tampereen yliopisto
Tampere University

Basics of Containers & Microservices

COMP.SE.140

Continuous Development and Deployment - DevOps

Humayra Noureen

Repository Link

https://github.com/humayra24/COMP.SE.140-DevOps-Exercise1-/tree/exercise1

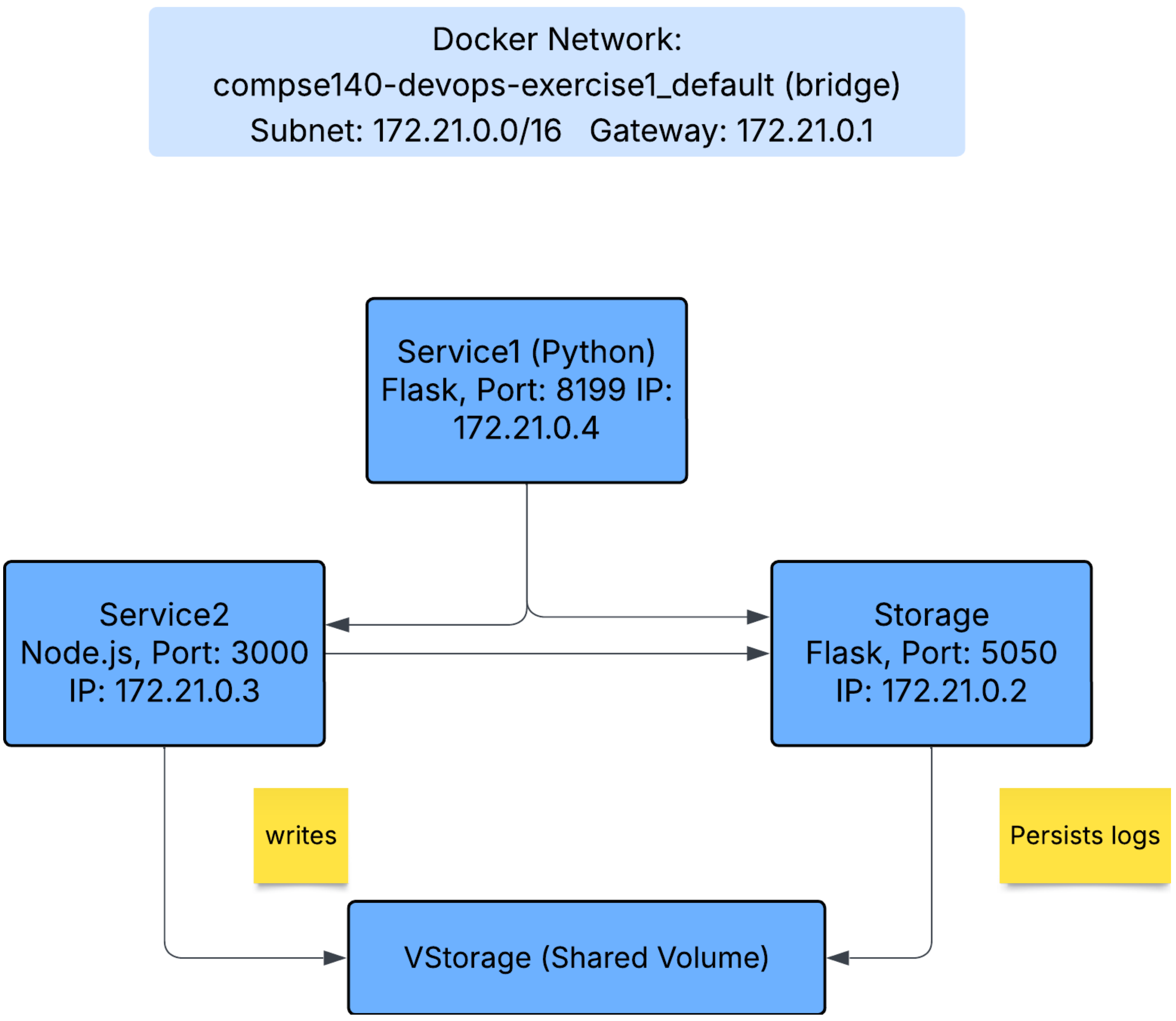
For directly cloning in the system

git clone -b exercise1 https://github.com/humayra24/COMP.SE.140-DevOps-Exercise1-.git

Information about the used platform

- **Hardware:** MacBook Air with Apple M2 chip, 16 GB unified memory, and 256 GB SSD storage.
- **Operating System:** macOS Sequoia version 15.6.1
- **Docker Version:** 28.4.0, build d8eb465
- **Docker Compose Version:** v2.39.4-desktop.1

Diagram


Docker Network:
compse140-devops-exercise1_default (bridge)
Subnet: 172.21.0.0/16 Gateway: 172.21.0.1
Service1 (Python) Flask, Port: 8199 IP: 172.21.0.4
Service2 Node.js, Port: 3000 IP: 172.21.0.3
Storage Flask, Port: 5050 IP: 172.21.0.2
writes
Persists logs
VStorage (Shared Volume)

Analysis of the content of the status records

Timestamp1 2025-09-29T17:49:00Z: uptime 5.4 hours, free disk in root: 940242 MBytes

Timestamp2 2025-09-29T17:49:01Z: uptime 5.4 hours, free disk in root: 992687 MBytes

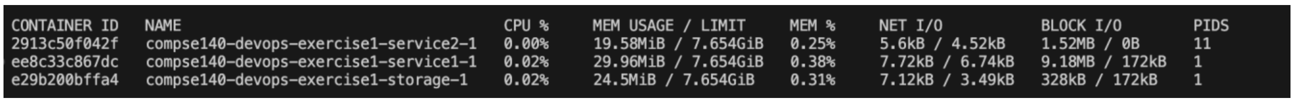
Uptime (how long running): Here, uptime means checking how long the host has been running.

Disk space (free storage): Here, disk space means checking free space on the root file system.

Relevance:

Container uptime indicates how long a specific service (e.g., Service1 or Service2) has been operational since it was started. This is essential for assessing the health, reliability, and availability of individual microservices.

Improvement:



```
CONTAINER ID   NAME                               CPU %     MEM USAGE / LIMIT     MEM %     NET I/O           BLOCK I/O         PIDS
2913c50f042f   compse140-devops-exercise1-service2-1   0.00%     19.58MiB / 7.654GiB   0.25%     5.6kB / 4.52kB    1.52MB / 0B       11
ee8c33c867dc   compse140-devops-exercise1-service1-1   0.02%     29.96MiB / 7.654GiB   0.38%     7.72kB / 6.74kB   9.18MB / 172kB    1
e29b200bffa4   compse140-devops-exercise1-storage-1    0.02%     24.5MiB / 7.654GiB    0.31%     7.12kB / 3.49kB   328kB / 172kB     1
```

By using docker stats, more accurate details about containers can be found.

Persistent Storage Solutions: Analysis and Comparison

- **Host-Mounted Volume (./vstorage)**:
  - **Good**: Simple to set up, allows direct host access for debugging.
  - **Bad**: Host-dependent, less portable, risks data corruption from external changes.
- **Named Volume (storage_vol)**:
  - **Good**: Portable, isolated, managed by Docker for consistency.
  - **Bad**: Complex to access, requires manual cleanup (e.g., docker volume rm).

Host-mounted suits local testing but lacks portability; named volume is better for cloud use but less accessible. Both meet the "two alternative ways" requirement and ensure identical logging for consistency.

Instructions for cleaning up the persistent storage

1. **Stop and Remove Containers**:
   Command: docker-compose down
   Purpose: Stops all services and removes the containers, preparing the environment for storage cleanup.
2. **Clean Host-Mounted Volume (./vstorage)**:
   Command: rm -rf ./vstorage
   Purpose: Deletes the host directory ./vstorage where Service1 and Service2 store logs.

3. **Clean Named Volume (devops-compse140-exercise-1_storageVolume)**:

   Overwrite storage_log.txt with an empty string to clear its content

   ```
   echo "" > storage/app/storage_log.txt
   ```

   Alternatively, delete and recreate it:

   ```
   rm storage/app/storage_log.txt
   touch storage/app/storage_log.txt
   ```

Difficulties

- At first logs were not appending correctly in persistent storage.
- As I did not have that much experience with Node.js, so I needed to understand syntax and how it works, that took a lot of time.

The main problems

- I was getting ConnectionRefusedError because I was trying to POST to Storage using localhost, fixed the error by changing to the service name upon realization.
- Service2 timestamp used 'ZZ' instead of 'Z' because I appended a extra Z in the timestamp.