

Docker-Compose Part 2

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Phần 1: Một số lệnh Docker Compose cơ bản

1. Kiểm tra phiên bản docker compose

docker compose version

```
D:\_GIT_KIENTRUC\TranMinhTien-Architectural-Software\WEEK7>docker compose version
Docker Compose version v2.33.1-desktop.1

D:\_GIT_KIENTRUC\TranMinhTien-Architectural-Software\WEEK7>
```

2. Chạy các container theo định nghĩa trong docker-compose.yml (foreground)

docker compose up

```
D:\_GIT_KIENTRUC\TranMinhTien-Architectural-Software\WEEK7>docker compose up
[+] Running 1/12
- db [0000000000] Pulling                               6.0s
- 548990e33276 Pulling fs layer                          0.6s
- 79f239a40e62 Pulling fs layer                          0.6s
- c11056354384 Pulling fs layer                          0.6s
- 769c3ac51f88 Pulling fs layer                          0.6s
- 49978e7ccddf Pulling fs layer                          0.6s
- cb8acbf2440c Pulling fs layer                          0.6s
- b2ead3e96e6b Pulling fs layer                          0.6s
- fae51f7de1fb Pulling fs layer                          0.6s
- daac2c594bdd Downloading [=====] ...                0.6s
- cea172a6e83b Pulling fs layer                          0.6s
- web Pulled                                             3.7s
```

```
C:\Windows\System32\cmd.exe - docker compose up
Microsoft Windows [Version 10.0.19045.5608]
(c) Microsoft Corporation. All rights reserved.

D:\_GIT_KIENTRUC\TranMinhTien-Architectural-Software\WEEK7>docker compose up
[+] Running 12/12
- db Pulled                                             104.2s
- 548990e33276 Pull complete                           98.6s
- 79f239a40e62 Pull complete                           73.7s
- c11056354384 Pull complete                           3.8s
- 769c3ac51f88 Pull complete                           70.8s
- 49978e7ccddf Pull complete                           94.3s
- cb8acbf2440c Pull complete                           16.1s
- b2ead3e96e6b Pull complete                           7.0s
- fae51f7de1fb Pull complete                           70.5s
- daac2c594bdd Pull complete                           3.8s
- cea172a6e83b Pull complete                           69.9s
- web Pulled                                           3.7s
[+] Running 3/3
- Network week7_default Created                        0.2s
- Container week7-web-1 Created                        9.2s
- Container week7-db-1 Created                         9.2s
Attaching to db-1, web-1
db-1 | 2025-04-10 05:51:42+00:00 [Note] [Entrypoint]: Entrypoint script for MySQL Server 9.2.0-1.el9 started.
web-1 | /docker-entrypoint.sh: /docker-entrypoint.d/ is not empty, will attempt to perform configuration
web-1 | /docker-entrypoint.sh: Looking for shell scripts in /docker-entrypoint.d/
web-1 | /docker-entrypoint.sh: Launching /docker-entrypoint.d/10-listen-on-ipv6-by-default.sh
web-1 | 10-listen-on-ipv6-by-default.sh: info: Getting the checksum of /etc/nginx/conf.d/default.conf
web-1 | 10-listen-on-ipv6-by-default.sh: info: Enabled listen on IPv6 in /etc/nginx/conf.d/default.conf
web-1 | /docker-entrypoint.sh: Sourcing /docker-entrypoint.d/15-local-resolvers.envsh
```

3. Chạy các container ở chế độ nền (backgrou)

docker compose up -d

```
D:\0_GIT_KIENTRUC\TranMinhTien-Architectural-Software\WEEK7>docker compose up -d
[+] Running 2/2
  Container week7-web-1 Started 0.7s
  Container week7-db-1 Started 0.8s
D:\0_GIT_KIENTRUC\TranMinhTien-Architectural-Software\WEEK7>
```

4. Liệt kê các container đang chạy bằng Docker Compose

docker compose ps

```
D:\0_GIT_KIENTRUC\TranMinhTien-Architectural-Software\WEEK7>docker compose ps
NAME                IMAGE             COMMAND             SERVICE    CREATED         STATUS          PORTS
week7-db-1          mysql             "docker-entrypoint.s..." db          2 minutes ago   Up 15 seconds   0.0.0.0:3306->3306/tcp,
33060/tcp
week7-web-1         nginx             "/docker-entrypoint..." web         About a minute ago   Up 15 seconds   0.0.0.0:8080->80/tcp
D:\0_GIT_KIENTRUC\TranMinhTien-Architectural-Software\WEEK7>
```

5. Dừng và xóa container, network, volume... được tạo ra

docker compose down

```
D:\0_GIT_KIENTRUC\TranMinhTien-Architectural-Software\WEEK7>docker compose down
[+] Running 2/3
  Container week7-db-1 Removed 2.0s
  Container week7-web-1 Removed 1.1s
  Network week7_default Removing 0.9s
D:\0_GIT_KIENTRUC\TranMinhTien-Architectural-Software\WEEK7>docker compose ps
NAME                IMAGE             COMMAND             SERVICE    CREATED         STATUS          PORTS
D:\0_GIT_KIENTRUC\TranMinhTien-Architectural-Software\WEEK7>
```

6. Khởi động lại các service đang chạy

docker compose restart

```
>[+] Restarting 2/2TranMinhTien-Architectural-Software\WEEK7>docker compose restart
> Container week7-db-1 Started 0.5s
> Container week7-web-1 Started 0.4s
>
```

7. Xem log các container (realtime, tương đương tail -f)

docker compose logs -f

```
D:\0_GIT_KIENTRUC\TranMinhTien-Architectural-Software\WEEK7>docker compose logs -f
web-1 | /docker-entrypoint.sh: /docker-entrypoint.d/ is not empty, will attempt to perform configuration
db-1  | 2025-04-10 05:56:44+00:00 [Note] [Entrypoint]: Entrypoint script for MySQL Server 9.2.0-1.el9 started.
web-1 | /docker-entrypoint.sh: Looking for shell scripts in /docker-entrypoint.d/
web-1 | /docker-entrypoint.sh: Launching /docker-entrypoint.d/10-listen-on-ipv6-by-default.sh
web-1 | 10-listen-on-ipv6-by-default.sh: info: Getting the checksum of /etc/nginx/conf.d/default.conf
web-1 | 10-listen-on-ipv6-by-default.sh: info: Enabled listen on IPv6 in /etc/nginx/conf.d/default.conf
web-1 | /docker-entrypoint.sh: Sourcing /docker-entrypoint.d/15-local-resolvers.envsh
db-1  | 2025-04-10 05:56:45+00:00 [Note] [Entrypoint]: Switching to dedicated user 'mysql'
db-1  | 2025-04-10 05:56:45+00:00 [Note] [Entrypoint]: Entrypoint script for MySQL Server 9.2.0-1.el9 started.
web-1 | /docker-entrypoint.sh: Launching /docker-entrypoint.d/20-envsubst-on-templates.sh
web-1 | /docker-entrypoint.sh: Launching /docker-entrypoint.d/30-tune-worker-processes.sh
web-1 | /docker-entrypoint.sh: Configuration complete; ready for start up
web-1 | 2025/04/10 05:56:44 [notice] 1#1: using the "epoll" event method
web-1 | 2025/04/10 05:56:44 [notice] 1#1: nginx/1.27.4
web-1 | 2025/04/10 05:56:44 [notice] 1#1: built by gcc 12.2.0 (Debian 12.2.0-14)
web-1 | 2025/04/10 05:56:44 [notice] 1#1: OS: Linux 5.15.167.4-microsoft-standard-WSL2
web-1 | 2025/04/10 05:56:44 [notice] 1#1: getrlimit(RLIMIT_NOFILE): 1048576:1048576
web-1 | 2025/04/10 05:56:44 [notice] 1#1: start worker processes
web-1 | 2025/04/10 05:56:44 [notice] 1#1: start worker process 29
web-1 | 2025/04/10 05:56:44 [notice] 1#1: start worker process 30
web-1 | 2025/04/10 05:56:44 [notice] 1#1: start worker process 31
web-1 | 2025/04/10 05:56:44 [notice] 1#1: start worker process 32
```

8. Build lại các image

docker compose build

9. Thực thi lệnh trong container đang chạy (ví dụ mở bash trong service "web")

docker compose exec web bash

```
D:\0_GIT_KIENTRUC\TranMinhTien-Architectural-Software\WEEK7>docker compose exce web ls
Usage:  docker compose [OPTIONS] COMMAND

Define and run multi-container applications with Docker

Options:
  --all-resources          Include all resources, even those not
                           used by services
  --ansi string            Control when to print ANSI control
                           characters ("never"|"always"|"auto")
                           (default "auto")
  --compatibility          Run compose in backward compatibility mode
  --dry-run               Execute command in dry run mode
  --env-file stringArray  Specify an alternate environment file
  -f, --file stringArray  Compose configuration files
  --parallel int           Control max parallelism, -1 for
                           unlimited (default -1)
  --profile stringArray    Specify a profile to enable
  --progress string       Set type of progress output (auto,
                           tty, plain, json, quiet) (default "auto")
  --project-directory string
                           Specify an alternate working directory
                           (default: the path of the, first
                           specified, Compose file)
  -p, --project-name string
                           Project name

Commands:
  attach      Attach local standard input, output, and error streams to a service's running container
  build       Build or rebuild services
  commit      Create a new image from a service container's changes
  config      Parse, resolve and render compose file in canonical format
  cp          Copy files/folders between a service container and the local filesystem
  create      Creates containers for a service
  down        Stop and remove containers, networks
  events      Receive real time events from containers
  exec        Execute a command in a running container
  export      Export a service container's filesystem as a tar archive
  images      List images used by the created containers
  kill        Force stop service containers
  logs        View output from containers
  ls          List running compose projects
  pause       Pause services
  port        Print the public port for a port binding
```

- Một số command thông dụng:

- bash hoặc sh: Mở một terminal shell trong container
- ls: Liệt kê các file và thư mục trong thư mục hiện tại của container
- pwd: Hiện thị đường dẫn thư mục hiện tại trong container
- cat <filename>: Đọc và hiện thị nội dung của một file trong container
- top: Hiện thị danh sách các tiến trình đang chạy trong container
- ps: Hiện thị danh sách các tiến trình trong container
- df -h: Hiện thị thông tin về dung lượng đĩa trong container
- curl: Gửi yêu cầu HTTP từ trong container

10. Dừng và xóa container, đồng thời xóa volume

docker compose down -v

```
D:\0_GIT_KIENTRUC\TranMinhTien-Architectural-Software\WEEK7>z
[+] Running 3/3 build or rebuild services
  Container week7-web-1  Removed      0.9s
  Container week7-db-1   Removed      2.4s
  Network week7_default  Removed      0.8s
  Container week7-db-1   Stopping     1.1s
D:\0_GIT_KIENTRUC\TranMinhTien-Architectural-Software\WEEK7>
```

11. Chạy một lệnh trong service mà không cần container đang chạy sẵn

```
D:\0_GIT_KIENTRUC\TranMinhTien-Architectural-Software\WEEK7>docker compose run web ls
[+] Creating 1/1
  Network week7_default  Created
bin  docker-entrypoint.d  home  media  proc  sbin  tmp
boot docker-entrypoint.sh  lib   mnt    root  srv   usr
dev  etc                   lib64 opt    run   sys   var
D:\0_GIT_KIENTRUC\TranMinhTien-Architectural-Software\WEEK7>
```

12. Dừng một service cụ thể

```
E:\Worksapce\Project\Kientruc\Lab\week7>docker compose ps
NAME                IMAGE      COMMAND                  SERVICE    CREATED      STATUS      PORTS
week7-db-1          mysql      "docker-entrypoint.s..." db         51 seconds ago Up 19 seconds 0.0.0.0:3306->3306/tcp, 3306
0/tcp
week7-web-1         nginx     "/docker-entrypoint...." web        51 seconds ago Up 19 seconds 0.0.0.0:8080->80/tcp

E:\Worksapce\Project\Kientruc\Lab\week7>docker compose stop web
[+] Stopping 1/1
✔Container week7-web-1 Stopped                                0.7s

E:\Worksapce\Project\Kientruc\Lab\week7>
```

13. Xóa container đã dừng của một service

```
E:\Worksapce\Project\Kientruc\Lab\week7>docker compose stop web
[+] Stopping 1/1
✔Container week7-web-1 Stopped

? Going to remove week7-web-1 Yes
[+] Removing 1/1e week7-web-1 (y/N) y
✔Container week7-web-1 Removed

E:\Worksapce\Project\Kientruc\Lab\week7>
```

14. Hiển thị file docker-compose.yml sau khi hợp nhất và xử lý biến docker compose config

```
D:\0_GIT_KIENTRUC\TranMinhTien-Architectural-Software\WEEK7>docker compose config
name: week7
services:
  db:
    environment:
      MYSQL_DATABASE: db_test
      MYSQL_ROOT_PASSWORD: root
    image: mysql
    networks:
      default: null
    ports:
      - mode: ingress
        target: 3306
        published: "3306"
        protocol: tcp
  web:
    image: nginx
    networks:
      default: null
    ports:
      - mode: ingress
        target: 80
        published: "8080"
        protocol: tcp
networks:
  default:
    name: week7_default

D:\0_GIT_KIENTRUC\TranMinhTien-Architectural-Software\WEEK7>
```

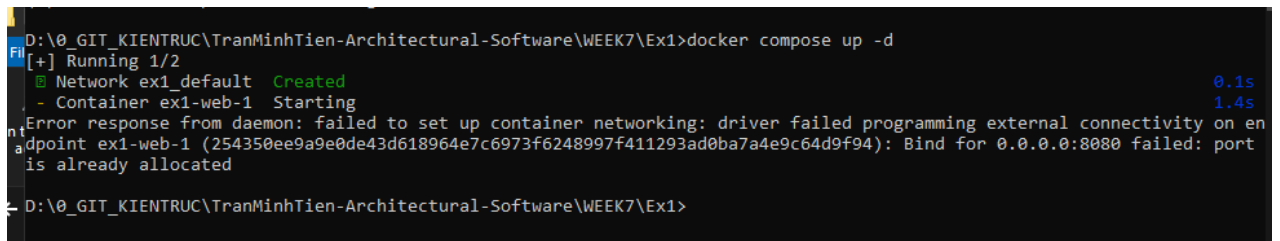
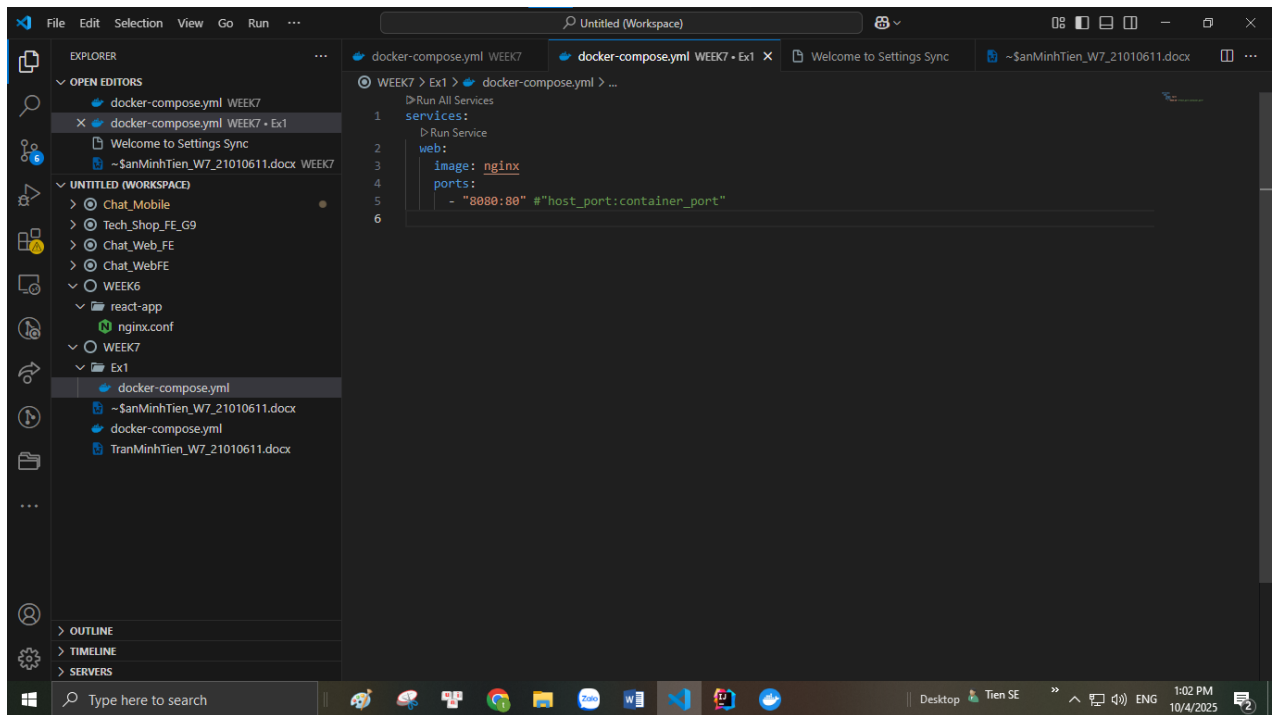
15. Build lại image và chạy các container ở chế độ nền docker compose up -d --build

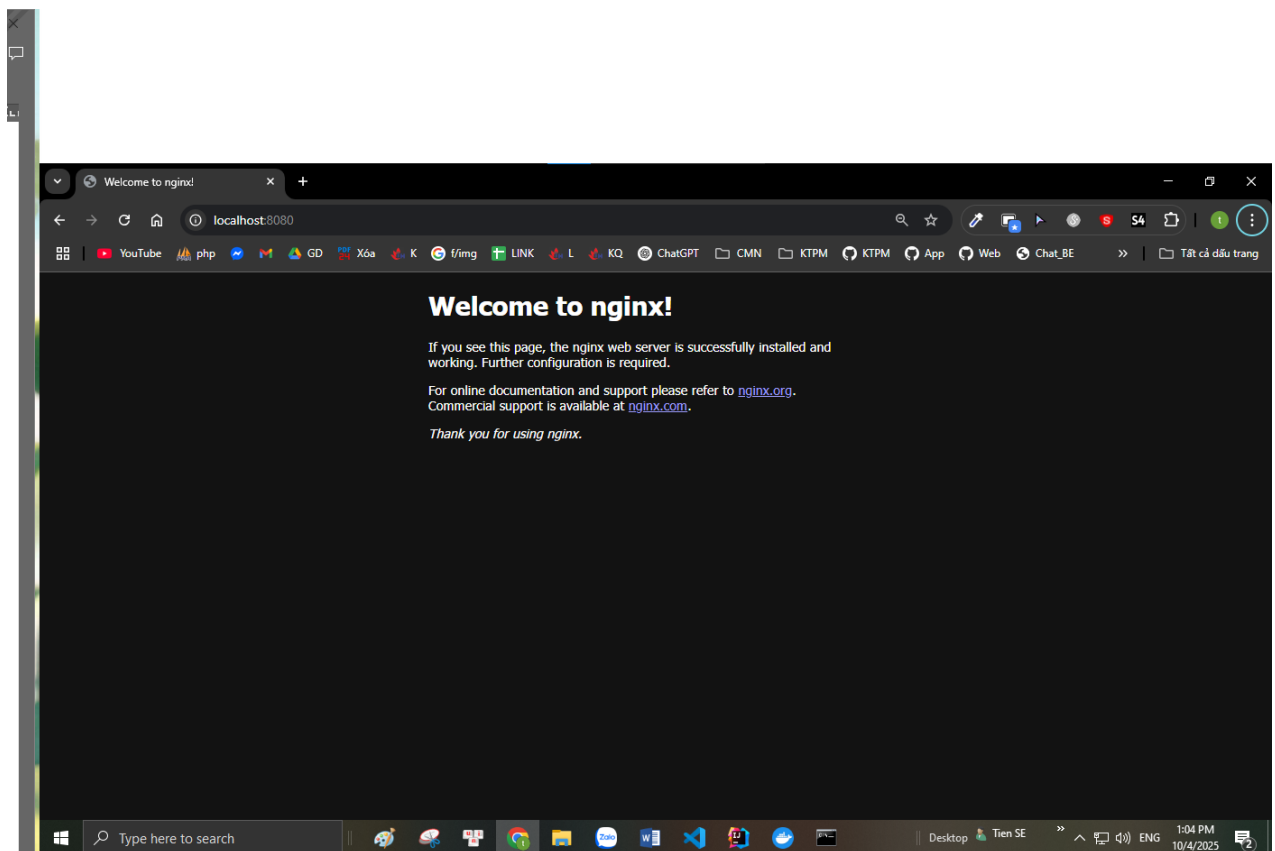
```
D:\0_GIT_KIENTRUC\TranMinhTien-Architectural-Software\WEEK7>docker compose up -d --build
time="2025-04-10T13:02:18+07:00" level=warning msg="Found orphan containers ([week7-web-run-cbe1986cdfdd]) for this project. If you removed or renamed this service in your compose file, you can run this command with the --remove-orphans flag to clean it up."
[+] Running 2/2
✔ Container week7-db-1 Running                                0.0s
✔ Container week7-web-1 Running                                0.0s

D:\0_GIT_KIENTRUC\TranMinhTien-Architectural-Software\WEEK7>
```

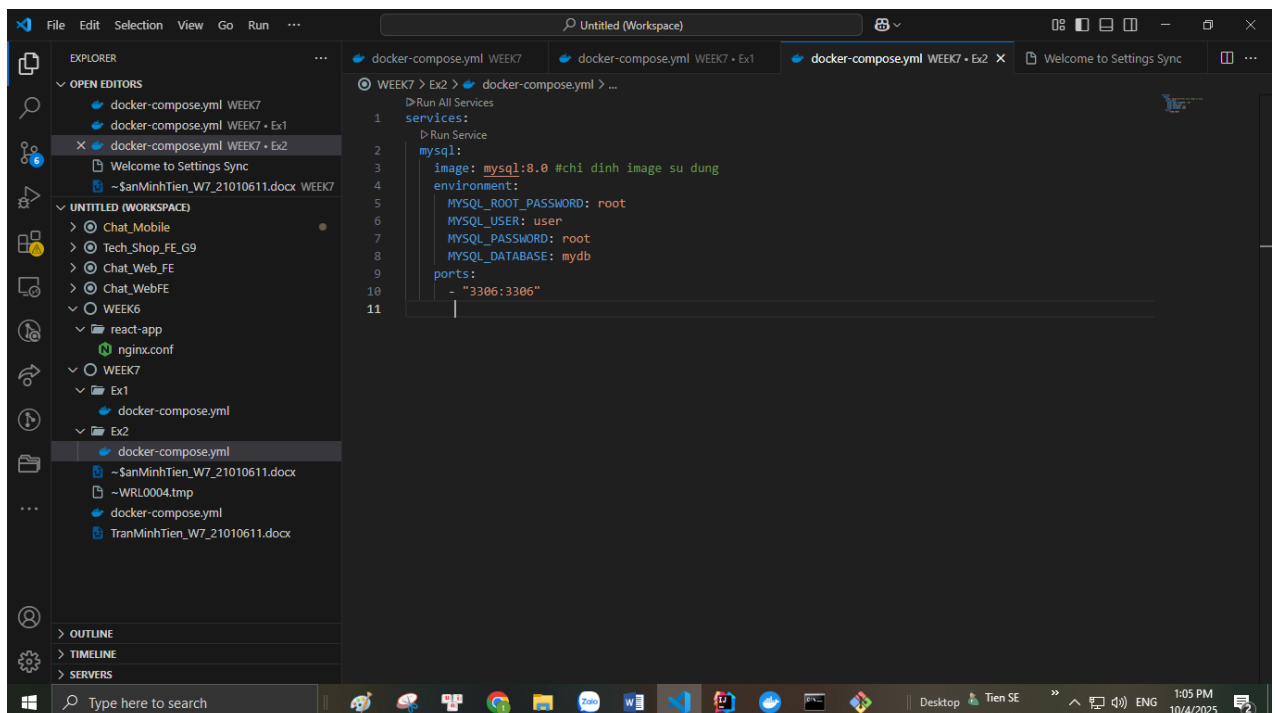
Phần 2: Docker Compose file

Bài 1: Chạy một container đơn giản với Docker Compose





Bài 2: Chạy MySQL với Docker Compose



VS Code interface showing a workspace with multiple Docker Compose files and a terminal window running the command `docker compose up -d`.

The Explorer sidebar shows the workspace structure, including files like `docker-compose.yml` and `TranMinhTien_W7_21010611.docx`.

The Terminal window displays the output of the `docker compose up -d` command, showing the progress of pulling and creating containers. The output includes the following details:

```
PS D:\0_GIT_KIENTRUC\TranMinhTien-Architectural-Software\WEEK7\Ex3> cd ..
PS D:\0_GIT_KIENTRUC\TranMinhTien-Architectural-Software\WEEK7\Ex2> cd ..
PS D:\0_GIT_KIENTRUC\TranMinhTien-Architectural-Software\WEEK7\Ex2> cd ..
PS D:\0_GIT_KIENTRUC\TranMinhTien-Architectural-Software\WEEK7> cd ex3
PS D:\0_GIT_KIENTRUC\TranMinhTien-Architectural-Software\WEEK7\ex3> cd Ex3
cd : Cannot find path 'D:\0_GIT_KIENTRUC\TranMinhTien-Architectural-Software\WEEK7\ex3\Ex3' because it does not exist.
At line:1 char:1
+ cd Ex3
+ ~~~~~
+ CategoryInfo          : ObjectNotFound: (D:\0_GIT_KIENTRUC\TranMinhTien-Architectural-Software\WEEK7\ex3:String) [Set-Location], ItemNotFoundException
+ FullyQualifiedErrorId : PathNotFound,Microsoft.PowerShell.Commands.SetLocationCommand

PS D:\0_GIT_KIENTRUC\TranMinhTien-Architectural-Software\WEEK7\ex3> cd ..
PS D:\0_GIT_KIENTRUC\TranMinhTien-Architectural-Software\WEEK7> cd Ex3
PS D:\0_GIT_KIENTRUC\TranMinhTien-Architectural-Software\WEEK7\Ex3> docker compose up -d
[+] Running 0/21
- phpadmin [ 0% ] Pulling
  - 0814cbbf72a2 Pulling fs layer
  - 3a28acedad8f8 Downloading [=====] 426B/426B
  - a5c74661bb9e Downloading [=====] 2.097MB/6.172MB
  - 1cf5cbfd971f Pulling fs layer
  - af302e5c37e9 Pulling fs layer
  - 2ab7ef40feaf Pulling fs layer
  - 88324ccb20a1 Pulling fs layer
  - ad5f2fca9132 Downloading [=====] 491B/491B
  - 71a74ed03dab Pulling fs layer
  - b3207e60ff9a Pulling fs layer
  - 11d17388a3b8 Pulling fs layer
  - 7755344c0dda Pulling fs layer
  - 3ef8d0774deb Pulling fs layer
  - 4f4fb70ef54 Pulling fs layer
  - e92d8472eb26 Pulling fs layer
  - 9df2a6231627 Pulling fs layer
  - 2ee0fe041682 Downloading [=====] 946B/946B
  - d18c9f420b35 Pulling fs layer
  - 673faad72ba8 Pulling fs layer
  - b0f9dd503cef Pulling fs layer

[+] Running 21/21
✓ phpadmin Pulled
✓ 0814cbbf72a2 Pull complete
✓ 3a28acedad8f8 Pull complete
✓ a5c74661bb9e Pull complete
✓ 1cf5cbfd971f Pull complete
✓ af302e5c37e9 Pull complete
✓ 2ab7ef40feaf Pull complete
✓ 88324ccb20a1 Pull complete
✓ ad5f2fca9132 Pull complete
✓ 71a74ed03dab Pull complete
✓ b3207e60ff9a Pull complete
✓ 11d17388a3b8 Pull complete
✓ 7755344c0dda Pull complete
✓ 3ef8d0774deb Pull complete
✓ 4f4fb70ef54 Pull complete
✓ e92d8472eb26 Pull complete
✓ 9df2a6231627 Pull complete
✓ 2ee0fe041682 Pull complete
✓ d18c9f420b35 Pull complete
✓ 673faad72ba8 Pull complete
✓ b0f9dd503cef Pull complete

[+] Running 1/2
✓ Network ex3_default Created
- Container ex3-mysql-1 Creating
```

The phpMyAdmin interface is visible at the bottom, showing the 'General settings' and 'Appearance settings' tabs. The 'General settings' tab is active, displaying the 'Server connection collation' set to 'utf8mb4_unicode_ci'.

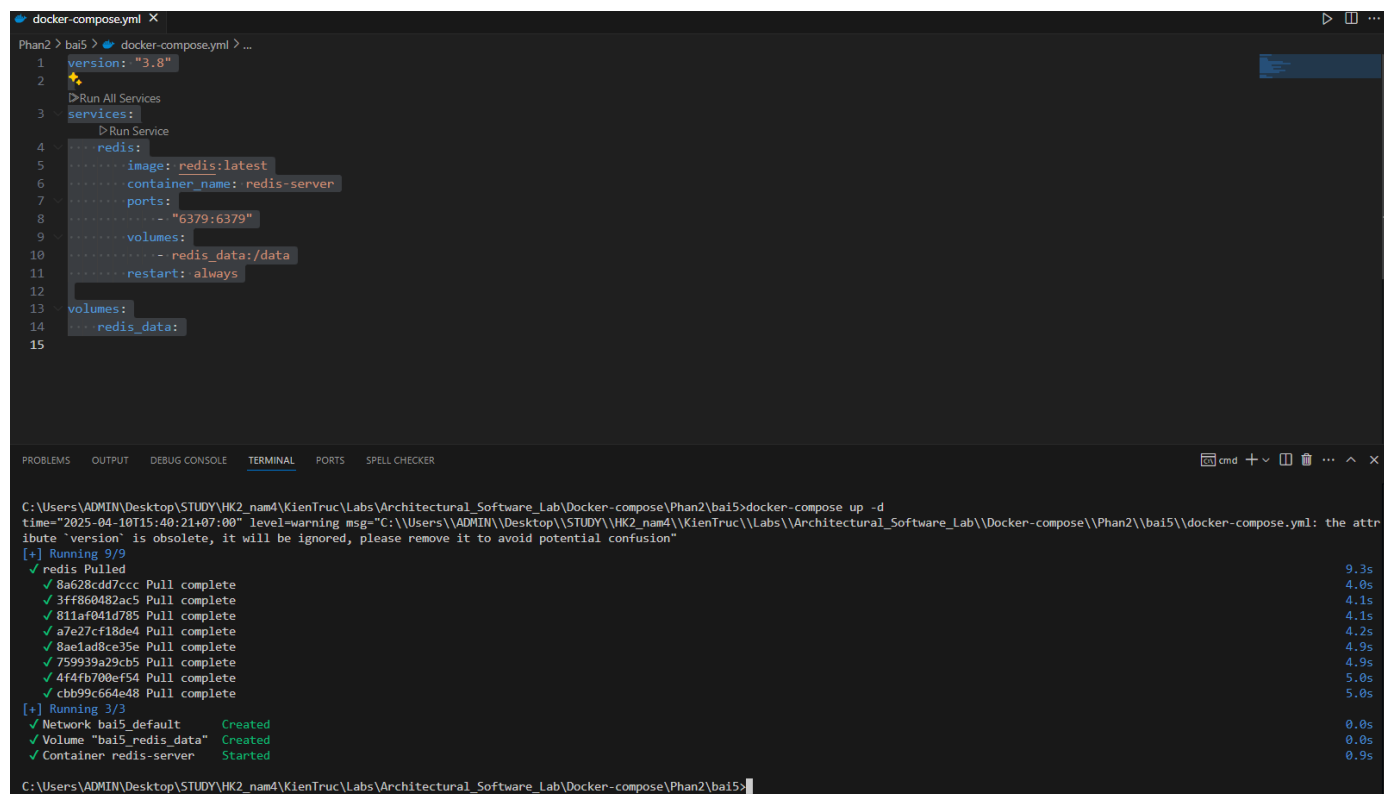
- Tạo file docker-compose.yml

```
version: "3.8"

services:
  redis:
    image: redis:lates
    container_name: redis-serve
    ports:
      - "6379:637"
    volumes:
      - redis_data:/dat
    restart: always

volumes:
  redis_dat :
```

- Chạy redis



The screenshot shows a Visual Studio Code editor with a file named `docker-compose.yml` open. The file content is as follows:

```
1 version: "3.8"
2
3 services:
4   redis:
5     image: redis:latest
6     container_name: redis-server
7     ports:
8       - "6379:6379"
9     volumes:
10      - redis_data:/data
11     restart: always
12
13 volumes:
14   redis_data:
```

The terminal at the bottom shows the command `docker-compose up -d` being executed. The output indicates that the Redis service was pulled successfully and the container was started. The terminal output is as follows:

```
C:\Users\ADMIN\Desktop\STUDY\HK2_nam4\KienTruc\Labs\Architectural_Software_Lab\Docker-compose\Phan2\bai5>docker-compose up -d
time="2025-04-10T15:40:21+07:00" level=warning msg="C:\Users\ADMIN\Desktop\STUDY\HK2_nam4\KienTruc\Labs\Architectural_Software_Lab\Docker-compose\Phan2\bai5\docker-compose.yml: the attribute `version` is obsolete, it will be ignored, please remove it to avoid potential confusion"
[+] Running 9/0
 ✓ redis Pulled 9.3s
   ✓ 8a628cdd7ccc Pull complete 4.0s
   ✓ 3ff860482ac5 Pull complete 4.1s
   ✓ 811af041d785 Pull complete 4.1s
   ✓ a7e27cf18de4 Pull complete 4.2s
   ✓ 8ae1ad8ce35e Pull complete 4.9s
   ✓ 759939a29cb5 Pull complete 4.9s
   ✓ 4f4fb700ef54 Pull complete 5.0s
   ✓ cbb99c664e48 Pull complete 5.0s
[+] Running 3/3
 ✓ Network bai5_default Created 0.0s
 ✓ Volume "bai5_redis_data" Created 0.0s
 ✓ Container redis-server Started 0.9s
```

- Kiểm tra

```

ibute `version` is obsolete, it will be ignored, please remove it to avoid potential confusion"
[+] Running 9/9
  ✓ redis Pulled
    ✓ 8a628cdd7ccc Pull complete
    ✓ 3ff860482ac5 Pull complete
    ✓ 811af041d785 Pull complete
    ✓ a7e27cf18de4 Pull complete
    ✓ 8ae1ad8ce35e Pull complete
    ✓ 759939a29cb5 Pull complete
    ✓ 4f4fb700ef54 Pull complete
    ✓ cbb99c664e48 Pull complete
[+] Running 3/3
  ✓ Network bai5_default      Created
  ✓ Volume "bai5_redis_data"  Created
  ✓ Container redis-server    Started

C:\Users\ADMIN\Desktop\STUDY\HK2_nam4\KienTruc\Labs\Architectural_Software_Lab\Docker-compose\Phan2\bai5>docker ps
CONTAINER ID   IMAGE          COMMAND                  CREATED        STATUS        PORTS                               NAMES
0efd268de412   redis:latest   "docker-entrypoint.s..." 36 seconds ago Up 35 seconds  0.0.0.0:6379->6379/tcp             redis-server

C:\Users\ADMIN\Desktop\STUDY\HK2_nam4\KienTruc\Labs\Architectural_Software_Lab\Docker-compose\Phan2\bai5>docker exec -it redis-server redis-cli
127.0.0.1:6379>

```

Bài 6: Chạy WordPress với MySQL

Yêu cầu:

Chạy WordPress với MySQL bằng Docker Compose.

Tạo docker-compose.yml

```

version: "3.8"

services:
  mysql:
    image: mysql:5.
    container_name : mysql-db
    restart: always
    environment :
      MYSQL_DATABASE : wordpress
      MYSQL_USER : wp_user
      MYSQL_PASSWORD : wp_pass
      MYSQL_ROOT_PASSWORD : rootpass
    volumes:
      - mysql_data:/var/lib/mysql
  wordpress :
    image: wordpress:latest
    container_name : wordpress-site
    depends_on :
      - mysql
    ports:
      - "8080:80"
    restart: always
    environment :
      WORDPRESS_DB_HOST : mysql:3306
      WORDPRESS_DB_NAME : wordpress
      WORDPRESS_DB_USER : wp_user
      WORDPRESS_DB_PASSWORD : wp_pass
    volumes:
      - wordpress_data:/var/www/html

volumes:
  mysql_data :
  wordpress_data :

```

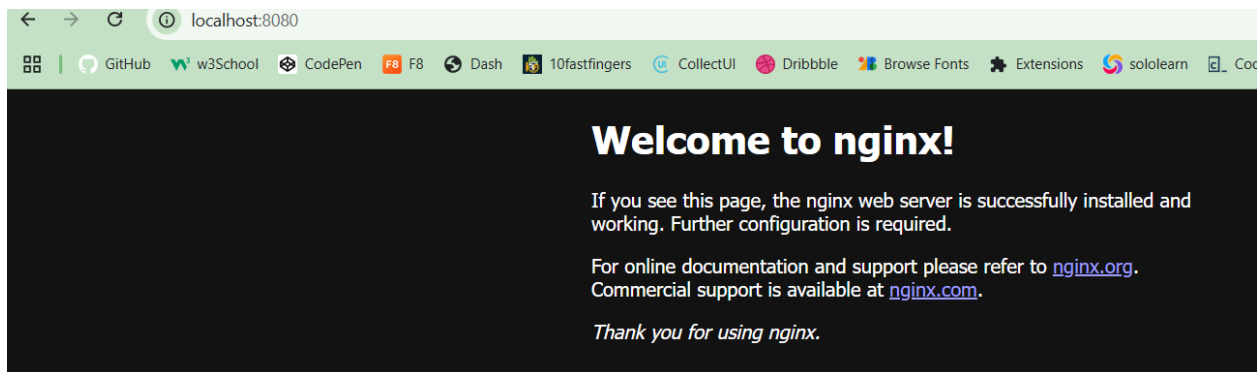
Chạy WordPress và MySQL

```
Run Terminal Help < -> Docker-compose
docker-compose.yml X
Phan2 > bai6 > docker-compose.yml > ...
19 ..... depends_on:
20 ..... - mysql
21 ..... ports:
22 ..... - "8080:80"
23 ..... restart: always
24 ..... environment:
25 ..... WORDPRESS_DB_HOST: mysql:3306
26 ..... WORDPRESS_DB_NAME: wordpress
27 ..... WORDPRESS_DB_USER: wp_user
28 ..... WORDPRESS_DB_PASSWORD: wp_pass
29 ..... volumes:
30 ..... - wordpress_data:/var/www/html
31
32 volumes:
33 - mysql_data:
34 - wordpress_data:
35

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS SPELL CHECKER
C:\Users\ADMIN\Desktop\STUDY\HK2_nam4\KienTruc\Labs\Architectural_Software_Lab\Docker-compose\Phan2\bai6>docker-compose up -d
time="2025-04-10T15:44:54+07:00" level=warning msg="C:\\Users\\ADMIN\\Desktop\\STUDY\\HK2_nam4\\KienTruc\\Labs\\Architectural_Software_Lab\\Docker-compose\\Phan2\\bai6\\docker-compose.yml: the attribute `version` is obsolete, it will be ignored, please remove it to avoid potential confusion"
[+] Running 35/35
  ✓ mysql Pulled 17.0s
  ✓ wordpress Pulled 25.6s

[+] Running 5/5
  ✓ Network bai6_default Created 0.8s
  ✓ Volume "bai6_mysql_data" Created 0.8s
```

Kiểm tra



Bài 7: Chạy MongoDB với Docker Compose

Yêu cầu:

Chạy MongoDB và Mongo Express để quản lý.

- Tạo docker-compose.yml

```

version: "3.8"

services:
  mongo:
    image: mongo:lates
    container_name: mongo-db
    restart: always
    ports:
      - "27017:27017"
    environment:
      MONGO_INITDB_ROOT_USERNAME: root
      MONGO_INITDB_ROOT_PASSWORD: example
    volumes:
      - mongo_data:/data/db
  mongo-express:
    image: mongo-express:lates
    container_name: mongo-express
    restart: always
    ports:
      - "8081:8081"
    environment:
      ME_CONFIG_MONGODB_ADMINUSERNAME: root
      ME_CONFIG_MONGODB_ADMINPASSWORD: example
      ME_CONFIG_MONGODB_SERVER: mongo
volumes:
  mongo_data:

```

- Chạy MongoDB và MongoExpress

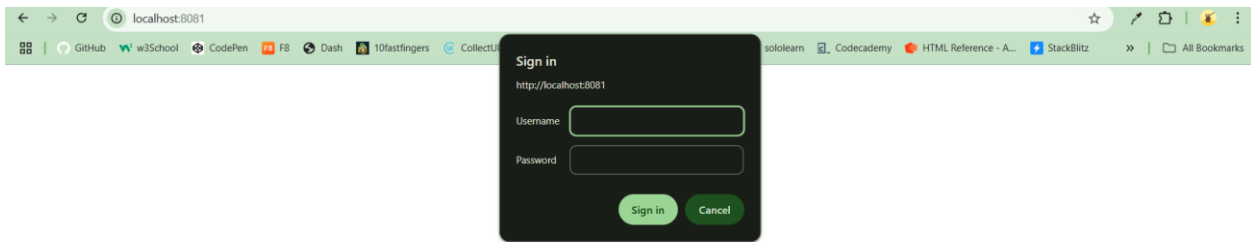
The image shows a VS Code editor with a Docker Compose file named `docker-compose.yml` open. The file is located at `Phan2\ba17\docker-compose.yml`. The file content is as follows:

```
12 version: '3.8'
13 services:
14   mongo_data:
15     image: mongo
16     volumes:
17       - mongo_data:/data/db
18   mongo-express:
19     image: mongo-express:latest
20     container_name: mongo-express
21     restart: always
22     ports:
23       - "8081:8081"
24     environment:
25       ME_CONFIG_MONGODB_ADMINUSERNAME: root
26       ME_CONFIG_MONGODB_ADMINPASSWORD: example
27       ME_CONFIG_MONGODB_SERVER: mongo
28 volumes:
29   mongo_data:
```

The terminal output shows the command `docker-compose up -d` being executed. The output indicates that the containers are being pulled and started successfully. The output is as follows:

```
C:\Users\ADMIN\Desktop\STUDY\Ph2_name\Kienruc\Architectural_Software_Lab\docker-compose\Phan2\ba17>docker-compose up -d
time="2025-04-10T15:49:29.07:00" level=warning msg="C:\Users\ADMIN\Desktop\STUDY\Ph2_name\Kienruc\Architectural_Software_Lab\docker-compose\Phan2\ba17\docker-compose.yml: the attribute 'version' is obsolete, it will be ignored, please remove it to avoid potential confusion"
[+] Running 18/18
✔ mongo Pulled
✔ 2726e217d1a3 Pull complete
✔ ad77a2b7606d Pull complete
✔ 1a88ed22962f Pull complete
✔ 90a6e5227b11 Pull complete
✔ 66eeef3d0b3 Pull complete
✔ 8fc21ef9255d Pull complete
✔ 29fee425ac1e Pull complete
✔ 7ed614a0672 Pull complete
✔ mongo-express Pulled
✔ 619be1103602 Pull complete
✔ 7ef5a007e524b Pull complete
✔ 518925e311d Pull complete
✔ 88f4f8a6c8d Pull complete
✔ d8385ae32c95 Pull complete
✔ 45b34ec126f9 Pull complete
✔ 9f7f995747f4 Pull complete
```

- Kiểm tra



Bài 8: Kết nối nhiều dịch vụ với Docker Compose

Yêu cầu:

Chạy Node.js kết nối với MySQL.

B1: Tạo project nodejs với docker-compose.yml

package.json

```
{
  "name": "bai8",
  "version": "1.0.0",
  "main": "index.js",
  "scripts": {
    "test": "echo \\\"Error: no test specified\\\" && exit 1",
    "start": "node index.js"
  },
  "keywords": [],
  "author": "",
  "license": "ISC",
  "description": "",
  "dependencies": {
    "express": "^5.1.0"
  }
}
```

index.js


```

const mysql = require("mysql2");

const connectio = mysql.createConnectio ({
  host: "mysql", // tên service trong docker-compose
  user: "root", e
  password: "rootpas",
  database: "testdb",
});

connectio .connect((err) => {
n  if (err) {
    console.error("❌ Kết nối thất bại", err);
    return;
  }
  console.log("✅ Kết nối MySQL thành công");
  connectio .query("SELECT NOW() AS now", (err, results) => {
n    if (err) throw err;
    console.log("🕒 Giờ hệ thống", results[0].now);
    connectio .end();
  }); n
});

```

Dockerfile

```

FROM node:18

WORKDIR /app

COPY package*.json ./
RUN npm install

COPY . .

CMD ["npm", "start"]

```

docker-compose.yml

```

version: '3.8'

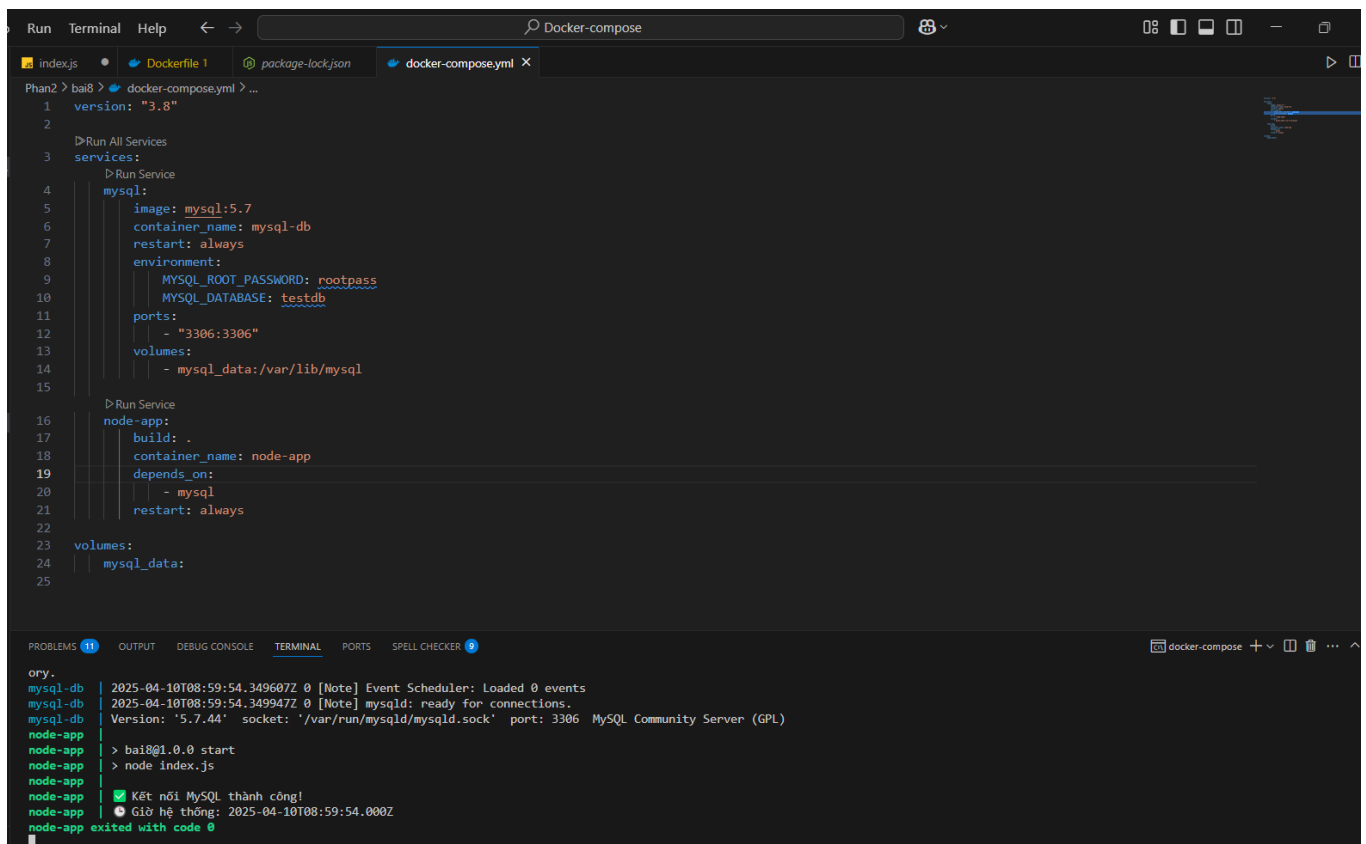
services:
  mysql:
    image: mysql:5.
    container_name : mysql-db
    restart: always
    environment :
      MYSQL_ROOT_PASSWORD : rootpass
      MYSQL_DATABASE : testdb
    ports:
      - "3306:3306"
    volumes:
      - mysql_data:/var/lib/mysql

  node-app:
    build: .
    container_name : node-app
    depends_on :
      - mysql
    restart: always

volumes:
  mysql_data :
    driver: local

```

- Chay



The screenshot shows a VS Code editor with a Docker Compose file named `docker-compose.yml` open. The file defines two services: `mysql` and `node-app`. The `mysql` service uses the `mysql:5.7` image, sets `container_name: mysql-db`, `restart: always`, and environment variables `MYSQL_ROOT_PASSWORD: rootpass` and `MYSQL_DATABASE: testdb`. It also maps port `3306` and uses a volume `mysql_data`. The `node-app` service is built from the current directory, depends on the `mysql` service, and also has `restart: always`. It shares the `mysql_data` volume.

The terminal at the bottom shows the output of running `docker-compose up`. It displays messages from MySQL and Node.js, indicating that the services are running successfully. The Node.js service prints a message: "Xin chào từ Flask trong Docker Compos e!".

Bài 9: Chạy ứng dụng Python Flask với Docker Compose

Yêu cầu:

Chạy ứng dụng Flask đơn giản với Docker Compose.

- Tạo ứng dụng Flask cơ bản

app.py

```
from flask import Flask
app = Flask(__name__)

@app.route('/')
def hello():
    return "✅ Xin chào từ Flask trong Docker Compos
e!"

if __name__ == '__main__':
    app.run(host='0.0.0.', port=5000)
    0'
```

Dockerfile

```

FROM python:3.10

WORKDIR /app

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

COPY . .

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

```

docker-compose.yml

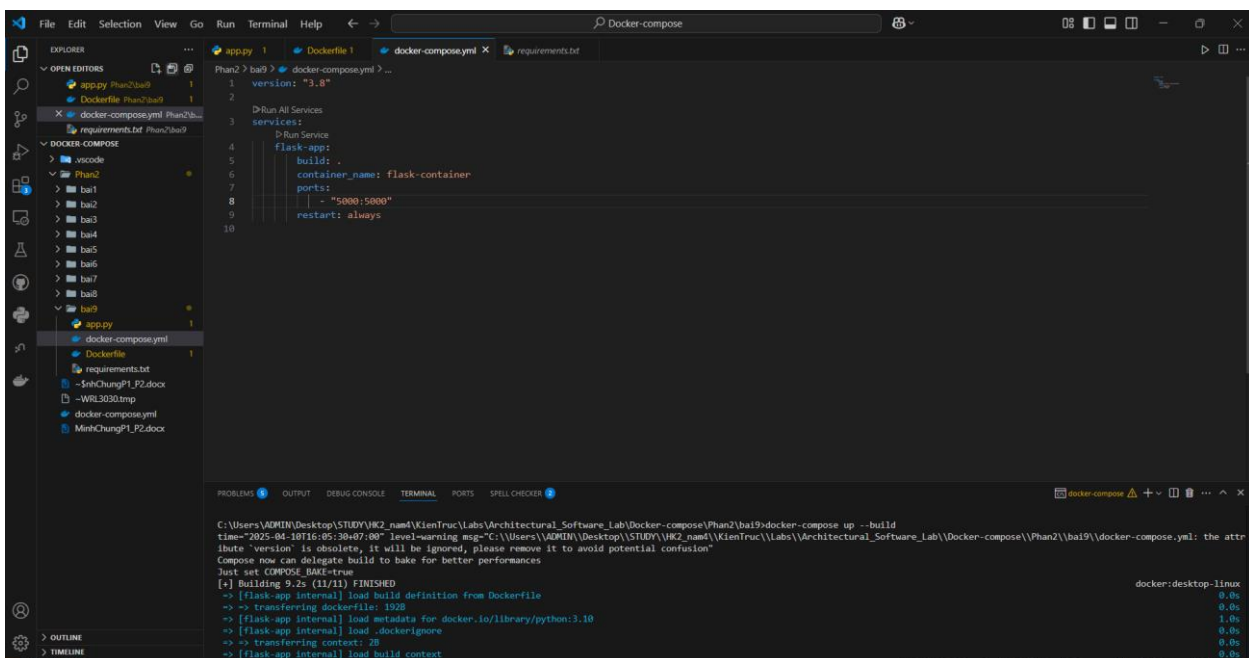
```

version: "3.8"

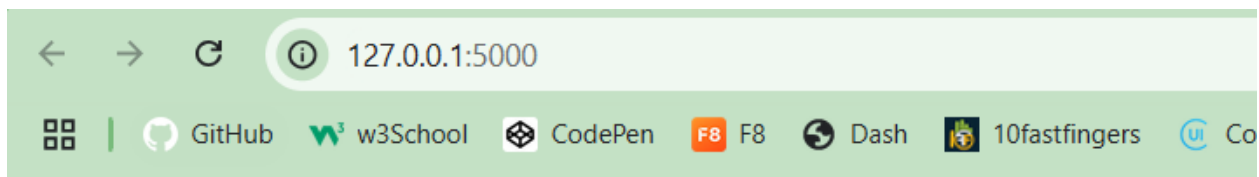
services:
  flask-app :
    build: .
    container_name: flask-container
    ports:
      - "5000:5000"
    restart: always

```

- Build và chạy ứng dụng



- Kiểm tra



✓ Xin chào từ Flask trong Docker Compose!

Bài 10: Lưu trữ dữ liệu với Docker Volumes

Yêu cầu:

Chạy MySQL và gắn volume để dữ liệu không bị mất.

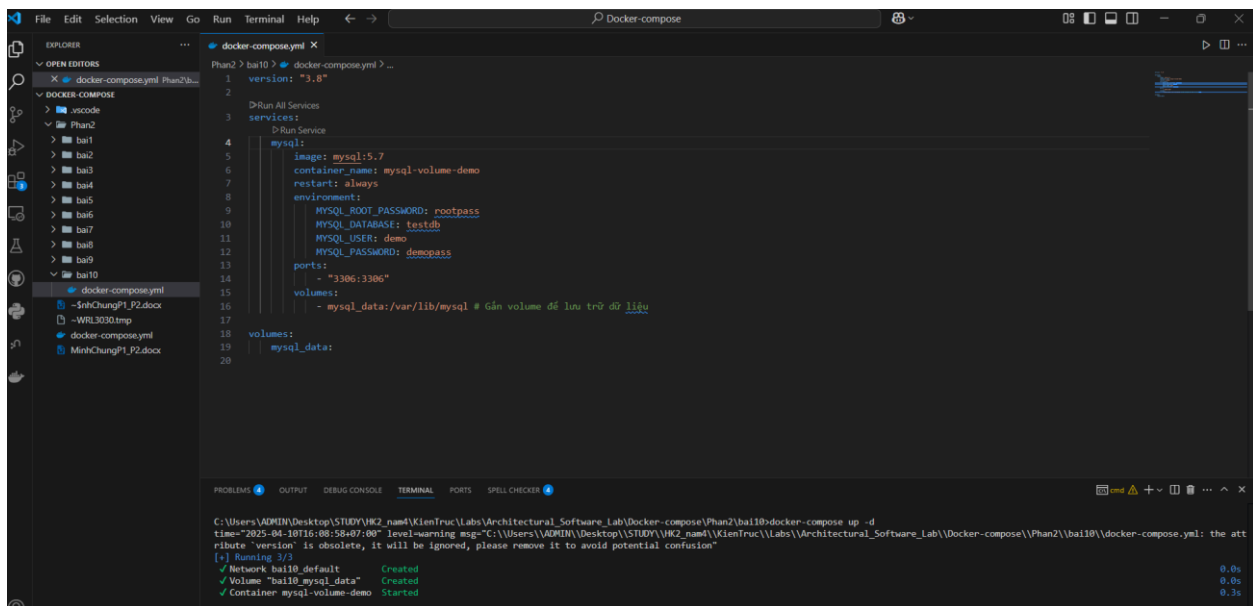
- Tạo docker-compose.yml

```
version: "3.8"

services:
  mysql:
    image: mysql:5.
    container_name: mysql-volume-dem
    restart: always
    environment:
      MYSQL_ROOT_PASSWORD: rootpass
      MYSQL_DATABASE: testdb
      MYSQL_USER: demo
      MYSQL_PASSWORD: demopass
    ports:
      - "3306:3306"
    volumes:
      - mysql_data:/var/lib/mysql # Gắn volume để lưu trữ dữ liệu

volumes:
  mysql_data:
```

- Build và run

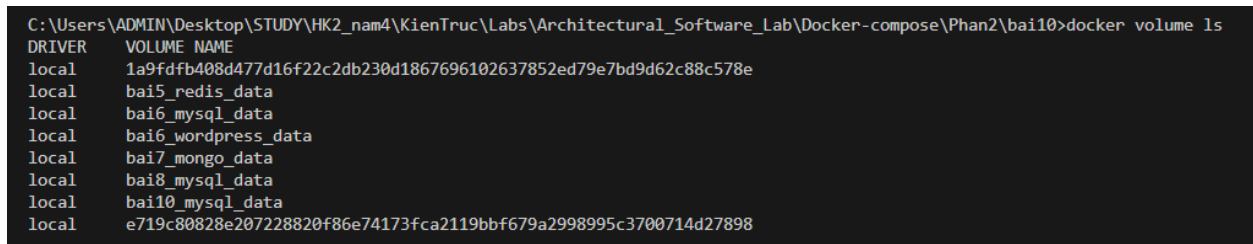


The screenshot shows a Visual Studio Code editor with a Docker Compose file named `docker-compose.yml` open. The file is located in the `Phan2` directory. The file content is as follows:

```
1 version: "3.8"
2
3 services:
4   D-Run Service
5     mysql:
6       image: mysql:5.7
7       container_name: mysql-volume-demo
8       restart: always
9       environment:
10        MYSQL_ROOT_PASSWORD: rootpass
11        MYSQL_DATABASE: testdb
12        MYSQL_USER: demo
13        MYSQL_PASSWORD: demopass
14       ports:
15        - "3306:3306"
16       volumes:
17        - mysql_data:/var/lib/mysql # Gán volume để lưu trữ dữ liệu
18
19 volumes:
20   mysql_data:
```

The terminal output shows the command `docker-compose up -d` being executed. The output indicates that the network `bai10_default` was created, the volume `bai10_mysql_data` was created, and the container `mysql-volume-demo` was started. The output also shows a warning message: `level=warning msg="C:\Users\ADMIN\Desktop\STUDY\HK2_nam4\KienTruc\Labs\Architectural_Software_Lab\docker-compose\Phan2\bai10\docker-compose.yml: the attribute 'version' is obsolete, it will be ignored, please remove it to avoid potential confusion"`.

- Kiểm tra



The screenshot shows a terminal window with the command `docker volume ls` being executed. The output lists several volumes, including `bai5_redis_data`, `bai6_mysql_data`, `bai6_wordpress_data`, `bai7_mongo_data`, `bai8_mysql_data`, `bai10_mysql_data`, and `e719c80828e207228820f86e74173fca2119bbf679a2998995c3700714d27898`.

```
C:\Users\ADMIN\Desktop\STUDY\HK2_nam4\KienTruc\Labs\Architectural_Software_Lab\docker-compose\Phan2\bai10>docker volume ls
DRIVER      VOLUME NAME
local       1a9fdfb408d477d16f22c2db230d1867696102637852ed79e7bd9d62c88c578e
local       bai5_redis_data
local       bai6_mysql_data
local       bai6_wordpress_data
local       bai7_mongo_data
local       bai8_mysql_data
local       bai10_mysql_data
local       e719c80828e207228820f86e74173fca2119bbf679a2998995c3700714d27898
```

Phần 3: Docker Compose file

Bài tập 1: Triển khai WordPress với MySQL

Mục tiêu: Tạo stack WordPress kết nối với MySQL, sử dụng volumes để lưu trữ dữ liệu.

Yêu cầu:

1. Sử dụng image wordpress:latest (port 80).
2. Sử dụng image mysql:5.7 (port 3306).
3. Volume cho database (/var/lib/mysql).
4. Biến môi trường cho MySQL:

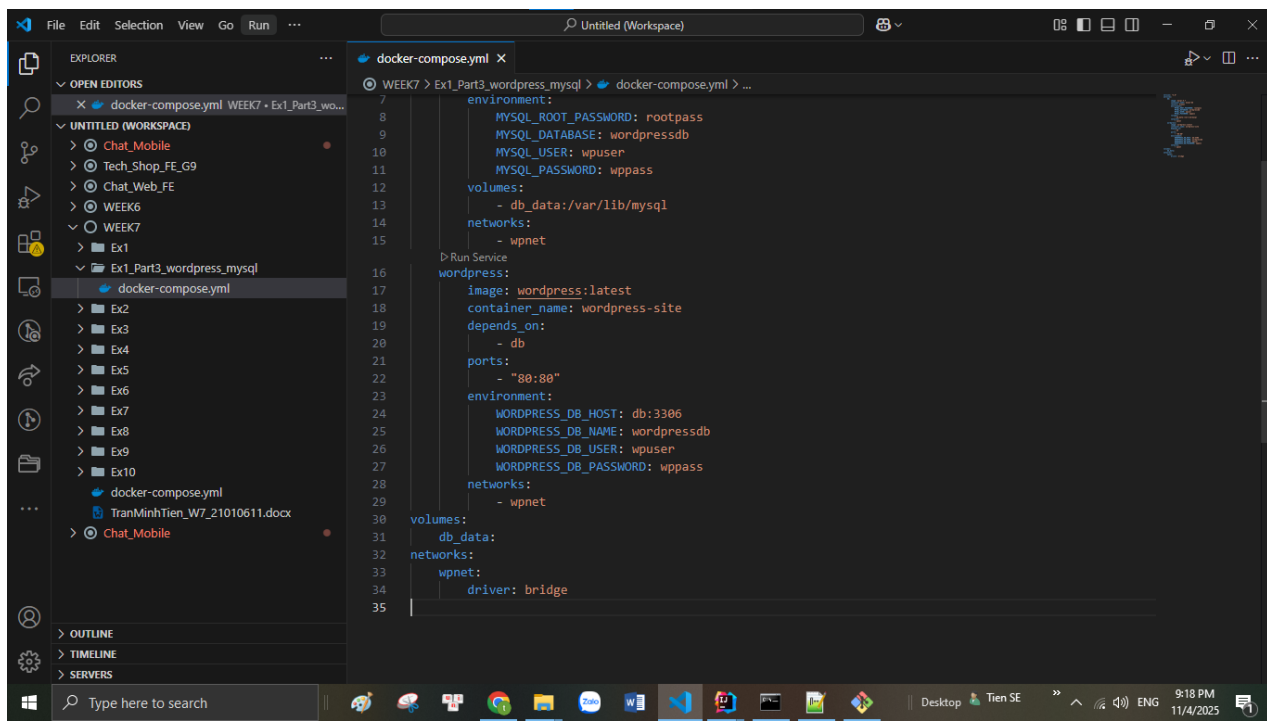
MYSQL_ROOT_PASSWORD, MYSQL_DATABASE,
MYSQL_USER, MYSQL_PASSWORD

Gợi ý:

WordPress cần khai báo depends_on MySQL.

Sử dụng network tùy chỉnh để kết nối giữa 2 service.

B1: Tạo docker-compose.yml

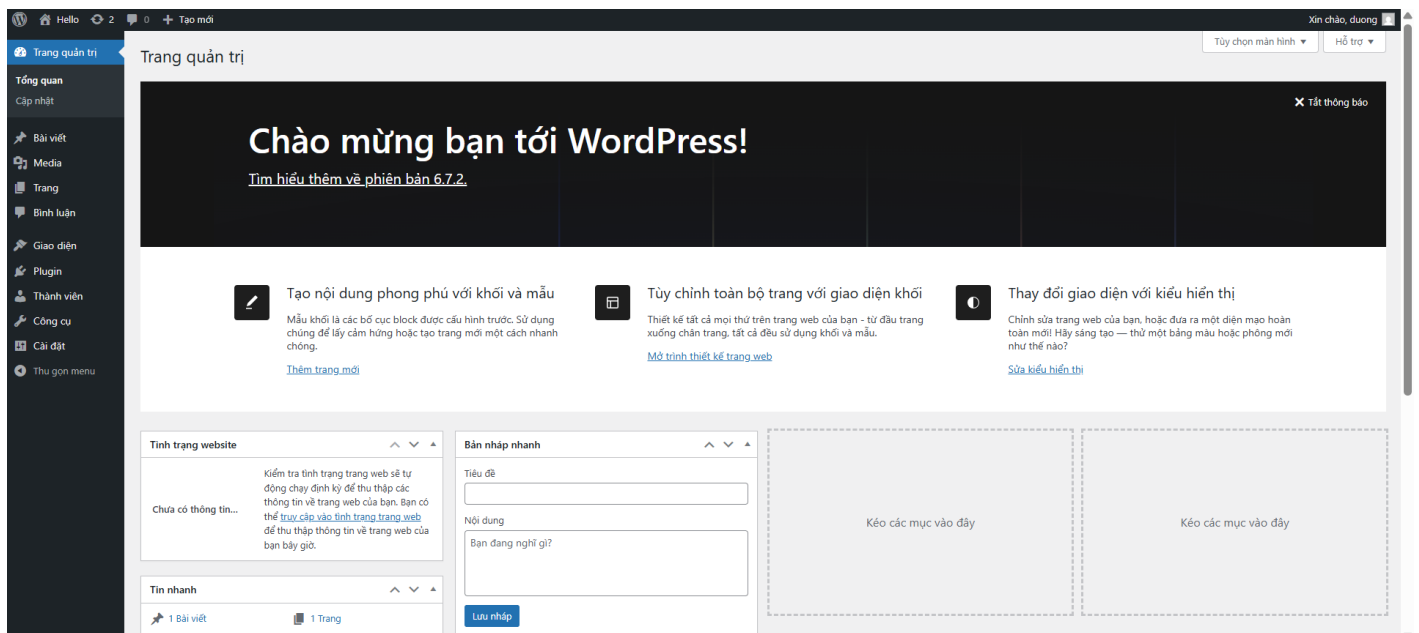


B2: Build và run

```
D:\0_GIT_KIENTRUC\TranMinhTien-Architectural-Software\WEEK7\Ex1_Part3_wordpress_mysql>docker-compose up -d
time="2025-04-11T21:26:07+07:00" level=warning msg="D:\\0_GIT_KIENTRUC\\TranMinhTien-Architectural-Software\\WEEK7\\Ex1_Part3_wordpress_mysql\\docker-compose.yml: the attribute `version` is obsolete, it will be ignored, please remove it to avoid potential confusion"
unable to get image 'mysql:5.7': error during connect: Get "http://%2F%2F.%2Fpipe%2FdockerDesktopLinuxEngine/v1.48/image
s/mysql:5.7/json": open //.pipe/dockerDesktopLinuxEngine: The system cannot find the file specified.

[+] Running 0/2UC\TranMinhTien-Architectural-Software\WEEK7\Ex1_Part3_wordpress_mysql>docker-compose up -d
- db Pulling
- wordpress Pulling
```

B3: Truy cập localhost

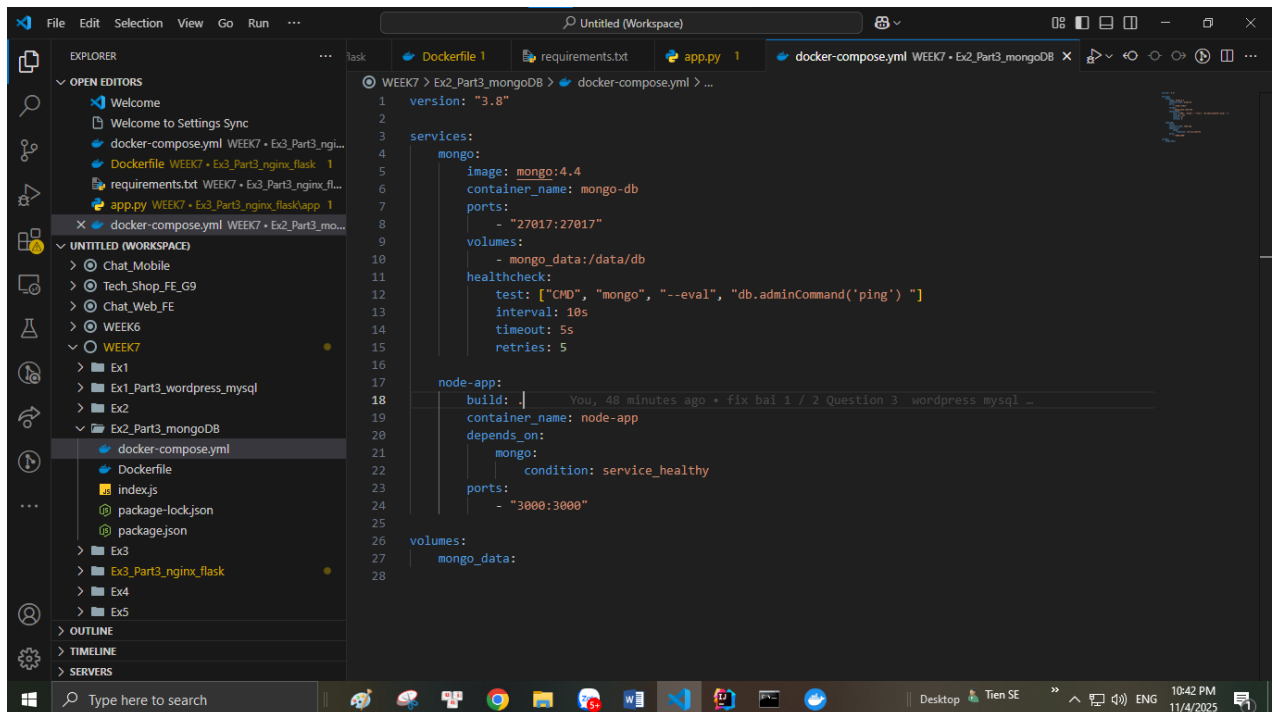


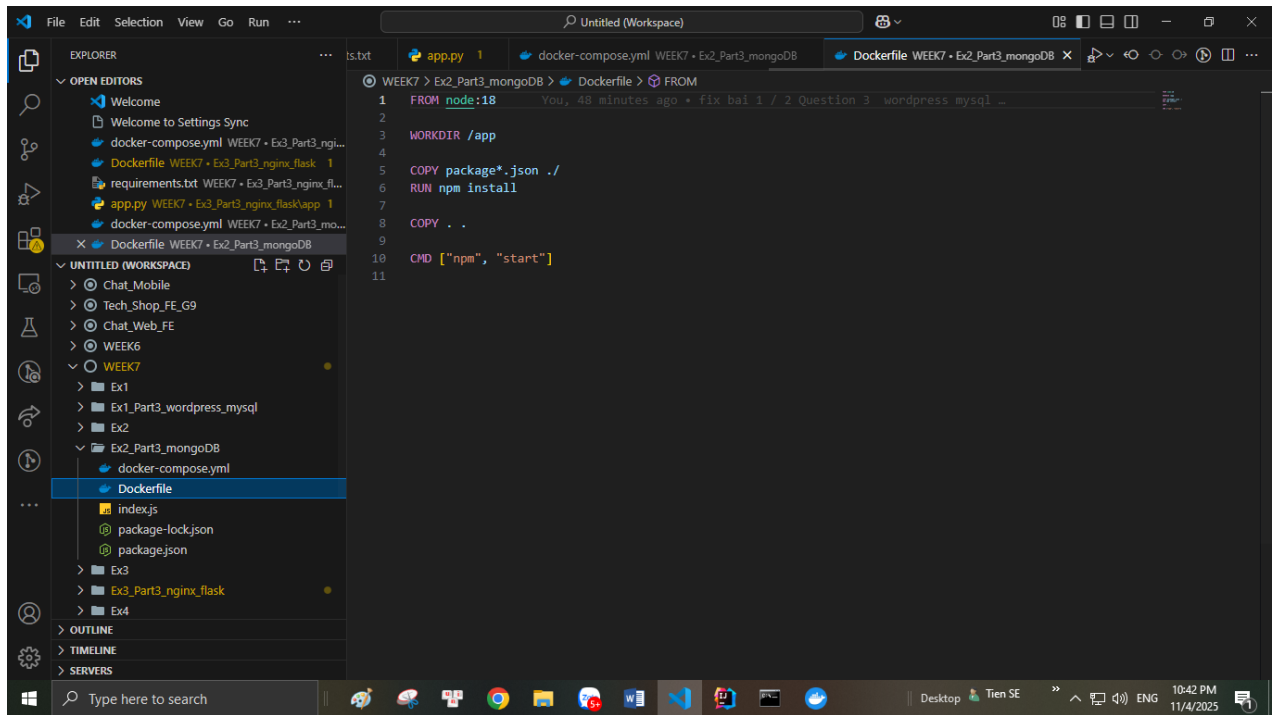
Bài tập 2: Ứng dụng Node.js + MongoDB

Mục tiêu: Triển khai ứng dụng Node.js (lưu dữ liệu vào MongoDB) và MongoDB với volume.

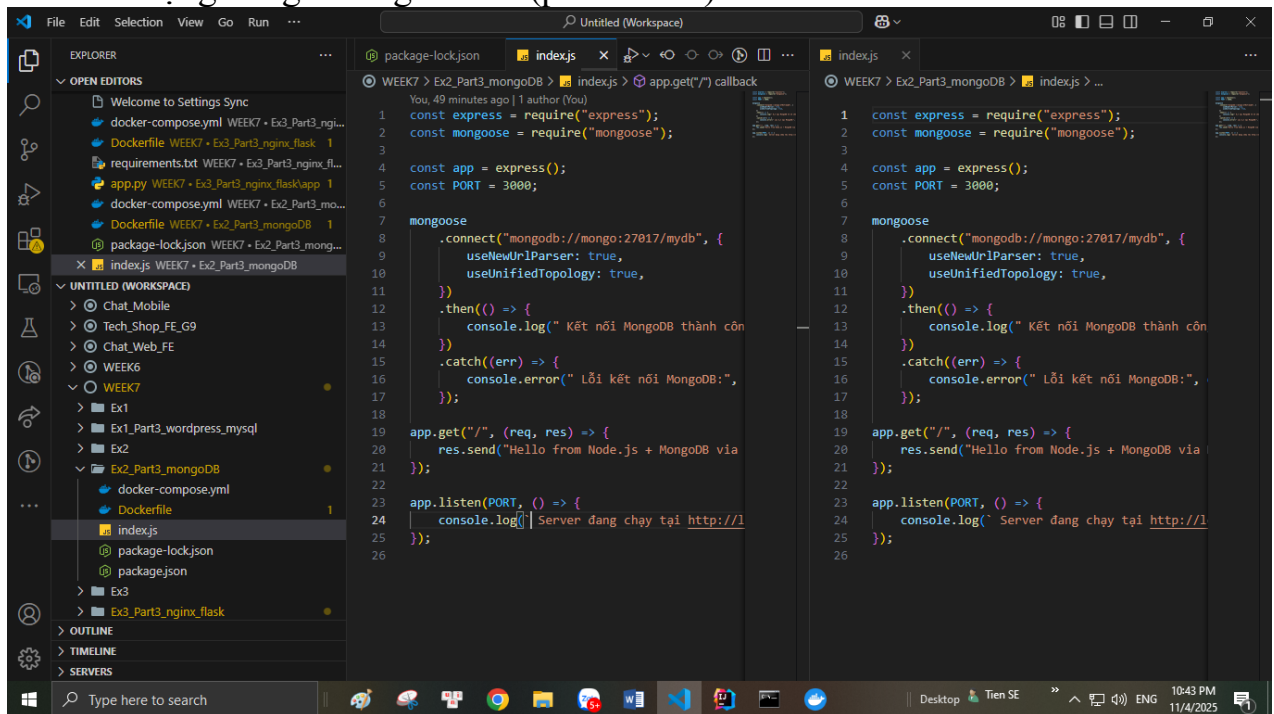
Yêu cầu:

- Viết Dockerfile cho ứng dụng Node.js (ví dụ: REST API đơn giản).

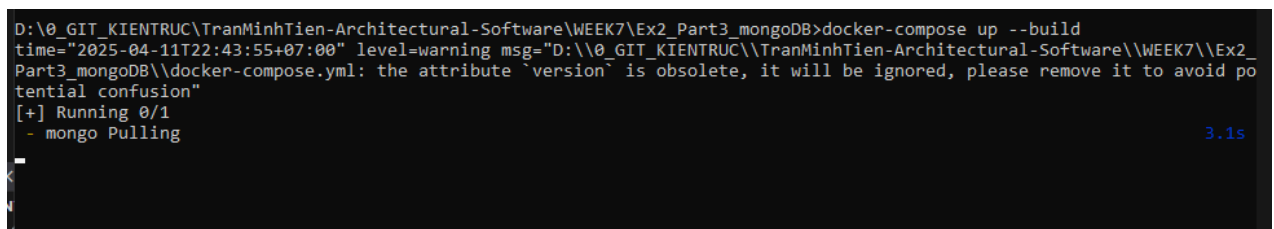




2. Sử dụng image mongo:latest (port 27017).



3. Volume cho MongoDB (/data/db).



```
C:\Windows\System32\cmd.exe - docker-compose up --build
Microsoft Windows [Version 10.0.19045.5608]
(c) Microsoft Corporation. All rights reserved.

D:\_GIT_KIENTRUC\TranMinhTien-Architectural-Software\WEEK7\Ex2_Part3_mongoDB>docker-compose up --build
time="2025-04-11T22:43:55+07:00" level=warning msg="D:\_GIT_KIENTRUC\TranMinhTien-Architectural-Software\WEEK7\Ex2_Part3_mongoDB\docker-compose.yml: the attribute `version` is obsolete, it will be ignored, please remove it to avoid potential confusion"
[+] Running 6/9
 - mongo [e233f2d1b360] 28.36MB / 173.1MB Pulling
    e233f2d1b360 Download complete 4.2s
    ddb77a597b02 Download complete 4.2s
    7ab9eb5a4d9d Download complete 4.2s
    - d4c3c94e5e10 Downloading [=====]... 9.0s
    - 83b651df5384 Downloading [=]... 9.0s
    bca5893fe8bd Download complete 4.2s
    a6c1ba219414 Download complete 4.2s
    35ec036951f8 Download complete 4.9s
```

4. Đảm bảo Node.js service khởi động sau MongoDB (depends_on + healthcheck).

The screenshot shows the VS Code interface with the Docker Compose build logs in the Output window and the index.js file in the Explorer.

Build Logs (Output Window):

```
Attaching to mongo-db, node-app
mongo-db | {"t":{"$date":"2025-04-11T15:46:47.378+00:00"},"s":"I", "c":"CONTROL", "id":23285, "ctx":"main","msg":"Automatically disabling TLS 1.0, to force-enable TLS 1.0 specify --sslDisabledProtocols 'none'"
mongo-db | {"t":{"$date":"2025-04-11T15:46:47.383+00:00"},"s":"I", "c":"NETWORK", "id":4648601, "ctx":"main","msg":"Implicit TCP FastOpen unavailable. If TCP FastOpen is required, set tcpFastOpenServer, tcpFastOpenClient, and tcpFastOpenQueueSize."}
mongo-db | {"t":{"$date":"2025-04-11T15:46:47.388+00:00"},"s":"I", "c":"STORAGE", "id":4615611, "ctx":"initandlisten","msg":"MongoDB starting","attr":{"pid":1,"port":27017,"dbPath":"/data/db","architecture":"64-bit","host":"5f0017149e9c"}
node-app | node
node-app | >
node-app | > require("express");
node-app | > require("mongoose");
node-app | >
node-app | > app.use(express.json());
node-app | >
node-app | > app.use(express.urlencoded({ extended: true }));
node-app | >
node-app | > app.get('/', (req, res) => {
node-app | >   res.json({ message: 'Hello from Node.js + MongoDB via'
node-app | > });
node-app | >
node-app | > app.listen(3000, () => {
node-app | >   console.log('Server đang chạy tại http://1
```

index.js (Explorer):

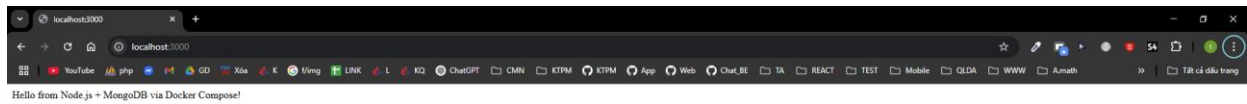
```
const express = require('express');
const mongoose = require('mongoose');

const app = express();

app.use(express.json());
app.use(express.urlencoded({ extended: true }));

app.get('/', (req, res) => {
  res.json({ message: 'Hello from Node.js + MongoDB via'
});

app.listen(3000, () => {
  console.log('Server đang chạy tại http://1
```



Bài tập 3: Load Balancing với Nginx + Flask

Mục tiêu: Cân bằng tải giữa 2 instance Flask dùng Nginx.

Yêu cầu:

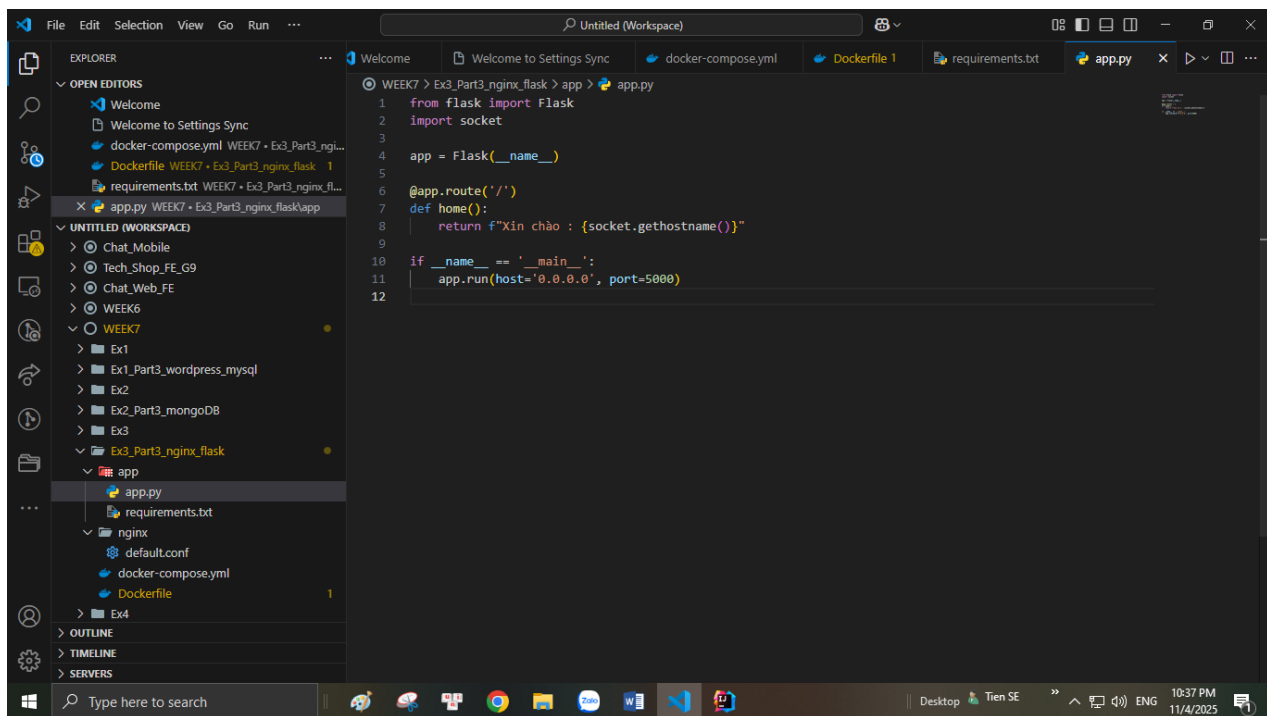
1. 2 service Flask (sử dụng app.py từ bài tập trước, port 5000).
2. 1 service Nginx (port 8080) cấu hình làm reverse proxy: Chuyển request / đến các Flask instance (round-robin).

3. Tạo custom network và Nginx config.

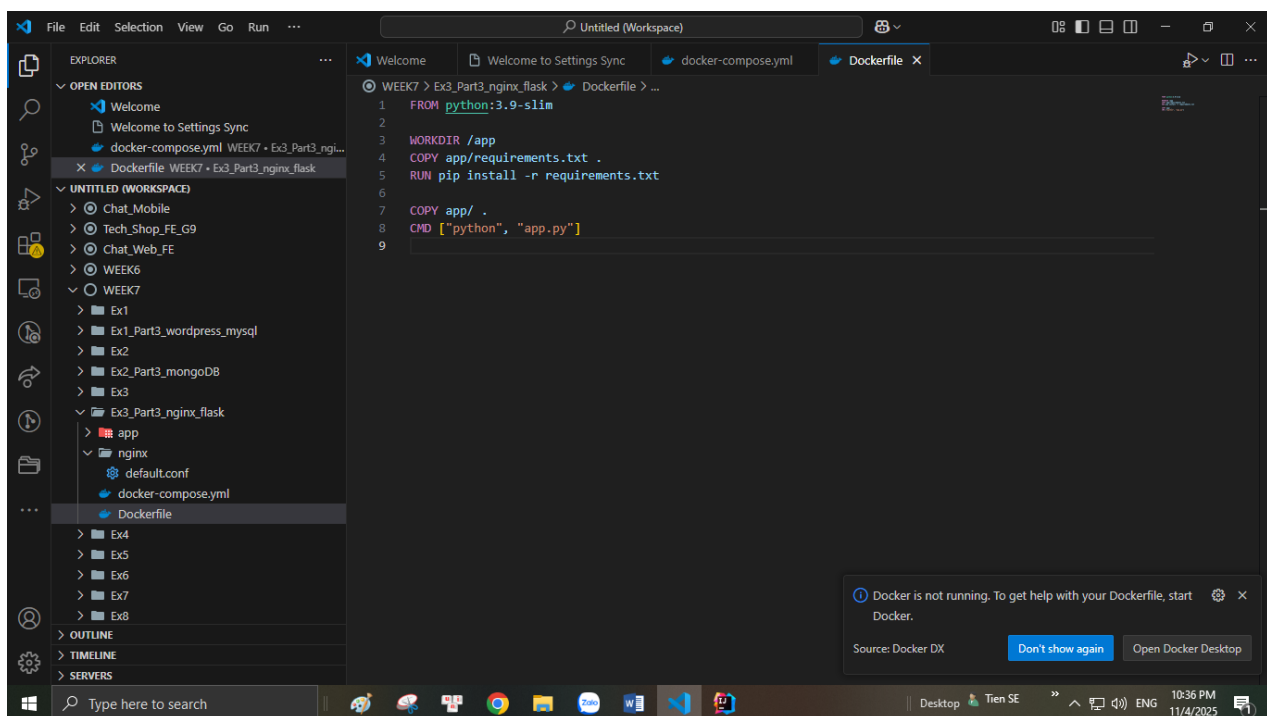
B1:

Tạo project nodejs

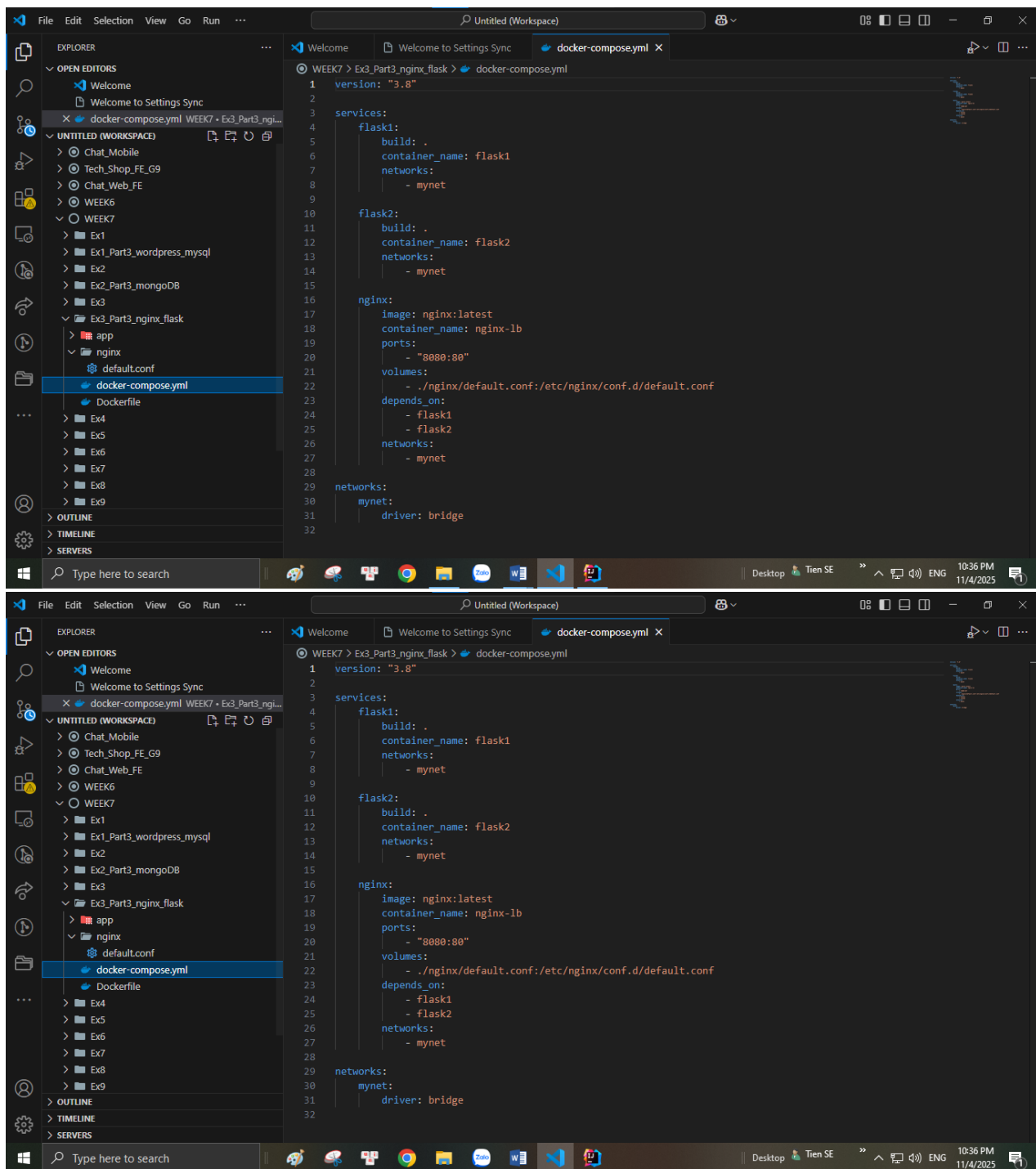
app.



Dockerfile



docker-compose.yml



Bài tập 4: Prometheus + Grafana Monitoring

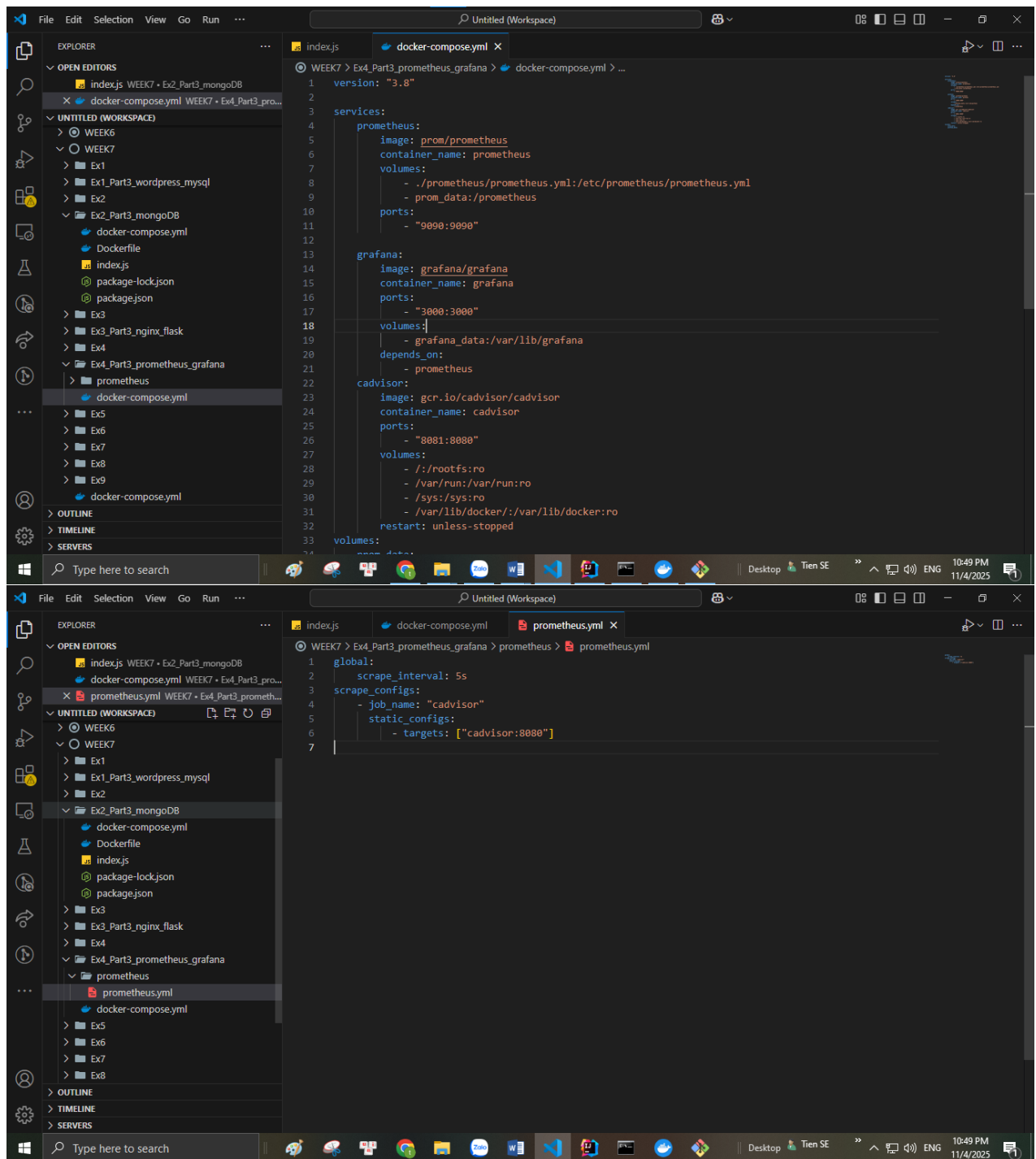
Mục tiêu: Giám sát Docker containers dùng Prometheus và Grafana.

Yêu cầu:

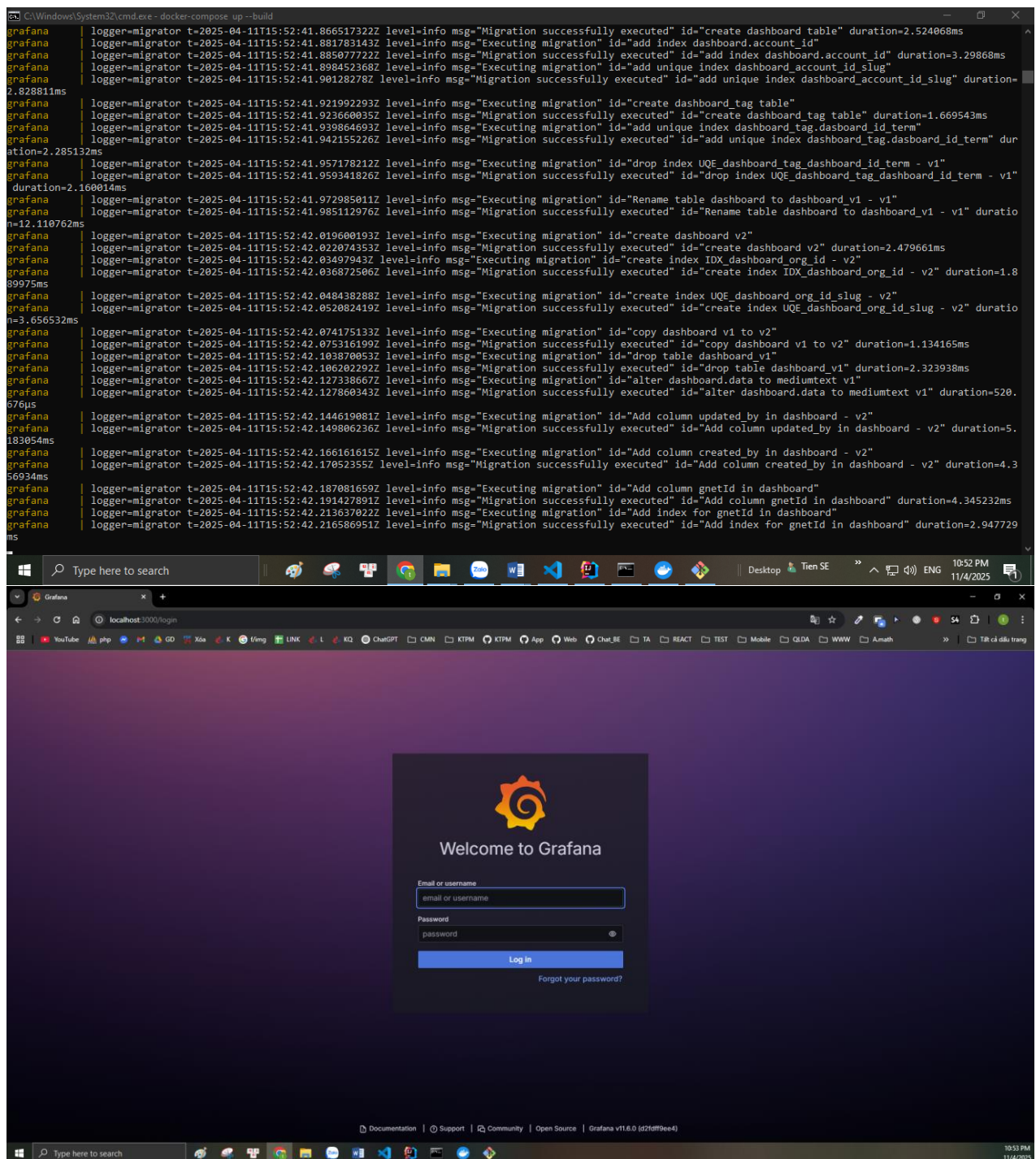
1. Service Prometheus (port 9090) với file cấu hình thu thập metrics từ Docker.

2. Service Grafana (port 3000) kết nối đến Prometheus.

3. Volume để lưu dữ liệu Prometheus và Grafana.



```
D:\0_GIT_KIENTRUC\TranMinhTien-Architectural-Software\WEEK7\Ex4_Part3_prometheus_grafana>docker-compose up --build
time="2025-04-11T22:50:50.07:00" level=warning msg="D:\0_GIT_KIENTRUC\TranMinhTien-Architectural-Software\WEEK7\Ex4_Part3_prometheus_grafana\docker-compose.yml: the attribute 'version' is obsolete, it will be ignored, please remove it to avoid potential confusion"
[*] Running 1/30
- cadvisor [b6999e] Pulling
  - 619be1103602 Pulling fs layer 5.1s
  - 902ecccc70f3 Pulling fs layer 1.7s
  - 3b8469b194b8 Pulling fs layer 1.7s
  - 6361eeb1639c Pulling fs layer 1.7s
  - 4f4fb700ef54 Already exists 0.1s
- prometheus [b6999e] Pulling
  - 5b41f3c98b42 Pulling fs layer 0.3s
  - a3c8c1417d94 Pulling fs layer 0.3s
  - ffe8cdbc09ba Pulling fs layer 0.3s
  - 9fa02260e034 Pulling fs layer 0.2s
  - 1617e25568b2 Pulling fs layer 0.2s
  - 9e81dc407c65 Pulling fs layer 0.2s
  - 1cc8183b9830 Pulling fs layer 0.2s
  - 8dd923415b9e Pulling fs layer 0.2s
  - 6547672ecd7f Pulling fs layer 0.2s
  - b2d104eee733 Pulling fs layer 0.2s
  - 3b84d8789434 Pulling fs layer 0.2s
  - 448ad452204b Pulling fs layer 0.2s
- grafana [b6999e] Pulling
  - 2a08a00fe446 Pulling fs layer 0.7s
  - 70ca445a67c2 Pulling fs layer 0.7s
  - c0a27b1e2168 Pulling fs layer 0.7s
  - ce185550173e Pulling fs layer 0.7s
  - daf4bae1c5dd Pulling fs layer 0.7s
  - b9d78c8c657a Pulling fs layer 0.7s
  - f18232174bc9 Pulling fs layer 0.7s
  - babadc1b811e Pulling fs layer 0.7s
  - bbb8b5218cfb Pulling fs layer 0.7s
  - 5b32a5607528 Pulling fs layer 0.7s
```



Bài tập 5: Multi-tier Voting App

Mục tiêu: Triển khai ứng dụng voting gồm 5 services (Tham khảo từ Docker Docs).

Yêu cầu:

1. Frontend: vote (Python, port 5000).
2. Backend: result (Node.js, port 5001).
3. Redis (lưu tạm vote).
4. Worker (Java) xử lý vote từ Redis sang DB.
5. Postgres (lưu kết quả).

Bài tập 6: CI/CD Pipeline với Docker Compose

Mục tiêu: Mô phỏng pipeline dev/test bằng Docker Compose.

Yêu cầu:

1. Service app (Python/Node.js) với code được mount từ host (development mode).
2. Service tests chạy unit tests khi code thay đổi (sử dụng volumes + entrypoint).
3. Service nginx (production mode) dùng image build sẵn từ app.

Gợi ý:

1. Dùng 2 file compose khác nhau (docker-compose-dev.yml và docker-compose-prod.yml).
2. Sử dụng docker-compose -f <file> up để chọn môi trường.

Bài tập 7: Elasticsearch + Kibana

Mục tiêu: Triển khai ELK stack đơn giản.

Yêu cầu:

1. Service Elasticsearch (port 9200) với volume.
2. Service Kibana (port 5601) kết nối với Elasticsearch.
3. Thiết lập environment variables cho credentials.

Bài tập 8: Django + Celery + Redis

Mục tiêu: Triển khai Django với Celery worker và Redis làm message broker.

Yêu cầu:

1. Django app (port 8000).
2. Celery worker chạy song song.
3. Redis service cho task queue.

Bài tập 9: Nextcloud với MariaDB + Redis Caching

Mục tiêu: Triển khai Nextcloud (self-hosted cloud) với MariaDB và Redis.

Yêu cầu:

1. Nextcloud (port 80).
2. MariaDB (volume cho dữ liệu).
3. Redis cache.

Bài tập 10: Traefik as Reverse Proxy

Mục tiêu: Dùng Traefik để định tuyến request đến các service (Flask, WordPress, etc.).

Yêu cầu:

1. Cấu hình Traefik với Docker provider.
2. Đặt labels cho services để Traefik nhận diện.

Tips khi làm bài tập:

1. Luôn dùng docker-compose down -v để xóa volumes khi test lại.
2. Kiểm tra log bằng docker-compose logs <service>.
3. Sử dụng docker-compose config để validate file YAML.