National Textile University

Department of Computer Science

Subject:

Operating System

Submitted To:

Sir Nasir Mehmood

Submitted By:

Hafsa Tayyab

Registration No:

23-NTU-CS-1163

Lab:

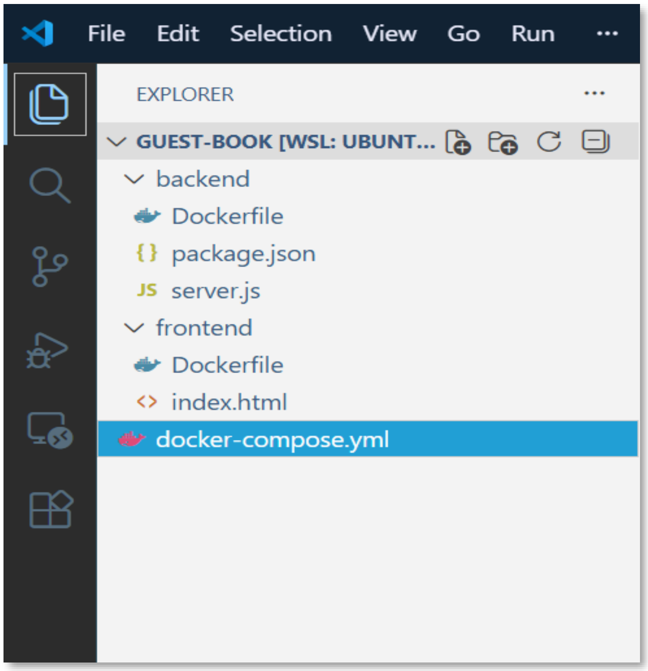
14

Semester:

5th

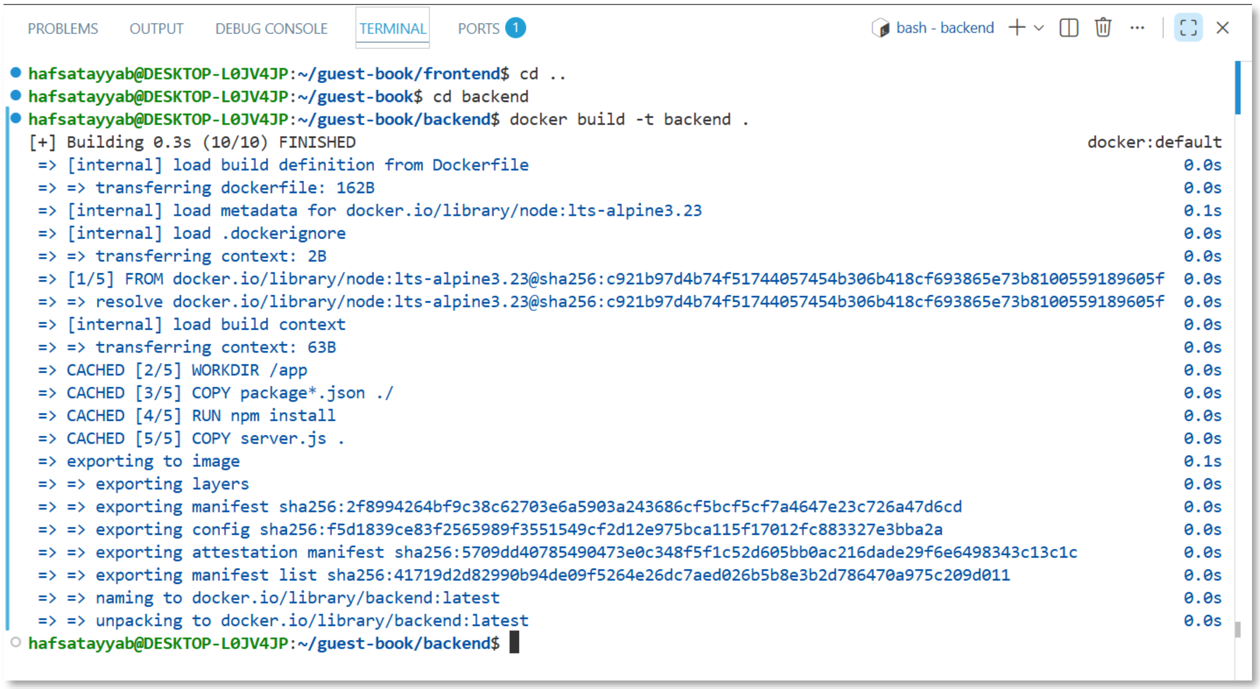
Building a Simple Multi-Container Application Project: Guest Book Application

Step 1: Project Structure

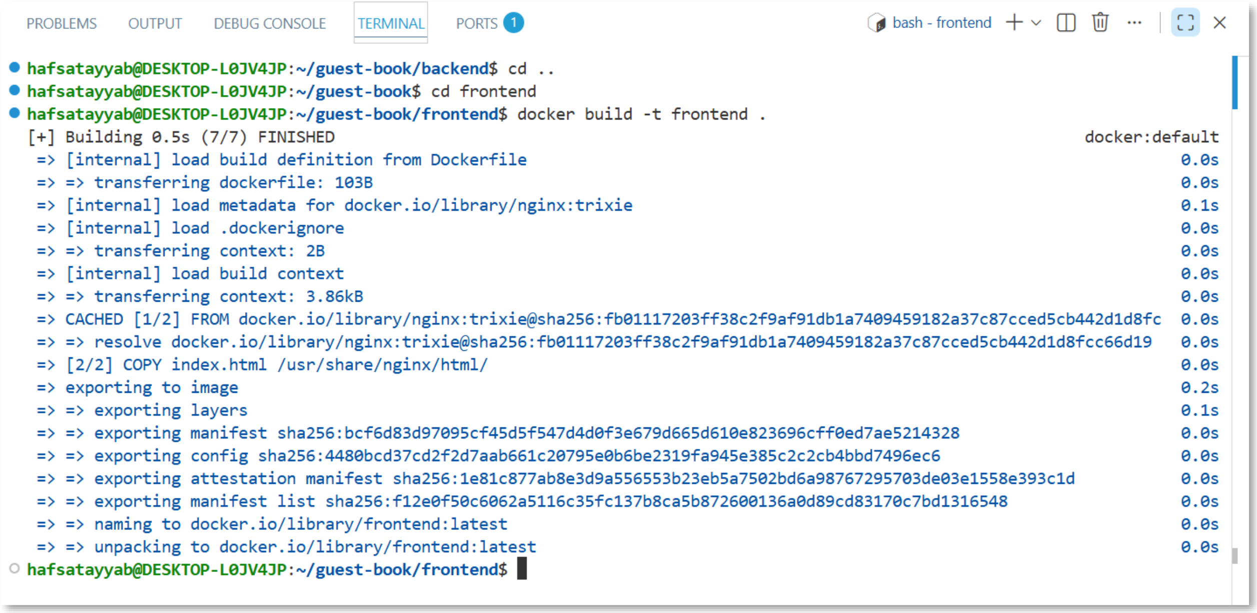


```
GUEST-BOOK [WSL: UBUNT...
  backend
    Dockerfile
    package.json
    server.js
  frontend
    Dockerfile
    index.html
  docker-compose.yml
```

Step 2: Output of both image building commands

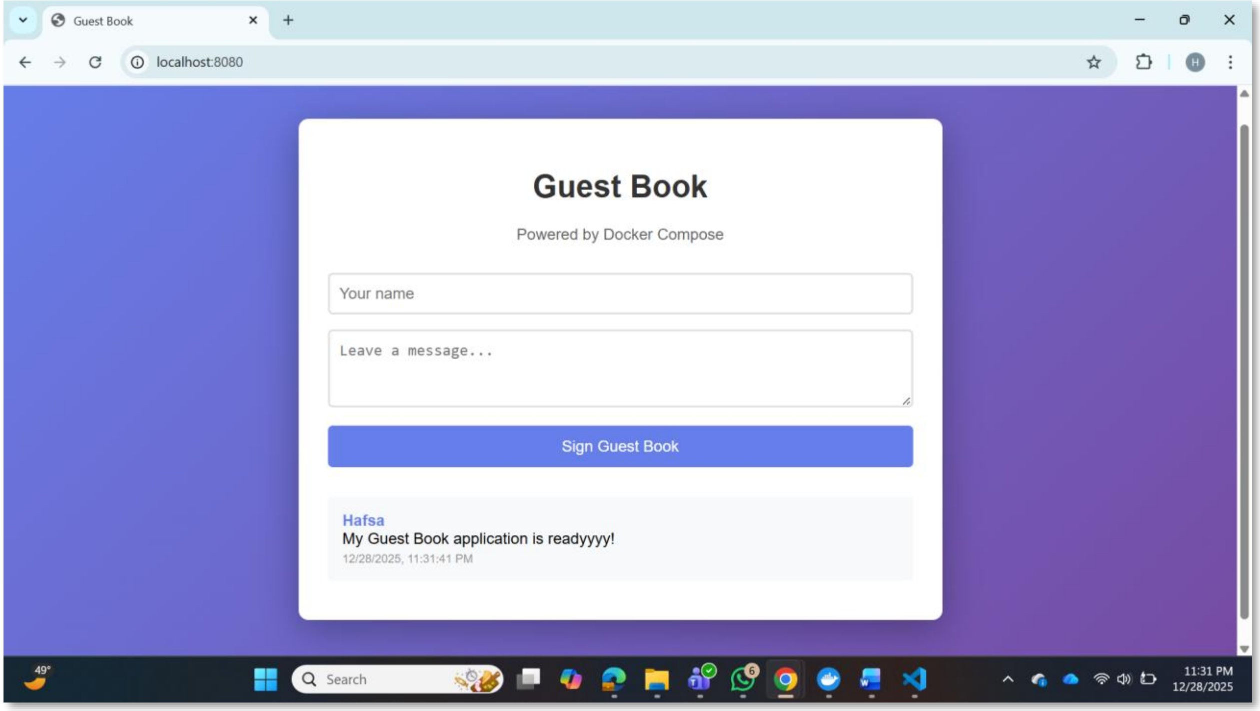


```
hafsatayyab@DESKTOP-L0JV4JP:~/guest-book/frontend$ cd ..
hafsatayyab@DESKTOP-L0JV4JP:~/guest-book$ cd backend
hafsatayyab@DESKTOP-L0JV4JP:~/guest-book/backend$ docker build -t backend .
[+] Building 0.3s (10/10) FINISHED                                                                            docker:default
 => [internal] load build definition from Dockerfile                                                                    0.0s
 => => transferring dockerfile: 162B                                                                                    0.0s
 => [internal] load metadata for docker.io/library/node:lts-alpine3.23                                                  0.1s
 => [internal] load .dockerignore                                                                                       0.0s
 => => transferring context: 2B                                                                                         0.0s
 => [1/5] FROM docker.io/library/node:lts-alpine3.23@sha256:c921b97d4b74f51744057454b306b418cf693865e73b8100559189605f  0.0s
 => => resolve docker.io/library/node:lts-alpine3.23@sha256:c921b97d4b74f51744057454b306b418cf693865e73b8100559189605f  0.0s
 => [internal] load build context                                                                                       0.0s
 => => transferring context: 63B                                                                                        0.0s
 => CACHED [2/5] WORKDIR /app                                                                                           0.0s
 => CACHED [3/5] COPY package*.json ./                                                                                  0.0s
 => CACHED [4/5] RUN npm install                                                                                        0.0s
 => CACHED [5/5] COPY server.js .                                                                                       0.0s
 => exporting to image                                                                                                  0.1s
 => => exporting layers                                                                                                 0.0s
 => => exporting manifest sha256:2f8994264bf9c38c62703e6a5903a243686cf5bcf5cf7a4647e23c726a47d6cd                       0.0s
 => => exporting config sha256:f5d1839ce83f2565989f3551549cf2d12e975bca115f17012fc883327e3bba2a                         0.0s
 => => exporting attestation manifest sha256:5709dd40785490473e0c348f5f1c52d605bb0ac216dade29f6e6498343c13c1c           0.0s
 => => exporting manifest list sha256:41719d2d82990b94de09f5264e26dc7aed026b5b8e3b2d786470a975c209d011                  0.0s
 => => naming to docker.io/library/backend:latest                                                                       0.0s
 => => unpacking to docker.io/library/backend:latest                                                                    0.0s
hafsatayyab@DESKTOP-L0JV4JP:~/guest-book/backend$ 
```



```
● hafsatayyab@DESKTOP-L0JV4JP:~/guest-book/backend$ cd ..
● hafsatayyab@DESKTOP-L0JV4JP:~/guest-book$ cd frontend
● hafsatayyab@DESKTOP-L0JV4JP:~/guest-book/frontend$ docker build -t frontend .
  [+] Building 0.5s (7/7) FINISHED                                                                    docker:default
   => [internal] load build definition from Dockerfile                                                         0.0s
   => => transferring dockerfile: 103B                                                                         0.0s
   => [internal] load metadata for docker.io/library/nginx:trixie                                              0.1s
   => [internal] load .dockerignore                                                                            0.0s
   => => transferring context: 2B                                                                              0.0s
   => [internal] load build context                                                                            0.0s
   => => transferring context: 3.86kB                                                                          0.0s
   => CACHED [1/2] FROM docker.io/library/nginx:trixie@sha256:fb01117203ff38c2f9af91db1a7409459182a37c87cced5cb442d1d8fc  0.0s
   => => resolve docker.io/library/nginx:trixie@sha256:fb01117203ff38c2f9af91db1a7409459182a37c87cced5cb442d1d8fcc66d19  0.0s
   => [2/2] COPY index.html /usr/share/nginx/html/                                                             0.0s
   => exporting to image                                                                                       0.2s
   => => exporting layers                                                                                      0.1s
   => => exporting manifest sha256:bcf6d83d97095cf45d5f547d4d0f3e679d665d610e823696cff0ed7ae5214328           0.0s
   => => exporting config sha256:4480bcd37cd2f2d7aab661c20795e0b6be2319fa945e385c2c2cb4bbd7496ec6             0.0s
   => => exporting attestation manifest sha256:1e81c877ab8e3d9a556553b23eb5a7502bd6a98767295703de03e1558e393c1d  0.0s
   => => exporting manifest list sha256:f12e0f50c6062a5116c35fc137b8ca5b872600136a0d89cd83170c7bd1316548      0.0s
   => => naming to docker.io/library/frontend:latest                                                           0.0s
   => => unpacking to docker.io/library/frontend:latest                                                        0.0s
○ hafsatayyab@DESKTOP-L0JV4JP:~/guest-book/frontend$ █
```

Step 3: Output at localhost:8080



Guest Book

Powered by Docker Compose

Your name

Leave a message...

Sign Guest Book

Hafsa
My Guest Book application is readyyyy!
12/28/2025, 11:31:41 PM

Step 4: Contents

backend/Dockerfile:

```
FROM node:lts-alpine3.23
WORKDIR /app
COPY package*.json ./
RUN npm install
COPY server.js .
EXPOSE 3000
CMD ["npm", "start"]
```

Frontend/Dockerfile:

```
FROM nginx:trixie
COPY index.html /usr/share/nginx/html/
EXPOSE 80
```

Docker-compose.yml:

```
services:
  # MongoDB Database
  mongodb:
    image: mongo:7-jammy
    container_name: guestbook-db
    networks:
    - guestbook_network
    volumes:
    - mongo_data:/data/db
  # Backend API
  api:
    build: ./backend
    image: backend
    container_name: guestbook-api
    environment:
      - MONGO_URL=mongodb://mongodb:27017
    ports:
      - "3000:3000"
    depends_on:
      - mongodb
    networks:
      - guestbook_network
  # Frontend
  web:
    build: ./frontend
    image: frontend
    container_name: guestbook-web
    ports:- "8080:80"
    depends_on:
    - api
    networks:
    - guestbook_network
networks:
  guestbook_network:
volumes:
  mongo_data:
```