National Textile University

Department of Computer Science

Subject: Operating System

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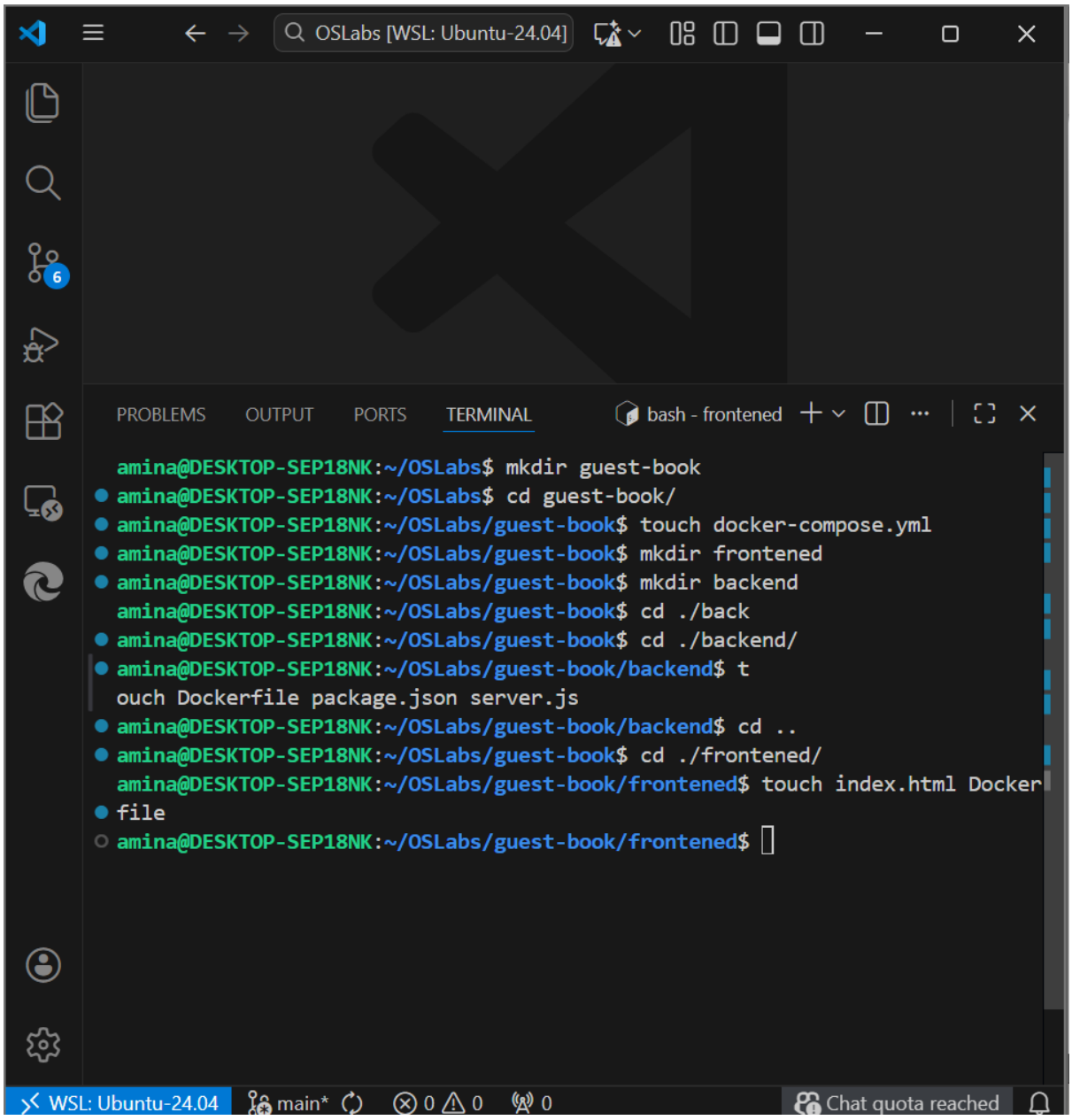
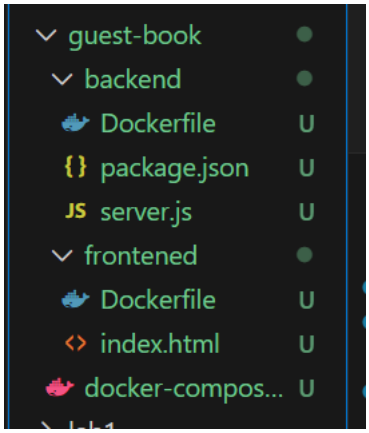
Docker Lab 03

Semester:5th

Docker Lab 03

Step 1: Project Structure





Codes:

1. Backend
    - DockerFile

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

    - Package.json

```
{
  "name": "guest-book-backend",
  "version": "1.0.0",
  "type": "module",
  "scripts": {
    "start": "node server.js"
  },
  "dependencies": {
    "express": "^4.18.2",
    "mongoose": "^8.0.0",
    "cors": "^2.8.5"
  }
}
```

    - Server.js

```
import express from 'express';
import mongoose from 'mongoose';
import cors from 'cors';
const app = express();
const PORT = 3000;
app.use(cors());
```

```
app.use(express.json());
// MongoDB connection URL
const MONGO_URL = process.env.MONGO_URL ||
'mongodb://mongodb:27017/guestbook';
// Define Mongoose Schema
const messageSchema = new mongoose.Schema({
    name: {
        type: String,
        required: true
    },
    message: {
        type: String,
        required: true
    },
    timestamp: {
        type: Date,
        default: Date.now
    }
});
// Create Mongoose Model
const Message = mongoose.model('Message', messageSchema);
// Connect to MongoDB
async function connectDB() {
try {
await mongoose.connect(MONGO_URL);
console.log('Connected to MongoDB with Mongoose');
} catch (error) {
console.error('MongoDB connection error:', error);
process.exit(1);
}
}
// Get all messages
app.get('/api/messages', async (req, res) => {
try {
const messages = await Message.find()
.sort({ timestamp:-1 })
.limit(10);
res.json(messages);
} catch (error) {
res.status(500).json({ error: error.message });
}
});
// Post a new message
app.post('/api/messages', async (req, res) => {
try {
const { name, message } = req.body;
const newMessage = new Message({
name,
```

```
message
});
await newMessage.save();
res.status(201).json(newMessage);
} catch (error) {
res.status(400).json({ error: error.message });
}
});
// Start server
connectDB().then(() => {
app.listen(PORT, () => {
console.log(`Server running on port ${PORT}`);
});
});
```

2. Frontend
    - Dockerfile

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

    - Index.html

```
<!DOCTYPE html>
<html lang="en">

<head>
  <meta charset="UTF-8">
  <meta name="viewport" content="width=device-width, initial-
scale=1.0">
  <title>Guest Book</title>
  <style>
    body {
      font-family: Arial, sans-serif;
      background: linear-gradient(135deg, #667eea 0%, #764ba2 100%);
      min-height: 100vh;
      padding: 20px;
      margin: 0;
    }

    .container {
      max-width: 600px;
      margin: 40px auto;
      background: white;
      padding: 30px;
      border-radius: 10px;
      box-shadow: 0 10px 40px rgba(0, 0, 0, 0.3);
    }
```

```css
h1 {
  color: #333;
  text-align: center;
}

.subtitle {
  text-align: center;
  color: #666;
  margin-bottom: 30px;
}

.form-group {
  margin-bottom: 15px;
}

input,
textarea {
  width: 100%;
  padding: 10px;
  border: 2px solid #e0e0e0;
  border-radius: 5px;
  font-size: 16px;
  box-sizing: border-box;
}

button {
  background: #667eea;
  color: white;
  border: none;
  padding: 12px 30px;
  font-size: 16px;
  border-radius: 5px;
  cursor: pointer;
  width: 100%;
}

button:hover {
  background: #5568d3;
}

.messages {
  margin-top: 30px;
}

.message {
  background: #f8f9fa;
  padding: 15px;
```

```
      border-radius: 5px;
      margin-bottom: 10px;
    }

    .message-name {
      font-weight: bold;
      color: #667eea;
    }

    .message-time {
      font-size: 12px;
      color: #999;
      margin-top: 5px;
    }
  </style>

</head>

<body>
  <div class="container">
    <h1>Guest Book</h1>
    <p class="subtitle">Powered by Docker Compose</p>

    <div class="form-group">
      <input type="text" id="nameInput" placeholder="Your name">
    </div>

    <div class="form-group">
      <textarea id="messageInput" placeholder="Leave a message..."
rows="3"></textarea>
    </div>

    <button onclick="addMessage()">Sign Guest Book</button>

    <div class="messages" id="messagesList">
      <p style="text-align: center; color: #999;">Loading
messages...</p>
    </div>
  </div>

  <script>
    const API_URL = 'http://localhost:3000/api/messages';

    async function loadMessages() {
      const response = await fetch(API_URL);
      const messages = await response.json();
      const messagesList = document.getElementById('messagesList');
```

```
      if (messages.length === 0) {
        messagesList.innerHTML = '<p style="text-align: center; color:
#999;">No messages yet. Be the first!</p>';
        return;
      }

      messagesList.innerHTML = messages.map(msg => `
                <div class="message">
                    <div class="message-
name">${escapeHtml(msg.name)}</div>
                    <div>${escapeHtml(msg.message)}</div>
                    <div class="message-time">${new
Date(msg.timestamp).toLocaleString()}</div>
                </div>
            `).join('');
    }

    async function addMessage() {
      const name = document.getElementById('nameInput').value.trim();
      const message =
document.getElementById('messageInput').value.trim();

      if (!name || !message) {
        alert('Please enter both name and message');
        return;
      }

      await fetch(API_URL, {
        method: 'POST',
        headers: { 'Content-Type': 'application/json' },
        body: JSON.stringify({ name, message })
      });

      document.getElementById('nameInput').value = '';
      document.getElementById('messageInput').value = '';
      loadMessages();
    }

    function escapeHtml(text) {
      const div = document.createElement('div');
      div.textContent = text;
      return div.innerHTML;
    }

    loadMessages();
  </script>
</body>
```

```
</html>
```

3. Docker-compose.yml:

- Create networks to facilitate communication between frontend, backend and database.
- The requirement is that frontend must not be able to call the database container.
- Don't forget to create named volume with the same name you've used in docker-compose.yml

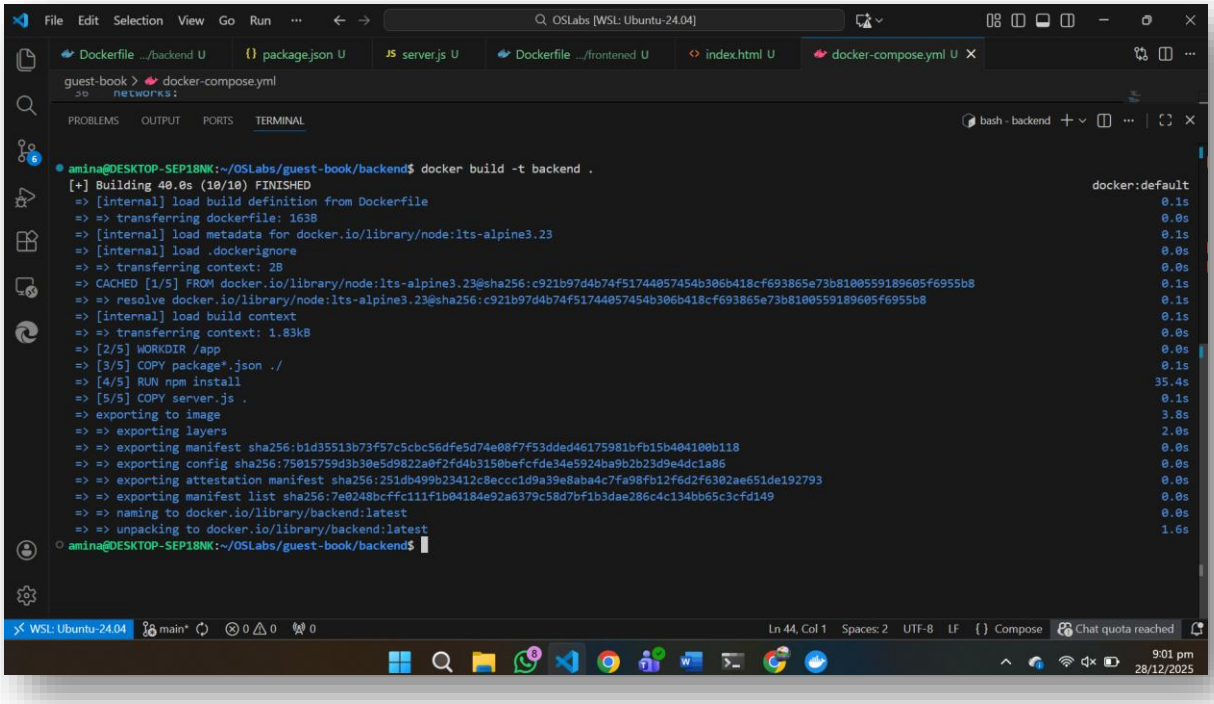
```yaml
services:
  # MongoDB Database
  mongodb:
    image: mongo:7-jammy
    container_name: guestbook-db
    networks:
      - backend_net
    volumes:
      - mongo_data:/data/db

  # Backend API
  api:
    build: ./backend
    container_name: guestbook-api
    environment:
      - MONGO_URL=mongodb://mongodb:27017
    ports:
      - "3000:3000"
    depends_on:
      - mongodb
    networks:
      - backend_net
      - frontend_net

  # Frontend
  web:
    build: ./frontend
    container_name: guestbook-web
    ports:
      - "8080:80"
    depends_on:
      - api
    networks:
      - frontend_net

networks:
  backend_net:
    driver: bridge
  frontend_net:
    driver: bridge
```

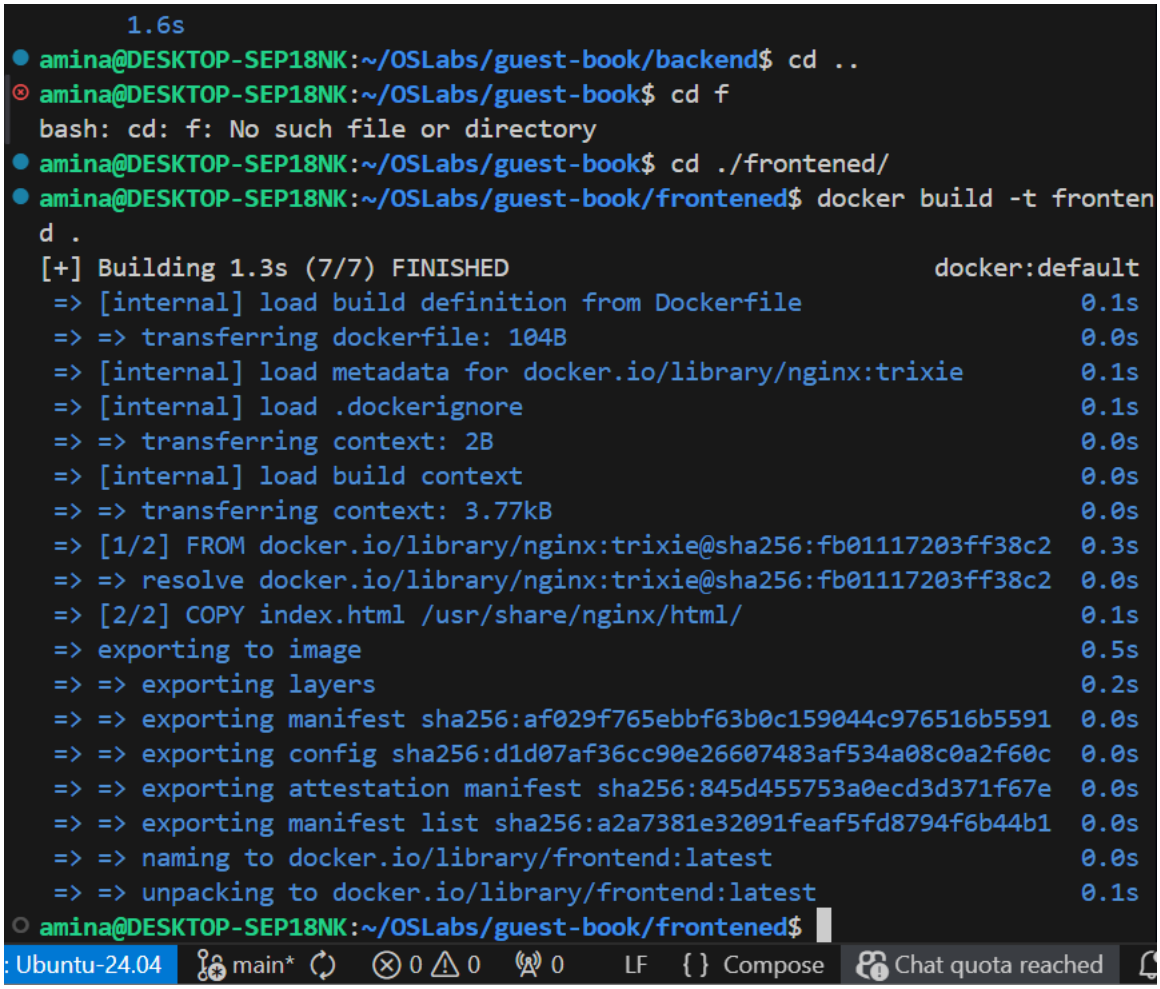
```
volumes:
  mongo_data:
```

Output of both image building commands e.g "docker build -t frontend ."

Commands:

- cd backend
- docker build -t backend .
- cd ..
- cd frontend
- docker build -t frontend .





Pulling mango db:

Command:

- Docker pull mango:7-jammy

```
amina@DESKTOP-SEP18NK:~/OSLabs/guest-book/frontened$ cd ..
amina@DESKTOP-SEP18NK:~/OSLabs/guest-book$ docker pull mango:7-jammy
Error response from daemon: pull access denied for mango, repository does no
t exist or may require 'docker login'
amina@DESKTOP-SEP18NK:~/OSLabs/guest-book$ docker pull mongo:7-jammy
7-jammy: Pulling from library/mongo
a4c2e1a296a6: Pull complete
7e49dc6156b0: Pull complete
d7381d7512ed: Pull complete
487128c0e848: Pull complete
929ce23bedbe: Pull complete
a4867e714827: Pull complete
47c219b2d4f5: Pull complete
d0fc8d2469ec: Pull complete
Digest: sha256:8ddd3db4d2638eb914cce56284e2f0d6daf140bba31679b2af86f7d790a4c
77e
Status: Downloaded newer image for mongo:7-jammy
docker.io/library/mongo:7-jammy
amina@DESKTOP-SEP18NK:~/OSLabs/guest-book$
```

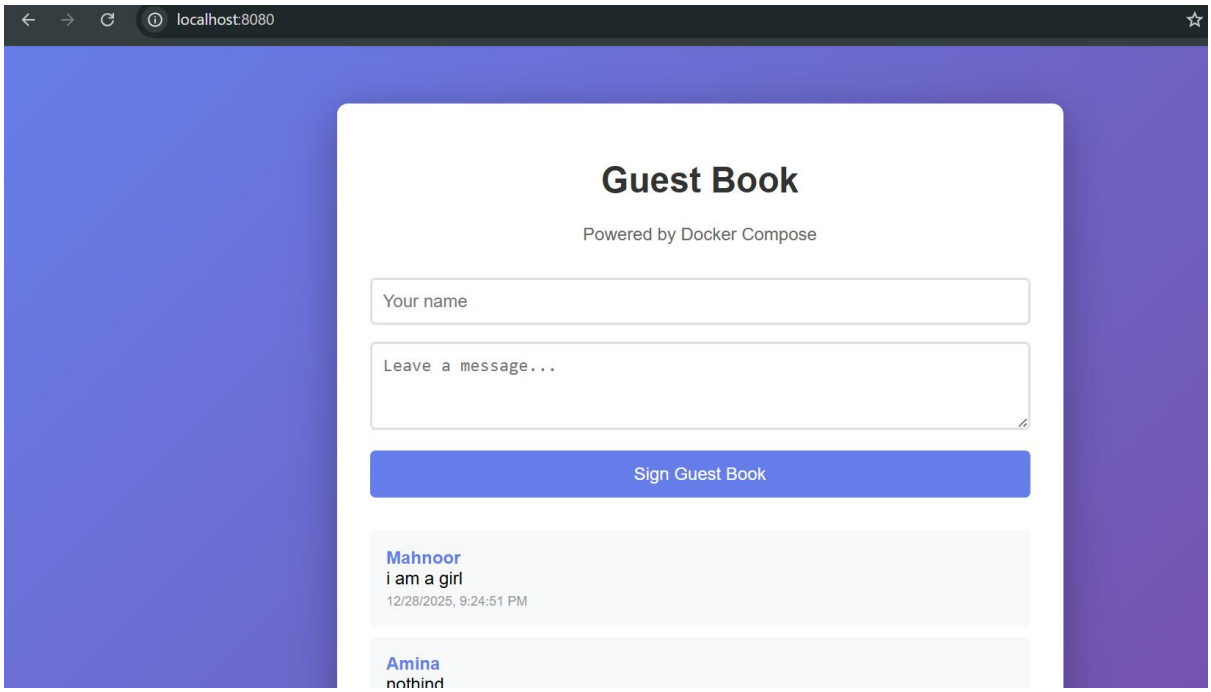
Running the Application

Command:

- docker compose up -d

```
amina@DESKTOP-SEP18NK:~/OSLabs/guest-book$ ls
backend  docker-compose.yml  frontened
amina@DESKTOP-SEP18NK:~/OSLabs/guest-book$ docker co
mpose up -d
[+] Building 1.2s (20/20) FINISHED
 => [internal] load local bake definitions     0.0s
 => => reading from stdin 957B                 0.0s
 => [web internal] load build definition from  0.1s
 => => transferring dockerfile: 104B           0.0s
 => [api internal] load build definition from  0.0s
 => => transferring dockerfile: 163B           0.0s
 => [api internal] load metadata for docker.i  0.1s
 => [web internal] load metadata for docker.i  0.1s
 => [api internal] load .dockerignore          0.0s
 => => transferring context: 2B                0.0s
 => [web internal] load .dockerignore          0.1s
 => => transferring context: 2B                0.0s
 => [api 1/5] FROM docker.io/library/node:lts  0.1s
 => => resolve docker.io/library/node:lts-alp  0.1s
 => [api internal] load build context          0.0s
 => => transferring context: 63B               0.0s
 => [web internal] load build context          0.1s
 => => transferring context: 3.77kB            0.0s
 => [web 1/2] FROM docker.io/library/nginx:tr  0.1s
 => => resolve docker.io/library/nginx:trixie  0.1s
```

```
 => [api] exporting to image                          0.4s
 => => exporting layers                               0.0s
 => => exporting manifest sha256:b484a0915478         0.0s
 => => exporting config sha256:c072a63f5b5415         0.0s
 => => exporting attestation manifest sha256:         0.1s
 => => exporting manifest list sha256:cbf0e6a         0.0s
 => => naming to docker.io/library/guest-book         0.0s
 => => unpacking to docker.io/library/guest-b         0.0s
 => [web] exporting to image                          0.4s
 => => exporting layers                               0.0s
 => => exporting manifest sha256:704c9df55fea         0.0s
 => => exporting config sha256:aaa4b0b9b4bc13         0.0s
 => => exporting attestation manifest sha256:         0.1s
 => => exporting manifest list sha256:778e7db         0.0s
 => => naming to docker.io/library/guest-book         0.0s
 => => unpacking to docker.io/library/guest-b         0.0s
 => [web] resolving provenance for metadata f         0.0s
 => [api] resolving provenance for metadata f         0.0s
[+] Running 8/8
 ✓ guest-book-api                  Built              0.0s
 ✓ guest-book-web                  Built              0.0s
 ✓ Network guest-book_frontend_net Created            0.1s
 ✓ Network guest-book_backend_net  Created            0.1s
 ✓ Volume guest-book_mongo_data    Created            0.0s
 ✓ Container guestbook-db          Starte...          1.2s
 ✓ Container guestbook-api         Start...           2.0s
 ✓ Container guestbook-web         Start...           2.5s
amina@DESKTOP-SEP18NK:~/OSLabs/guest-book$
```




tender_wing
5416125fc8ce
my-server
3000:3000
0%
9 days ago
ubuntu_contain
c68f1177ae5c
ubuntu:resc
0%
16 days ago
guest-book
-
-
-
1.76%
4 minutes a