



National Textile University

Department of Computer Science

Subject:

Operating System

Submitted to:

Sir Nasir Mehmood

Submitted by:

Akasha Fatima

Reg. number:

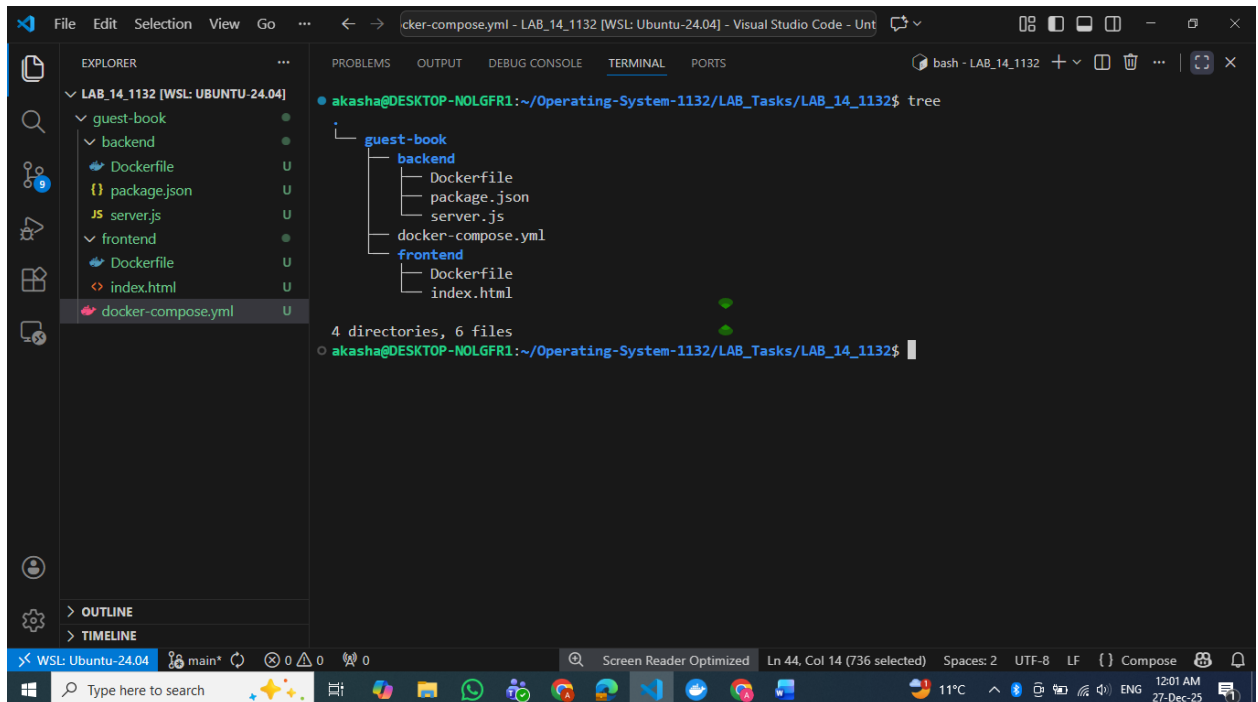
23-NTU-CS-FL-1132

Semester:

5th - A

LAB_14

Task_01: Whole Project Structure:

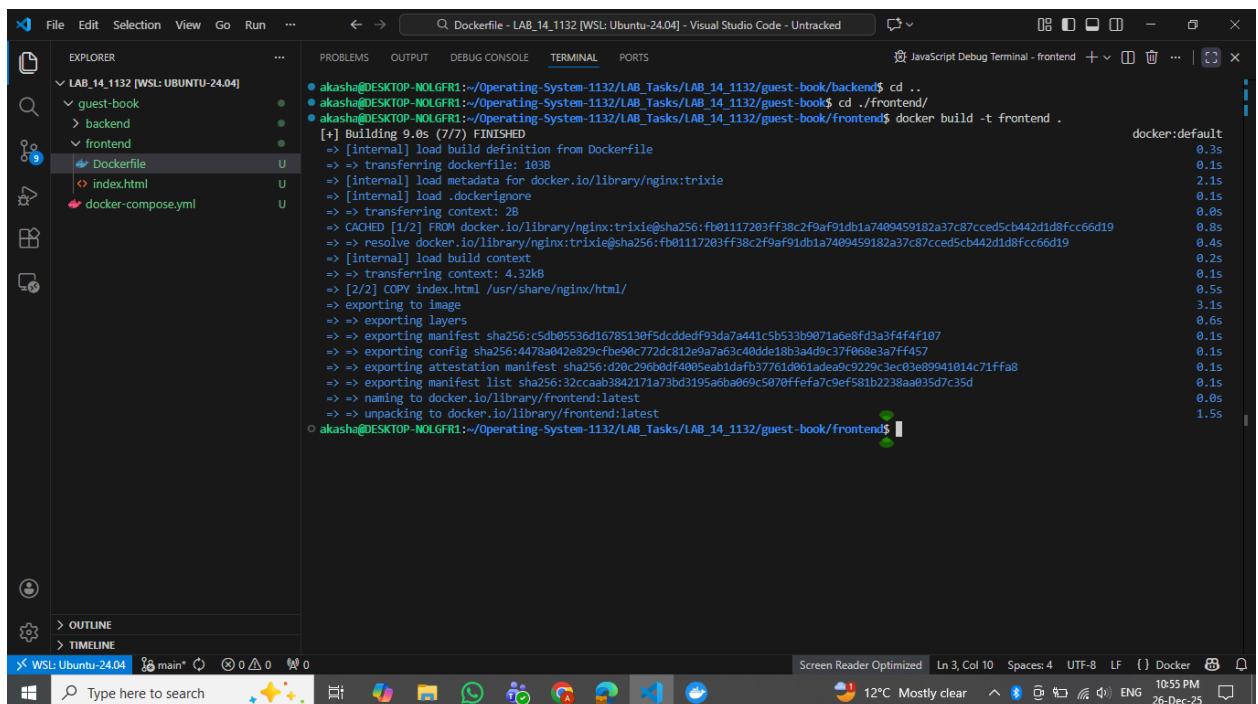


```
akasha@DESKTOP-NOLGFR1:~/Operating-System-1132/LAB_Tasks/LAB_14_1132$ tree
.
├── guest-book
│   ├── backend
│   │   ├── Dockerfile
│   │   ├── package.json
│   │   └── server.js
│   ├── docker-compose.yml
│   └── frontend
│       ├── Dockerfile
│       └── index.html
└── 4 directories, 6 files

akasha@DESKTOP-NOLGFR1:~/Operating-System-1132/LAB_Tasks/LAB_14_1132$
```

Task_02: Output of both image building commands e.g "docker build -t frontend ."

Docker build -t frontend .

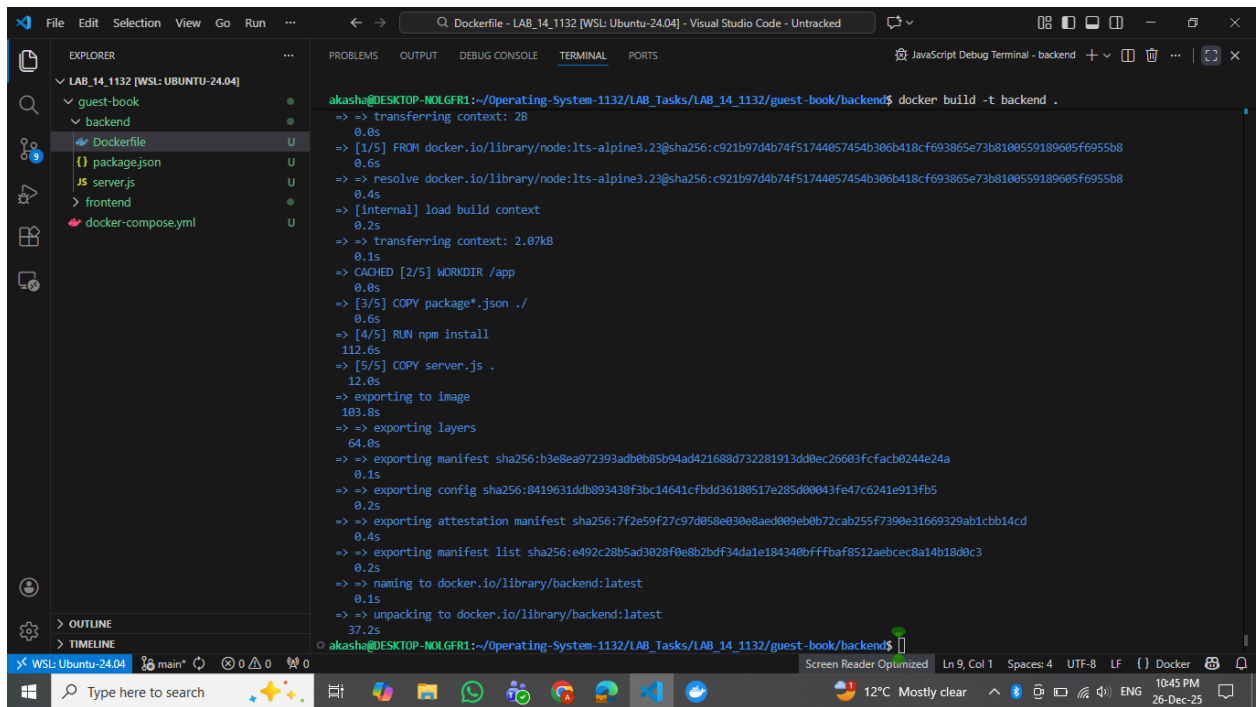


```
akasha@DESKTOP-NOLGFR1:~/Operating-System-1132/LAB_Tasks/LAB_14_1132/guest-book/backend$ cd ..
akasha@DESKTOP-NOLGFR1:~/Operating-System-1132/LAB_Tasks/LAB_14_1132/guest-book$ cd ./frontend/
akasha@DESKTOP-NOLGFR1:~/Operating-System-1132/LAB_Tasks/LAB_14_1132/guest-book/frontend$ docker build -t frontend .

[+] Building 9.0s (7/7) FINISHED
=> [internal] load build definition from Dockerfile
=> => transferring dockerfile: 103B
=> [internal] load metadata for docker.io/library/nginx:trixie
=> [internal] load .dockerignore
=> transferring context: 2B
=> CACHED [1/2] FROM docker.io/library/nginx:trixie@sha256:fb01117203ff38c2f9af91db1a7409459182a37c87cced5cb442d1d8fcc66d19
=> => resolve docker.io/library/nginx:trixie@sha256:fb01117203ff38c2f9af91db1a7409459182a37c87cced5cb442d1d8fcc66d19
=> [internal] load build context
=> transferring context: 4.32kB
=> [2/2] COPY index.html /usr/share/nginx/html/
=> exporting image
=> exporting layers
=> exporting manifest sha256:c5db85536d16785130f5dcdedd93da7a441c5b533b9071a6e8fd3a3f4f4f107
=> exporting config sha256:4478a042e829cfbe90c772dc812e9a7a63c40dde18b3a4d9c37f068e3a7ff457
=> exporting attestation manifest sha256:d28c296b0df4005eab1dafb37761d061adea9c9229c3ec03e89941014c71ffa8
=> exporting manifest list sha256:32ccaab3842171a73bd3195a6ba069c5070ffefa7c9ef581b2238aa035d7c35d
=> naming to docker.io/library/frontend:latest
=> unpacking to docker.io/library/frontend:latest

akasha@DESKTOP-NOLGFR1:~/Operating-System-1132/LAB_Tasks/LAB_14_1132/guest-book/frontend$
```

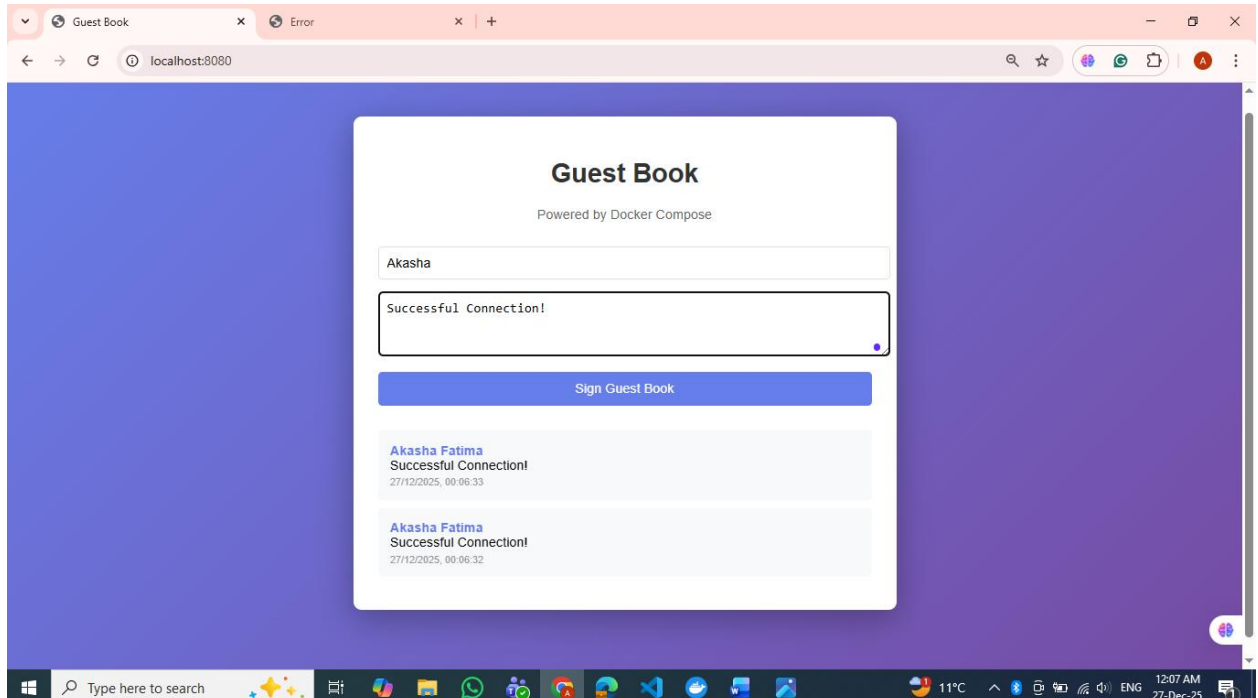
Docker build -t backend .



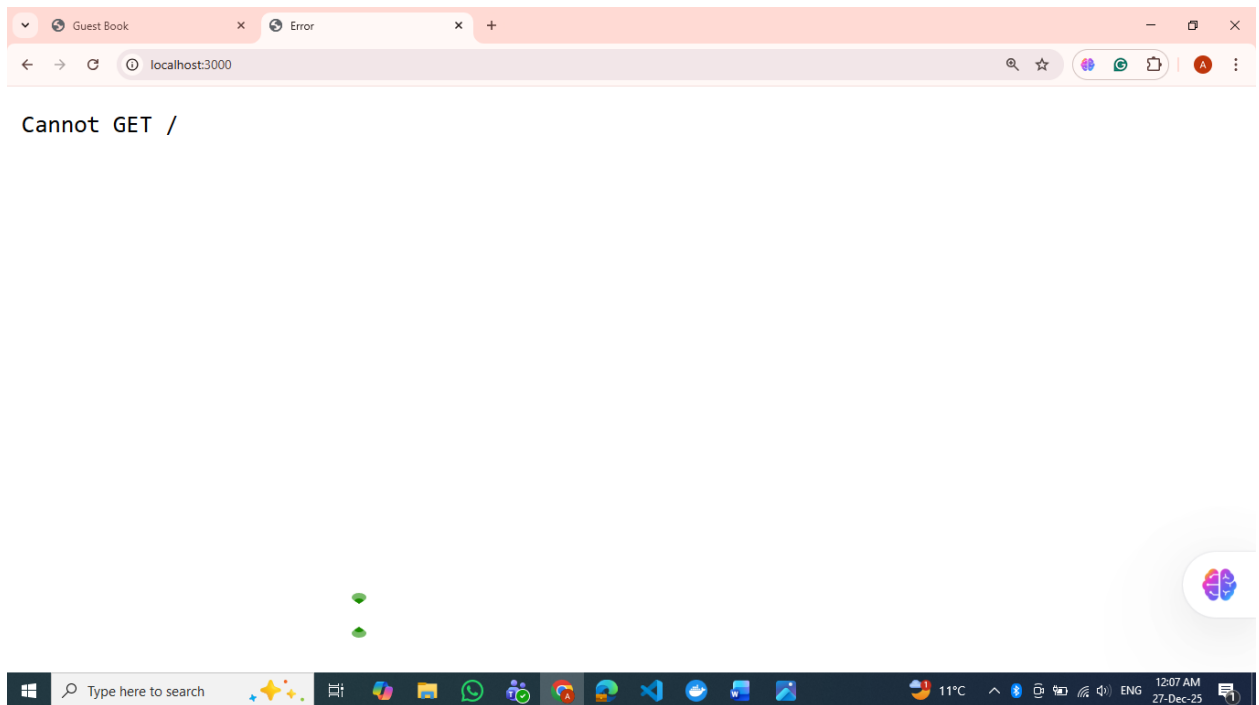
```
akasha@DESKTOP-NOLGFR1:~/Operating-System-1132/LAB_Tasks/LAB_14_1132/guest-book/backend$ docker build -t backend .
=> => transferring context: 2B
0.0s
=> [1/5] FROM docker.io/library/node:lts-alpine3.23@sha256:c921b97d4b74f51744857454b386b418cf693865e73b8100559189685f6955b8
0.6s
=> => resolve docker.io/library/node:lts-alpine3.23@sha256:c921b97d4b74f51744857454b386b418cf693865e73b8100559189685f6955b8
0.4s
=> [internal] load build context
0.2s
=> => transferring context: 2.07kB
0.1s
=> CACHED [2/5] WORKDIR /app
0.0s
=> [3/5] COPY package*.json ./
0.6s
=> [4/5] RUN npm install
112.6s
=> [5/5] COPY server.js .
12.0s
=> exporting to image
103.8s
=> => exporting layers
64.0s
=> => exporting manifest sha256:b3e8ea972393adb0b85b94ad421688d732281913dd0ec26603fcfacb0244e24a
0.1s
=> => exporting config sha256:8419631ddb093438f3bc14641cfbdd36180517e285d00043fe47c6241e913fb5
0.2s
=> => exporting attestation manifest sha256:7f2e59f27c97d858e030e8aed009eb0b72cab255f7390e31669329ab1cbb14cd
0.4s
=> => exporting manifest list sha256:e492c28b5ad3028f0e8b2bdf34da1e184340bffffba8512aebcec8a14b18d0c3
0.2s
=> => naming to docker.io/library/backend:latest
0.1s
=> => unpacking to docker.io/library/backend:latest
37.2s
akasha@DESKTOP-NOLGFR1:~/Operating-System-1132/LAB_Tasks/LAB_14_1132/guest-book/backend$
```

Task_03: Webpage at localhost:8080

localhost:8080



localhost:3000



Task_04: Copy contents of docker-compose and both Dockerfiles in the pdf.

Docker-compose.yml:

```
services:
  # MongoDB Database
  mongodb:
    image: mongo:7-jammy
    container_name: guestbook-db
    networks:
      - backend-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:
  - backend-network
  - frontend-network

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

networks:
  backend-network:
  frontend-network:

volumes:
  mongo_data:
```

frontend/Dockerfile

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

backend/Dockerfile

```
FROM node:lts-alpine3.23

WORKDIR /app
```

COPY package*.json ./

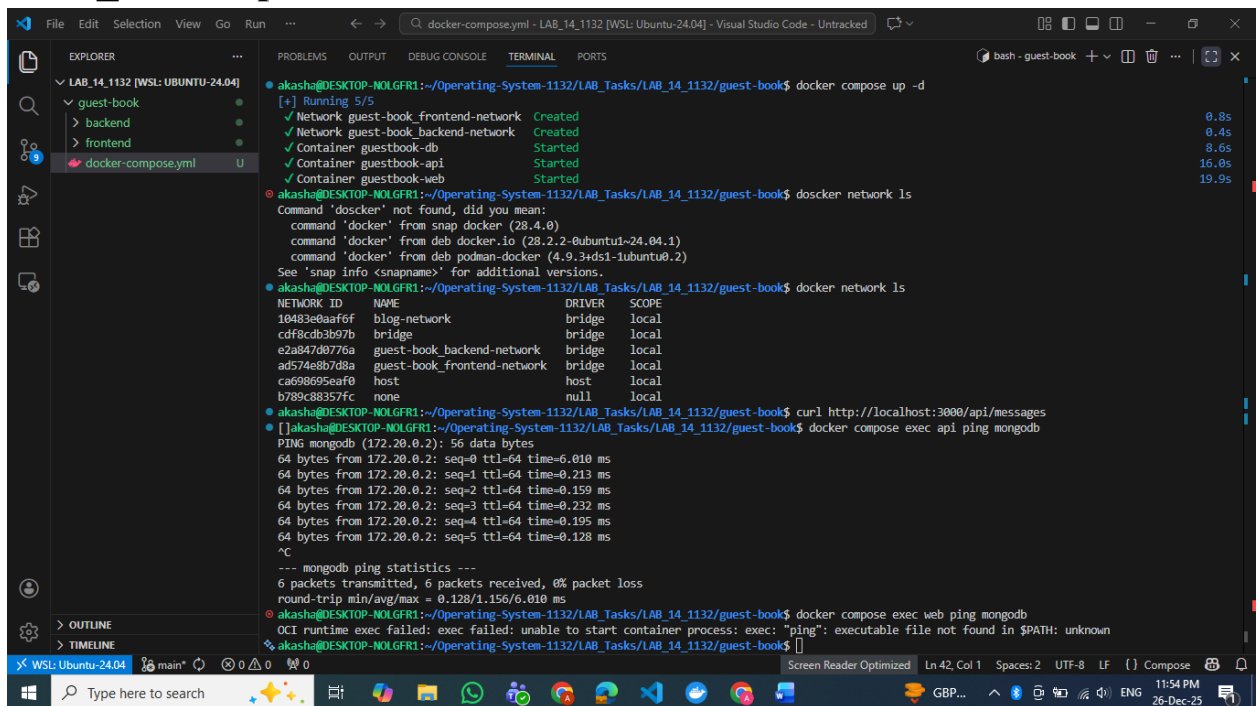
RUN npm install

COPY server.js .

EXPOSE 3000

CMD ["npm", "start"]

Task_05: Output of the instruction's verification:



```
akasha@DESKTOP-NOLGFR1:~/Operating-System-1132/LAB_Tasks/LAB_14_1132/guest-book$ docker compose up -d
[+] Running 5/5
  ✓ Network guest-book_frontend-network Created                                0.8s
  ✓ Network guest-book_backend-network Created                               0.4s
  ✓ Container guestbook-db Started                                           8.6s
  ✓ Container guestbook-api Started                                         16.0s
  ✓ Container guestbook-web Started                                         19.9s

akasha@DESKTOP-NOLGFR1:~/Operating-System-1132/LAB_Tasks/LAB_14_1132/guest-book$ doscker network ls
Command 'doscker' not found, did you mean:
  command 'docker' from snap docker (28.4.0)
  command 'docker' from deb docker.io (28.2.2-0ubuntu1~24.04.1)
  command 'docker' from deb podman-docker (4.9.3+ds1-1ubuntu0.2)
See 'snap info <snapname>' for additional versions.

akasha@DESKTOP-NOLGFR1:~/Operating-System-1132/LAB_Tasks/LAB_14_1132/guest-book$ docker network ls
NETWORK ID          NAME                DRIVER              SCOPE
10483e8aaff6        blog-network        bridge              local
cdf8cd3b97b         bridge              bridge              local
e2a847d0776a        guest-book_backend-network bridge              local
ad574e8b7d8a        guest-book_frontend-network bridge              local
ca698695eaf0        host                host                local
b789c88357fc        none                null                local

akasha@DESKTOP-NOLGFR1:~/Operating-System-1132/LAB_Tasks/LAB_14_1132/guest-book$ curl http://localhost:3000/api/messages
[akasha@DESKTOP-NOLGFR1:~/Operating-System-1132/LAB_Tasks/LAB_14_1132/guest-book$ docker compose exec api ping mongodb
PING mongodb (172.28.0.2): 56 data bytes
64 bytes from 172.28.0.2: seq=0 ttl=64 time=6.010 ms
64 bytes from 172.28.0.2: seq=1 ttl=64 time=0.213 ms
64 bytes from 172.28.0.2: seq=2 ttl=64 time=0.159 ms
64 bytes from 172.28.0.2: seq=3 ttl=64 time=0.232 ms
64 bytes from 172.28.0.2: seq=4 ttl=64 time=0.195 ms
64 bytes from 172.28.0.2: seq=5 ttl=64 time=0.128 ms
^C
--- mongodb ping statistics ---
6 packets transmitted, 6 packets received, 0% packet loss
round-trip min/avg/max = 0.128/1.156/6.010 ms

akasha@DESKTOP-NOLGFR1:~/Operating-System-1132/LAB_Tasks/LAB_14_1132/guest-book$ docker compose exec web ping mongodb
OCI runtime exec failed: exec failed: unable to start container process: exec: "ping": executable file not found in $PATH: unknown
akasha@DESKTOP-NOLGFR1:~/Operating-System-1132/LAB_Tasks/LAB_14_1132/guest-book$
```

Task_06: Additional Executions:

```
akasha@DESKTOP-NOLGFR1:~/Operating-System-1132/LAB_Tasks/LAB_14_1132$ cd ./guest-book/frontend/
akasha@DESKTOP-NOLGFR1:~/Operating-System-1132/LAB_Tasks/LAB_14_1132/guest-book/frontend$ docker
mongo:7-jammy
7-jammy: Pulling from library/mongo
Digest: sha256:8ddd3db4d2638eb914cce56284e2f0d6daf140bba31679b2af86f7d790a4c77e
Status: Image is up to date for mongo:7-jammy
docker.io/library/mongo:7-jammy
akasha@DESKTOP-NOLGFR1:~/Operating-System-1132/LAB_Tasks/LAB_14_1132/guest-book/frontend$
```

```
akasha@DESKTOP-NOLGFR1:~/Operating-System-1132/LAB_Tasks/LAB_14_1132/guest-book$ docker compose up --build
40968", "uid": {"$binary": "47DEQpj8HBSa+/TImW+5JCeuQeRkm5NMpJWZG3hSuFU=", "subType": "0"}}, "u": {"$set": {"lastUse": "$NOW"}}, "multi": false, "upsert": true, "planSummary": "IDHACK", "planningTimeMicros": 4326941, "keysExamined": 0, "docsExamined": 0, "nModified": 0, "nUpserted": 1, "keysInserted": 2, "numYields": 1, "locks": {"ParallelBatchWriterMode": {"acquireCount": {"r": 2}, "FeatureCompatibilityVersion": {"acquireCount": {"w": 2}}, "ReplicationStateTransition": {"acquireCount": {"w": 2}}, "Global": {"acquireCount": {"w": 2}}, "Database": {"acquireCount": {"w": 2}}, "Collection": {"acquireCount": {"w": 2}}, "FlowControl": {"acquireCount": 2}, "storage": {}, "cpuNanos": 1612213800, "durationMillis": 5598}}, "guestbook-db | {"t": {"$date": "2025-12-26T18:09:53.917+00:00"}, "s": "I", "c": "COMMAND", "id": 51803, "ctx": "LogicalSessionCacheRefresh", "msg": "Slow query", "attr": {"type": "command", "ns": "config.$cmd", "command": {"update": "system.sessions", "ordered": false, "writeConcern": {"w": "majority", "wtimeout": 60000}, "$db": "config", "numYields": 1, "reslen": 171, "locks": {"ParallelBatchWriterMode": {"acquireCount": {"r": 2}}, "FeatureCompatibilityVersion": {"acquireCount": {"r": 1, "w": 2}}, "ReplicationStateTransition": {"acquireCount": {"w": 2}}, "Global": {"acquireCount": {"r": 1, "w": 2}}, "Database": {"acquireCount": {"w": 2}}, "Collection": {"acquireCount": {"w": 2}}, "FlowControl": {"acquireCount": 2}, "writeConcern": {"w": "majority", "wtimeout": 60000, "provenance": "clientSupplied"}, "waitForWriteConcernDurationMillis": 7, "storage": {}, "cpuNanos": 1749188500, "protocol": "op_msg", "durationMillis": 5953}}
guestbook-db | {"t": {"$date": "2025-12-26T18:10:47.951+00:00"}, "s": "I", "c": "WCHKPT", "id": 22430, "ctx": "Checkpoint", "msg": "WiredTiger message", "attr": {"message": {"ts_sec": 1766772647, "ts_usec": 820805, "thread": "1:0x72fb4c485640", "session name": "WT_SESSION.checkpoint", "category": "WT_VERB_CHECKPOINT_PROGRESS", "category_id": 6, "verbose_level": "DEBUG 1", "verbose_level_id": 1, "msg": "saving checkpoint snapshot min: 49, snapshot max: 48 snapshot count: 0, oldest timestamp: (0, 0), meta checkpoint timestamp: (0, 0) base write gen: 1"}}}
guestbook-db | {"t": {"$date": "2025-12-26T18:10:54.371+00:00"}, "s": "I", "c": "INDEX", "id": 5479200, "ctx": "TTLMonitor", "msg": "Deleted expired documents using index", "attr": {"namespace": "config.system.sessions", "index": "1:1idTTLIndex", "numDeleted": 0, "durationMillis": 933}}
guestbook-db | {"t": {"$date": "2025-12-26T18:11:50.482+00:00"}, "s": "I", "c": "WCHKPT", "id": 22430, "ctx": "Checkpoint", "msg": "WiredTiger message", "attr": {"message": {"ts_sec": 1766772710, "ts_usec": 463159, "thread": "1:0x72fb4c485640", "session name": "WT_SESSION.checkpoint", "category": "WT_VERB_CHECKPOINT_PROGRESS", "category_id": 6, "verbose_level": "DEBUG 1", "verbose_level_id": 1, "msg": "saving checkpoint snapshot min: 49, snapshot max: 49 snapshot count: 0, oldest timestamp: (0, 0), meta checkpoint timestamp: (0, 0) base write gen: 1"}}}
guestbook-db | {"t": {"$date": "2025-12-26T18:12:50.670+00:00"}, "s": "I", "c": "WCHKPT", "id": 22430, "ctx": "Checkpoint", "msg": "WiredTiger message", "attr": {"message": {"ts_sec": 1766772770, "ts_usec": 595346, "thread": "1:0x72fb4c485640", "session name": "WT_SESSION.checkpoint", "category": "WT_VERB_CHECKPOINT_PROGRESS", "category_id": 6, "verbose_level": "DEBUG 1", "verbose_level_id": 1, "msg": "saving checkpoint snapshot min: 50, snapshot max: 50 snapshot count: 0, oldest timestamp: (0, 0), meta checkpoint timestamp: (0, 0) base write gen: 1"}}}
View in Docker Desktop View Config Enable Watch
```

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Container memory usage ⓘ166.14MB / 1.77GB

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	Name	Container ID	Image	Port(s)	CPU (%)	Last started	Actions
	cool_torvalds	4b6316c7695a	my-first-ser	3000:3000	0%	7 days ago	
	test-container	e8f4862dda56	ubuntu:resr		0%	7 days ago	
	goofy_Lehmann	dd93e2a23d81	node:its-alp		0%	7 hours ago	
	guest-book	-	-	-	1.18%	29 minutes ago	
	guestbook-dt	b085bf0fb794	mongo:Z-ja		0.89%	29 minutes ago	
	guestbook-ap	ca1bcf9e7da0	backend	3000:3000	0.29%	29 minutes ago	
	guestbook-wr	6202dc27ab1b	frontend	8080:80	0%	29 minutes ago	

Showing 7 items

Engine running

RAM 1.72 GB CPU 4.72% Disk: 3.94 GB used (limit 1006.85 GB)

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	Name	Tag	Image ID	Created	Size	Actions
	node	its-alpine3.23	c921b97d4b74	9 days ago	225.95 MB	
	nginx	trixie	fb01117203ff	17 days ago	224.94 MB	
	postgres	15.15-trixie	697ff7029514	18 days ago	626.86 MB	
	ubuntu	resolute-20251130	901617b8bedb	27 days ago	132.74 MB	
	ubuntu	latest	c35e29c94501	2 months ago	117.31 MB	
	backend	latest	e492c28b5ad3	2 hours ago	280.36 MB	
	frontend	latest	32ccaab38421	1 hour ago	224.98 MB	
	mongo	7-jammy	8ddd3db4d263	7 days ago	1.14 GB	

Showing 9 items

Engine running

RAM 1.72 GB CPU 4.77% Disk: 3.94 GB used (limit 1006.85 GB)

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