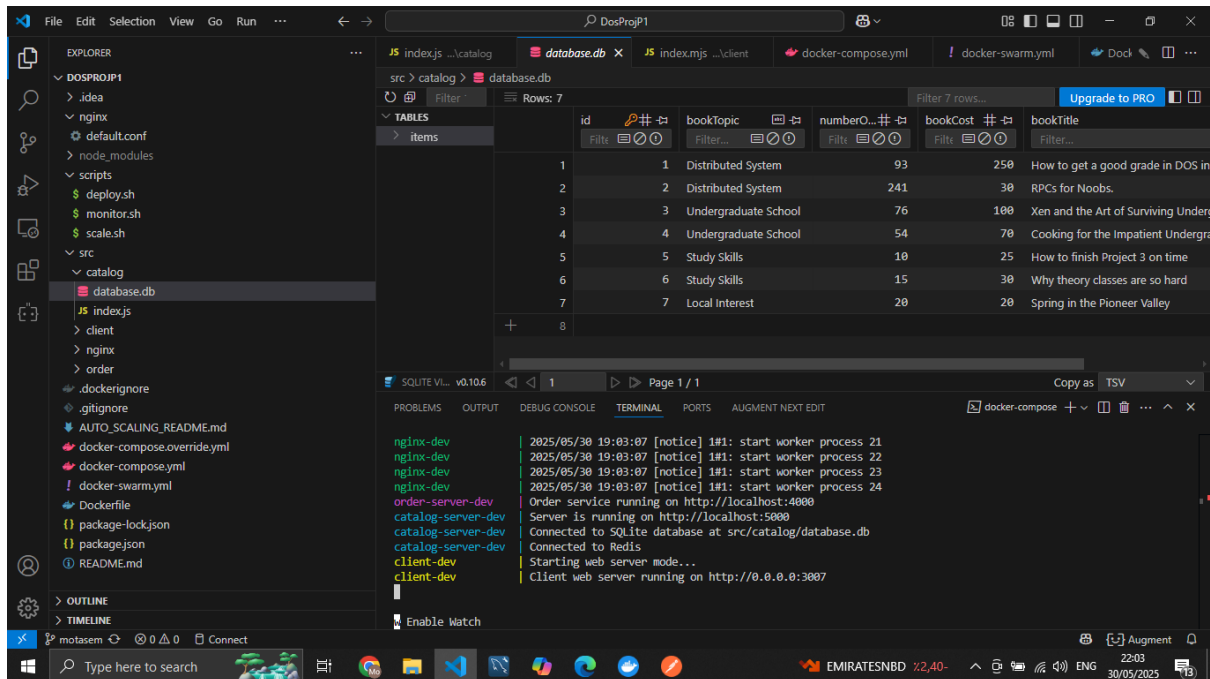


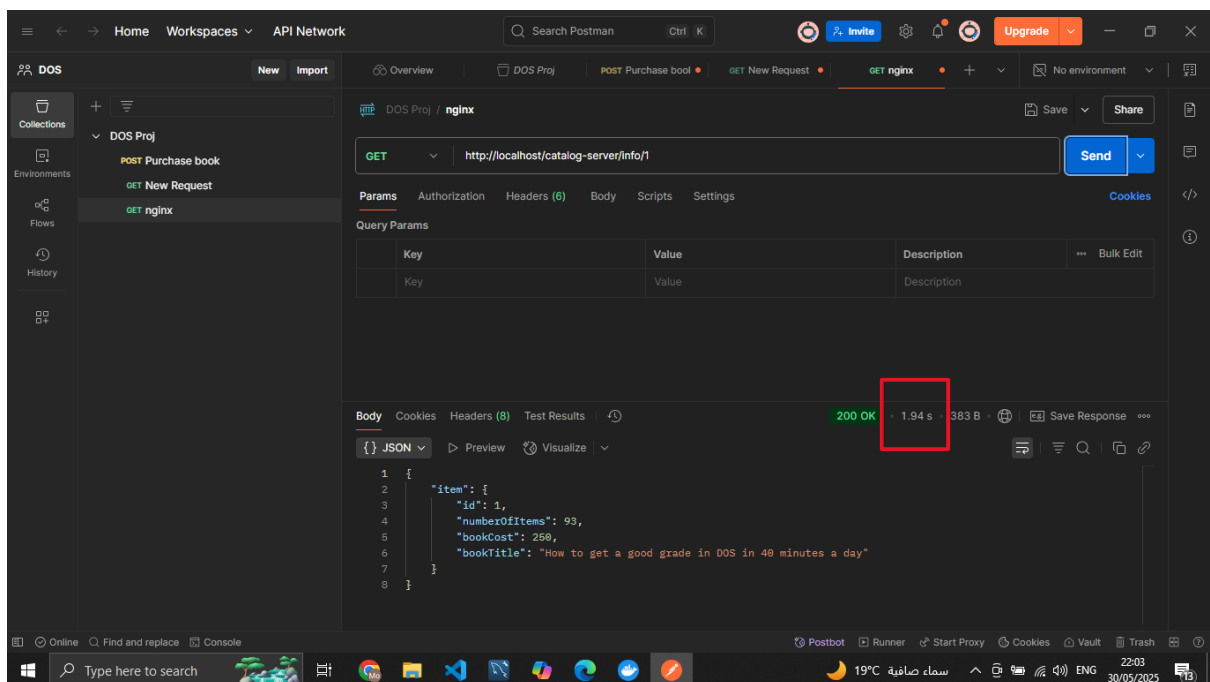
## Results of part 2

### 1. Caching

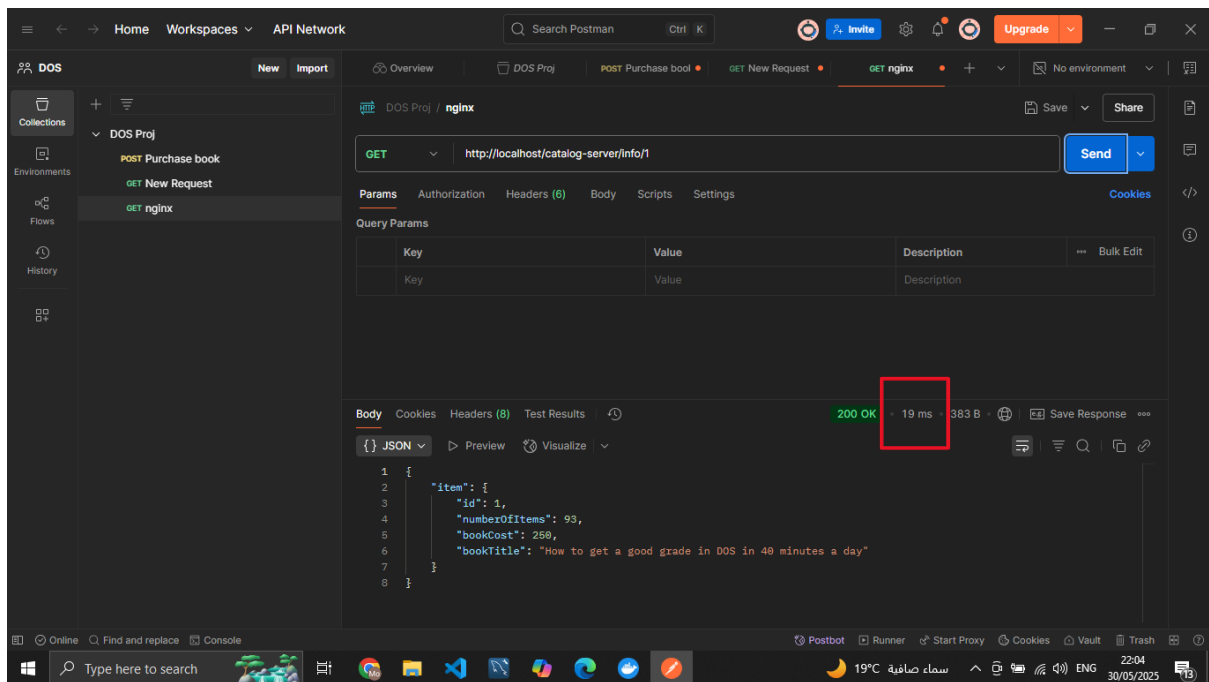
Building and running docker-compose file, the picture also shows the initial values in the database.



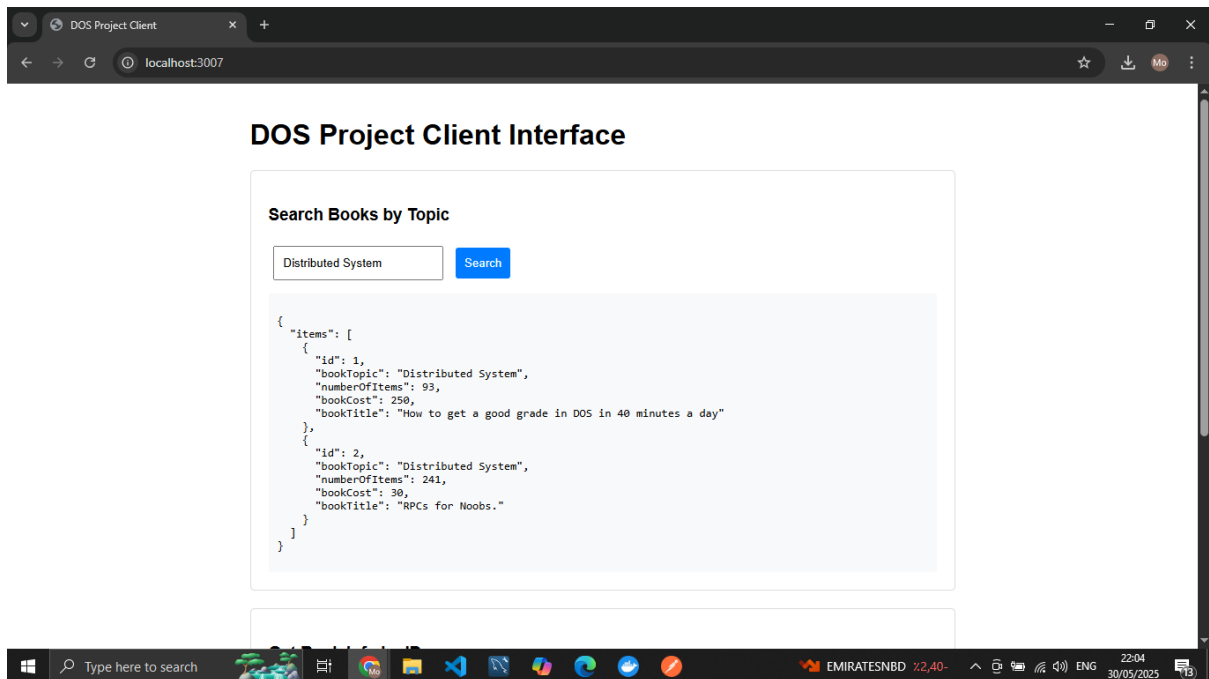
Testing a GET endpoint using post man and showing the **initial response time** (before caching) which is 1.94s.

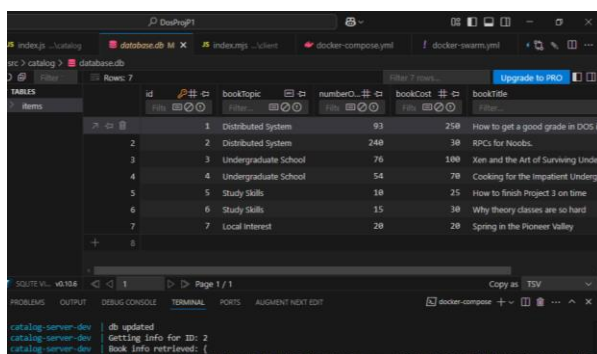
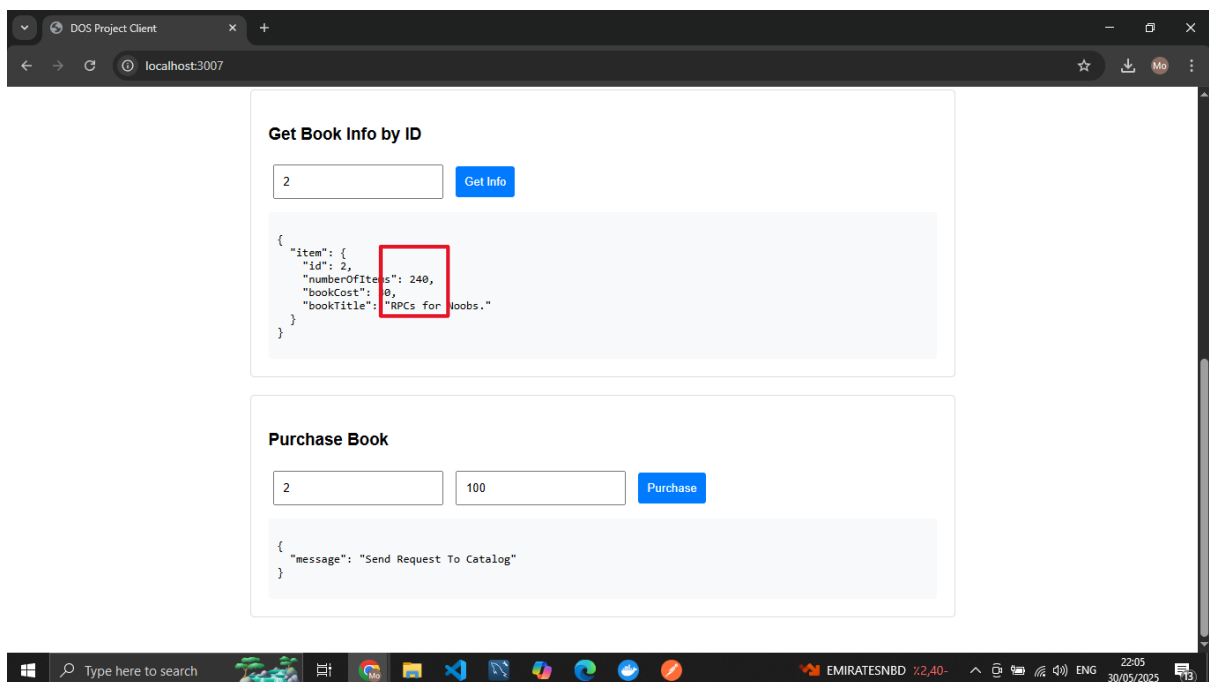
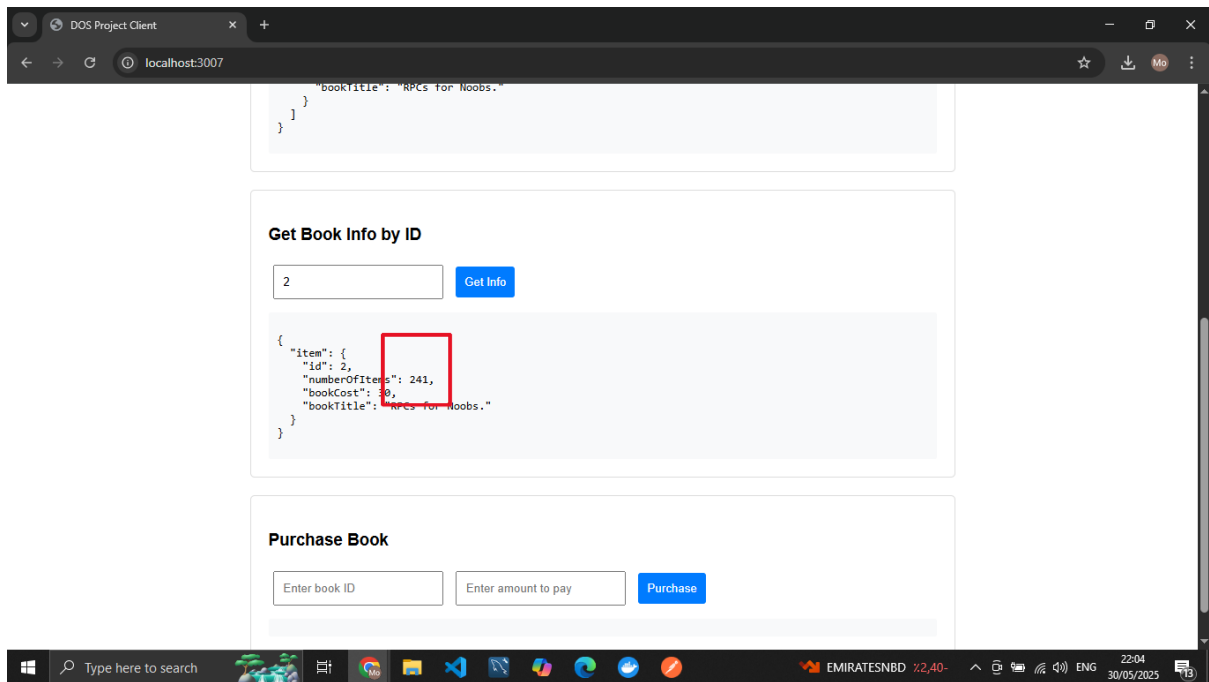


Testing the same endpoint after caching with a 19ms delay only.



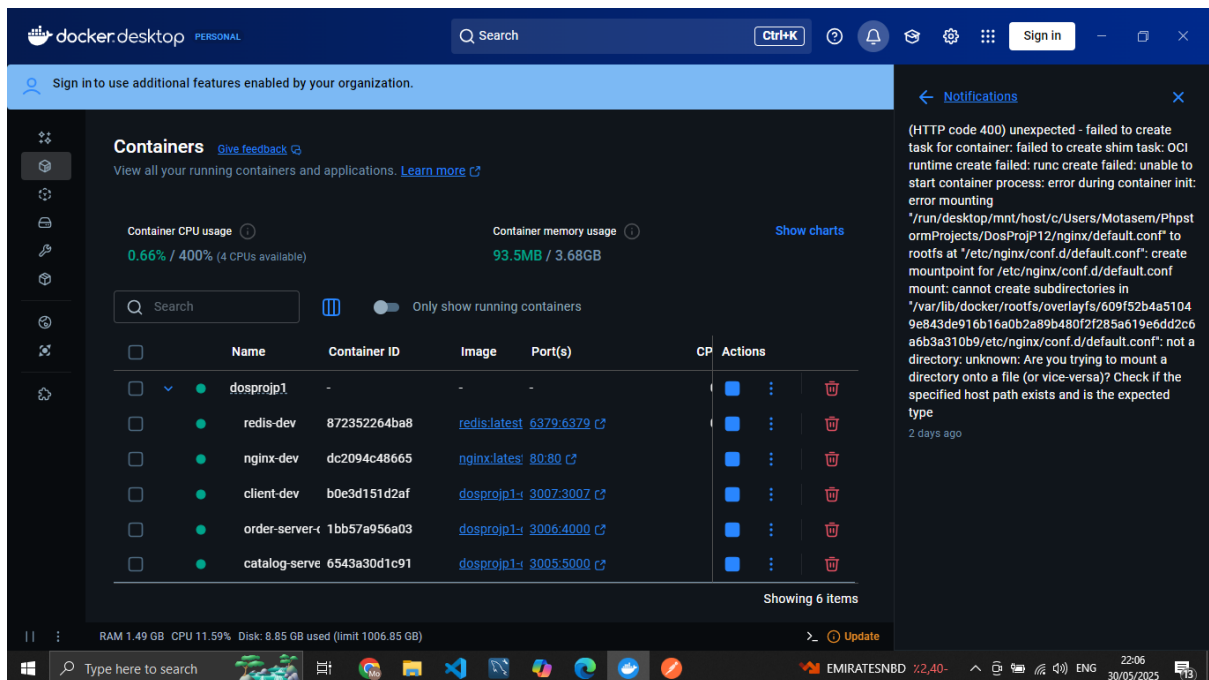
Testing endpoints using front end web page(Notice the amount before and after purchasing).





Showing that the original database values have also changed.

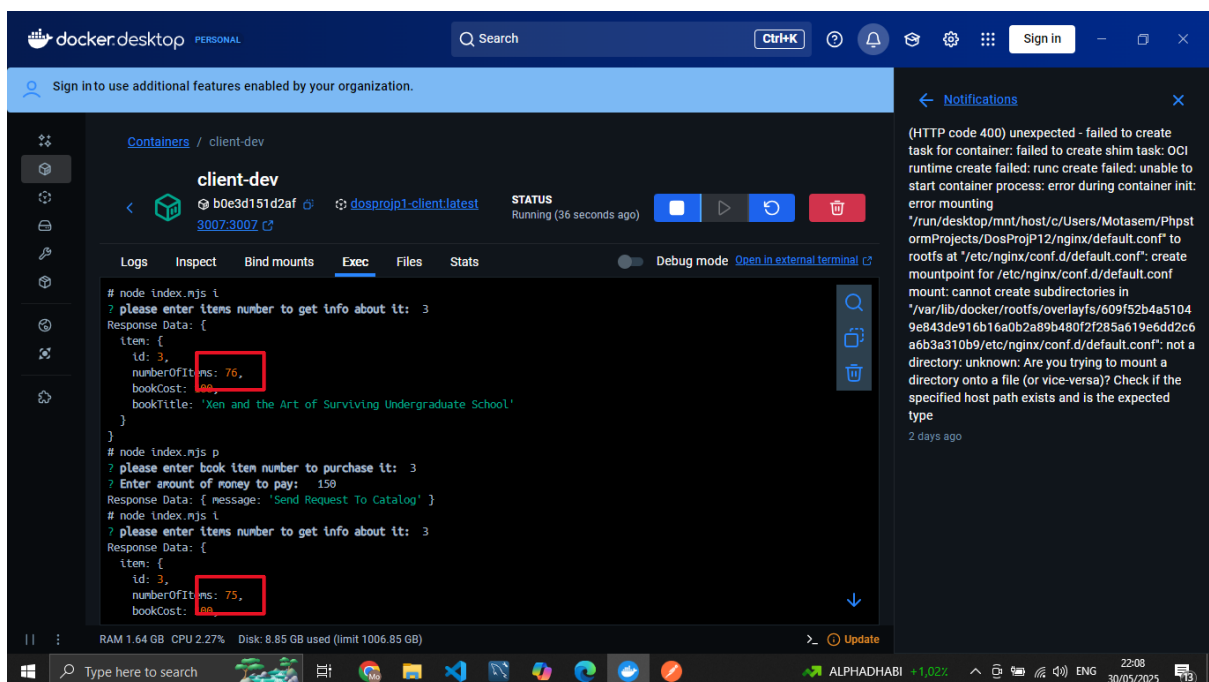
Showing dockering and putting each service in a separate container.



The screenshot shows the Docker Desktop interface. The 'Containers' tab is active, displaying a list of running containers. The system resources at the bottom show RAM 1.49 GB, CPU 11.59%, and Disk 8.85 GB used. A notification on the right side indicates an error: (HTTP code 400) unexpected - failed to create task for container: failed to create shim task: OCI runtime create failed: runc create failed: unable to start container process: error during container init: error mounting. The error message continues: "/run/desktop/mnt/host/c/Users/Motasem/PhpstormProjects/DosProj12/nginx/default.conf" to rootfs at "/etc/nginx/conf.d/default.conf": create mountpoint for "/etc/nginx/conf.d/default.conf" mount: cannot create subdirectories in "/var/lib/docker/rootfs/overlayfs/609f52b4a51049e843de916b16a0b2a89b480f2f285a619e6dd2c6a6b3a310b9/etc/nginx/conf.d/default.conf": not a directory: unknown: Are you trying to mount a directory onto a file (or vice-versa)? Check if the specified host path exists and is the expected type. 2 days ago.

Name	Container ID	Image	Port(s)	CP	Actions
dosproj1	-	-	-	-	[Stop] [Restart] [Delete]
redis-dev	872352264ba8	redis:latest	6379:6379		[Stop] [Restart] [Delete]
nginx-dev	dc2094c48665	nginx:latest	80:80		[Stop] [Restart] [Delete]
client-dev	b0e3d151d2af	dosproj1-client:latest	3007:3007		[Stop] [Restart] [Delete]
order-server	1bb57a956a03	dosproj1-client:latest	3006:4000		[Stop] [Restart] [Delete]
catalog-server	6543a30d1c91	dosproj1-client:latest	3005:5000		[Stop] [Restart] [Delete]

Testing purchasing from inside docker executer.



The screenshot shows the Docker Desktop interface with the 'client-dev' container selected. The 'Exec' tab is active, displaying the container's logs. The logs show a series of commands and responses from a Node.js application. Two instances of 'numberOfItems: 76,' and 'numberOfItems: 75,' are highlighted with red boxes. The system resources at the bottom show RAM 1.64 GB, CPU 2.27%, and Disk 8.85 GB used. The same notification from the previous screenshot is visible on the right side.

```
# node index.mjs i
? please enter items number to get info about it: 3
Response Data: {
  item: {
    id: 3,
    numberOfItems: 76,
    bookCost: 100,
    bookTitle: 'Xen and the Art of Surviving Undergraduate School'
  }
}
# node index.mjs p
? please enter book item number to purchase it: 3
? Enter amount of money to pay: 150
Response Data: { message: 'Send Request To Catalog' }
# node index.mjs i
? please enter items number to get info about it: 3
Response Data: {
  item: {
    id: 3,
    numberOfItems: 75,
    bookCost: 100,
  }
}
```

## 2. Replication

### Initializing docker swarm

```
Motaseem@DESKTOP-EE1R393 MINGW64 ~/Desktop/DOS-Repo/DosProjP1 (motasem)
$ docker swarm init
Swarm initialized: current node (extwmdpmoqltdt299ptoucdti) is now a manager.

To add a worker to this swarm, run the following command:

    docker swarm join --token SWMTKN-1-5f1qtu3urxq3rwbwldqshby38i19flxgo2np5sinq7k9zazxk-aywd47ljs14hld79qwxobpwi 192.168.65.3:2377

To add a manager to this swarm, run 'docker swarm join-token manager' and follow the instructions.
```

Containers and replicas deployment and listing the services and their replicas **after** a certain delay (around 1 min) to make sure that the replicas run properly.

```
MINGW64/c/Users/Motaseem/Desktop/DOS-Repo/DosProjP1
Motaseem@DESKTOP-EE1R393 MINGW64 ~/Desktop/DOS-Repo/DosProjP1 (motasem)
$ docker stack deploy -c docker-swarm.yml dos-app
Ignoring deprecated options:

expose: Exposing ports is unnecessary - services on the same network can access each other's containers on any port.

Since --detach=false was not specified, tasks will be created in the background.
In a future release, --detach=false will become the default.
Creating network dos-app_network
Creating service dos-app_nginx
Creating service dos-app_client
Creating service dos-app_catalog-server
Creating service dos-app_order-server
Creating service dos-app_redis

Motaseem@DESKTOP-EE1R393 MINGW64 ~/Desktop/DOS-Repo/DosProjP1 (motasem)
$ docker service ls
ID                NAME                MODE                REPLICAS            IMAGE                PORTS
m4xlm9uziym      dos-app_catalog-server  replicated          3/3                  dos-project:catalog
qxxddayw8p       dos-app_client         replicated          1/1                  dos-project:client
p23wkq206x2a     dos-app_nginx          replicated          2/2                  nginx:latest        *:80->80/tcp
trtiirf3dc5r     dos-app_order-server   replicated          3/3                  dos-project:order
e97xbd3lw0ou     dos-app_redis          replicated          1/1                  redis:latest

Motaseem@DESKTOP-EE1R393 MINGW64 ~/Desktop/DOS-Repo/DosProjP1 (motasem)
$ curl http://localhost/health
healthy

Motaseem@DESKTOP-EE1R393 MINGW64 ~/Desktop/DOS-Repo/DosProjP1 (motasem)
$
```

Showing the scaling logs of the running replicas and checking their health.

```
MINGW64/c/Users/Motaseem/Desktop/DOS-Repo/DosProjP1
Motaseem@DESKTOP-EE1R393 MINGW64 ~/Desktop/DOS-Repo/DosProjP1 (motasem)
$ ./scripts/monitor.sh
WARNING: DOCKER_INSECURE_NO_TEMPLATES_RAW is set
WARNING: daemon is not using the default seccomp profile
[INFO] DOS Project Auto-scaling Monitor (Single Run)
[INFO] For continuous monitoring, use: ./scripts/monitor.sh --continuous

[INFO] === Service Overview ===
ID                NAME                MODE                REPLICAS            IMAGE                PORTS
m4xlm9uziym      dos-app_catalog-server  replicated          3/3                  dos-project:catalog
qxxddayw8p       dos-app_client         replicated          1/1                  dos-project:client
p23wkq206x2a     dos-app_nginx          replicated          2/2                  nginx:latest        *:80->80/tcp
trtiirf3dc5r     dos-app_order-server   replicated          3/3                  dos-project:order
e97xbd3lw0ou     dos-app_redis          replicated          1/1                  redis:latest

[INFO] === dos-app_catalog-server Metrics ===
[METRIC] Current replicas: 3
[METRIC] Running tasks: 3
[SUCCESS] Health check: HEALTHY
[INFO] Recent logs:
dos-app_catalog-server.1.jdwry6j8jgq48docker-desktop | Connected to Redis
dos-app_catalog-server.2.zvrbpzm0a0u48docker-desktop | Connected to Redis
dos-app_catalog-server.3.p8jydvew20jg8docker-desktop | Connected to Redis

[INFO] === dos-app_order-server Metrics ===
[METRIC] Current replicas: 3
[METRIC] Running tasks: 3
[SUCCESS] Health check: HEALTHY
[INFO] Recent logs:
dos-app_order-server.3.z0ns621puekh8docker-desktop | Order service running on http://localhost:4000
dos-app_order-server.2.ykn8chmgm9n8docker-desktop | Order service running on http://localhost:4000
dos-app_order-server.1.zqdrvkllmq76docker-desktop | Order service running on http://localhost:4000

[INFO] === dos-app_nginx Metrics ===
[METRIC] Current replicas: 2
[METRIC] Running tasks: 2
[SUCCESS] Health check: HEALTHY
[INFO] Recent logs:
dos-app_nginx.2.n6jslhwzh24g8docker-desktop | /docker-entrypoint.sh: Launching /docker-entrypoint.d/20-envsubst-on-templates.sh
dos-app_nginx.1.fscrhjyibb28docker-desktop | /docker-entrypoint.sh: Launching /docker-entrypoint.d/20-envsubst-on-templates.sh
dos-app_nginx.2.n6jslhwzh24g8docker-desktop | /docker-entrypoint.sh: Launching /docker-entrypoint.d/30-tune-worker-processes.sh
dos-app_nginx.1.fscrhjyibb28docker-desktop | /docker-entrypoint.sh: Launching /docker-entrypoint.d/30-tune-worker-processes.sh
dos-app_nginx.2.n6jslhwzh24g8docker-desktop | /docker-entrypoint.sh: Configuration complete; ready for start up
dos-app_nginx.1.fscrhjyibb28docker-desktop | /docker-entrypoint.sh: Configuration complete; ready for start up
dos-app_nginx.2.4gvcy20hnmj78docker-desktop | /docker-entrypoint.sh: Launching /docker-entrypoint.d/20-envsubst-on-templates.sh
dos-app_nginx.2.4gvcy20hnmj78docker-desktop | /docker-entrypoint.sh: Launching /docker-entrypoint.d/30-tune-worker-processes.sh
dos-app_nginx.2.4gvcy20hnmj78docker-desktop | /docker-entrypoint.sh: Configuration complete; ready for start up
dos-app_nginx.1.whntnvo0r3eb48docker-desktop | 10.0.0.2 - - [30/May/2025:19:16:08 +0000] "GET /catalog-server/metrics HTTP/1.1" 200 236 "-" "curl/8.12.1" "-"
dos-app_nginx.1.whntnvo0r3eb48docker-desktop | 10.0.0.2 - - [30/May/2025:19:16:10 +0000] "GET /order-server/metrics HTTP/1.1" 200 211 "-" "curl/8.12.1" "-"
dos-app_nginx.2.8goaqep1cya18docker-desktop | 10.0.0.2 - - [30/May/2025:19:16:09 +0000] "GET /catalog-server/metrics HTTP/1.1" 200 236 "-" "curl/8.12.1" "-"
```