

# Lab 2

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March 5, 2025



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# 1 Publishing and Exposing Ports

## 1.1 Use the Docker CLI

```
PS C:\Users\mjcul> docker run -d -p 8080:80 docker/welcome-to-docker
Unable to find image 'docker/welcome-to-docker:latest' locally
740091335c74: Pull complete
da9c2e764c5b: Pull complete
ade17ad21ef4: Pull complete
4e6f462c8a69: Pull complete
1324d9977cd2: Pull complete
1b9b96da2c74: Pull complete
5d329b1e101a: Pull complete
Digest: sha256:eedaff45e3c78538087bdd9dc7afafac7e110061bbdd836af4104b10f10ab693
Status: Downloaded newer image for docker/welcome-to-docker:latest
87d06b35879f32b2be664f30ded79686d63c83d06c6cc6a927143b80a6c8cb12
PS C:\Users\mjcul>
```

### Containers

[Give feedback](#)

View all your running containers and applications. [Learn more](#)


Container CPU usage





No containers are running.

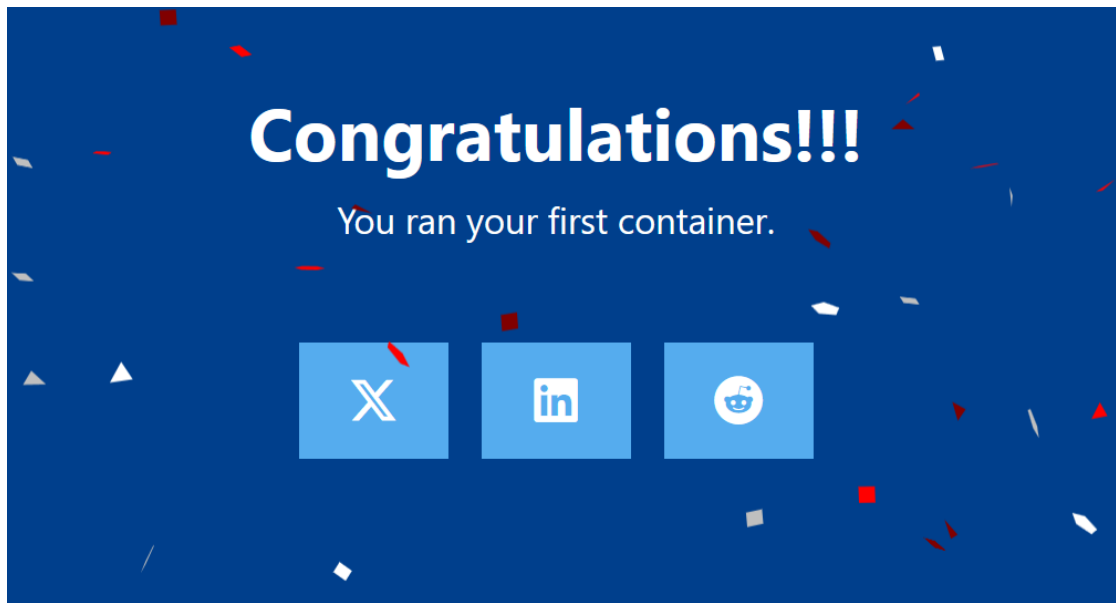
Container memory usage

No containers are running.

Show charts

 ☒ Only show running containers

<input type="checkbox"/>	Name	Container ID	Image	Port(s)	CPU (%)	Last start	Actions
<input type="checkbox"/>	 frosty_lamarr	87d06b35879f	<a href="#">docker/wel</a>	8080:80	N/A	2 hours ag	  



## 1.2 Use Docker Compose

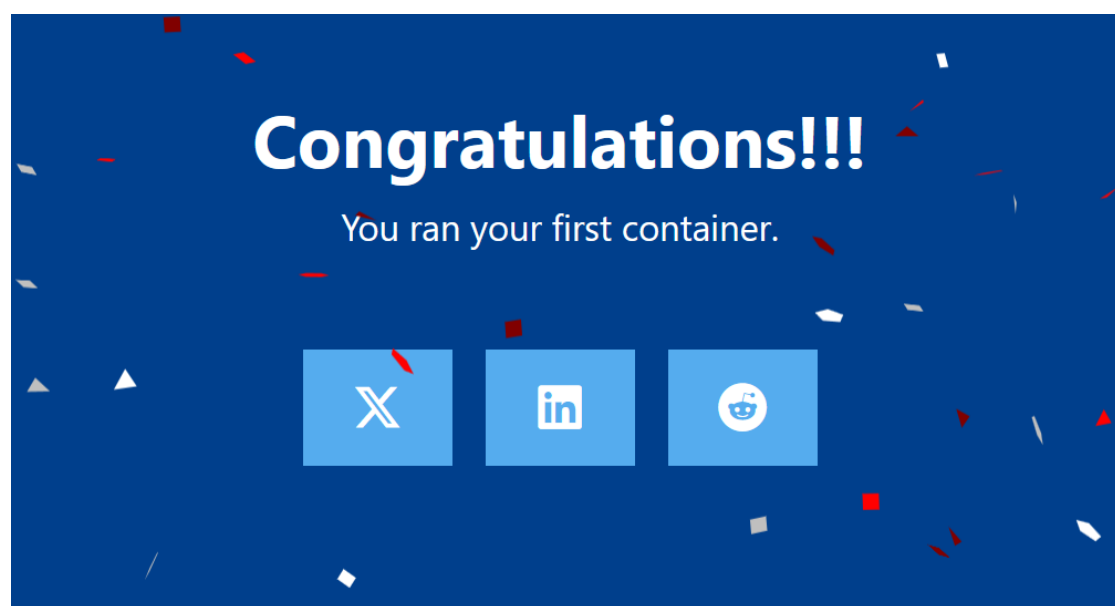
A screenshot of a code editor interface. On the left is the Explorer sidebar with a tree view showing a project structure: 'lab2' is expanded, containing 'compose.yaml', 'Penetration\_Test\_Re...', '.gitattributes', and 'lab1.txt'. The main editor area shows the 'compose.yaml' file with the following content:

```
lab2 > compose.yaml
1  services:
2    app:
3      image: docker/welcome-to-docker
4      ports:
5        - 8080:80
```

```
Terminal

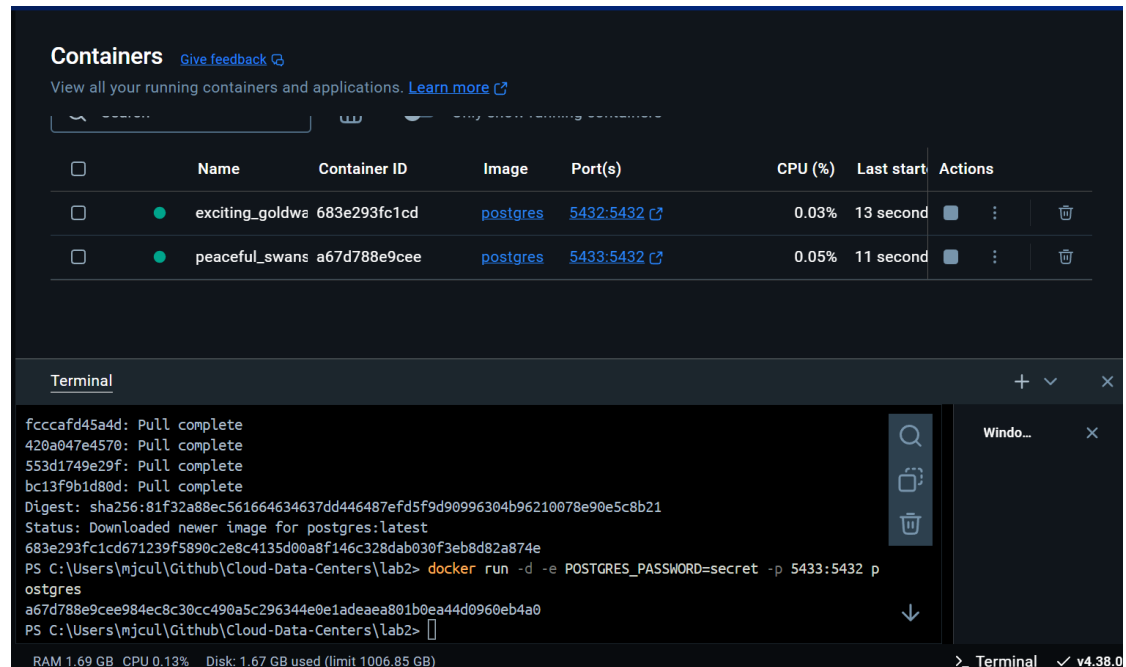
Mode                LastWriteTime         Length Name
----                -
-a-----         05/03/2025      14:20             83 compose.yaml

PS C:\Users\mjcul\Github\Cloud-Data-Centers\lab2> docker compose up
[+] Running 2/2
 ✓ Network lab2_default Created                                0.3s
 ✓ Container lab2-app-1 Created                                0.2s
Attaching to app-1
app-1 | /docker-entrypoint.sh: /docker-entrypoint.d/ is not empty, will attempt to perform configuration
app-1 | /docker-entrypoint.sh: Looking for shell scripts in /docker-entrypoint.d/
app-1 | /docker-entrypoint.sh: Launching /docker-entrypoint.d/10-listen-on-ipv6-by-default.sh
```



## 2 Overriding container defaults

### 2.1 Run multiple instance of the Postgres database



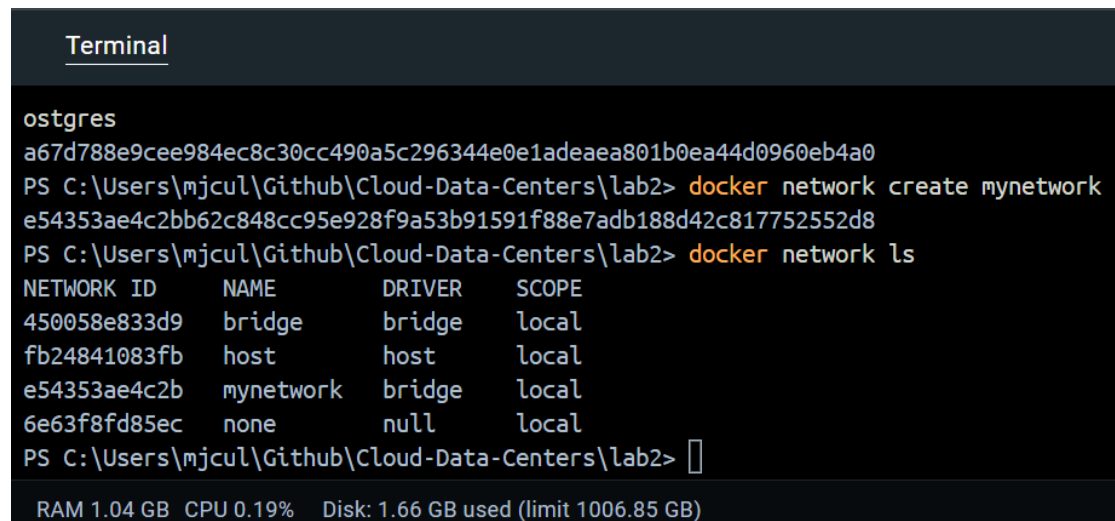
The screenshot shows the Docker Desktop interface. At the top, there's a 'Containers' section with a link to 'Give feedback'. Below it, a table lists running containers. Two containers are shown: 'exciting\_goldwa' and 'peaceful\_swans', both using the 'postgres' image and listening on port 5432. Below the table is a 'Terminal' window showing the output of a 'docker run' command. The command is: `docker run -d -e POSTGRES_PASSWORD=secret -p 5432:5432 postgres`. The output shows the container ID 'a67d788e9cee' and the command being executed. The bottom status bar shows 'RAM 1.69 GB CPU 0.13% Disk: 1.67 GB used (limit 1006.85 GB)' and 'Terminal v4.38.0'.

	Name	Container ID	Image	Port(s)	CPU (%)	Last start	Actions
<input type="checkbox"/>	exciting_goldwa	683e293fc1cd	postgres	5432:5432	0.03%	13 second	
<input type="checkbox"/>	peaceful_swans	a67d788e9cee	postgres	5433:5432	0.05%	11 second	

```
fcccafd45a4d: Pull complete
420a047e4570: Pull complete
553d1749e29f: Pull complete
bc13f9b1d80d: Pull complete
Digest: sha256:81f32a88ec561664634637dd446487efd5f9d90996304b96210078e90e5c8b21
Status: Downloaded newer image for postgres:latest
683e293fc1cd671239f5890c2e8c4135d00a8f146c328dab030f3eb8d82a874e
PS C:\Users\mjcul\Github\Cloud-Data-Centers\lab2> docker run -d -e POSTGRES_PASSWORD=secret -p 5432:5432 postgres
a67d788e9cee984ec8c30cc490a5c296344e0e1adeaea801b0ea44d0960eb4a0
PS C:\Users\mjcul\Github\Cloud-Data-Centers\lab2>
```

RAM 1.69 GB CPU 0.13% Disk: 1.67 GB used (limit 1006.85 GB) Terminal v4.38.0

### 2.2 Run Postgres container in a controlled network



The screenshot shows a terminal window with the following commands and output:

```
postgres
a67d788e9cee984ec8c30cc490a5c296344e0e1adeaea801b0ea44d0960eb4a0
PS C:\Users\mjcul\Github\Cloud-Data-Centers\lab2> docker network create mynetwork
e54353ae4c2bb62c848cc95e928f9a53b91591f88e7adb188d42c817752552d8
PS C:\Users\mjcul\Github\Cloud-Data-Centers\lab2> docker network ls
NETWORK ID      NAME          DRIVER  SCOPE
450058e833d9    bridge       bridge  local
fb24841083fb    host         host    local
e54353ae4c2b    mynetwork    bridge  local
6e63f8fd85ec    none        null    local
PS C:\Users\mjcul\Github\Cloud-Data-Centers\lab2>
```



RAM 1.04 GB CPU 0.19% Disk: 1.66 GB used (limit 1006.85 GB)





## 2.3 Override the default CMD and ENTRYPOINT

```
PS C:\Users\mjcul\Github\Cloud-Data-Centers\lab2> docker run -d -e POSTGRES_PASSWORD=secret --memory="512m" --cpus=".5" postgres
70890d3d42408c57e950c5ece8f075fdabdbf55c440b631ef6c724fdda1fca85
PS C:\Users\mjcul\Github\Cloud-Data-Centers\lab2> docker compose up -d
[+] Running 2/2
✓ Network lab2_default      Created          0.3s
✓ Container lab2-postgres-1 Started         0.6s
PS C:\Users\mjcul\Github\Cloud-Data-Centers\lab2>
```

Containers / lab2-postgres-1

### lab2-postgres-1

◀  b60187607815  postgres:latest

**STATUS**  
Running (4 minutes ago)    

**Logs** Inspect Bind mounts Exec Files Stats

```
2025-03-05 14:39:11 2025-03-05 14:39:11.219 UTC [49] LOG: checkpoint starting: shutdown immediate
2025-03-05 14:39:11 2025-03-05 14:39:11.234 UTC [49] LOG: checkpoint complete: wrote 3 buffers (0.0%); 0 WAL file(s) added, 0
removed, 0 recycled; write=0.005 s, sync=0.002 s, total=0.019 s; sync files=2, longest=0.001 s, average=0.001 s; distance=0 k
B, estimate=0 kB; lsn=0/14E4FA0, redo lsn=0/14E4FA0
2025-03-05 14:39:11 2025-03-05 14:39:11.242 UTC [48] LOG: database system is shut down
2025-03-05 14:39:11 done
2025-03-05 14:39:11 server stopped
2025-03-05 14:39:11
2025-03-05 14:39:11 PostgreSQL init process complete; ready for start up.
2025-03-05 14:39:11
2025-03-05 14:39:10 initdb: warning: enabling "trust" authentication for local connections
2025-03-05 14:39:10 initdb: hint: You can change this by editing pg_hba.conf or using the option -A, or --auth-local and --aut
h-host, the next time you run initdb.
2025-03-05 14:39:11 2025-03-05 14:39:11.357 UTC [1] LOG: starting PostgreSQL 17.4 (Debian 17.4-1.pgdg120+2) on x86_64-pc-linu
x-gnu, compiled by gcc (Debian 12.2.0-14) 12.2.0, 64-bit
2025-03-05 14:39:11 2025-03-05 14:39:11.362 UTC [1] LOG: listening on IPv6 address "::1", port 5432
2025-03-05 14:39:11 2025-03-05 14:39:11.363 UTC [1] LOG: listening on IPv4 address "127.0.0.1", port 5432
2025-03-05 14:39:11 2025-03-05 14:39:11.371 UTC [1] LOG: listening on Unix socket "/var/run/postgresql/.s.PGSQL.5432"
2025-03-05 14:39:11 2025-03-05 14:39:11.385 UTC [62] LOG: database system was shut down at 2025-03-05 14:39:11 UTC
2025-03-05 14:39:11 2025-03-05 14:39:11.399 UTC [1] LOG: database system is ready to accept connections
```

## 3 Persisting container data

### 3.1 Use volumes

```
PS C:\Users\mjcul\Github\Cloud-Data-Centers\lab2> docker exec -ti new-db psql -U postgres -c "SELECT * FROM tasks"
id | description
-----+-----
 1 | Finish work
 2 | Have fun
(2 rows)

PS C:\Users\mjcul\Github\Cloud-Data-Centers\lab2> 
```

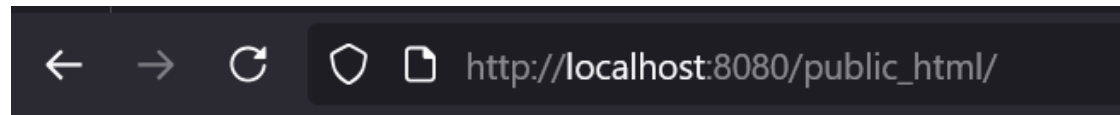
### 3.2 Remove volumes

```
PS C:\Users\mjcul\Github\Cloud-Data-Centers\lab2> docker rm -f new-db
new-db
PS C:\Users\mjcul\Github\Cloud-Data-Centers\lab2> docker volume rm postgres_data
postgres_data
PS C:\Users\mjcul\Github\Cloud-Data-Centers\lab2> docker volume prune
WARNING! This will remove anonymous local volumes not used by at least one container.
Are you sure you want to continue? [y/N] y
Deleted Volumes:
867024d97ace0e949c517da1ad50b4acdbfbc6cef8d07276b32c1ba5eea034aa

Total reclaimed space: 40.38MB
```

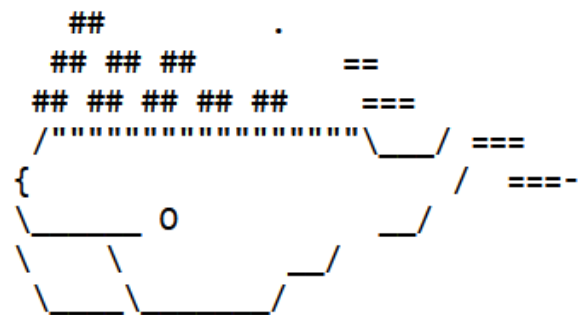


## 4 Sharing local files with containers



# Whalecome!!

Look! There's a friendly whale greeting you!



Hello from Docker!

## 5 Multi-container applications

```
9dd64d726ade94c7856f282ef86c243134f84d312556cabfebefbfbcb479e806
PS C:\Users\mjcul\Github\Cloud-Data-Centers\lab2> git clone https://github.com/docker-samples/nginx-node-redis
Cloning into 'nginx-node-redis'...
remote: Enumerating objects: 78, done.
remote: Counting objects: 100% (78/78), done.
remote: Compressing objects: 100% (73/73), done.
Receiving objects: 97% (76/78)used 4 (delta 1), pack-reused 0 (from 0)
Receiving objects: 100% (78/78), 75.06 KiB | 5.77 MiB/s, done.
Resolving deltas: 100% (25/25), done.
PS C:\Users\mjcul\Github\Cloud-Data-Centers\lab2> cd nginx-node-redis
PS C:\Users\mjcul\Github\Cloud-Data-Centers\lab2\nnginx-node-redis> 
```

```
22bb6e1d0f3fbc4b527db74b1da231da09131f073de93838f604373972f33
PS C:\Users\mjcul\Github\Cloud-Data-Centers\lab2\nnginx-node-redis\nnginx> docker ps
CONTAINER ID   IMAGE      COMMAND                  CREATED        STATUS        PORTS                    NAMES
78bfca0c21b8   web        "/docker-entrypoint..." 16 seconds ago Up 16 seconds   80/tcp         web2
4f47648f20b7   redis      "docker-entrypoint.s..." 23 seconds ago Up 23 seconds   6379/tcp       redis
9dd64d726ade   httpd:2.4 "httpd-foreground"       12 minutes ago Up 11 minutes   0.0.0.0:8080->80/tcp my_site
PS C:\Users\mjcul\Github\Cloud-Data-Centers\lab2\nnginx-node-redis\nnginx> 
```

← → ↺ 🛡️ 📄 http://localhost

web2: Number of visits is: 12