Docker Challenge 3

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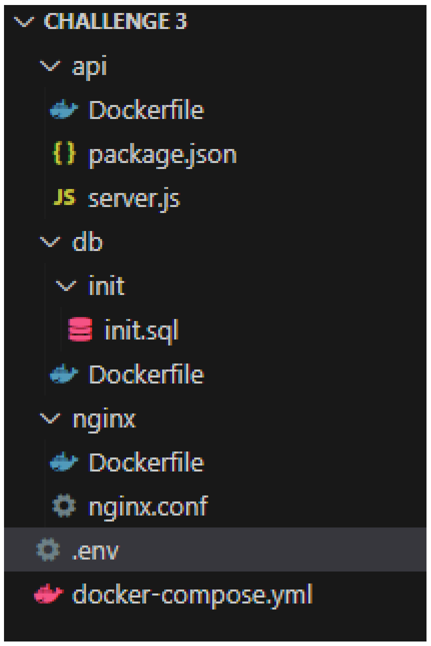
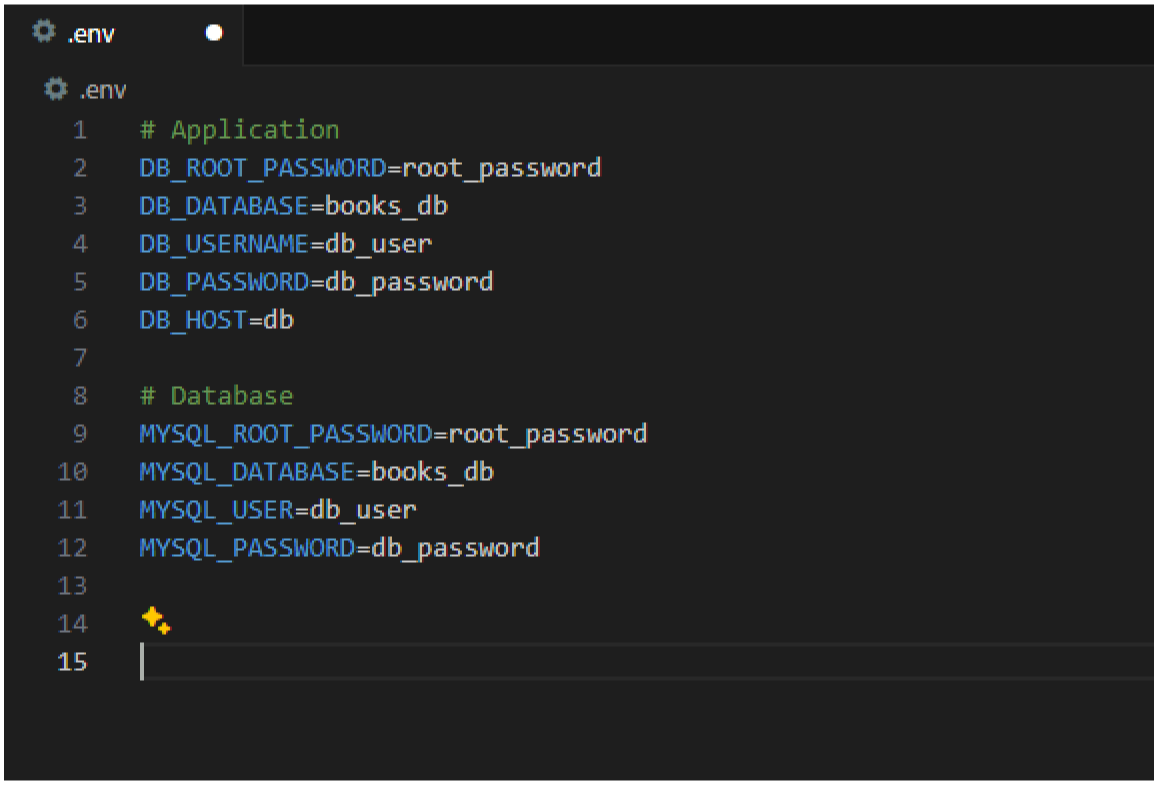
For Docker Challenge 3, we are tasked with connecting a NGinx app to a simple database, and displaying the information. To start, we were given the NGinx, the database, and the api files and their respective dockerfiles.

This is the overall file layout:



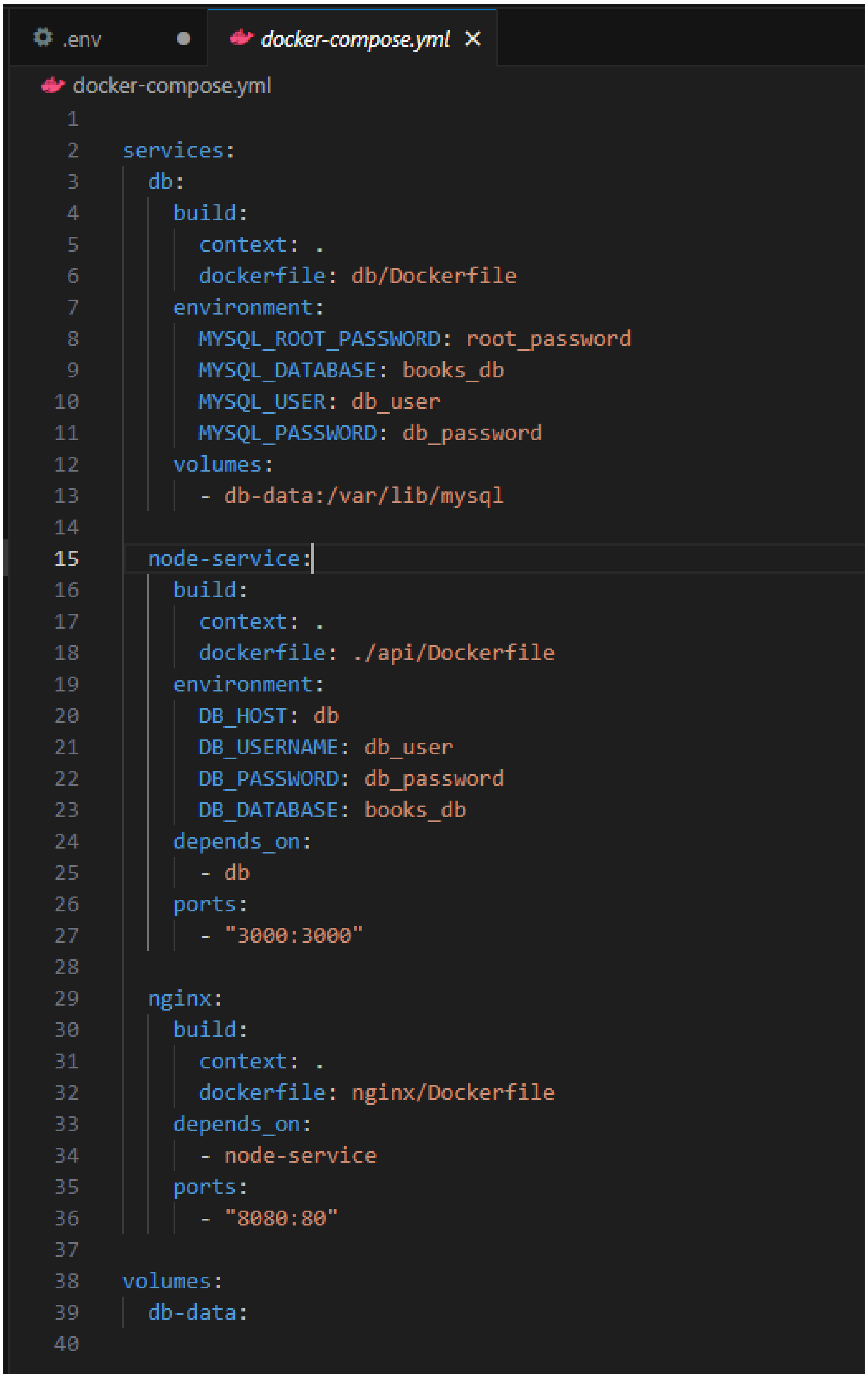
```
CHALLENGE 3
  api
    Dockerfile
    package.json
    server.js
  db
    init
      init.sql
    Dockerfile
  nginx
    Dockerfile
    nginx.conf
  .env
  docker-compose.yml
```

Note that the .env, and the docker-compose file were not included in the package.
Once the package was extracted, we were responsible for setting the .env variables and writing the docker-compose file. The .env file should look something like this:



```
# Application
DB_ROOT_PASSWORD=root_password
DB_DATABASE=books_db
DB_USERNAME=db_user
DB_PASSWORD=db_password
DB_HOST=db

# Database
MYSQL_ROOT_PASSWORD=root_password
MYSQL_DATABASE=books_db
MYSQL_USER=db_user
MYSQL_PASSWORD=db_password


```

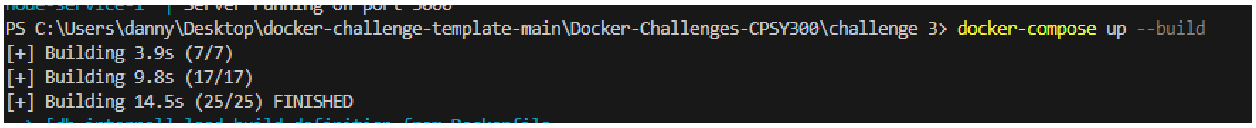
After we have made our .env file and saved all of our variables, we can continue on to write out docker-compose file. It should look something like this



```yaml

services:
  db:
    build:
      context: .
      dockerfile: db/Dockerfile
    environment:
      MYSQL_ROOT_PASSWORD: root_password
      MYSQL_DATABASE: books_db
      MYSQL_USER: db_user
      MYSQL_PASSWORD: db_password
    volumes:
      - db-data:/var/lib/mysql

  node-service:
    build:
      context: .
      dockerfile: ./api/Dockerfile
    environment:
      DB_HOST: db
      DB_USERNAME: db_user
      DB_PASSWORD: db_password
      DB_DATABASE: books_db
    depends_on:
      - db
    ports:
      - "3000:3000"

  nginx:
    build:
      context: .
      dockerfile: nginx/Dockerfile
    depends_on:
      - node-service
    ports:
      - "8080:80"

volumes:
  db-data:

```

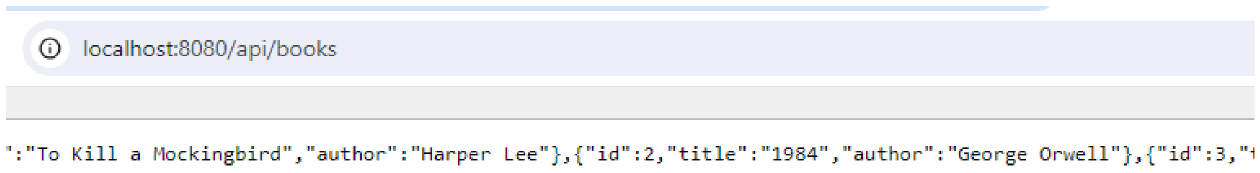
This file describes what services we are building, and where to find them. For example for the database (db), the build section describes where to find the dockerfile to build the database from, and in this case it is the db/Dockerfile in the directory. The environment variables are used to build the database (not to be confused with the .env). The volumes mounts a volume to the /var/lib/mysql MariaDB directory. This is how the information is stored. The other two services are largely the same, but the only difference being that node-service and nginx have ports. This first number is the port of the host, and the second is the port of the container.

Now that we have our files ready, we can simply build and run our container. The command for building and running the docker-compose file, in the directory of the docker-compose file we type the command ‘docker-compose up --build’, which first builds the container, then runs it. It should take a few minutes for the container to build and then to run.



```
PS C:\Users\danny\Desktop\docker-challenge-template-main\Docker-Challenges-CPSY300\challenge 3> docker-compose up --build
[+] Building 3.9s (7/7)
[+] Building 9.8s (17/17)
[+] Building 14.5s (25/25) FINISHED
```

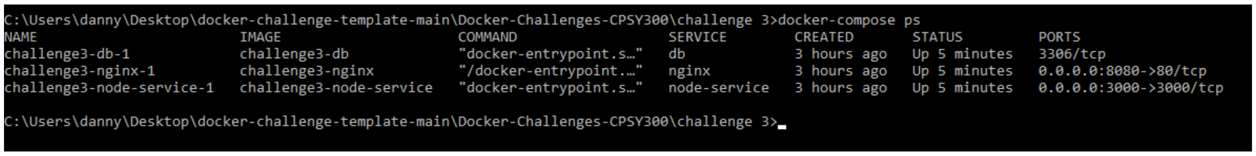
Once the container is running, we can go to port 8080 of the localhost in a browser. If everything is correct, and the build was successful, you should be able to see the items in the database in json format.



localhost:8080/api/books

```
":"To Kill a Mockingbird","author":"Harper Lee"},{"id":2,"title":"1984","author":"George Orwell"},{"id":3,"
```

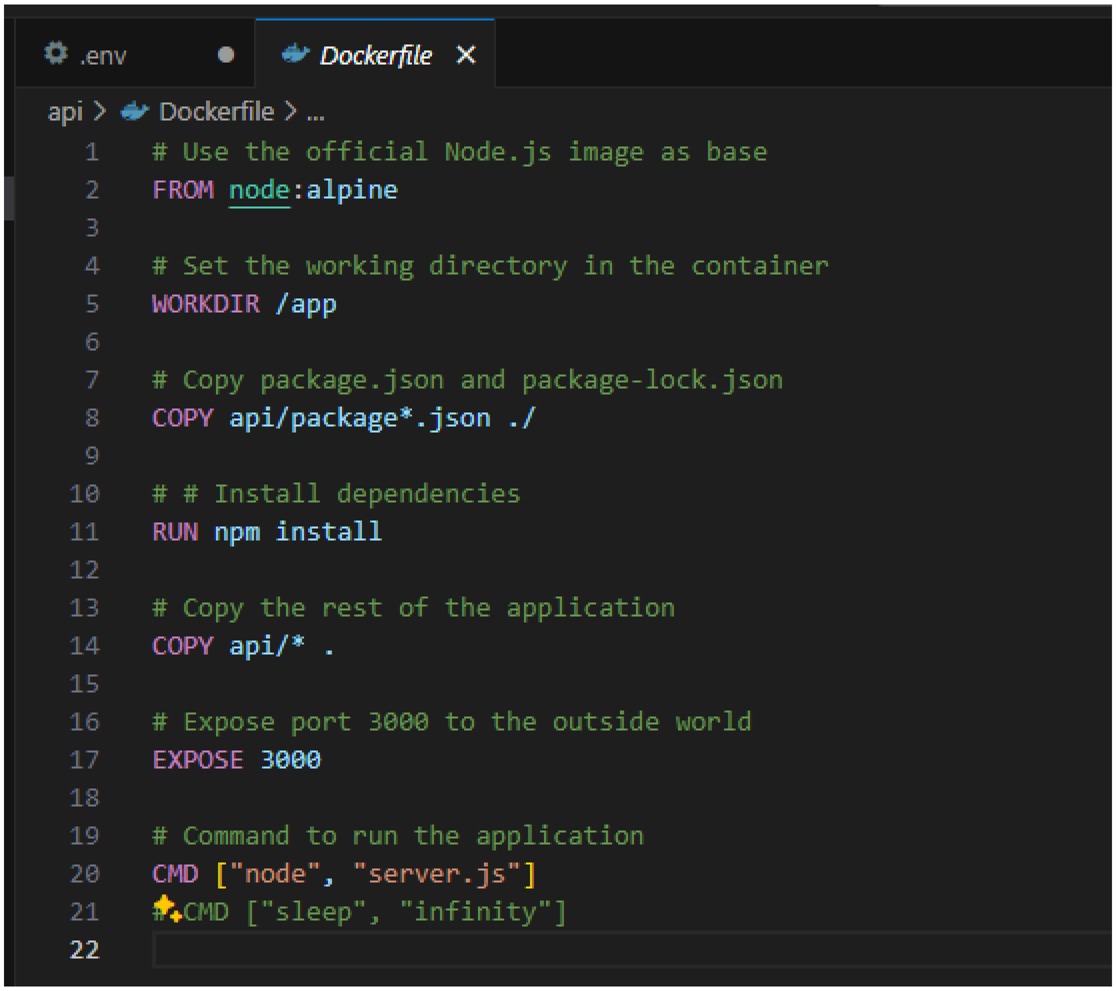
Additionally, you can test the containers by navigating to the correct folder in the command line, and typing in docker-compose ps, which should give you something like this:



```
C:\Users\danny\Desktop\docker-challenge-template-main\Docker-Challenges-CPSY300\challenge 3>docker-compose ps
NAME                     IMAGE                    COMMAND                  SERVICE         CREATED         STATUS         PORTS
challenge3-db-1          challenge3-db            "docker-entrypoint.s…"   db              3 hours ago     Up 5 minutes   3306/tcp
challenge3-nginx-1       challenge3-nginx         "/docker-entrypoint.…"   nginx           3 hours ago     Up 5 minutes   0.0.0.0:8080->80/tcp
challenge3-node-service-1   challenge3-node-service   "docker-entrypoint.s…"   node-service    3 hours ago     Up 5 minutes   0.0.0.0:3000->3000/tcp

C:\Users\danny\Desktop\docker-challenge-template-main\Docker-Challenges-CPSY300\challenge 3>
```

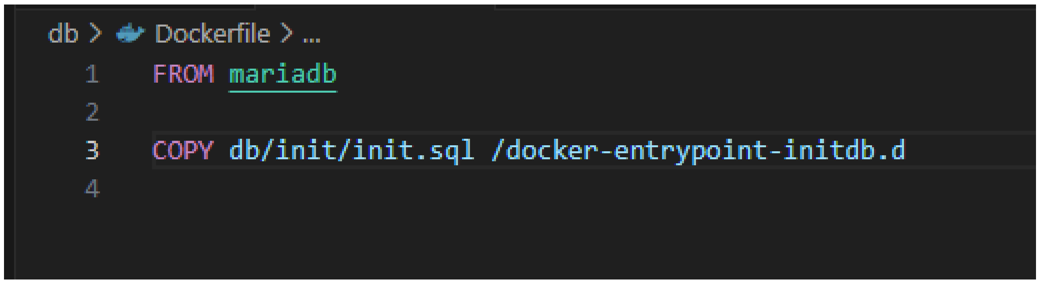
Here we can visibility see all 3 services are correctly running.

As for trouble shooting, it is imperative that the file layout in the directory is correct, and that the dockerfile addresses are correct. The initial package had docker/ in front of the COPY command, which I deleted, and then the relative addresses worked fine. Here are the corrected dockerfile addresses:

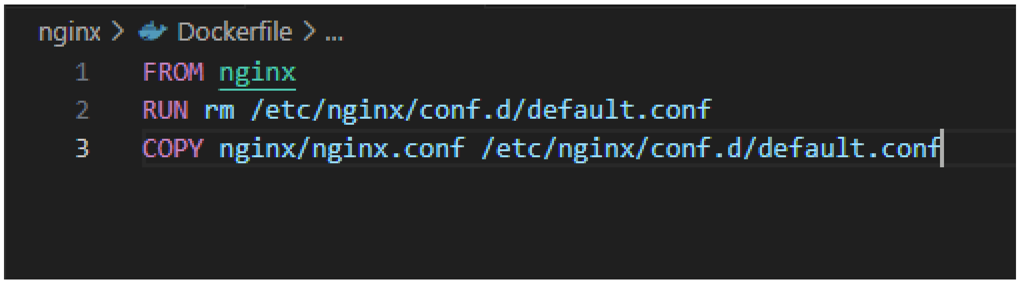

.env Dockerfile

api > Dockerfile > ...

```dockerfile
# Use the official Node.js image as base
FROM node:alpine

# Set the working directory in the container
WORKDIR /app

# Copy package.json and package-lock.json
COPY api/package*.json ./

# # Install dependencies
RUN npm install

# Copy the rest of the application
COPY api/* .

# Expose port 3000 to the outside world
EXPOSE 3000

# Command to run the application
CMD ["node", "server.js"]
#CMD ["sleep", "infinity"]

```


db > Dockerfile > ...

```dockerfile
FROM mariadb

COPY db/init/init.sql /docker-entrypoint-initdb.d

```


nginx > Dockerfile > ...

```dockerfile
FROM nginx
RUN rm /etc/nginx/conf.d/default.conf
COPY nginx/nginx.conf /etc/nginx/conf.d/default.conf
```

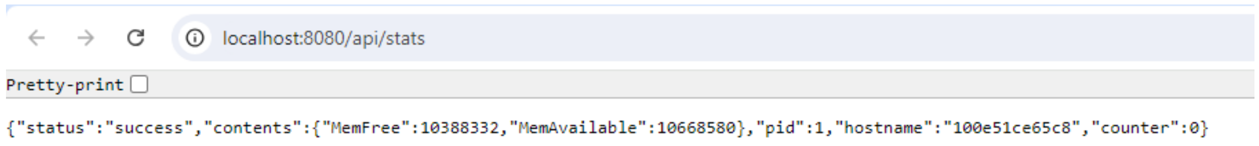
Another trouble shooting aspect was ensuring that the .env file and the docker-compose file had the same environment variables. Any variance and the container will not work, as the variables must be the same. If you are still struggling, here are some commands for debugging:

Docker-compose logs db
Docker-compose logs node-service
Docker-compose logs nginx

These will show you the logs of the of the build process, and you can see any problems as they arise.

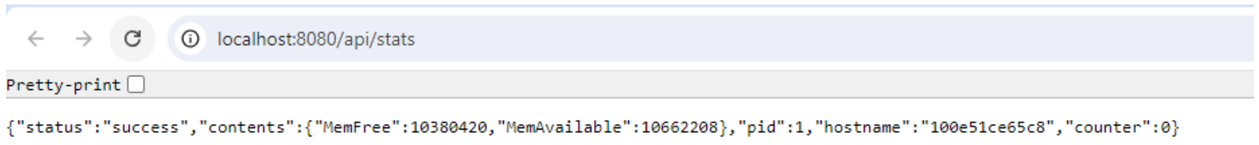
Docker Challenge 4

The docker challenge 4 require us to scale the application we built in challenge 3 up. Going to the url http://localhost:8080/api/stats with the app running, we get this message:

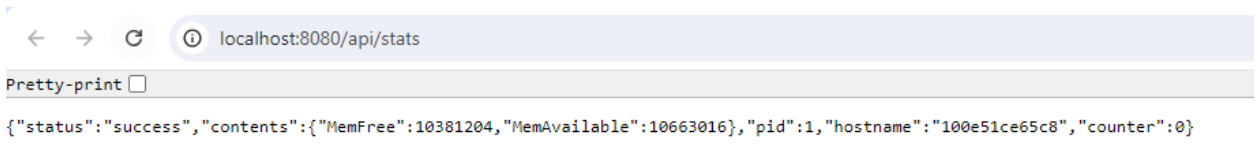


```
{"status":"success","contents":{"MemFree":10388332,"MemAvailable":10668580},"pid":1,"hostname":"100e51ce65c8","counter":0}
```

If we do this a couple more times we get:



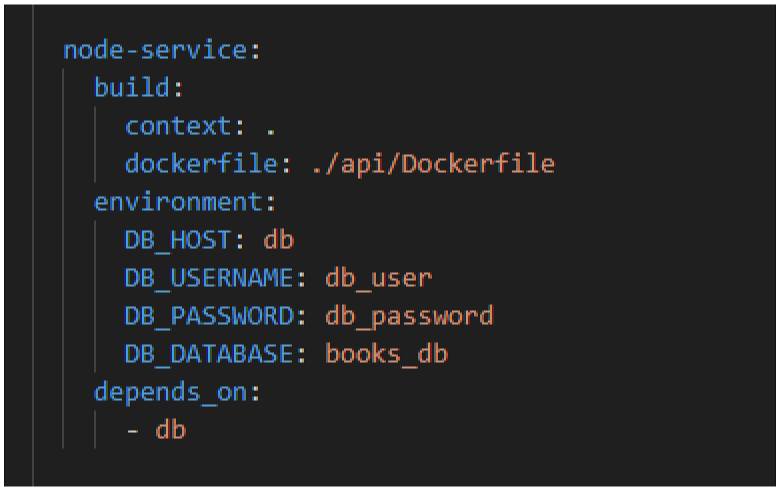
```
{"status":"success","contents":{"MemFree":10380420,"MemAvailable":10662208},"pid":1,"hostname":"100e51ce65c8","counter":0}
```



```
{"status":"success","contents":{"MemFree":10381204,"MemAvailable":10663016},"pid":1,"hostname":"100e51ce65c8","counter":0}
```

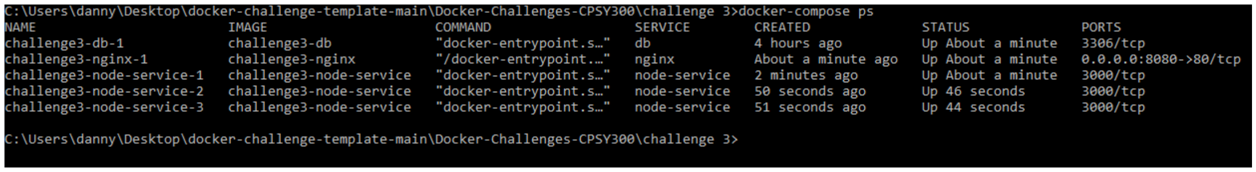
As we can see, the host name remains the same. We know this is actually a new request by the change in memory, and not just a frozen browser. The hostname we get for this is "100e51ce65c8"

After changing our docker-compose file slightly to let docker handle the ports instead of explicitly declaring them, like this:



```
  node-service:
    build:
      context: .
      dockerfile: ./api/Dockerfile
    environment:
      DB_HOST: db
      DB_USERNAME: db_user
      DB_PASSWORD: db_password
      DB_DATABASE: books_db
    depends_on:
      - db
```

We then could use the command 'docker-compose up - -scale node-service=3 -d' to scale up the application. When we look at the hostname in the localhost, we see that is has changed to "d50ab7dff472"
When we run the command docker-compose ps in the command line we can see the three different node-services running, as shown here:



```
C:\Users\danny\Desktop\docker-challenge-template-main\Docker-Challenges-CPSY300\challenge 3>docker-compose ps
NAME                         IMAGE                      COMMAND                   SERVICE         CREATED              STATUS               PORTS
challenge3-db-1              challenge3-db              "docker-entrypoint.s…"   db              4 hours ago          Up About a minute    3306/tcp
challenge3-nginx-1           challenge3-nginx           "/docker-entrypoint.…"   nginx           About a minute ago   Up About a minute    0.0.0.0:8080->80/tcp
challenge3-node-service-1    challenge3-node-service    "docker-entrypoint.s…"   node-service    2 minutes ago        Up About a minute    3000/tcp
challenge3-node-service-2    challenge3-node-service    "docker-entrypoint.s…"   node-service    50 seconds ago       Up 46 seconds        3000/tcp
challenge3-node-service-3    challenge3-node-service    "docker-entrypoint.s…"   node-service    51 seconds ago       Up 44 seconds        3000/tcp

C:\Users\danny\Desktop\docker-challenge-template-main\Docker-Challenges-CPSY300\challenge 3>
```

This should be all you need to scale your application as needed.

References:

https://github.com/infiniflow/ragflow/issues/329

https://hub.docker.com/_/mariadb

https://nginx.org/en/docs/beginners_guide.html