

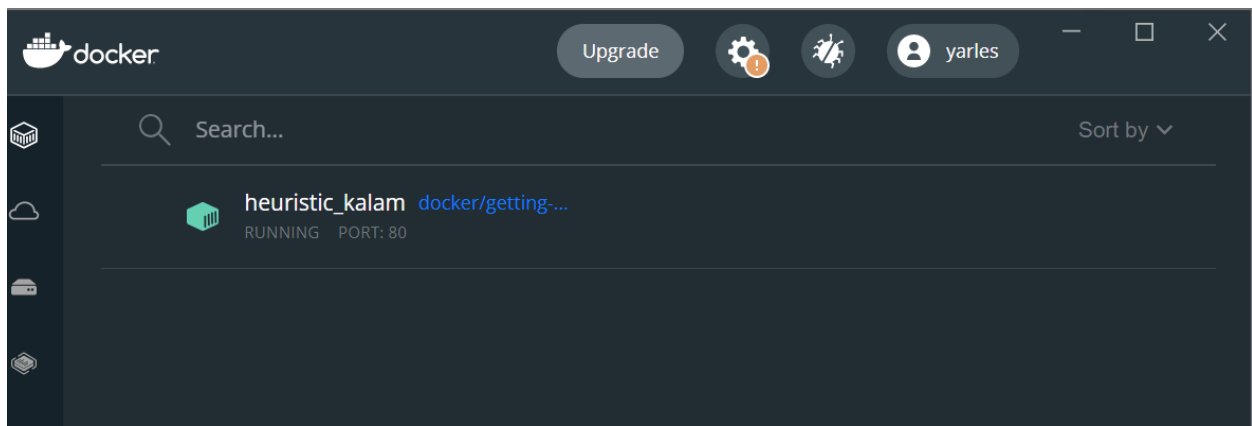
## SE 422X: Individual Assignment 2

Charles Yang

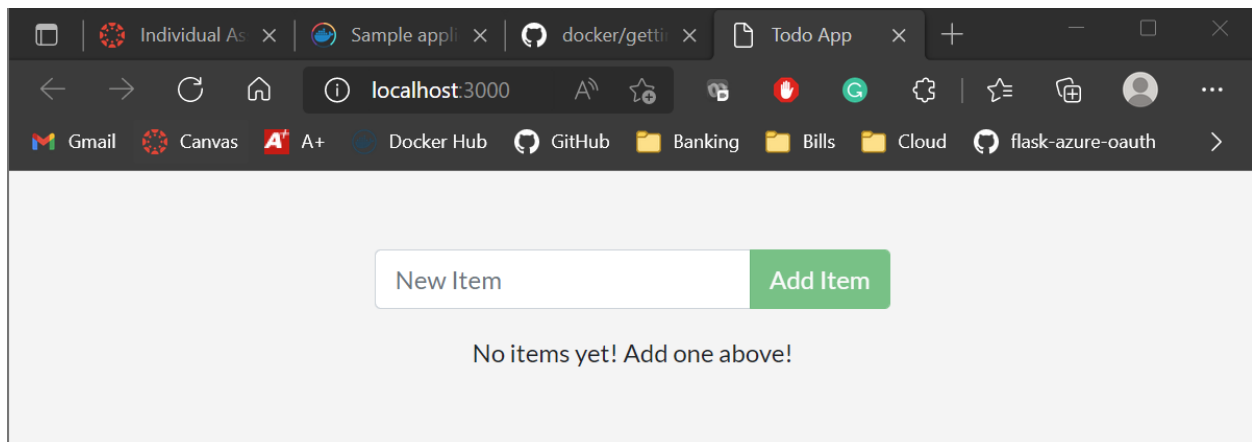
### Summary

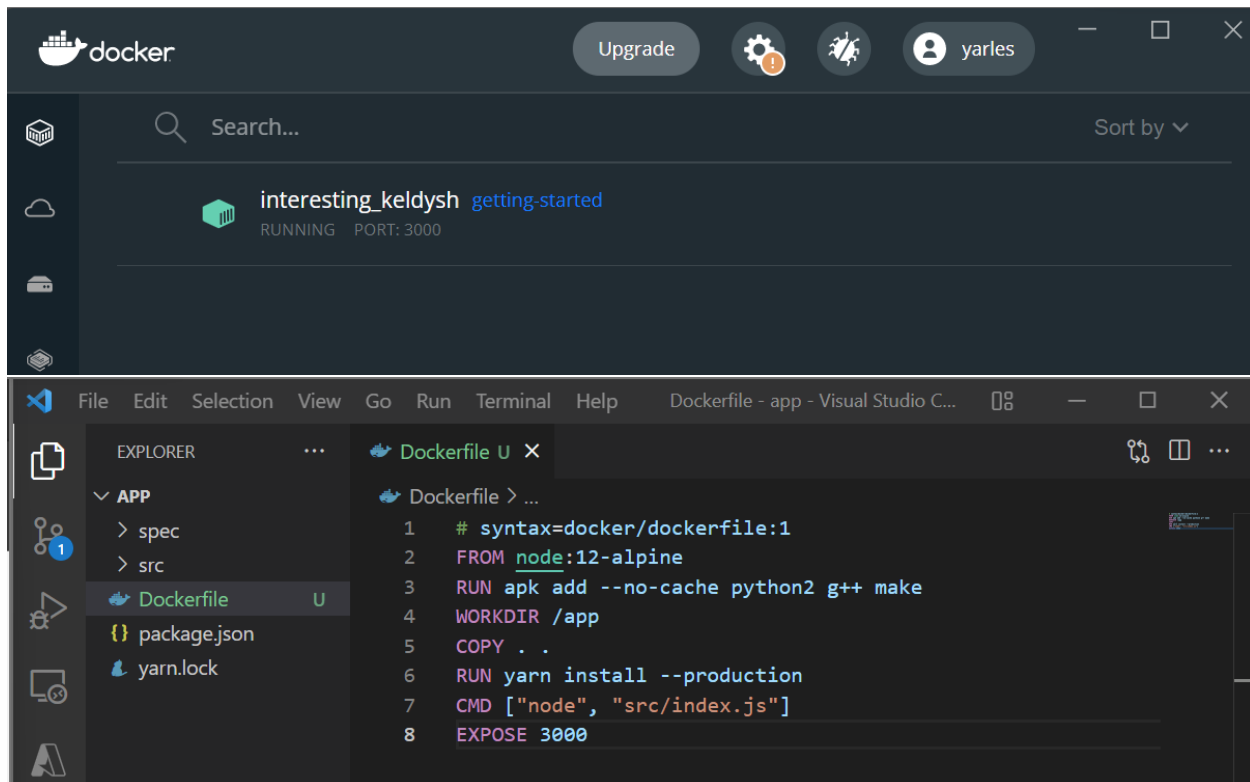
In the official getting started tutorial, I learned all the basic features of Dockers. Additionally, I was able to get an overview of the fundamentals, such as images, containers, volumes, and networks. While I already have a strong understanding of images and containers, the rest of the tutorial was very helpful in navigating the more advanced features, such as container networking and docker compose. I now know that docker compose is supposed to map steps for creating multi-container applications into a yaml file. Finally, I was able to see the power of docker scan in identifying vulnerabilities, and will likely use it in the future.

### Part 1

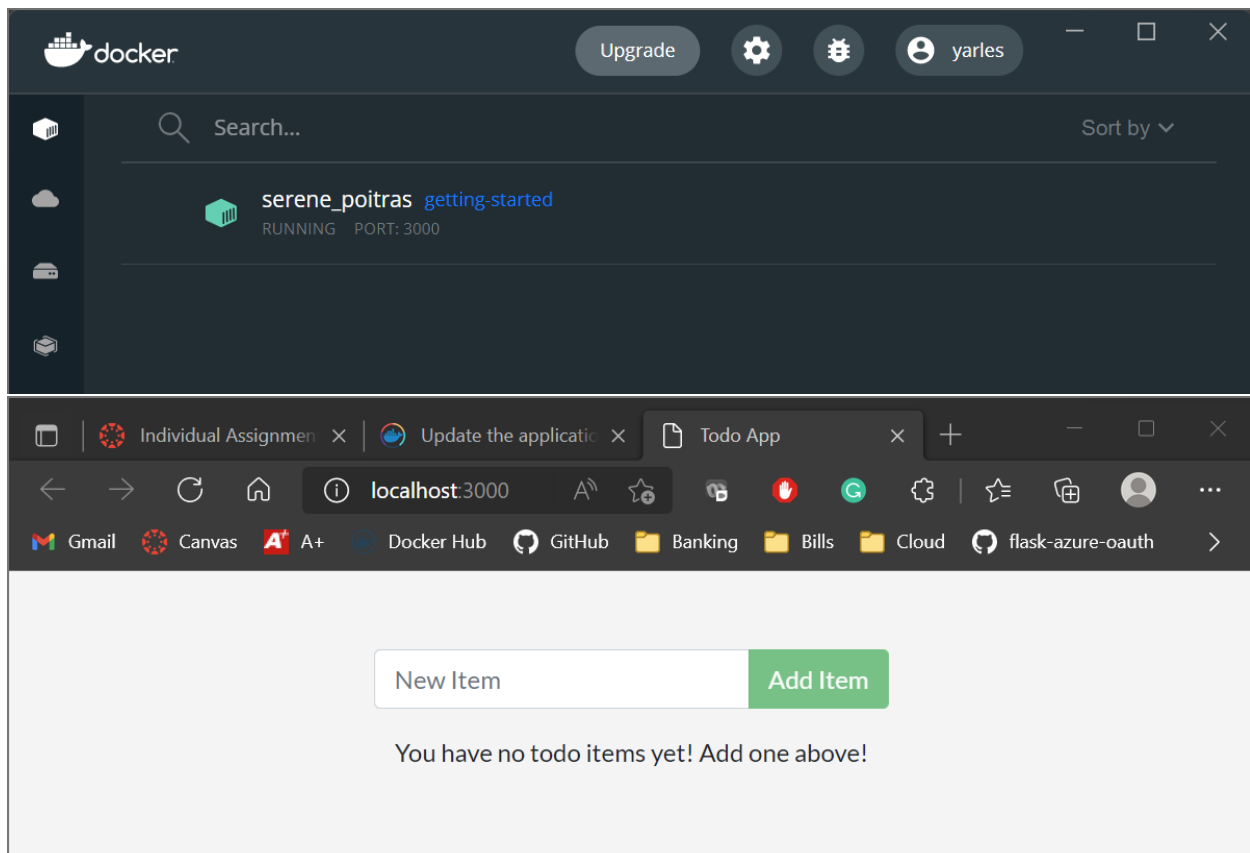


### Part 2





### Part 3



## Part 4

The screenshot shows a web browser with two tabs. The left tab, titled 'labs.play...', displays a container management interface for a container named 'c8uhmkp4\_c8uhmkp4lkk00e42p4g'. The interface shows the IP address '192.168.0.18', an 'OPEN PORT' button, and a port '3000'. Below this, resource usage is shown: Memory '13.89% (555.4MiB / 3.906GiB)', CPU '0.80%', and an SSH link. At the bottom of the interface are 'DELETE' and 'EDITOR' buttons. The right tab, titled 'ip172-18-0-3-c8...', shows a 'Todo App' interface with a 'New Item' input field, an 'Add Item' button, and a message: 'You have no todo items yet! Add one above!'. Below the browser, a terminal window shows a warning message and a series of Docker commands and output, including pulling the 'yarlles/getting-started' image and running it with the command 'docker run -dp 3000:3000 yarlles/getting-started'.

## Part 5

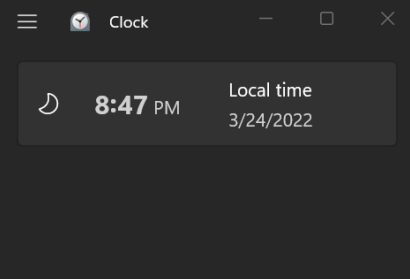
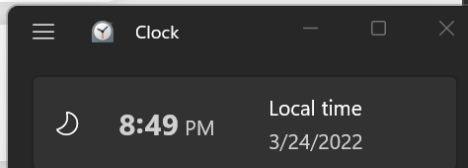
The screenshot shows the Docker Desktop application interface. The top bar includes the Docker logo, an 'Upgrade' button, and user information for 'yarlles'. The main area displays a list of containers: 'serene\_poitras' (getting-started, EXITED (0), PORT: 3000) and 'infallible\_swartz' (ubuntu, RUNNING). Below the Docker Desktop window, a terminal window shows the following commands and output:

```
yarle@DESKTOP-6F1LIBE MINGW64
p (master)
$ docker stop 52a09503bc40
52a09503bc40
yarle@DESKTOP-6F1LIBE MINGW64
p (master)
$
```

Overlaid on the terminal is a 'Clock' application window showing the local time as 8:48 PM on 3/24/2022.

```
yarle@DESKTOP-6F1LIBE MINGW64 ~/Desktop/schoolwork/se422x/hw2/getting-started/app (master)
$ docker exec b018c7f24979 cat data.txt
8924
```

```
yarle@DESKTOP-6F1LIBE MINGW64 ~/Desktop/schoolwork/se422x/hw2/getting-started/app (master)
$
```

Add Item☐ individual assignment 2☐ sleepAdd Item☐ individual assignment 2☐ sleep

PROBLEMS OUTPUT DEBUG CONSOLE

Usage: docker start [OPTIONS]

Start one or more stopped containers

```
yarle@DESKTOP-6F1LIBE MINGW64
p (master)
```

```
$ docker start container 52a09503bc40
Error response from daemon: No such container: 52a09503bc40
Error: failed to start container 52a09503bc40
```

```
yarle@DESKTOP-6F1LIBE MINGW64
p (master)
```

```
$ docker start 52a09503bc40
52a09503bc40
```

```
yarle@DESKTOP-6F1LIBE MINGW64
p (master)
```

```
$
```

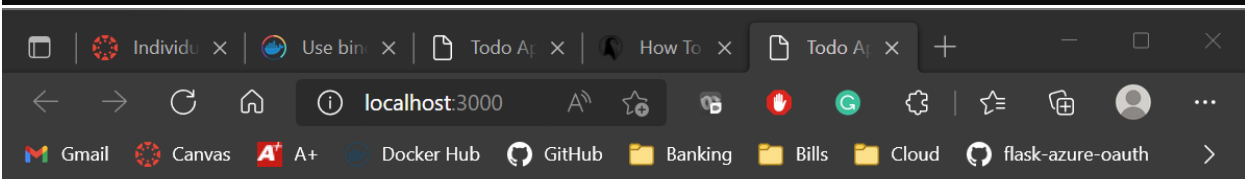
```
docker exec -it b018c7f24979d × + ∨
# cat /data.txt
8924
#

yarle@DESKTOP-6F1LIBE MINGW64 ~/Desktop/schoolwork/se422x/hw2/getting-started/ap
p (master)
$ docker volume inspect todo-db
[
  {
    "CreatedAt": "2022-03-25T01:41:54Z",
    "Driver": "local",
    "Labels": {},
    "Mountpoint": "/var/lib/docker/volumes/todo-db/_data",
    "Name": "todo-db",
    "Options": {},
    "Scope": "local"
  }
]

yarle@DESKTOP-6F1LIBE MINGW64 ~/Desktop/schoolwork/se422x/hw2/getting-started/ap
p (master)
$ █
```

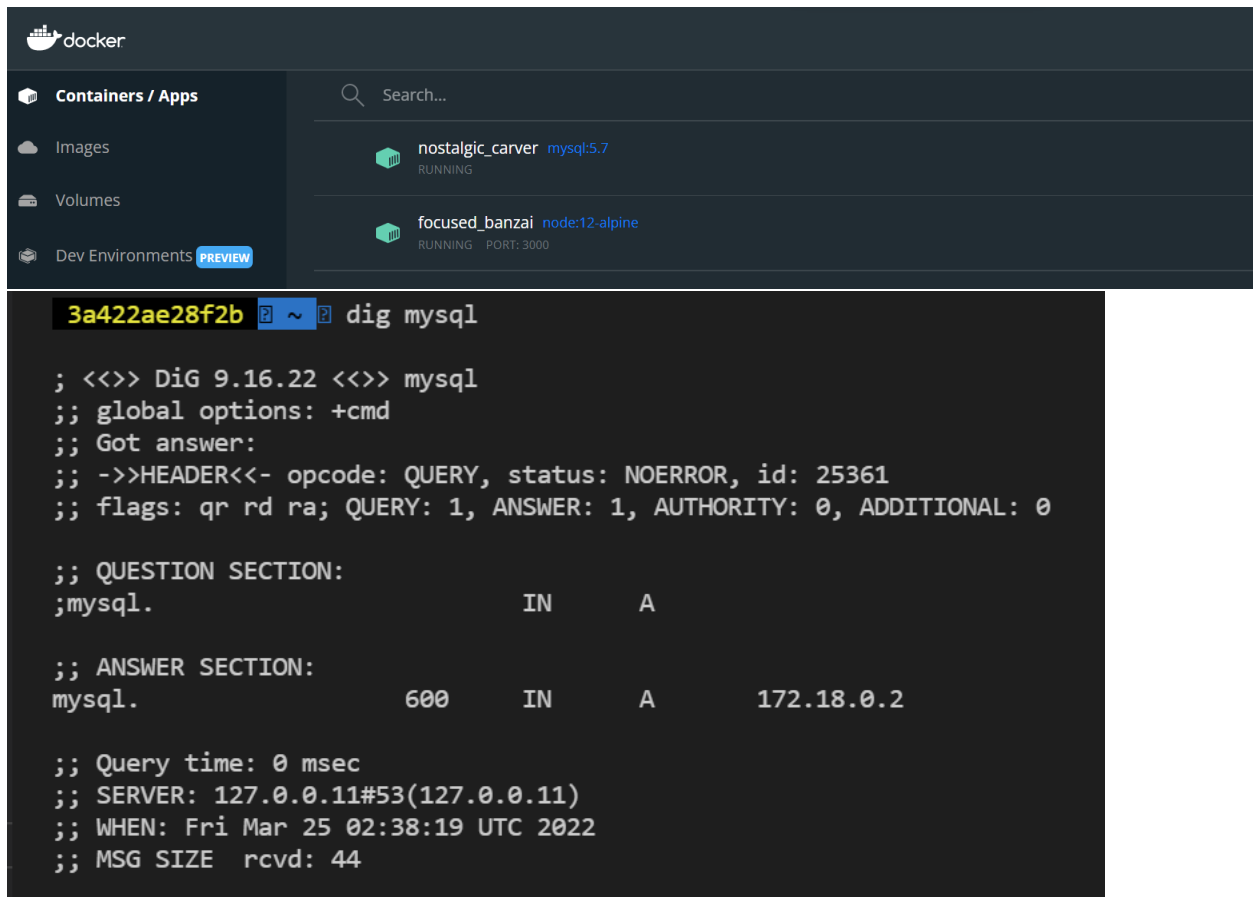
## Part 6

```
PS C:\Users\yarle\Desktop\schoolwork\se422x\hw2\getting-started\app> docker run -dp 3000:3000 `
>>   -w /app -v "${(pwd)}:/app" `
>>   node:12-alpine `
>>   sh -c "yarn install && yarn run dev"
a80a2a49d3292538d6fb520e1b2899de784ee0986e5b6c5f64f26f1d2578db11
PS C:\Users\yarle\Desktop\schoolwork\se422x\hw2\getting-started\app> docker logs -f a80a2a49d3292538d6fb520e1b
yarn install v1.22.17
[1/4] Resolving packages...
warning Resolution field "ansi-regex@5.0.1" is incompatible with requested version "ansi-regex@^2.0.0"
warning Resolution field "ansi-regex@5.0.1" is incompatible with requested version "ansi-regex@^3.0.0"
warning sqlite3 > node-gyp > request@2.88.2: request has been deprecated, see https://github.com/request/request
warning sqlite3 > node-gyp > tar@2.2.2: This version of tar is no longer supported, and will not receive security
warning sqlite3 > node-gyp > request > har-validator@5.1.5: this library is no longer supported
warning sqlite3 > node-gyp > request > uuid@3.4.0: Please upgrade to version 7 or higher. Older versions may
n to be problematic. See https://v8.dev/blog/math-random for details.
[2/4] Fetching packages...
[3/4] Linking dependencies...
[4/4] Building fresh packages...
success Saved lockfile.
Done in 42.83s.
yarn run v1.22.17
$ nodemon src/index.js
[nodemon] 2.0.13
[nodemon] to restart at any time, enter `rs`
[nodemon] watching path(s): *.*
[nodemon] watching extensions: js,mjs,json
[nodemon] starting `node src/index.js`
Using sqlite database at /etc/todos/todo.db
Listening on port 3000
```

Add

You have no todo items yet! Add one above!

## Part 7



The screenshot shows the Docker Desktop interface. On the left, a sidebar contains navigation options: Containers / Apps (selected), Images, Volumes, and Dev Environments (with a PREVIEW badge). The main area displays a list of running containers: 'nostalgic\_carver' (mysql:5.7) and 'focused\_banzai' (node:12-alpine). Below this, a terminal window is open, showing the output of the 'dig mysql' command. The terminal output includes details about the DNS query, such as the opcode (QUERY), status (NOERROR), and the answer section showing the IP address 172.18.0.2.

```
3a422ae28f2b ~ dig mysql

; <<>> DiG 9.16.22 <<>> mysql
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 25361
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 0

;; QUESTION SECTION:
;mysql.                IN      A

;; ANSWER SECTION:
mysql.                 600     IN      A      172.18.0.2

;; Query time: 0 msec
;; SERVER: 127.0.0.11#53(127.0.0.11)
;; WHEN: Fri Mar 25 02:38:19 UTC 2022
;; MSG SIZE  rcvd: 44
```

```
yarle@DESKTOP-6F1LIBE MINGW64 ~/Desktop/schoolwork/se422x/hw2/getting-started/app (master)
```

```
$ docker exec -it 95f92c5d4752493ea9138a488822a81941bfdabb2ccfb7e70234245f417c1941 mysql -u root -p
```

```
Enter password:
```

```
Welcome to the MySQL monitor.  Commands end with ; or \g.
```

```
Your MySQL connection id is 2
```

```
Server version: 5.7.37 MySQL Community Server (GPL)
```

```
Copyright (c) 2000, 2022, Oracle and/or its affiliates.
```

```
Oracle is a registered trademark of Oracle Corporation and/or its affiliates. Other names may be trademarks of their respective owners.
```

```
Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.
```

```
mysql> 
```

```
PS C:\Users\yarle\Desktop\schoolwork\se422x\hw2\getting-started\app> docker exec -it 95f92c5d4752 mysql -p todos
```

```
Enter password:
```

```
Reading table information for completion of table and column names
```

```
You can turn off this feature to get a quicker startup with -A
```

```
Welcome to the MySQL monitor.  Commands end with ; or \g.
```

```
Your MySQL connection id is 6
```

```
Server version: 5.7.37 MySQL Community Server (GPL)
```

```
Copyright (c) 2000, 2022, Oracle and/or its affiliates.
```

```
Oracle is a registered trademark of Oracle Corporation and/or its affiliates. Other names may be trademarks of their respective owners.
```

```
Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.
```

```
mysql> select * from todo_items;
```

id	name	completed
e0bb5228-0f33-4c69-9666-55f3848ac2bc	Sleep	0
0605e2dc-b22b-460b-bd03-962367b1fcab	Climb	0

```
2 rows in set (0.00 sec)
```

```
mysql>
```



## Part 8

```
Dockerfile U JS app.js M docker-compose.yml U X
docker-compose.yml
1  version: "3.7"
2
3  services:
4    app:
5      image: node:12-alpine
6      command: sh -c "yarn install && yarn run dev"
7      ports:
8        - 3000:3000
9      working_dir: /app
10     volumes:
11       - ./:/app
12     environment:
13       MYSQL_HOST: mysql
14       MYSQL_USER: root
15       MYSQL_PASSWORD: secret
16       MYSQL_DB: todos
17     mysql:
18       image: mysql:5.7
19       volumes:
20         - todo-mysql-data:/var/lib/mysql
21       environment:
22         MYSQL_ROOT_PASSWORD: secret
23         MYSQL_DATABASE: todos
24
25     volumes:
26       todo-mysql-data:
```

```
yarle@DESKTOP-6F1LIBE MINGW64 ~/Desktop/schoolwork/se422x/hw2/getting-started/app (master)
$ docker-compose logs -f
app-mysql-1 | 2022-03-25 03:15:24+00:00 [Note] [Entrypoint]: Entrypoint script for MySQL Server 5.7.37-1debian10 started.
app-mysql-1 | 2022-03-25 03:15:24+00:00 [Note] [Entrypoint]: Switching to dedicated user 'mysql'
app-mysql-1 | 2022-03-25 03:15:24+00:00 [Note] [Entrypoint]: Entrypoint script for MySQL Server 5.7.37-1debian10 started.
app-mysql-1 | 2022-03-25T03:15:25.203051Z 0 [Warning] TIMESTAMP with implicit DEFAULT value is deprecated. Please use --explicit_defaults_for_timestamp server option (see documentation for more details).
app-mysql-1 | 2022-03-25T03:15:25.204396Z 0 [Note] mysqld (mysqld 5.7.37) starting as process 1 ...
app-mysql-1 | 2022-03-25T03:15:25.206497Z 0 [Note] InnoDB: PUNCH HOLE support available
app-mysql-1 | 2022-03-25T03:15:25.206544Z 0 [Note] InnoDB: Mutexes and rw_locks use GCC atomic builtins
app-mysql-1 | 2022-03-25T03:15:25.206548Z 0 [Note] InnoDB: Uses event mutexes
app-mysql-1 | 2022-03-25T03:15:25.206550Z 0 [Note] InnoDB: GCC builtin __atomic_thread_fence() is used for memory barrier
app-mysql-1 | 2022-03-25T03:15:25.206552Z 0 [Note] InnoDB: Compressed tables use zlib 1.2.11
app-mysql-1 | 2022-03-25T03:15:25.206554Z 0 [Note] InnoDB: Using Linux native AIO
app-mysql-1 | 2022-03-25T03:15:25.206692Z 0 [Note] InnoDB: Number of pools: 1
app-mysql-1 | 2022-03-25T03:15:25.206781Z 0 [Note] InnoDB: Using CPU crc32 instructions
app-mysql-1 | 2022-03-25T03:15:25.207857Z 0 [Note] InnoDB: Initializing buffer pool, total size = 128M, instances = 1, chunk size = 128M
app-mysql-1 | 2022-03-25T03:15:25.213032Z 0 [Note] InnoDB: Completed initialization of buffer pool
app-mysql-1 | 2022-03-25T03:15:25.214840Z 0 [Note] InnoDB: If the mysqld execution user is authorized, page cleaner thread priority can be changed. See the man page of setpriority().
app-mysql-1 | 2022-03-25T03:15:25.226395Z 0 [Note] InnoDB: Highest supported file format is Barracuda.
app-mysql-1 | 2022-03-25T03:15:25.233646Z 0 [Note] InnoDB: Creating shared tablespace for temporary tables
app-mysql-1 | 2022-03-25T03:15:25.233756Z 0 [Note] InnoDB: Setting file './ibtmp1' size to 12 MB. Physically writing the file full; Please wait ...
app-mysql-1 | 2022-03-25T03:15:25.246797Z 0 [Note] InnoDB: File './ibtmp1' size is now 12 MB.
app-mysql-1 | 2022-03-25T03:15:25.247395Z 0 [Note] InnoDB: 96 redo rollback segment(s) found. 96 redo rollback segment(s) are active.
app-mysql-1 | 2022-03-25T03:15:25.247421Z 0 [Note] InnoDB: 32 non-redo rollback segment(s) are active.
app-mysql-1 | 2022-03-25T03:15:25.248358Z 0 [Note] InnoDB: 5.7.37 started; log sequence number 12660067
app-mysql-1 | 2022-03-25T03:15:25.248483Z 0 [Note] InnoDB: Loading buffer pool(s) from /var/lib/mysql/ib_buffer_pool
app-mysql-1 | 2022-03-25T03:15:25.249220Z 0 [Note] Plugin 'FEDERATED' is disabled.
app-mysql-1 | 2022-03-25T03:15:25.250257Z 0 [Note] InnoDB: Buffer pool(s) load completed at 220325 3:15:25
app-mysql-1 | 2022-03-25T03:15:25.253180Z 0 [Note] Found ca.pem, server-cert.pem and server-key.pem in data directory. Trying to enable SSL support using them.
app-mysql-1 | 2022-03-25T03:15:25.253205Z 0 [Note] Skipping generation of SSL certificates as certificate files are present in data directory.
app-mysql-1 | 2022-03-25T03:15:25.253209Z 0 [Warning] A deprecated TLS version TLSv1 is enabled. Please use TLSv1.2 or higher.
app-mysql-1 | 2022-03-25T03:15:25.253599Z 0 [Warning] CA certificate ca.pem is self signed.
app-mysql-1 | 2022-03-25T03:15:25.253638Z 0 [Note] Skipping generation of RSA key pair as key files are present in data directory.
app-mysql-1 | 2022-03-25T03:15:25.254224Z 0 [Note] Server hostname (bind-address): '*'; port: 3306
app-mysql-1 | 2022-03-25T03:15:25.254321Z 0 [Note] IPv6 is available.
app-mysql-1 | 2022-03-25T03:15:25.254339Z 0 [Note] - '::' resolves to '::';
app-mysql-1 | 2022-03-25T03:15:25.254350Z 0 [Note] Server socket created on IP: '::'.
app-mysql-1 | 2022-03-25T03:15:25.257358Z 0 [Warning] Insecure configuration for --pid-file: Location '/var/run/mysqld' in the path is accessible to all OS users. Consider choosing a different directory.
app-mysql-1 | 2022-03-25T03:15:25.261959Z 0 [Note] Event Scheduler: Loaded 0 events
app-mysql-1 | 2022-03-25T03:15:25.262325Z 0 [Note] mysqld: ready for connections.
app-mysql-1 | Version: '5.7.37' socket: '/var/run/mysqld/mysqld.sock' port: 3306 MySQL Community Server (GPL)
app-app-1 | [1/4] Resolving packages...
app-app-1 | warning Resolution field "ansi-regex@5.0.1" is incompatible with requested version "ansi-regex@^2.0.0"
app-app-1 | warning Resolution field "ansi-regex@5.0.1" is incompatible with requested version "ansi-regex@^3.0.0"
app-app-1 | success Already up-to-date.
app-app-1 | Done in 0.44s.
app-app-1 | yarn run v1.22.17
app-app-1 | $ node src/index.js
app-app-1 | [nodemon] 2.0.13
app-app-1 | [nodemon] to restart at any time, enter `rs`
app-app-1 | [nodemon] watching path(s): *.*
app-app-1 | [nodemon] watching extensions: js,mjs,json
app-app-1 | [nodemon] starting 'node src/index.js'
app-app-1 | Waiting for mysql:3306.
app-app-1 | Connected!
```

Search...

app

RUNNING

app-mysql-1

mysql:5.7

RUNNING

app-app-1

node:12-alpine

RUNNING PORT: 3000

```
yarle@DESKTOP-6F1LIBE MINGW64 ~/Desktop/schoolwork/se422x/hw2/getting-started/app (master)
$ docker-compose up -d
[+] Running 3/3
- Network app_default Created 0.0s
- Container app-mysql-1 Started 0.9s
- Container app-app-1 Started 1.0s
```

## Part 9

```
[+] Building 11.9s (10/10) FINISHED
=> [internal] load build definition from Dockerfile
=> => transferring dockerfile: 181B
=> [internal] load .dockerignore
=> => transferring context: 52B
=> [internal] load metadata for docker.io/library/node:12-alpine
=> CACHED [1/5] FROM docker.io/library/node:12-alpine
=> [internal] load build context
=> => transferring context: 188.07kB
=> [2/5] WORKDIR /app
=> [3/5] COPY package.json yarn.lock ./
=> [4/5] RUN yarn install --production
=> [5/5] COPY . .
=> exporting to image
=> => exporting layers
=> => writing image sha256:84a26e73f95afb864e772ef7ef30a984d4aa713bad24ed605774b36420387c85
=> => naming to docker.io/library/getting-started
```

```
yarle@DESKTOP-6F1LIBE MINGW64 ~/Desktop/schoolwork/se422x/hw2/getting-started/app (master)
```

```
$ docker image history getting-started
```

IMAGE	SIZE	CREATED	COMMENT	CREATED BY
96d5e4361b03	0B	2 hours ago	EXPOSE map[3000/tcp:{}]	buildkit.dockerfile.v0
<missing>	0B	2 hours ago	CMD ["node" "src/index.js"]	buildkit.dockerfile.v0
<missing>	86.3MB	2 hours ago	RUN /bin/sh -c yarn install --production #	buildkit.dockerfile.v0
<missing>	4.64MB	2 hours ago	COPY . . # buildkit	buildkit.dockerfile.v0
<missing>	0B	2 hours ago	WORKDIR /app	buildkit.dockerfile.v0
<missing>	223MB	2 hours ago	RUN /bin/sh -c apk add --no-cache python2 g	buildkit.dockerfile.v0
<missing>	0B	36 hours ago	/bin/sh -c #(nop) CMD ["node"]	
<missing>	0B	36 hours ago	/bin/sh -c #(nop) ENTRYPOINT ["docker-entr	
<missing>	388B	36 hours ago	/bin/sh -c #(nop) COPY file:4d192565a7220e1	
<missing>	7.84MB	36 hours ago	/bin/sh -c apk add --no-cache --virtual .bu	
<missing>	0B	36 hours ago	/bin/sh -c #(nop) ENV YARN_VERSION=1.22.17	
<missing>	77.6MB	36 hours ago	/bin/sh -c addgroup -g 1000 node && add	
<missing>	0B	36 hours ago	/bin/sh -c #(nop) ENV NODE_VERSION=12.22.1	
<missing>	0B	36 hours ago	/bin/sh -c #(nop) CMD ["/bin/sh"]	
<missing>	5.57MB	36 hours ago	/bin/sh -c #(nop) ADD file:7386ad893672007c	

```
yarle@DESKTOP-6F1LIBE MINGW64 ~/Desktop/schoolwork/se422x/hw2/getting-started/app (master)
$ docker scan getting-started
Docker Scan relies upon access to Snyk, a third party provider, do you consent to proceed using Snyk? (y/N)
y

Testing getting-started...

Package manager: apk
Project name: docker-image|getting-started
Docker image: getting-started
Platform: linux/amd64
Base image: node:12.22.11-alpine3.15

✓ Tested 39 dependencies for known vulnerabilities, no vulnerable paths found.

According to our scan, you are currently using the most secure version of the selected base image

For more free scans that keep your images secure, sign up to Snyk at https://dockr.ly/3ePqVcp
-----

Testing getting-started...

Tested 191 dependencies for known vulnerabilities, found 7 vulnerabilities.

Issues with no direct upgrade or patch:
X Prototype Pollution [Low Severity][https://snyk.io/vuln/SNYK-JS-MINIMIST-2429795] in minimist@1.2.5
  introduced by sqlite3@5.0.2 > node-pre-gyp@0.11.0 > mkdirp@0.5.5 > minimist@1.2.5 and 2 other path(s)
This issue was fixed in versions: 1.2.6
X Arbitrary File Overwrite [High Severity][https://snyk.io/vuln/SNYK-JS-TAR-1536528] in tar@2.2.2
  introduced by sqlite3@5.0.2 > node-gyp@3.8.0 > tar@2.2.2
This issue was fixed in versions: 3.2.3, 4.4.15, 5.0.7, 6.1.2
X Arbitrary File Overwrite [High Severity][https://snyk.io/vuln/SNYK-JS-TAR-1536531] in tar@2.2.2
  introduced by sqlite3@5.0.2 > node-gyp@3.8.0 > tar@2.2.2
This issue was fixed in versions: 3.2.2, 4.4.14, 5.0.6, 6.1.1
X Regular Expression Denial of Service (ReDoS) [Low Severity][https://snyk.io/vuln/SNYK-JS-TAR-1536758] in tar@2.2.2
  introduced by sqlite3@5.0.2 > node-gyp@3.8.0 > tar@2.2.2
This issue was fixed in versions: 6.1.4, 5.0.8, 4.4.16
X Arbitrary File Write [High Severity][https://snyk.io/vuln/SNYK-JS-TAR-1579147] in tar@2.2.2
  introduced by sqlite3@5.0.2 > node-gyp@3.8.0 > tar@2.2.2
This issue was fixed in versions: 6.1.7, 5.0.8, 4.4.16
X Arbitrary File Write [High Severity][https://snyk.io/vuln/SNYK-JS-TAR-1579152] in tar@2.2.2
  introduced by sqlite3@5.0.2 > node-gyp@3.8.0 > tar@2.2.2
This issue was fixed in versions: 6.1.9, 5.0.10, 4.4.18
X Arbitrary File Write [High Severity][https://snyk.io/vuln/SNYK-JS-TAR-1579155] in tar@2.2.2
  introduced by sqlite3@5.0.2 > node-gyp@3.8.0 > tar@2.2.2
This issue was fixed in versions: 6.1.9, 5.0.10, 4.4.18

Package manager: yarn
Target file: \app\package.json
Project name: 101-app
Docker image: getting-started

For more free scans that keep your images secure, sign up to Snyk at https://dockr.ly/3ePqVcp
```

```
yarle@DESKTOP-6F1LIBE MINGW64 ~/Desktop/schoolwork/se422x/hw2/getting-started/app (master)
$ docker build -t getting-started .
[+] Building 0.2s (10/10) FINISHED
=> [internal] load build definition from Dockerfile
=> => transferring dockerfile: 32B
=> [internal] load .dockerignore
=> => transferring context: 34B
=> [internal] load metadata for docker.io/library/node:12-alpine
=> [1/5] FROM docker.io/library/node:12-alpine
=> [internal] load build context
=> => transferring context: 3.46kB
=> CACHED [2/5] WORKDIR /app
=> CACHED [3/5] COPY package.json yarn.lock ./
=> CACHED [4/5] RUN yarn install --production
=> [5/5] COPY . .
=> exporting to image
=> => exporting layers
=> => writing image sha256:2e76f5581a45362d1190ad1d4d2f629fccc677778ffa7b5661398b1f8c4e13e9
=> => naming to docker.io/library/getting-started
```