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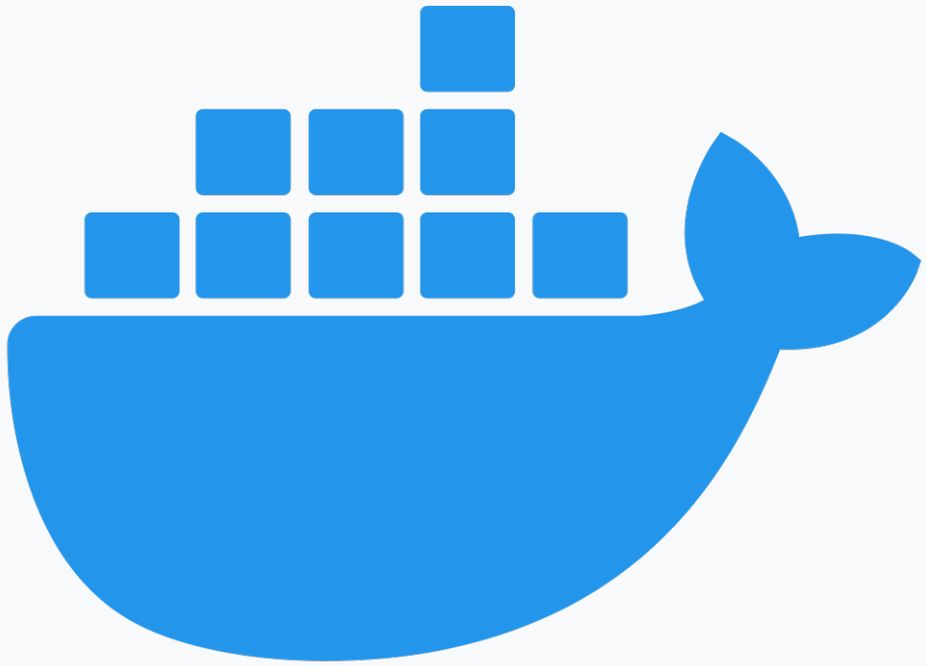

Basic

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What is Docker?

- Docker
- NodeJS
- VSCode

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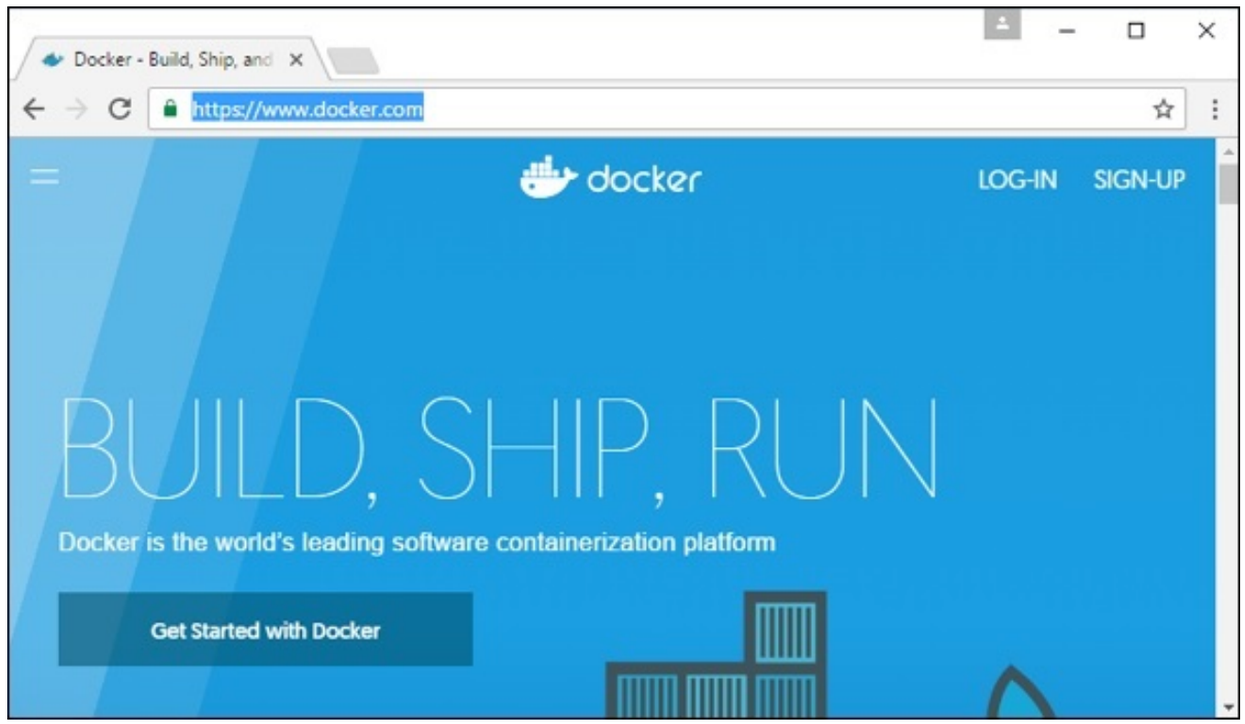
What is Docker?

Docker is a container management service. The keywords of Docker are **develop,** **ship** and **run** anywhere. The whole idea of Docker is for developers to easily develop applications, ship them into containers which can then be deployed anywhere.



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Dock is ท่าเรือ

ทั้งหมด ค้นรูป Maps วิดีโอ ช็อปปิ้ง เพิ่มเติม เครื่องมือ

ผลการค้นหาประมาณ 489,000,000 รายการ (0.57 วินาที)

อังกฤษ ⇄ ไทย

dock

däk

ท่าเรือ

Thāreụ̄x

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Dock

Components of Docker

Docker has the following components

- **Docker for Mac** − It allows one to run Docker containers on the Mac OS.
- **Docker for Linux** − It allows one to run Docker containers on the Linux OS.
- **Docker for Windows** − It allows one to run Docker containers on the Windows OS.
- **Docker Engine** − It is used for building Docker images and creating Docker containers.
- **Docker Hub** − This is the registry which is used to host various Docker images.
- **Docker Compose** − This is used to define applications using multiple Docker containers.

Docker Installation

Docker Desktop for Mac

Docker Desktop for Windows

Docker for Linux

Docker Desktop

Developer productivity tools and a local Kubernetes environment.

Download for Mac - Intel Chip

Download for Mac - Apple Chip

Download for Windows

View Linux Engine

https://www.docker.com/get-started

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Docker CLI

Cheatsheet for Docker CLI

Run a new Container

Start a new Container from an Image
```
docker run IMAGE
docker run nginx
```

...and assign it a name
```
docker run --name CONTAINER IMAGE
docker run --name web nginx
```

...and map a port
```
docker run -p HOSTPORT:CONTAINERPORT IMAGE
docker run -p 8080:80 nginx
```

...and map all ports
```
docker run -P IMAGE
docker run -P nginx
```

...and start container in background
```
docker run -d IMAGE
docker run -d nginx
```

...and assign it a hostname
```
docker run --hostname HOSTNAME IMAGE
docker run --hostname srv nginx
```

...and add a dns entry
```
docker run --add-host HOSTNAME:IP IMAGE
```

...and map a local directory into the container
```
docker run -v HOSTDIR:TARGETDIR IMAGE
docker run -v ~/:/usr/share/nginx/html nginx
```

...but change the entrypoint
```
docker run -it --entrypoint EXECUTABLE IMAGE
docker run -it --entrypoint bash nginx
```

Manage Containers

Show a list of running containers
```
docker ps
```

Show a list of all containers
```
docker ps -a
```

Delete a container
```
docker rm CONTAINER
docker rm web
```

Delete a running container
```
docker rm -f CONTAINER
docker rm -f web
```

Delete stopped containers
```
docker container prune
```

Stop a running container
```
docker stop CONTAINER
docker stop web
```

Start a stopped container
```
docker start CONTAINER
docker start web
```

Copy a file from a container to the host
```
docker cp CONTAINER:SOURCE TARGET
docker cp web:/index.html index.html
```

Copy a file from the host to a container
```
docker cp TARGET CONTAINER:SOURCE
docker cp index.html web:/index.html
```

Start a shell inside a running container
```
docker exec -it CONTAINER EXECUTABLE
docker exec -it web bash
```

Rename a container
```
docker rename OLD_NAME NEW_NAME
docker rename 096 web
```

Create an image out of container
```
docker commit CONTAINER
docker commit web
```

Manage Images

Download an image
```
docker pull IMAGE[:TAG]
docker pull nginx
```

Upload an image to a repository
```
docker push IMAGE
docker push myimage:1.0
```

Delete an image
```
docker rmi IMAGE
```

Show a list of all Images
```
docker images
```

Delete dangling images
```
docker image prune
```

Delete all unused images
```
docker image prune -a
```

Build an image from a Dockerfile
```
docker build DIRECTORY
docker build .
```

Tag an image
```
docker tag IMAGE NEWIMAGE
docker tag ubuntu ubuntu:18.04
```

Build and tag an image from a Dockerfile
```
docker build -t IMAGE DIRECTORY
docker build -t myimage .
```

Save an image to .tar file
```
docker save IMAGE > FILE
docker save nginx > nginx.tar
```

Load an image from a .tar file
```
docker load -i TARFILE
docker load -i nginx.tar
```

Info & Stats

Show the logs of a container
```
docker logs CONTAINER
docker logs web
```

Show stats of running containers
```
docker stats
```

Show processes of container
```
docker top CONTAINER
docker top web
```

Show installed docker version
```
docker version
```

Get detailed info about an object
```
docker inspect NAME
docker inspect nginx
```

Show all modified files in container
```
docker diff CONTAINER
docker diff web
```

Show mapped ports of a container
```
docker port CONTAINER
docker port web
```

To test that Docker runs properly, we can use the Docker **run command** to download and run a simple **HelloWorld Docker container**.

The working of the Docker **run command** is given below –

```
docker run
```

This command is used to run a command in a Docker container.

Syntax

```
docker run image
```

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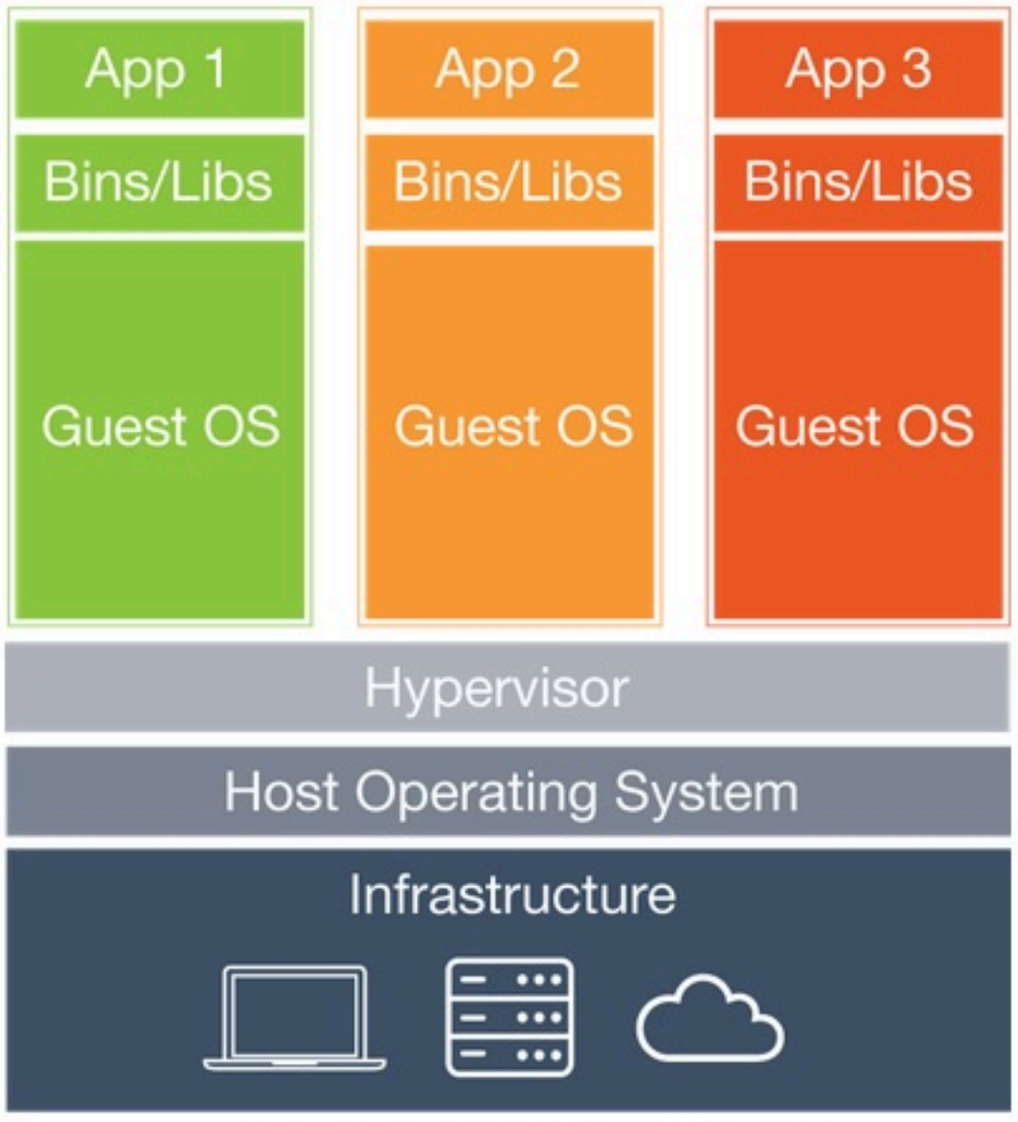
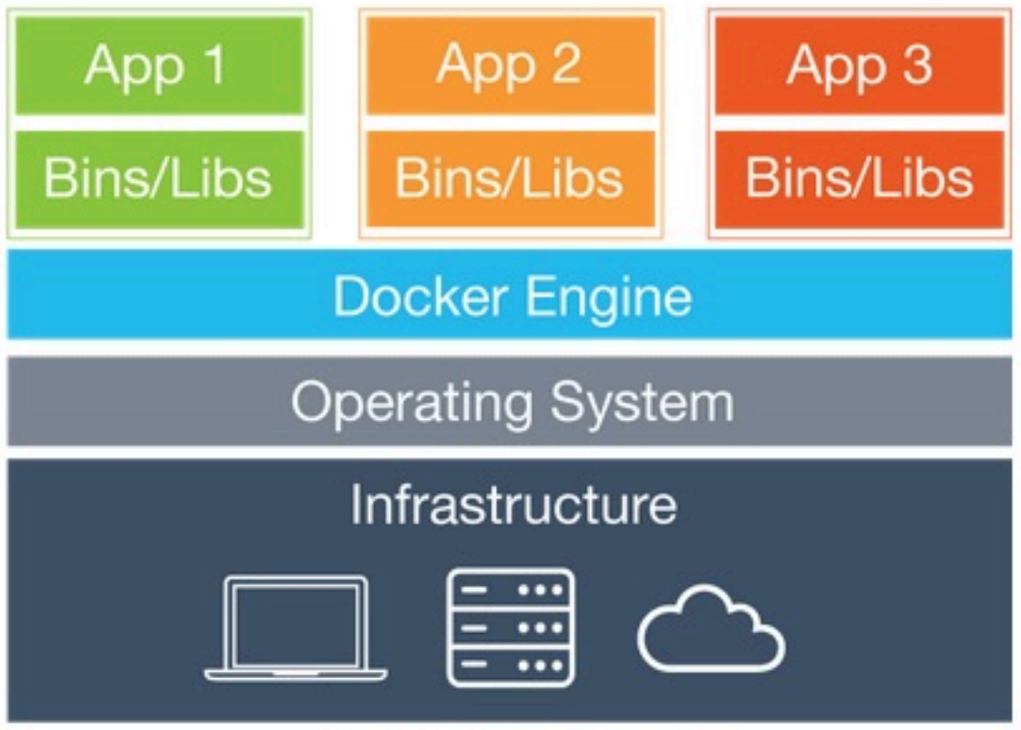
Container vs VMs

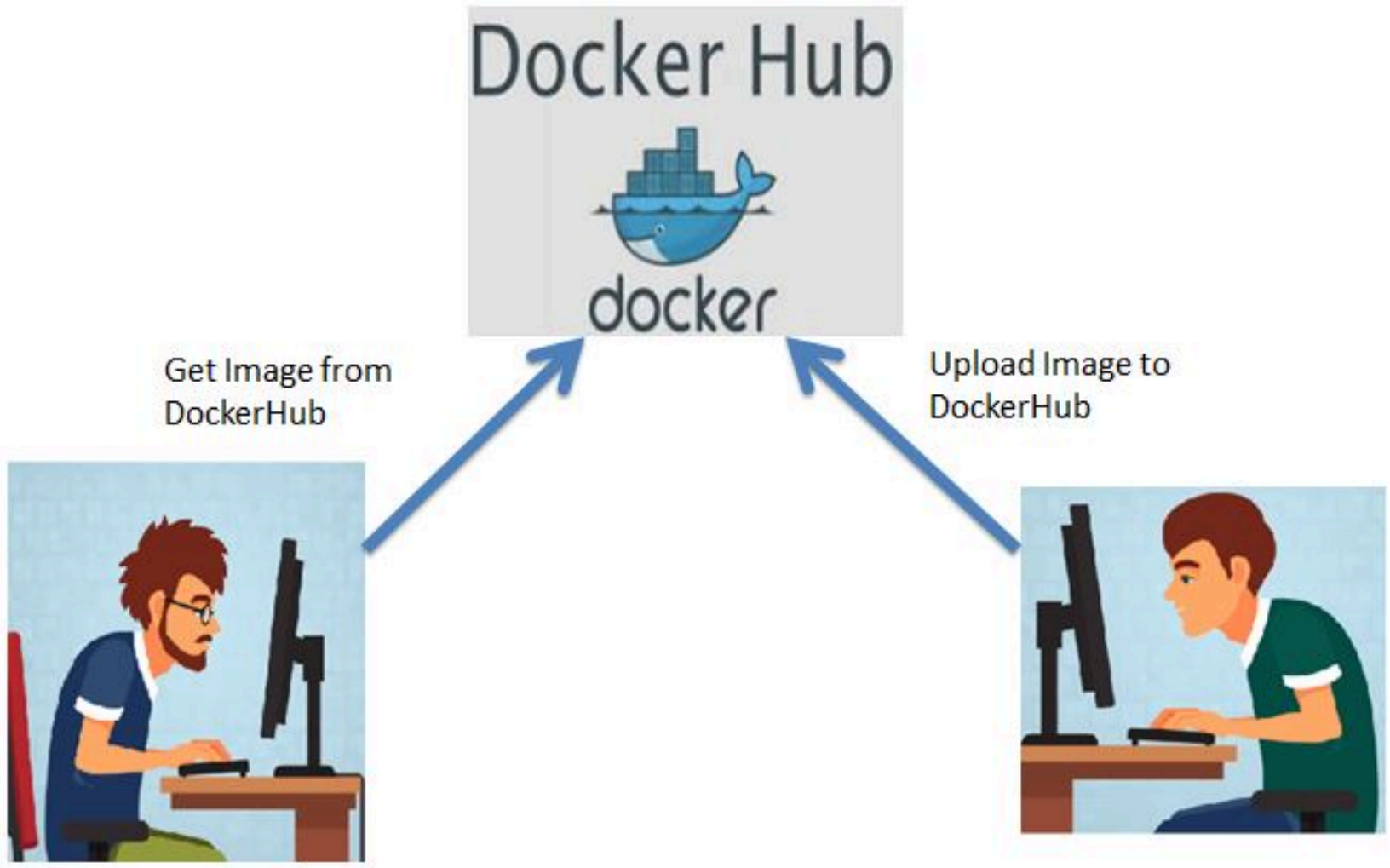


Virtual Machines



Containers

Docker Hub



Share Work Environment using Docker

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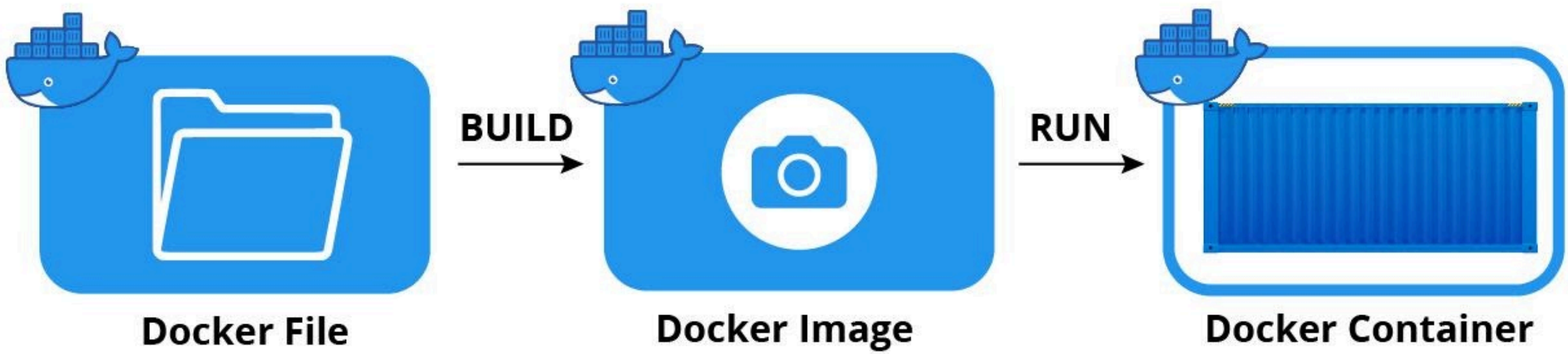
Docker Image



```
sudo docker images
```

Output

When we run the above command, it will produce the following result −

```
demo@ubuntuserver:~$ sudo docker images
[sudo] password for demo:
REPOSITORY          TAG                 IMAGE ID            CREATED
VIRTUAL SIZE
newcentos           latest              7a86f8ffcb25        9 days ago
196.5 MB
jenkins             latest              998d1854867e        2 weeks ago
714.1 MB
centos              latest              97cad5e16cb6        4 weeks ago
196.5 MB
demo@ubuntuserver:~$ _
```

From the above output, you can see that the server has three images: **centos, newcentos,** and **jenkins**. Each image has the following attributes −

- **TAG** − This is used to logically tag images.
- **Image ID** − This is used to uniquely identify the image.
- **Created** − The number of days since the image was created.
- **Virtual Size** − The size of the image.

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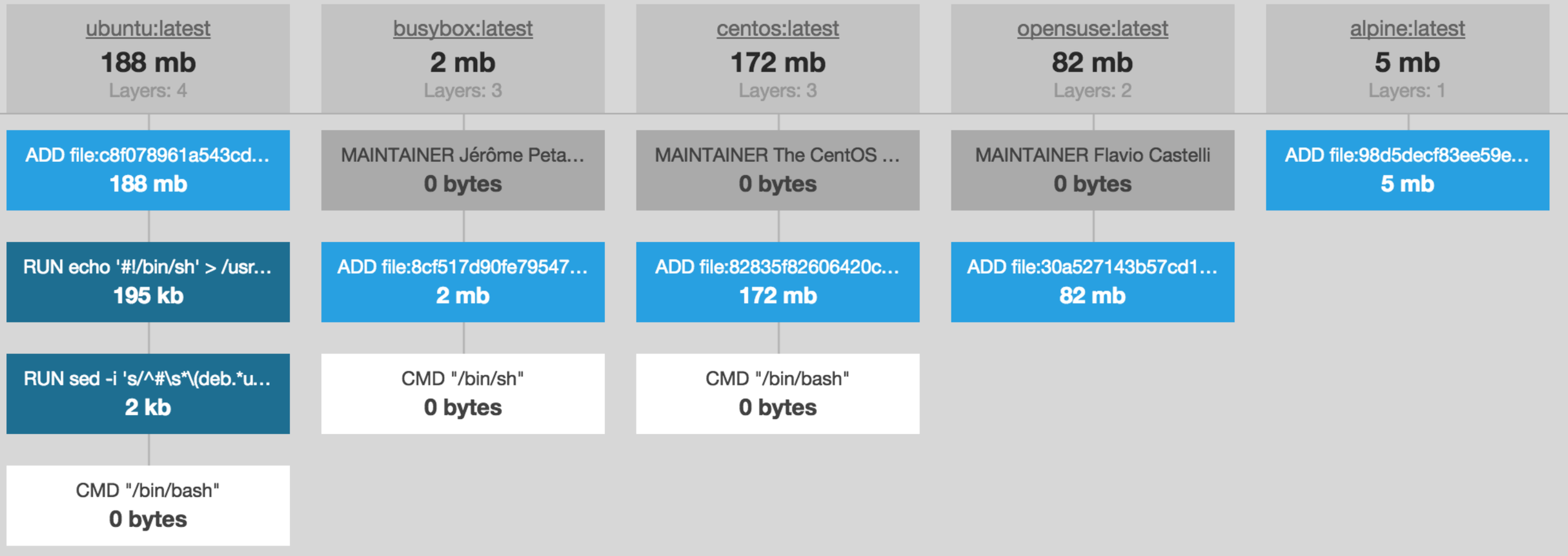
Docker Linux Dist.



https://brianchristner.io/docker-image-base-os-size-comparison/

Docker Image

- docker run --rm -it node node
- docker run --rm -it python python
- docker run --rm -it go go version

Image management commands

command	description
`docker images`	list all local images
`docker history` *image*	show the image history (list of ancestors)
`docker inspect` *image...*	show low-level infos (in json format)
`docker tag` *image tag*	tag an image
`docker commit` *container image*	create an image (from a container)
`docker import` *url*|- [*tag*]	create an image (from a tarball)
`docker rmi` *image...*	delete images

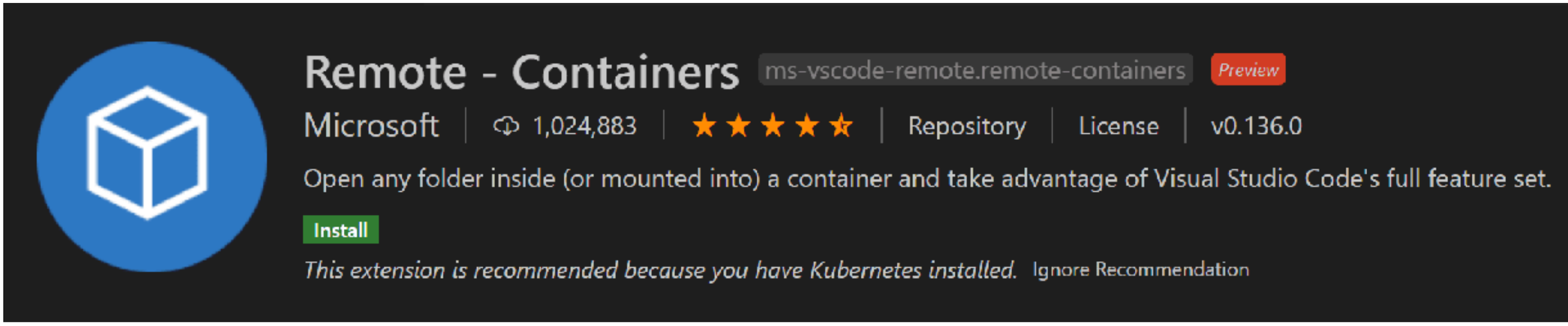
- docker run --rm -it node /bin/bash
- apt-get update
- apt-get install vim
- npm init -y
- npx node ...

Interacting with the container

command	description
`docker attach` *container*	attach to a running container (stdin/stdout/stderr)
`docker cp` *container:path hostpath*|- `docker cp` *hostpath*|- *container:path*	copy files from the container copy files into the container
`docker export` *container*	export the content of the container (tar archive)
`docker exec` *container args...*	run a command in an existing container (**useful** for debugging)
`docker wait` *container*	wait until the container terminates and return the exit code
`docker commit` *container image*	commit a new docker image (snapshot of the container)

Remote development in Containers

https://code.visualstudio.com/docs/remote/containers-tutorial



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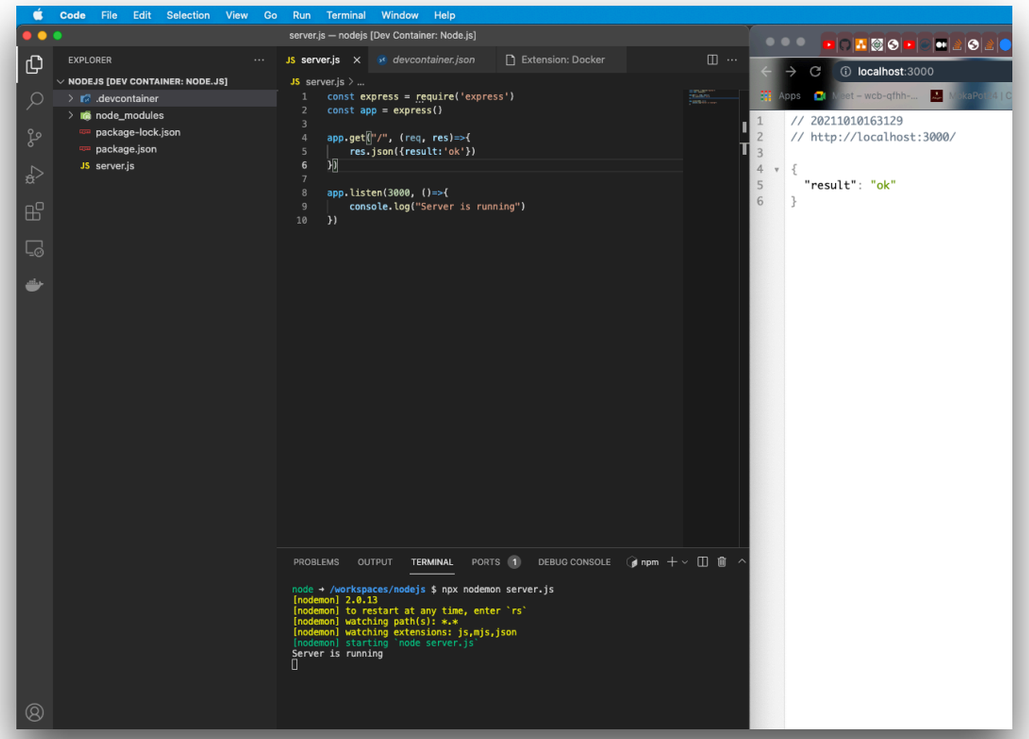
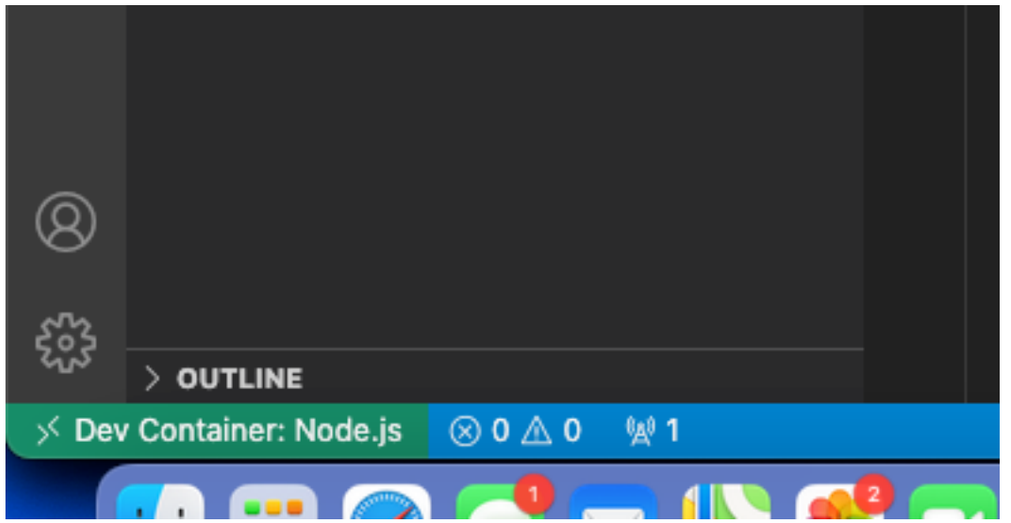
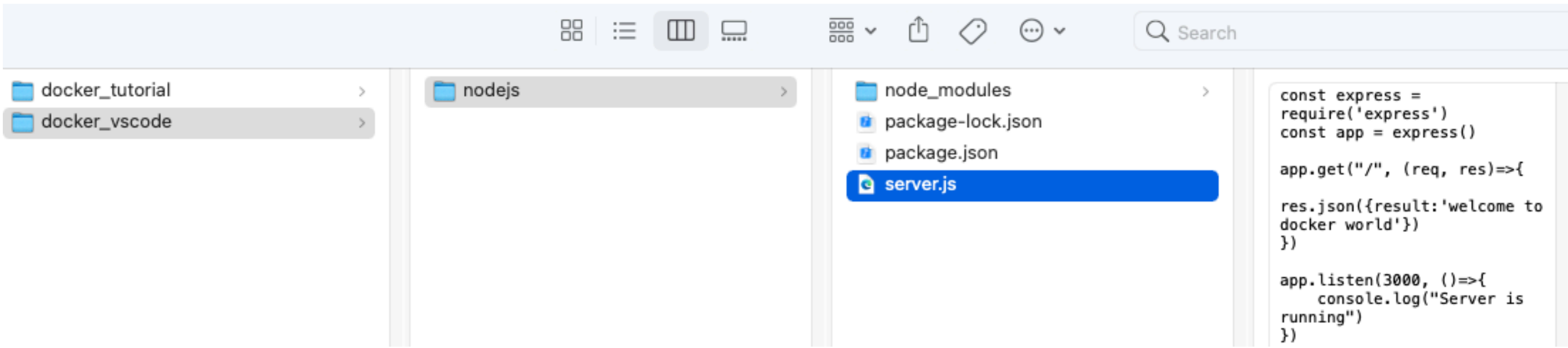
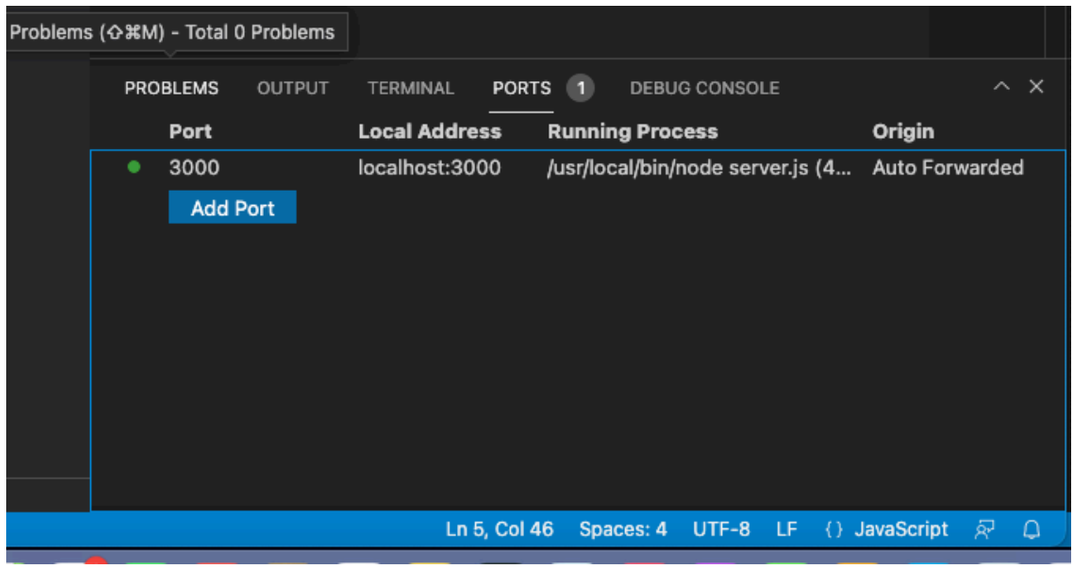
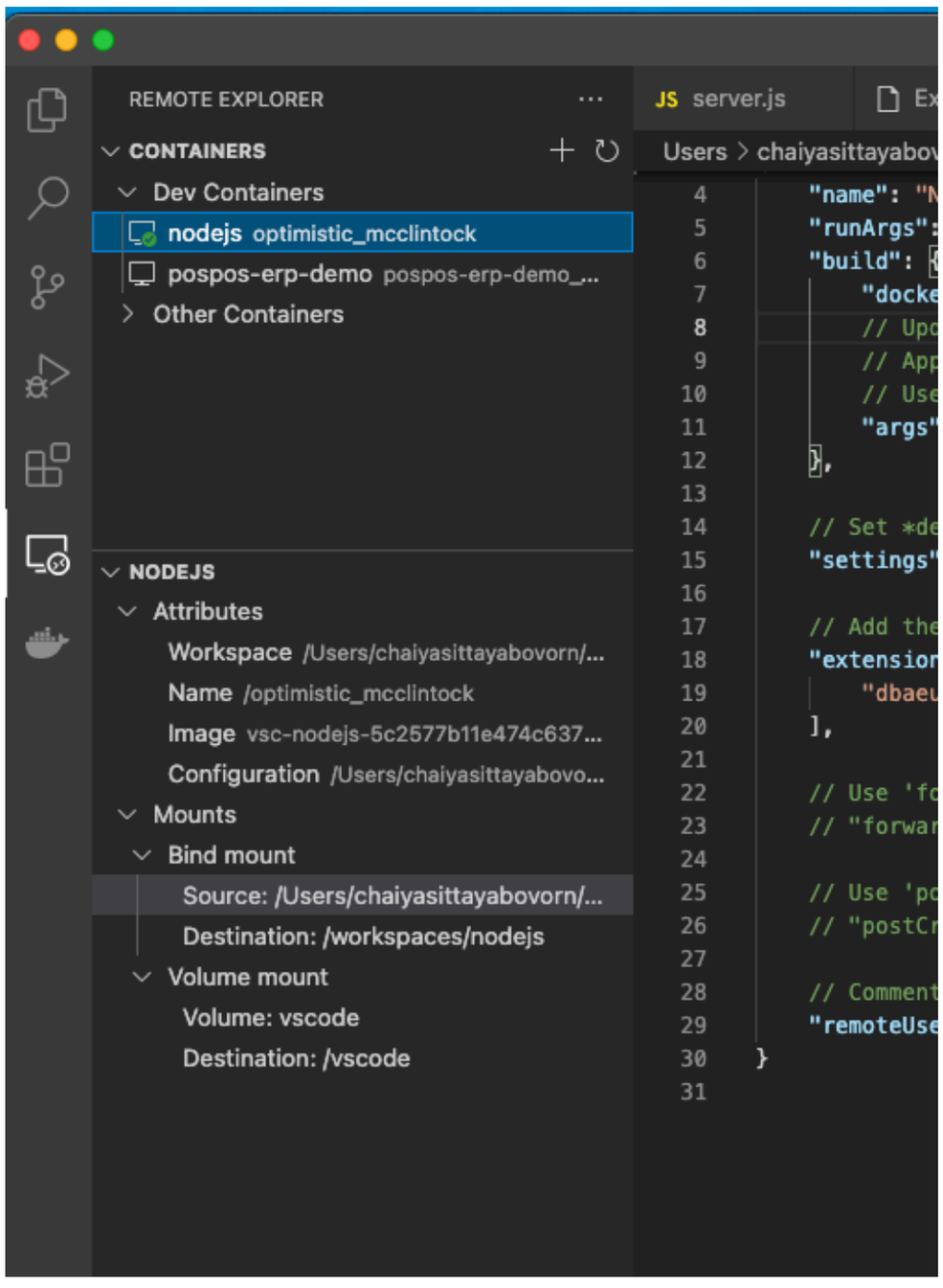
Docker for Developer








Problems (⇧⌘M) - Total 0 Problems
PROBLEMS
OUTPUT
TERMINAL
PORTS 1
DEBUG CONSOLE
Port
Local Address
Running Process
Origin
3000
localhost:3000
/usr/local/bin/node server.js (4...
Auto Forwarded
Add Port
Ln 5, Col 46
Spaces: 4
UTF-8
LF
JavaScript


REMOTE EXPLORER
CONTAINERS
Dev Containers
nodejs optimistic_mcclintock
pospos-erp-demo pospos-erp-demo_...
Other Containers
NODEJS
Attributes
Workspace /Users/chaiyasittayabovorn/...
Name /optimistic_mcclintock
Image vsc-nodejs-5c2577b11e474c637...
Configuration /Users/chaiyasittayabovo...
Mounts
Bind mount
Source: /Users/chaiyasittayabovorn/...
Destination: /workspaces/nodejs
Volume mount
Volume: vscode
Destination: /vscode
JS server.js
Users > chaiyasittayabov
"name": "N
"runArgs":
"build": {
"docke
// Upc
// App
// Use
"args"
},
// Set *de
"settings"
// Add the
"extensior
"dbaeu
],
// Use 'fc
// "forwar
// Use 'po
// "postCr
// Comment
"remoteUse
}

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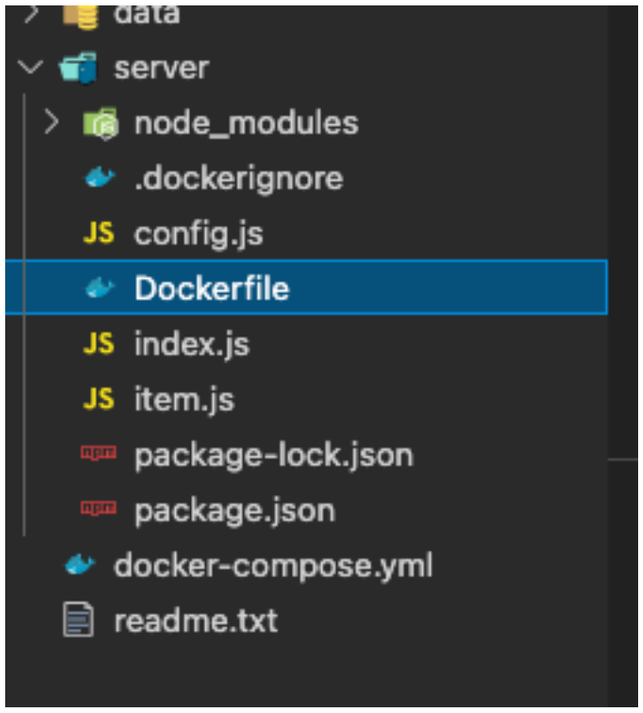
Debug Image

docker run --rm -it --entrypoint sh image:tag

```
CMDevM1 [~/Desktop/Training/Docker/workshop/docker_tutorial/docker_mean_demo/server]$ docker run --rm -it --entrypoint sh meanserver:1.0
/usr/src/app # ls -lrt
total 44
-rw-r--r--    1 root     root         22383 Oct 10 10:06 package-lock.json
-rw-r--r--    1 root     root           327 Oct 10 10:27 package.json
-rw-r--r--    1 root     root           192 Oct 10 10:44 config.js
-rw-r--r--    1 root     root           271 Oct 10 11:01 item.js
-rw-r--r--    1 root     root          1221 Oct 11 02:50 index.js
drwxr-xr-x   74 root     root          4096 Oct 11 02:50 node_modules
/usr/src/app #
```

Dockerfile

A Dockerfile is a text document that contains all the commands a user could call on the command line to assemble an image.




```
server > Dockerfile > ...
1   FROM node:15.14.0-alpine3.10
2
3   WORKDIR /usr/src/app
4   COPY package*.json ./
5   RUN npm install
6   COPY . .
7   EXPOSE 8080
8   CMD [ "npm", "start" ]
9
```

Builder main commands

command	description
`FROM` *image*|`scratch`	base image for the build
`MAINTAINER` *email*	name of the mainainer (metadata)
`COPY` *path dst*	copy *path* from the context into the container at location *dst*
`ADD` *src dst*	same as `COPY` but untar archives and accepts http urls
`RUN` *args...*	run an arbitrary command inside the container
`USER` *name*	set the default username
`WORKDIR` *path*	set the default working directory
`CMD` *args...*	set the default command
`ENV` *name value*	set an environment variable

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Dockerfile

- FROM
- WORKDIR
- COPY
- RUN
- EXPOSE
- CMD

r > Dockerfile > ...

```
FROM node:15.14.0-alpine3.10

WORKDIR /usr/src/app
COPY package*.json ./
RUN npm install
COPY . .
EXPOSE 8080
CMD [ "npm", "start" ]
```

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Dockerfile

- ENV
- AS
- ENTRYPOINT
- MAINTAINER
- DEPEND
- ADD
- LINK
- NETWORK
- VOLUME

Dockerfile client U × | readme.txt | environment.prod.ts | app.com

client > Dockerfile > ...

```
1   FROM node:15.14.0-alpine3.10 AS builder
2   WORKDIR /usr/src/app
3
4   COPY package.json package-lock.json ./
5   RUN npm install
6
7   ENV PATH="./node_modules/.bin:$PATH"
8   COPY . ./
9   RUN ng build --prod
10
11  FROM nginx:1.19.10-alpine
12  COPY --from=builder /usr/src/app/dist/client /usr/share/nginx/html
13
```

Build Dockerfile

docker build --no-cache -t image_name:1.0 .

- build : to build
- --no-cache : to re-build completely without using cache
- -t : to tag image name and version
- image_name:1.0 : name and tag of image
- . : target folder

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Debug Build Dockerfile

DOCKER_BUILDKIT=0 docker build --no-cache -t meanstackapp:1.0 .

- Set Env DOCKER_BUILDKIT=0 : to debug or see console output from run command

Debug with entrypoint

docker run -it --rm **--entrypoint sh** image:tag

This override/intercept the base entrypoint - in order to shell to view content. Use this option to verify content in image

```
[root@berded tmp]# docker run -it --rm --entrypoint sh tmp:1.0
/usr/src/app #
```

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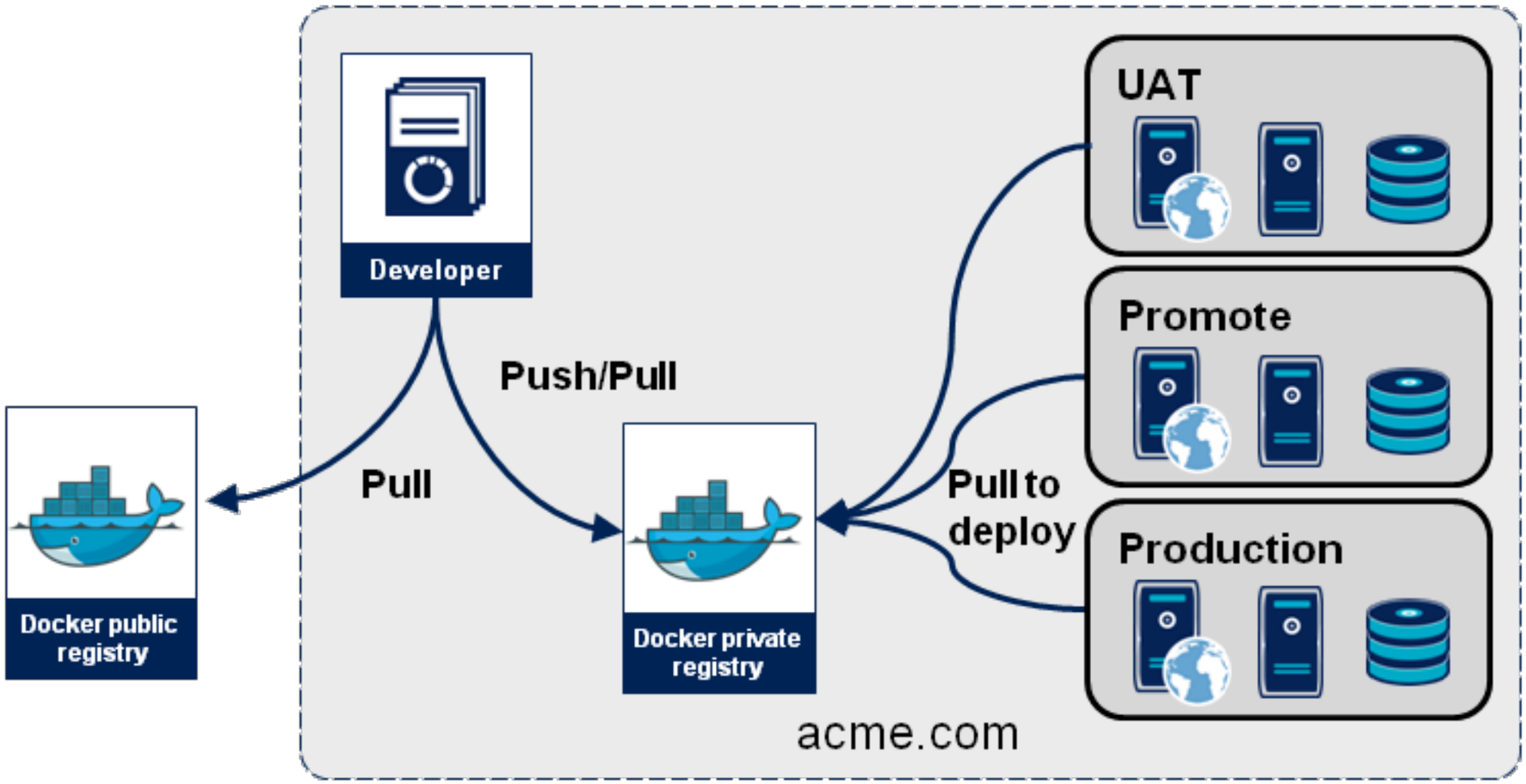
Using Git in Dockerfile

client > Dockerfile > ...

```
1   FROM node:14.18.1-alpine3.14 AS builder
2   WORKDIR /usr/src/app
3
4   COPY package*.json ./
5   RUN apk add --no-cache git
6   RUN npm install
7   RUN command
8
9   # ENV PATH="./node_modules/.bin:$PATH"
```

Docker hub


Developer
Push/Pull
Pull
Docker public registry
Docker private registry
UAT
Promote
Pull to deploy
Production
acme.com

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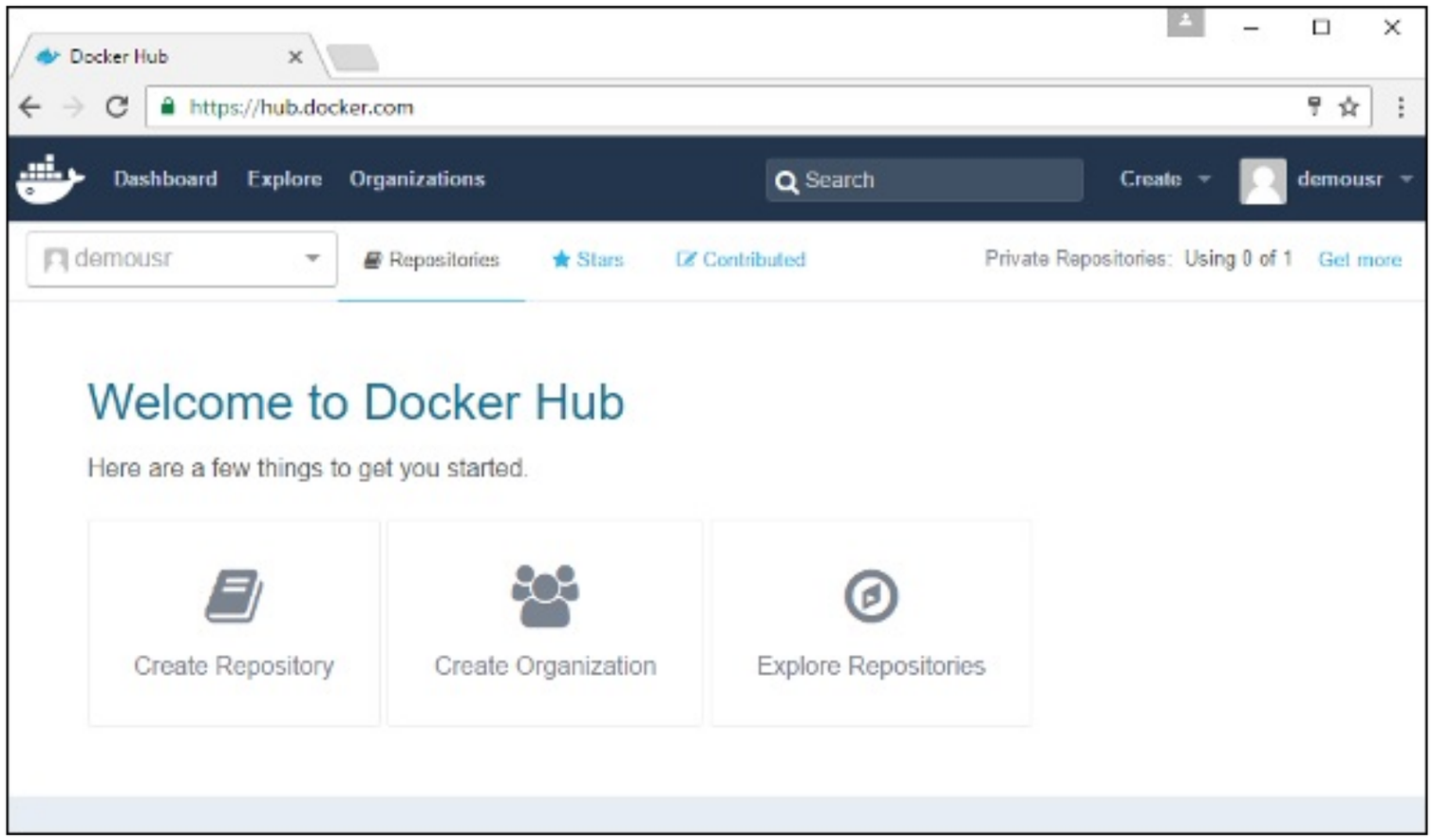
Docker hub



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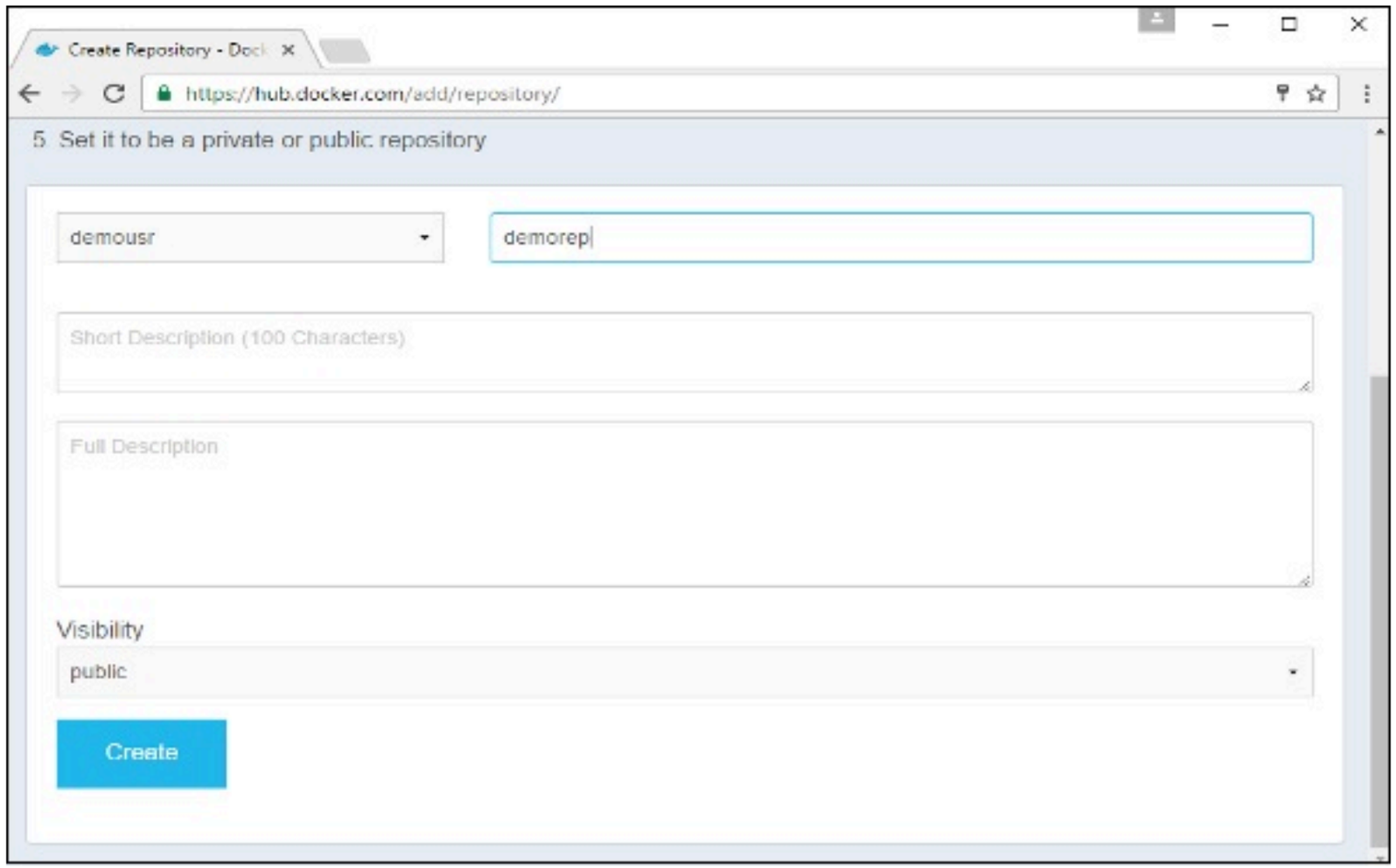
Submit Image to Docker hub



https://www.tutorialspoint.com/docker/docker_public_repositories.htm

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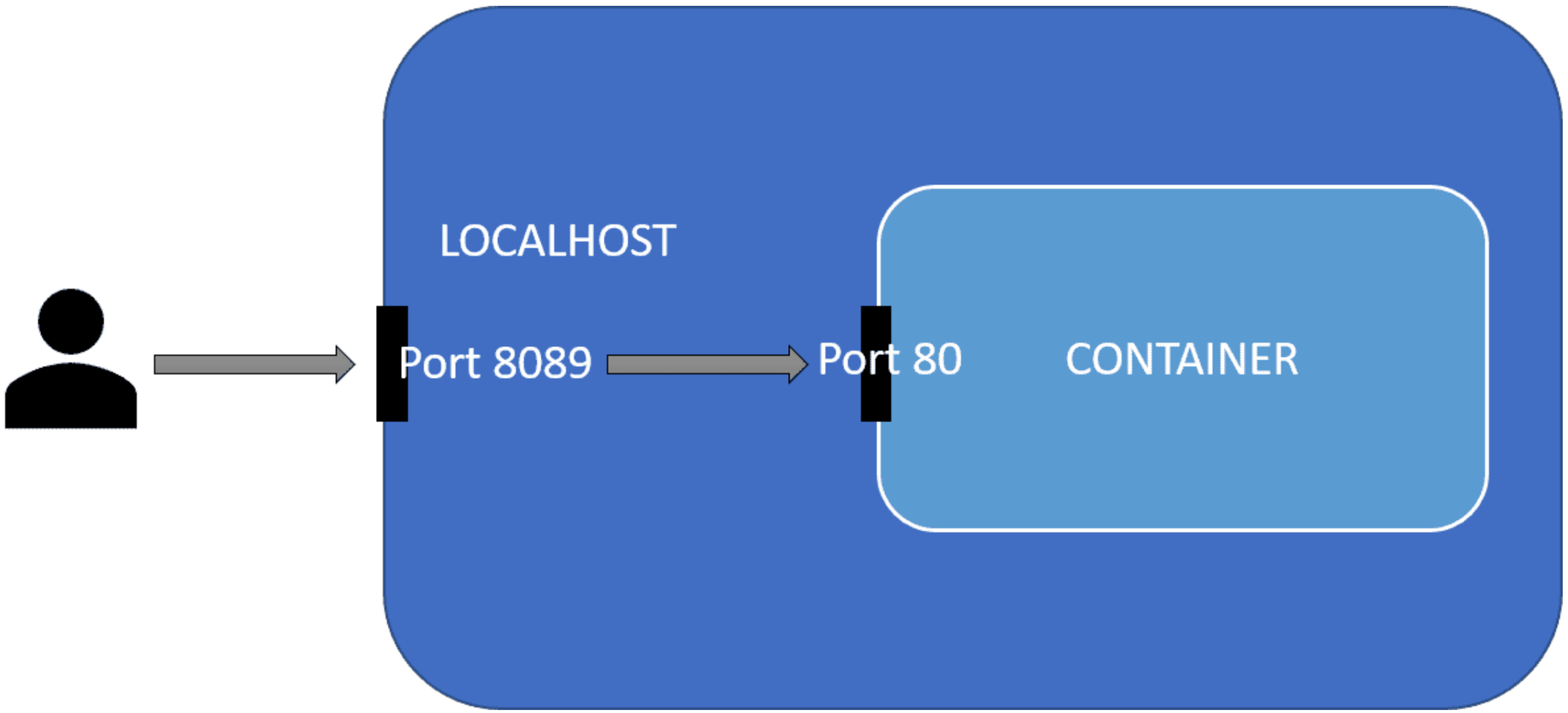
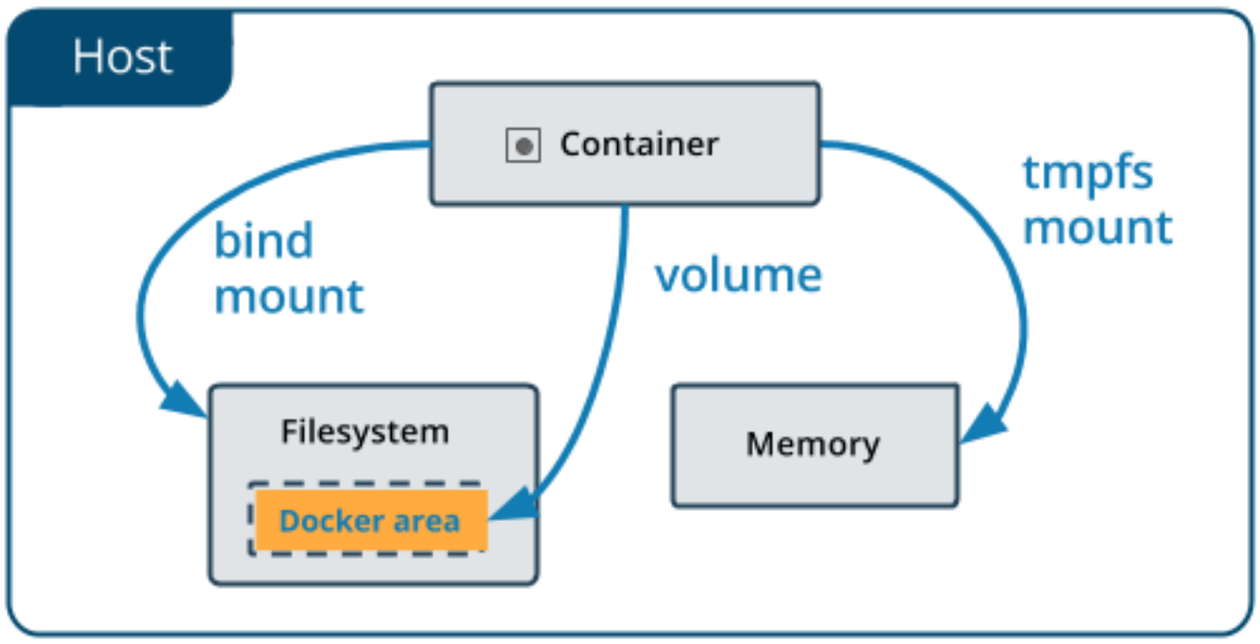
Docker Port




```
sudo docker run -p 8089:80 -p host_port:container_port jenkins
```

Docker Volume




```
docker volume ls
```

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Remove Containers, Images, Volumes, Networks

https://linuxize.com/post/how-to-remove-docker-images-containers-volumes-and-networks/#removing-all-unused-images

Removing All Unused Docker Objects

The `docker system prune` command removes all stopped containers, dangling images, and unused networks:

```
$ docker system prune
```

You'll be prompt you to confirm the operation:

```
Output

WARNING! This will remove:
        - all stopped containers
        - all networks not used by at least one container
        - all dangling images
        - all build cache
Are you sure you want to continue? [y/N]
```

Use the `-f` (`--force`) option to bypass the prompt.

If you want to remove all unused images not just the dangling ones, add the `-a` (`--all`) option to the command:

https://linuxize.com/post/how-to-remove-docker-images-containers-volumes-and-networks/#removing-all-unused-images

Remove Unused Volumes

By default, the command doesn't remove unused volumes to prevent losing important data. To remove all unused volumes, pass the `--volumes` option:

```
$ docker system prune --volumes
```

```
Output
WARNING! This will remove:
        - all stopped containers
        - all networks not used by at least one container
        - all volumes not used by at least one container
        - all dangling images
        - all build cache
Are you sure you want to continue? [y/N] y
```

https://linuxize.com/post/how-to-remove-docker-images-containers-volumes-and-networks/#removing-all-unused-images

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List All Containers

You can get a list of all containers by invoking the `docker container ls` command with the `-a` option:

```
$ docker container ls -a
```

or docker ps -a

https://linuxize.com/post/how-to-remove-docker-images-containers-volumes-and-networks/#removing-all-unused-images

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List All Stopped Containers

```
docker container ls -a --filter status=exited --filter status=created
```

https://linuxize.com/post/how-to-remove-docker-images-containers-volumes-and-networks/#removing-all-unused-images

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Remove all Stoped Containers

Removing all stopped containers

To remove all stopped containers, invoke the `docker container prune` command:

```
$ docker container prune
```

https://linuxize.com/post/how-to-remove-docker-images-containers-volumes-and-networks/#removing-all-unused-images

Removing one or more images

To remove one or more Docker images, first, you need to find the IDs of the images:

```
$ docker image ls
```

The output should look something like this:

```
Output
REPOSITORY              TAG                 IMAGE ID            CREATED
centos                  latest              75835a67d134        7 days ago
ubuntu                  latest              2a4cca5ac898        2 months ago
linuxize/fedora         latest              a45d6dca3361        3 months ago
java                    8-jre               e44d62cf8862        3 months ago
```

https://linuxize.com/post/how-to-remove-docker-images-containers-volumes-and-networks/#removing-all-unused-images

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Remove Dangling Images (Unused)

Removing dangling images

Docker provides a `docker image prune` command that can be used to remove dangled and unused images.

A dangling image is an image that is not tagged and is not used by any container. To remove dangling images, type:

```
$ docker image prune
```

https://linuxize.com/post/how-to-remove-docker-images-containers-volumes-and-networks/#removing-all-unused-images

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List All Dangling Images (Unused)

Removing all unused images

To remove all images that are not referenced by any existing container, not just the dangling ones, use the `prune` command with the `-a` option:

```
$ docker image prune -a
```

```
Output

WARNING! This will remove all images without at least one container associate
Are you sure you want to continue? [y/N] y
```

https://linuxize.com/post/how-to-remove-docker-images-containers-volumes-and-networks/#removing-all-unused-images

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Prune Objects

```
# system all objects
docker system prune

# images
docker image prune
docker image prune  --filter "until=12h"

# containers
docker container prune
docker container prune --filter "until=12h"

# volume
docker system prune --volumes

# network
docker network ls
docker network prune
docker network prune --filter "until=12h"
```

https://linuxize.com/post/how-to-remove-docker-images-containers-volumes-and-networks/#removing-all-unused-images

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List All Dangling Images (Unused)

Removing images using filters

With the `docker image prune` command, you can also remove images based on a particular condition with the `--filter` option.

At the time of the writing of this article, the currently supported filters are `until` and `label`. You can use more than one filter.

For example, to remove all images that are created more than seven days (168 hours) ago, you would run:

```
$ docker image prune -a --filter "until=168h"
```

https://linuxize.com/post/how-to-remove-docker-images-containers-volumes-and-networks/#removing-all-unused-images

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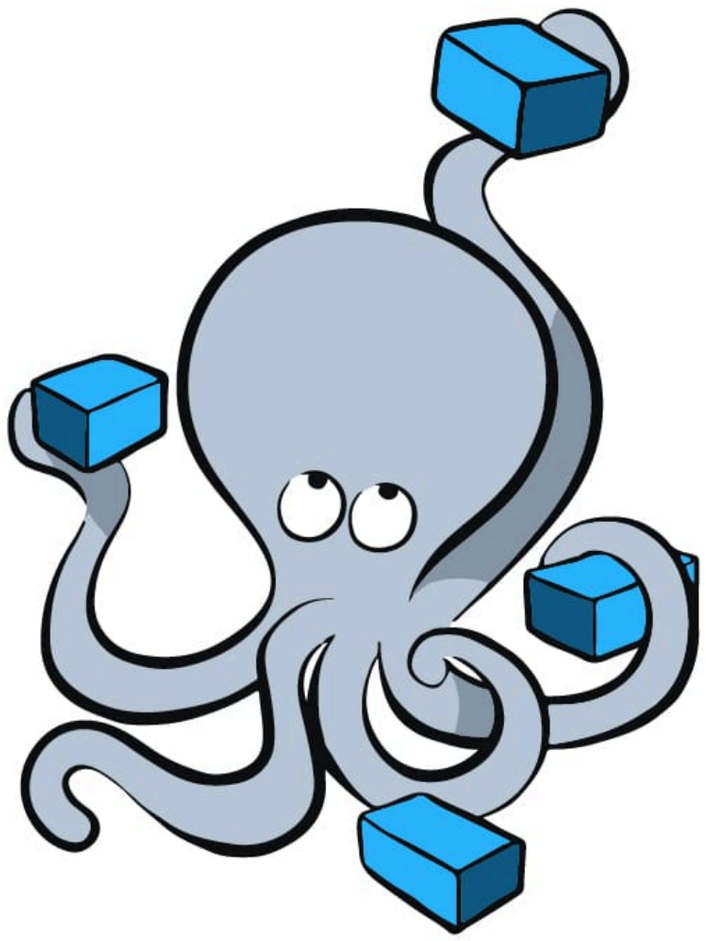
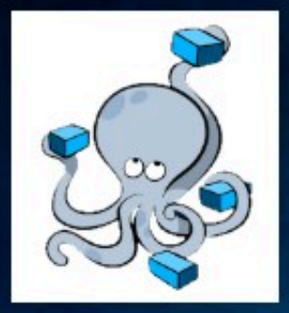
Docker-compose

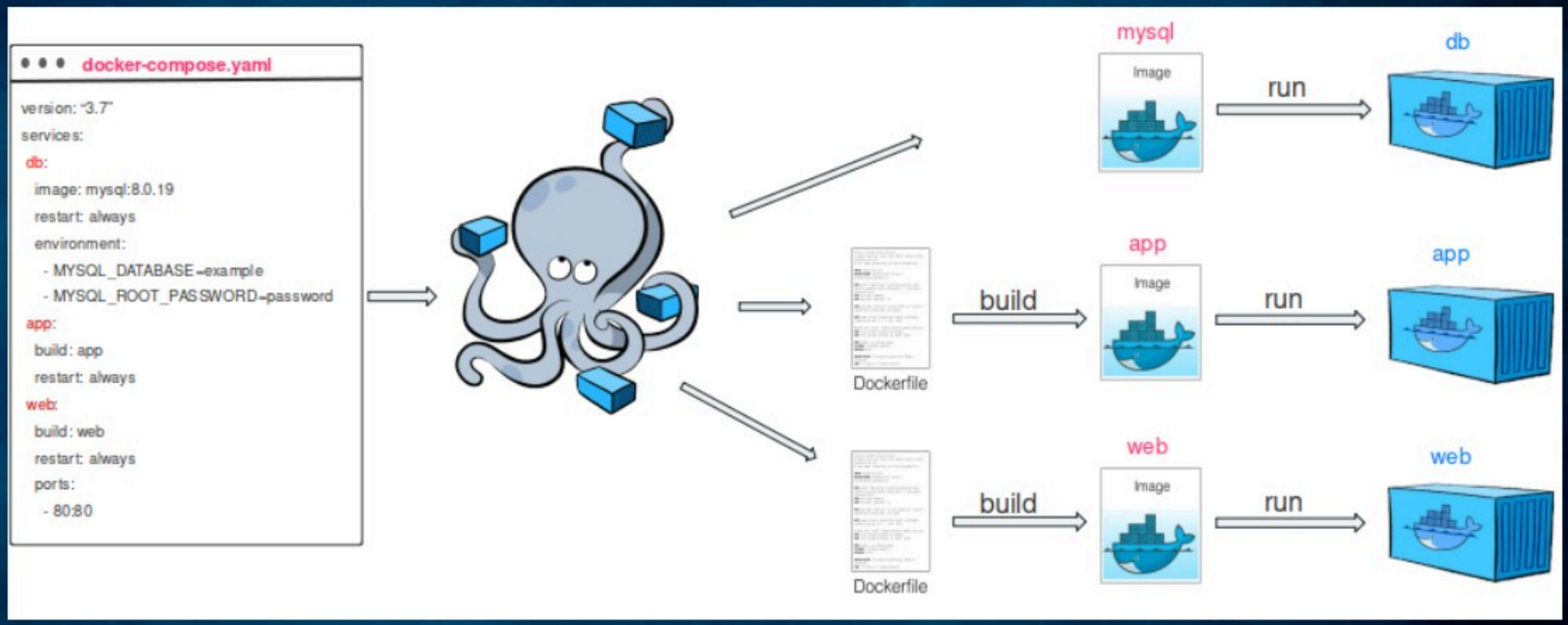


docker

Compose



Docker Compose



Run multiple containers as a service from 1 .yaml file

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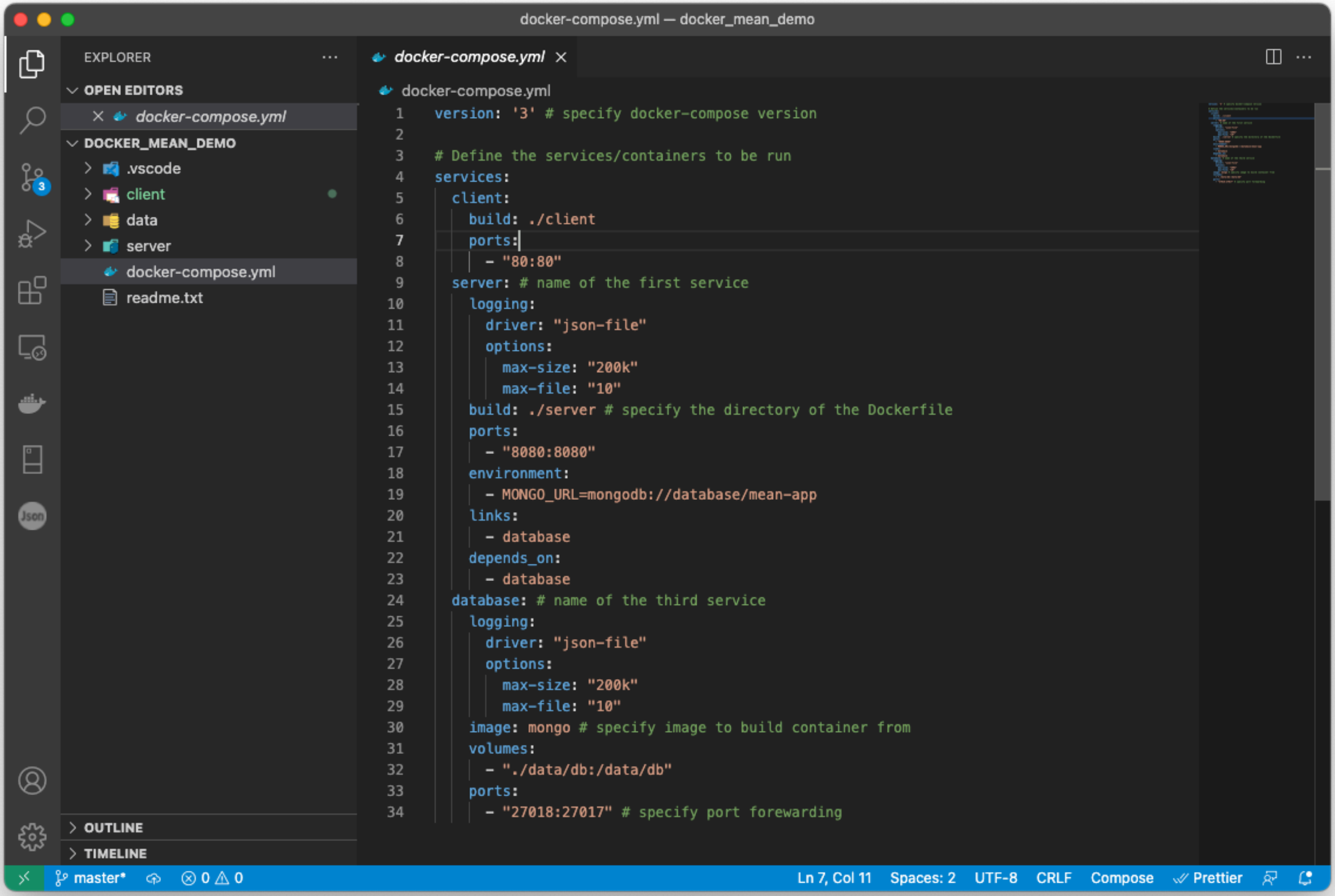
Docker-compose



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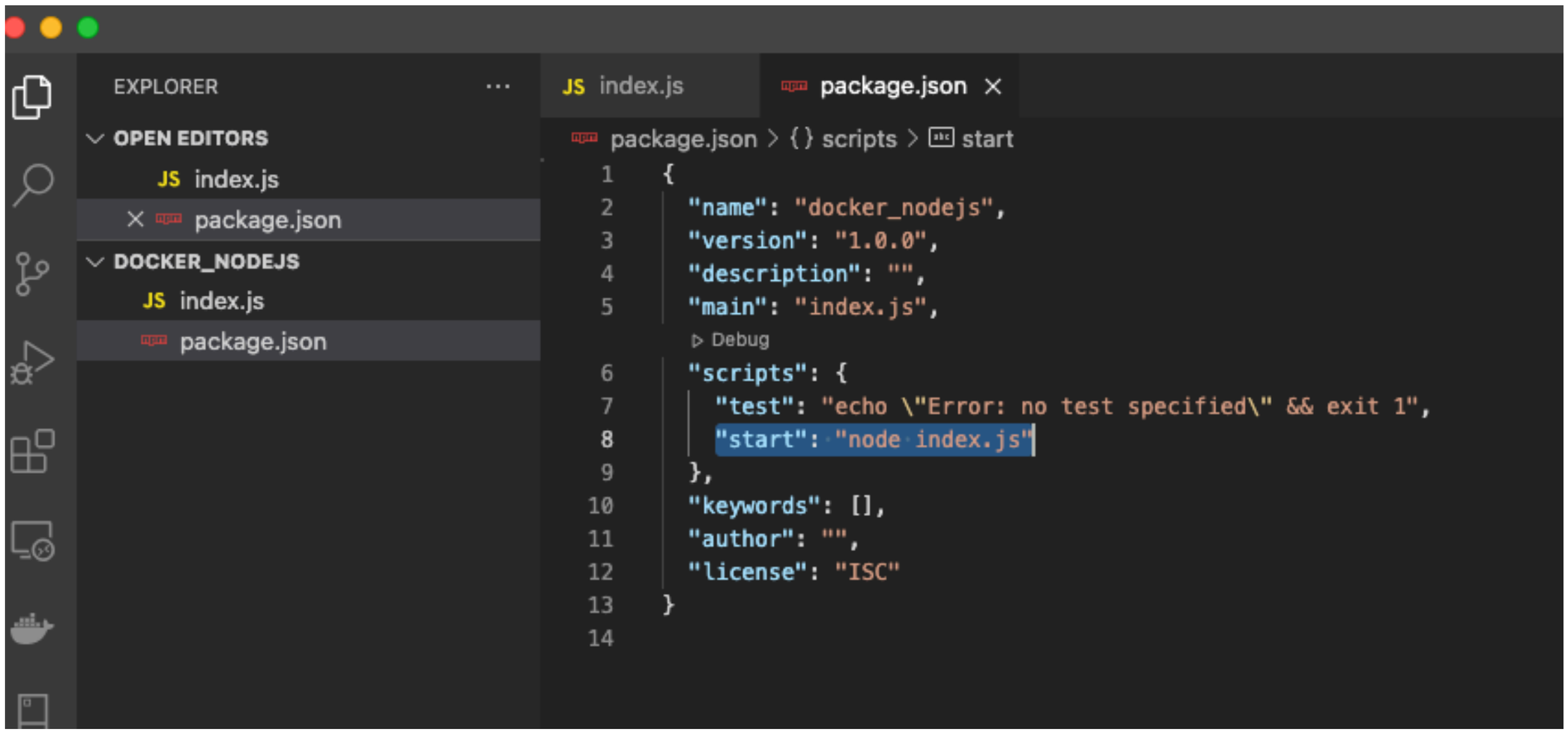
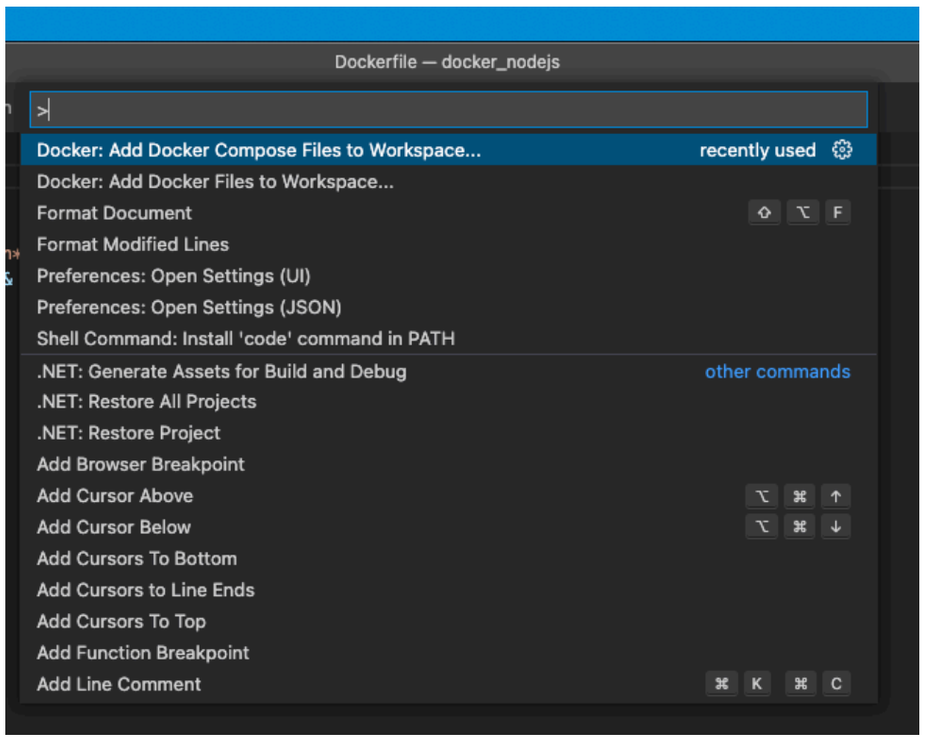
Docker NodeJS Workshop

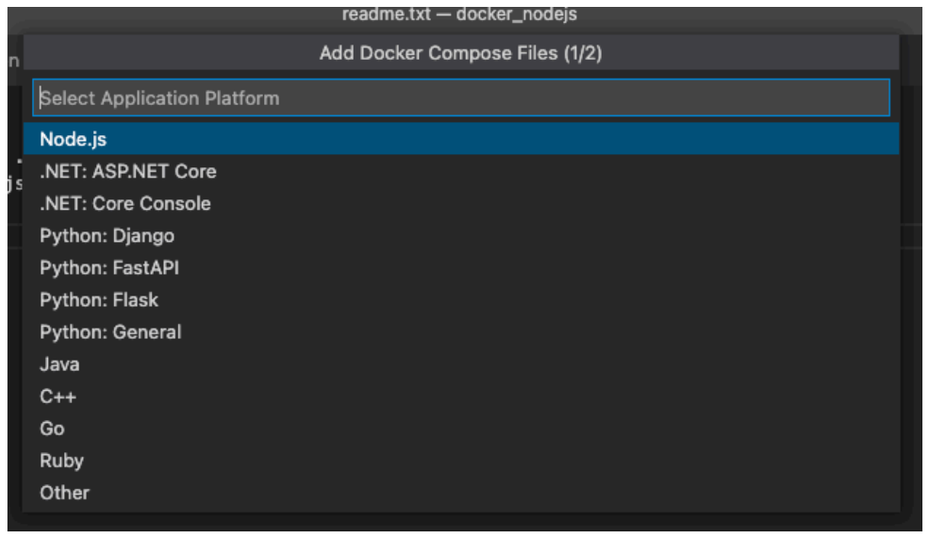
- **Preparation**
  - create a docker project folder like demo1
  - npm init -y
  - npm i express
  - Revise package.json to start index.js file
    - "start": "node index.js"
- Create index.js
- Create Dockerfile with VSCode Docker Extension
- docker build -t cmnodejs:1.0 .
- docker run -it --rm -p 3000:3000 cmnodejs:1.0

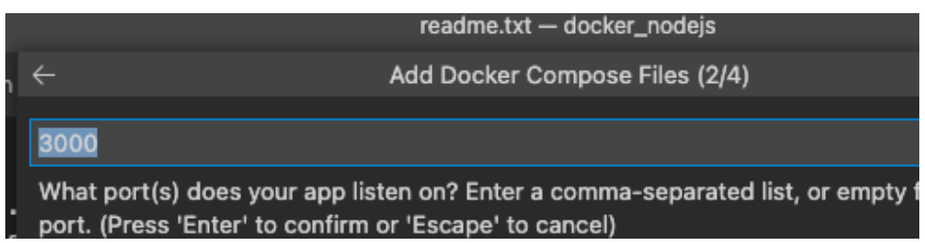
- create a docker project folder like demo1
- npm init -y
- npm i express
- Revise package.json to start index.js file : "start": "node index.js"

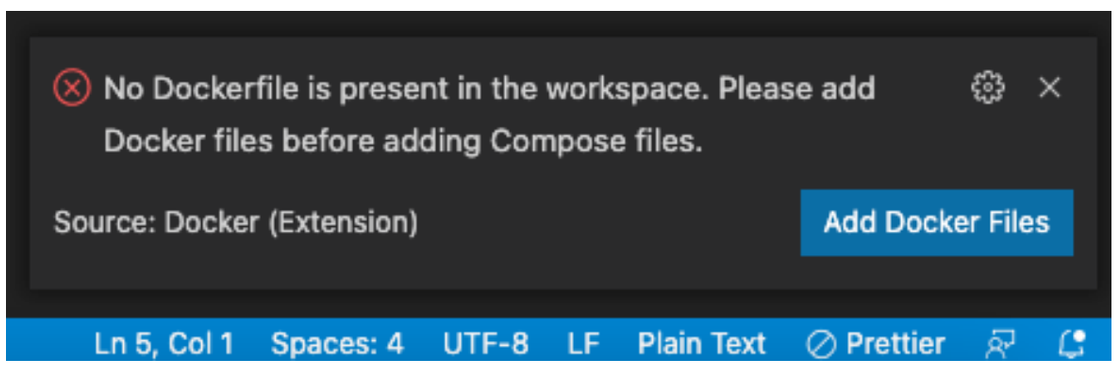


Create Dockerfile with VSCode Extension

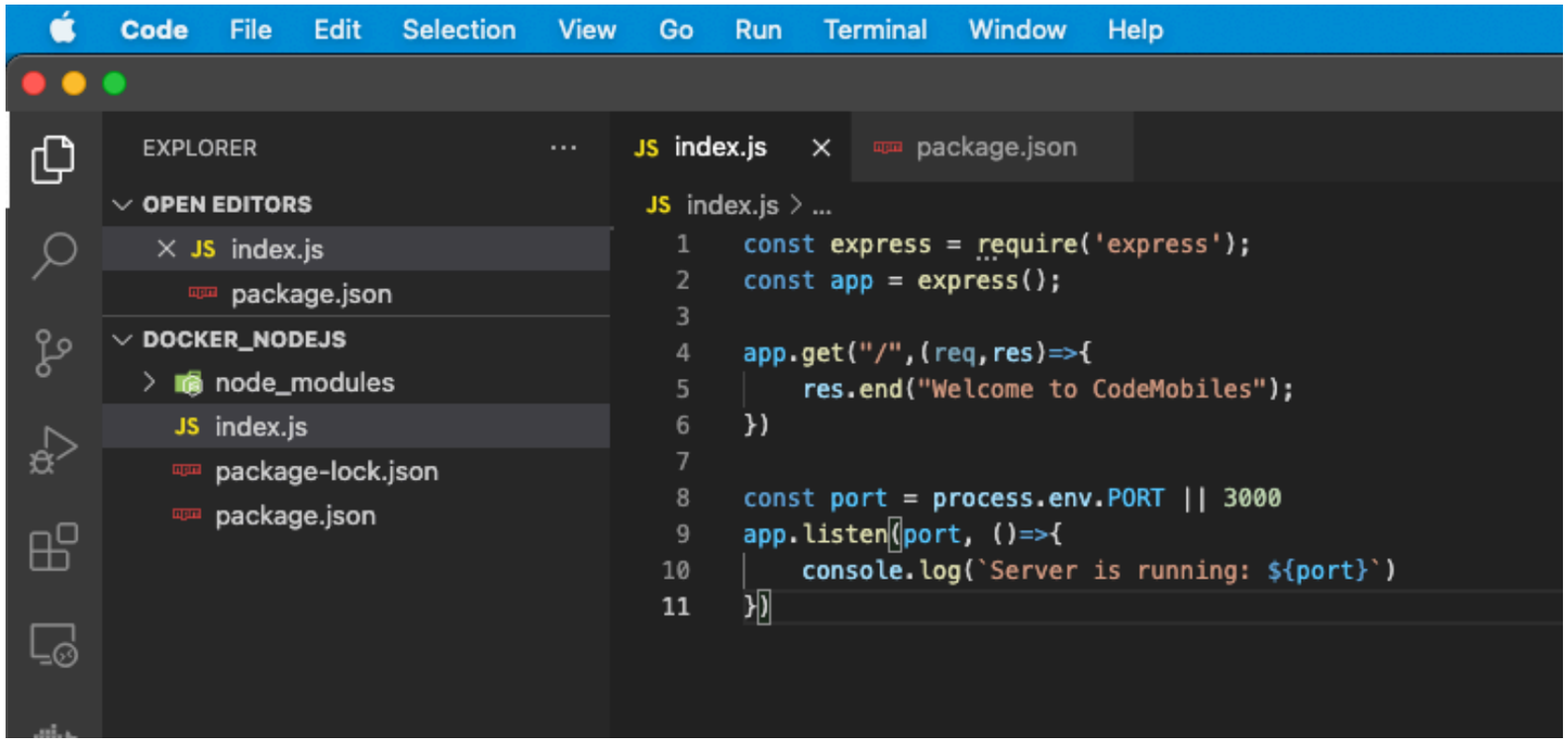








Create nodejs code named : index.js




```
const express = require('express');
const app = express();

app.get("/",(req,res)=>{
    res.end("Welcome to CodeMobiles");
})

const port = process.env.PORT || 3000
app.listen(port, ()=>{
    console.log(`Server is running: ${port}`)
})
```

docker build --no-cache -t cmnodejs:1.0 .

```
PROBLEMS    OUTPUT    TERMINAL    DEBUG CONSOLE

CMDevM1 [~/Desktop/Training/Docker/workshop/docker_tutorial/docker_nodejs]$ docker build --no-cache -t cmnodejs:1.0 .
[+] Building 6.2s (12/12) FINISHED
 => [internal] load build definition from Dockerfile
 => => transferring dockerfile: 337B
 => [internal] load .dockerignore
 => => transferring context: 366B
 => [internal] load metadata for docker.io/library/node:14-alpine
 => [auth] library/node:pull token for registry-1.docker.io
 => [internal] load build context
 => => transferring context: 245B
 => [1/6] FROM docker.io/library/node:14-alpine@sha256:6e52e0b3bedfb494496488514d18bee7fd503fd4e44289ea012ad02f8f41a312
 => CACHED [2/6] WORKDIR /usr/src/app
 => [3/6] COPY [package.json, package-lock.json*, npm-shrinkwrap.json*, ./]
 => [4/6] RUN npm install --production --silent && mv node_modules ../
 => [5/6] COPY . .
 => [6/6] RUN chown -R node /usr/src/app
 => exporting to image
 => => exporting layers
 => => writing image sha256:32aaec411c9cae9b476686d3d6920d8c57374c6add768c072ed1b988626211e2
 => => naming to docker.io/library/cmnodejs:1.0

Use 'docker scan' to run Snyk tests against images to find vulnerabilities and learn how to fix them
CMDevM1 [~/Desktop/Training/Docker/workshop/docker_tutorial/docker_nodejs]$
```

docker run -it --rm -p 3000:3000 cmnodejs:1.0

```
PROBLEMS  OUTPUT  TERMINAL  DEBUG CONSOLE

CMDevM1 [~/Desktop/Training/Docker/workshop/docker_tutorial/docker_nodejs]$ docker run -it --rm -p 3000:3000 cmnodejs:1.0

> docker_nodejs@1.0.0 start /usr/src/app
> node index.js

Server is running: 3000
```

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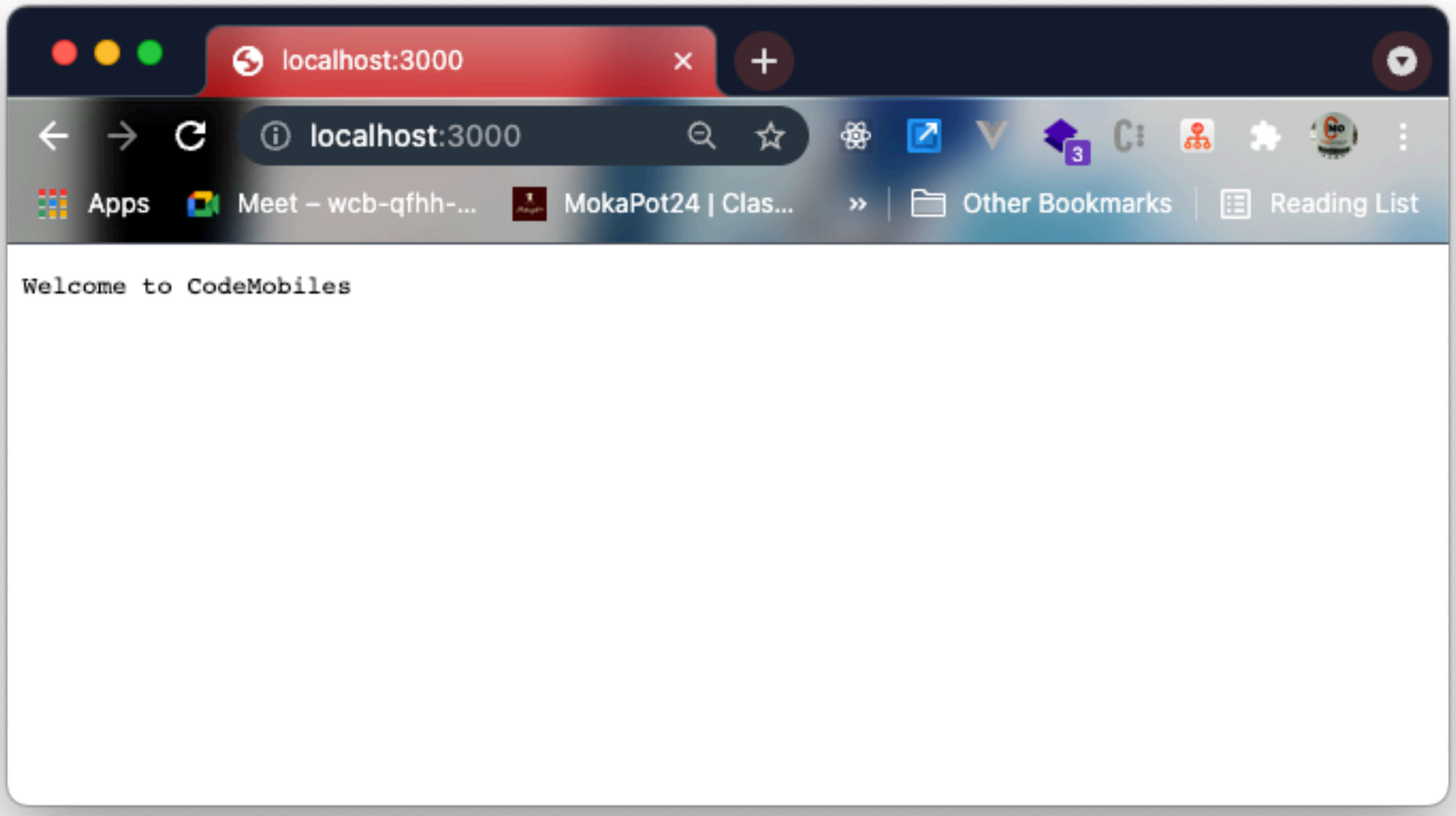
Docker NodeJS Workshop



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Thank You
For Your Attention