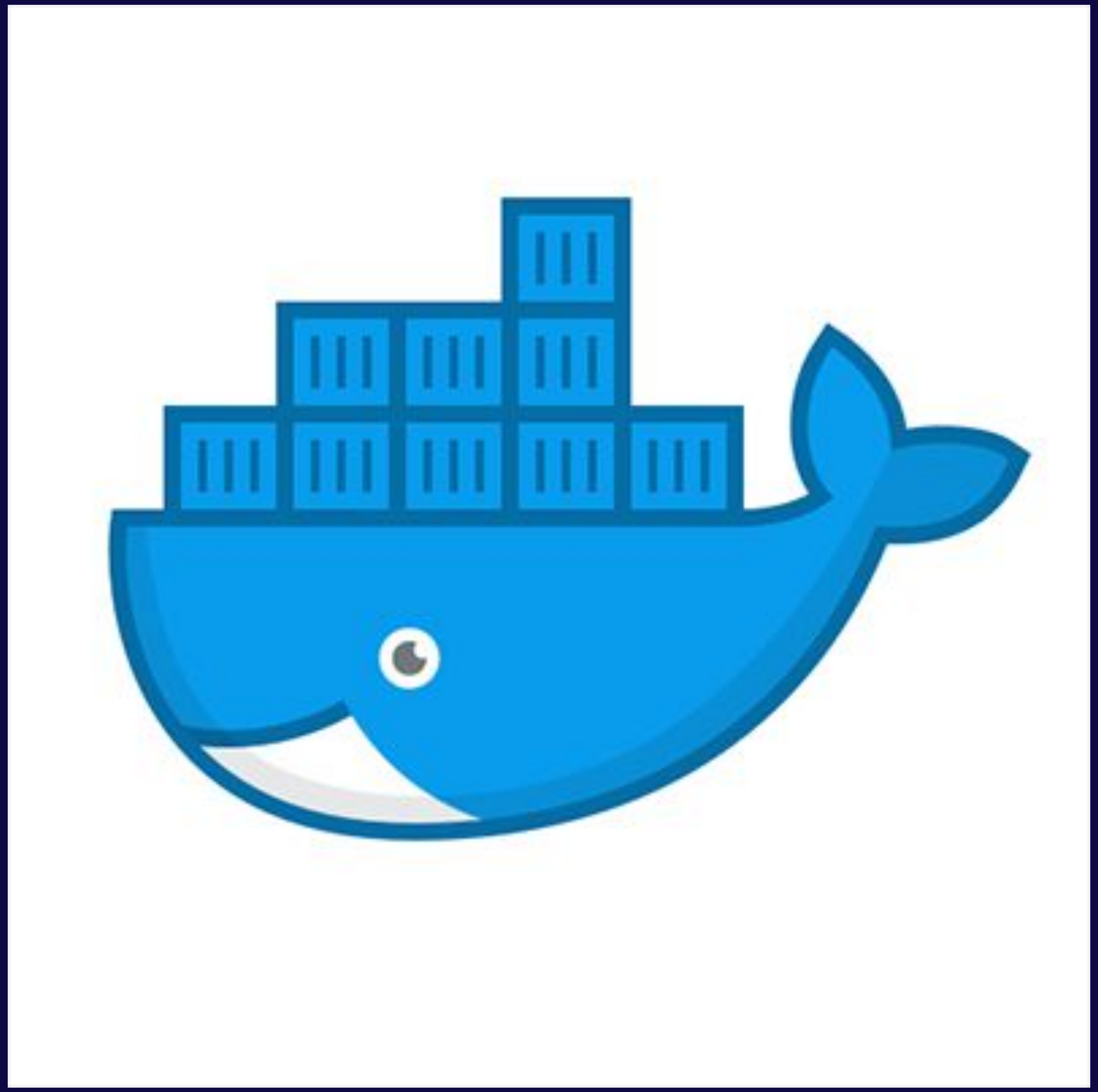
LIVEPERSON

Advanced Docker

Mannheimer Java User Group



Simon Pelczer
SDE III , LivePerson

Overview

Building

- Build Arguments
- Multi-Stage Images

Docker under the hood

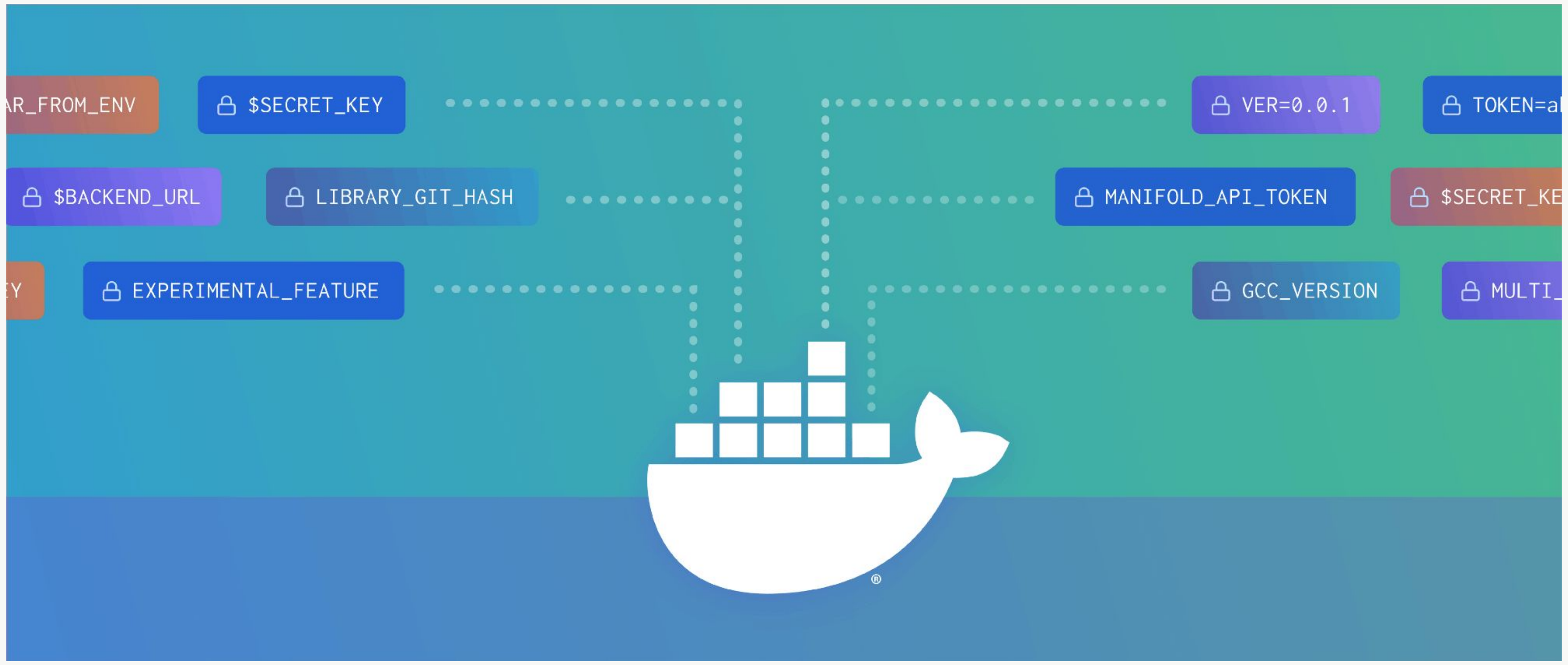
- OnionFS/OverlayFS
- Docker CLI

Tipps & Tricks

- Remote Containers
- Best Practices

Building

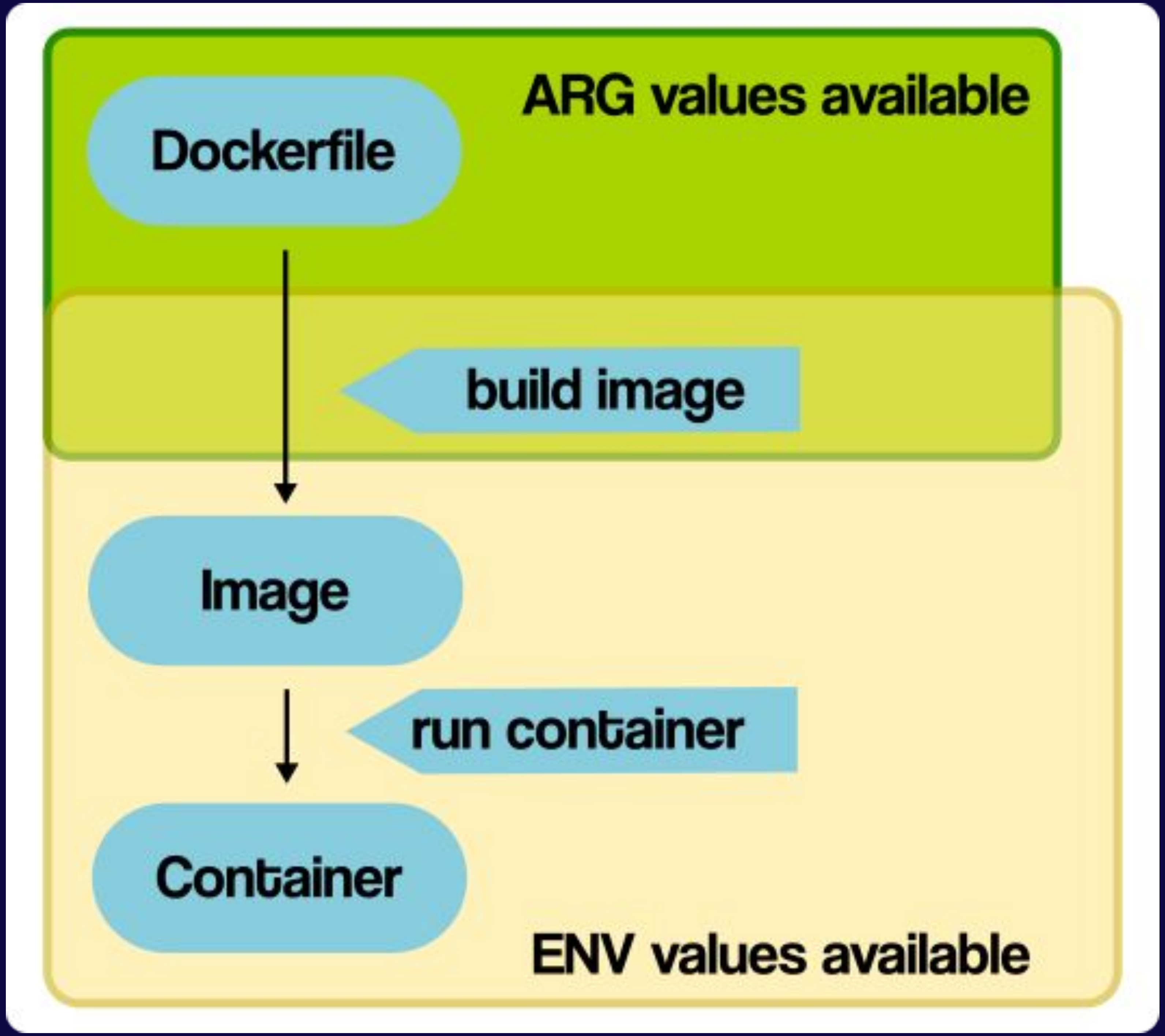
Build Arguments



Building - Build Arguments

FUN Facts

- **Only available & referenceable at build time**
- **Can have a default value**
- **Still visible in the history**
- **Can be used to dynamically set ENVS**
- **Combined with Multi-Stage allow to inject build secret**



Building - Build Arguments - ARGS vs ENVS

ARGS:

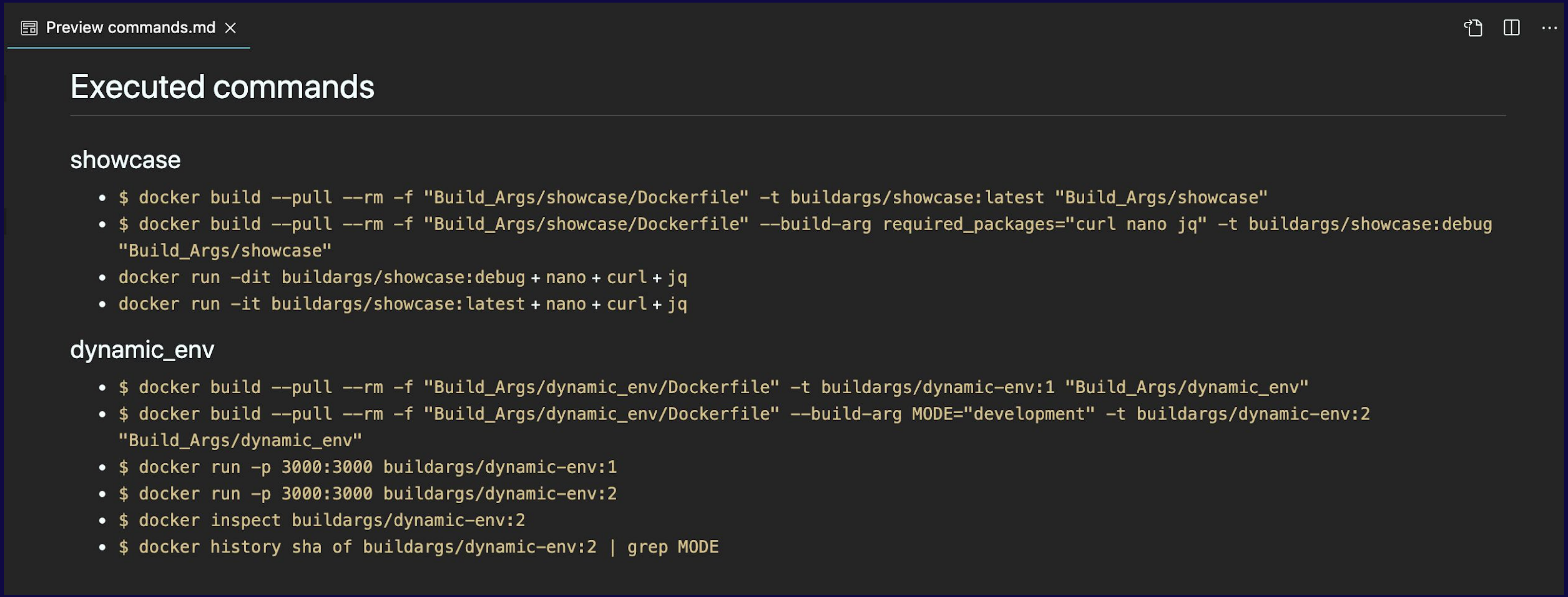
- Available only at build time
- Is provided during build time
- Visible in history

ENVS:

- Available during build & runtime
- Can be overwritten at runtime
- Visible directly when using inspect + history

Live Demo

- Demonstrating dynamic setting of environment variables
- Manipulation of the underlying image based on parameters



Preview commands.md

Executed commands

showcase

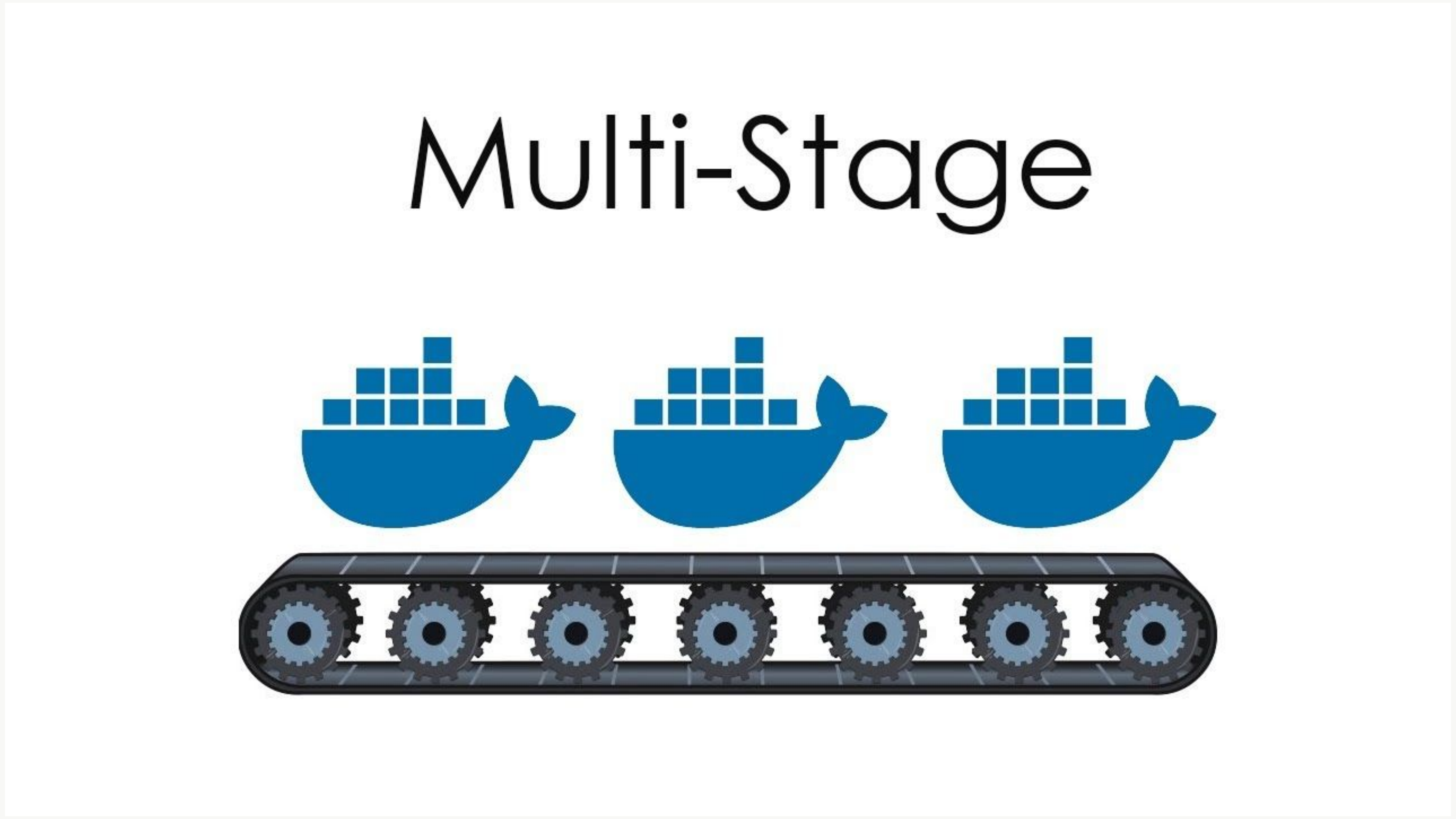
- `$ docker build --pull --rm -f "Build_Args/showcase/Dockerfile" -t buildargs/showcase:latest "Build_Args/showcase"`
- `$ docker build --pull --rm -f "Build_Args/showcase/Dockerfile" --build-arg required_packages="curl nano jq" -t buildargs/showcase:debug "Build_Args/showcase"`
- `docker run -dit buildargs/showcase:debug` + `nano` + `curl` + `jq`
- `docker run -it buildargs/showcase:latest` + `nano` + `curl` + `jq`

dynamic_env

- `$ docker build --pull --rm -f "Build_Args/dynamic_env/Dockerfile" -t buildargs/dynamic-env:1 "Build_Args/dynamic_env"`
- `$ docker build --pull --rm -f "Build_Args/dynamic_env/Dockerfile" --build-arg MODE="development" -t buildargs/dynamic-env:2 "Build_Args/dynamic_env"`
- `$ docker run -p 3000:3000 buildargs/dynamic-env:1`
- `$ docker run -p 3000:3000 buildargs/dynamic-env:2`
- `$ docker inspect buildargs/dynamic-env:2`
- `$ docker history sha of buildargs/dynamic-env:2 | grep MODE`

Building

Multi-Stage



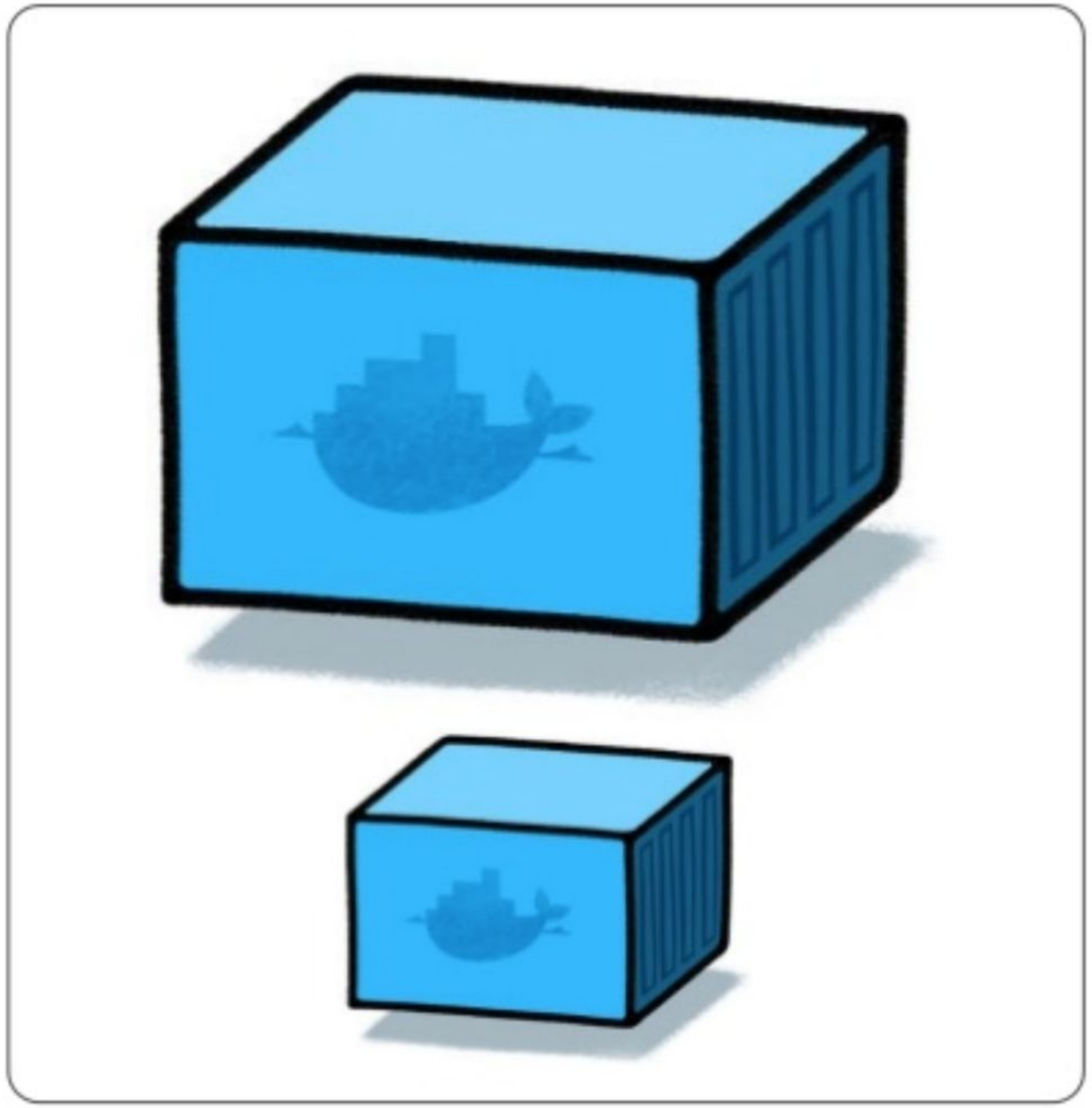
Building - Multi-Stage

1

```
# Dockerfile
# build stage
FROM buildbase as build
...
...
...
```

2

```
# production ready stage
FROM runbase
...
COPY --from=build
/artifact /app
```



Building - Multi-Stage

Uses

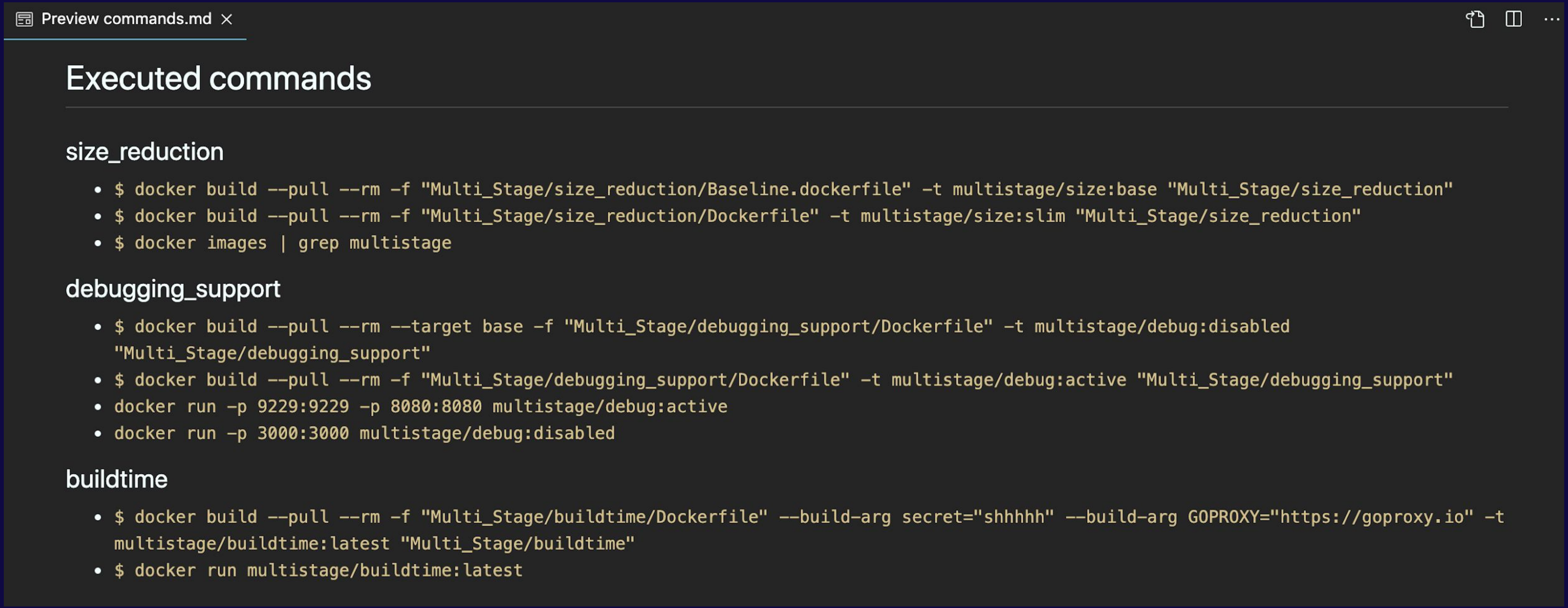
- Reducing image size
- Faster builds
- Allowing different flavors (debugging)
- Using build secrets

FUN Facts

- Stages can be named
- Copying from previous stages
- Building of previous stages
- Can run till specified stage
- Can use external images directly

Live Demo

- Demonstration of image size reduction
- Implementation of Debugging Flavor
- Build Secrets + Build Time variables



Preview commands.md

Executed commands

size_reduction

```
$ docker build --pull --rm -f "Multi_Stage/size_reduction/Baseline.dockerfile" -t multistage/size:base "Multi_Stage/size_reduction"
$ docker build --pull --rm -f "Multi_Stage/size_reduction/Dockerfile" -t multistage/size:slim "Multi_Stage/size_reduction"
$ docker images | grep multistage
```

debugging_support

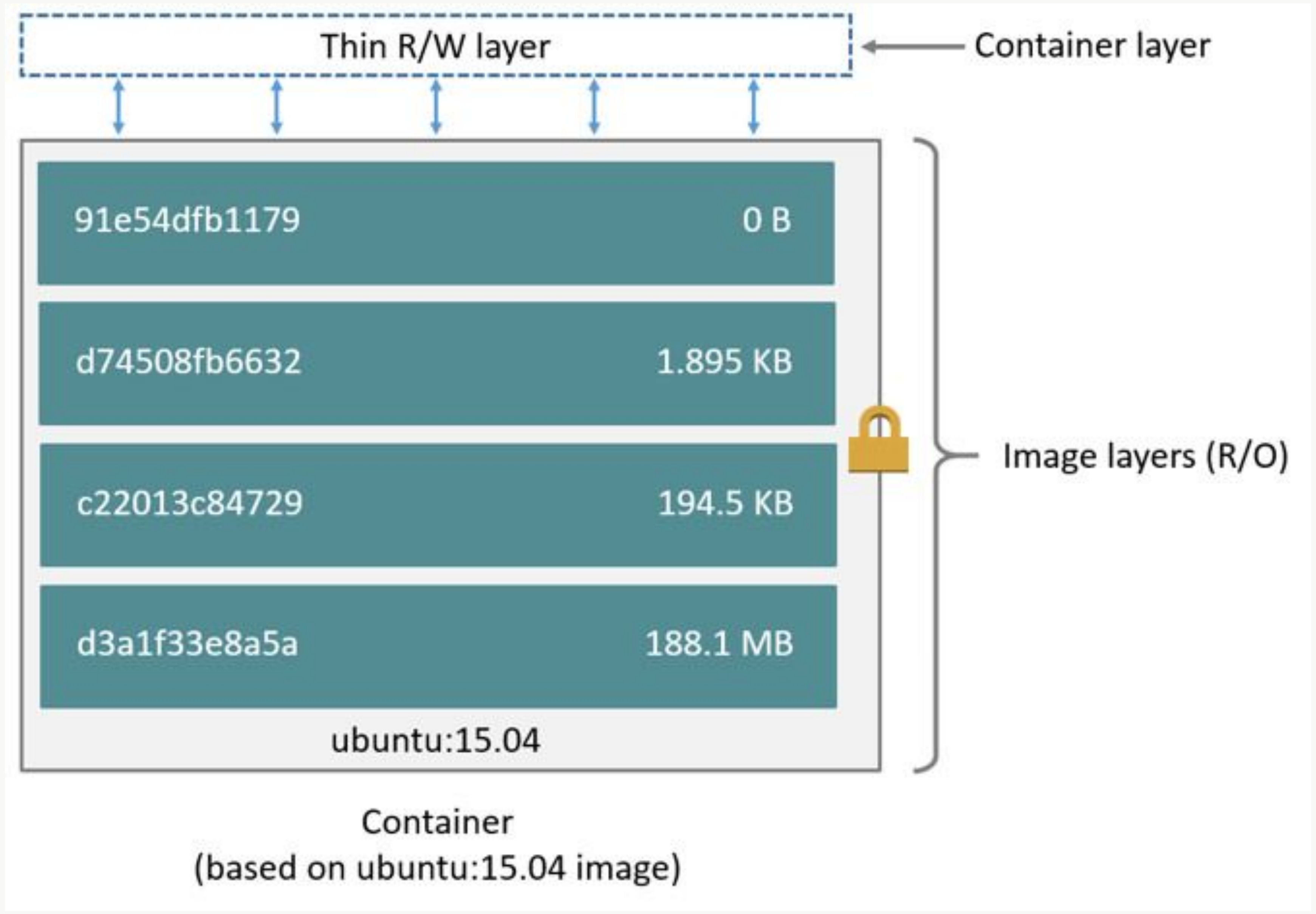
```
$ docker build --pull --rm --target base -f "Multi_Stage/debugging_support/Dockerfile" -t multistage/debug:disabled "Multi_Stage/debugging_support"
$ docker build --pull --rm -f "Multi_Stage/debugging_support/Dockerfile" -t multistage/debug:active "Multi_Stage/debugging_support"
docker run -p 9229:9229 -p 8080:8080 multistage/debug:active
docker run -p 3000:3000 multistage/debug:disabled
```

buildtime

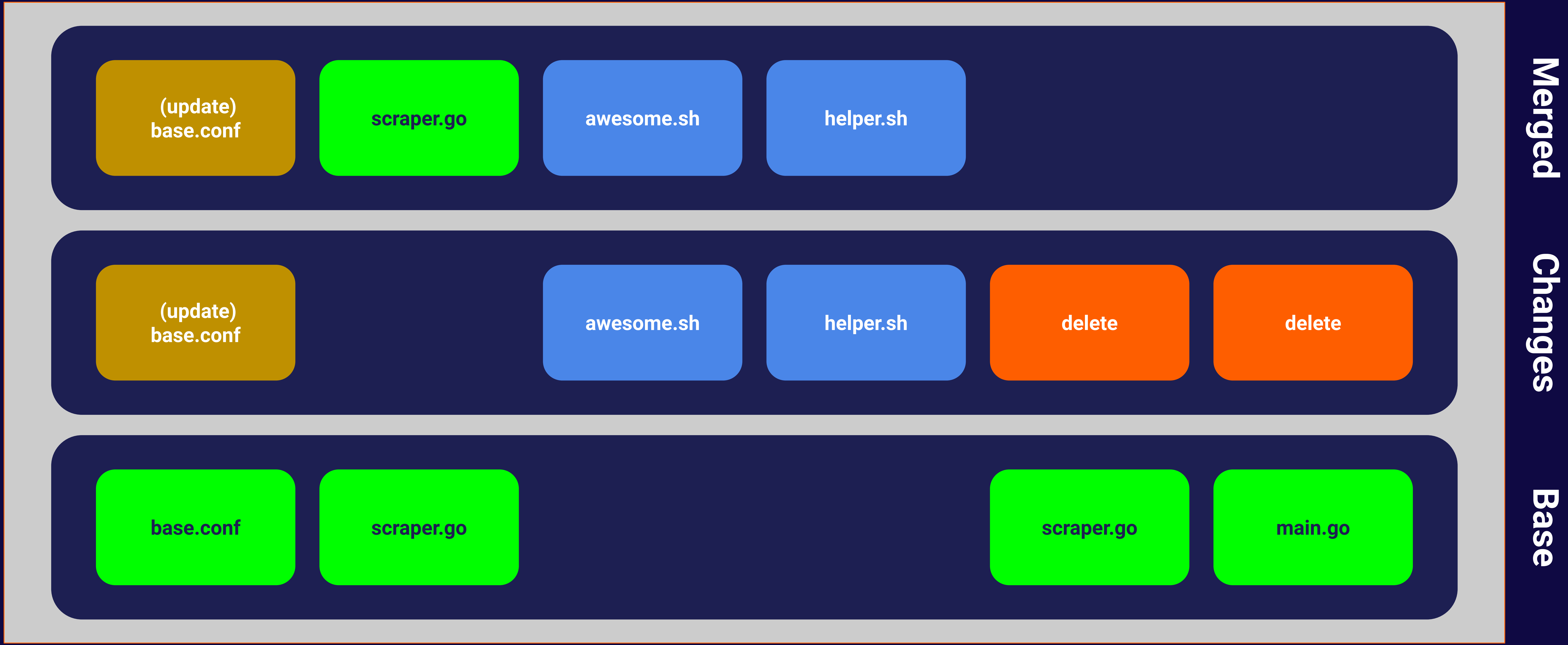
```
$ docker build --pull --rm -f "Multi_Stage/buildtime/Dockerfile" --build-arg secret="shhhhh" --build-arg GOPROXY="https://goproxy.io" -t multistage/buildtime:latest "Multi_Stage/buildtime"
$ docker run multistage/buildtime:latest
```

Docker under the hood

OverlayFS

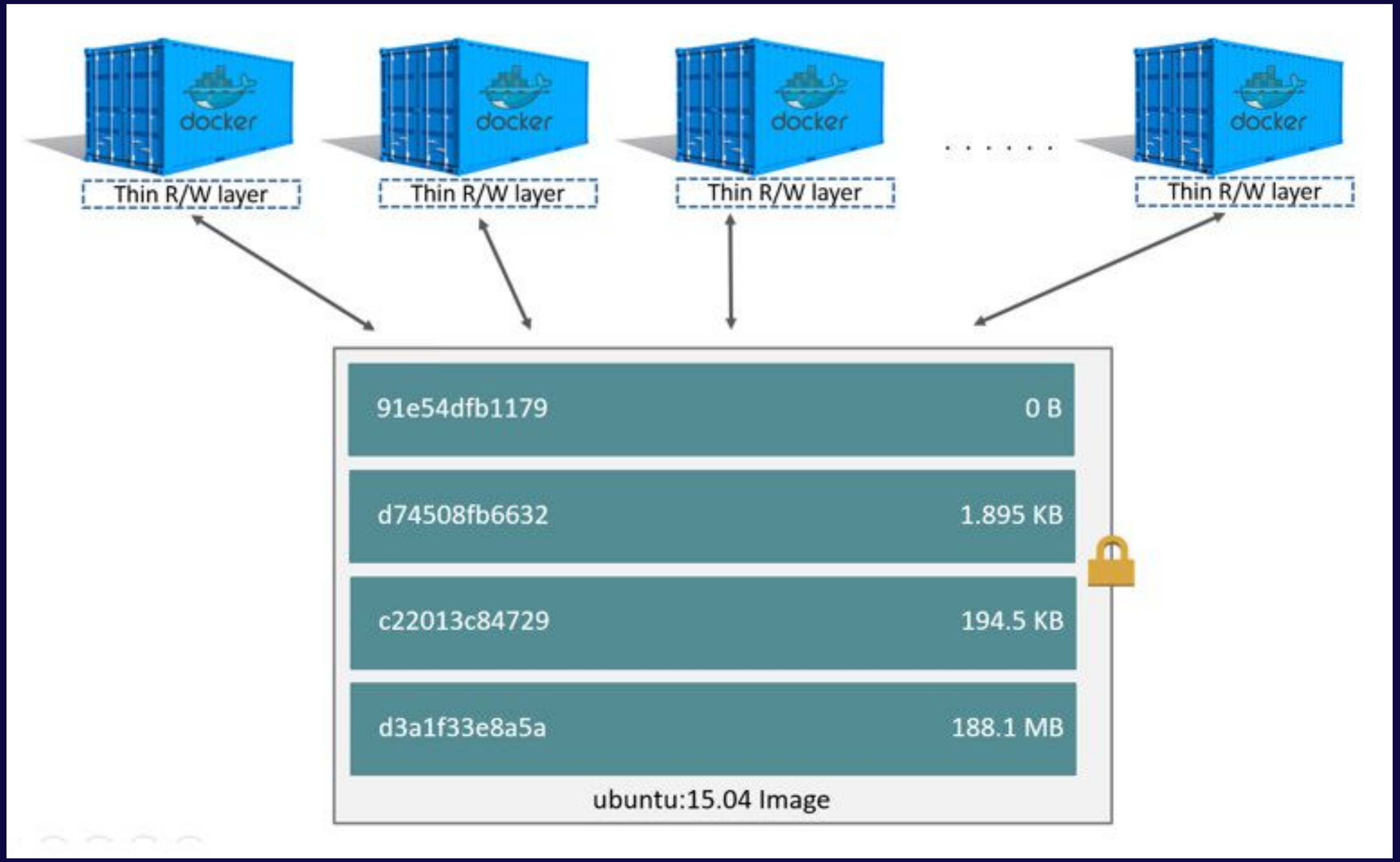


Docker under the hood - OverlayFS



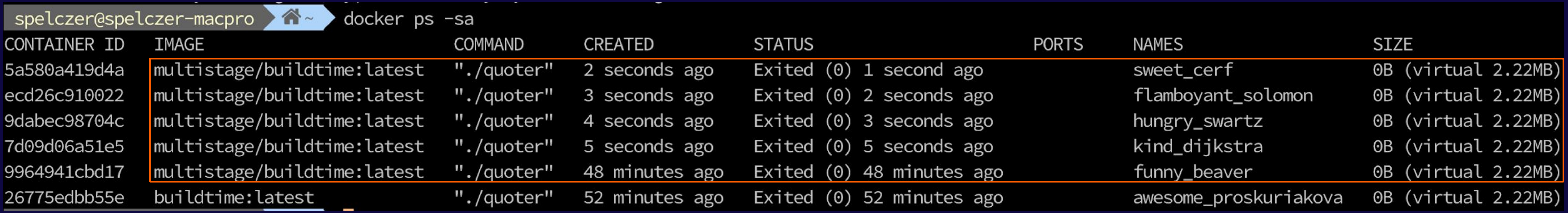
Docker under the hood - OverlayFS

- One layer per executed command
- Layers of an image are read-only
- During container start a new r/w (overlay) layer gets created
- Modifications on existing files use copy-on-write approach
    - File gets copied into r/w layer and then modified



Docker under the hood - OverlayFS

- Individual container
  - Size on disk := size + virtual size
- Multiple container
  - Size on disk := sum(size) + 1 * (virtual size - size)
- $ docker ps -s(a)

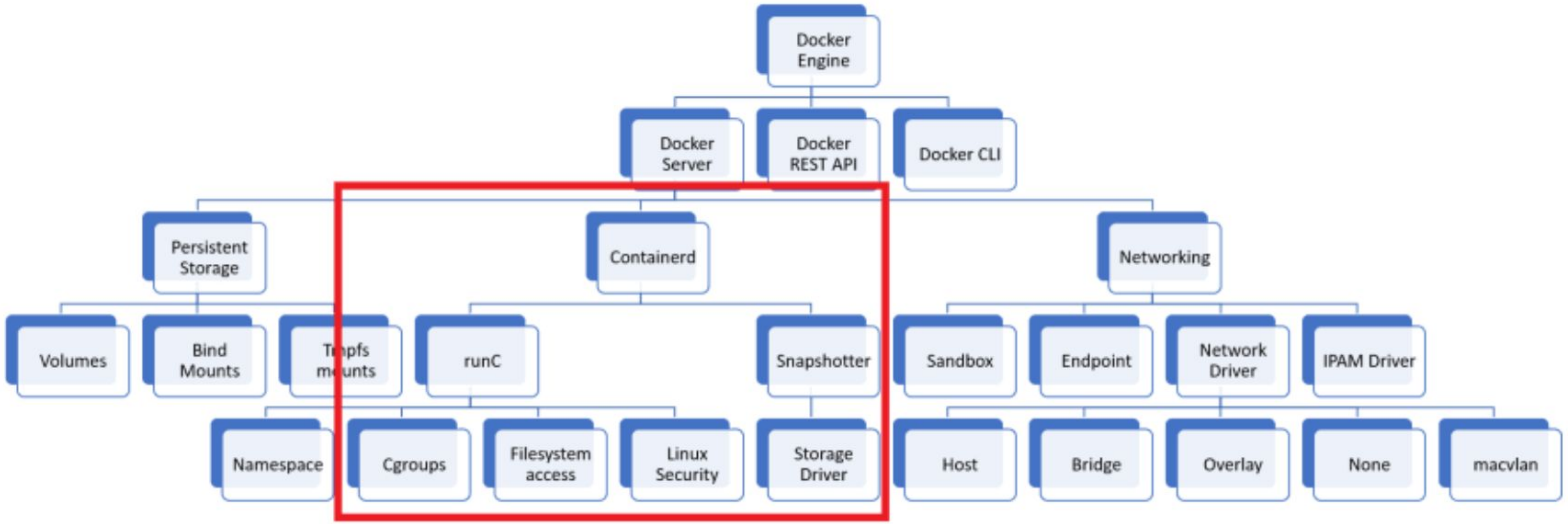


```
spelczer@spelczer-macpro  ~  docker ps -sa
CONTAINER ID   IMAGE                        COMMAND       CREATED           STATUS                      PORTS     NAMES                   SIZE
5a580a419d4a   multistage/buildtime:latest  "./quoter"    2 seconds ago     Exited (0) 1 second ago               sweet_cerf              0B (virtual 2.22MB)
ecd26c910022   multistage/buildtime:latest  "./quoter"    3 seconds ago     Exited (0) 2 seconds ago              flamboyant_solomon      0B (virtual 2.22MB)
9dabec98704c   multistage/buildtime:latest  "./quoter"    4 seconds ago     Exited (0) 3 seconds ago              hungry_swartz           0B (virtual 2.22MB)
7d09d06a51e5   multistage/buildtime:latest  "./quoter"    5 seconds ago     Exited (0) 5 seconds ago              kind_dijkstra           0B (virtual 2.22MB)
9964941cbd17   multistage/buildtime:latest  "./quoter"    48 minutes ago    Exited (0) 48 minutes ago             funny_beaver            0B (virtual 2.22MB)
26775edbb55e   buildtime:latest             "./quoter"    52 minutes ago    Exited (0) 52 minutes ago             awesome_proskuriakova   0B (virtual 2.22MB)
```

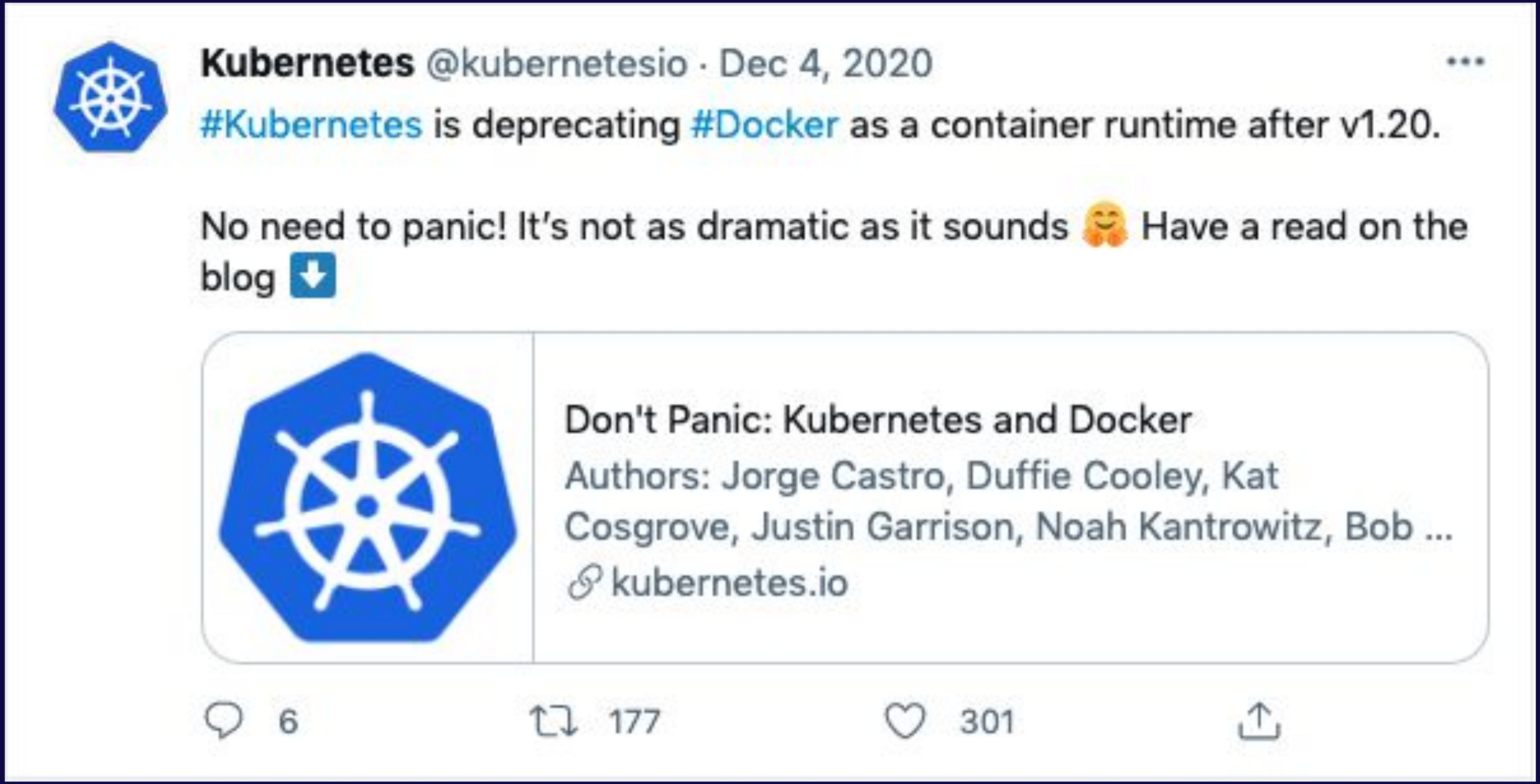
Docker under the hood

Docker CLI

Docker under the hood - Docker CLI



Docker under the hood - Docker CLI



Kubernetes @kubernetesio · Dec 4, 2020

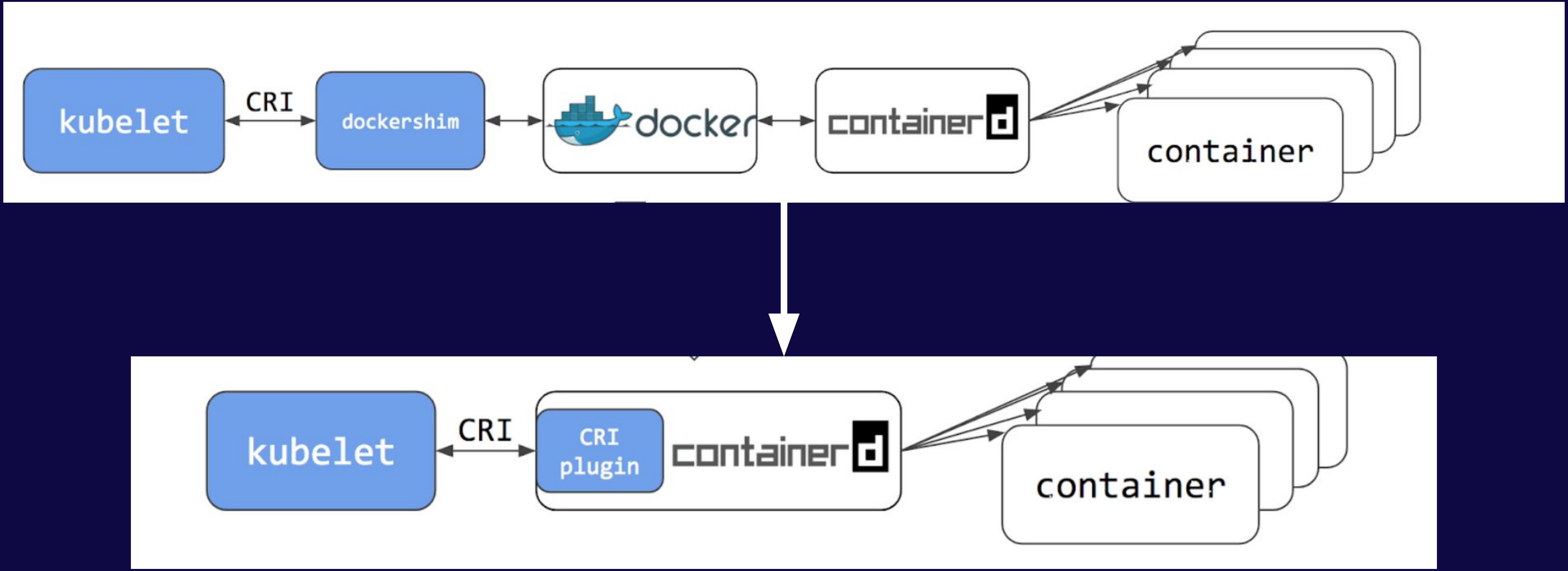
#Kubernetes is deprecating #Docker as a container runtime after v1.20.

No need to panic! It's not as dramatic as it sounds 🤗 Have a read on the blog ⬇️

Don't Panic: Kubernetes and Docker
Authors: Jorge Castro, Duffie Cooley, Kat Cosgrove, Justin Garrison, Noah Kantrowitz, Bob ...
kubernetes.io

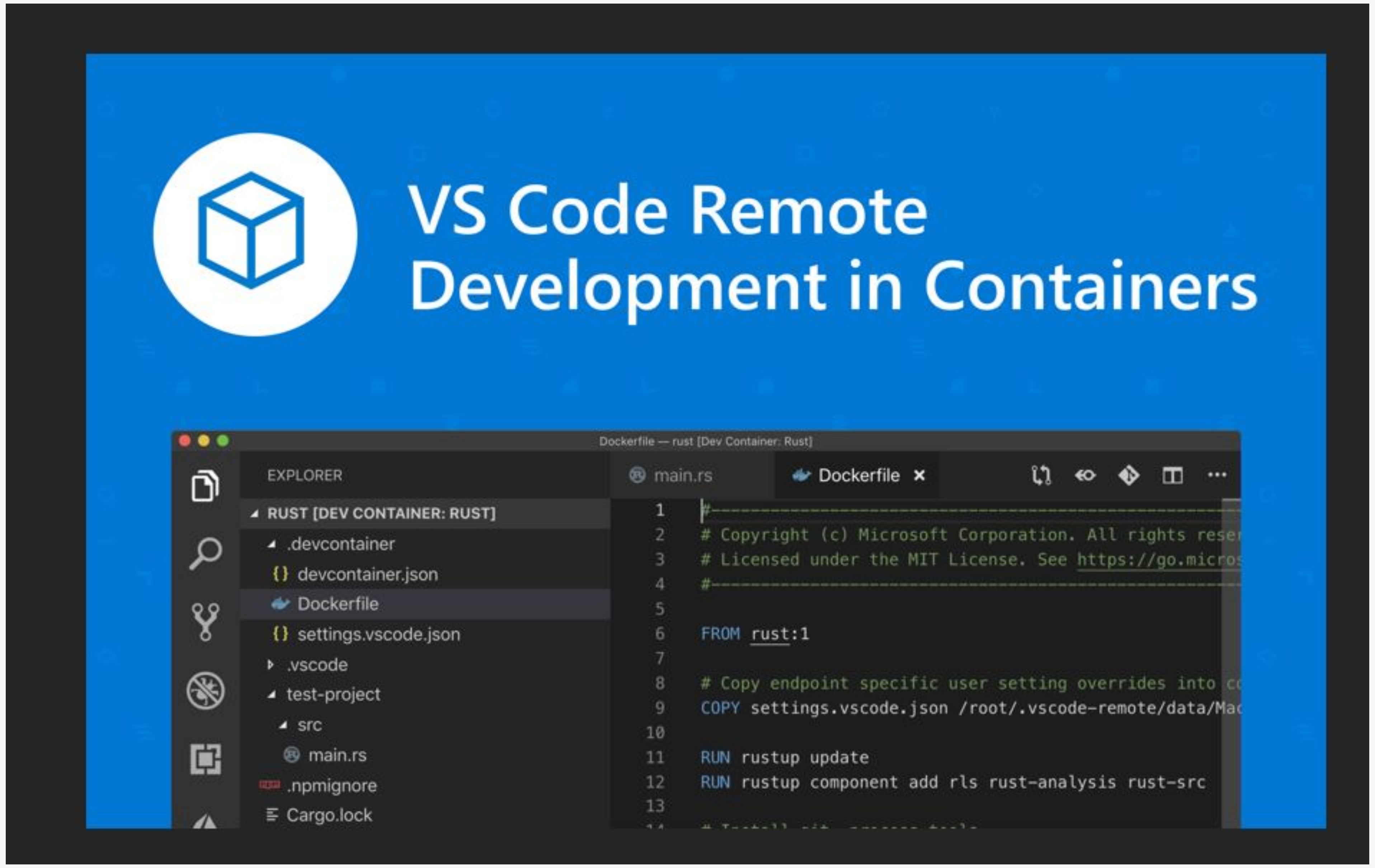
6 177 301

Docker under the hood - Docker CLI



Tipps & Tricks

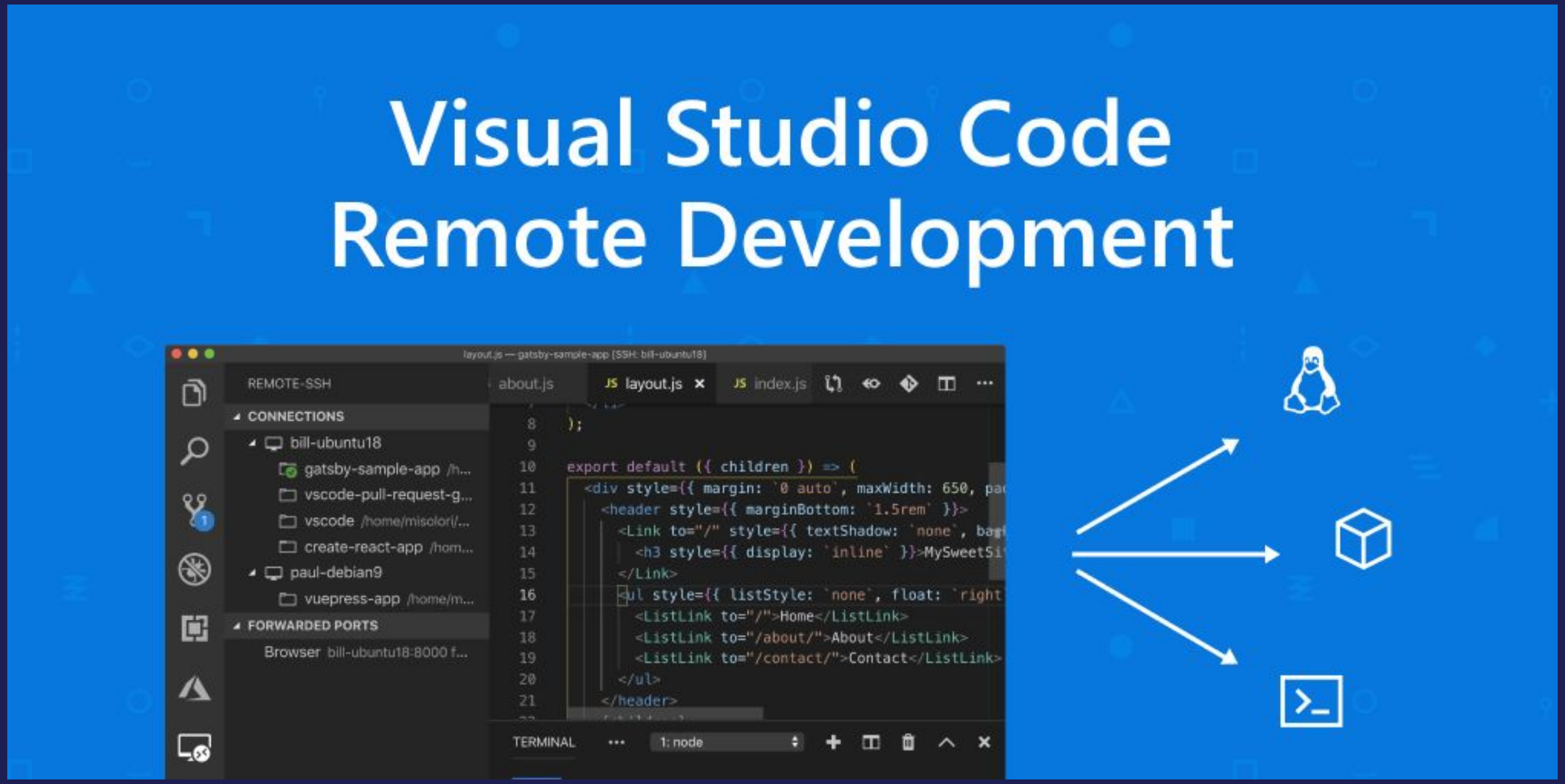
Remote Containers



```
#----------------------------------------------------------
# Copyright (c) Microsoft Corporation. All rights rese
# Licensed under the MIT License. See https://go.micros
#----------------------------------------------------------

FROM rust:1

# Copy endpoint specific user setting overrides into co
COPY settings.vscode.json /root/.vscode-remote/data/Mac

RUN rustup update
RUN rustup component add rls rust-analysis rust-src

```

Tipps & Tricks - Remote Containers

- Development in OS you deploy to
- Easy onboarding as coding-env stays with project code
  - OS
  - Dependencies
  - Extensions



```
);

export default ({ children }) => (
  <div style={{ margin: `0 auto`, maxWidth: 650, pa
    <header style={{ marginBottom: `1.5rem` }}>
      <Link to="/" style={{ textShadow: `none`, ba
        <h3 style={{ display: `inline` }}>MySweetSi
      </Link>
      <ul style={{ listStyle: `none`, float: `right
        <ListLink to="/">Home</ListLink>
        <ListLink to="/about/">About</ListLink>
        <ListLink to="/contact/">Contact</ListLink>
      </ul>
    </header>
```

Tipps & Tricks

Best Practices

Tipps & Tricks - Best Practices

- Minimize number of layers
- Reduce layer size, by removing cache(s) e.g. apt-get
- Organize Layers by likeliness of change
- Leverage Multi-Stage to separate runtime from build dependencies
- Use specific tags, avoid latest or rolling tags
- Leverage init system like tini or dumb-init where applicable

- Create & Use a user with minimum privileges, default user always has root
- Use distroless
- Scan for Vulnerability

The End