DOCKER 101

docker

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Versie: 1.0

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connect.engage.succeed.

DOCKER 101

- Goal:
  - Practical 101 Docker
    - Tell / Show / Workshop
- Key take away:
  - What Docker is and can do for you
  - Doing Docker 101 with confidence

Audience: DEV colleagues

DISCLAIMER

- Our view and way of working
- Docker is changing constantly
  – Version 17.06.2-ce (17.09.0-ce)

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CONTENT DOCKER 101

- **What & Why Docker?**
- **Examples**
  - **static website in 1 container on 1 DockerHost**
  - **Linux host / Docker UI**
- **(our) Docker workflow**
- **Docker commands explained**
- **Some Topics**

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WHY DOCKER?

- No more: works on my laptop
- Time to Market
- CI/CD (Continuous Integration / Continuous Delivery)
  - Time from commit to in production (cycle time)
- DevOps
- *Try something new*
- *Testing*
- …….

OUR DOCKER DEFINITION

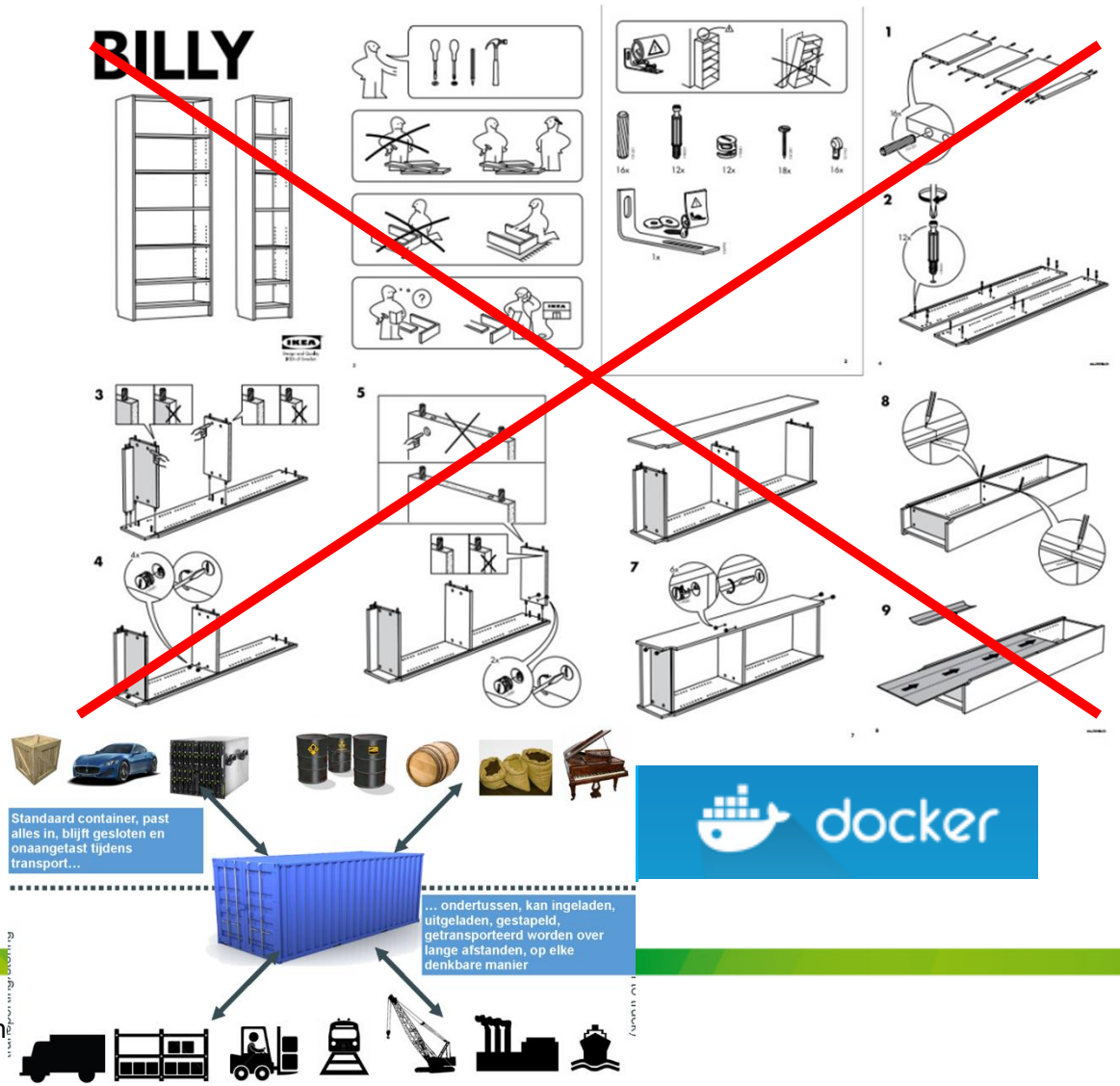
FOUND ON INTERNET

Is the world's leading software container platform
available for developers, ops and businesses
to **build, ship and run**
any app
on any infrastructure.

EXAMPLE: DOCKER USER STORIES

- As Product Owner I want features and an easy process to change and maintenance processes
- As DEV I want to build application only once and be sure that it is the same software
- As OPS I want the same software in each environment
- As Bus I want a short time to market for application feature

WORKS ON MY MACHINE
APP IN A CONTAINER



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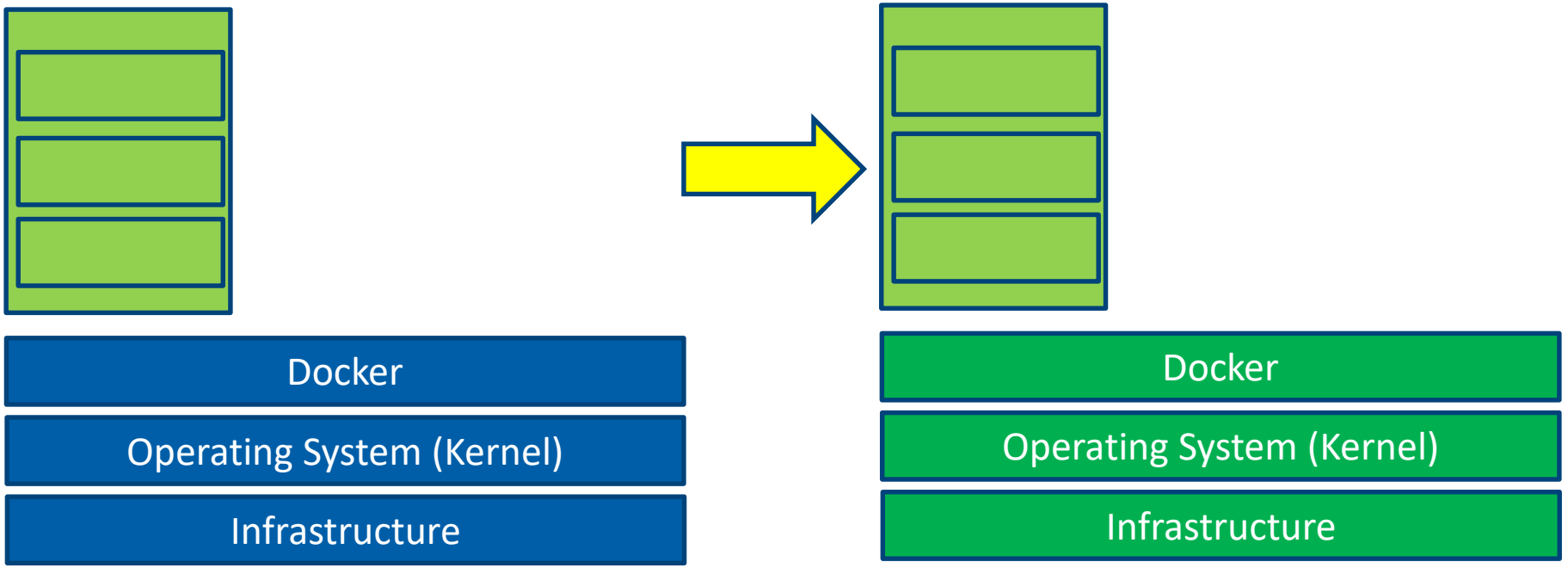
WORKS ON MY MACHINE
RUN – CONTAINER



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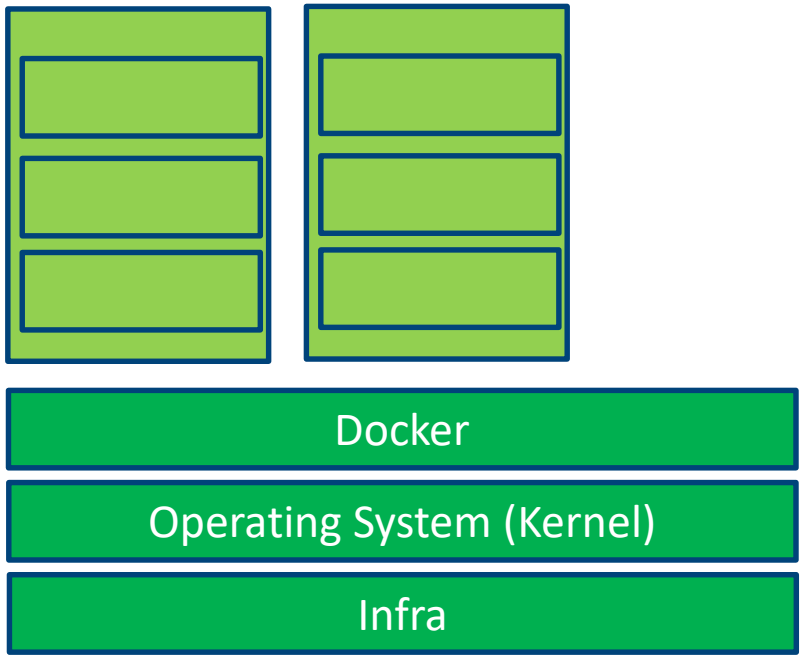
WORKS ON MY MACHINE
RUN - ISOLATION



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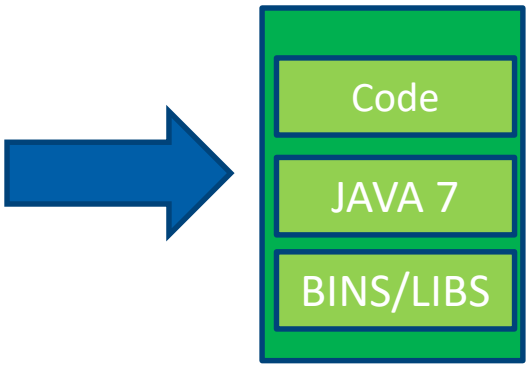
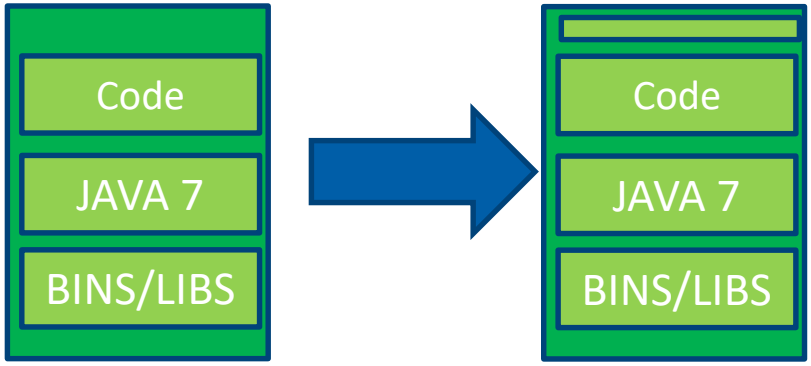
WORKS ON MY MACHINE
BUILD IMAGE



WORKS ON MY MACHINE
IMAGE → CONTAINER



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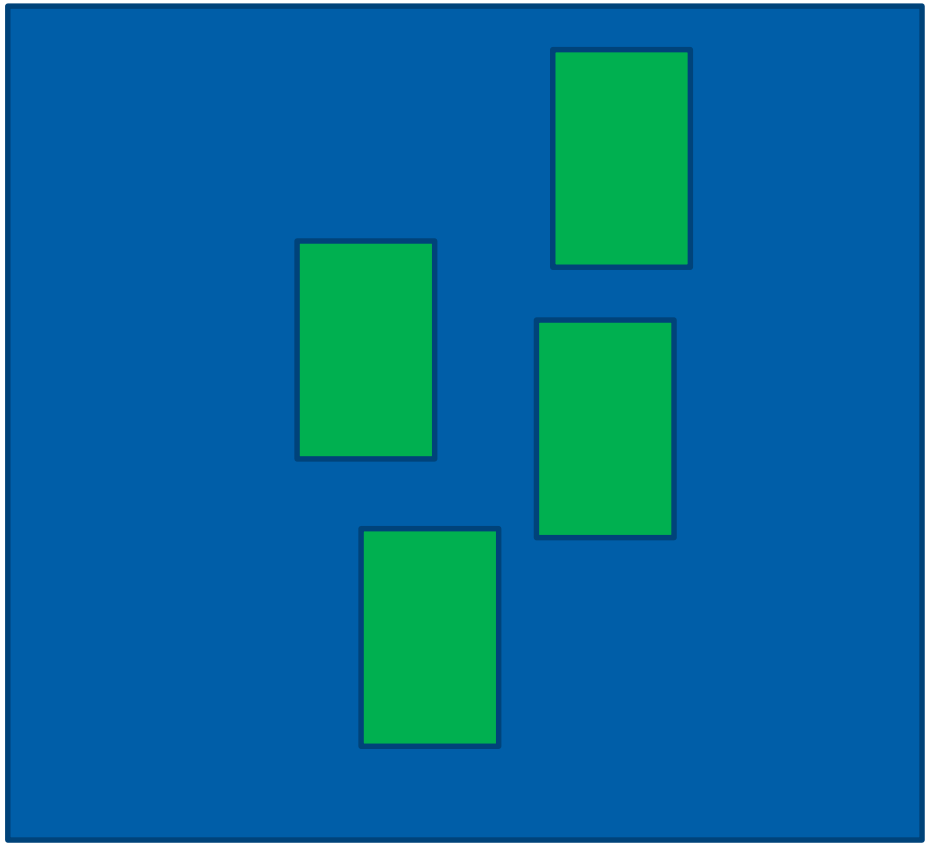
WORKS ON MY MACHINE
SHARE – REGISTRY DOCKER HUB/STORE



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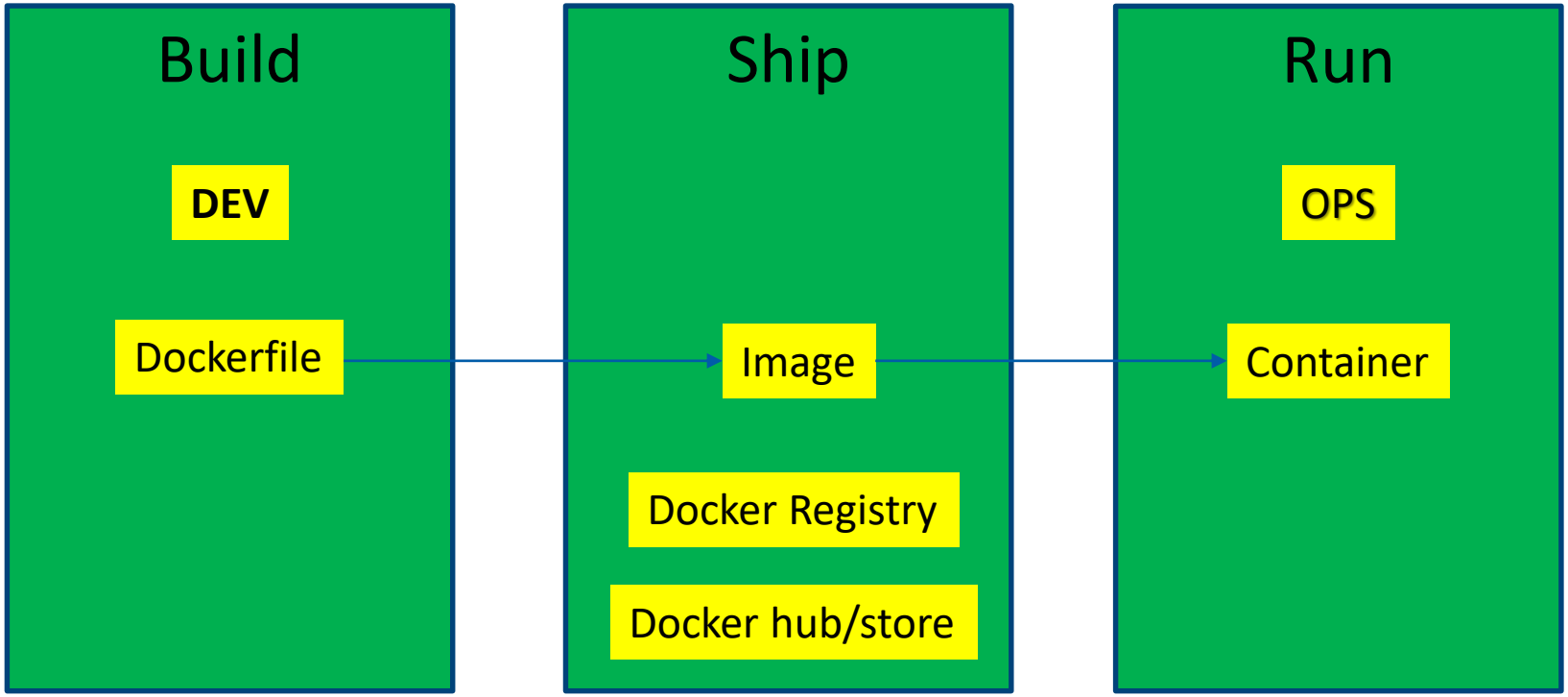
BUILD – SHIP - RUN



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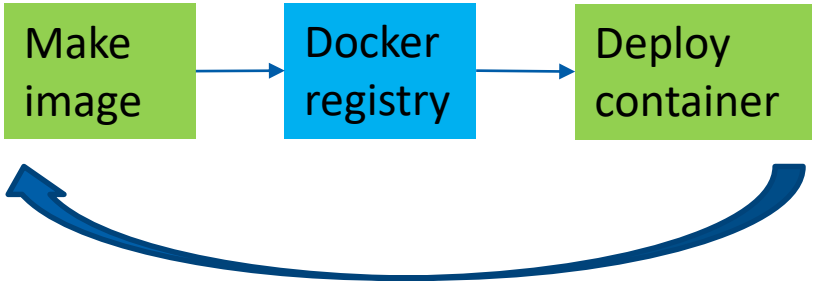
TIME TO MARKET



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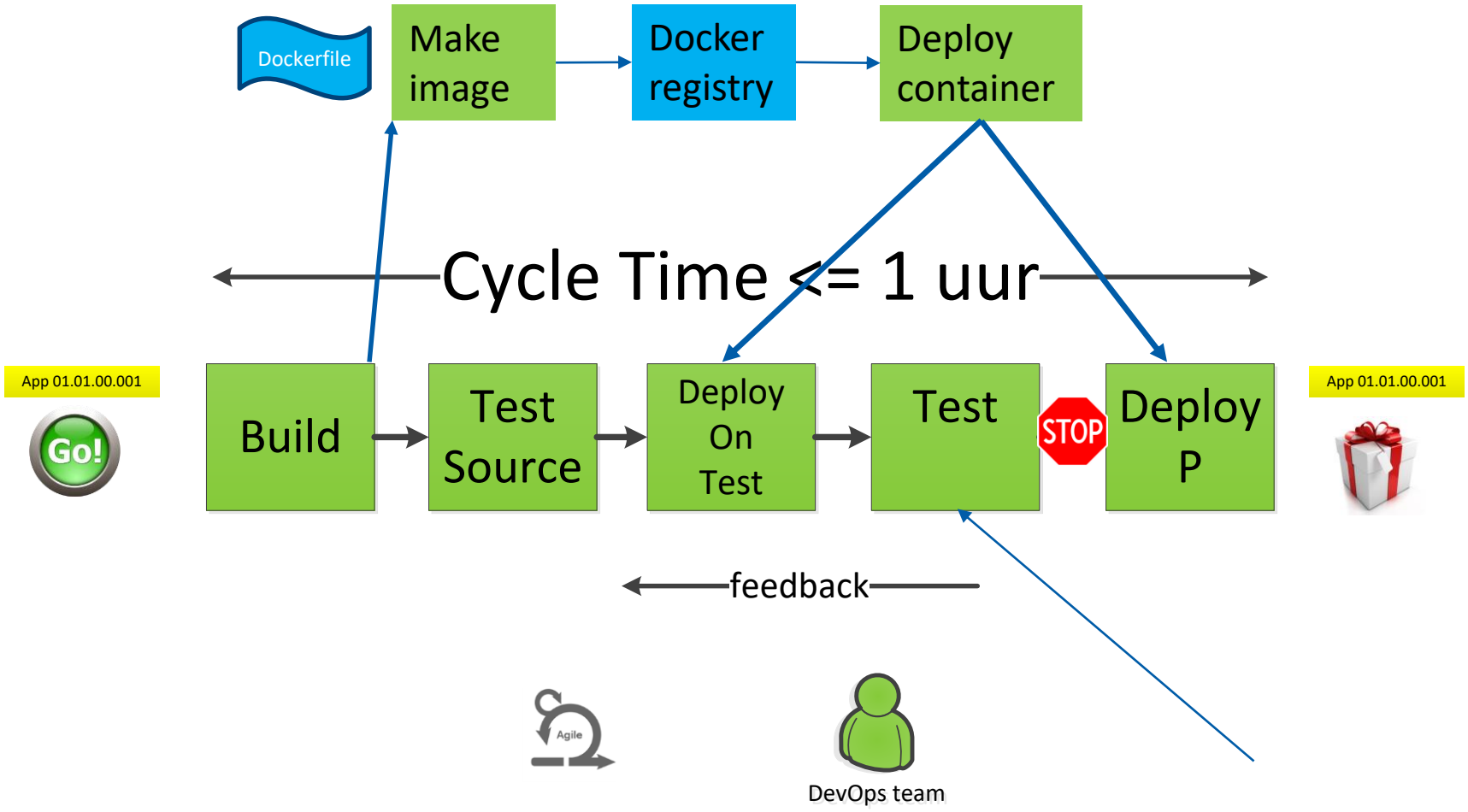
CI/CD



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DEVOPS
IMAGE = INTERFACE DEV-OPS

Laptop

Laptop

Laptop

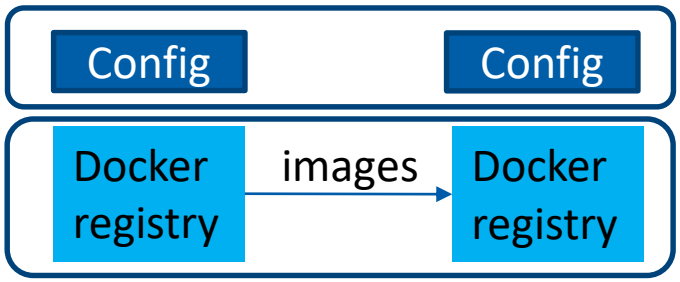
Dev

Maintenance

PROD

Acceptance

Test



Dev decide what is in an image

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DOCKER “CONCEPTS”

- Container “standard”
- Build once – run anywhere
- Container
  - in “production”
    - Everything what is needed and nothing more
    - 1 process – 1 task
    - Immutable

SUMMARY DOCKER

- DockerFile
  - blueprint
  - recipe
- Image
  - class
  - layers
- Registry (private) – Docker Hub – Docker store
  - “app store”
- Container
  - instance
  - running image

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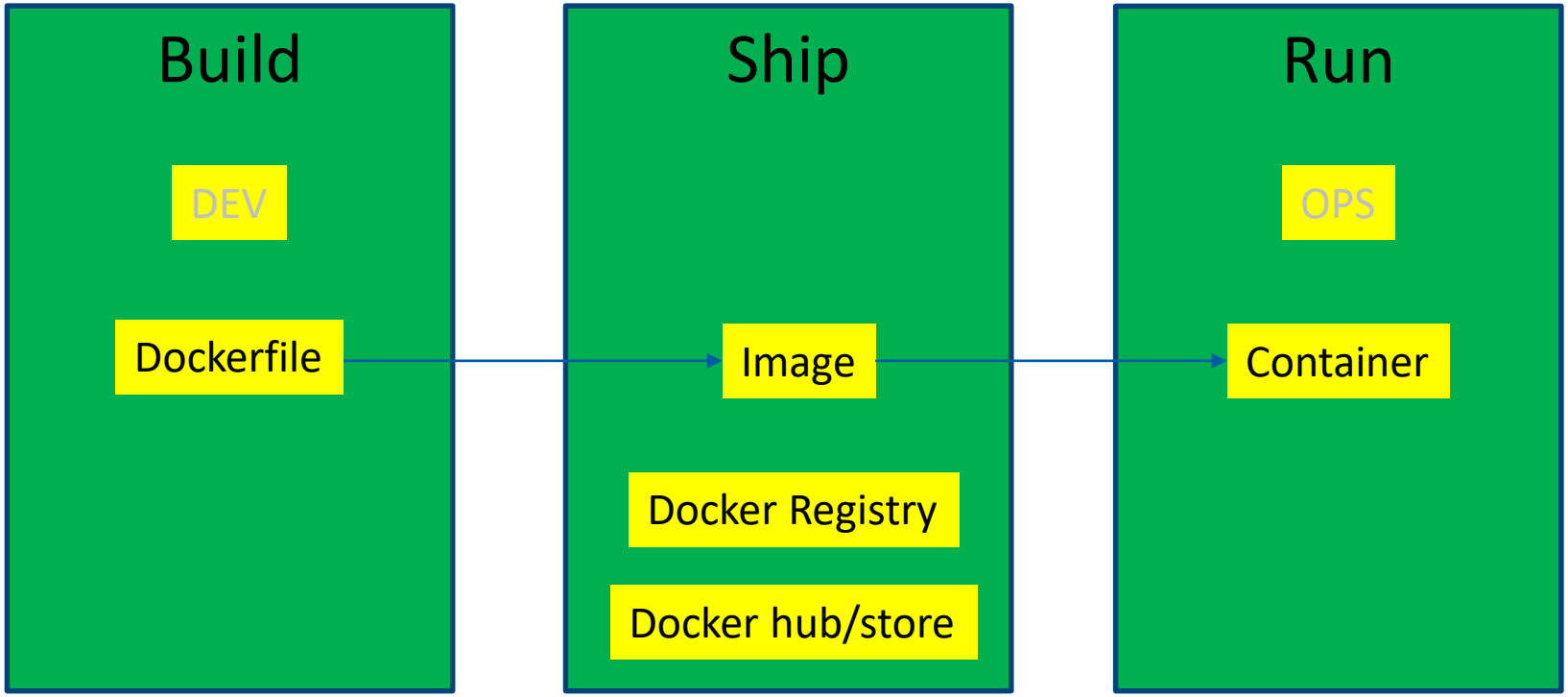
BUILD – SHIP – RUN SUMMARY



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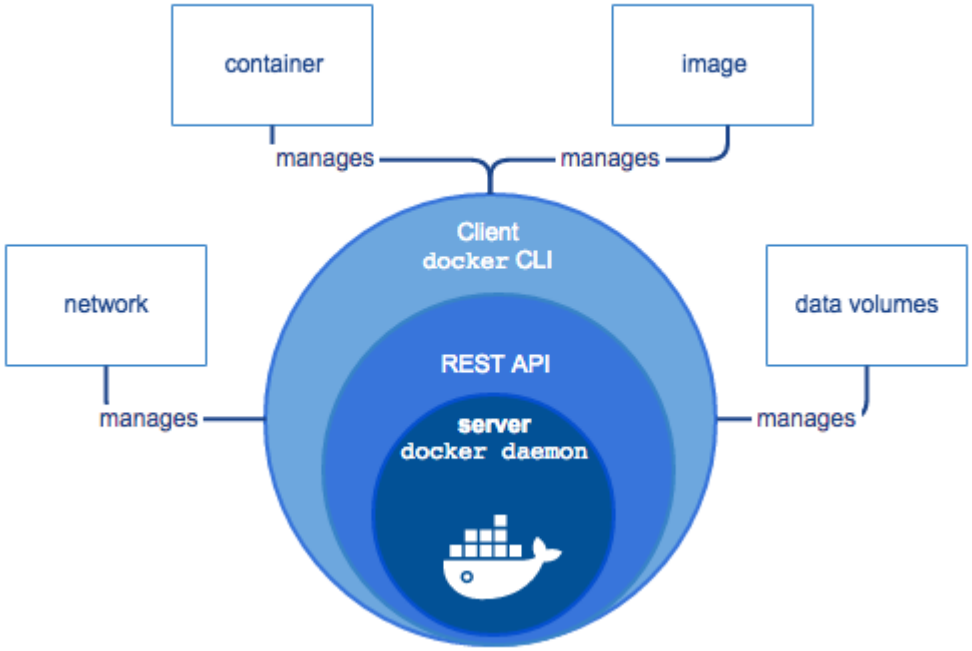
TOPIC: DOCKER ARCHITECTURE HIGH LEVEL



https://docs.docker.com/engine/docker-overview/

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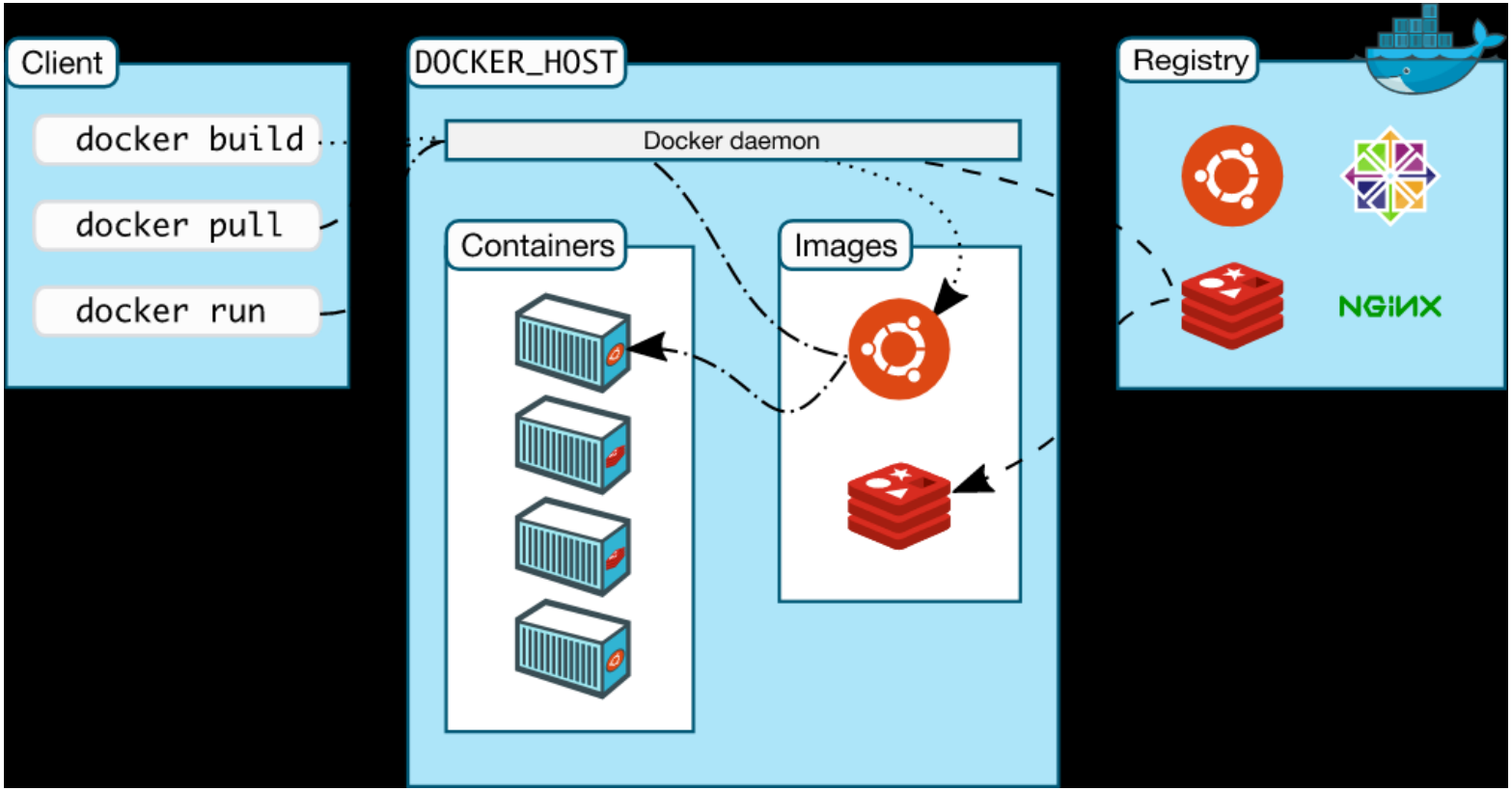
TOPIC: DOCKER ARCHITECTURE HIGH LEVEL



https://docs.docker.com/engine/docker-overview/

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TOPIC:
VIRTUAL MACHINE VERSUS CONTAINER

- Docker containers are not VM's

- Analogy
  - Apartment building = VM
  - Apartment = Docker Container
  - Share of kernel

- Real world
  - DockerHost are VM's
  - Docker can also run directly on server with OS

TOPIC: DOCKER VERSIONS

- Containers are not new (Unix: 199x)
- Docker to open source: march 2013

- Docker 1.13 = Docker 17.03
  - Year.month

- CE (Community Edition)
  - 2 release channels
    - Edge each month
    - Stable each 3 month

- EE (Enterprise Edition)

- Current version: 17:09

EXAMPLE:
OUR CONTAINER WORKFLOW

Case: Static website

- HTML pagina on webserver nginx

- Code: HTML
- Dockerfile
- Build an image
- Run container

- Show result

- Push to registry

- Pull from registry

- Run Azure DockerHost

EXAMPLE: HTML

```
<!DOCTYPE html>
<html>
<body>

<h1>Hello Static Website</h1>

<p>Continuously Delivered by:</p>

<img src="centric_logo_x2.png" alt="centric.eu">


<p>Versie: 01.00.00 - september 2017</p>
</body>
</html>
```


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EXAMPLE DOCKERFILE

```
7    FROM nginx:stable-alpine
8    COPY index.html *.png /usr/share/nginx/html/
```


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EXAMPLE
DOCKER RUN

docker container run --name staticws -d -p 4200:80 centricms/staticws:latest

df16bf953be84b16fe3f8b67cd90d50a056b17b5a8a3fc4075a92634c3720b65

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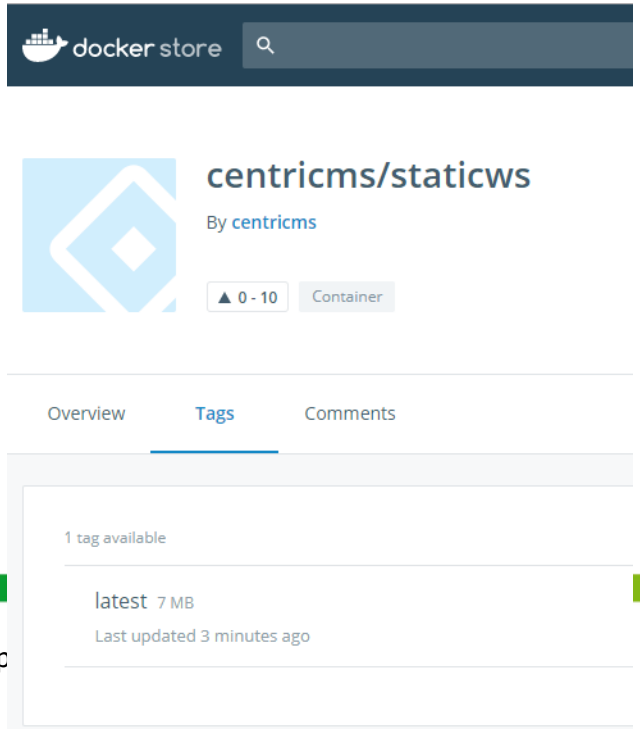
EXAMPLE PUSH

docker push centricms/staticws

The push refers to a repository [docker.io/centricms/staticws]
645034a2dbe2: Pushed
1690bc77acd5: Mounted from library/nginx
cbeb94c1f91a: Mounted from library/nginx
4bbeb364e643: Pushed
040fd7841192: Pushed
latest: digest: sha256:3b473ed6b592d06ea0f191972cf49ad13c62912733d8e0a7bb5c2a5319dbe5dd size: 1362



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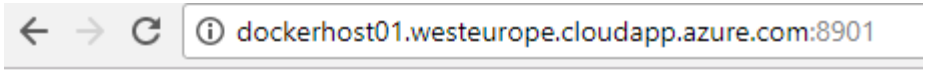
EXAMPLE
PULL FROM AZURE HOST

docker pull centricms/staticws:latest
latest: Pulling from centricms/staticws
ab14e39f58e6: Pull complete
206c8e58fb89: Pull complete
aeb57280dce6: Pull complete
9a661d863527: Pull complete
0459f9b530b7: Pull complete
Digest: sha256:3b473ed6b592d06ea0f191972cf49ad13c62912733d8e0a7bb5c2a5319dbe5dd
Status: Downloaded newer image for centricms/staticws:latest

docker container run --name staticws -d -p 8901:80 centricms/staticws:latest



Hello Static Website

Continuously Delivered by:

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connect.engage.succeed.

Versie: 01.04.00 - september 2017

OUR WAY OF WORKING

On laptop

- GIT
- VS CODE
- DockerForWindows

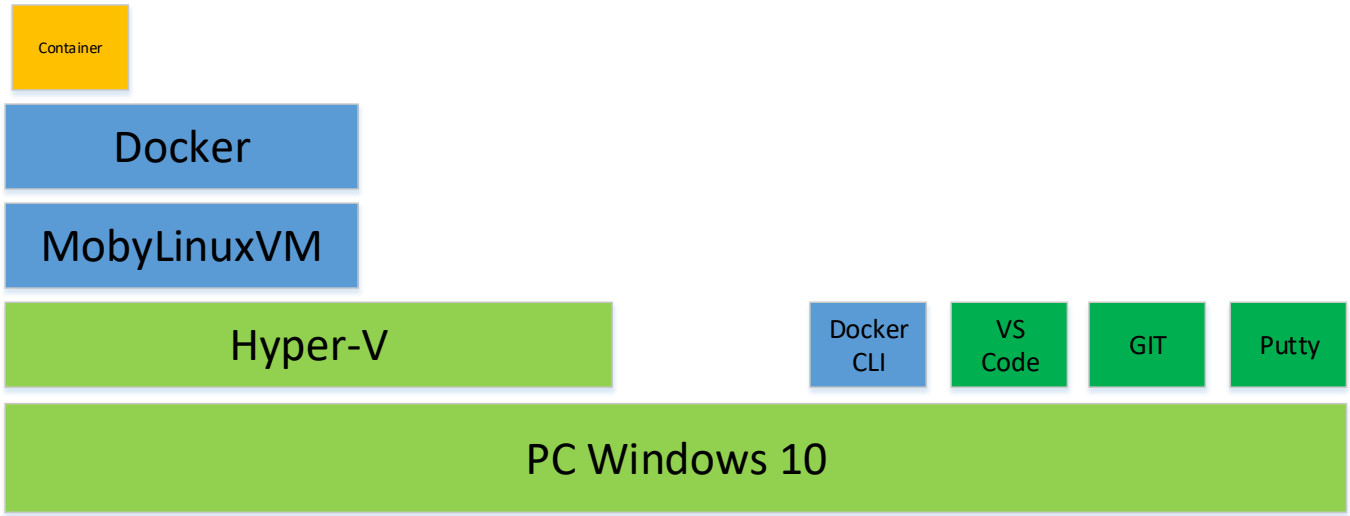
Internet

- GitHub
- Docker Hub / Docker Store

Cloud

- *DockerHost on Azure*

LAPTOP, INTERNET, CLOUD



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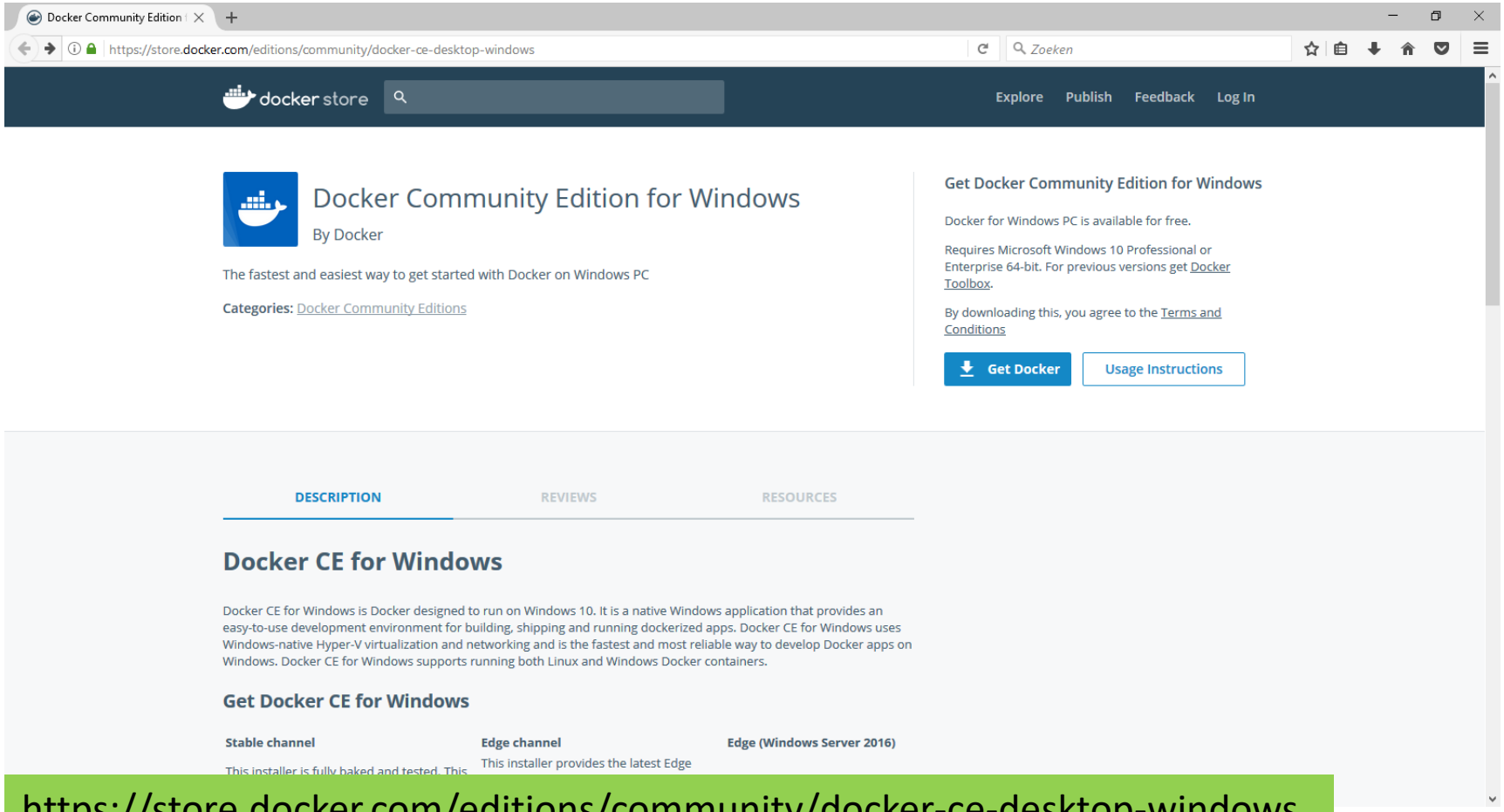
INSTALL

- GIT
  - https://git-scm.com/download/win
- VS CODE
  - https://code.visualstudio.com/docs/?dv=win32
- Download GitHub repro
  - New directory
  - Clone repro
    - https://github.com/RenzoVeldkamp/MicroContainer
    - in directory
    - Git clone https://github.com/RenzoVeldkamp/MicroContainer.git

DOCKER DOWNLOADEN



https://store.docker.com/editions/community/docker-ce-desktop-windows

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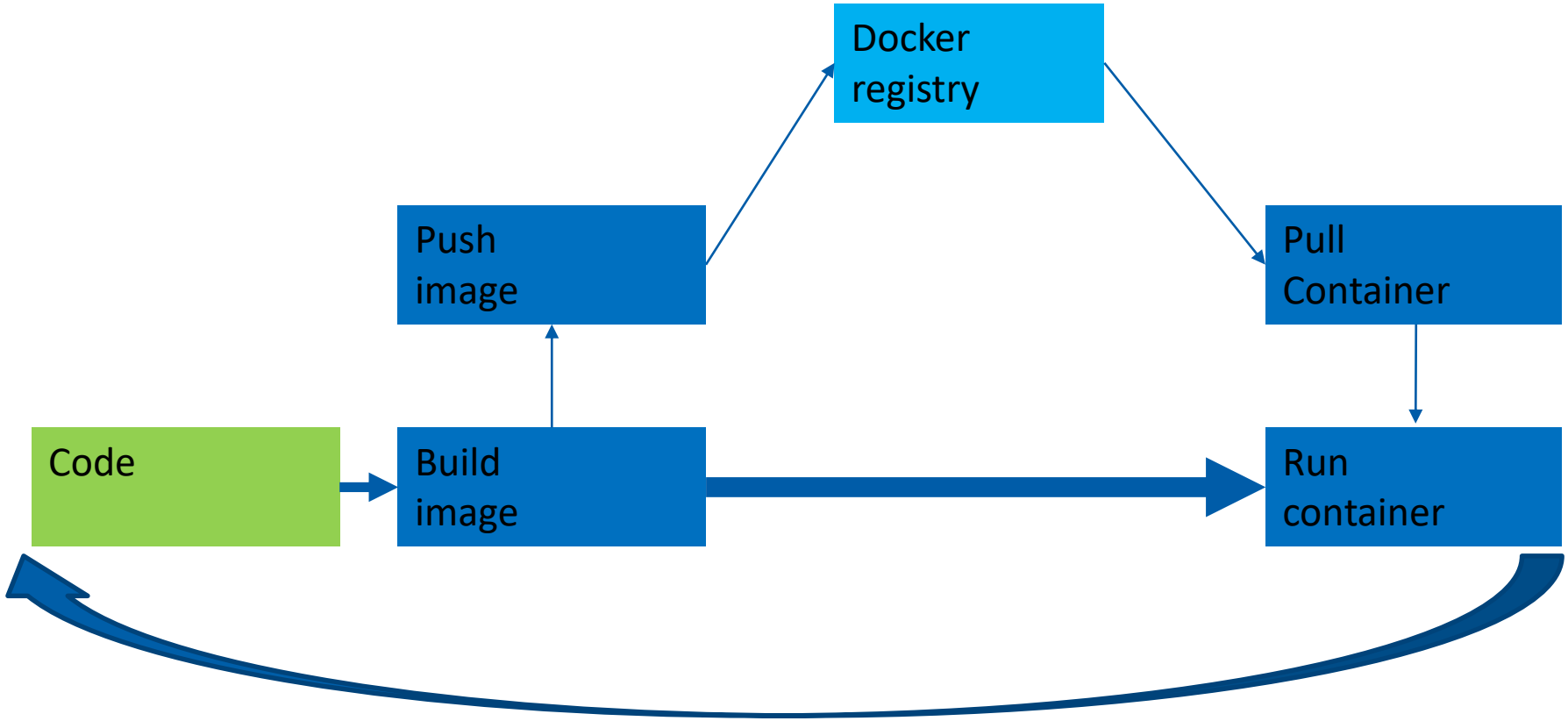
WORKFLOW



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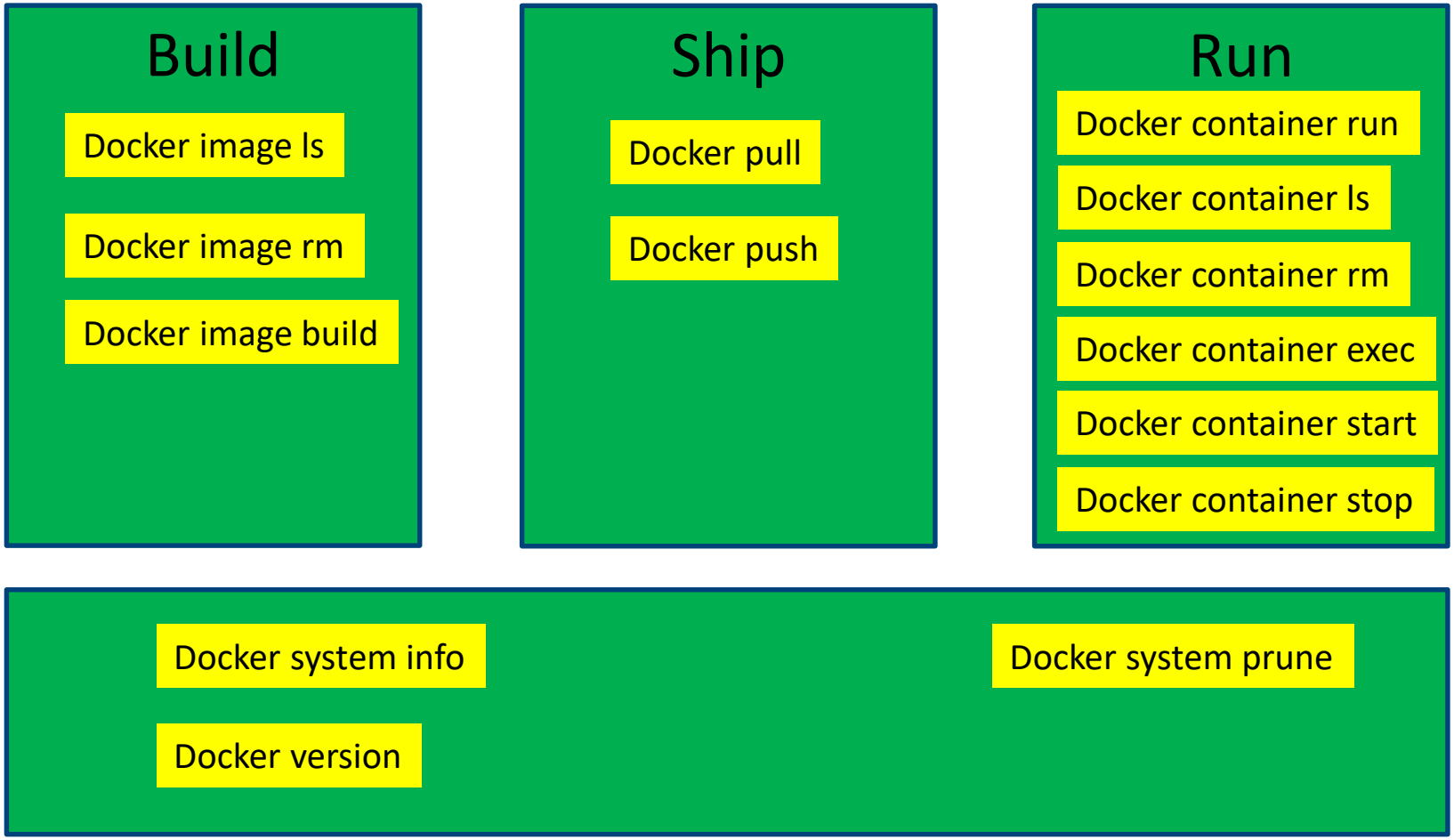
COMMAND LINE INTERFACE (CLI)

- How:
  - **Powershell window in VS Code**
  - Powershell
  - CMD
- Docker <command>
- Docker management commands
  - docker container <command>
  - docker image <command>
- Docker –-help

- https://docs.docker.com/engine/reference
- Google search

DOCKER COMMAND LINE INTERFACE



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WHICH DOCKER VERSION

- Docker version
- *Docker-compose version*
- *Docker-machine version*

```
Client:
 Version:      17.06.1-ce
 API version:  1.30
 Go version:   go1.8.3
 Git commit:   874a737
 Built:        Thu Aug 17 22:48:20 2017
 OS/Arch:      windows/amd64

Server:
 Version:      17.06.1-ce
 API version:  1.30 (minimum version 1.12)
 Go version:   go1.8.3
 Git commit:   874a737
 Built:        Thu Aug 17 22:54:55 2017
 OS/Arch:      linux/amd64
 Experimental: true
```

- Docker info
  - Lots of info

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DOCKER RUNNING CORRECTLY?

- docker container run hello-world

```
Unable to find image 'hello-world:latest' locally
latest: Pulling from library/hello-world
b04784fba78d: Pull complete
Digest: sha256:f3b3b28a45160805bb16542c9531888519430e9e6d6ffc09d72261b0d26ff74f
Status: Downloaded newer image for hello-world:latest

Hello from Docker!
This message shows that your installation appears to be working correctly.

To generate this message, Docker took the following steps:
 1. The Docker client contacted the Docker daemon.
 2. The Docker daemon pulled the "hello-world" image from the Docker Hub.
 3. The Docker daemon created a new container from that image which runs the
    executable that produces the output you are currently reading.
 4. The Docker daemon streamed that output to the Docker client, which sent it
    to your terminal.

To try something more ambitious, you can run an Ubuntu container with:
 $ docker run -it ubuntu bash

Share images, automate workflows, and more with a free Docker ID:
 https://cloud.docker.com/

For more examples and ideas, visit:
 https://docs.docker.com/engine/userguide/
```

DOCKER CONTAINER RUN

- docker container run hello-world
- Run container with the content of image called hello-world
- hello-world cannot be found on the DockerHost (Laptop)
- hello-world will be pulled from the Docker Hub / Store
- Hello-world will execute and end
- docker container run hello-world (once again)
  - Image on the Docker Host

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WHICH CONTAINERS ARE RUNNING?

- **docker container ls**
- Will only show the running containers
- Old command: docker ps
  - backwards compatible

```
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS              PORTS               NAMES
```

- **docker container ls –a**

```
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS                      PORTS               NAMES
b5022e576368        hello-world         "/hello"            18 hours ago        Exited (0) 18 hours ago                         jovial_booth
```

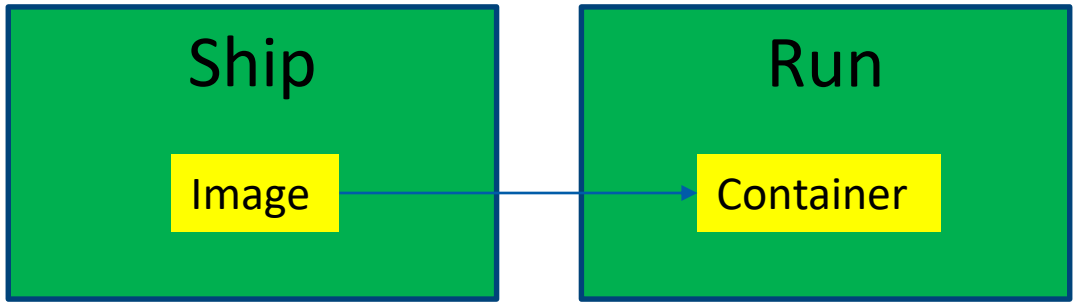
EASE OF DOCKER
READY TO RUN - CONTAINERS

- Docker registry

- Docker Hub
  - https://hub.docker.com/
- Docker Store

EXAMPLE – EASE OF DOCKER READY TO RUN - CONTAINER

- Run a Linux machine on my laptop - Alpine
- Run a Docker UI - Portainer



- We show:
  - Docker store (docker hub)
  - Pull image
  - Run container
  - Show result

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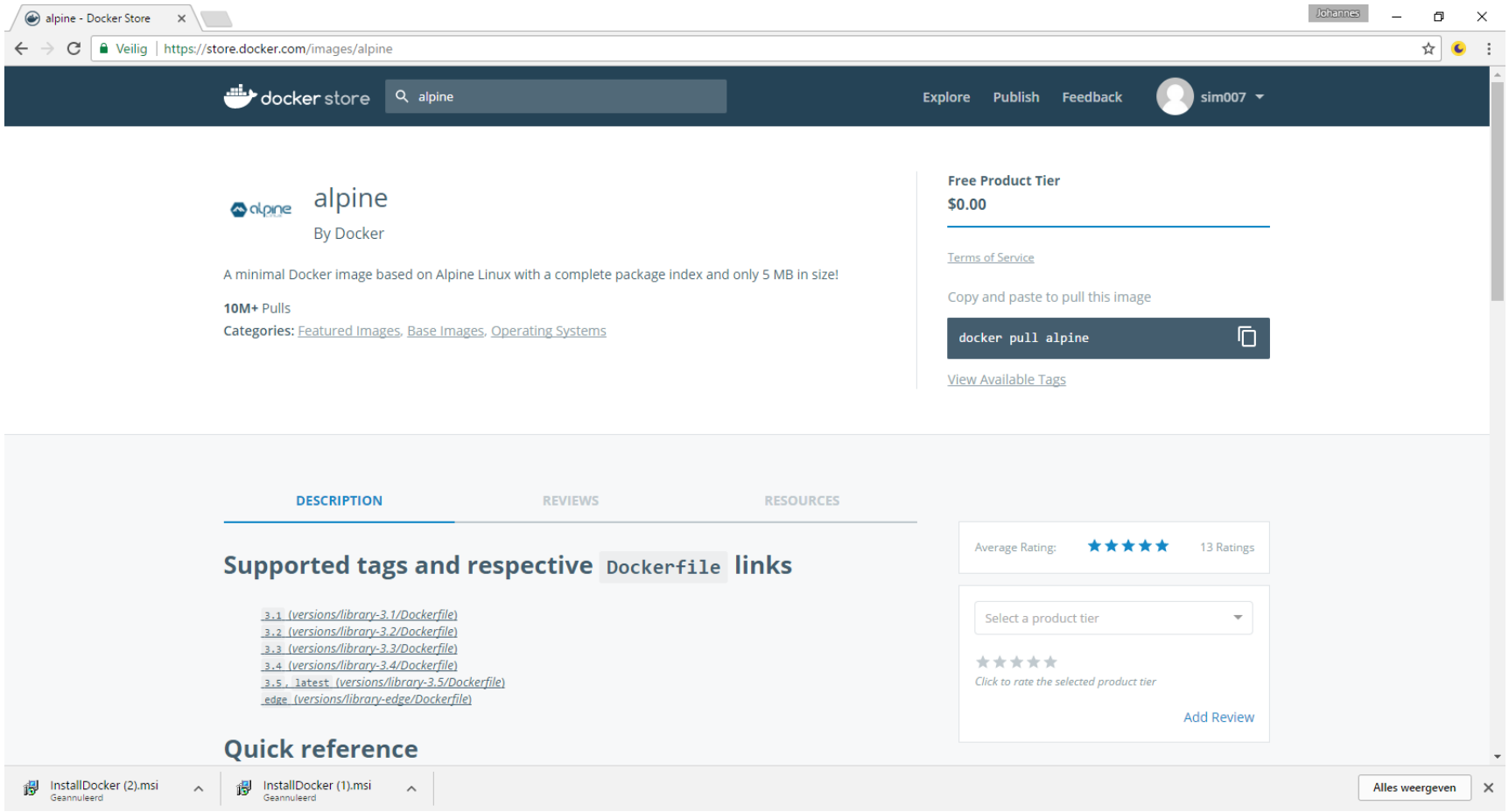
ALPINE REPO



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LINUX ALPINE

Nr	Step	Commando
1	Go to Docker store	https://store.docker.com/images/alpine
2	Copy docker command	copy
3	Go to Docker	docker pull alpine
4	Run the container	docker container run –it alpine /bin/sh

GIVE SOME COMMANDS ALPINE

	Command	
Linux version	cat /etc/*-release	
	Pwd	
Show directory	ls	
User	Whoami	
Close Alpine container	Ctrl-D	

Check if container is still running:

- Docker container ls
- Docker container ls -a

ALPINE RESULT

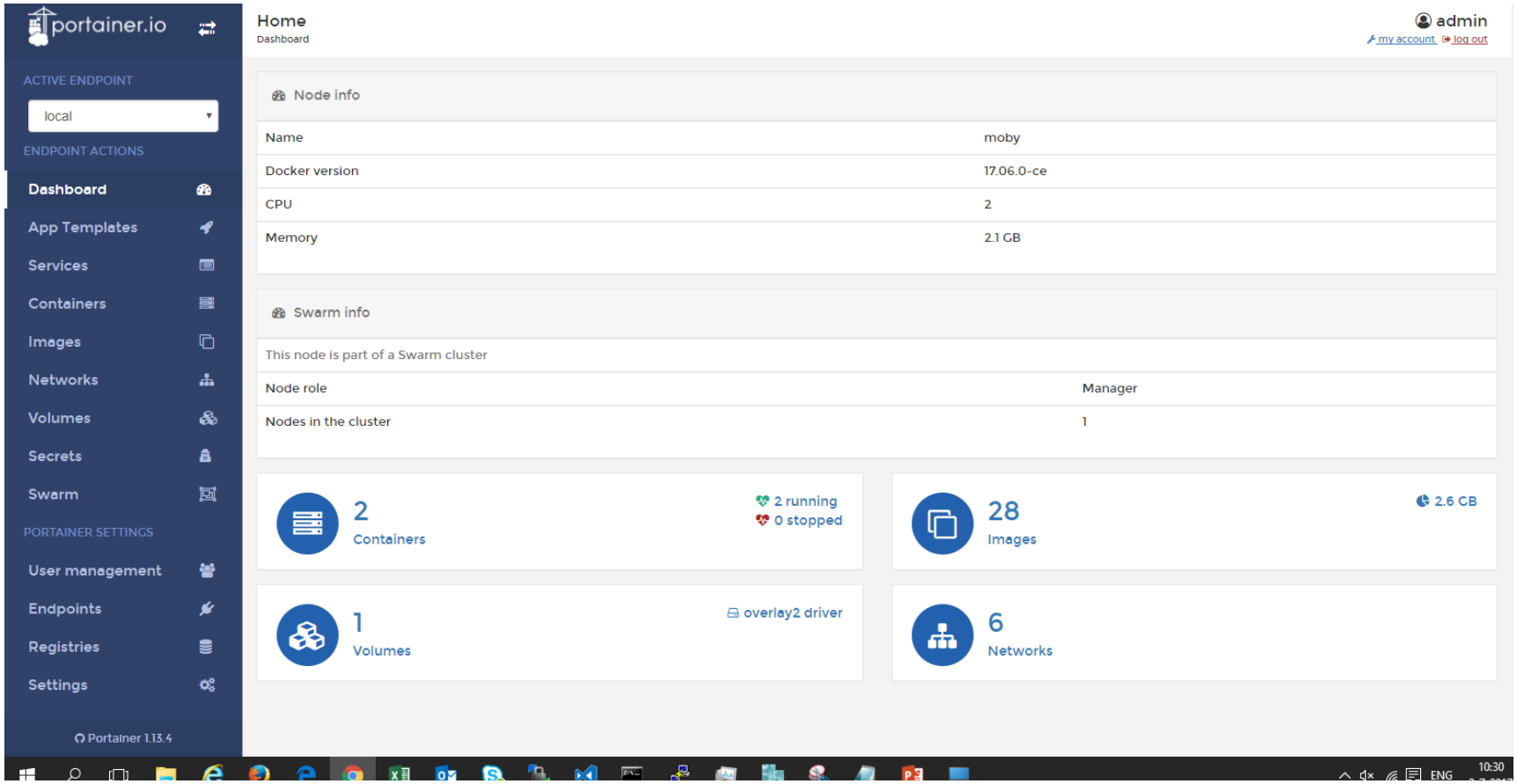
```
N:\>docker pull alpine
Using default tag: latest
latest: Pulling from library/alpine
88286f41530e: Pull complete
Digest: sha256:1072e499f3f655a032e88542330cf75b02e7bdf673278f701d7ba61629ee3ebe
Status: Downloaded newer image for alpine:latest

N:\>docker run -it alpine /bin/sh
/ # cat /etc/*-release
3.6.2
NAME="Alpine Linux"
ID=alpine
VERSION_ID=3.6.2
PRETTY_NAME="Alpine Linux v3.6"
HOME_URL="http://alpinelinux.org"
BUG_REPORT_URL="http://bugs.alpinelinux.org"
/ # pwd
/
/ # ls
bin    dev    etc    home   lib    media  mnt    proc   root   run    sbin   srv    sys    tmp    usr    var
/ # whoami
root
/ #
```

EXAMPLE – EASE OF DOCKER PORTAINER

- Command:
  - docker container run -d -p 9000:9000 -v /var/run/docker.sock:/var/run/docker.sock portainer/portainer

- Docker Store:
  - https://store.docker.com/community/images/portainer/portainer
- Website:
  - https://portainer.io/
- Documentation

PORTAINER: A DOCKER UI
DOCKER UI OR CLI?



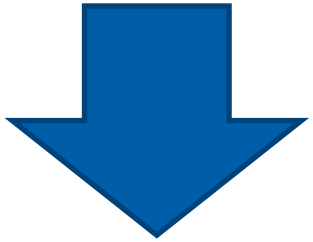

```
docker container run -d -p 9000:9000 -v /var/run/docker.sock:/var/run/docker.sock portainer/portainer
```

EXPLAIN CONFIGURATION ON RUNTIME

- docker container run -d -p 9000:9000 -v /var/run/docker.sock:/var/run/docker.sock portainer/portainer

	Explain
docker container run	depricated command: docker run
-d	detached – run on background in the cli
-p <hostport> <container port>	publish
-v	use volume
Read more	https://docs.docker.com/engine/reference/commandline/container_run/

DOCKER COMMANDS



Build

- Docker image ls
- Docker image rm
- Docker image build

Ship

- Docker pull
- Docker push

Run

- Docker container run
- Docker container ls
- Docker container rm
- Docker container exec
- Docker container start
- Docker container stop

- Docker system info
- Docker version
- Docker system prune

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EXAMPLE:
OUR STATIC WEB SITE

docker container run --name staticws -d -p 4200:80 centricms/staticws:latest

df16bf953be84b16fe3f8b67cd90d50a056b17b5a8a3fc4075a92634c3720b65

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EXPLAIN DOCKER CONTAINER RUN

- docker container run --name staticws -d -p 4200:80 centricms/staticws:latest

	Explain
docker container run	Old command: docker run
--name	Container name Name must be unique!
-d	detached – run on background in the cli
-p <hostport> <container port>	publish 4200:80
<name image>	<user>/<name>:<tag>
Read more	https://docs.docker.com/engine/reference/commandline/container_run/

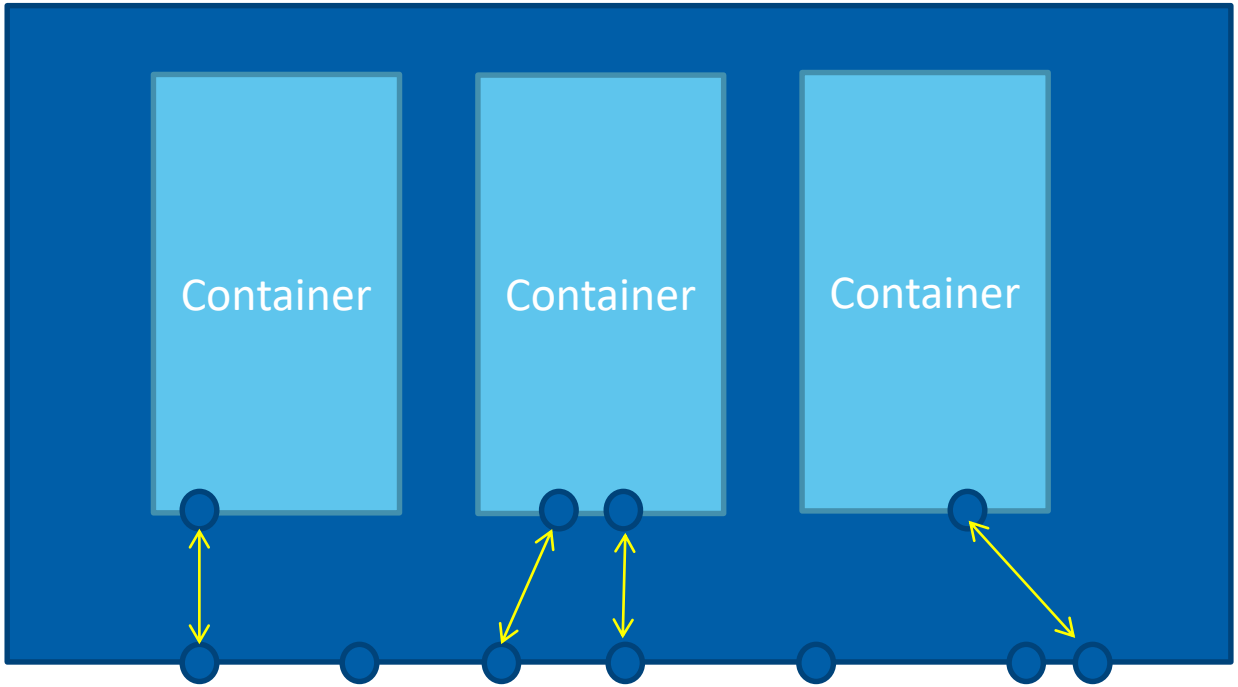
MULTIPLE CONTAINERS FROM 1 IMAGE

- Try:
  - docker container run --name staticws –d –p 8000:80 centricms/staticws:latest
  - docker container run --name staticws –d –p 8000:80 centricms/staticws:latest
  - → error same name

  - docker container run -d -p 8000:80 centricms/staticws:latest
  - docker container run -d -p 8000:80 centricms/staticws:latest
  - → error same hostport

  - docker container run -d -p 8001:80 centricms/staticws:latest
  - docker container run -d -p 8002:80 centricms/staticws:latest
  - → 3 static website

PUBLISH PORTS



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EXPLAIN DOCKER LS

```
PS W:\ShowCase\microcontainer> docker container ls
CONTAINER ID        IMAGE                       COMMAND                  CREATED              STATUS              PORTS                    NAMES
a800b0b15a7f        centricms/staticws:latest   "nginx -g 'daemon ..."   36 seconds ago       Up 35 seconds       0.0.0.0:8002->80/tcp     boring_shaw
f99f2346bdde        centricms/staticws:latest   "nginx -g 'daemon ..."   45 seconds ago       Up 44 seconds       0.0.0.0:8001->80/tcp     priceless_kirch
bfa5f9587908        centricms/staticws:latest   "nginx -g 'daemon ..."   About a minute ago   Up About a minute   0.0.0.0:8000->80/tcp     staticws
```

	Explain
Container ID	Unique nuber
Image	3 Containers from the same image
Start command	detached – run on background in the cli
Created	
Status	
Ports	Host port → container port
Names	No –name, Docker provide unique name

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EXPLAIN
- P, DOCKER WILL ASSIGN PORT

```
PS W:\ShowCase\microcontainer> docker container run -d -P centricms/staticws:latest
f9eec56eb68b1111d931c07fef8ae953dcbf6dd34d195341ba0b4e263db5256f
```

```
PS W:\ShowCase\microcontainer> docker container ls
CONTAINER ID        IMAGE                       COMMAND                  CREATED             STATUS              PORTS                     NAMES
f9eec56eb68b        centricms/staticws:latest   "nginx -g 'daemon ..."   12 seconds ago      Up 10 seconds       0.0.0.0:32768->80/tcp     priceless_goldberg
74c05a37bd26        centricms/staticws:latest   "nginx -g 'daemon ..."   21 minutes ago      Up 21 minutes       80/tcp                    noport
a800b0b15a7f        centricms/staticws:latest   "nginx -g 'daemon ..."   30 minutes ago      Up 30 minutes       0.0.0.0:8002->80/tcp      boring_shaw
f99f2346bdde        centricms/staticws:latest   "nginx -g 'daemon ..."   30 minutes ago      Up 30 minutes       0.0.0.0:8001->80/tcp      priceless_kirch
bfa5f9587908        centricms/staticws:latest   "nginx -g 'daemon ..."   31 minutes ago      Up 31 minutes       0.0.0.0:8000->80/tcp      staticws
```

☐	running	priceless_goldberg	centricms/staticws:latest	172.17.0.6	32768:80	public
☐	running	noport	centricms/staticws:latest	172.17.0.5	-	public
☐	running	boring_shaw	centricms/staticws:latest	172.17.0.4	8002:80	public
☐	running	priceless_kirch	centricms/staticws:latest	172.17.0.3	8001:80	public
☐	running	staticws	centricms/staticws:latest	172.17.0.2	8000:80	public

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EXPLAIN
-D -DETACHED

```
PS W:\ShowCase\microcontainer> docker container run -p 8003:80 centricms/staticws:latest
172.17.0.1 - - [09/Sep/2017:11:12:37 +0000] "GET / HTTP/1.1" 200 217 "-" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chr
ome/60.0.3112.113 Safari/537.36" "-"
172.17.0.1 - - [09/Sep/2017:11:12:37 +0000] "GET /centric_logo_x2.png HTTP/1.1" 200 9853 "http://localhost:8003/" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) A
ppleWebKit/537.36 (KHTML, like Gecko) Chrome/60.0.3112.113 Safari/537.36" "-"
2017/09/09 11:12:37 [error] 7#7: *1 open() "/usr/share/nginx/html/favicon.ico" failed (2: No such file or directory), client: 172.17.0.1, server: localhost, r
equest: "GET /favicon.ico HTTP/1.1", host: "localhost:8003", referrer: "http://localhost:8003/"
172.17.0.1 - - [09/Sep/2017:11:12:37 +0000] "GET /favicon.ico HTTP/1.1" 404 571 "http://localhost:8003/" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKi
t/537.36 (KHTML, like Gecko) Chrome/60.0.3112.113 Safari/537.36" "-"
172.17.0.1 - - [09/Sep/2017:11:12:40 +0000] "GET / HTTP/1.1" 304 0 "-" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrom
e/60.0.3112.113 Safari/537.36" "-"
172.17.0.1 - - [09/Sep/2017:11:12:41 +0000] "GET / HTTP/1.1" 304 0 "-" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrom
e/60.0.3112.113 Safari/537.36" "-"
172.17.0.1 - - [09/Sep/2017:11:12:42 +0000] "GET / HTTP/1.1" 304 0 "-" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrom
e/60.0.3112.113 Safari/537.36" "-"
172.17.0.1 - - [09/Sep/2017:11:12:43 +0000] "GET / HTTP/1.1" 304 0 "-" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrom
e/60.0.3112.113 Safari/537.36" "-"
172.17.0.1 - - [09/Sep/2017:11:12:43 +0000] "GET / HTTP/1.1" 304 0 "-" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrom
e/60.0.3112.113 Safari/537.36" "-"
172.17.0.1 - - [09/Sep/2017:11:12:44 +0000] "GET / HTTP/1.1" 304 0 "-" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrom
e/60.0.3112.113 Safari/537.36" "-"
```


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DOCKER CONTAINER COMMAND

- Docker container run
  - new container from image
  - Docker container run –rm
    - after stop remove

- Docker container stop
- Docker container start – container must exist
  - id or containername

DOCKER EXEC

- docker container exec -it <containername> /bin/sh

- Enter the container
  - Container must be running!
- Depends on base image which shell can be started

DOCKER LOGS

- docker container logs –f

```
PS W:\ShowCase\microcontainer> docker container logs -f staticws
172.17.0.1 - - [10/Sep/2017:08:07:04 +0000] "GET / HTTP/1.1" 200 217 "-" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chr
ome/60.0.3112.113 Safari/537.36" "-"
172.17.0.1 - - [10/Sep/2017:08:07:05 +0000] "GET /centric_logo_x2.png HTTP/1.1" 200 9853 "http://localhost:8000/" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) A
ppleWebKit/537.36 (KHTML, like Gecko) Chrome/60.0.3112.113 Safari/537.36" "-"
2017/09/10 08:07:05 [error] 6#6: *1 open() "/usr/share/nginx/html/favicon.ico" failed (2: No such file or directory), client: 172.17.0.1, server: localhost, r
equest: "GET /favicon.ico HTTP/1.1", host: "localhost:8000", referrer: "http://localhost:8000/"
172.17.0.1 - - [10/Sep/2017:08:07:05 +0000] "GET /favicon.ico HTTP/1.1" 404 571 "http://localhost:8000/" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKi
t/537.36 (KHTML, like Gecko) Chrome/60.0.3112.113 Safari/537.36" "-"
```

REMOVE DOCKER CONTAINER

- Running & Stopped containers

- Remove container
  - Docker container rm <container>
- Remove running container
  - Docker container rm –f <container>
- Remove all stopped containers
  - Docker container prune

DEMO: RUN ON AZURE

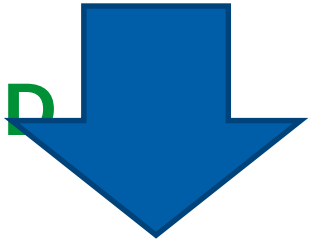
```
centric@DockerHost01:~$ sudo docker version
Client:
 Version:      17.06.0-ce
 API version:  1.30
 Go version:   go1.8.3
 Git commit:   02c1d87
 Built:        Fri Jun 23 21:23:31 2017
 OS/Arch:      linux/amd64

Server:
 Version:      17.06.0-ce
 API version:  1.30 (minimum version 1.12)
 Go version:   go1.8.3
 Git commit:   02c1d87
 Built:        Fri Jun 23 21:19:04 2017
 OS/Arch:      linux/amd64
 Experimental: false
```

```
centric@DockerHost01:~$ sudo docker container ls
CONTAINER ID        IMAGE               COMMAND             CREATED
STATUS              PORTS               NAMES
centric@DockerHost01:~$
```

```
centric@DockerHost01:~$ sudo docker container run -d -p:8901:80 centricms/static
ws
bb20b7f4bd8a273cb951b46ff88130012d95d5caf7d7c51b9500f532d767dc35
centric@DockerHost01:~$ sudo docker container ls
CONTAINER ID        IMAGE                 COMMAND                  CREATED
       STATUS              PORTS                   NAMES
bb20b7f4bd8a        centricms/staticws    "nginx -g 'daemon ..."   About a minute
 ago   Up About a minute   0.0.0.0:8901->80/tcp    condescending_ritchie
centric@DockerHost01:~$
```

DOCKER COMMAND



Build

- Docker image ls
- Docker image rm
- Docker image build

Ship

- Docker pull
- Docker push

Run

- Docker container run
- Docker container ls
- Docker container rm
- Docker container exec
- Docker container start
- Docker container stop

- Docker system info
- Docker version
- Docker system prune

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DOCKER REGISTRY

- Ready to use:
  - DOCKER HUB / DOCKER STORE
- Private registry
  - For companies & enterprises

DOCKER PUSH

- You need a user-id on Docker Hub
  - Free of charge for public repo (images)
- Docker login
- Every repo (image) name must start with your user

- Version – tag

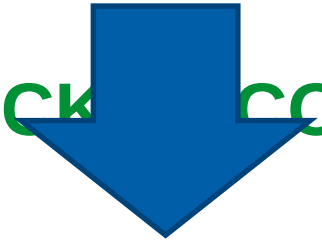
- Example
  - docker push centricms/staticws:latest

DOCKER IMAGE PULL

- For Docker Hub / Store
  - No user-id needed for public repo
- Official & open source
  - Official by Docker or supplier

- Tips:
  - Use safe images: official, number of pulls, rating
  - Efficient download (only changed layers)
  - Image is first search on local DockerHost

DOCK COMMAND



Build

- Docker image ls
- Docker image rm
- Docker image build

Ship

- Docker pull
- Docker push

Run

- Docker container run
- Docker container ls
- Docker container rm
- Docker container exec
- Docker container start
- Docker container stop

- Docker system info
- Docker version
- Docker system prune

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DOCKERFILE

- Recipe or blue print

- Each line will be layer
- Each layer will be cached

WHAT IS IMAGE? - REVISITED

- Image = stack of layers
- Made by:
  - Dockerfile = recipe or blue print
  - Docker commit – seldomly used – not in this Docker 101
- Container made from image must run on any environment

DOCKER BUILD - DOCKERIZE

- DOCKERIZE = PACKAGE application in a Docker image

- Image / container

  - contains every dependency
  - Small
  - Secure
  - ….

Best practice:

- Use the same image for very environment

TOPIC: DOCKER BUILD DOCKERFILE

- Dockerfile: Recipe or blue print

- Base image
  - FROM SCRATCH
  - KNOWN TRUSTED IMAGE (OFFICIAL)

TOPIC: VERSION

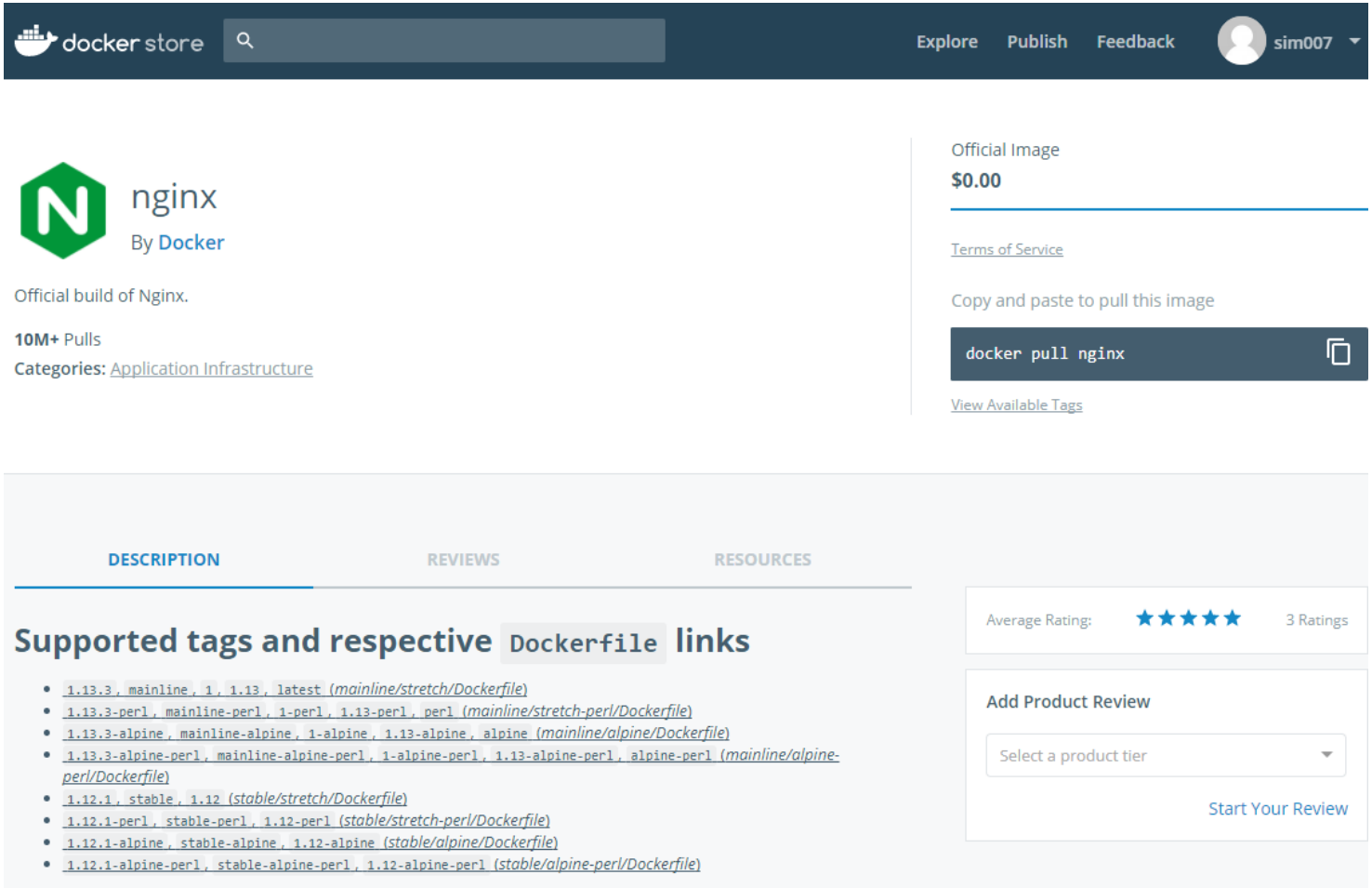
- TAG
- Latest
  - Just a tag!
  - use with care
- No tag: build - snapshot

- Base OS
  - Alpine – Docker default - small
  - Debian
  - Windows

DOCKERFILE FOR STATICWS

- Goal & requirement:
  - Static website that can run on laptop and Azure
  - Easy webserver – use nginx
  - Fits in our way of working (CD flow)

SEARCH FOR NGINX



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DOCKER BUILD

- Make Dockerfile
  - Base on base image
    - From docker Store
    - From scratch
  - Copy static files to the correct directory

- Build the image with:
  - Docker image build –t <name> .

- Tips
  - Default filename is Dockerfile
  - CLI must be in the same directory as Dockerfile
  - Do not use networkshare on W10

EXPLAIN DOCKER BUILD

- Docker image build –t <name> .

	Explain
docker image build	deprecated command: docker build
-t <name>	Tag a unique name
.	directory
Read more	https://docs.docker.com/engine/reference/commandline/image_build/

EXAMPLE OUTPUT (FIRST TIME AND NEXT TIME)

```
PS C:\SimProjects\ShowCase\microcontainer\StaticWS> docker image build -t centricms/staticws:latest .
Sending build context to Docker daemon  14.34kB
Step 1/3 : FROM nginx:stable-alpine
stable-alpine: Pulling from library/nginx
019300c8a437: Pull complete
b9b9e74a248d: Pull complete
5efb344a3d05: Pull complete
1b297156e526: Pull complete
Digest: sha256:0fa9c1773647d8a60fb1df954b35c93e745de7b80e3b7fe261c61a059ee75b62
Status: Downloaded newer image for nginx:stable-alpine
 ---> 7c588c2e29dc
Step 2/3 : COPY index.html *.png /usr/share/nginx/html/
 ---> 03c9908810e8
Removing intermediate container 68018b79d2c6
Step 3/3 : LABEL MAINTAINER "Johannes Sim / Renzo Veldkamp" REFRESHED_AT "2017-09-17"
 ---> Running in 9370013c0bfc
 ---> b83189dccfa7
Removing intermediate container 9370013c0bfc
Successfully built b83189dccfa7
Successfully tagged centricms/staticws:latest
SECURITY WARNING: You are building a Docker image from Windows against a non-Windows Docker host. All files and directories added to build context will have '
-rwxr-xr-x' permissions. It is recommended to double check and reset permissions for sensitive files and directories.
```

```
PS C:\SimProjects\ShowCase\microcontainer\StaticWS> docker image build -t centricms/staticws:latest .
Sending build context to Docker daemon  14.34kB
Step 1/3 : FROM nginx:stable-alpine
 ---> 7c588c2e29dc
Step 2/3 : COPY index.html *.png /usr/share/nginx/html/
 ---> Using cache
 ---> 03c9908810e8
Step 3/3 : LABEL MAINTAINER "Johannes Sim / Renzo Veldkamp" REFRESHED_AT "2017-09-17"
 ---> Using cache
 ---> b83189dccfa7
Successfully built b83189dccfa7
Successfully tagged centricms/staticws:latest
SECURITY WARNING: You are building a Docker image from Windows against a non-Windows Docker host. All files and directories added to build context will have '-rwxr-xr-x' pe
rmissions. It is recommended to double check and reset permissions for sensitive files and directories.
```


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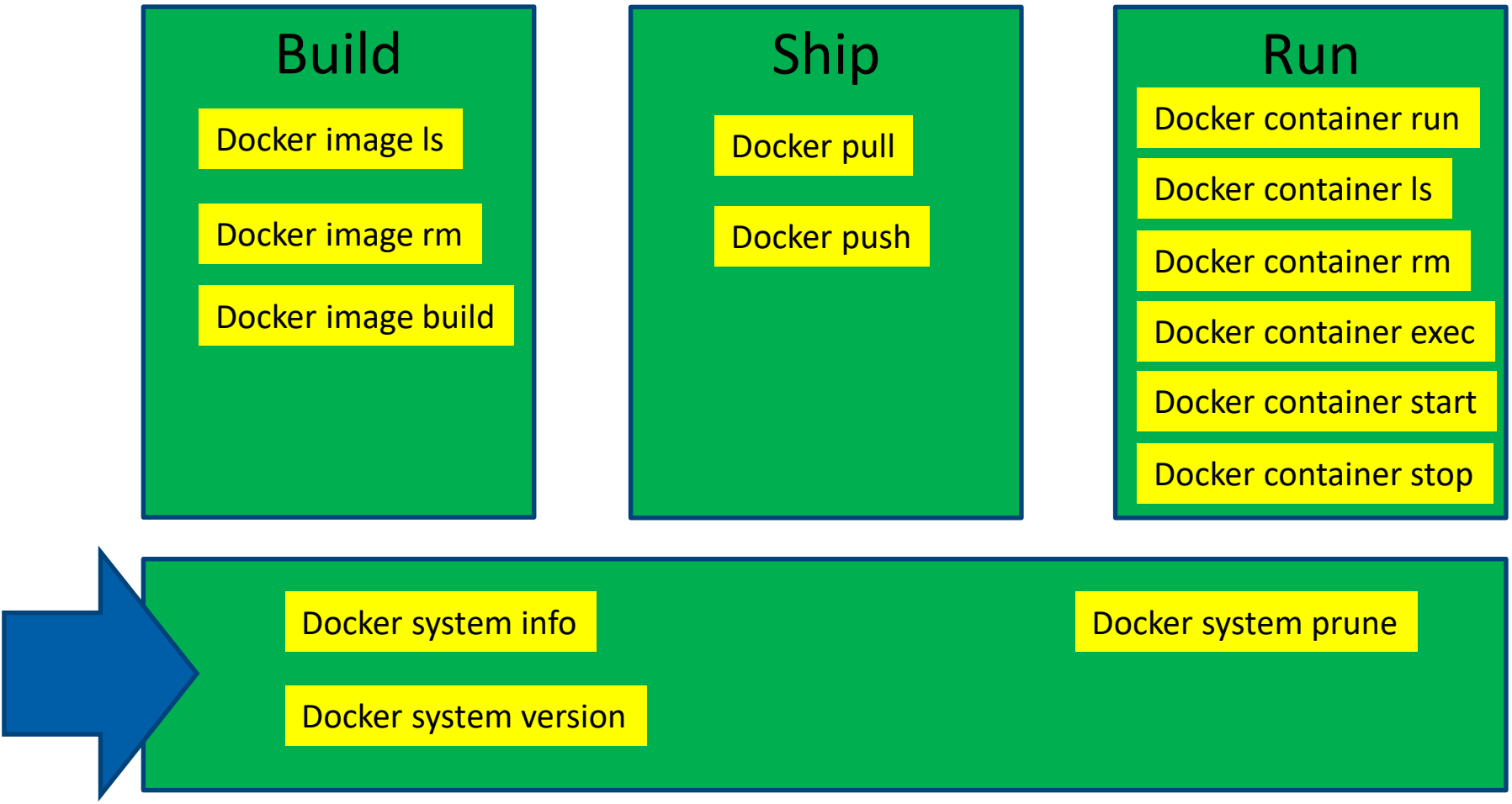
COMMAND DOCKER IMAGE

Docker image --help	List options for docker image	
Docker image ls	List docker images	Listed deprecated: Docker images Image has id and repo name
Docker history <image>	Returns Dockerfile commands	
Docker inspect <image>	Lots of information	

```
REPOSITORY              TAG                 IMAGE ID            CREATED             SIZE
centricms/staticws      latest              b83189dccfa7        7 minutes ago       15.5MB
nginx                   stable-alpine       7c588c2e29dc        2 days ago          15.5MB
```

DOCKER COMMAND LINE INTERFACE



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COMMAND
DOCKER IMAGE

Docker system prune	Delete all stopped containers and used images	
Docker system prune –a	Delete all containers and images	Clean docker environment
Docker system df	Show docker disk usage	
Docker system events	Get real time events from the server	
Docker system info	Display system-wide information	

SUMMARY: OUR WORKFLOW

- What is on the laptop?
  - Static website
- Build
  - Build the image
- Ship –Flow
  - Push to Docker Hub / Docker Store
  - Pull from Docker Hub / Docker Store
- Run
  - Run on Laptop
  - Run on Azure host

OTHER LABS

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connect.engage.succeed.

LAB
IMMUTABLE CONTAINER

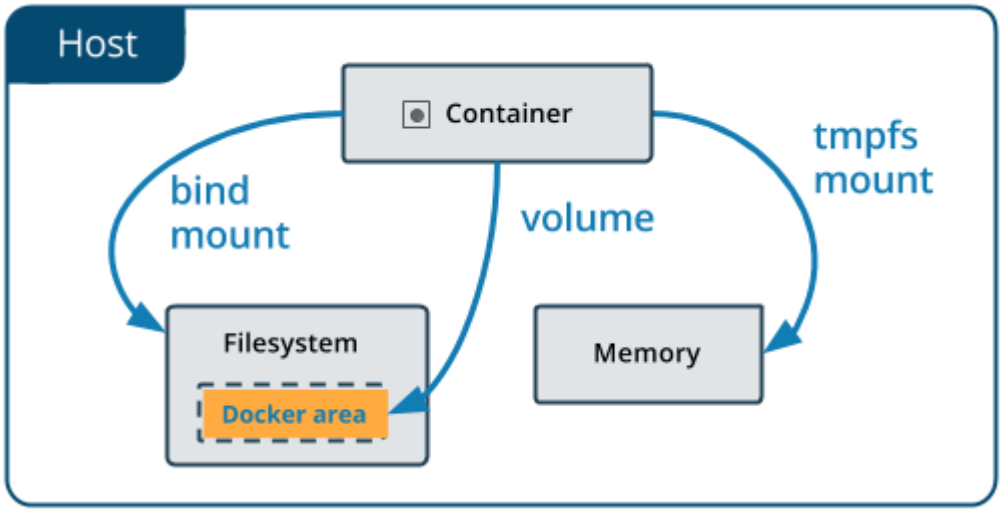
- Start an alpine container
- Add a file Centric in home directory
  - echo “deze file heet centric” >> centric
- Stop the container with exit

- Case 1: start new container
  - docker container –it alpine sh
  - Result: no file Centric

- Case 2: start old container
  - docker container ls –a (find the container-id)
  - docker container start <id>
  - docker exec -it <id>
  - Result: Centric file

LAB
DOCKER VOLUME

- DEV flow – dev mode
- Changes in code change without building



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LAB
EXPORT & IMPORT

- Ship without docker registry

- Docker export
- Docker import