

**Lodz**

# < DEV DAY >

**2020**

< Docker for developers  
- tips and tricks >

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# We will not talk about ...

**Not about production use of Docker**

**Not about tests environments**

# **We will not talk about ...**

**Not about production use of Docker**

**Not about tests environments**

**We will talk about using Docker for  
developers tools on your  
laptop/workstations.**

**“Why we want use  
Docker on our  
laptops???”**

**Sebastian  
sorry !**



# Why ???

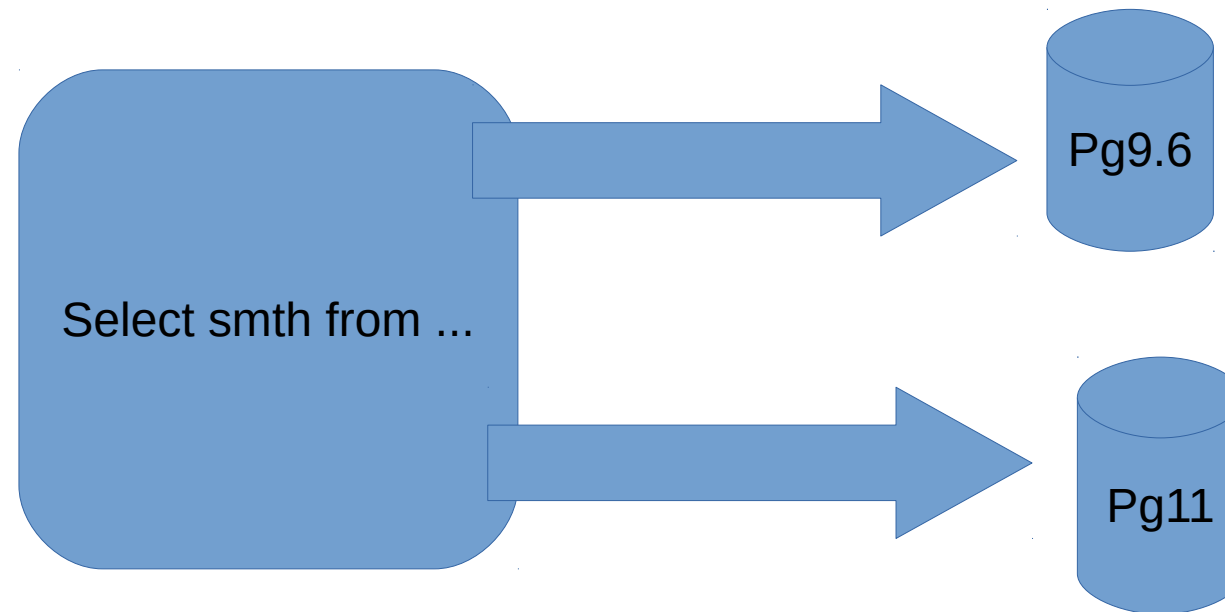
- Isolation
- Experience with docker

# Using ready images

Tool name	Count
mysql	18.163
postgresql	4.137
java	21.419
consul	2.988

There is about 3 milions ready images on [hub.docker.com](https://hub.docker.com)

# Testing sql query





# Testing sql query

```
docker run -d --name pg9.6 -e POSTGRES_PASSWORD=mysecret
postgres:9.6
docker run -d --name pg11 -e POSTGRES_PASSWORD=mysecret
postgres:11
```

```
zalewski@pl1lxl-108704 ~$ docker run -it --rm --network container:pg11 postgres:11 psql -h localhost -U postgres
psql (11.6 (Debian 11.6-1.pgdg90+1))
Type "help" for help.

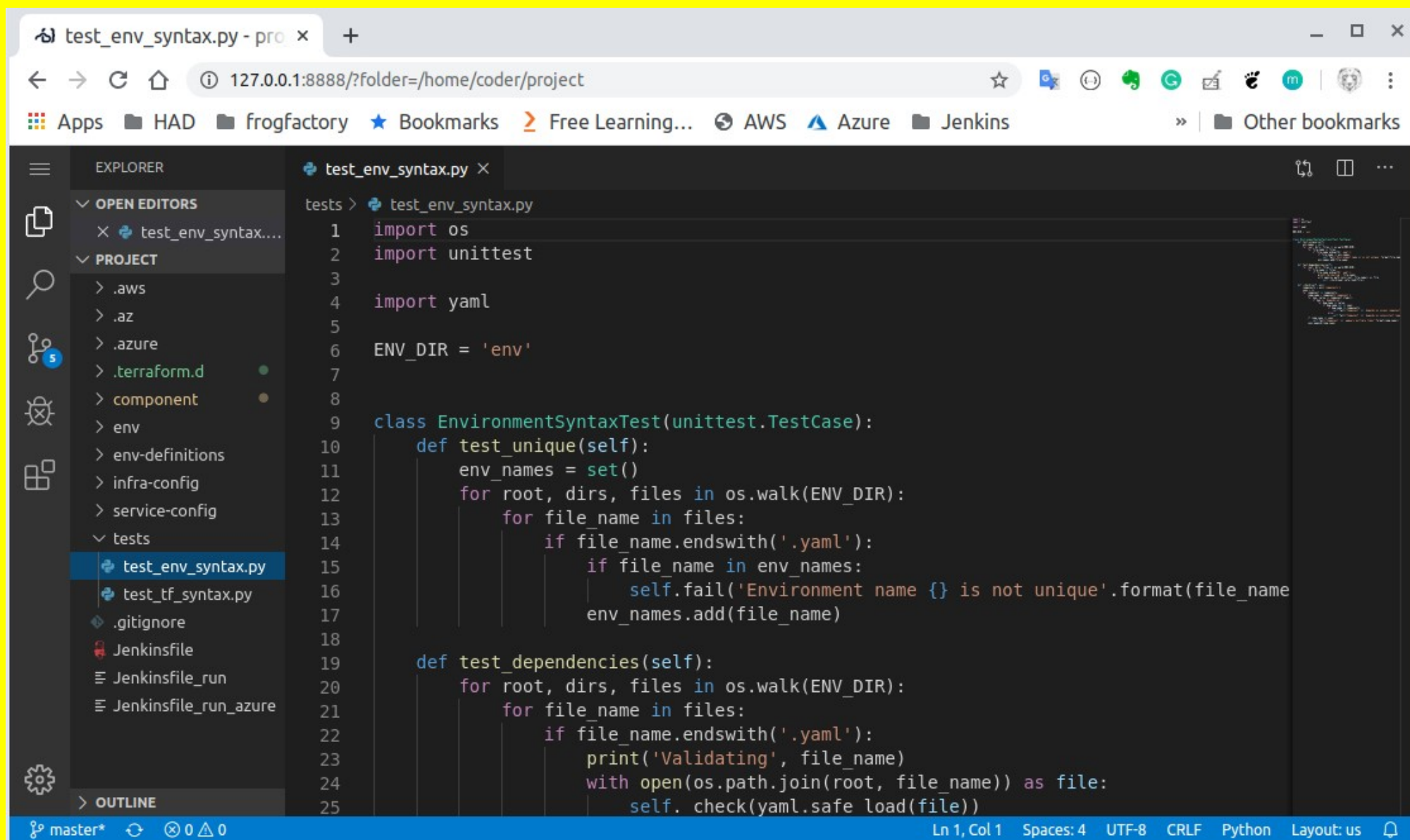
postgres=# select 1;
 ?column?
-----
         1
(1 row)
```



# VSCode

# VSCode

```
docker run -it -p 8080:8080  
-v "$(pwd):/home/coder/project"  
codercom/code-server --auth none
```



# Cloud utils

**aws, az, kubectl – different versions**

# Cloud utils

```
docker run -it --rm
-e AWS_SECRET_KEY = XXXSSDSXSXXXX
-e AWS_ACCESS_KEY = XSwewedfwewee
pzalews/awscli
aws rds describe-db-instances --output table
```

# Cloud utils

```
docker run -it -rm  
-v ~/.aws:/aws/.aws:ro  
pzalews/awsccli  
aws rds describe-db-instances --output table
```

# Cloud utils

```
alias awsd=  
'docker run -it --rm  
-v "$(pwd):/aws"  
-v ~/.aws:/aws/.aws:ro  
-e AWS_PROFILE=had-dev  
pzalews/awsccli aws'
```



```
zalewski@pl1lxl-108704 ~ > alias awsd='docker run -it --rm -v "$(pwd):/aws" -v ~/.aws:/aws/.aws:ro -e AWS_PROFILE=had-dev pzalews/awsccli aws'
zalewski@pl1lxl-108704 ~ > awsd s3 ls
2018-05-09 06:59:24 367040365964-audit-logs
2019-12-13 12:46:25 ad-instalation
2019-10-08 07:05:23 addo-test-logs
2019-10-16 06:30:00 aggregate-scope-coverage
2019-10-16 06:30:18 aggregate-scope-coverage-tableau
```

# Consul

**How to run some tools on my local network interface?**

# Consul

**How to run some tools on my local network interface?**

```
alias consul=  
'docker run -d --rm  
  -e CONSUL_BIND_INTERFACE=enxa44cc8d6bc80  
  --net=host  
  consul'
```

# Debug network traffic



# Debug network traffic

## Run our main service

```
docker run --name ubuntu -it ubuntu /bin/bash
```

# Debug network traffic

```
docker run --name ubuntu -it ubuntu /bin/bash
```

```
docker run --net=container:ubuntu
```

```
-v $(pwd)/temp:/dump
```

```
corfr/tcpdump -s 65535 -w /dump/test.dump
```



test.dump

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

Apply a display filter ... <Ctrl-/> Expression.

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	192.168.188.4	192.168.188.1	DNS	69	Standard query 0xe013 A www.wp.pl
2	0.000086	192.168.188.4	192.168.188.1	DNS	69	Standard query 0x6e27 AAAA www.wp.pl
3	0.004693	192.168.188.1	192.168.188.4	DNS	85	Standard query response 0xe013 A www.wp.pl A 212.77.98.9
4	0.004755	192.168.188.1	192.168.188.4	DNS	125	Standard query response 0x6e27 AAAA www.wp.pl SOA ns1.wp.pl
5	0.005065	192.168.188.4	212.77.98.9	ICMP	98	Echo (ping) request id=0x0147, seq=1/256, ttl=64 (reply in 6)
6	0.008821	212.77.98.9	192.168.188.4	ICMP	98	Echo (ping) reply id=0x0147, seq=1/256, ttl=51 (request in 5)
7	0.009040	192.168.188.4	192.168.188.1	DNS	84	Standard query 0x9715 PTR 9.98.77.212.in-addr.arpa
8	0.013282	192.168.188.1	192.168.188.4	DNS	107	Standard query response 0x9715 PTR 9.98.77.212.in-addr.arpa PTR www.wp.pl
9	1.006590	192.168.188.4	212.77.98.9	ICMP	98	Echo (ping) request id=0x0147, seq=2/512, ttl=64 (reply in 10)
10	1.010321	212.77.98.9	192.168.188.4	ICMP	98	Echo (ping) reply id=0x0147, seq=2/512, ttl=51 (request in 9)

**More  
docker,  
more...**

**X**



**More  
docker,  
more...**

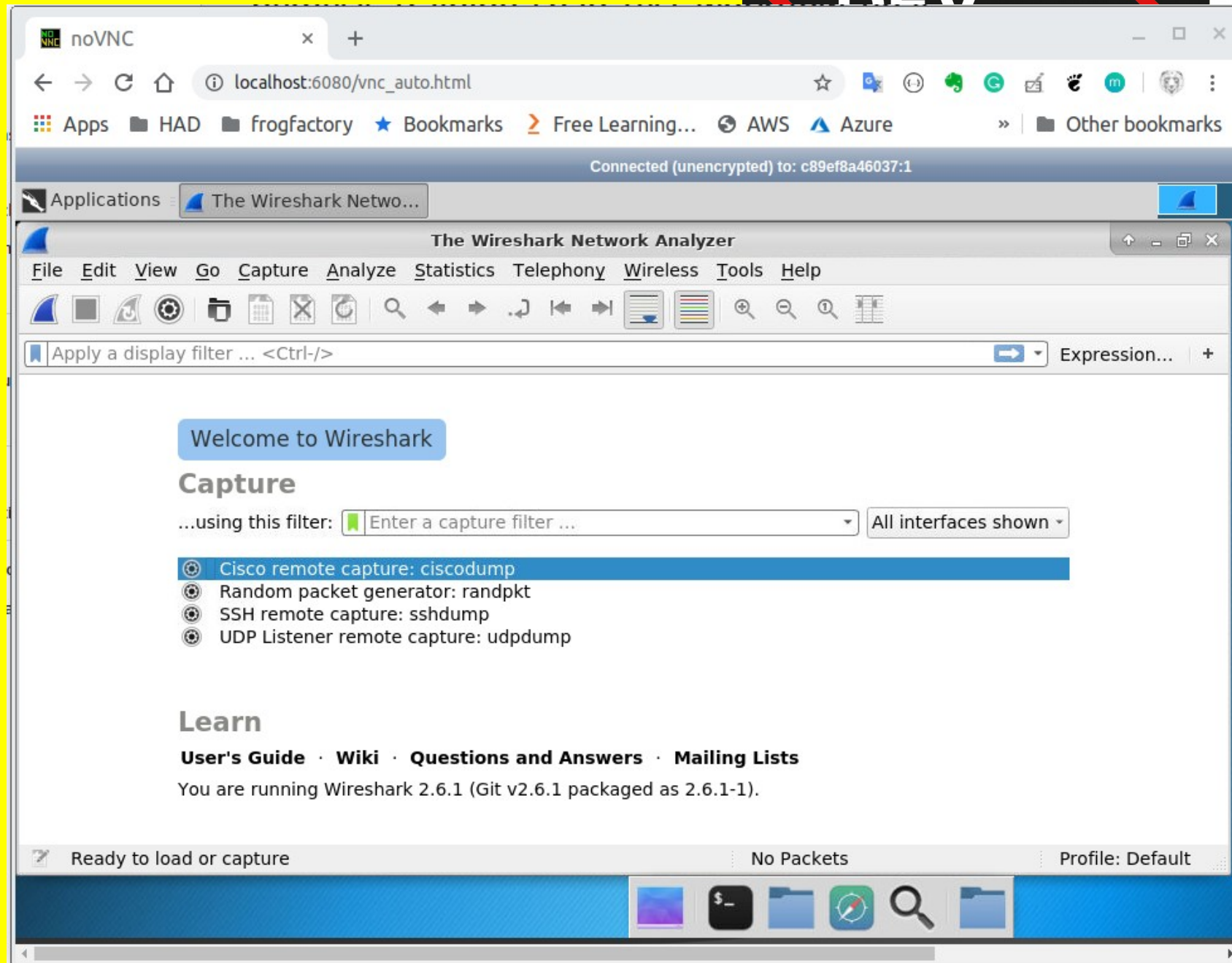
**X→Vnc**

**More  
docker,  
more...**

**X→Vnc  
Http  
client  
for  
vnc**

# More docker, more...

```
docker run -d -p 6080:6080  
lukaszlach/kali-desktop:xfce-top10
```



# Dockerizing your tools



```
zalewski@pl1xl-108704:~/PIOTRZ/aztools$ pcat Dockerfile
```

```
FROM mcr.microsoft.com/azure-cli:2.0.76
```

```
ENV YQ_BIN_VERSION 2.2.0
```

```
ENV TERRAFORM_VERSION 0.12.13
```

```
ENV KUBECTL_VERSION 1.13.10
```

```
ENTRYPOINT ["/entrypoint.sh"]
```

```
COPY entrypoint.sh entrypoint.sh
```

```
COPY commands.sh /commands.sh
```

```
VOLUME /work
```

```
WORKDIR /work
```

```
ENV HOME /work
```

```
RUN curl --silent --location --output /usr/local/bin/yq https://github.com/mikefarah/yq/releases/download/${YQ_BIN_VERSION}/yq_linux_amd64 && \
  chmod 755 /usr/local/bin/yq && \
  chmod +x /entrypoint.sh && \
  chmod +x /commands.sh
```

```
RUN curl --silent -o terraform.zip https://releases.hashicorp.com/terraform/${TERRAFORM_VERSION}/terraform_${TERRAFORM_VERSION}_linux_amd64.zip && \
  unzip terraform.zip && \
  chmod +x terraform && \
  mv terraform /usr/bin && \
  rm terraform.zip
```

```
RUN curl --silent -LO https://storage.googleapis.com/kubernetes-release/release/v${KUBECTL_VERSION}/bin/linux/amd64/kubectl && \
  mv kubectl /usr/bin/kubectl && \
  chmod +x /usr/bin/kubectl
```

```
zalewski@pl1xl-108704:~/PIOTRZ/aztools$
```

# Docker build

`docker build -t imagename .`



```
Sending build context to Docker daemon 81.92kB
Step 1/13 : FROM mcr.microsoft.com/azure-cli:2.0.76
--> e1bb0df63df8
```

```
Step 2/13 : ENV YQ_BIN_VERSION 2.2.0
--> Running in daa48ba1199e
```

```
Removing intermediate container daa48ba1199e
--> fdef7d5d73b4
```

```
Step 3/13 : ENV TERRAFORM_VERSION 0.12.14
--> Running in bb31218f61c4
```

```
Removing intermediate container bb31218f61c4
--> 5342f3212306
```

```
Step 4/13 : ENV KUBECTL_VERSION 1.13.10
--> Running in c1fce1466ec2
```

```
Removing intermediate container c1fce1466ec2
--> 0e304ebc3703
```

```
Step 5/13 : ENTRYPOINT ["/entrypoint.sh"]
--> Running in 594f8d56c608
```

```
Removing intermediate container 594f8d56c608
--> 91aa988e1ec1
```

```
Step 6/13 : COPY entrypoint.sh entrypoint.sh
--> 2220b77248d2
```

```
Step 7/13 : COPY commands.sh /commands.sh
--> b8be0ea2b5ae
```

```
Step 8/13 : VOLUME /work
--> Running in 8e0516146ab8
```

```
Removing intermediate container 8e0516146ab8
--> eb1fc0b078f1
```

```
Step 9/13 : WORKDIR /work
--> Running in e3b070b66e35
```

```
Removing intermediate container e3b070b66e35
--> 0213665db226
```

```
Step 10/13 : ENV HOME /work
--> Running in 50a939058f06
```

```
Removing intermediate container 50a939058f06
--> a2d390bb483f
```

```
Step 11/13 : RUN curl --silent --location --output /usr/local/bin/yq https://github.com/mikefarah/yq/releases/download/v2.2.2/yq_linux_amd64.tar.gz &&
  chmod +x /entrypoint.sh &&      chmod +x /commands.sh
--> Running in 8c5ac5b2e492
```

```
Removing intermediate container 8c5ac5b2e492
--> 39eb58dbea42
```

```
Step 12/13 : RUN curl --silent -o terraform.zip https://releases.hashicorp.com/terraform/0.12.14/terraform_0.12.14_linux_amd64.zip &&
  unzip terraform.zip && mv terraform /usr/bin && rm terraform.zip
```





# Docker buildkit

**export DOCKER\_BUILDKIT=1**  
**(starting from Docker 18.09)**

- New tty output
- Better caching
- Mounting folders for build time only
- Adding secrets for build time only
- Parallel build

```

zalewski@pl1lxl-108704 > ~/PIOTRZ/aztools > master > docker build .
[+] Building 19.2s (12/12) FINISHED
=> [internal] load build definition from Dockerfile                                0.0s
=> => transferring dockerfile: 1.00kB                                             0.0s
=> [internal] load .dockerignore                                                  0.0s
=> => transferring context: 2B                                                    0.0s
=> [internal] load metadata for mcr.microsoft.com/azure-cli:2.0.76              0.0s
=> [1/7] FROM mcr.microsoft.com/azure-cli:2.0.76                               0.0s
=> [internal] load build context                                                  0.0s
=> => transferring context: 64B                                                  0.0s
=> CACHED [2/7] COPY entrypoint.sh entrypoint.sh                               0.0s
=> CACHED [3/7] COPY commands.sh /commands.sh                                  0.0s
=> CACHED [4/7] WORKDIR /work                                                    0.0s
=> [5/7] RUN curl --silent --location --output /usr/local/bin/yq https://github.com/mikefarah/yq/releases/dow 11.4s
=> [6/7] RUN curl --silent -o terraform.zip https://releases.hashicorp.com/terraform/0.12.14/terraform_0.12.14 4.6s
=> [7/7] RUN curl --silent -LO https://storage.googleapis.com/kubernetes-release/release/v1.13.10/bin/linux/am 2.5s
=> exporting to image                                                            0.7s
=> => exporting layers                                                            0.7s
=> => writing image sha256:4d974ba765bbdb106a149ccbe5014076d014910dadfac40c0e819d4b4732cd50 0.0s
zalewski@pl1lxl-108704 > ~/PIOTRZ/aztools > master > 

```

```
zalewski@pl11xl-108704:~/PIOTRZ/aztools$ pcat Dockerfile
FROM mcr.microsoft.com/azure-cli:2.0.76
```

```
ENV YQ_BIN_VERSION 2.2.0
```

```
ENV TERRAFORM_VERSION 0.12.13
```

```
ENV KUBECTL_VERSION 1.13.10
```

```
ENTRYPOINT ["/entrypoint.sh"]
```

```
COPY entrypoint.sh entrypoint.sh
```

```
COPY commands.sh /commands.sh
```

```
VOLUME /work
```

```
WORKDIR /work
```

```
ENV HOME /work
```

```
RUN curl --silent --location --output /usr/local/bin/yq https://github.com/mikefarah/yq/releases/download/${YQ_BIN_VERSION}/yq_linux_amd64 && \
  chmod 755 /usr/local/bin/yq && \
  chmod +x /entrypoint.sh && \
  chmod +x /commands.sh
```

```
RUN curl --silent -o terraform.zip https://releases.hashicorp.com/terraform/${TERRAFORM_VERSION}/terraform_${TERRAFORM_VERSION}_linux_amd64.zip && \
  unzip terraform.zip && \
  chmod +x terraform && \
  mv terraform /usr/bin && \
  rm terraform.zip
```

```
RUN curl --silent -LO https://storage.googleapis.com/kubernetes-release/release/v${KUBECTL_VERSION}/bin/linux/amd64/kubectl && \
  mv kubectl /usr/bin/kubectl && \
  chmod +x /usr/bin/kubectl
```

```
zalewski@pl11xl-108704:~/PIOTRZ/aztools$
```

# Image size

**What is eating my space ?**

docker image ls

```
zalewski@pl11xl-108704 ~$ docker image ls
```

REPOSITORY	TAG	IMAGE ID	CREATED	SIZE
testjava	latest	64af5fc45786	3 hours ago	246MB
<none>	<none>	f8cb5e2047c0	3 hours ago	246MB
testjava_old	latest	5563d8a941dd	3 hours ago	488MB
aztools	latest	cb879425691e	26 hours ago	1.06GB
postgres	11	d3d96b1e5d48	11 days ago	332MB
postgres	latest	ec5d6d5f5b34	11 days ago	394MB
openjdk	8	f8146facf376	11 days ago	488MB
envdeployer11	latest	de1e505e09a5	2 weeks ago	1.33GB
ubuntu	latest	549b9b86cb8d	2 weeks ago	64.2MB
aquasec/trivy	latest	8500c7a94b4b	3 weeks ago	62.9MB

# Image size

`docker image history imagename`



```
zalewski@pl1lxl-108704 ~ docker image history aztools
```

IMAGE	CREATED	CREATED BY	SIZE	COMMENT
cb879425691e	2 minutes ago	RUN /bin/sh -c curl --silent -LO https://sto...	39.3MB	buildkit.dockerfile.v0
<missing>	2 minutes ago	RUN /bin/sh -c curl --silent -o terraform.zi...	50.6MB	buildkit.dockerfile.v0
<missing>	2 minutes ago	RUN /bin/sh -c curl --silent --location --ou...	5.4MB	buildkit.dockerfile.v0
<missing>	2 minutes ago	ENV HOME=/work	0B	buildkit.dockerfile.v0
<missing>	2 minutes ago	WORKDIR /work	0B	buildkit.dockerfile.v0
<missing>	2 minutes ago	VOLUME [/work]	0B	buildkit.dockerfile.v0
<missing>	2 minutes ago	COPY commands.sh /commands.sh # buildkit	67B	buildkit.dockerfile.v0
<missing>	2 minutes ago	COPY entrypoint.sh entrypoint.sh # buildkit	73B	buildkit.dockerfile.v0
<missing>	2 minutes ago	ENTRYPOINT ["/entrypoint.sh"]	0B	buildkit.dockerfile.v0
<missing>	2 minutes ago	ENV KUBECTL_VERSION=1.13.10	0B	buildkit.dockerfile.v0
<missing>	2 minutes ago	ENV TERRAFORM_VERSION=0.12.13	0B	buildkit.dockerfile.v0
<missing>	2 minutes ago	ENV YQ_BIN_VERSION=2.2.0	0B	buildkit.dockerfile.v0
<missing>	2 months ago	/bin/sh -c #(nop) CMD ["/bin/sh" "-c" "bash...	0B	
<missing>	2 months ago	3 BUILD_DATE=2019-10-30T06:26:39Z CLI_VERSI...	1.25kB	
<missing>	2 months ago	/bin/sh -c #(nop) WORKDIR /	0B	
<missing>	2 months ago	3 BUILD_DATE=2019-10-30T06:26:39Z CLI_VERSI...	282MB	
<missing>	2 months ago	/bin/sh -c #(nop) COPY dir:7a3763f48c2fc6db3...	406MB	
<missing>	2 months ago	/bin/sh -c #(nop) WORKDIR /azure-cli	0B	

# Docker build context

One of first steps in build process is sending build context to docker daemon.

Default build context is whole directory with all subfolders.

Tip: The rule of thumb is not adding files to the build context, if you do not need them in your Docker image. The Docker context should be minimal and secret-free.

Use wisely `.dockerignore`

# Docker build context

`docker build -f out/ < Dockerfile`



```
zalewski@pl11xl-108704:~/PIOTRZ/aztools$ pcat Dockerfile
FROM mcr.microsoft.com/azure-cli:2.0.76
```

```
ENV YQ_BIN_VERSION 2.2.0
```

```
ENV TERRAFORM_VERSION 0.12.13
```

```
ENV KUBECTL_VERSION 1.13.10
```

```
ENTRYPOINT ["/entrypoint.sh"]
```

```
COPY entrypoint.sh entrypoint.sh
```

```
COPY commands.sh /commands.sh
```

```
VOLUME /work
```

```
WORKDIR /work
```

```
ENV HOME /work
```

```
RUN curl --silent --location --output /usr/local/bin/yq https://github.com/mikefarah/yq/releases/download/${YQ_BIN_VERSION}/yq_linux_amd64 && \
  chmod 755 /usr/local/bin/yq && \
  chmod +x /entrypoint.sh && \
  chmod +x /commands.sh
```

```
RUN curl --silent -o terraform.zip https://releases.hashicorp.com/terraform/${TERRAFORM_VERSION}/terraform_${TERRAFORM_VERSION}_linux_amd64.zip && \
  unzip terraform.zip && \
  chmod +x terraform && \
  mv terraform /usr/bin && \
  rm terraform.zip
```

```
RUN curl --silent -LO https://storage.googleapis.com/kubernetes-release/release/v${KUBECTL_VERSION}/bin/linux/amd64/kubectl && \
  mv kubectl /usr/bin/kubectl && \
  chmod +x /usr/bin/kubectl
```

```
zalewski@pl11xl-108704:~/PIOTRZ/aztools$
```

```
zalewski@pl1lxl-108704 > ~/PIOTRZ/aztools > master > docker build .
[+] Building 0.2s (12/12) FINISHED
=> [internal] load build definition from Dockerfile 0.0s
=> => transferring dockerfile: 38B 0.0s
=> [internal] load .dockerignore 0.0s
=> => transferring context: 2B 0.0s
=> [internal] load metadata for mcr.microsoft.com/azure-cli:2.0.76 0.0s
=> [1/7] FROM mcr.microsoft.com/azure-cli:2.0.76 0.0s
=> [internal] load build context 0.0s
=> => transferring context: 64B 0.0s
=> CACHED [2/7] COPY entrypoint.sh entrypoint.sh 0.0s
=> CACHED [3/7] COPY commands.sh /commands.sh 0.0s
=> CACHED [4/7] WORKDIR /work 0.0s
=> CACHED [5/7] RUN curl --silent --location --output /usr/local/bin/yq https://github.com/mikefarah/yq/releas 0.0s
=> CACHED [6/7] RUN curl --silent -o terraform.zip https://releases.hashicorp.com/terraform/0.12.13/terraform_ 0.0s
=> CACHED [7/7] RUN curl --silent -LO https://storage.googleapis.com/kubernetes-release/release/v1.13.10/bin/l 0.0s
=> exporting to image 0.0s
=> => exporting layers 0.0s
=> => writing image sha256:cb879425691ea1ca7a142202b03c36fab09ff5c1ef01f5fc732f1c5ee5e07915 0.0s
zalewski@pl1lxl-108704 > ~/PIOTRZ/aztools > master > 
```

```
zalewski@pl1lxl-108704 > ~/PIOTRZ/aztools > master > docker build .
[+] Building 19.2s (12/12) FINISHED
=> [internal] load build definition from Dockerfile 0.0s
=> => transferring dockerfile: 1.00kB 0.0s
=> [internal] load .dockerignore 0.0s
=> => transferring context: 2B 0.0s
=> [internal] load metadata for mcr.microsoft.com/azure-cli:2.0.76 0.0s
=> [1/7] FROM mcr.microsoft.com/azure-cli:2.0.76 0.0s
=> [internal] load build context 0.0s
=> => transferring context: 64B 0.0s
=> CACHED [2/7] COPY entrypoint.sh entrypoint.sh 0.0s
=> CACHED [3/7] COPY commands.sh /commands.sh 0.0s
=> CACHED [4/7] WORKDIR /work 0.0s
=> [5/7] RUN curl --silent --location --output /usr/local/bin/yq https://github.com/mikefarah/yq/releases/dow 11.4s
=> [6/7] RUN curl --silent -o terraform.zip https://releases.hashicorp.com/terraform/0.12.14/terraform_0.12.14 4.6s
=> [7/7] RUN curl --silent -LO https://storage.googleapis.com/kubernetes-release/release/v1.13.10/bin/linux/am 2.5s
=> exporting to image 0.7s
=> => exporting layers 0.7s
=> => writing image sha256:4d974ba765bbdb106a149ccbe5014076d014910dadfac40c0e819d4b4732cd50 0.0s
zalewski@pl1lxl-108704 > ~/PIOTRZ/aztools > master > 
```

# Lint for Dockerfile

```
docker run --rm -i hadolint/hadolint < Dockerfile
```



```
zalewski@pl1lxl-108704 > ~/HAD/env-deployer > master ● docker run --rm -i hadolint/hadolint < Dockerfile
/dev/stdin:17 DL3018 Pin versions in apk add. Instead of `apk add <package>` use `apk add <package>=<version>`
/dev/stdin:17 DL3019 Use the `--no-cache` switch to avoid the need to use `--update` and remove `/var/cache/apk/*` when done installing packages
/dev/stdin:17 DL3013 Pin versions in pip. Instead of `pip install <package>` use `pip install <package>==<version>`
X zalewski@pl1lxl-108704 > ~/HAD/env-deployer > master ●
```

# Cleaning after work

# Logs

```
docker run -it  
--log-opt max-size=10m  
alpine ping 127.0.0.1
```

# Logs

add "log-opts": { "max-size": "10m", "max-file":"3"}

```
zalewski@pl1lxl-108704 ~ ➤ sudo cat /etc/docker/daemon.json
{
  "dns":["192.168.188.1"],
  "bip":"192.168.188.1/24" ,
  "log-driver":"local",
  "log-opts": { "max-size": "10m", "max-file":"3"}
}
```



# System prune

**docker system prune -f**

This doesn't clean by default:

- Running containers
- Tagged images
- Volumes

# Restart options

Flag	Description
<code>no</code>	Do not automatically restart the container. (the default)
<code>on-failure</code>	Restart the container if it exits due to an error, which manifests as a non-zero exit code.
<code>always</code>	Always restart the container if it stops. If it is manually stopped, it is restarted only when Docker daemon restarts or the container itself is manually restarted. (See the second bullet listed in <a href="#">restart policy details</a> )
<code>unless-stopped</code>	Similar to <code>always</code> , except that when the container is stopped (manually or otherwise), it is not restarted even after Docker daemon restarts.

# Crontab by docker

```
docker run -d --restart=unless-stopped --name cleanup  
-v /var/run/docker.sock:/var/run/docker.sock  
docker  
/bin/sh -c "while true; do docker system prune -f &&  
date ; sleep 24h; done"
```

# Multistage build

## Show time

**Lodz**

**< DEV  
DAY >**

**2020**

**Thank you!**