Docker tips and tricks for developers

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Docker tips and tricks for developers

What is this presentation about ?

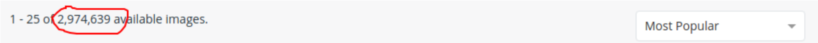
Not about production, not about deploying

We will talk about using developer tools packed in docker images.

Why use docker on your workstation ?

Isolation
zdjecie szuflady

Using ready images of tools

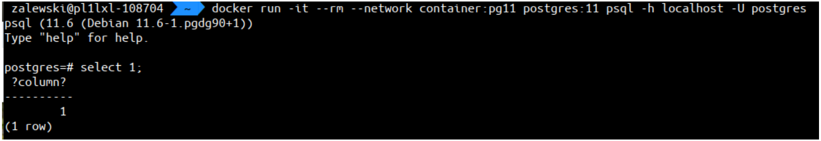


1 - 25 of 2,974,639 available images.

Tool name	count
mysql	18.163
postgresql	4.137
java	21.419
consul	2.989

Postgresql

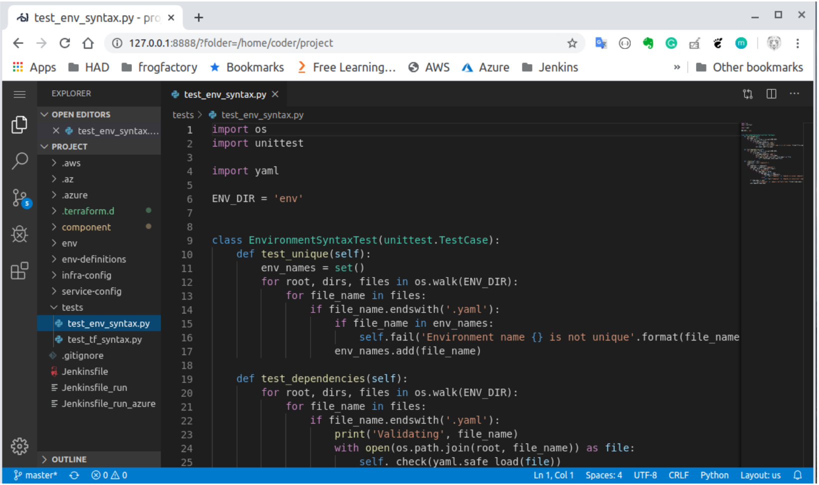
```
docker run --name pg9.6 -e POSTGRES_PASSWORD=mysecret
    -d postgres:9.6
docker run --name pg11 -e POSTGRES_PASSWORD=mysecret
    -d postgres:11
```



```
 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

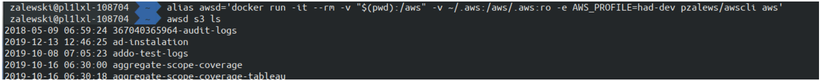
```
docker run -it -p 8080:8080
    -v "$(pwd):/home/coder/project"
    codercom/code-server --auth none
```



```python
import os
import unittest

import yaml

ENV_DIR = 'env'


class EnvironmentSyntaxTest(unittest.TestCase):
    def test_unique(self):
        env_names = set()
        for root, dirs, files in os.walk(ENV_DIR):
            for file_name in files:
                if file_name.endswith('.yaml'):
                    if file_name in env_names:
                        self.fail('Environment name {} is not unique'.format(file_name
                    env_names.add(file_name)

    def test_dependencies(self):
        for root, dirs, files in os.walk(ENV_DIR):
            for file_name in files:
                if file_name.endswith('.yaml'):
                    print('Validating', file_name)
                    with open(os.path.join(root, file_name)) as file:
                        self._check(yaml.safe_load(file))
```

Passing secrets to apps

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

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

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



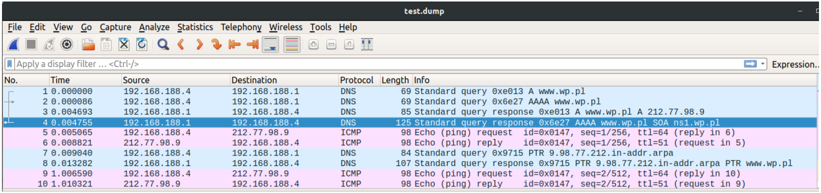
```
 zalewski@pl1lxl-108704  ~  alias awsd='docker run -it --rm -v "$(pwd):/aws" -v ~/.aws:/aws/.aws:ro -e AWS_PROFILE=had-dev pzalews/awscli aws'
 zalewski@pl1lxl-108704  ~  awsd s3 ls
2018-05-09 06:59:24 367040365964-audit-logs
2019-12-13 12:46:25 ad-instalation
2019-10-08 07:05:23 addo-test-logs
2019-10-16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

Network mode host

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

Debug network interfaces

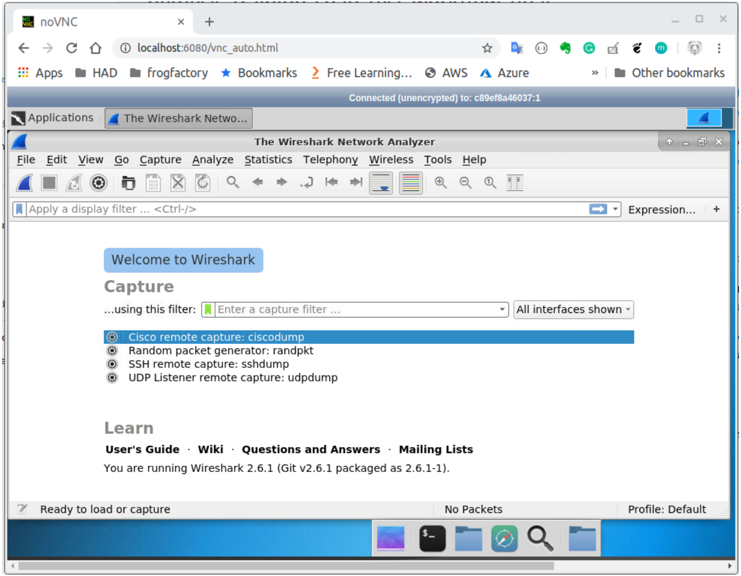
```
docker run --name ubuntu -it ubuntu /bin/bash
docker run --net=container:ubuntu
       -v $(pwd)/temp:/dump
       corfr/tcpdump -s 65535 -w /dump/test.dump
```


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)

Figure 1: wireshark

Kali Linux



Connected (unencrypted) to: c89ef8a46037:1

...using this filter: Enter a capture filter ... All interfaces shown

- Cisco remote capture: ciscodump
- Random packet generator: randpkt
- SSH remote capture: sshdump
- UDP Listener remote capture: udpdump

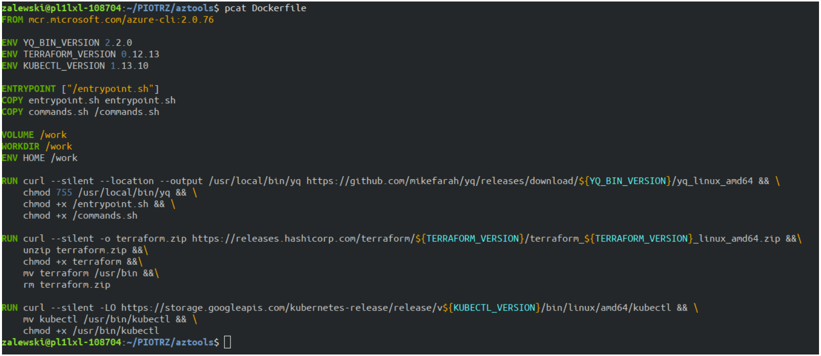
You are running Wireshark 2.6.1 (Git v2.6.1 packaged as 2.6.1-1).

Ready to load or capture No Packets Profile: Default

Figure 2: kalilinux

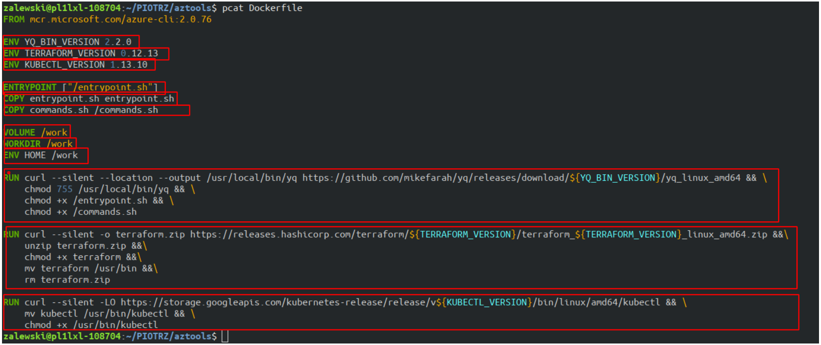
Dockerizing your tools

Dockerfile



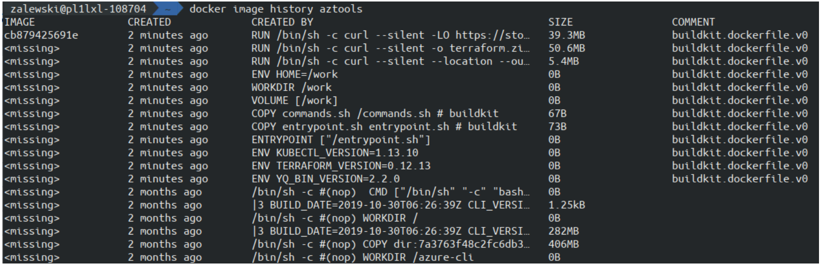
```
zalewski@pl1lxl-108704:~/PIOTRZ/aztools$ pcat Dockerfile
FROM mcr.microsoft.com/azure-cli:2.0.76

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${KUBECTL_VERSION}/bin/linux/amd64/kubectl && \
    mv kubectl /usr/bin/kubectl && \
    chmod +x /usr/bin/kubectl
zalewski@pl1lxl-108704:~/PIOTRZ/aztools$ 
```

Dockerfile - layers



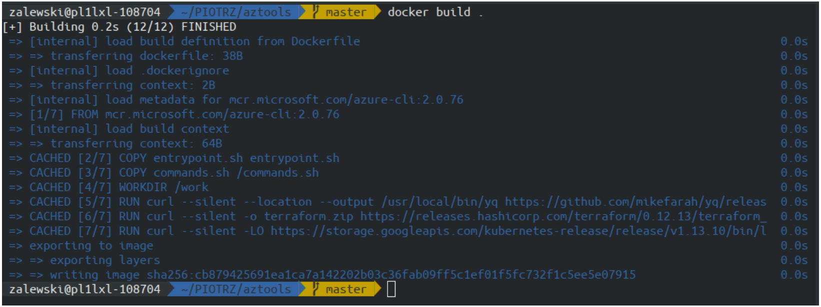
```
zalewski@pl1lxl-108704:~/PIOTRZ/aztools$ pcat Dockerfile
FROM mcr.microsoft.com/azure-cli:2.0.76

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${KUBECTL_VERSION}/bin/linux/amd64/kubectl && \
    mv kubectl /usr/bin/kubectl && \
    chmod +x /usr/bin/kubectl
zalewski@pl1lxl-108704:~/PIOTRZ/aztools$
```

Docker image history

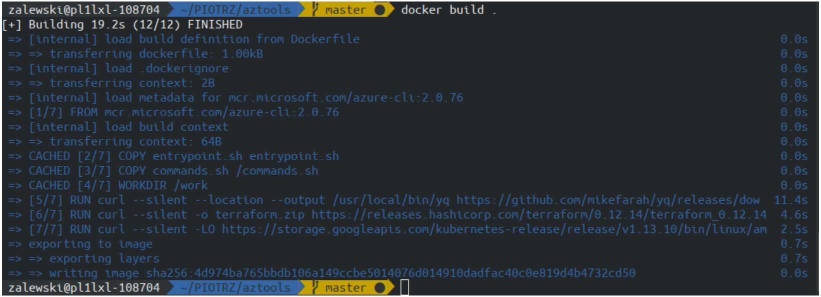


```
 zalewski@pl1lxl-108704  ~  docker image history aztools
IMAGE               CREATED             CREATED BY                                      SIZE                COMMENT
cb879425691e        2 minutes ago       RUN /bin/sh -c curl --silent -LO https://sto…   39.3MB              buildkit.dockerfile.v0
<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
```

Layers cache



```
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 ● 
```

Docker buildkit

export DOCKER_BUILDKIT=1 (starting from Docker 18.09)

- new tty output
- better caching
- mounting some folders for build time
- adding secret informations for build time

Dockerignore

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

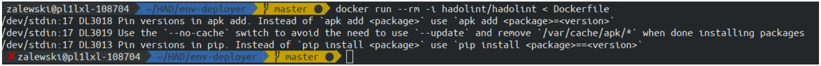
Default build contect is whole directory with all subfolders.

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.

Scanners - hadolint

Best practices 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>`
✗ zalewski@pl1lxl-108704  ~/HAD/env-deployer  master ● 
```

CMD and ENTRYPOINT

Fast use docker apps (Azure Container Instances)

Cleaninig after work

logs

add “log-opts”: { “max-size”: “10m”, “max-file”:“3”} to daemon.logs add log-driver to local

other logs drivers

docker system prune

```
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”
```

This doesn’t clean by default: * Running containers * tagged images * volumes

tips for java

java - cpu and memery , heapsize
https://youtu.be/RwtrLjh8_SU?t=2609