Dockerizing PHP Apps

Aurelijus Banelis

KaunasPHP
2019-02-20

Aurelijus Banelis

Backend/DevOps

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aurelijus@banelis.lt

```
PGP    0x320205E7539B6203
130D C446 1F1A 2E50 D6E3
3DA8 3202 05E7 539B 6203
```

.NFQ

AKADEMIJA .NFQ

Auginte

Adapting PHP applications to be used with docker

Introduction

Why to dockerize
What is docker
How to dockerize

Development

Context/Alternatives
What I really liked
What I do not like

Production

Deploying to AWS
Logging challenges

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Development bottleneck

Confidence/tooling bottleneck

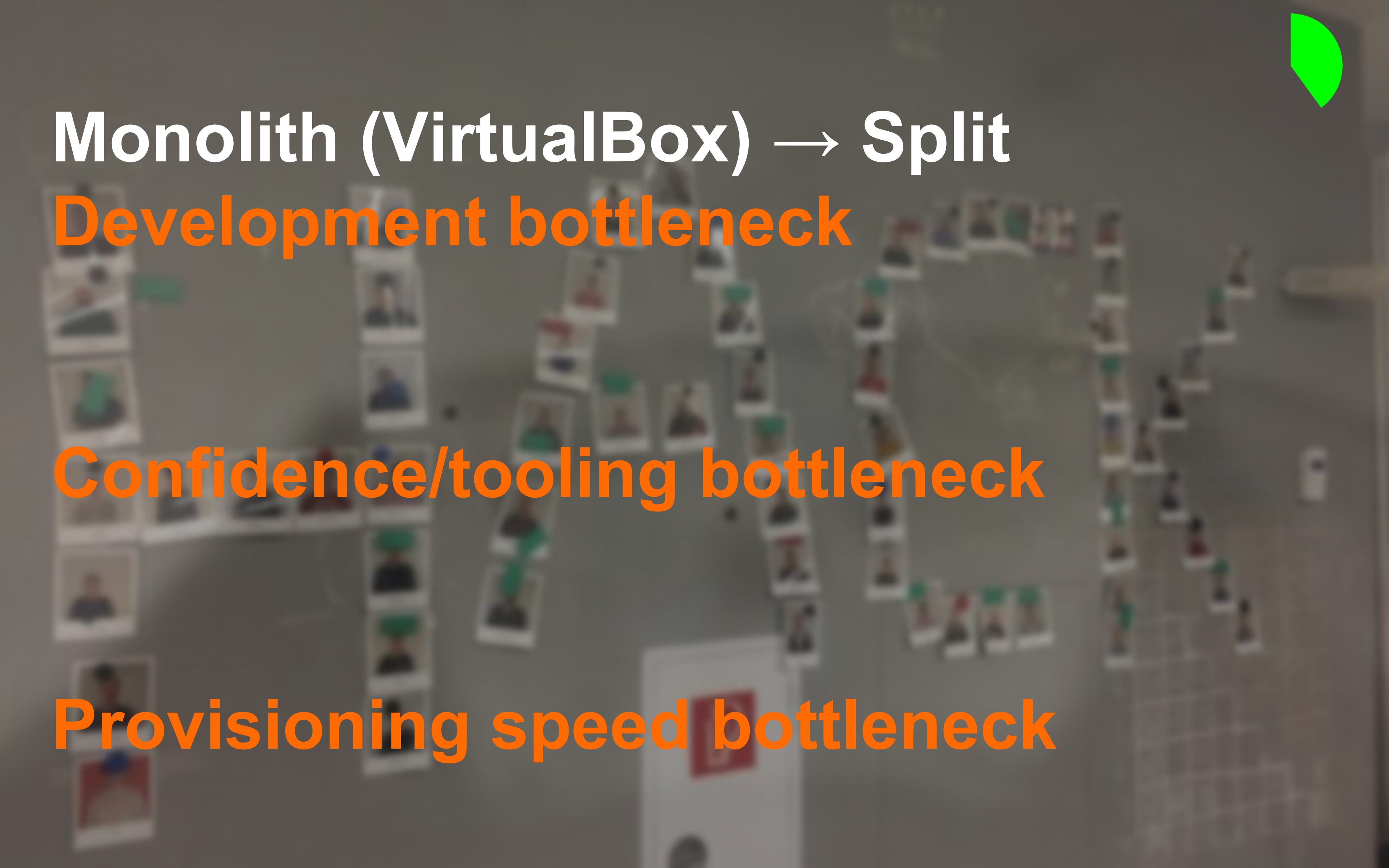
Provisioning speed bottleneck

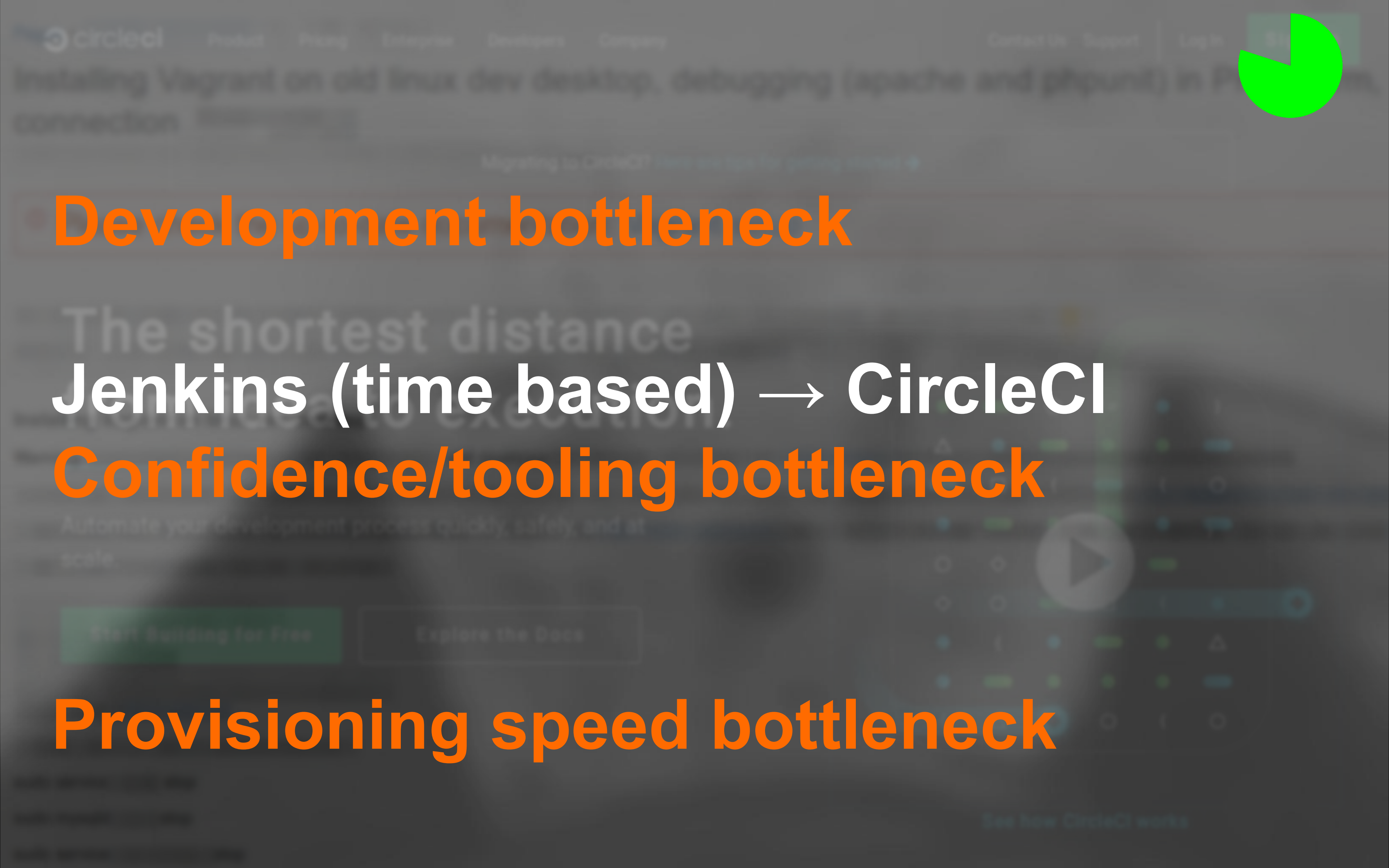
Monolith (VirtualBox) → Split

Development bottleneck

Confidence/tooling bottleneck

Provisioning speed bottleneck





Development bottleneck

Jenkins (time based) → CircleCI

Confidence/tooling bottleneck

Provisioning speed bottleneck

Development bottleneck

Confidence/tooling bottleneck

Release coordination → AWS services

Provisioning speed bottleneck

Bottleneck to grow

Monolith (VirtualBox) → Split

Development bottleneck

Jenkins (time based) → CircleCI

Confidence/tooling bottleneck

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The need for better virtualization tools

Monolith (VirtualBox) → Split

Development bottleneck

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Monolith (VirtualBox) → Split

Development bottleneck

Jenkins (time based) → CircleCI

Confidence/tooling bottleneck

Release coordination → AWS services

Provisioning speed bottleneck

The need for better virtualization tools

docker?

We migrated to docker

Using docker extensively at home24

org:Home24 filename:Dockerfile

Pull requests Issues Marketplace Explore

Repositories

Code

Commits

Issues

Marketplace

Topics

Wikis

Users

Languages

Dockerfile	157
PHP	

Advanced search Cheat sheet

Showing available code results

Home24/ Dockerfile

Dockerfile

Dockerfile

Home24 Dockerfile

Dockerfile

Dockerfile

Home24 Dockerfile

Dockerfile

Dockerfile

Home24 – Dockerfile

Dockerfile

Dockerfile

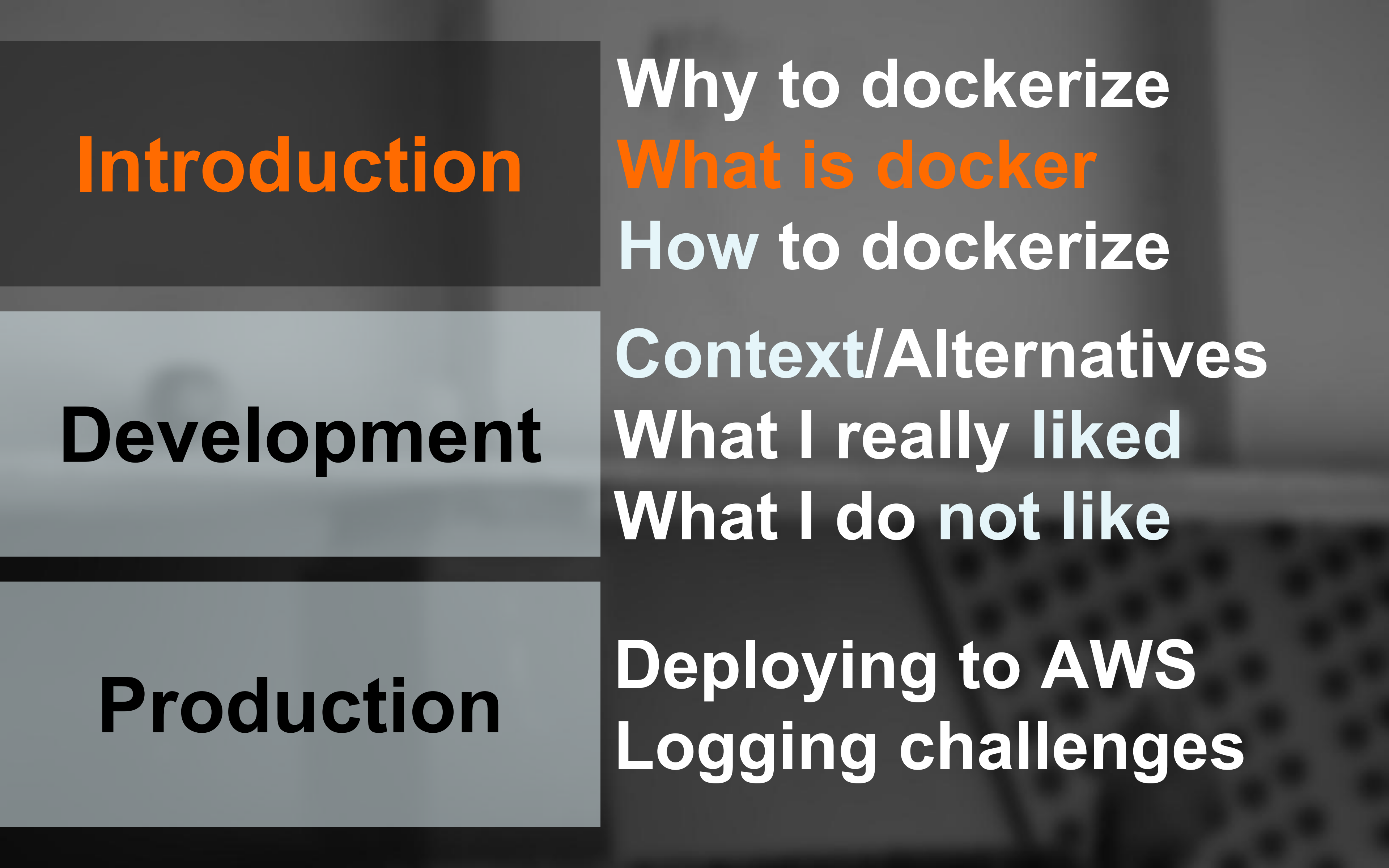
We migrated to docker

Using docker extensively at home24

I would do the same again

Right decision for current scale

Future opportunities



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Tool to run in isolated environment
Many ifs in kernel = cgroups
Not VirtualBox, not unikernel

Open source tool backed by Docker Inc
Container hosting and premium service
Improved by community (AWS, K8s)

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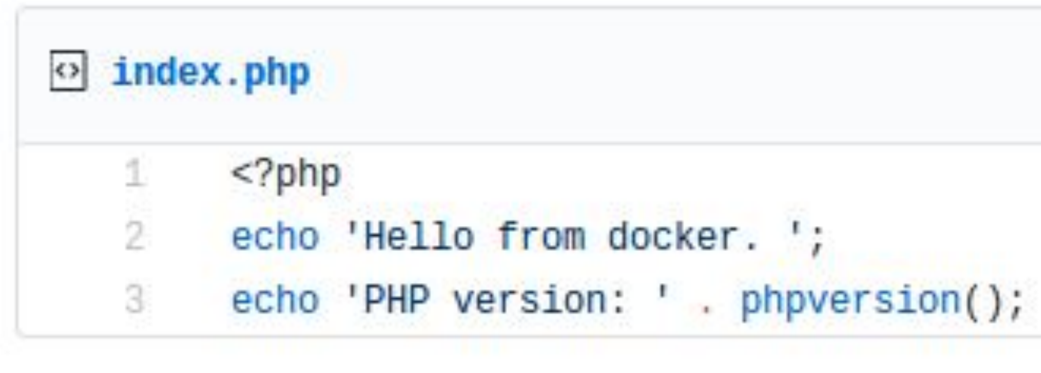
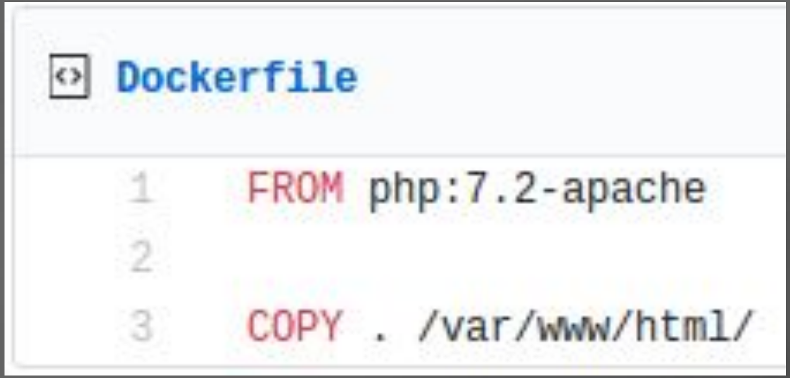


index.php

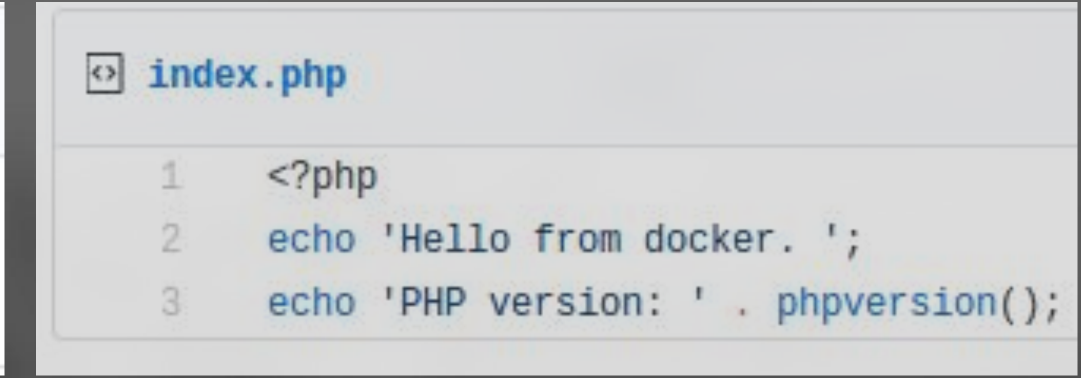
```php
<?php
echo 'Hello from docker. ';
echo 'PHP version: ' . phpversion();
```



Dockerfile

```dockerfile
FROM php:7.2-apache

COPY . /var/www/html/
```



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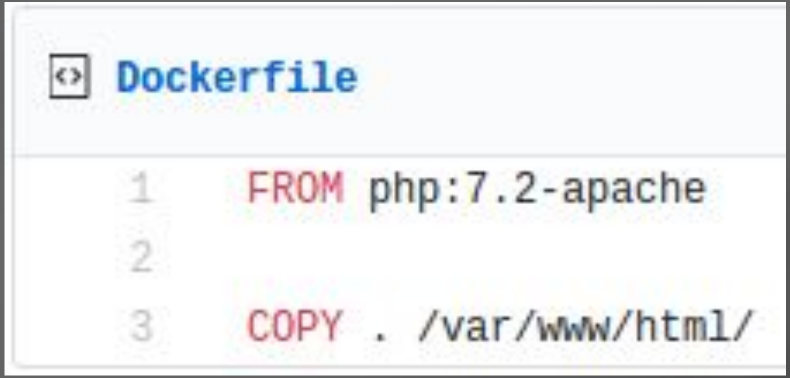

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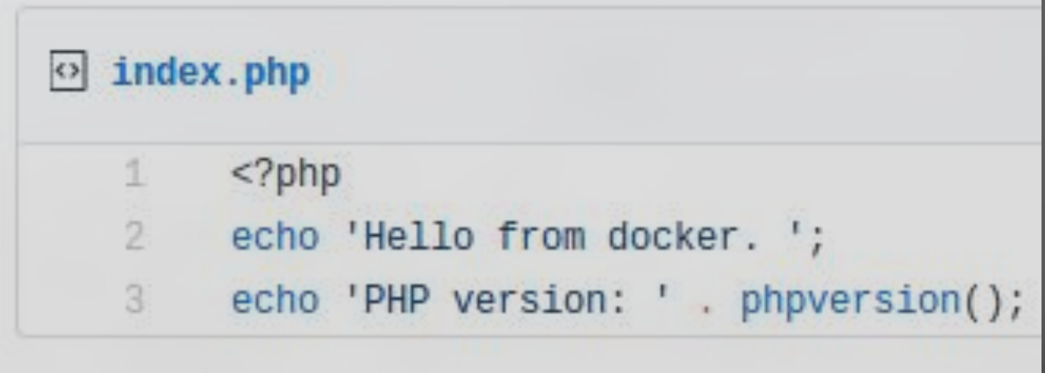

index.php

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<?php
echo 'Hello from docker. ';
echo 'PHP version: ' . phpversion();
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```
docker build . -t kaunasphp-example
docker run -p 8080:80 kaunasphp-example
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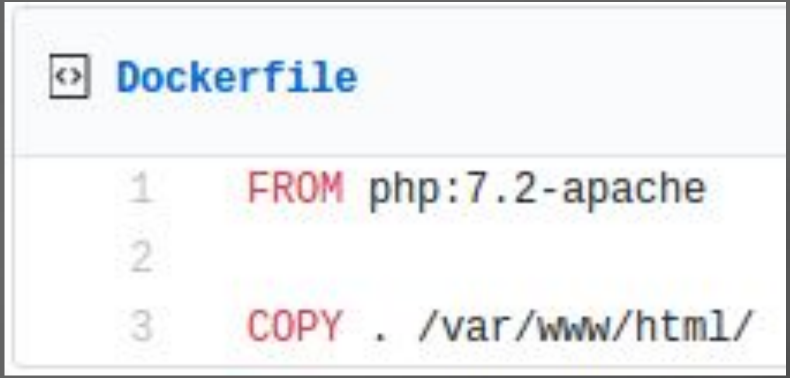

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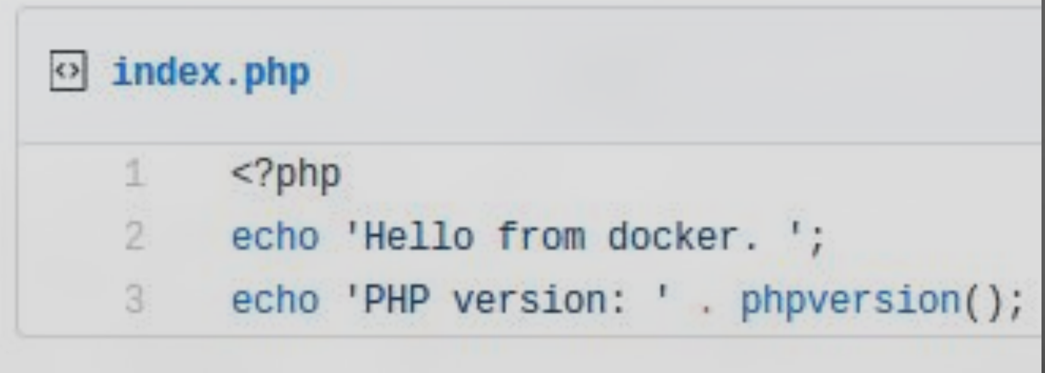

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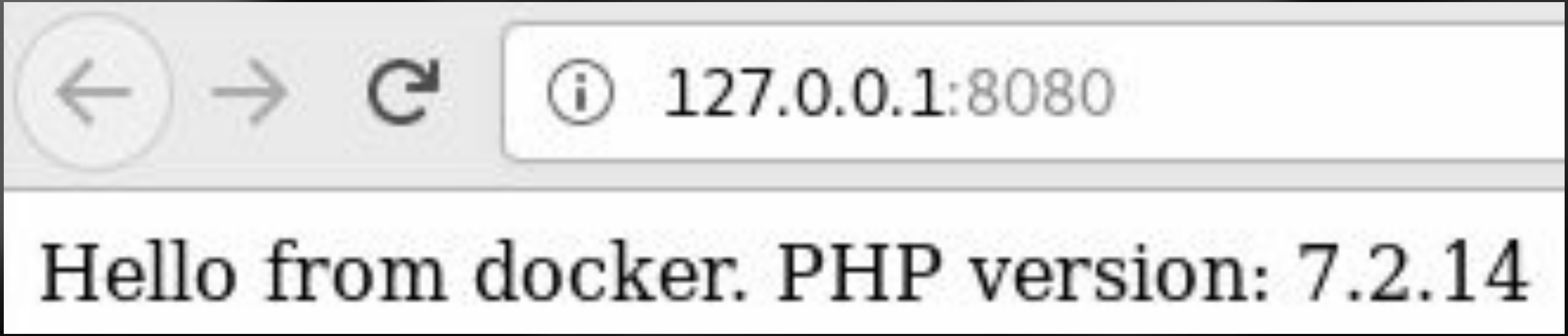
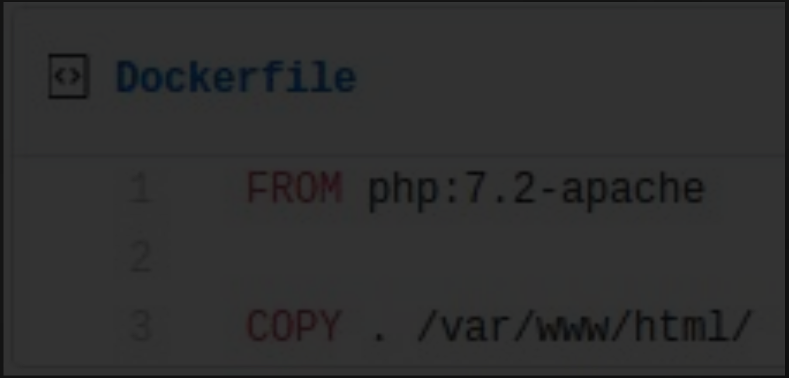


127.0.0.1:8080

Hello from docker. PHP version: 7.2.14

https://gist.github.com/aurelijusb/6f6b1c86c440ce527250193ffcae62d7

Simple?


Dockerfile

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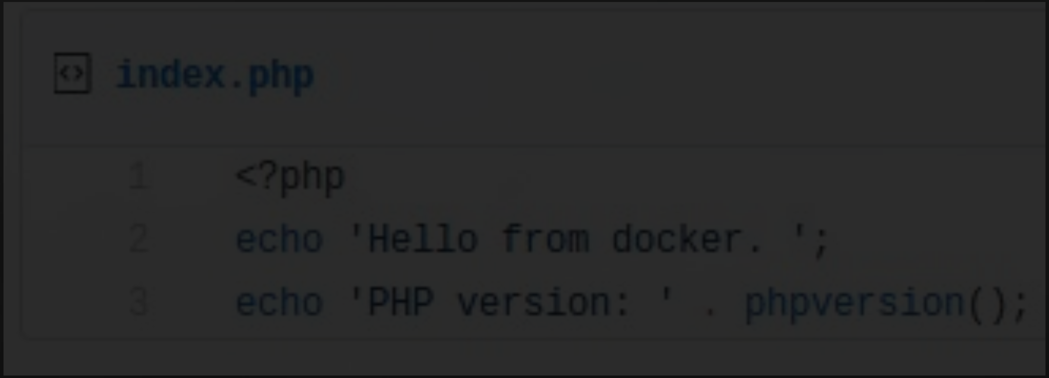
COPY . /var/www/html/
```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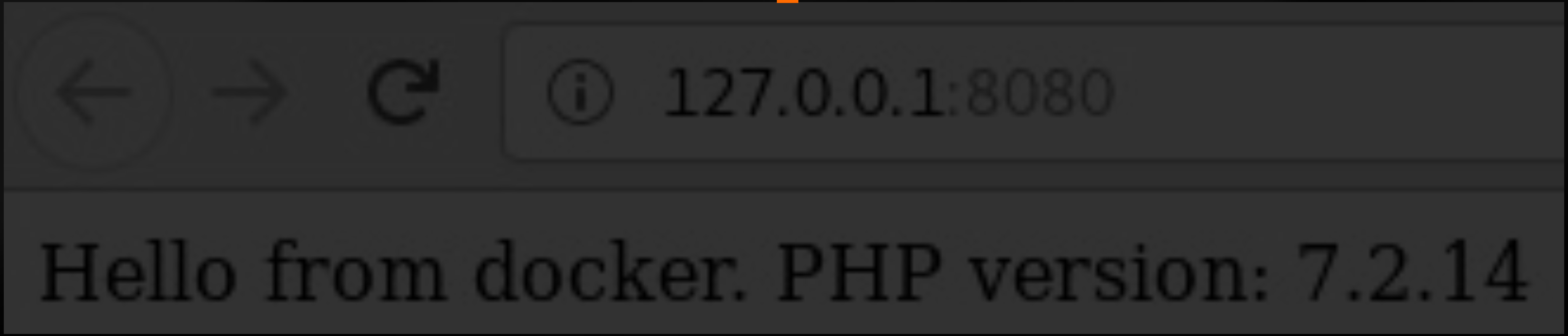

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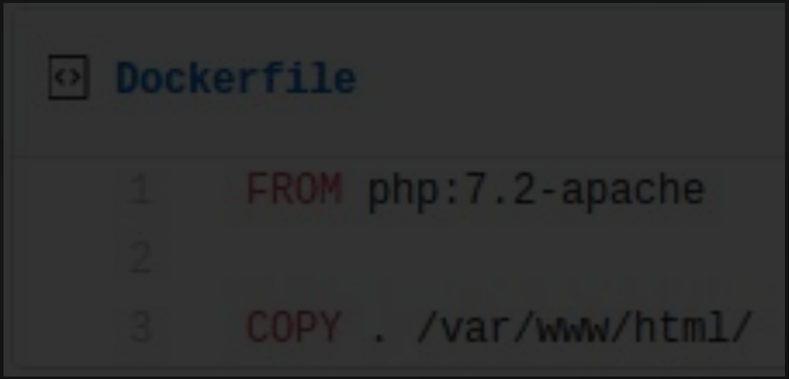

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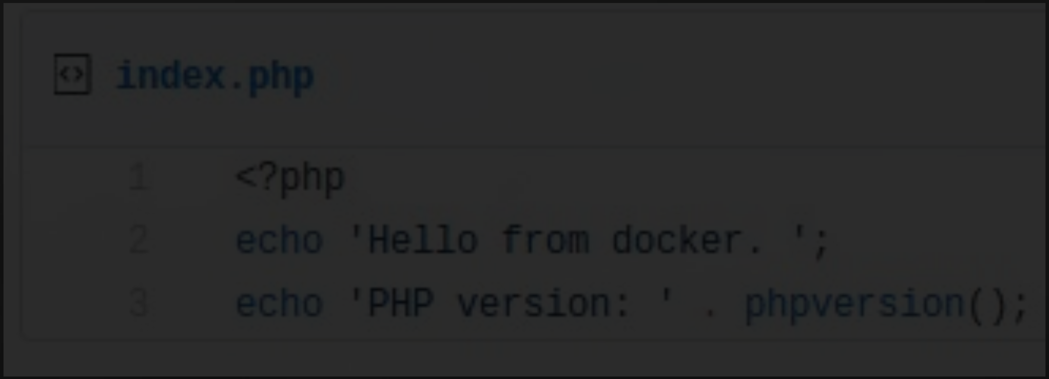

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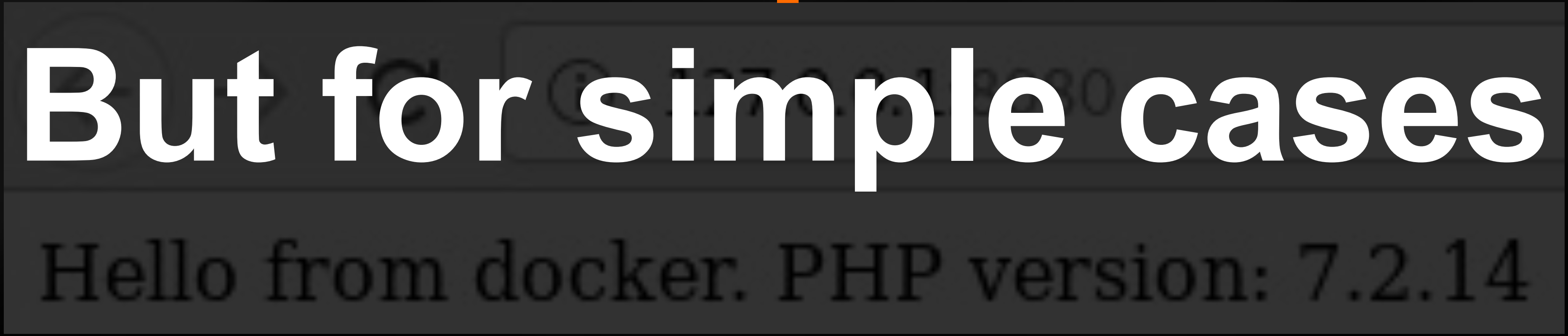
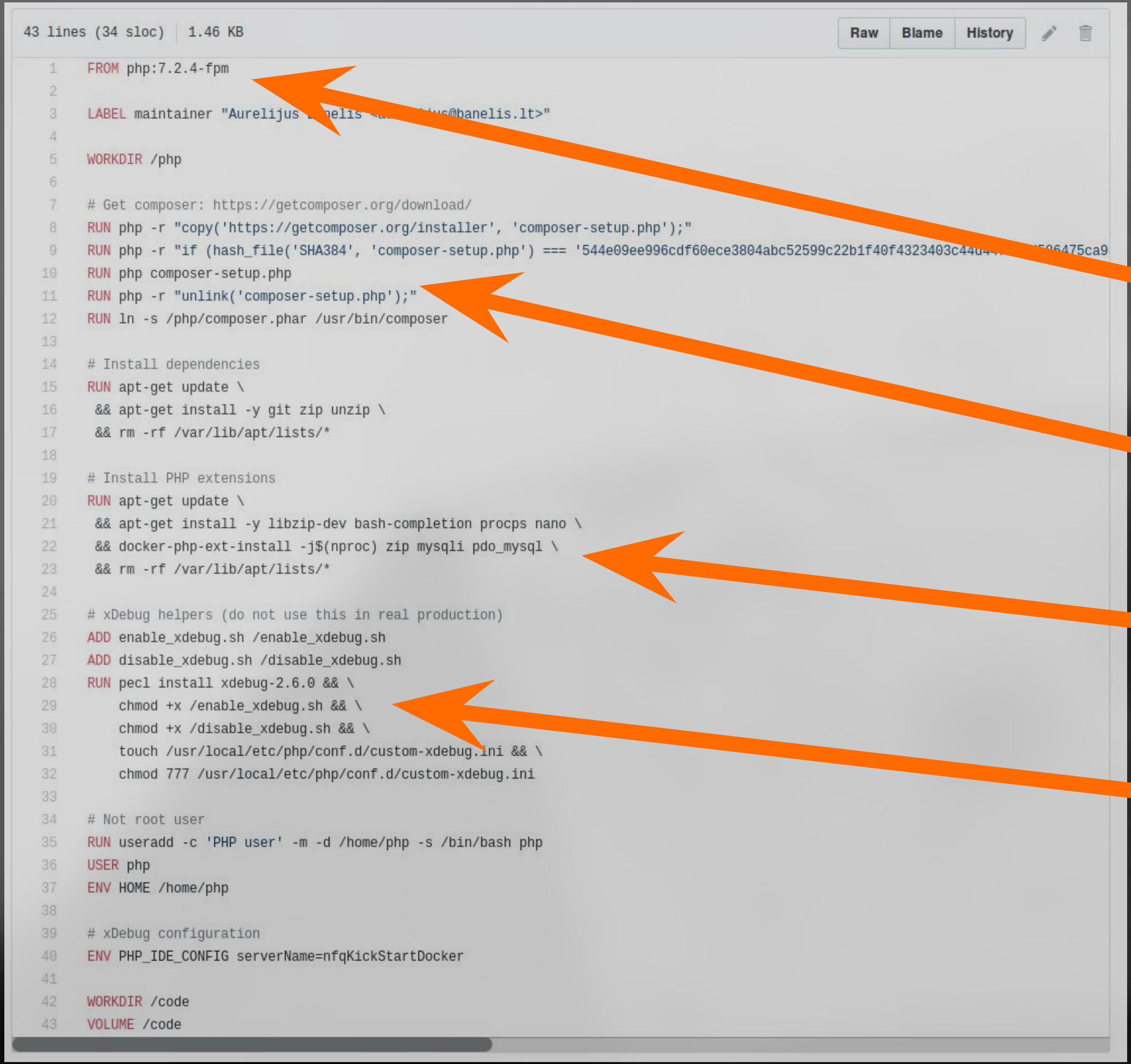


```
Hello from docker. PHP version: 7.2.14
```

But for simple cases

https://gist.github.com/aurelijusb/6f6b1c86c440ce527250193ffcae62d7



```
FROM php:7.2.4-fpm

LABEL maintainer "Aurelijus Banelis <aurelijus@banelis.lt>"

WORKDIR /php

# Get composer: https://getcomposer.org/download/
RUN php -r "copy('https://getcomposer.org/installer', 'composer-setup.php');"
RUN php -r "if (hash_file('SHA384', 'composer-setup.php') === '544e09ee996cdf60ece3804abc52599c22b1f40f4323403c44d4 [illegible] 86475ca9
RUN php composer-setup.php
RUN php -r "unlink('composer-setup.php');"
RUN ln -s /php/composer.phar /usr/bin/composer

# Install dependencies
RUN apt-get update \
 && apt-get install -y git zip unzip \
 && rm -rf /var/lib/apt/lists/*

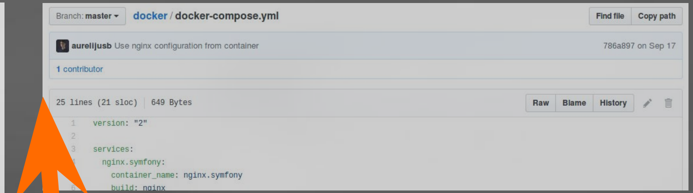
# Install PHP extensions
RUN apt-get update \
 && apt-get install -y libzip-dev bash-completion procps nano \
 && docker-php-ext-install -j$(nproc) zip mysqli pdo_mysql \
 && rm -rf /var/lib/apt/lists/*

# xDebug helpers (do not use this in real production)
ADD enable_xdebug.sh /enable_xdebug.sh
ADD disable_xdebug.sh /disable_xdebug.sh
RUN pecl install xdebug-2.6.0 && \
    chmod +x /enable_xdebug.sh && \
    chmod +x /disable_xdebug.sh && \
    touch /usr/local/etc/php/conf.d/custom-xdebug.ini && \
    chmod 777 /usr/local/etc/php/conf.d/custom-xdebug.ini

# Not root user
RUN useradd -c 'PHP user' -m -d /home/php -s /bin/bash php
USER php
ENV HOME /home/php

# xDebug configuration
ENV PHP_IDE_CONFIG serverName=nfqKickStartDocker

WORKDIR /code
VOLUME /code
```



Branch: master
docker / docker-compose.yml
Find file
Copy path
aurelijusb Use nginx configuration from container
786a897 on Sep 17
1 contributor
25 lines (21 sloc) | 649 Bytes
Raw
Blame
History

```
version: "2"

services:
  nginx.symfony:
    container_name: nginx.symfony
    build: nginx
```

Multiple containers

Development tools

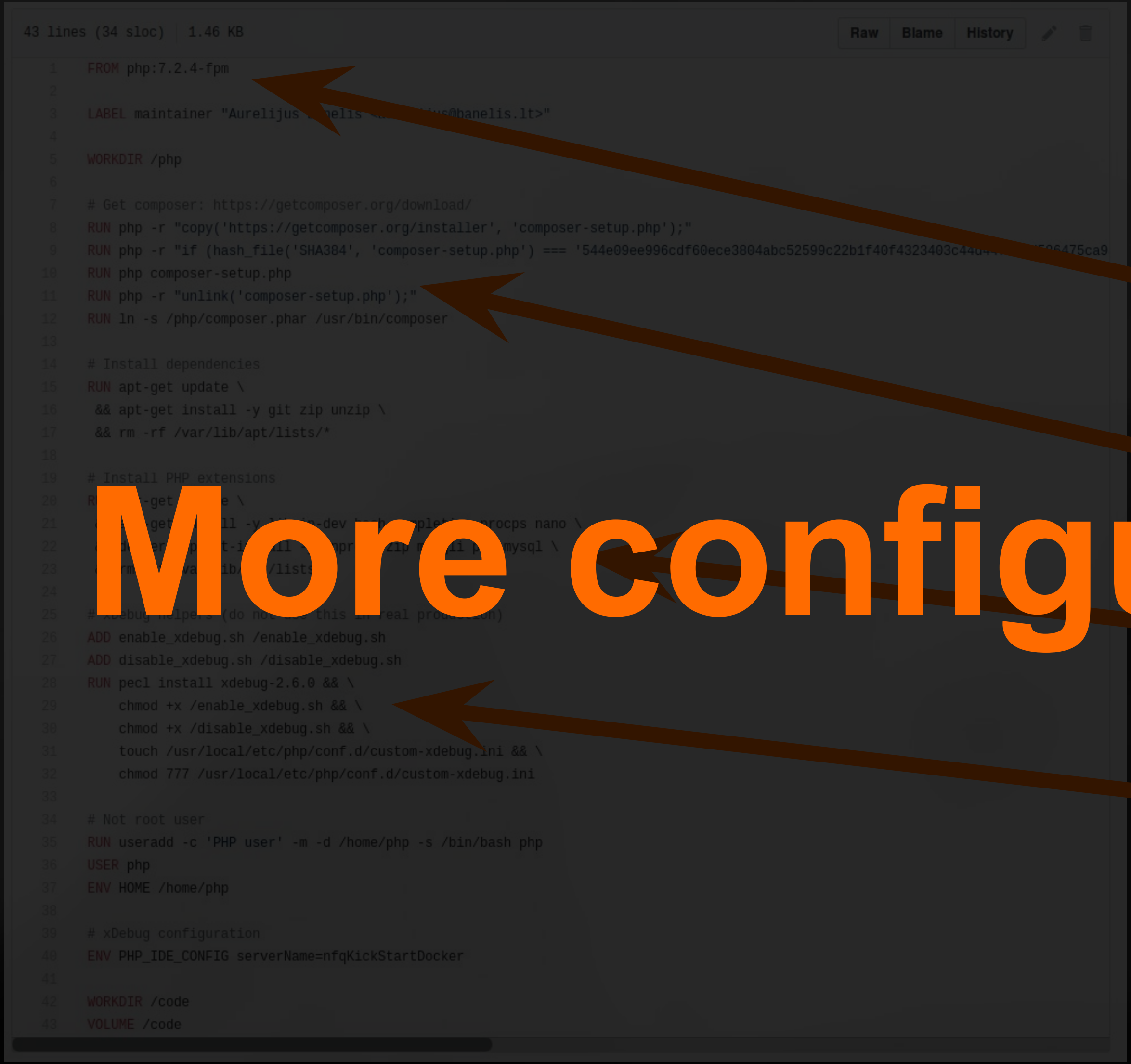
PHP extensions

xDebug support

...

https://github.com/nfqakademija/docker/blob/master/php/Dockerfile

More configuration



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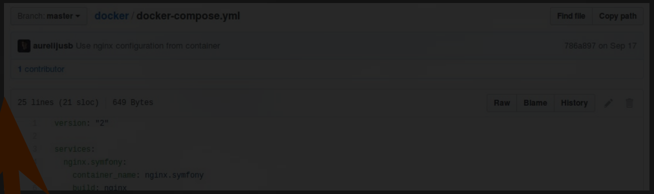
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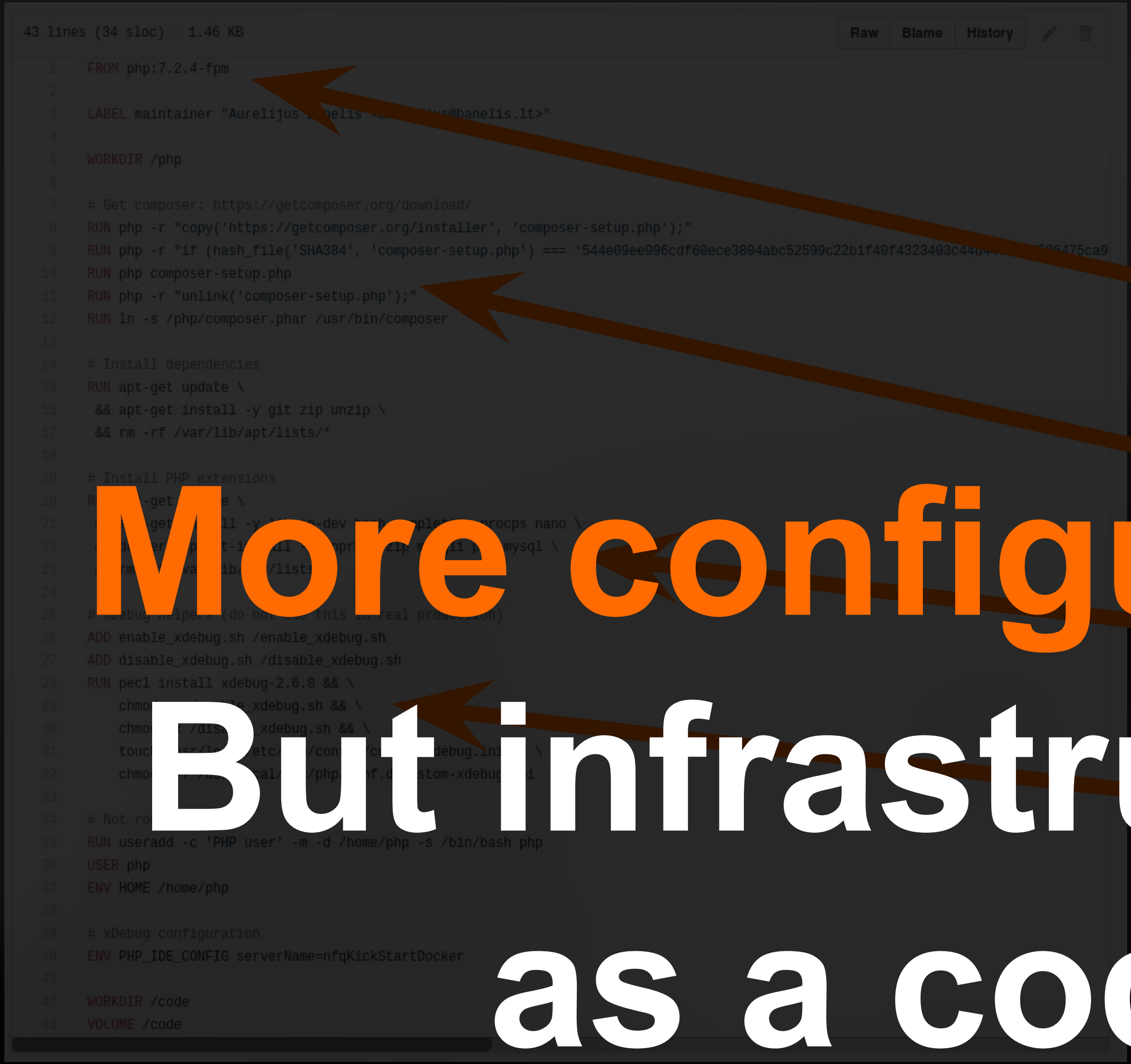

```
43 lines (34 sloc) | 1.46 KB

FROM php:7.2.4-fpm

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     rm    va   ib/   /lists

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    touc  sr/l    etc/   /con   /c    debug.ini   \
    chmo     /u    cal/   /php.   f.d   stom-xdebug   i

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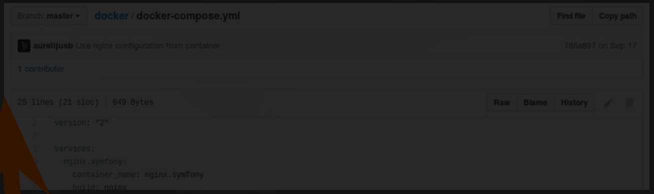

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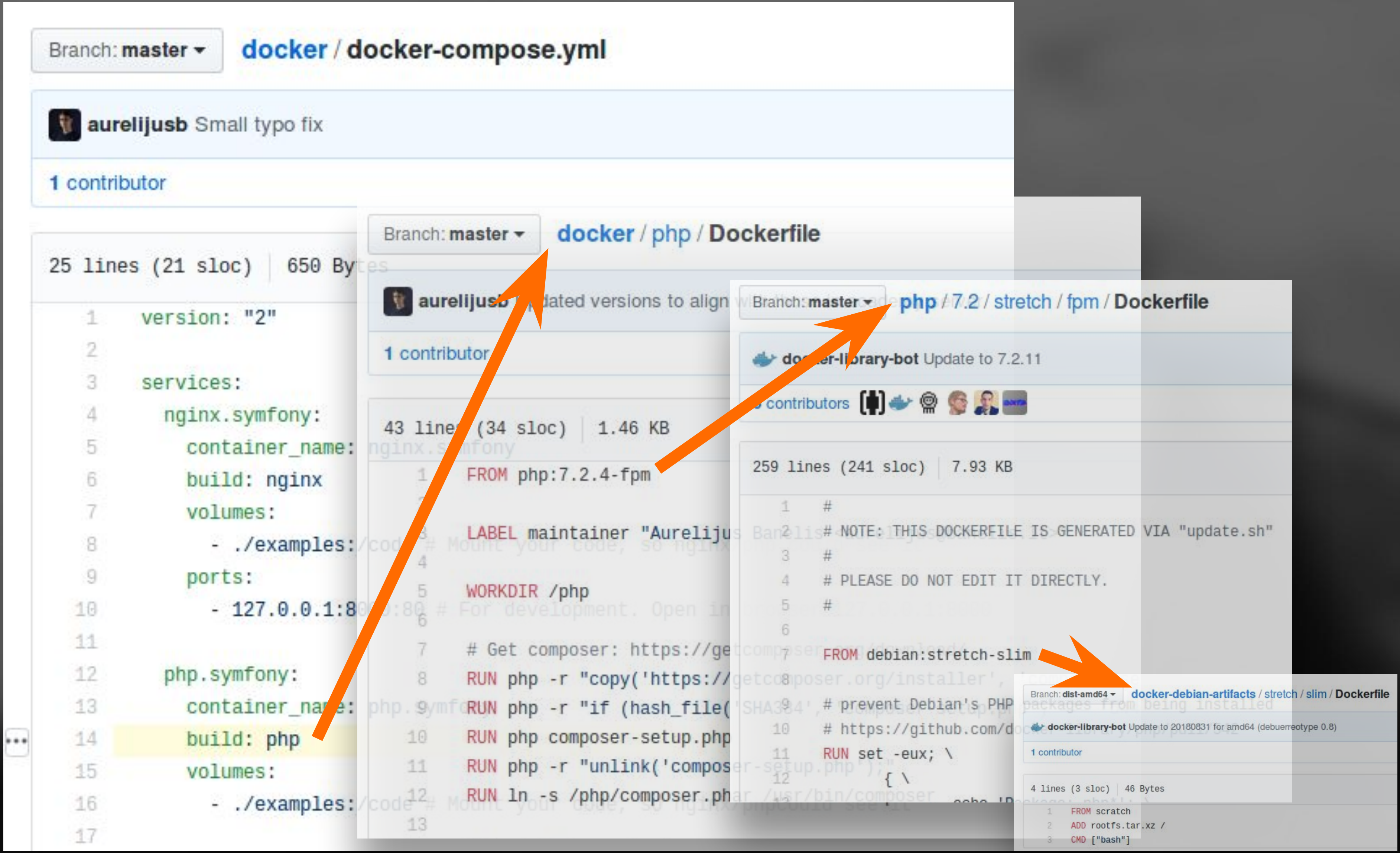
More configuration

But infrastructure as a code

https://github.com/nfqakademija/docker/blob/master/php/Dockerfile



Branch: master ▾ docker / docker-compose.yml

aurelijusb Small typo fix

1 contributor

25 lines (21 sloc) | 650 Bytes

```yaml
version: "2"

services:
  nginx.symfony:
    container_name: nginx.symfony
    build: nginx
    volumes:
      - ./examples:/code # Mount your code, so nginx
    ports:
      - 127.0.0.1:8000:80 # For development. Open in

  php.symfony:
    container_name: php.symfony
    build: php
    volumes:
      - ./examples:/code # Mount your code, so nginx/phpcould see it
```

Branch: master ▾ docker / php / Dockerfile

aurelijusb Updated versions to align

1 contributor

43 lines (34 sloc) | 1.46 KB

```dockerfile
FROM php:7.2.4-fpm

LABEL maintainer "Aurelijus Banelis

WORKDIR /php

# Get composer: https://getcomposer.org/download/
RUN php -r "copy('https://getcomposer.org/installer',
RUN php -r "if (hash_file('SHA384', 'composer-setup.p
RUN php composer-setup.php
RUN php -r "unlink('composer-setup.php');"
RUN ln -s /php/composer.phar /usr/bin/composer
```

Branch: master ▾ php / 7.2 / stretch / fpm / Dockerfile

docker-library-bot Update to 7.2.11

contributors

259 lines (241 sloc) | 7.93 KB

```dockerfile
#
# NOTE: THIS DOCKERFILE IS GENERATED VIA "update.sh"
#
# PLEASE DO NOT EDIT IT DIRECTLY.
#

FROM debian:stretch-slim

# prevent Debian's PHP packages from being installed
# https://github.com/docker-library/php/pull/542
RUN set -eux; \
	{ \
		echo 'Package: php*'; \
```

Branch: dist-amd64 ▾ docker-debian-artifacts / stretch / slim / Dockerfile

docker-library-bot Update to 20180831 for amd64 (debuerreotype 0.8)

1 contributor

4 lines (3 sloc) | 46 Bytes

```dockerfile
FROM scratch
ADD rootfs.tar.xz /
CMD ["bash"]
```

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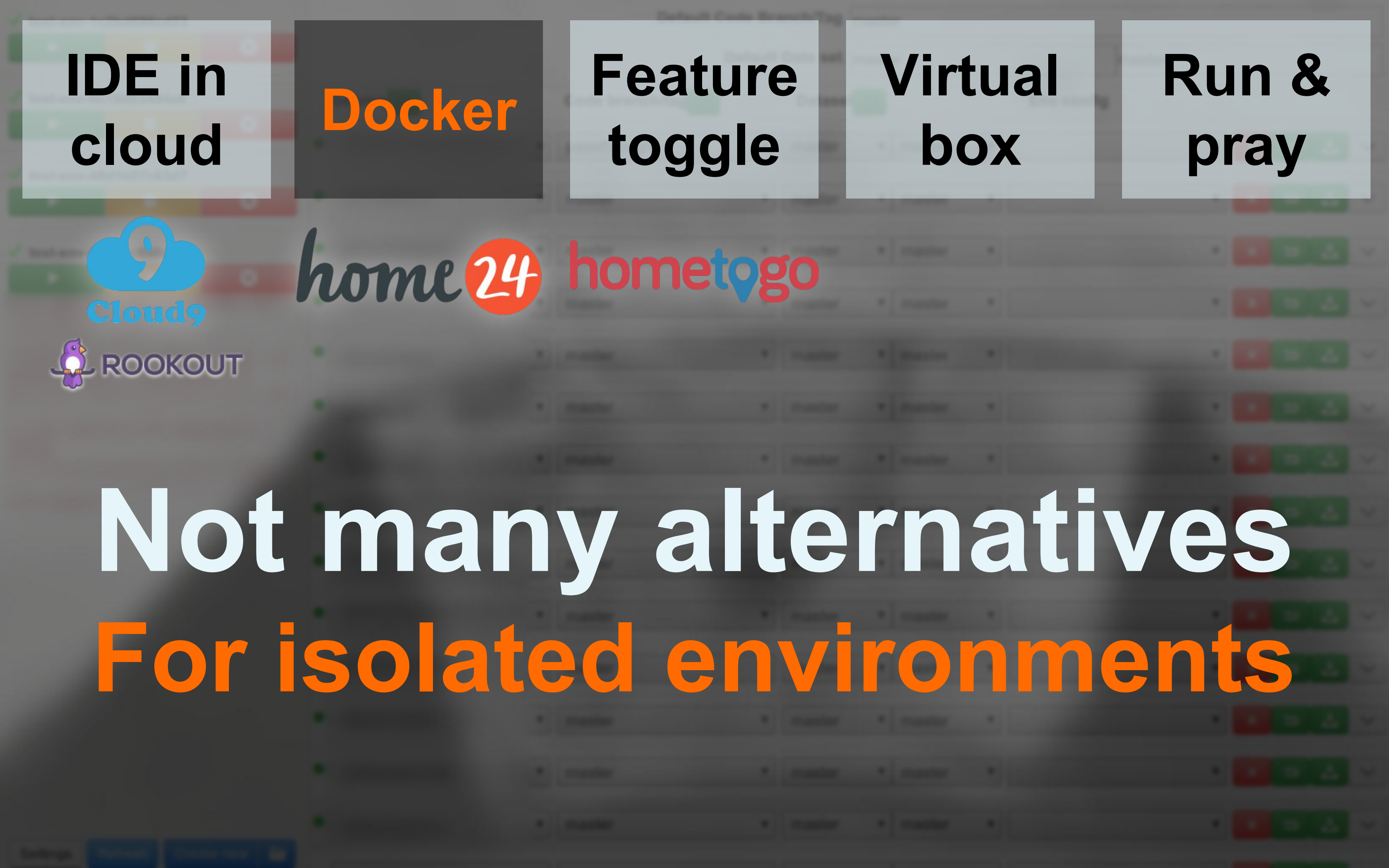

IDE in cloud

Docker

Feature toggle

Virtual box

Run & pray

Cloud9

ROOKOUT

home24

hometogo

Not many alternatives

For isolated environments

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Person

Community

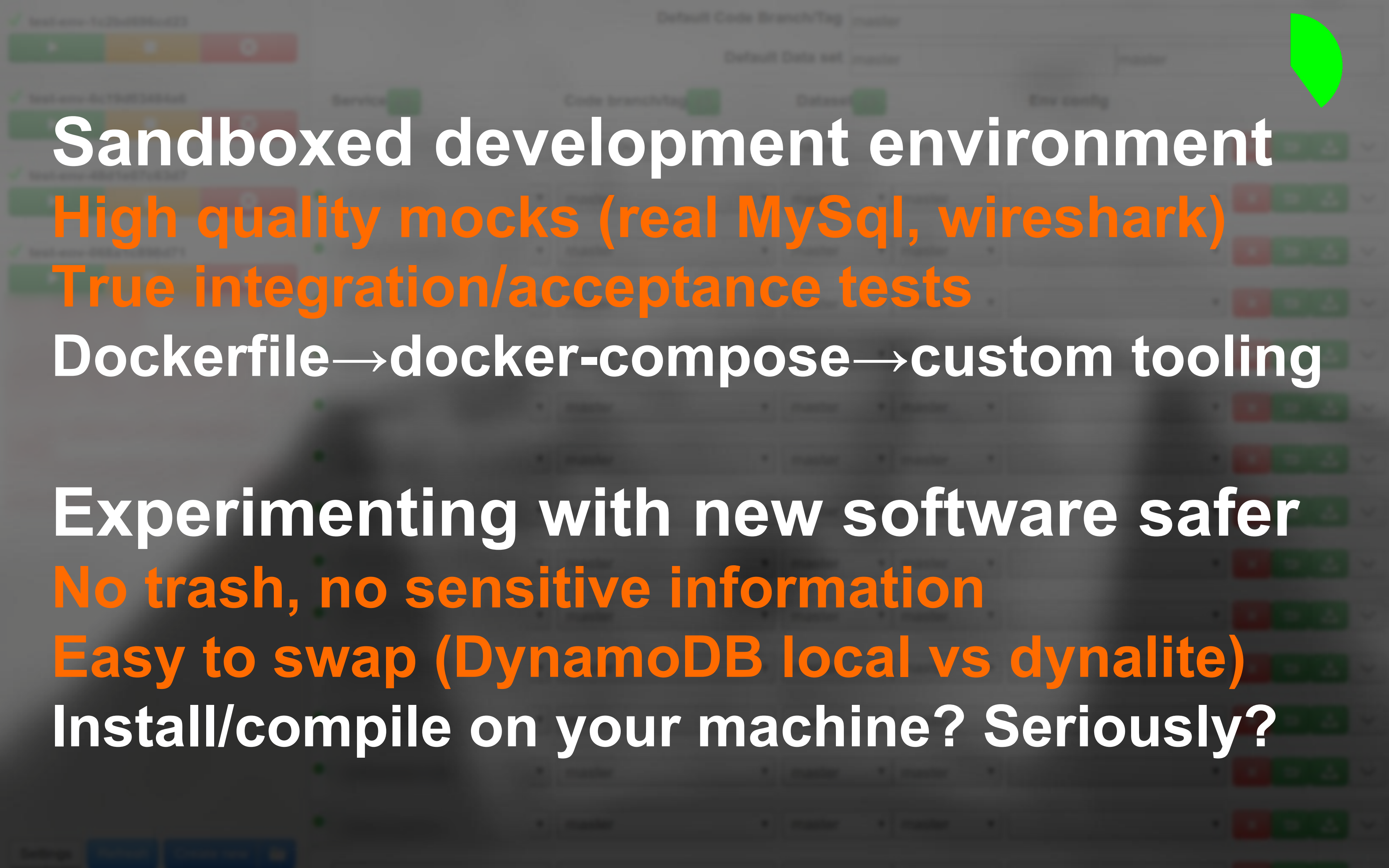
Kubernetes is an open-source system for automating deployment, scaling, and management of containerized applications.

It groups containers that make up an application into logical units for easy management and discovery. Kubernetes builds upon 15 years of experience of running production workloads at Google, combined with best-of-breed ideas and practices from the community.

How Amazon ECS works

Node
Amazon Elastic Container Registry
Build images and store using ECR or any other repository
Amazon Elastic Container Service
Define your application
Select container images and resources needed for your application
Amazon EC2
Launch containers on EC2
AWS Fargate
Launch containers on Fargate
Manage containers
Amazon ECS scales your application and manages your containers for availability

Team



Sandboxed development environment

High quality mocks (real MySql, wireshark)

True integration/acceptance tests

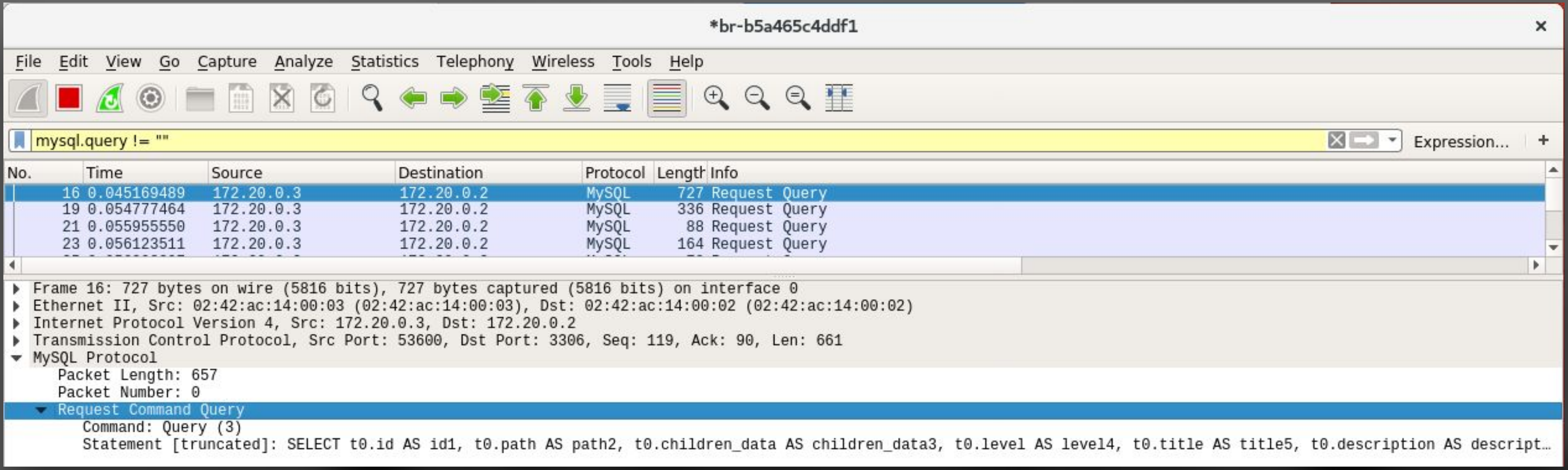
Dockerfile→docker-compose→custom tooling

Experimenting with new software safer

No trash, no sensitive information

Easy to swap (DynamoDB local vs dynalite)

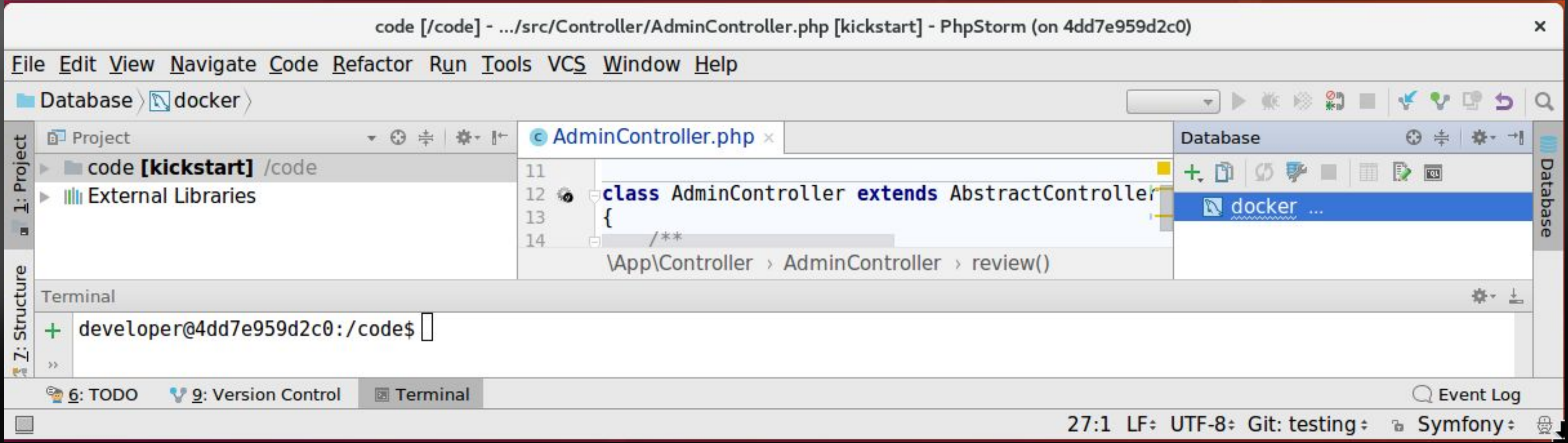
Install/compile on your machine? Seriously?


*br-b5a465c4ddf1
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
Expression...
+

```
mysql.query != ""
```

```
No.   Time         Source       Destination  Protocol Length Info
   16 0.045169489  172.20.0.3   172.20.0.2   MySQL       727 Request Query
   19 0.054777464  172.20.0.3   172.20.0.2   MySQL       336 Request Query
   21 0.055955550  172.20.0.3   172.20.0.2   MySQL        88 Request Query
   23 0.056123511  172.20.0.3   172.20.0.2   MySQL       164 Request Query
```

```
▶ Frame 16: 727 bytes on wire (5816 bits), 727 bytes captured (5816 bits) on interface 0
▶ Ethernet II, Src: 02:42:ac:14:00:03 (02:42:ac:14:00:03), Dst: 02:42:ac:14:00:02 (02:42:ac:14:00:02)
▶ Internet Protocol Version 4, Src: 172.20.0.3, Dst: 172.20.0.2
▶ Transmission Control Protocol, Src Port: 53600, Dst Port: 3306, Seq: 119, Ack: 90, Len: 661
▼ MySQL Protocol
    Packet Length: 657
    Packet Number: 0
  ▼ Request Command Query
      Command: Query (3)
      Statement [truncated]: SELECT t0.id AS id1, t0.path AS path2, t0.children_data AS children_data3, t0.level AS level4, t0.title AS title5, t0.description AS descript…
```


code [/code] - .../src/Controller/AdminController.php [kickstart] - PhpStorm (on 4dd7e959d2c0)
File Edit View Navigate Code Refactor Run Tools VCS Window Help
Database
docker
1: Project
Project
code [kickstart] /code
External Libraries
AdminController.php
Database
docker ...
\App\Controller › AdminController › review()
7: Structure
Terminal
6: TODO
9: Version Control
Terminal
Event Log
27:1 LF÷ UTF-8÷ Git: testing ÷ Symfony ÷

```
class AdminController extends AbstractController
{
    /**
```

```
developer@4dd7e959d2c0:/code$
```

Switching between branches/tasks

Less issues with cache invalidation

Kill-it-not-heal-it

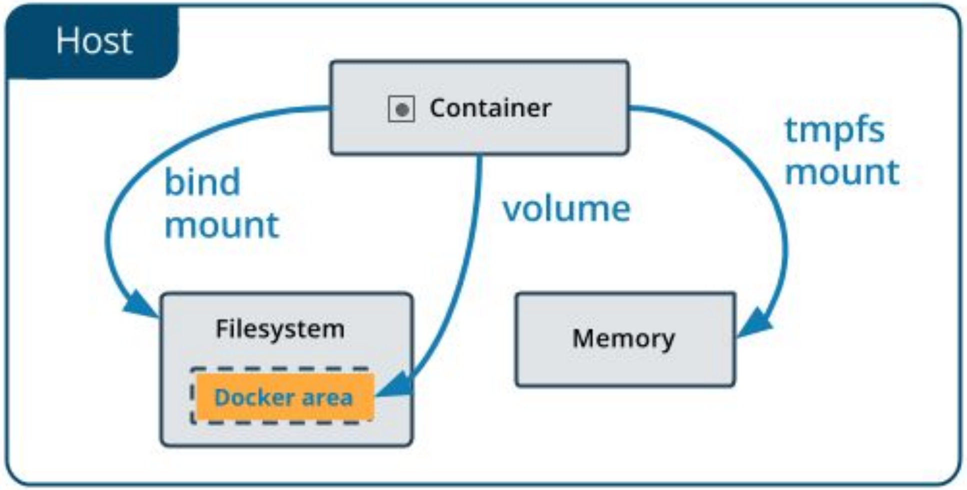
Data volumes = test data in branch

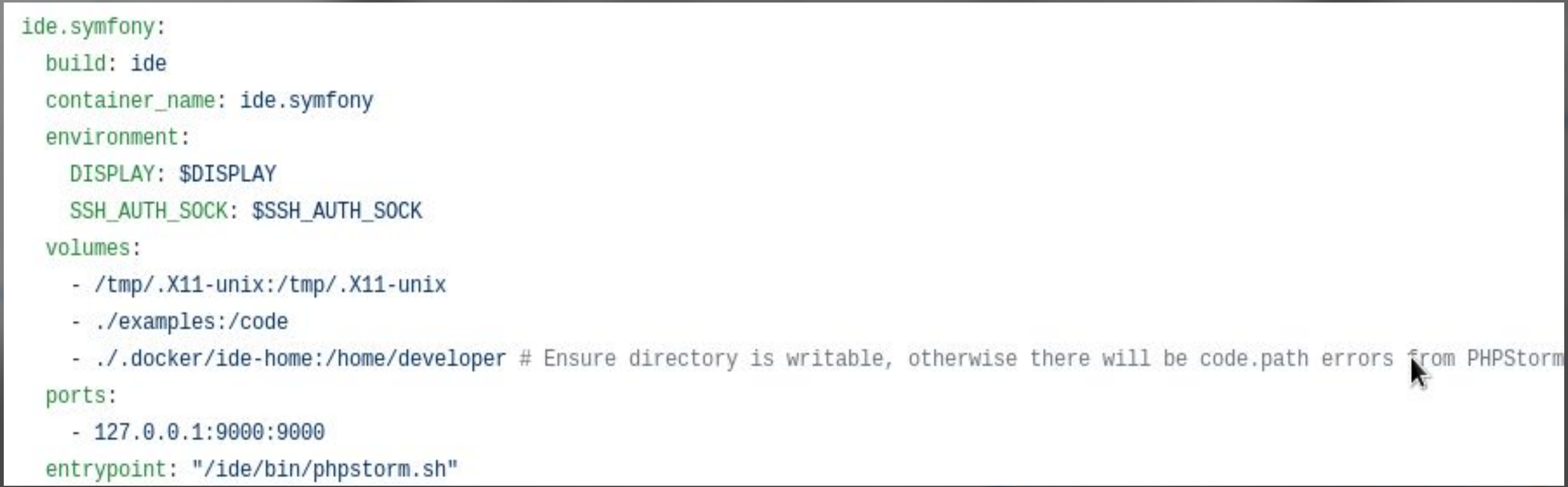
Infrastructure as a code

Fixed versions, fixed php.ini+extensions

Less “works on my machine” = reproducible

Many bash scripts, configuration via ENV





```
ide.symfony:
  build: ide
  container_name: ide.symfony
  environment:
    DISPLAY: $DISPLAY
    SSH_AUTH_SOCK: $SSH_AUTH_SOCK
  volumes:
    - /tmp/.X11-unix:/tmp/.X11-unix
    - ./examples:/code
    - ./.docker/ide-home:/home/developer # Ensure directory is writable, otherwise there will be code.path errors from PHPStorm
  ports:
    - 127.0.0.1:9000:9000
  entrypoint: "/ide/bin/phpstorm.sh"
```

Huge ecosystem

Pioniers are using and improving

Amazon, Google (K8s) is investing

Known issues and solutions in StackOverflow

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High learning curve = blame docker

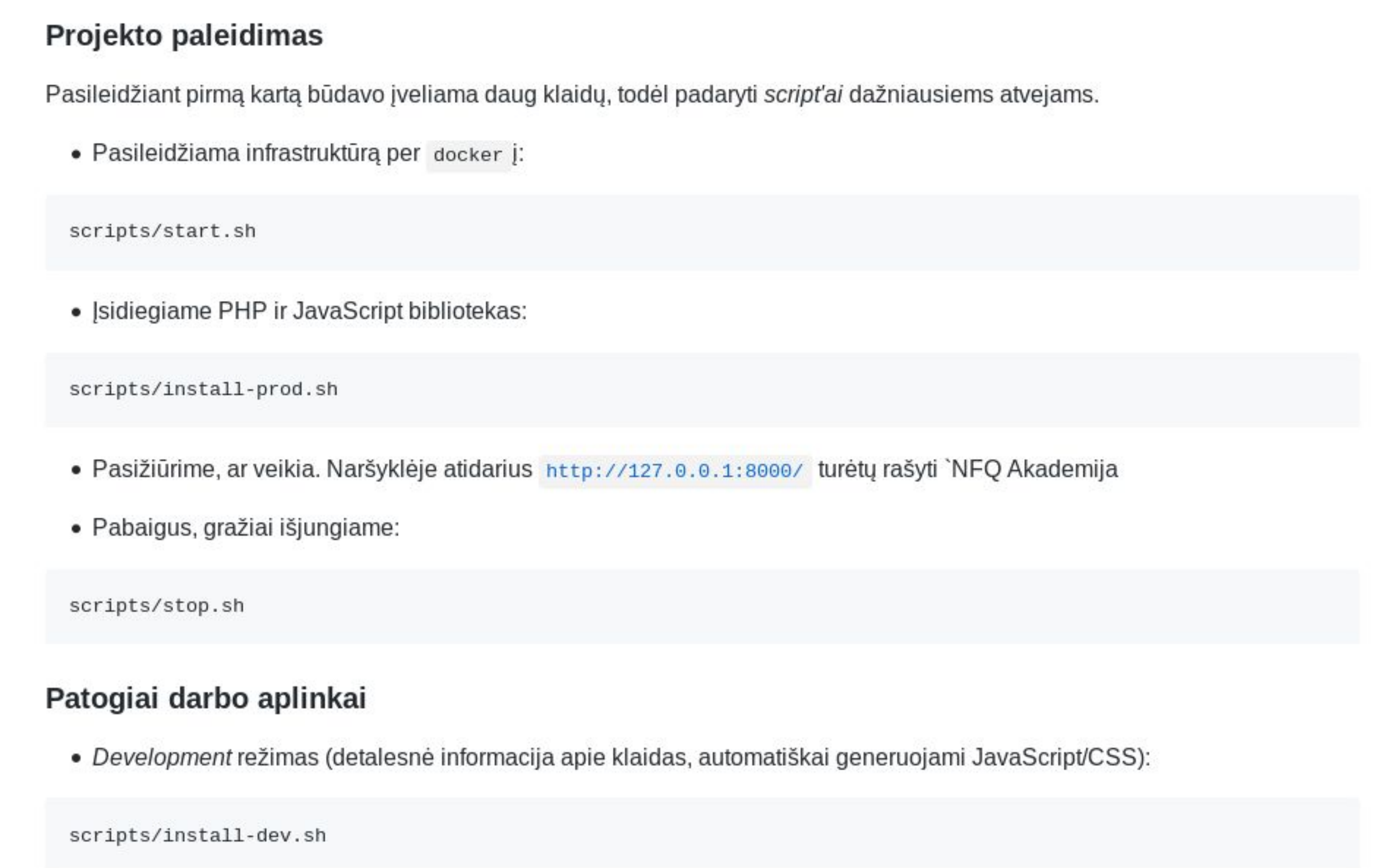
Misuse of the tool – isn’t docker *silver bullet*?

Docker wraps – everyone blames the wrapper

Many ways to install docker incorrectly

Mounting vs copy-on-write operation

No Windows, more tooling/docs around



Projekto paleidimas

Pasileidžiant pirmą kartą būdavo įveliama daug klaidų, todėl padaryti *script'ai* dažniausiems atvejams.

- Pasileidžiama infrastruktūrą per `docker` į:

```
scripts/start.sh
```

- Įsidiegiame PHP ir JavaScript bibliotekas:

```
scripts/install-prod.sh
```

- Pasižiūrime, ar veikia. Naršyklėje atidarius `http://127.0.0.1:8000/` turėtų rašyti `NFQ Akademija

- Pabaigus, gražiai išjungiame:

```
scripts/stop.sh
```

Patogiai darbo aplinkai

- *Development* režimas (detalesnė informacija apie klaidas, automatiškai generuojami JavaScript/CSS):

```
scripts/install-dev.sh
```

Not mature tooling / edge cases

Download private dependency: github token?

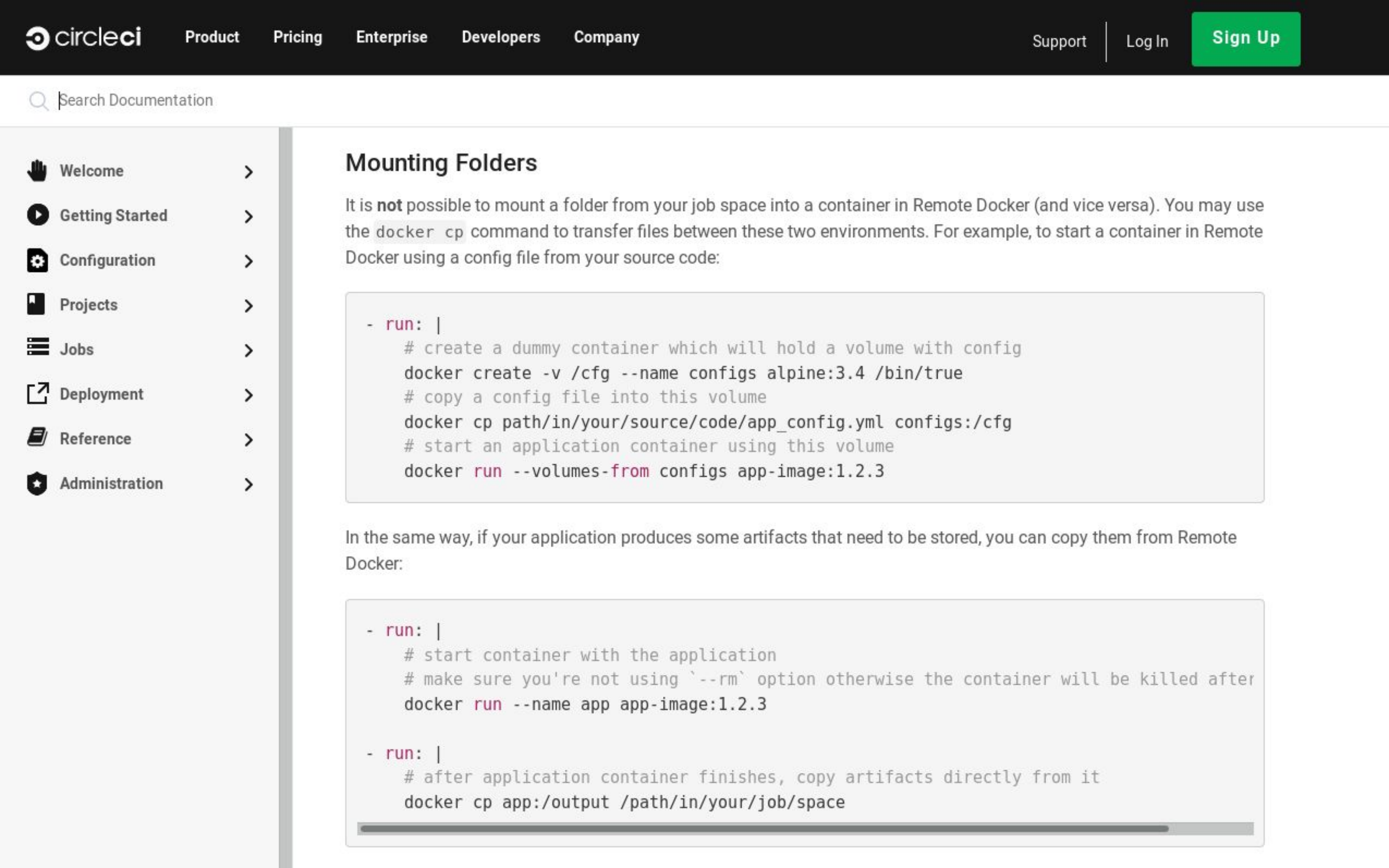
Password protected SSH key? (Mac+Linux)

CircleCI limited “remote docker”

Host IP for xDebug

Even more bash scripts/docs*

*Newest docker-compose supports secrets



Mounting Folders

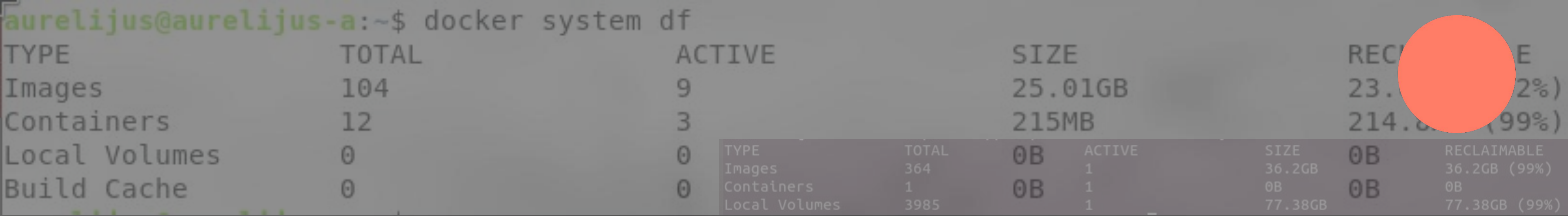
It is **not** possible to mount a folder from your job space into a container in Remote Docker (and vice versa). You may use the `docker cp` command to transfer files between these two environments. For example, to start a container in Remote Docker using a config file from your source code:

```
- run: |
    # create a dummy container which will hold a volume with config
    docker create -v /cfg --name configs alpine:3.4 /bin/true
    # copy a config file into this volume
    docker cp path/in/your/source/code/app_config.yml configs:/cfg
    # start an application container using this volume
    docker run --volumes-from configs app-image:1.2.3
```

In the same way, if your application produces some artifacts that need to be stored, you can copy them from Remote Docker:

```
- run: |
    # start container with the application
    # make sure you're not using `--rm` option otherwise the container will be killed after
    docker run --name app app-image:1.2.3

- run: |
    # after application container finishes, copy artifacts directly from it
    docker cp app:/output /path/in/your/job/space
```



```
aurelijus@aurelijus-a:~$ docker system df
TYPE                TOTAL               ACTIVE              SIZE                REC          E
Images              104                 9                   25.01GB             23.          2%)
Containers          12                  3                   215MB               214.8        (99%)
Local Volumes       0                   0                   0B                  0B
Build Cache         0                   0                   0B                  0B
```

```
TYPE                TOTAL               ACTIVE              SIZE                RECLAIMABLE
Images              364                 1                   36.2GB              36.2GB (99%)
Containers          1                   1                   0B                  0B
Local Volumes       3985                1                   77.38GB             77.38GB (99%)
```

Cache everything by design

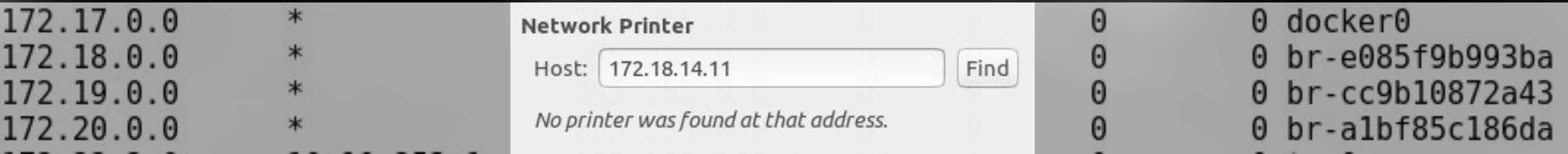
Full HDD because of docker images

Missing log rotation (no “log-opts” by default)

“Latest” tag, that is not immutable

Network unreachable, since used by docker

docker system prune, docker pull, RTFM



```
172.17.0.0      *                                  0          0 docker0
172.18.0.0      *                                  0          0 br-e085f9b993ba
172.19.0.0      *                                  0          0 br-cc9b10872a43
172.20.0.0      *                                  0          0 br-a1bf85c186da
```

Network Printer

Host: 172.18.14.11

No printer was found at that address.

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PHP + Docker in production

Migrated Tier1 service – nobody noticed

AWS ECS

PHP 7.2

Docker

Apache

PHP + Docker in production

Migrated Tier1 service – nobody noticed

AWS ECS

PHP 7.2

Docker

Apache

Amazon Web Services Elastic Container Service

- AWS integration (E.g. spot-instances)
- K8s on AWS then was not mature
- Know-how (our Go apps in prod)

Deployment Id	Status	Desired count	Pending count	Running count	Created time	Updated time
ecs-svc/9223370495346757540	PRIMARY	1	0	0	2018-11-06 14:40:18 +0200	2018-11-06 14:40:18 +0200
ecs-svc/9223370495882532443	ACTIVE				2018-10-31 09:50:43 +0200	2018-11-06 14:40:18 +0200

Amazon Web Services Elastic Container Service

- AWS integration (E.g. spot-instances)
- K8s on AWS then was not mature
- Know-how (our Go apps in prod)

Details | Tasks | Events | Auto Scaling | Deployments | Metrics

create pipeline | view pipelines

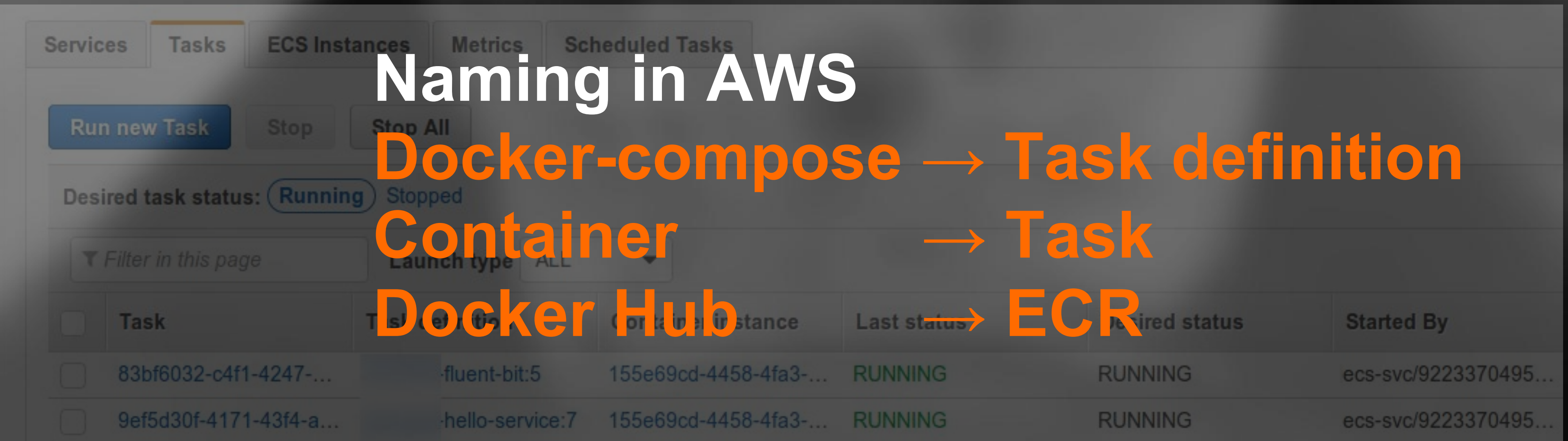
Filter in this page

1-2

Deployment Id	Status	Desired count	Pending count	Running count	Created time	Updated time
ecs-svc/9223370495346757540	PRIMARY	1	0	0	2018-11-06 14:40:18 +0200	2018-11-06 14:40:18 +0200
ecs-svc/9223370495882532443	ACTIVE				2018-10-31 09:50:43 +0200	2018-11-06 14:40:18 +0200

Naming in AWS

- Docker-compose → Task definition
- Container → Task
- Docker Hub → ECR



Services | Tasks | ECS Instances | Metrics | Scheduled Tasks

Run new Task | Stop | Stop All

Desired task status: Running Stopped

Filter in this page

Launch type ALL

□	Task	Task definition	Container instance	Last status	Desired status	Started By
□	83bf6032-c4f1-4247-...	[redacted]-fluent-bit:5	155e69cd-4458-4fa3-...	RUNNING	RUNNING	ecs-svc/9223370495...
□	9ef5d30f-4171-43f4-a...	[redacted]-hello-service:7	155e69cd-4458-4fa3-...	RUNNING	RUNNING	ecs-svc/9223370495...

Apache mod_php

PHP 7.2 log trimming in Nginx+FPM

Single process container – easier

No visible performance impact

Internal service (no slow loris attack)

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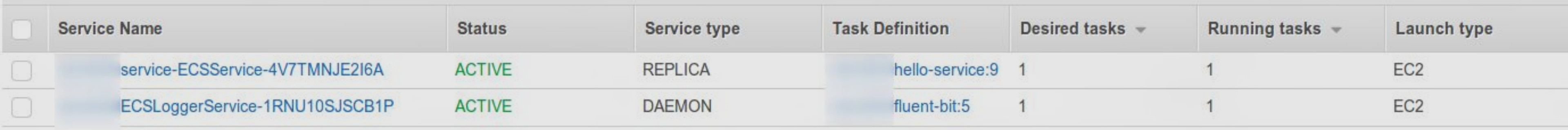
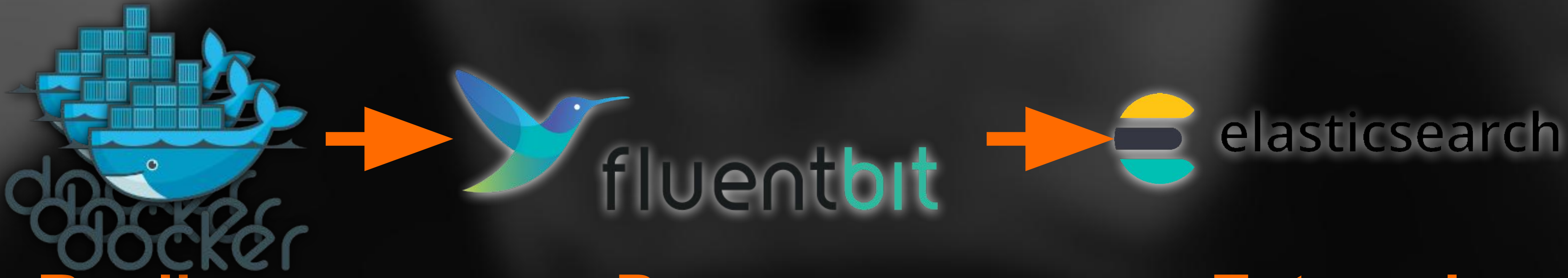
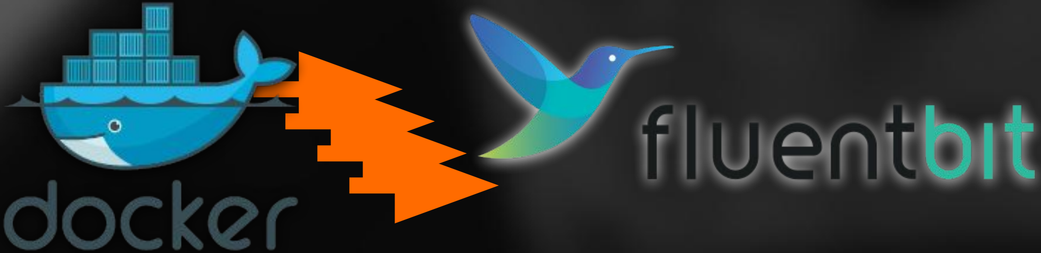


☐	Service Name	Status	Service type	Task Definition	Desired tasks	Running tasks	Launch type
☐	[redacted]service-ECSService-4V7TMNJE2I6A	ACTIVE	REPLICA	[redacted]hello-service:9	1	1	EC2
☐	[redacted]ECSLoggerService-1RNU10SJSCB1P	ACTIVE	DAEMON	[redacted]fluent-bit:5	1	1	EC2

ECS Service types

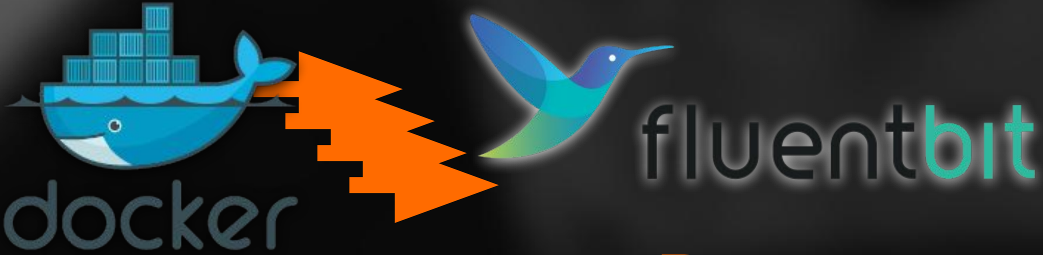


Replica Daemon External

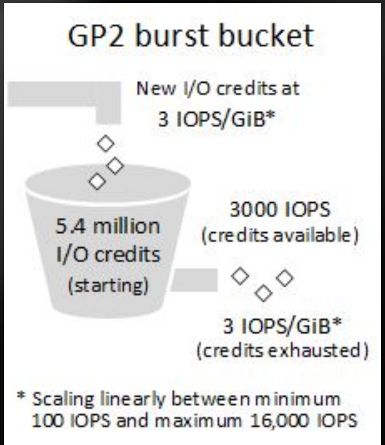


Daemon

```
LogConfiguration:
 LogDriver: fluentd
 Options:
   fluentd-async-connect: "true"
   fluentd-buffer-limit: "32MB"
   mode: "non-blocking"
```



Daemon



GP2 burst bucket

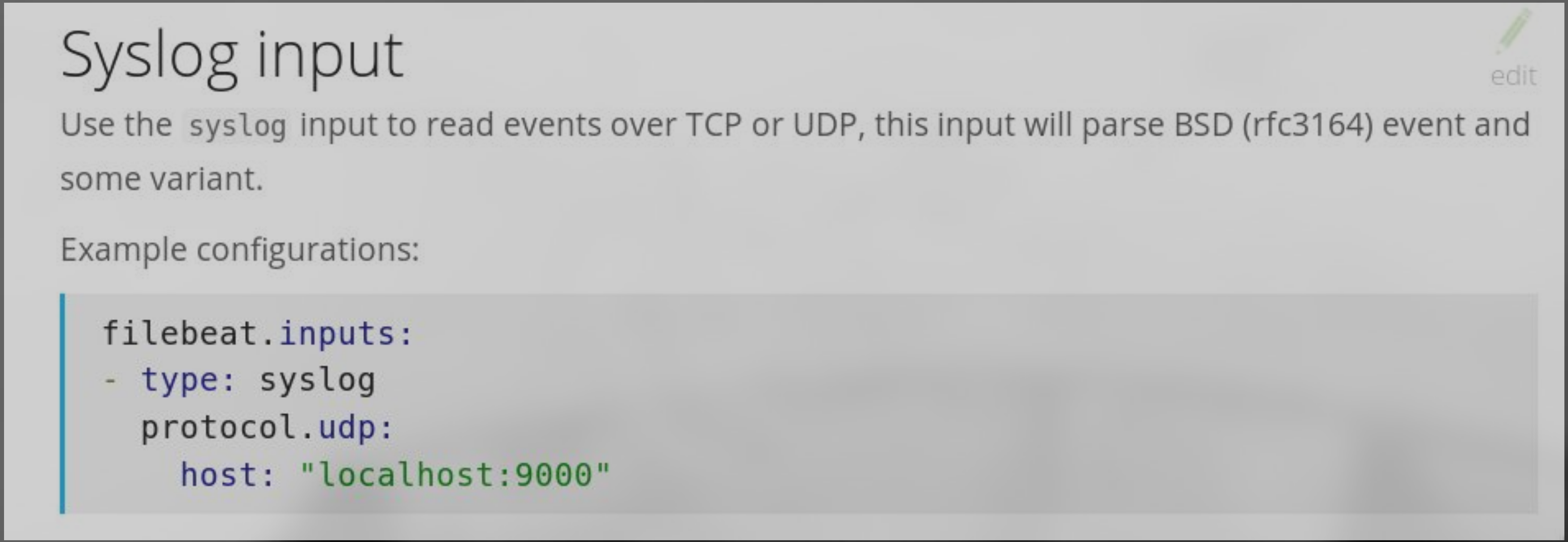
New I/O credits at 3 IOPS/GiB*

5.4 million I/O credits (starting)

3000 IOPS (credits available)

3 IOPS/GiB* (credits exhausted)

* Scaling linearly between minimum 100 IOPS and maximum 16,000 IOPS



Syslog input

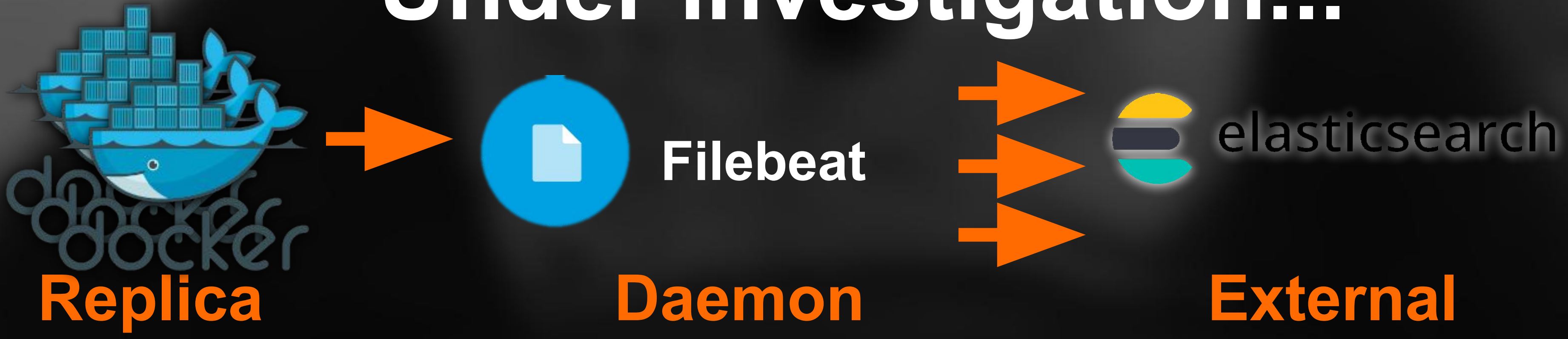
edit

Use the `syslog` input to read events over TCP or UDP, this input will parse BSD (rfc3164) event and some variant.

Example configurations:

```
filebeat.inputs:
- type: syslog
  protocol.udp:
    host: "localhost:9000"
```

Under investigation...



Replica

Daemon

External

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Production	Deploying to AWS Logging challenges

Feature toggle | Docker | IDE in cloud | Virtual box | Run & pray

Docker:

Good to understand

Use on demand

Thank you

Questions?

Dockerizing PHP Apps

Aurelijus Banelis

KaunasPHP
2019-02-20

Further reading/references

- https://www.docker.com/
- https://hub.docker.com/
- https://aws.amazon.com/ecs/
- https://aws.amazon.com/ecr/
- https://fluentbit.io/
- https://www.home24.de/
- https://home24.tech.blog/category/aws/
- https://aws.amazon.com/blogs/opensource/network-load-balancer-support-in-kubernetes-1-9/
- https://docs.aws.amazon.com/AmazonECS/latest/developerguide/docker-volumes.html
- https://d1.awsstatic.com/whitepapers/microservices-on-aws.pdf
- https://justi.cz/security/2019/01/22/apt-rce.html
- https://www.elastic.co/guide/en/beats/filebeat/master/filebeat-input-syslog.html
- https://d1.awsstatic.com/whitepapers/DevOps/running-containerized-microservices-on-aws.pdf