Der Einsatz von Docker in Entwicklungs- und Production-Umgebungen

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Linux Info-Tag
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Agenda

- Objective
- Docker Swarm Architecture
- Demo
- Production Issues
- Summary

Objective

- Same development environment on multiple platforms
- Same environment in development, staging & production

Swarm Architecture

- Main Project Swarm
- Support Swarm & Services
- Docker Images
- Compose File
- Scripts

Project Swarm

- A project swarm has multiple services
- Typical services include
  - Applications
  - Load balancers
  - Database servers
  - Cron
  - Visualizer

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Applications

- Typical customer projects have multiple application websites
  - Each website runs in a separate service
  - Each service can have multiple containers
- Application containers include
  - Debian 8.x or 9.x
  - Apache
  - PHP 5.x or 7.x optionally with Xdebug & IonCube
- Website files are mounted in Docker volumes

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Load Balancing

- NGINX front end service
  - routes incoming requests to application services
  - provides SSL termination
- Swarm load balancer
  - Convert service name to container IP
  - Round robin between containers
- For production
  - Typically minimum 4 host servers in swarm
  - Physical load balancer in front of servers
  - At least two containers in NGINX service

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Database servers

- Database service
  - MariaDB with Galera Cluster
  - Multi-master cluster for HA
  - Production stability challenging…

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Cron

- Cron service
  - Database backup
  - Log file rotation
  - Website cache & tmp folder cleanup

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Visualizer

- Visualiser Service
  - Basic monitoring of nodes & services

Support Services

- Separate swarm provides
  - Private docker registry
  - Performance monitoring
  - Logging
- Production NFS server
  - Storage & backup for website files & data
  - LetsEncrypt for website SSL certificates

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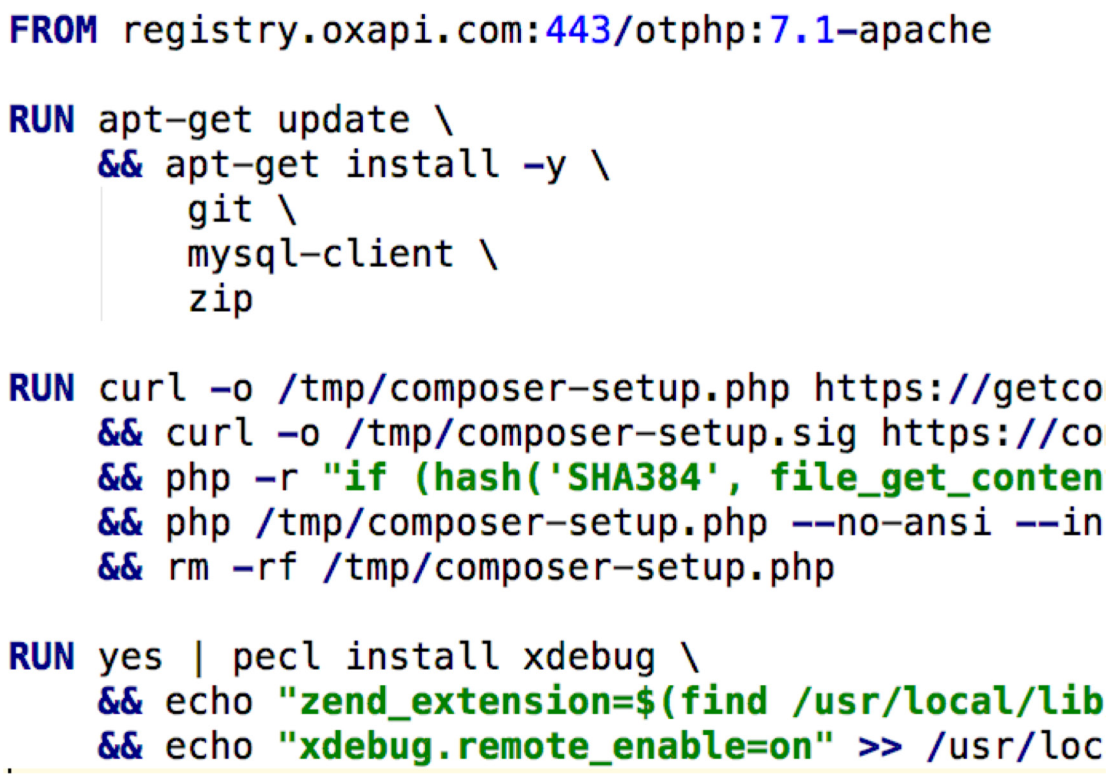
Docker Images

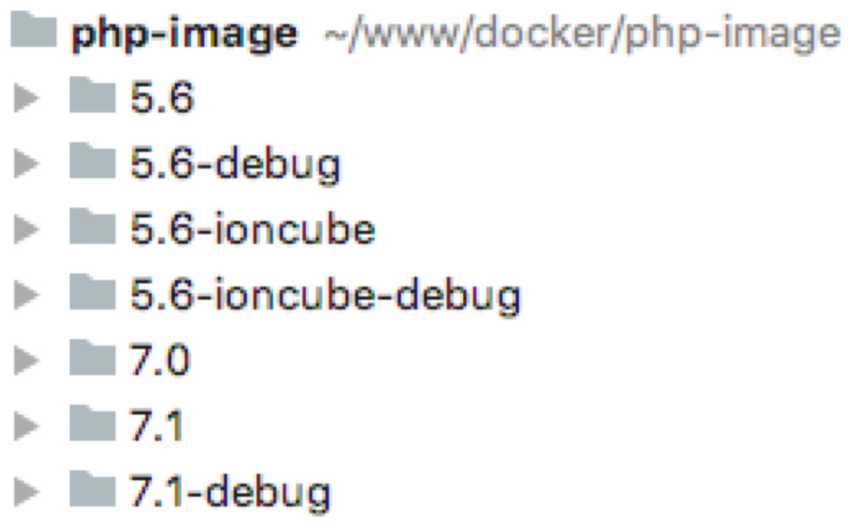
- Multiple layers
  - Linux distribution
  - Apache + PHP
  - MySQL Client + GIT + ZIP + Composer + Debug + Ioncube
  - …



```
FROM registry.oxapi.com:443/otphp:7.1-apache

RUN apt-get update \
    && apt-get install -y \
        git \
        mysql-client \
        zip

RUN curl -o /tmp/composer-setup.php https://getco
    && curl -o /tmp/composer-setup.sig https://co
    && php -r "if (hash('SHA384', file_get_conten
    && php /tmp/composer-setup.php --no-ansi --in
    && rm -rf /tmp/composer-setup.php

RUN yes | pecl install xdebug \
    && echo "zend_extension=$(find /usr/local/lib
    && echo "xdebug.remote_enable=on" >> /usr/loc
```

Docker Images

- Multiple releases
  - PHP 5.6
  - PHP 7.0
  - PHP 7.1
  - …



```
php-image  ~/www/docker/php-image
▶ 5.6
▶ 5.6-debug
▶ 5.6-ioncube
▶ 5.6-ioncube-debug
▶ 7.0
▶ 7.1
▶ 7.1-debug
```

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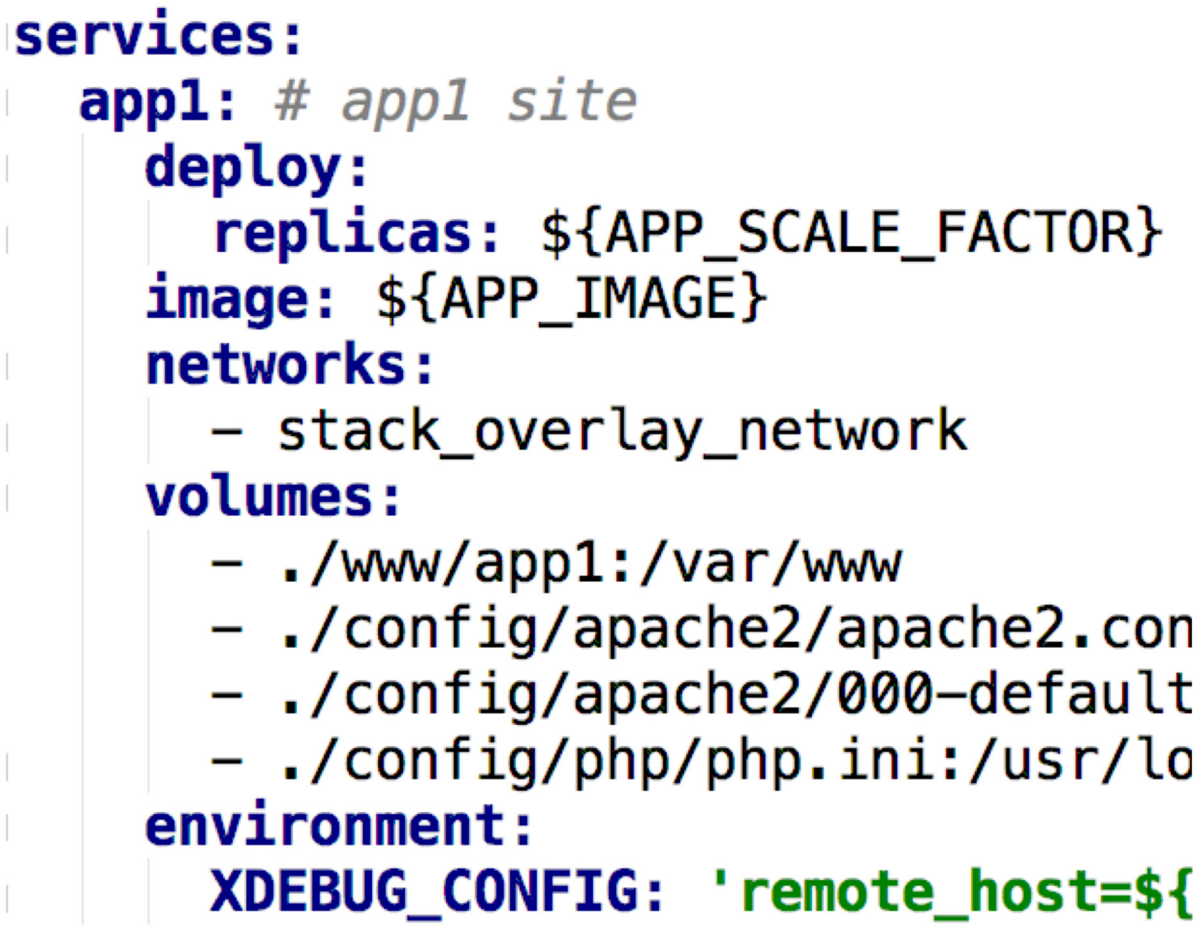
Docker Compose File

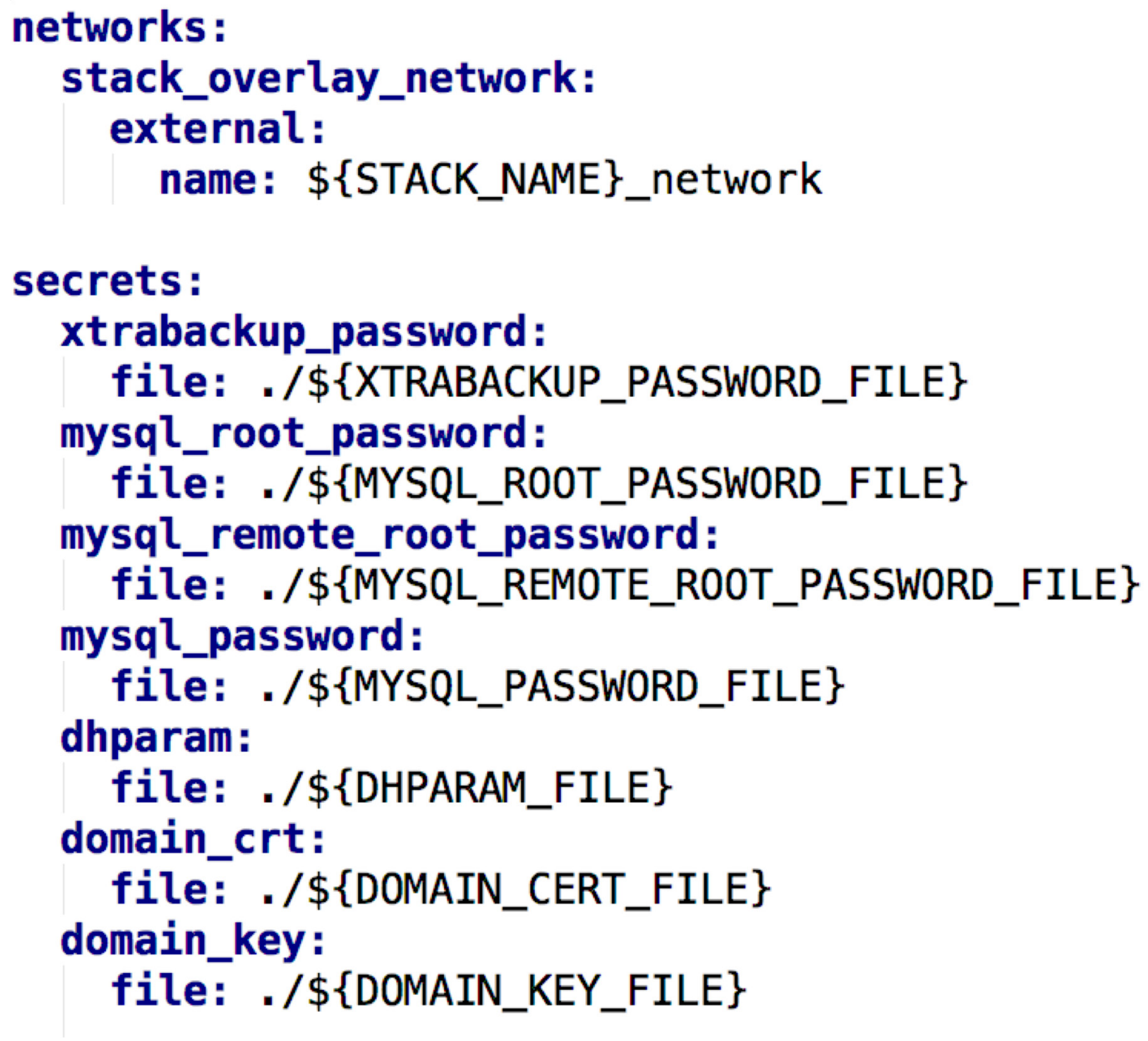
- Services
  - Deployment
  - Image
  - Networking
  - Storage
  - Config



```
services:
  app1: # app1 site
    deploy:
      replicas: ${APP_SCALE_FACTOR}
    image: ${APP_IMAGE}
    networks:
      - stack_overlay_network
    volumes:
      - ./www/app1:/var/www
      - ./config/apache2/apache2.con
      - ./config/apache2/000-default
      - ./config/php/php.ini:/usr/lo
    environment:
      XDEBUG_CONFIG: 'remote_host=${
```

Docker Compose File

- Networking
- Secrets

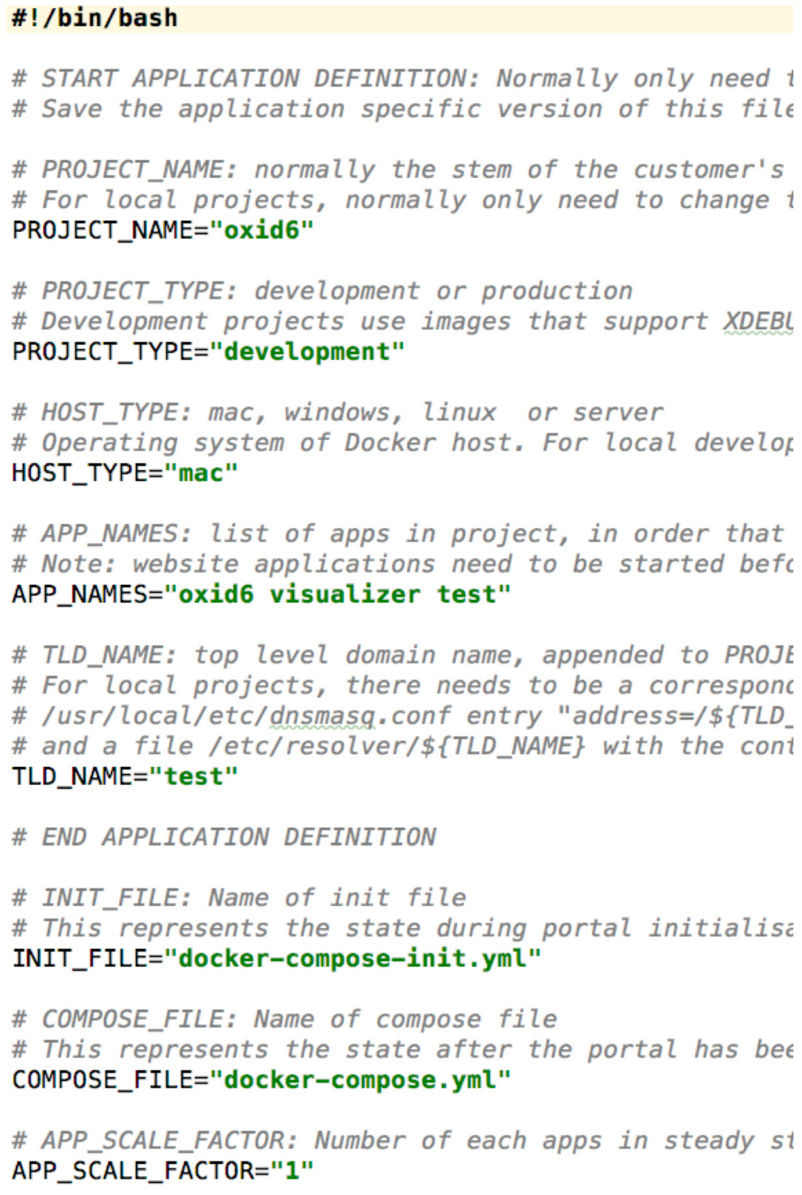


```yaml
networks:
  stack_overlay_network:
    external:
      name: ${STACK_NAME}_network

secrets:
  xtrabackup_password:
    file: ./${XTRABACKUP_PASSWORD_FILE}
  mysql_root_password:
    file: ./${MYSQL_ROOT_PASSWORD_FILE}
  mysql_remote_root_password:
    file: ./${MYSQL_REMOTE_ROOT_PASSWORD_FILE}
  mysql_password:
    file: ./${MYSQL_PASSWORD_FILE}
  dhparam:
    file: ./${DHPARAM_FILE}
  domain_crt:
    file: ./${DOMAIN_CERT_FILE}
  domain_key:
    file: ./${DOMAIN_KEY_FILE}
```

Scripts

- Environment variables
  - Project name & type
  - Service scale factors
  - Port numbers
  - Image names
  - Paths & filenames



```
#!/bin/bash

# START APPLICATION DEFINITION: Normally only need t
# Save the application specific version of this file

# PROJECT_NAME: normally the stem of the customer's
# For local projects, normally only need to change t
PROJECT_NAME="oxid6"

# PROJECT_TYPE: development or production
# Development projects use images that support XDEBU
PROJECT_TYPE="development"

# HOST_TYPE: mac, windows, linux  or server
# Operating system of Docker host. For local develop
HOST_TYPE="mac"

# APP_NAMES: list of apps in project, in order that
# Note: website applications need to be started befo
APP_NAMES="oxid6 visualizer test"

# TLD_NAME: top level domain name, appended to PROJE
# For local projects, there needs to be a correspond
# /usr/local/etc/dnsmasq.conf entry "address=/${TLD_
# and a file /etc/resolver/${TLD_NAME} with the cont
TLD_NAME="test"

# END APPLICATION DEFINITION

# INIT_FILE: Name of init file
# This represents the state during portal initialisa
INIT_FILE="docker-compose-init.yml"

# COMPOSE_FILE: Name of compose file
# This represents the state after the portal has bee
COMPOSE_FILE="docker-compose.yml"

# APP_SCALE_FACTOR: Number of each apps in steady st
APP_SCALE_FACTOR="1"
```

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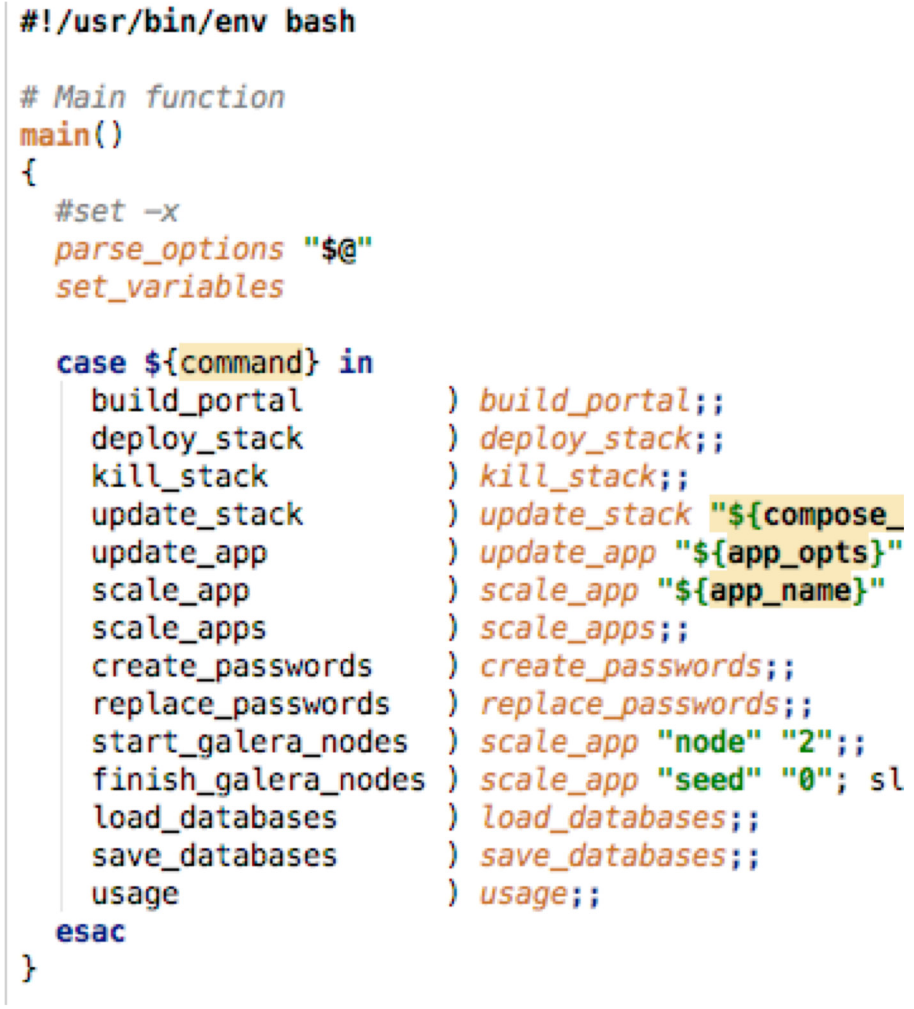
Scripts

- Swarm Builder
  - Build stack
  - Create network
  - Launch services
  - Scale services
  - Load databases
  - Shutdown stack



```
#!/usr/bin/env bash

# Main function
main()
{
  #set -x
  parse_options "$@"
  set_variables

  case ${command} in
    build_portal         ) build_portal;;
    deploy_stack         ) deploy_stack;;
    kill_stack           ) kill_stack;;
    update_stack         ) update_stack "${compose_
    update_app           ) update_app "${app_opts}"
    scale_app            ) scale_app "${app_name}"
    scale_apps           ) scale_apps;;
    create_passwords     ) create_passwords;;
    replace_passwords    ) replace_passwords;;
    start_galera_nodes   ) scale_app "node" "2";;
    finish_galera_nodes  ) scale_app "seed" "0"; sl
    load_databases       ) load_databases;;
    save_databases       ) save_databases;;
    usage                ) usage;;
  esac
}
```

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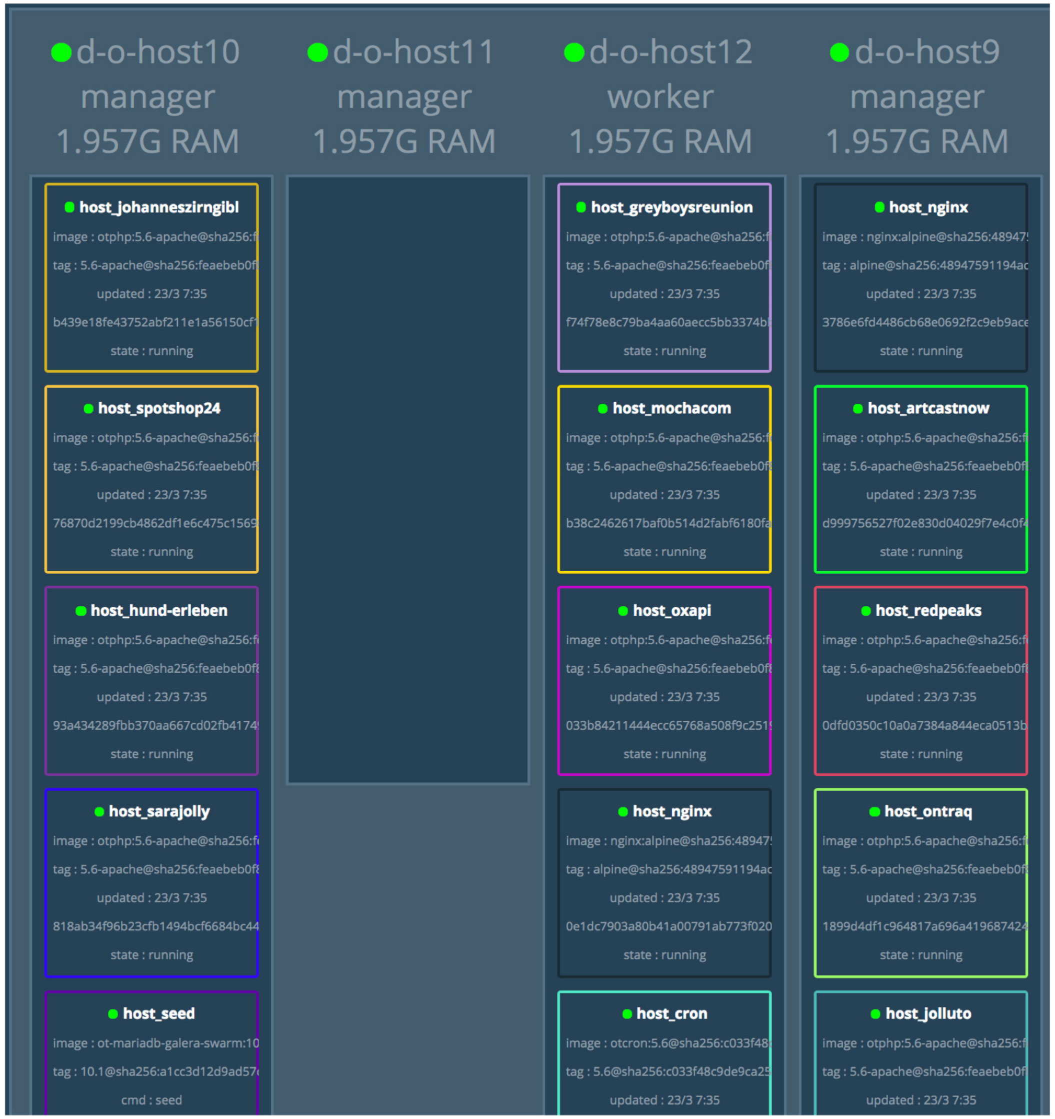
Demo

Production Issues

- Swarm restarts containers on other nodes
- Node reboots & re-joins swarm
- No automatic redistribution of containers
- Kubernetes offers more orchestration control features



```
● d-o-host10                       ● d-o-host11        ● d-o-host12                       ● d-o-host9
manager                            manager             worker                             manager
1.957G RAM                         1.957G RAM          1.957G RAM                         1.957G RAM

● host_johanneszirngibl                                ● host_greyboysreunion             ● host_nginx
image : otphp:5.6-apache@sha256:f                      image : otphp:5.6-apache@sha256:f  image : nginx:alpine@sha256:48947
tag : 5.6-apache@sha256:feaebeb0f                      tag : 5.6-apache@sha256:feaebeb0f  tag : alpine@sha256:48947591194ac
updated : 23/3 7:35                                    updated : 23/3 7:35                updated : 23/3 7:35
b439e18fe43752abf211e1a56150cf1                        f74f78e8c79ba4aa60aecc5bb3374b     3786e6fd4486cb68e0692f2c9eb9ace
state : running                                        state : running                    state : running

● host_spotshop24                                      ● host_mochacom                    ● host_artcastnow
image : otphp:5.6-apache@sha256:f                      image : otphp:5.6-apache@sha256:f  image : otphp:5.6-apache@sha256:f
tag : 5.6-apache@sha256:feaebeb0f                      tag : 5.6-apache@sha256:feaebeb0f  tag : 5.6-apache@sha256:feaebeb0f
updated : 23/3 7:35                                    updated : 23/3 7:35                updated : 23/3 7:35
76870d2199cb4862df1e6c475c1569                         b38c2462617baf0b514d2fabf6180fa    d999756527f02e830d04029f7e4c0f
state : running                                        state : running                    state : running

● host_hund-erleben                                    ● host_oxapi                       ● host_redpeaks
image : otphp:5.6-apache@sha256:f                      image : otphp:5.6-apache@sha256:f  image : otphp:5.6-apache@sha256:f
tag : 5.6-apache@sha256:feaebeb0f                      tag : 5.6-apache@sha256:feaebeb0f  tag : 5.6-apache@sha256:feaebeb0f
updated : 23/3 7:35                                    updated : 23/3 7:35                updated : 23/3 7:35
93a434289fbb370aa667cd02fb4174                         033b84211444ecc65768a508f9c251     0dfd0350c10a0a7384a844eca0513b
state : running                                        state : running                    state : running

● host_sarajolly                                       ● host_nginx                       ● host_ontraq
image : otphp:5.6-apache@sha256:f                      image : nginx:alpine@sha256:48947  image : otphp:5.6-apache@sha256:f
tag : 5.6-apache@sha256:feaebeb0f                      tag : alpine@sha256:48947591194ac  tag : 5.6-apache@sha256:feaebeb0f
updated : 23/3 7:35                                    updated : 23/3 7:35                updated : 23/3 7:35
818ab34f96b23cfb1494bcf6684bc44                        0e1dc7903a80b41a00791ab773f020     1899d4df1c964817a696a41968742
state : running                                        state : running                    state : running

● host_seed                                            ● host_cron                        ● host_jolluto
image : ot-mariadb-galera-swarm:10                     image : otcron:5.6@sha256:c033f48  image : otphp:5.6-apache@sha256:f
tag : 10.1@sha256:a1cc3d12d9ad57                       tag : 5.6@sha256:c033f48c9de9ca2   tag : 5.6-apache@sha256:feaebeb0f
cmd : seed                                             updated : 23/3 7:35                updated : 23/3 7:35
```

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Summary

- Local development works well
  - Significant learning curve & time investment
  - Eliminates cross-machine issues
  - Speeds up development process
  - Needs a powerful laptop
- Production deployment not fully mature
  - Swarm can be unpredictable
  - Requires monitoring & intervention
  - Kubernetes is complicated but robust
  - Database HA solutions challenging