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Kubernetes i Docker [LIVE DEMO]

Marcin Makowski

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About me

Marcin Makowski

Cloud Architect & Senior Software Developer w Powel

Why docker?

- Different libraries version
- Different OS versions
- Reproduction of behavior – DEV != STAGE != PROD
- Coexistence of software & applications (backward/forwad compatibility)
- No need for new VM each time new software is installed
- Great for SAAS, PAAS solutions
- Run Tests same way against DEV, STAGE, PROD

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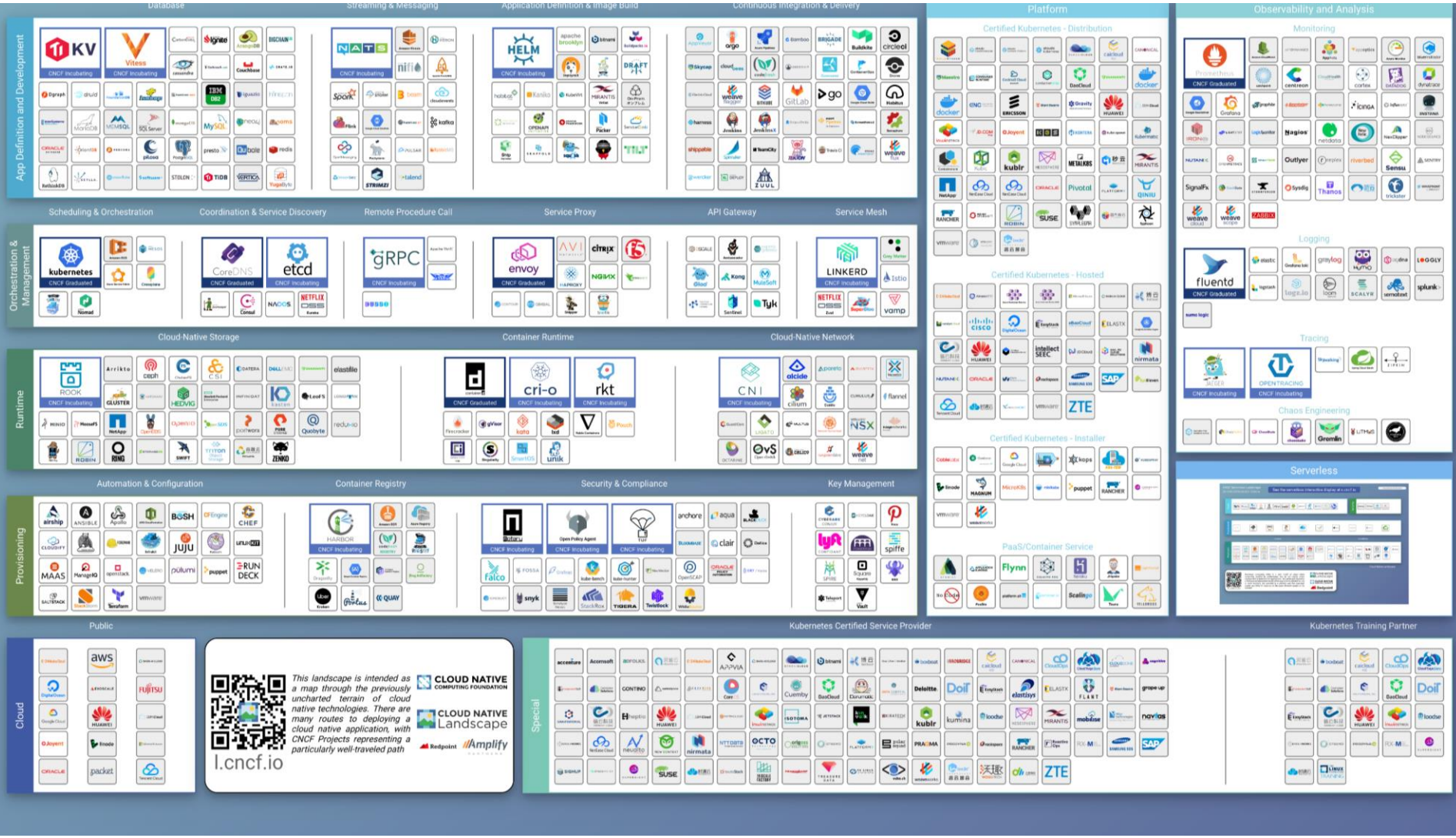
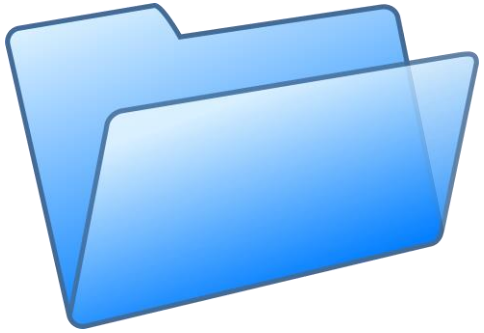

Database
Streaming & Messaging
Application Definition & Image Build
Continuous Integration & Delivery
App Definition and Development
Scheduling & Orchestration
Coordination & Service Discovery
Remote Procedure Call
Service Proxy
API Gateway
Service Mesh
Orchestration & Management
Cloud-Native Storage
Container Runtime
Cloud-Native Network
Runtime
Automation & Configuration
Container Registry
Security & Compliance
Key Management
Provisioning
Public
Kubernetes Certified Service Provider
Kubernetes Training Partner
Cloud
Special
Platform
Certified Kubernetes - Distribution
Certified Kubernetes - Hosted
Certified Kubernetes - Installer
PaaS/Container Service
Observability and Analysis
Monitoring
Logging
Tracing
Chaos Engineering
Serverless
This landscape is intended as a map through the previously uncharted terrain of cloud native technologies. There are many routes to deploying a cloud native application, with CNCF Projects representing a particularly well-traveled path
CLOUD NATIVE COMPUTING FOUNDATION
CLOUD NATIVE Landscape
l.cncf.io

Docker

OCI – Standard



UnionFS

CGroups

- PID namespace for process isolation.
- NET namespace for managing network interfaces.
- IPC namespace for managing access to IPC resources.
- MNT namespace for managing filesystem mount points.
- UTS namespace for isolating kernel and version identifiers.

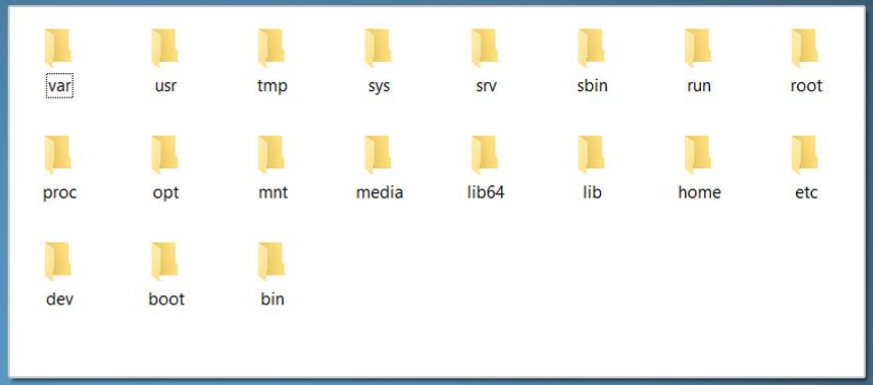
Container, Image, Dockerfile

```
FROM gcc:9.3.0

COPY main.cpp main.cpp

RUN c++ -static main.cpp -o main

CMD ["./main"]
```



Container, Image, Dockerfile

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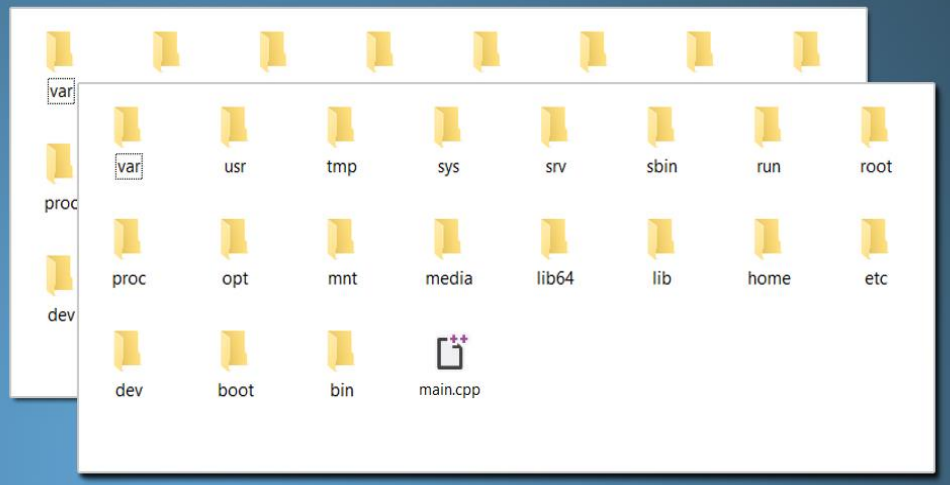

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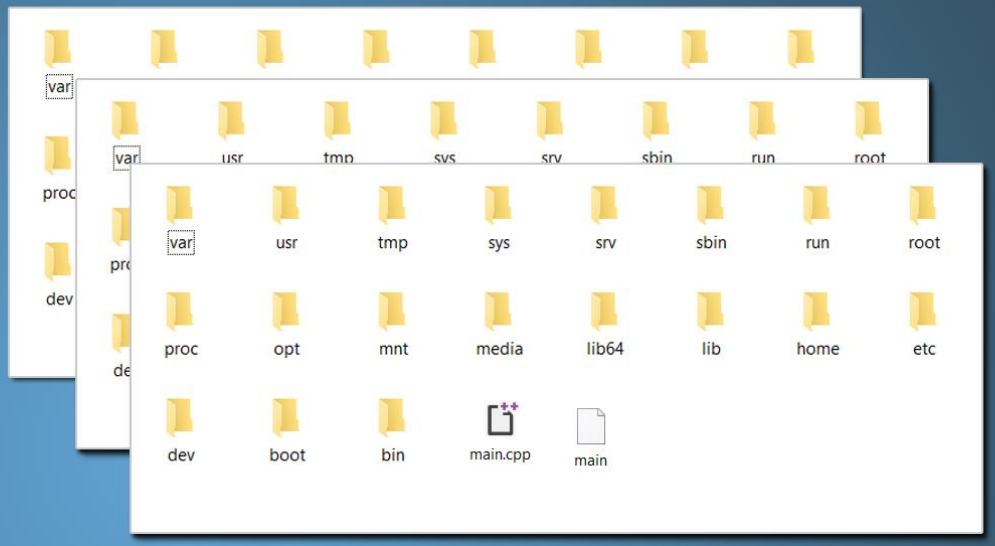
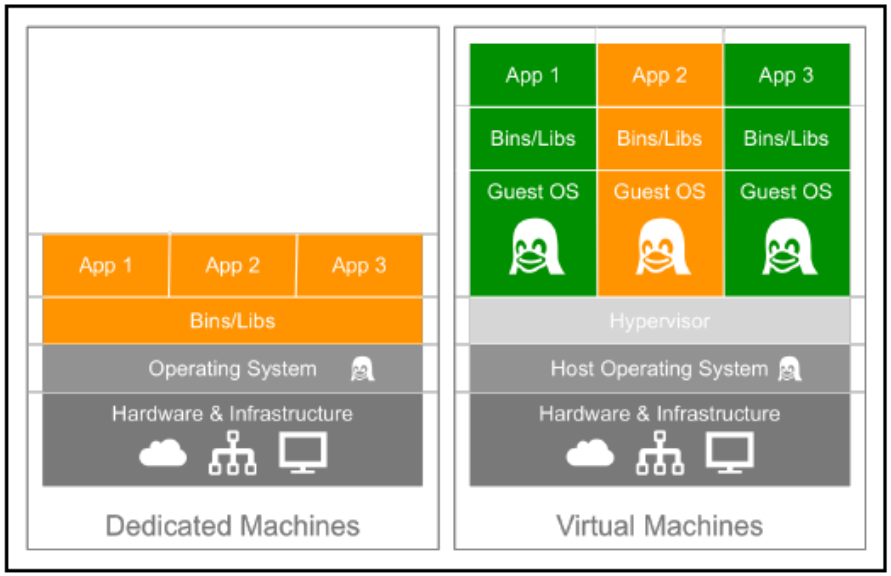
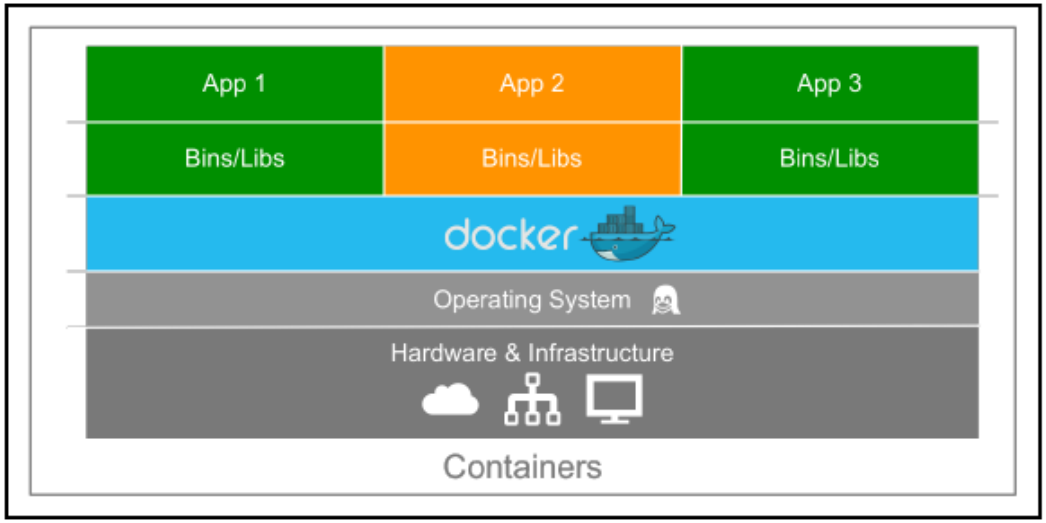



App 1
App 2
App 3
Bins/Libs
Operating System
Hardware & Infrastructure
Dedicated Machines
App 1
App 2
App 3
Bins/Libs
Bins/Libs
Bins/Libs
Guest OS
Guest OS
Guest OS
Hypervisor
Host Operating System
Hardware & Infrastructure
Virtual Machines


App 1
App 2
App 3
Bins/Libs
Bins/Libs
Bins/Libs
docker
Operating System
Hardware & Infrastructure
Containers

12th factor app for SaaS applications

1 application 1 codebase many Deploys

Many codebases means many applications
Common codebase means lack of dependency manager
Deploy from one codebase to each env (dev/stage/prod)

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12th factor app for SaaS applications

Explicitly declare and isolate dependencies

Each application declares all dependecies

Application is not dependent on „not listed" dependencies

Application is not dependent on system tools (like bash/ps/curl)

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Store config in the environment

Can I share my app as open source right away without compromising information?

Can you run my app on your envinronemnt using just code?

Use ENV variables to set configuration

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Treat backing services as attached resources

All services are attached, there is no ‚local' and ‚remote' resources

Service can be easily attached and detached

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Strictly separate build and run stages

Build code (merge all dependencies)
Prepare release with version (use build and config)
Run release – should be possible without supervision

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Execute the app as one or more stateless processes

Any data that needs to persist should be attached through resource

Application can't be sure that information on disk or in memory would be available

Move „sticky sessions" to REDIS or similar tool

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Export services via port binding

Attach PORT to each possible application

If application doesn't use PORT then it is not servcie (job/run proces)

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Scale out via the process model

Consider that application will be scalled horizontaly by increasing number of processes

Don’t start process in background

12th factor app for SaaS applications

Maximize robustness with fast startup and graceful shutdown

processes are disposable – they can be stopped at any time
Handle SIGTERM gracefully
Consider „power off" situations

12th factor app for SaaS applications

Keep development, staging, and production as similar as possible

developers who wrote code are closely involved in deploying it and watching its behavior in production.

The twelve-factor developer resists the urge to use different backing services between development and production

12th factor app for SaaS applications

Treat logs as event streams

A twelve-factor app never concerns itself with routing or storage of its output stream. It should not attempt to write to or manage logfiles.

12th factor app for SaaS applications

Run admin/management tasks as one-off processes

One-off admin processes should be run in an identical environment as the regular long-running processes of the app. They run against a release, using the same codebase and config as any process run against that release.

Trade-offs

Knowledge
DevOps
CI / CD
Debug
Development overhead

HA
Scalability
0 downtime deploy
Infrastructure as a code
OS independence

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Docker CLI

> docker help

> docker <COMMAND> --help

> docker container run hello-world

Dockerfile

FROM

LABEL

RUN

COPY and ADD

EXPOSE

ENV

ARG

ENTRYPOINT and CMD

VOLUME

	No ENTRYPOINT	ENTRYPOINT exec_entry p1_entry	ENTRYPOINT [“exec_entry”, “p1_entry”]
No CMD	*error, not allowed*	/bin/sh -c exec_entry p1_entry	exec_entry p1_entry
CMD [“exec_cmd”, “p1_cmd”]	exec_cmd p1_cmd	/bin/sh -c exec_entry p1_entry	exec_entry p1_entry exec_cmd p1_cmd
CMD [“p1_cmd”, “p2_cmd”]	p1_cmd p2_cmd	/bin/sh -c exec_entry p1_entry	exec_entry p1_entry p1_cmd p2_cmd
CMD exec_cmd p1_cmd	/bin/sh -c exec_cmd p1_cmd	/bin/sh -c exec_entry p1_entry	exec_entry p1_entry /bin/sh -c exec_cmd p1_cmd

Docker container

run

attach

exec –ti nginx [/bin/bash | /bin/sh]

stop

start

restart

rm

Docker container

PAUSE == SIGSTOP

STOP == SIGTERM + SIGKILL

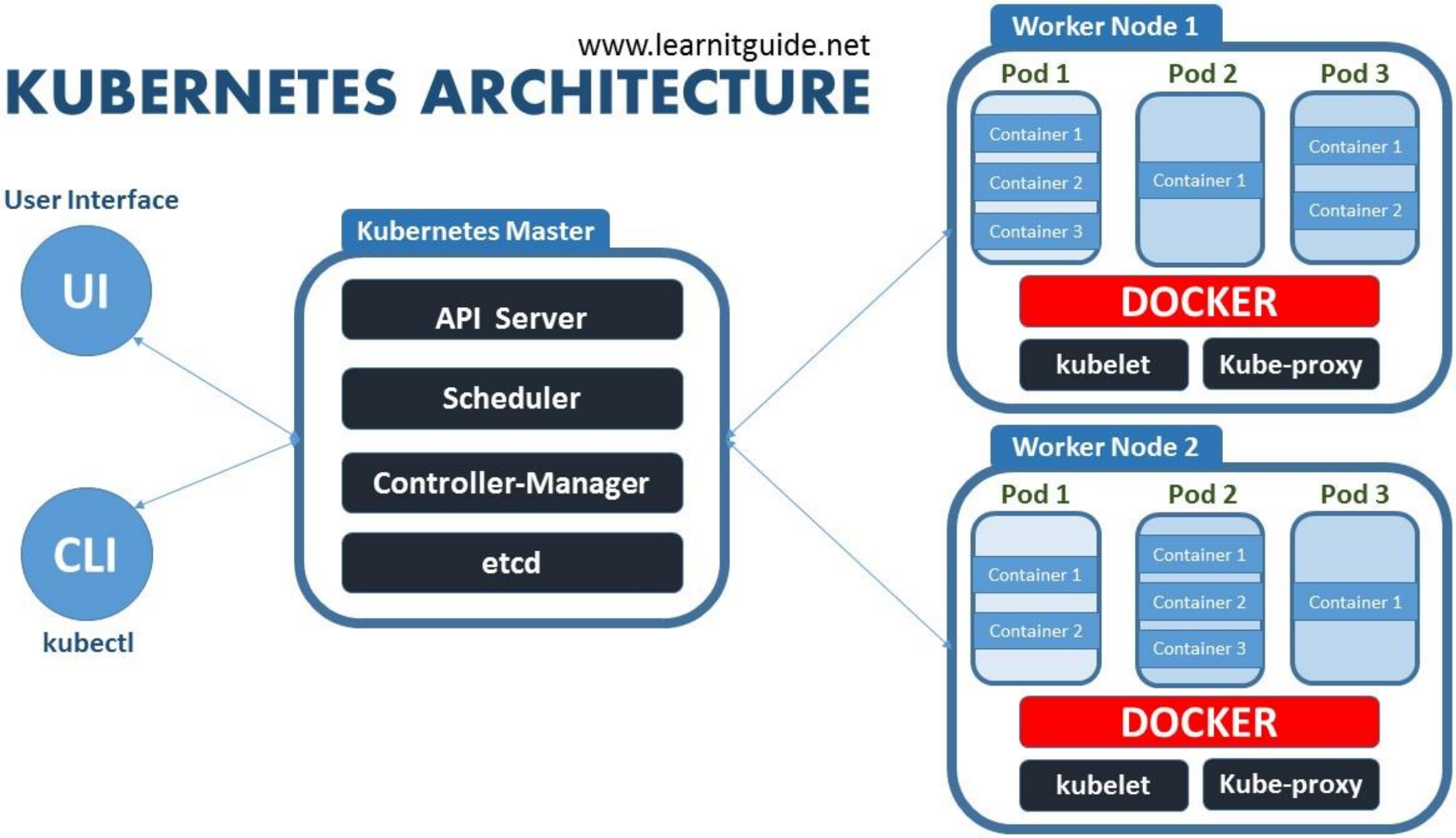
KILL == SIGKILL

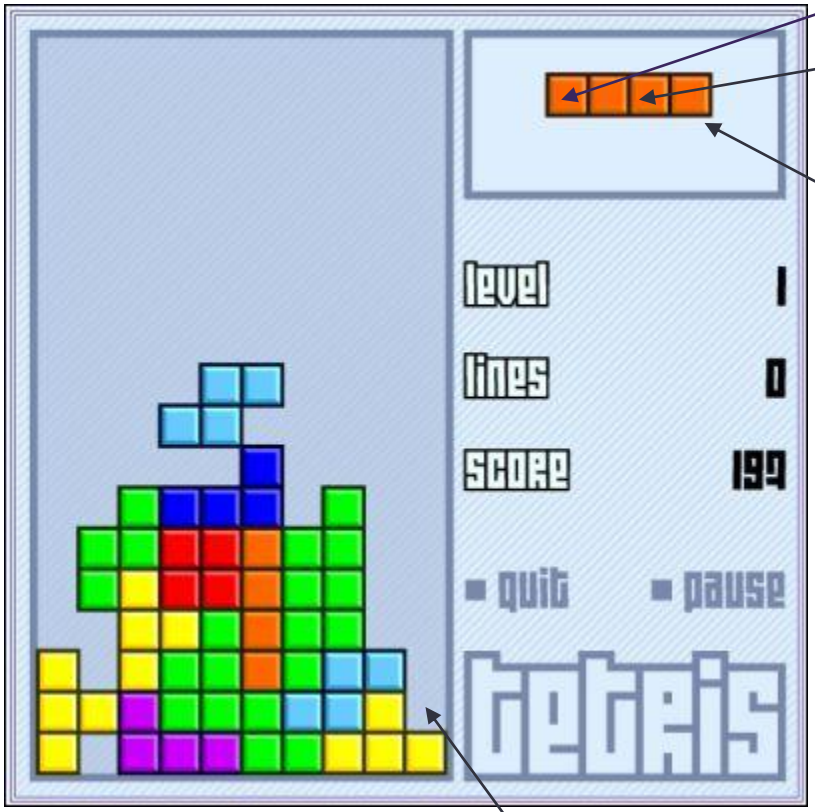
Orchestrator concepts

- Replicas
- Ingress
- Healthchecks
- Pods / Services
- Configs
- Secrets
- Volumes
- Rolling updates

www.learnitguide.net

KUBERNETES ARCHITECTURE





Container

Container

Pod

Node

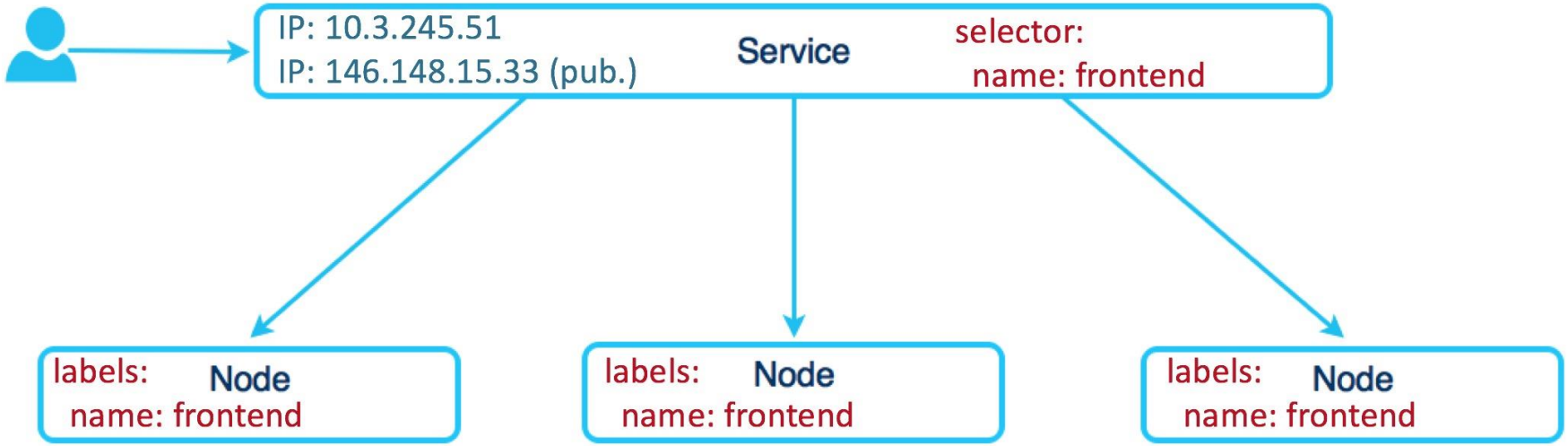
Kubernetes is a player trying to win!

Kubectl

$ kubectl config view
$ kubectl config use-context
$ kubectl create -f ./<DIR>
$ kubectl create -f <URL>
$ kubectl create -R -f ./<DIR>
$ kubectl port-forward POD PORT:PORT
$ kubectl exec –ti .. /bin/bash
$ kubectl logs
$ kubectl --kubeconfig=./config -n monitoring get pods
$ kubectl get events
$ kubectl top nodes (requires metric server)
$ kubectl describe <>
$ kubectl get –o json

Kubernetes - essentials

```
ports:
  -port: 80
    targetPort: 8181
```



Dziękujemy za uwagę.

Podziel się opinią ze szkolenia @sagespl na