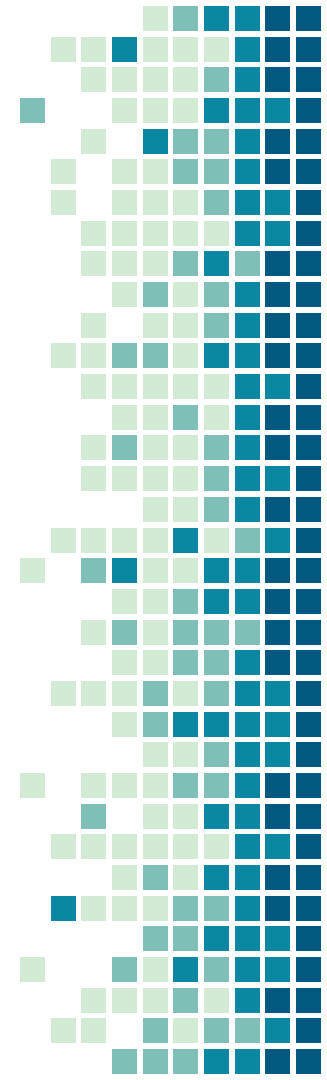


BELOW KUBERNETES

DEMYSTIFYING **CONTAINER RUNTIMES**

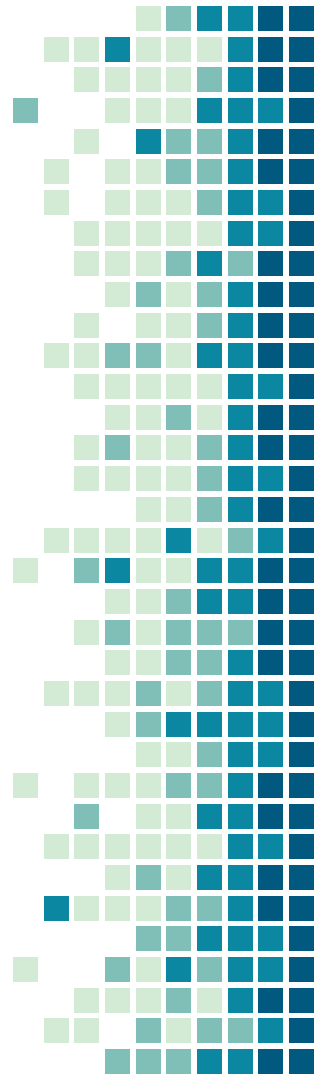
Thierry Carrez, OpenStack Foundation (OSF)
@tcarrez on Twitter
ltx on Freenode

WHY AM I HERE?



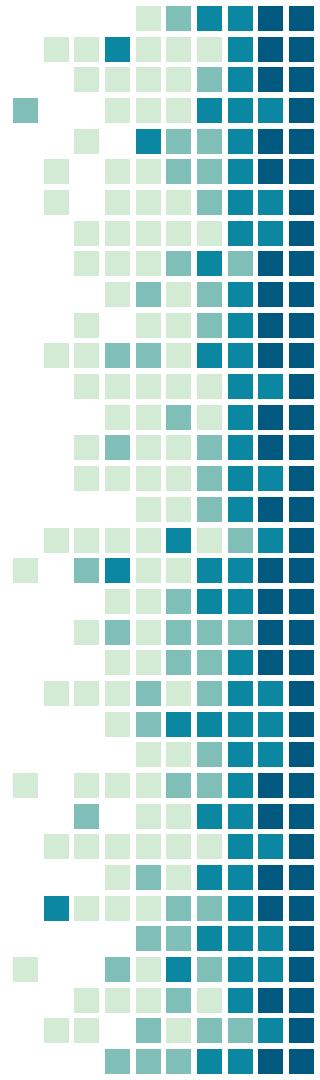
WHY AM I HERE?

- OpenStack is more than just VMs



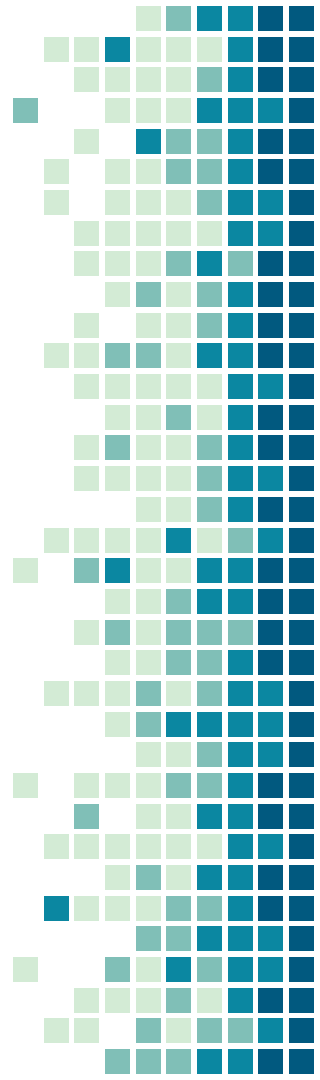
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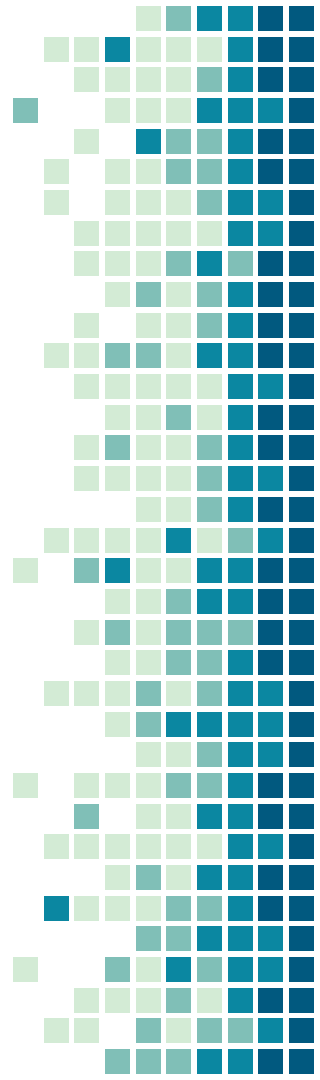
WHY AM I HERE?

- OpenStack is more than just VMs
- OSF is more than just OpenStack
- Openly developing open infrastructure



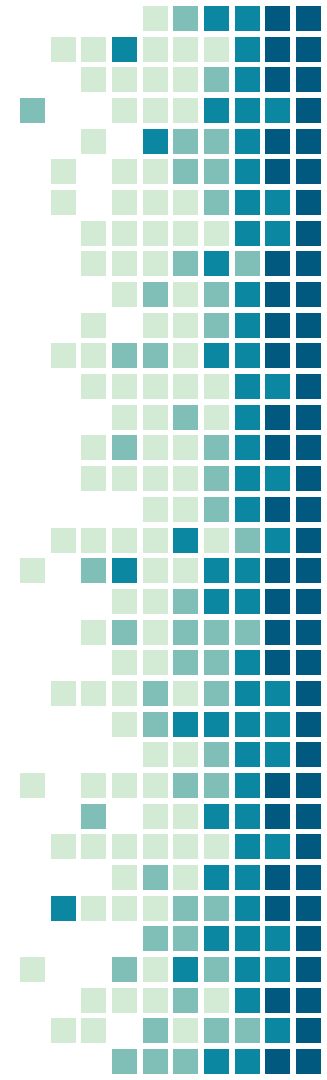
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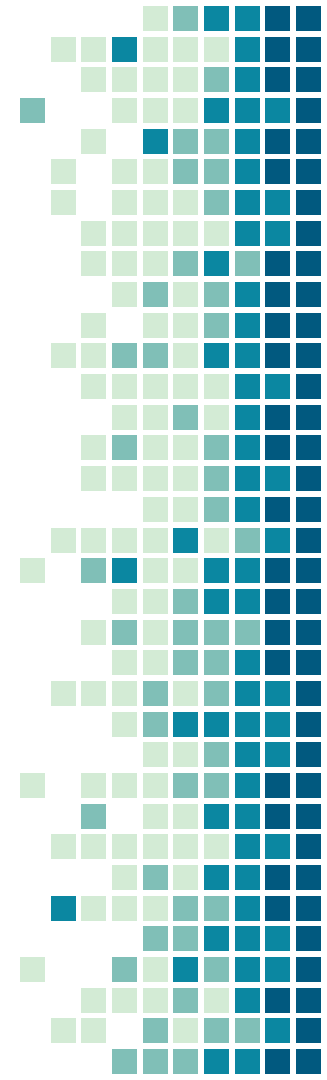
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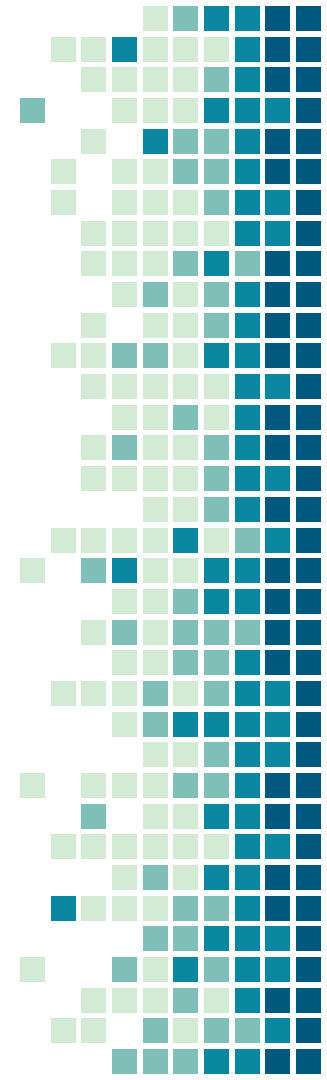
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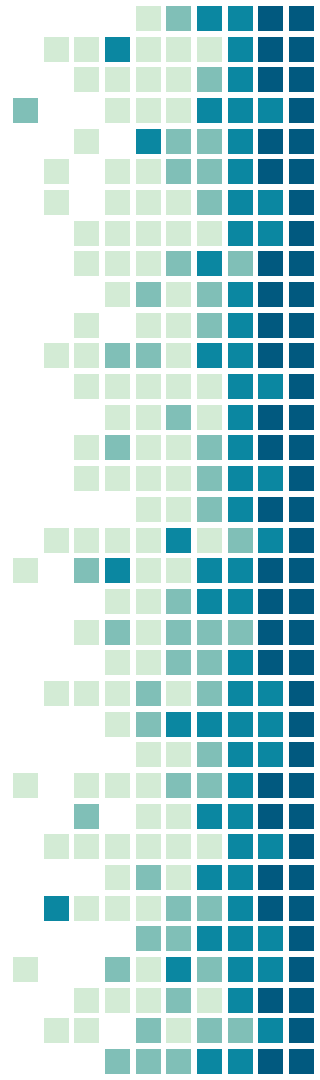
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Kubernetes



Kubernetes



Kubernetes

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Kubernetes

?

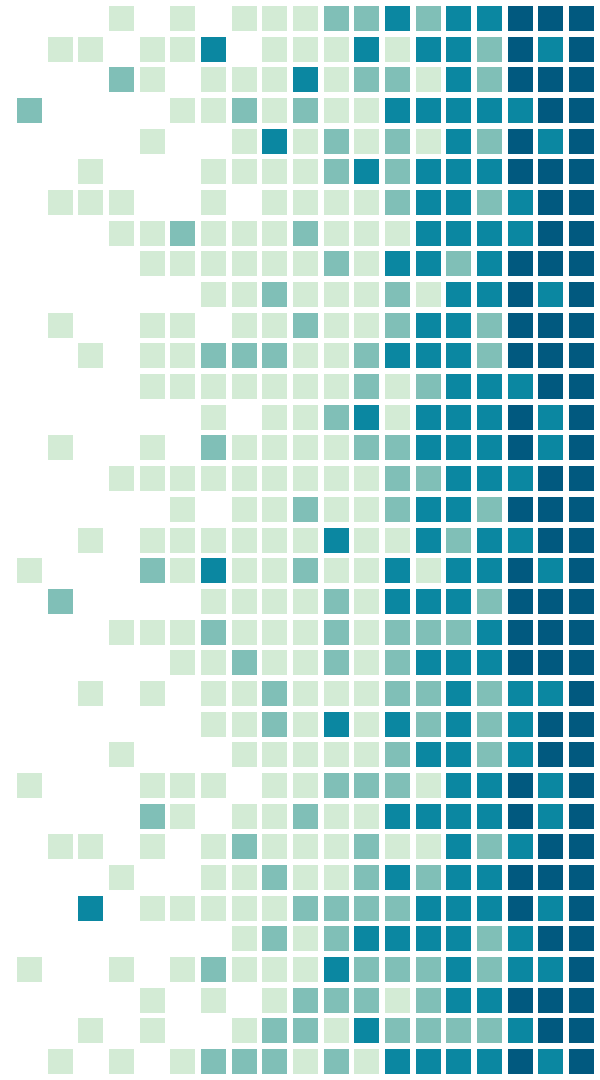


Linux Kernel



1.

THE WORLD
USED TO BE SIMPLE





Kubernetes

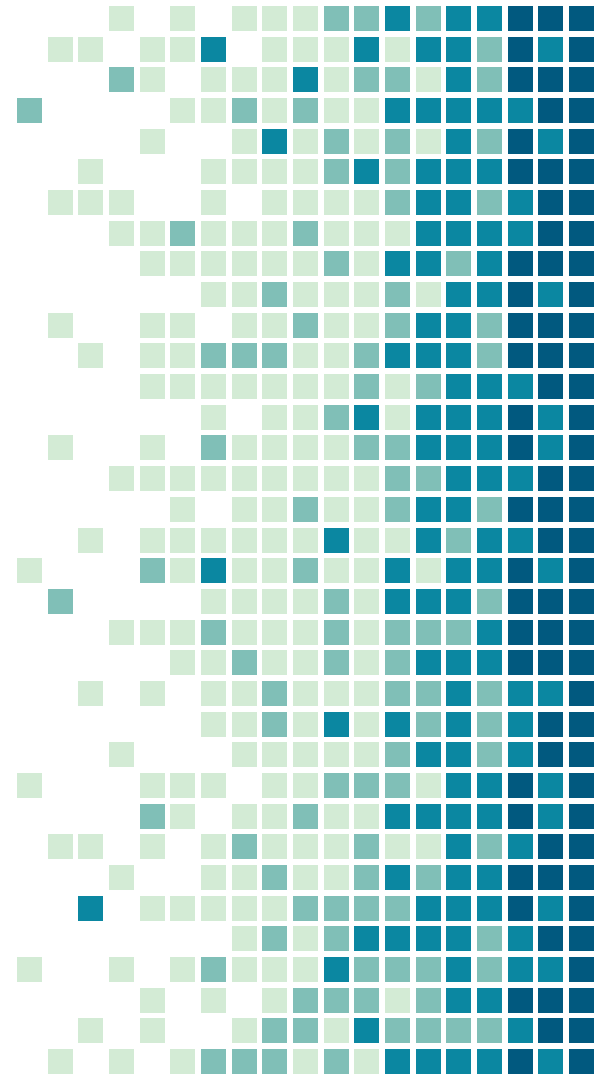


Docker



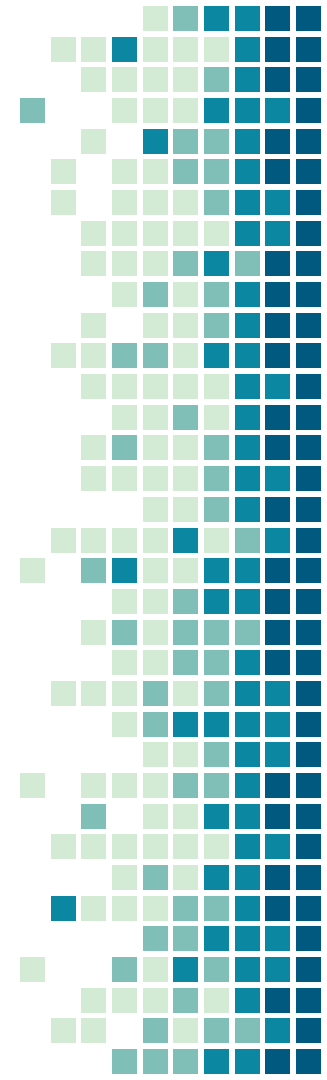
Linux Kernel

2. INTERFACES



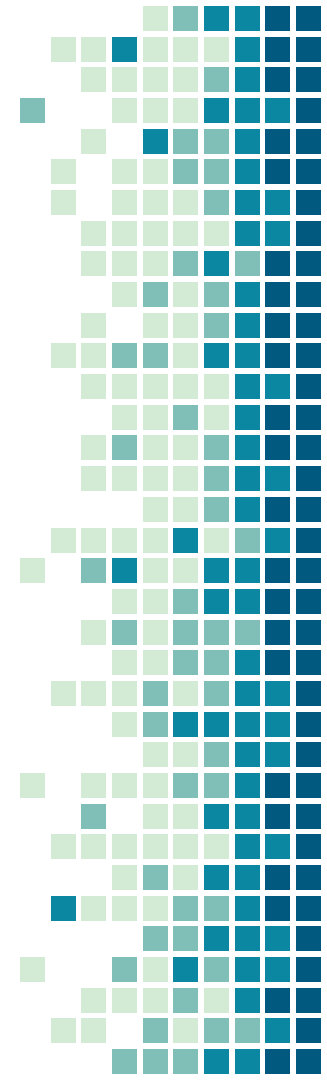
OCI

- Open Containers Initiative, est. June 2015



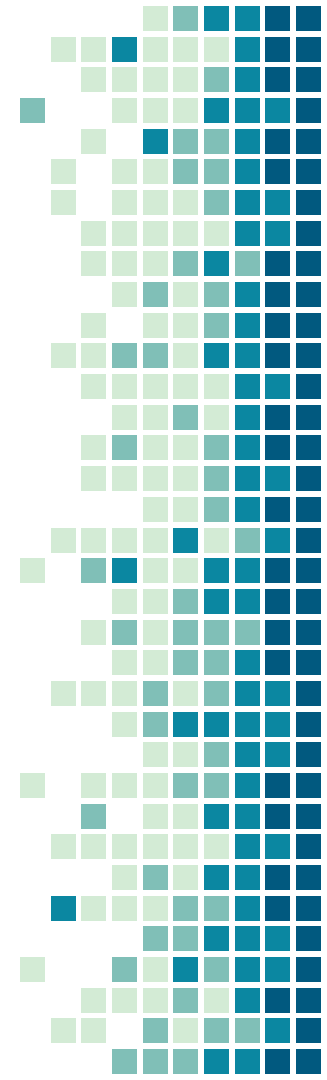
OCI

- Open Containers Initiative, est. June 2015
- Standardize the wild west of container tech



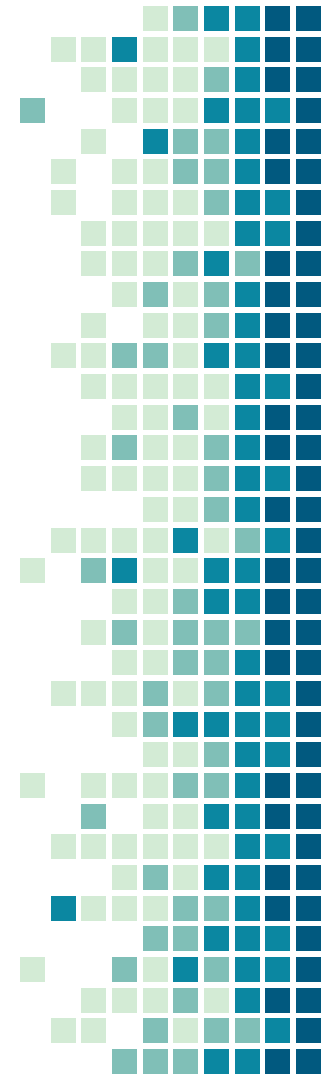
OCI

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- Runtime spec defining OCI runtimes



OCI

- Open Containers Initiative, est. June 2015
- Standardize the wild west of container tech
- Runtime spec defining OCI runtimes
- Image spec defining OCI runtime bundles





Kubernetes



Docker



Linux Kernel



Kubernetes



Docker

OCI



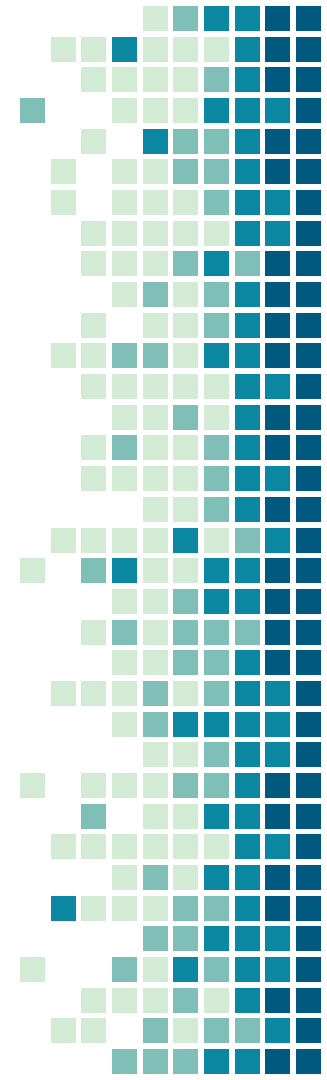
runC



Linux Kernel

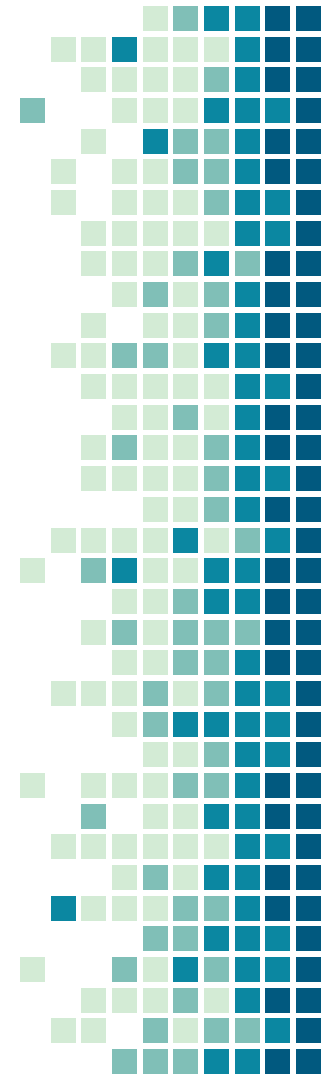
CRI

- Container Runtime Interface, est. Dec 2016



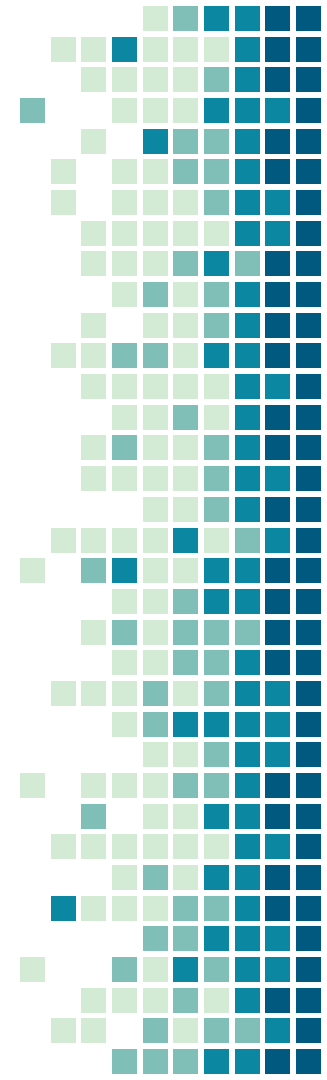
CRI

- Container Runtime Interface, est. Dec 2016
- Primitives to manage pods of containers



CRI

- Container Runtime Interface, est. Dec 2016
- Primitives to manage pods of containers
- A single interface for Rkt & Docker





Kubernetes



rkt



Docker

OCI



runC



Linux Kernel



Kubernetes

CRI



rkt



Docker

OCI



runC



Linux Kernel



Kubernetes

CRI



cri-containerd

Docker CLI



rkt



containerd

OCI



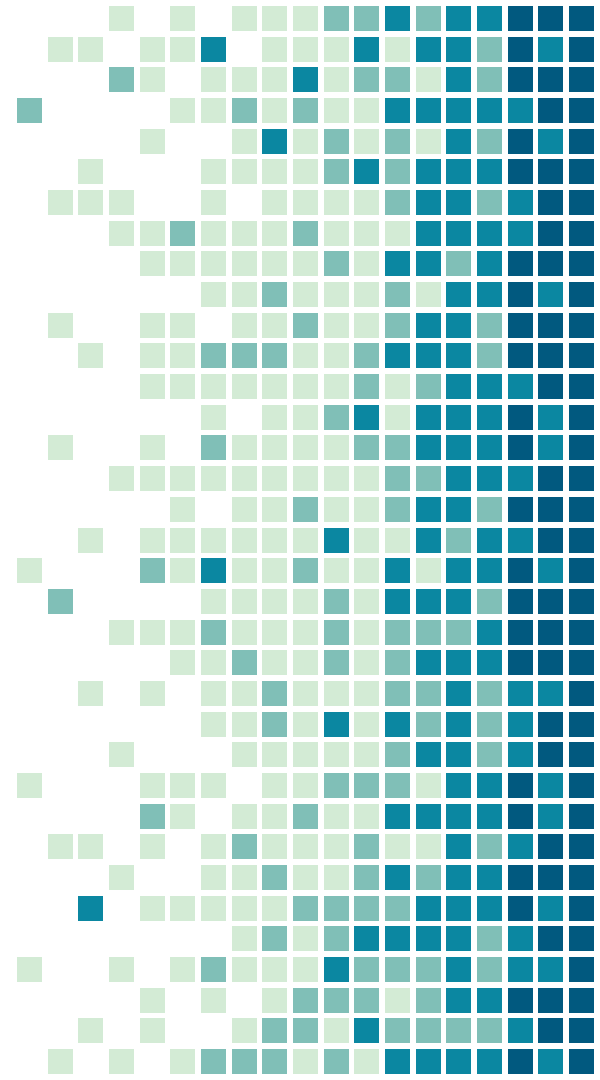
runC



Linux Kernel

2.

MORE PUZZLE PIECES





Kubernetes

CRI



cri-containerd

Docker CLI



containerd

OCI



runC



Linux Kernel



Kubernetes

CRI



cri-containerd

Docker CLI



containerd

OCI



runC



Linux Kernel



Kubernetes

CRI

Docker CLI



CRI-O



cri-containerd



containerd

OCI



runC



Linux Kernel



Kubernetes

CRI



CRI-O



cri-containerd



containerd

Docker
CLI



Podman

OCI



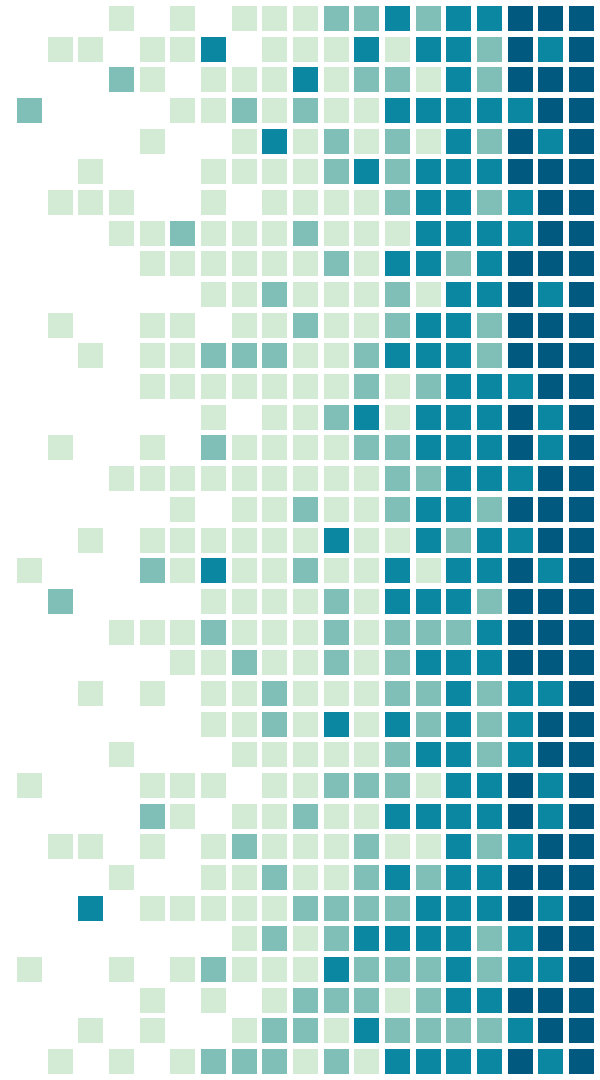
runC



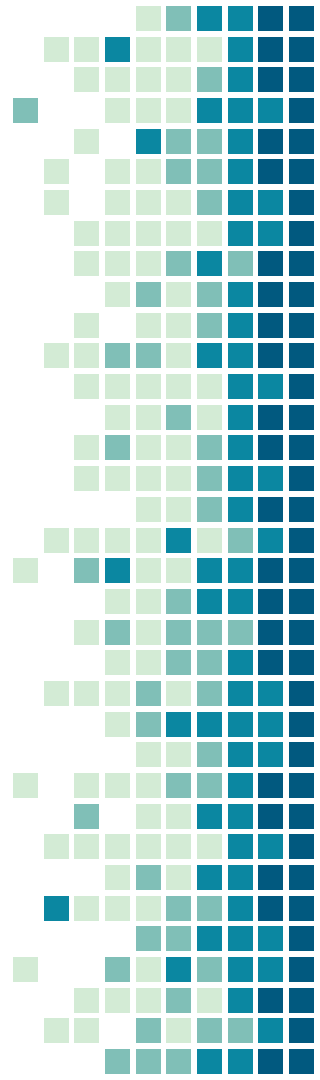
Linux Kernel

3.

WORKLOAD ISOLATION

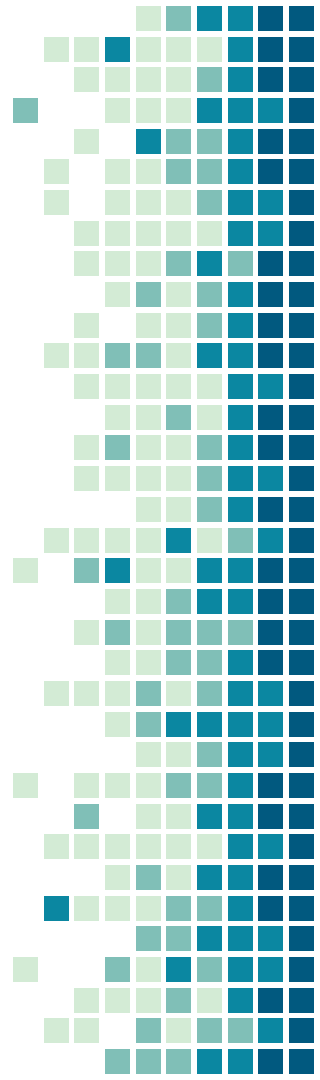


THE DIRTY SECRET OF CONTAINERS



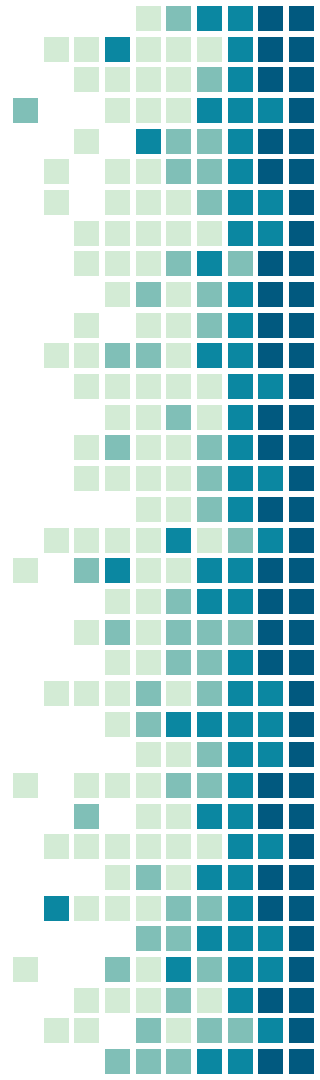
THE DIRTY SECRET OF CONTAINERS

- Containers don't contain



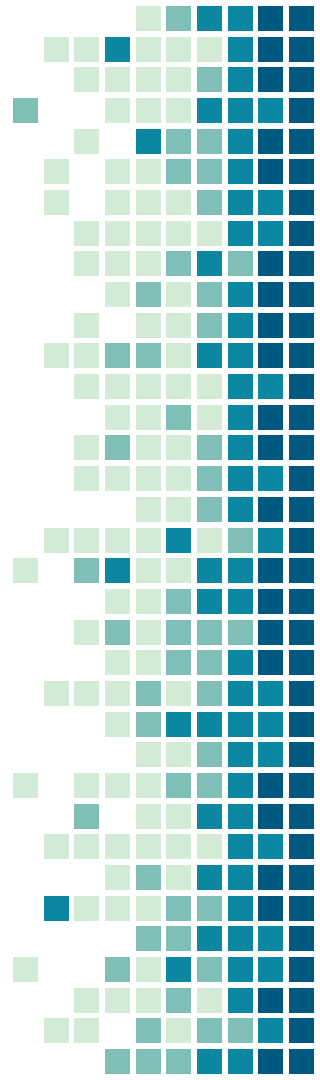
THE DIRTY SECRET OF CONTAINERS

- Containers don't contain
- Real-world containers run in VMs



THE DIRTY SECRET OF CONTAINERS

- Containers don't contain
- Real-world containers run in VMs
- In GCP, Azure, AWS or Alicloud





Kubernetes

CRI



CRI-O



cri-containerd



containerd

OCI



runC

Docker
CLI



Podman



QEMU

KVM



Linux Kernel



Kubernetes

CRI



CRI-O



cri-containerd



containerd

OCI

Docker
CLI



Podman

hyper

runV

QEMU

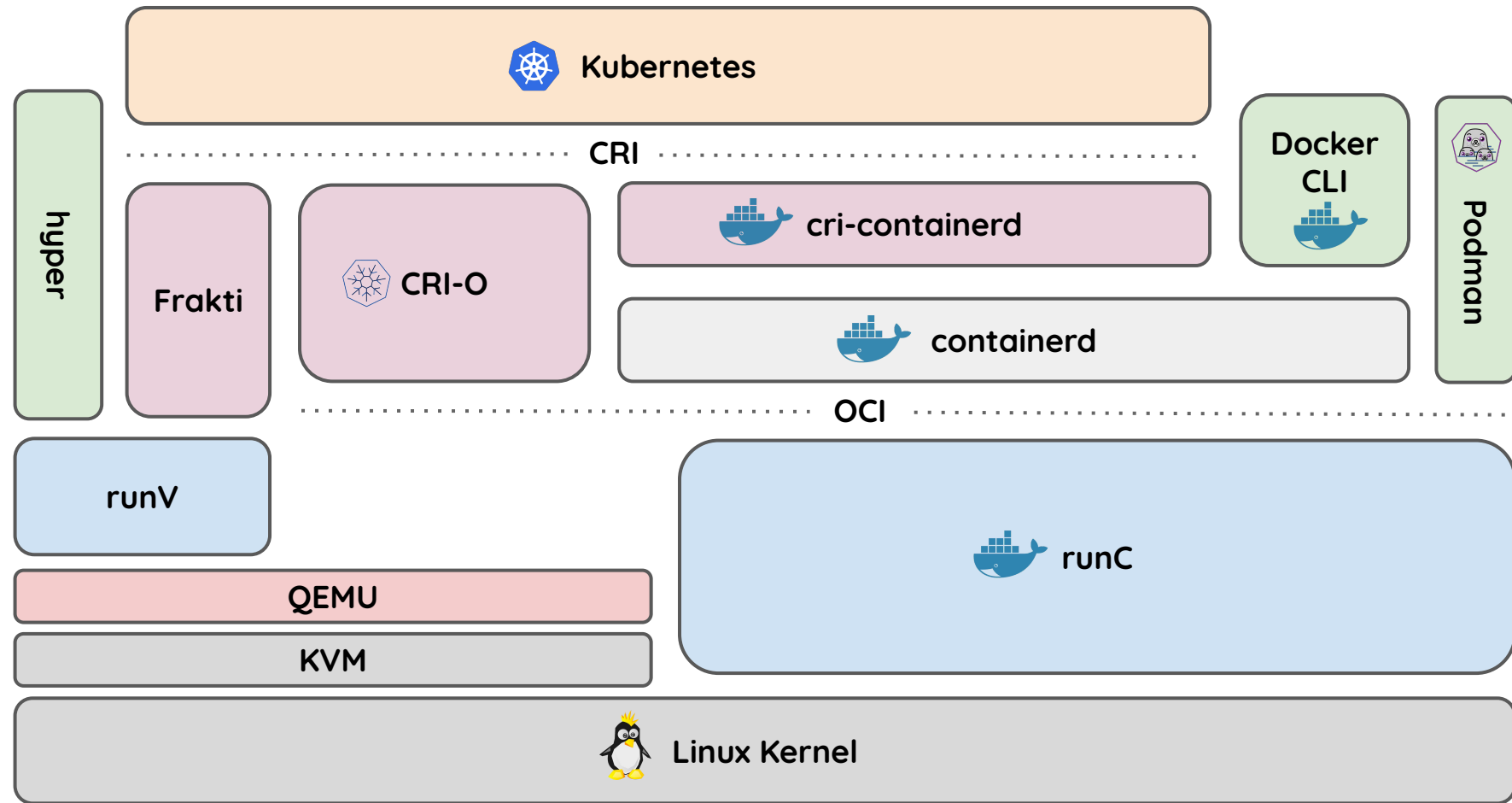
KVM



runC



Linux Kernel





Kubernetes

CRI

Docker
CLI



Podman



cri-containerd



containerd

OCI

runV

Clear Containers



runC

QEMU

KVM



Linux Kernel

hyper

Frakti



CRI-O



Kubernetes

CRI

Frakti



CRI-O



cri-containerd



containerd

Docker
CLI



Podman

OCI



Kata Containers

QEMU

KVM



runC



Linux Kernel



Kubernetes

CRI

Frakti



CRI-O



cri-containerd



containerd

Docker
CLI



Podman

OCI



Kata Containers

QEMU

KVM



runC



Linux Kernel



Kubernetes

CRI

Frakti



CRI-O



cri-containerd



containerd

Docker
CLI



Podman

OCI



Kata Containers

gVisor
(ptrace mode)



runC

QEMU

KVM



Linux Kernel



Kubernetes

CRI

Frakti



CRI-O



cri-containerd



containerd

Docker
CLI



Podman

OCI



Kata Containers

QEMU

Firecracker

KVM

gVisor
(ptrace mode)



runC



Linux Kernel



Kubernetes

CRI

Frakti



CRI-O



cri-containerd

Docker
CLI



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containerd

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Firecracker

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Linux Kernel



CLI tools



CRI runtimes



OCI runtimes



VMMs

THANKS!

Any questions?

You can reach me at
@tcarrez on Twitter
thierry@openstack.org by email

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