

CRI Runtimes: Who
is running my pod?



Hello!

I'm Phil Estes



Distinguished Engineer & CTO,
Linux OS & Container Architecture
IBM Watson & Cloud Platform

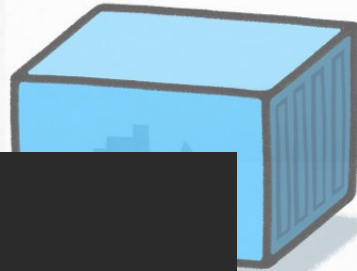
Docker Captain, containerd maintainer

@estesp

Docker



Containers



```
$ docker run redis
```

```
$ docker ps
```

```
$ docker stop redis
```

```
$ docker build -t myapp .
```

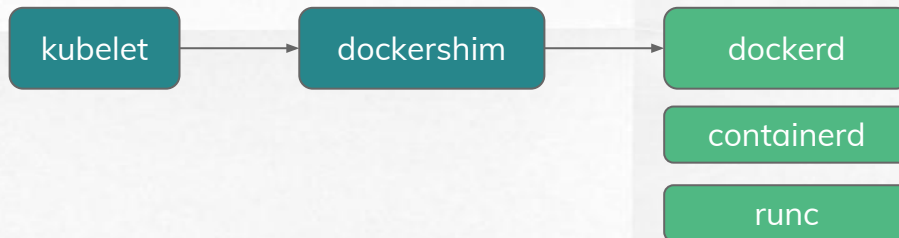
You are using **Kubernetes** aren't you?



Kubernetes is an
orchestrator

Kubernetes *doesn't* run your containers

<https://github.com/kubernetes/kubernetes/tree/release-1.4/pkg/kubelet/dockershim>



 **CLOUD NATIVE**
COMPUTING FOUNDATION

 **OPEN** CONTAINER
INITIATIVE

Monday, December 19, 2016

Introducing Container Runtime Interface (CRI) in Kubernetes

Editor's note: this post is part of a [series of in-depth articles](#) on what's new in Kubernetes 1.5

At the lowest layers of a Kubernetes node is the software that, among other things, starts and stops containers. We call this the "Container Runtime". The most widely known container runtime is Docker, but it is not alone in this space. In fact, the container runtime space has been rapidly evolving. As part of the effort to make Kubernetes more extensible, we've been working on a new plugin API for container runtimes in Kubernetes, called "CRI".

What is the CRI and why does Kubernetes need it?

Each container runtime has its own strengths, and many users have asked for Kubernetes to support more runtimes. In the Kubernetes 1.5 release, we are proud to introduce the [Container Runtime Interface](#) (CRI) -- a plugin interface which enables kubelet to use a wide variety of container runtimes, without the need to recompile. CRI consists of a [protocol buffers](#) and [gRPC API](#), and [libraries](#), with additional specifications and tools under active development. CRI is being released as Alpha in [Kubernetes 1.5](#).

Kubernetes

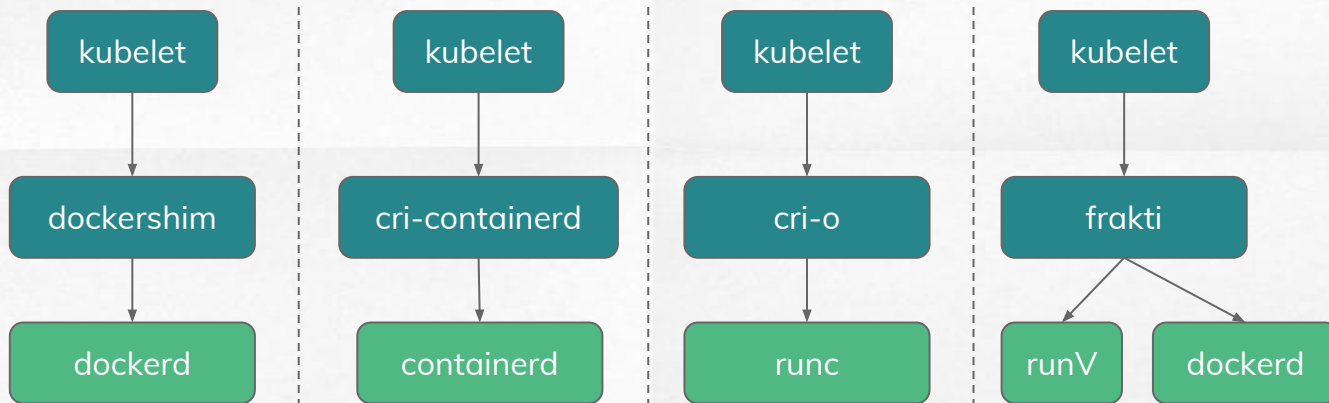
- K8s API
- Storage
- Networking (CNI)
- Healthchecks
- Placement
- Custom resources

CRI

Container Runtime

- Pod container lifecycle
 - Start/stop/delete
- Image management
 - Push/pull/status
- Status
- Container interactions
 - attach, exec, ports, log

What Runtimes Exist?



```
kubelet --container-runtime {string}  
        --container-runtime-endpoint {string}
```


But...
why should I
care?



The benefits of runtime pluggability are mostly focused on operational concerns.



Kelsey Hightower 

@kelseyhightower

Following



runtimes

Treating containers  like a black box will eventually leave you in the dark.

10:52 AM - 22 Jun 2018

152 Retweets 614 Likes



17



152



614



What do I need?

- ▣ Performance
- ▣ Stability
- ▣ (Optional) Hypervisor Isolation
- ▣ Security Capabilities
- ▣ Broad Usage
- ▣ Multi-architecture Support

Containerd: A Core Runtime

containerd



Containerd Benefits

- Designed with **broad usage** as a core container runtime:
 - Docker, LinuxKit, Kubernetes and embedded core runtime use cases (OpenWhisk, Cloud Foundry)
- **Stress testing** for stability and performance guarantees 24/7
- Usable Go library (or gRPC) for ease of embedding
- **Compatibility guarantees**; bug fix backports for stable support



Michael Crosby

@crosbymichael

Following

Fun fact of the day:

@containerd runs ~3.5 million containers every 5 days, stress testing and recording the data to find performance regressions. 24hr/7days a week, with a 0.04% error rate. (5d retention on data)

2:21 PM - 5 Jan 2018

33 Retweets 128 Likes



2



33




128



IBM Cloud

Containerd + CRI

 **kubernetes**

Documentation Blog Partners Community Case S

Kubernetes Blog

Thursday, May 24, 2018

Kubernetes Containerd Integration Goes GA

Authors: Lantao Liu, Software Engineer, Google and Mike Brown, Open Source Developer Advocate, IBM

In a previous blog - [Containerd Brings More Container Runtime Options for Kubernetes](#), we introduced the alpha version of the Kubernetes containerd integration. With another 6 months of development, the integration with containerd is now generally available! You can now use [containerd 1.1](#) as the container runtime for production Kubernetes clusters!

Containerd 1.1 works with Kubernetes 1.10 and above, and supports all Kubernetes features. The test coverage of containerd integration on [Google Cloud Platform](#) in Kubernetes test infrastructure is now equivalent to the Docker integration (See: [test dashboard](#)).

We're very glad to see containerd rapidly grow to this big milestone. Alibaba Cloud started to use containerd actively since its first day, and thanks to the simplicity and robustness emphasise, make it a perfect container engine running in our Serverless Kubernetes product, which has high qualification on performance and stability. No doubt, containerd will be a core engine of container era, and continue to driving innovation forward.


— Xinwei, Staff Engineer in Alibaba Cloud

<https://kubernetes.io/blog/2018/05/24/kubernetes-containerd-integration-goes-ga/>


Containerd in the Cloud(s)

- ❑ Kelsey Hightower's "[Kubernetes the Hard Way](#)" deploys **containerd** as the kubelet runtime
- ❑ **GKE beta**: containerd-based K8s clusters
- ❑ **IBM Cloud**: containerd-based clusters for 1.11+
- ❑ **Azure**: OSS acs-engine includes containerd; AKS moving to containerd (but CRI-O for OpenShift)
- ❑ **Amazon**: still reviewing runtime options for EKS
- ❑ **CloudFoundry**: moving to containerd from runc


Kubernetes 1.11 + containerd 1.1.0


 IBM Cloud


CatalogDocsSupportManage

(Philip...count)

Clusters / containerd


 containerd ● Normal

Kubernetes Dashboard 

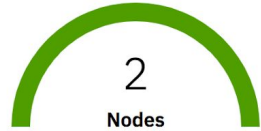


AccessOverviewWorker NodesWorker PoolsServices

Summary

Cluster ID	c492459e4f4c400e9a3d988e8be9926e
Kubernetes version	1.11.0_1505
Zones	dal10
Owner	estesp@us.ibm.com
Infrastructure User	estesp
Ingress subdomain	containerd.us-south.stg.containers.appdomain.cloud
Metrics	View 

Worker Nodes



2
Nodes

2 ● Normal

0 ● Warning

0 ● Critical

0 ● Pending

FEEDBACK

Demo time

Going Further

- ❑ **crictl** User's Guide:
<https://github.com/containerd/cri/blob/master/docs/crictl.md>
- ❑ Stephen Day's **KubeCon 2018** containerd talk:
<https://www.youtube.com/watch?v=3AynH3c0F8M>
- ❑ **Containerd** project:
<https://github.com/containerd/containerd>

Thanks!



Any questions?

You can find me at:
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Credits

Special thanks to all the people who made and released these awesome resources for free:

- ▣ Presentation template by SlidesCarnival
- ▣ Photographs by Unsplash
- ▣ Backgrounds by Pixeden