



Next Generation Tools for container technology

Dan Walsh @rhatdan & Mrunal Patel @mrunalp

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Linux

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Linux

Containers

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Core OS



redhat.®

What do you need to run a container

- Standard Definition of what makes up a container image.
 - OCI Image Bundle Definition



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- Mechanism to pull images from a container registry to the host
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- Mechanism to pull images from a container registry to the host
 - github.com/containers/image
- Ability to explode images onto COW file systems on disk
 - github.com/containers/storage
- Standard mechanism for running a container
 - OCI Runtime Spec (1.0)
 - runc default implementation of OCI Runtime Spec (Same tool Docker uses to run containers)





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OPENSIFT

OPENSIFT

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What does OpenShift/Kubernetes need run a container?

CRI - Container Runtime Interface



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What does OpenShift/Kubernetes need run a container?

CRI - Container Runtime Interface



Kubernetes tells CRI to run Container Image:

- CRI needs to pull image from Container Registry
- CRI Needs to store image on COW File system
- CRI Needs to execute OCI Runtime

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Introducing CRI-0



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Introducing CRI-O



CRI-O - OCI-based implementation of Kubernetes Container Runtime Interface

- Scope tied to kubernetes CRI
- Only supported user is kubernetes
- Uses standard components as building blocks

“Nothing more, Nothing Less”

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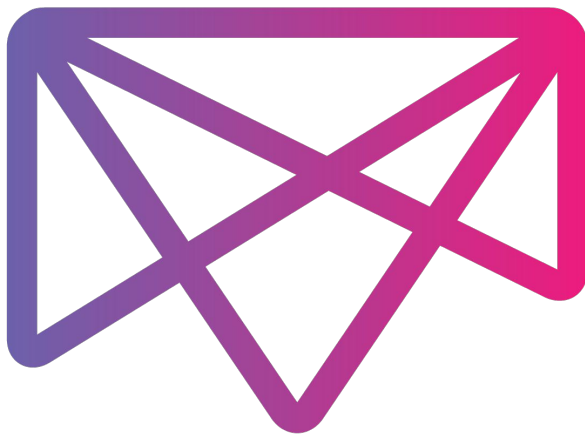


cri-o



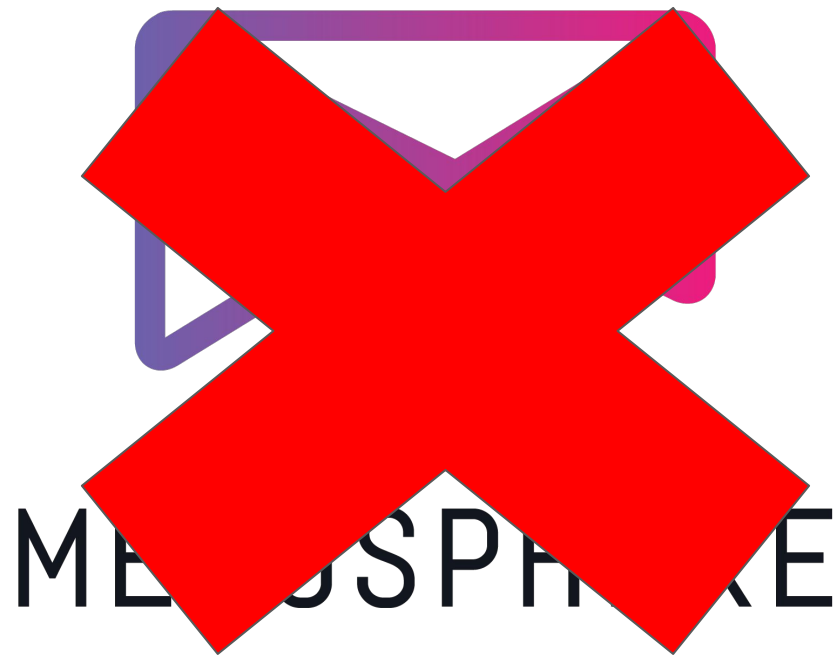
kubernetes

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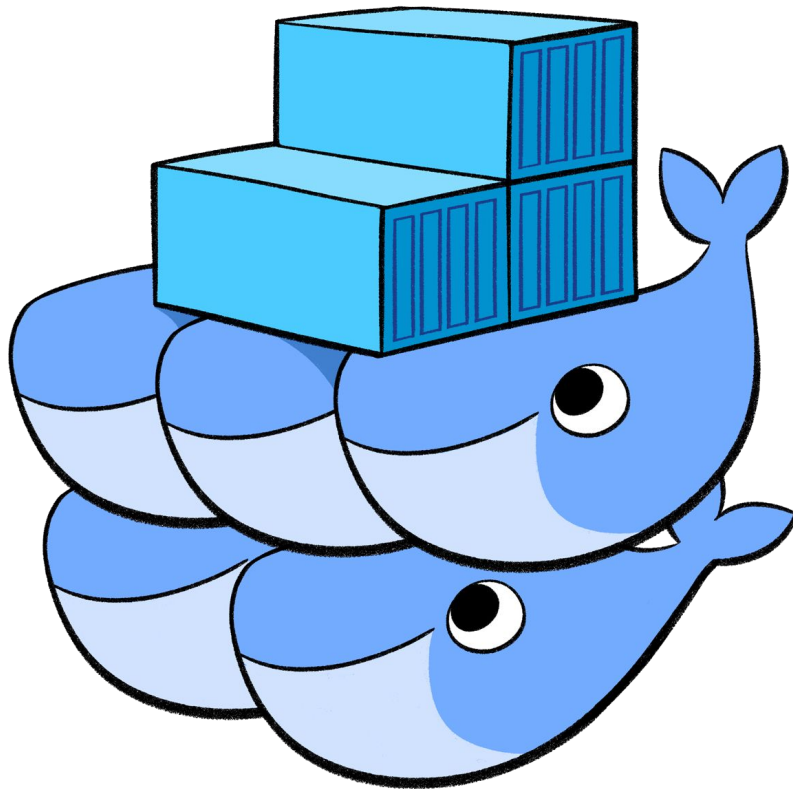
MESOSPHERE

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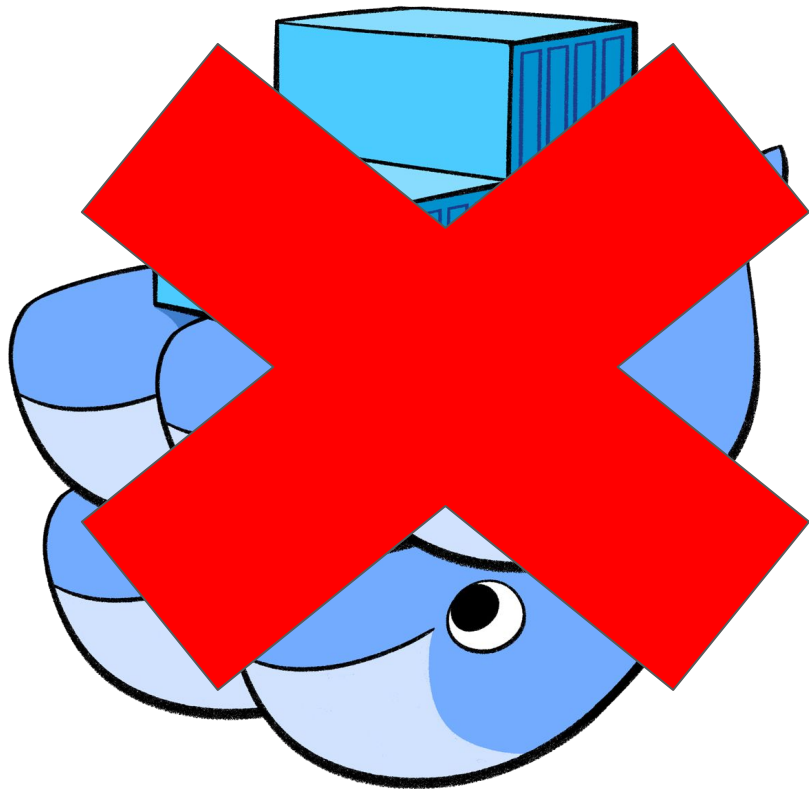
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R
M



#nobigfatdaemons

S
W
A
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M



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vs.

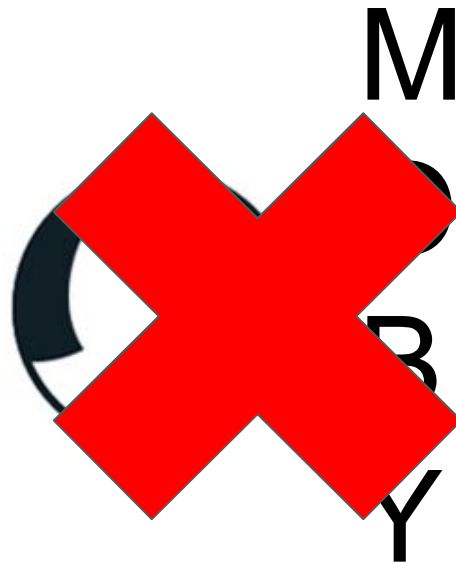


M
O
B
Y

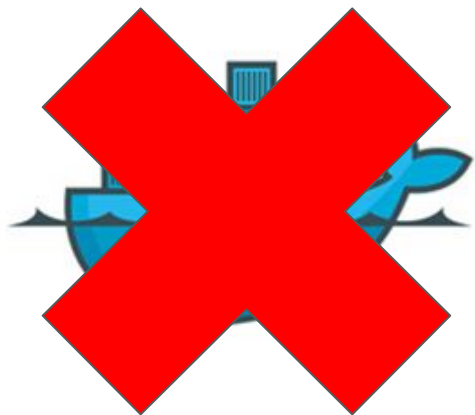
#nobigfatdaemons



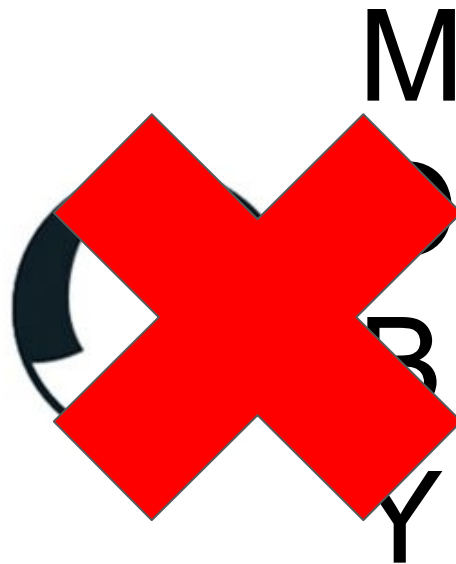
vs.



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VS.



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cri-o



kubernetes

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Overview of additional components

- **oci-runtime-tools** library is used to generate OCI configs for containers



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- **CNI** is used for setting up networking
 - Tested with Flannel, Weave and openshift-sdn



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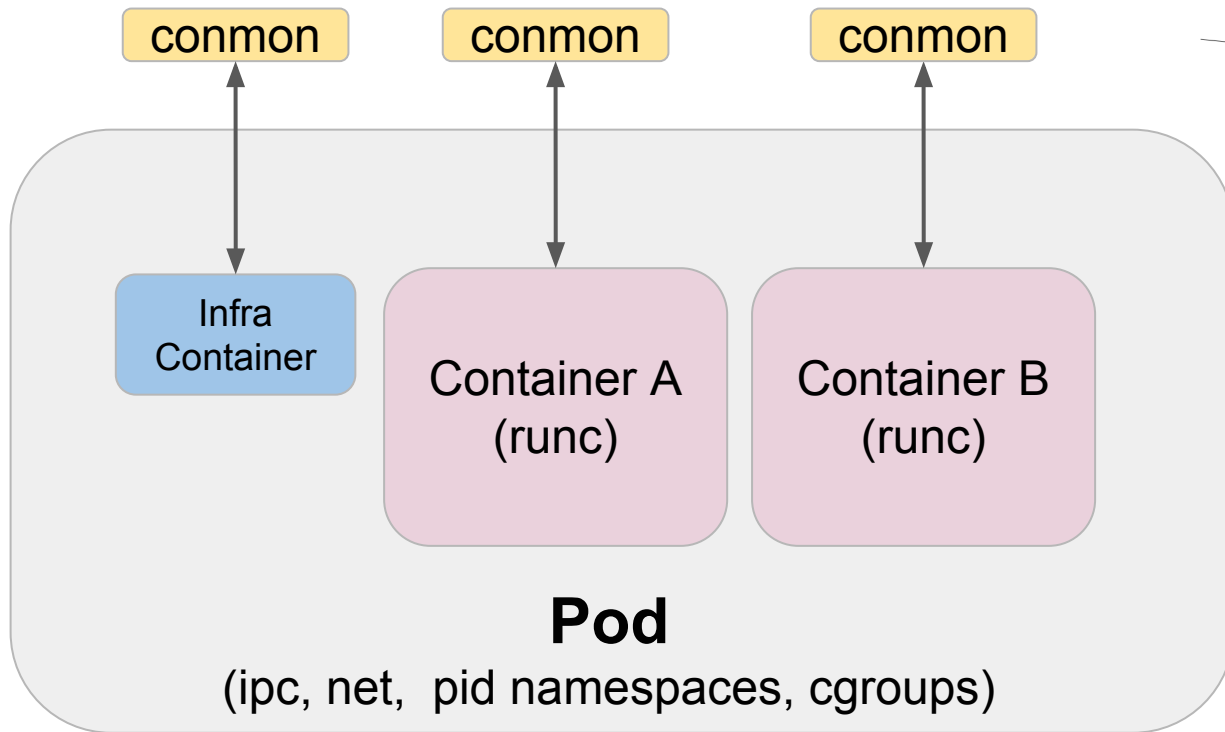
Overview of additional components

- **oci-runtime-tools** library is used to generate OCI configs for containers
- **CNI** is used for setting up networking
 - Tested with Flannel, Weave and openshift-sdn
- **common** is a utility for:
 - Monitoring
 - Logging
 - Handling tty
 - Serving attach clients
 - Detecting and reporting OOM



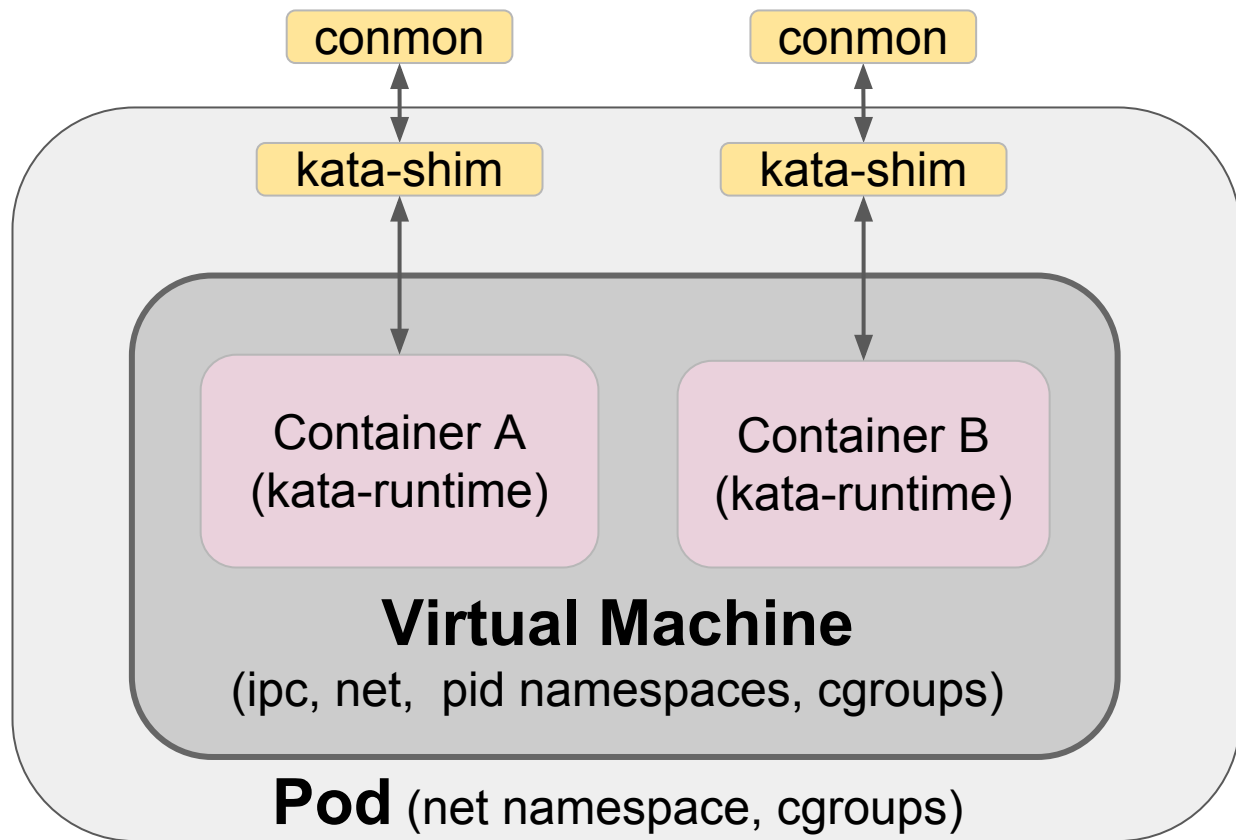
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Pod architecture (runc)



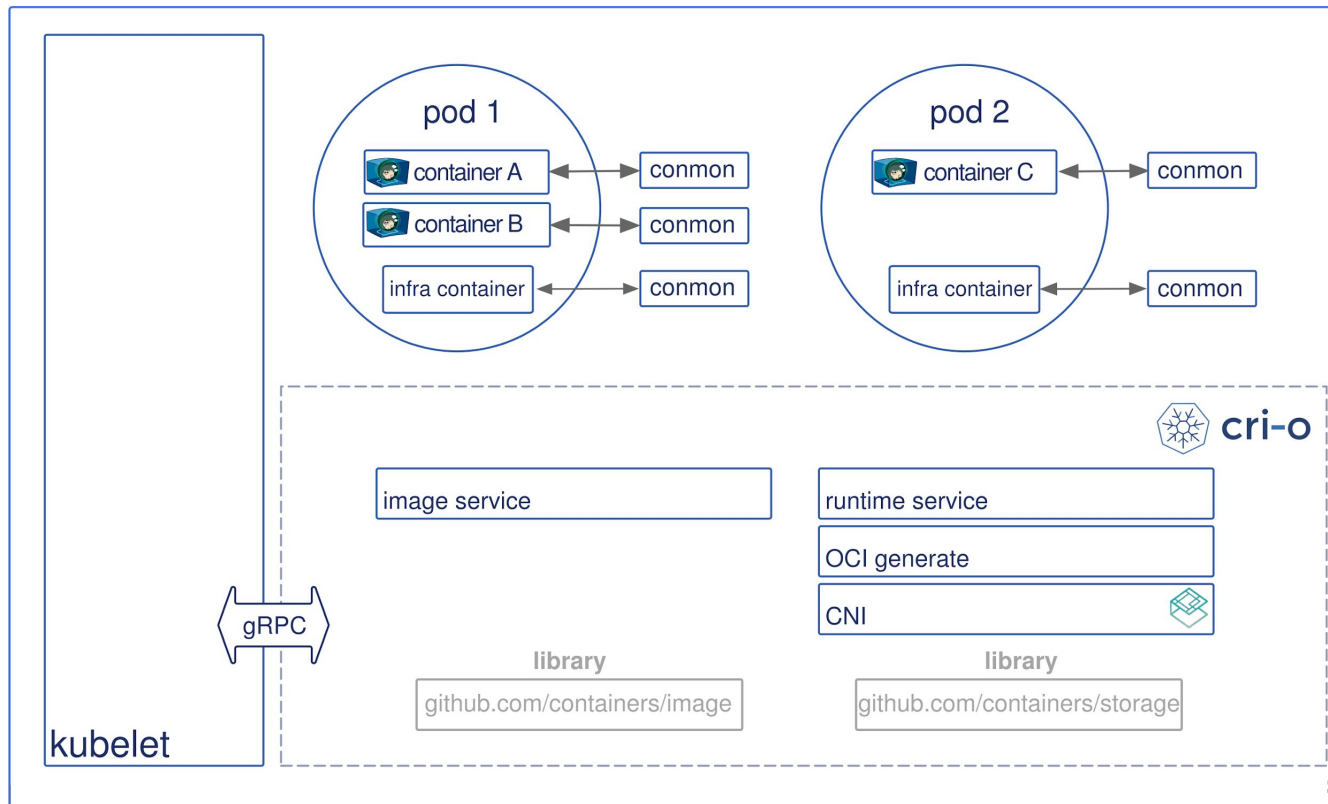
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Pod architecture (Kata Containers)



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Architecture



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Status

- **All** e2e, cri-tools, integration (>500) tests passing.
 - **No PRs merged without passing all the tests.**



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- **Goal for OpenShift 3.10 is to fully support CRI-O by default.**
 - 1.10.1 (kube 1.9.x) released.
- **Maintainers/contributors from Red Hat, Intel, Lyft, SUSE and many others.**

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Status



CRI-O is now powering nodes on OpenShift Online.

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"CRI-0 just works for them,
so they haven't had much to say"



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Making running containers in production

boring

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What else does OpenShift need?

- Ability to build container images
- Ability to push container images to container registries



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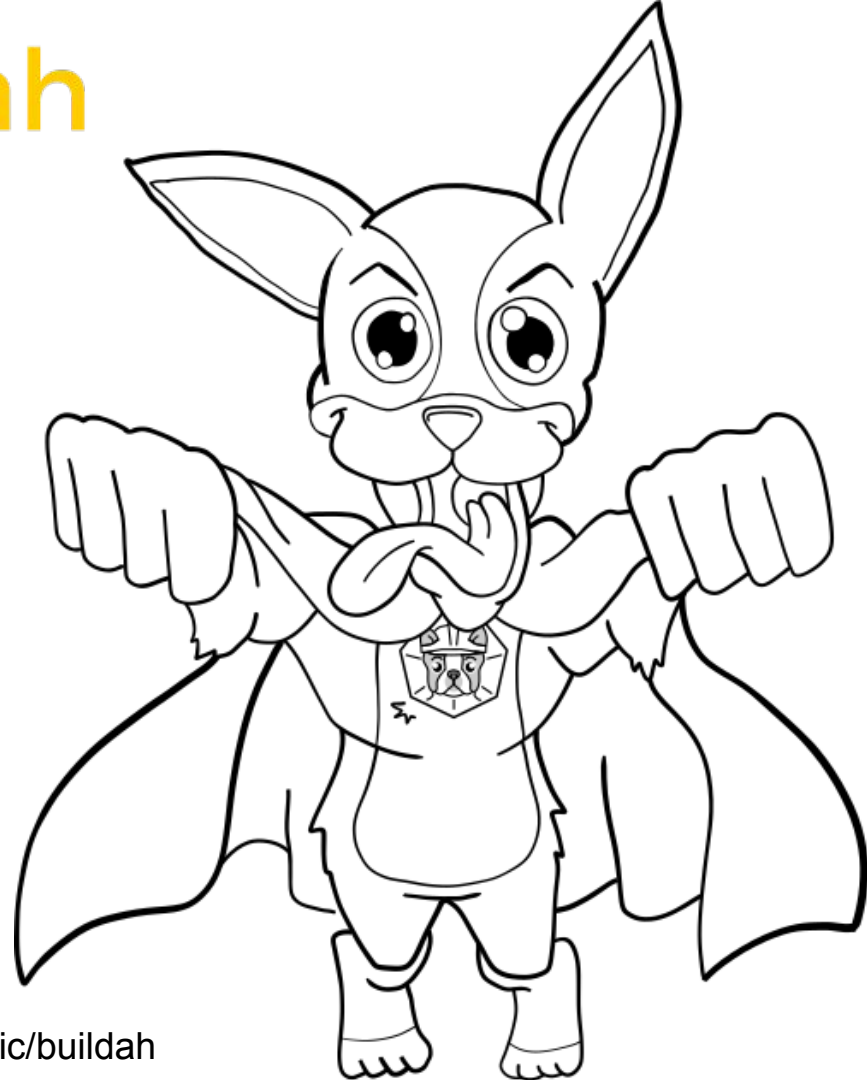
Introducing Buildah



buildah

<https://github.com/projectatomic/buildah>

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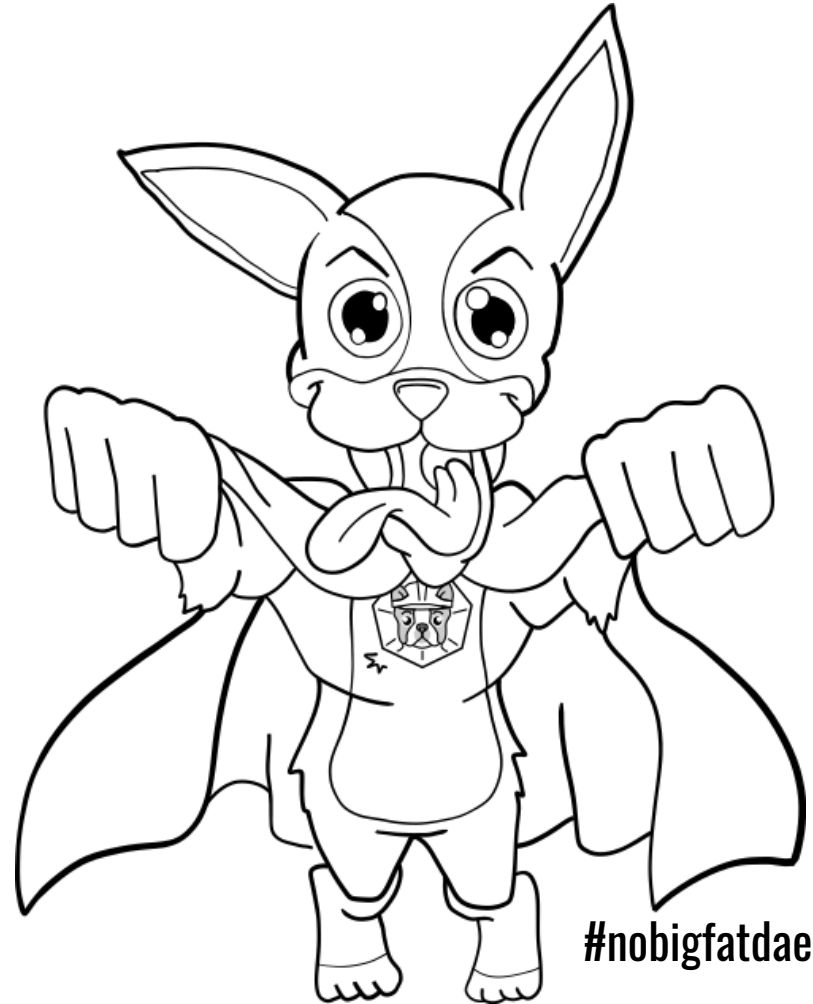


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buildah



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buildah

Coreutils for building containers. Simple interface



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buildah



Coreutils for building containers. Simple interface
ctr=\$(buildah from fedora)

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buildah



Coreutils for building containers. Simple interface

```
# ctr=$(buildah from fedora)
```

```
# mnt=$(buildah mount $ctr)
```

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Activities

Firefox

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docker cp | Docker Documentation - Mozilla Firefox

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🔒 https://docs.docker.com/engine/reference/commandline/cp/

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⋮

docker docs

🔍 Search the docs

Guides

Product manuals

Glossary

Reference

Samples

Docker v17.12 (current) 📄

File formats

Command-Line Interfaces (CLIs)

Docker CLI (docker)

Stable

Docker run reference

Use the Docker command line

docker (base command)

docker attach

docker build

docker checkpoint *

docker commit

docker config *

docker container *

docker cp

docker create

docker deploy

docker diff

docker events

docker exec

docker export

docker history

docker image *

docker images

docker cp

Estimated reading time: 5 minutes

Description

Copy files/folders between a container and the local filesystem

Usage

```
docker cp [OPTIONS] CONTAINER:SRC_PATH DEST_PATH|-
docker cp [OPTIONS] SRC_PATH|- CONTAINER:DEST_PATH
```

Options

Name, shorthand	Default	Description
<code>--archive , -a</code>		Archive mode (copy all uid/gid information)
<code>--follow-link , -L</code>		Always follow symbol link in SRC_PATH

Parent command

Command	Description
<code>docker</code>	The base command for the Docker CLI.

Extended description

The `docker cp` utility copies the contents of `SRC_PATH` to the `DEST_PATH` . You can copy from the container's file system to the local machine or the reverse, from the local filesystem to the container. If `-` is specified for either the `SRC_PATH` or `DEST_PATH` , you can also stream a tar archive from `STDIN` or to `STDOUT` . The `CONTAINER` can be a running or stopped container. The `SRC_PATH` or `DEST_PATH` can be a file or directory.

✎ Edit this page

✓ Request docs changes

? Get support

⚙️ ☒ ☐

On this page:

Description

Usage

Options

Parent command

Extended description



buildah



Coreutils for building containers. Simple interface

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# cp -R src $mnt
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```

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buildah



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```

```
# buildah config --entrypoint=/usr/sbin/test.sh --env foo=bar $ctr
```

```
# buildah commit $ctr myhttpd
```

```
# buildah push myhttpd docker://rhatdan/myhttpd
```

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buildah



Dan Wait!

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buildah



Dan Wait!

What about Dockerfile?????

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buildah

Buildah also supports Dockerfile
`buildah build-using-dockerfile -f Dockerfile .`



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buildah



Buildah also supports Dockerfile

buildah build-using-dockerfile -f Dockerfile .

Or for those lazy ones:

buildah **bud** -f Dockerfile .

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buildah



**Does Buildah have a
scripting language?
Perhaps Buildahfile?**

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buildah

BASH



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buildah



BASH

We want others to build higher level tools on Buildah.

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buildah



BASH

We want others to build higher level tools on Buildah.

Working to make OpenShift use Buildah for S2I containers rather than use Docker.

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buildah



BASH

We want others to build higher level tools on Buildah.

Working to make OpenShift use Buildah for S2I containers rather than use Docker.

Want to work with Ansible-containers to use buildah for containers as well.

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What else does OpenShift need?

- Ability to diagnose problems on the host
- If you don't use Docker to run the containers, how does an admin discover what is going on in his Container runtime, without the docker CLI?



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Introducing podman
part of the libpod effort



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Introducing podman part of the libpod effort

podman is tool for managing POD/Containers based on the Docker CLI



<https://github.com/projectatomic/libpod>

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Introducing podman

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# podman ps -a
```

<https://github.com/projectatomic/libpod>



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podman is tool for managing POD/Containers based on the Docker CLI

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# podman exec -ti fedora sh
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# podman run -ti fedora sleep 2000
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```
# podman exec -ti fedora sh
```

```
# podman images
```

...

<https://github.com/projectatomic/libpod>



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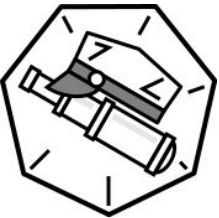


Introducing Skopeo



<https://github.com/projectatomic/skopeo>

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Skopeo

- `$ skopeo inspect docker://docker.io/fedora`
- `$ skopeo copy docker://busybox:1-glibc atomic:myns/unsigned:streaming`
`$ skopeo copy docker://busybox:latest dir:existingemptydirectory`
`$ skopeo copy docker://busybox:latest oci:busybox_ocilayout:latest`
- `$ skopeo delete docker://localhost:5000/imagename:latest`



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<https://github.com/mairin/coloringbook-container-commandos/blob/master/Web.pdf>

Questions

Blog: <https://medium.com/cri-o>

Github:

- <https://github.com/kubernetes-incubator/cri-o>
- <https://github.com/projectatomic/buildah>
- <https://github.com/projectatomic/skopeo>
- <https://github.com/projectatomic/libpod> (podman)
- <https://github.com/containers/storage>
- <https://github.com/containers/image>

IRC: freenode: #cri-o

IRC: freenode: #podman

Site: <https://cri-o.io>

