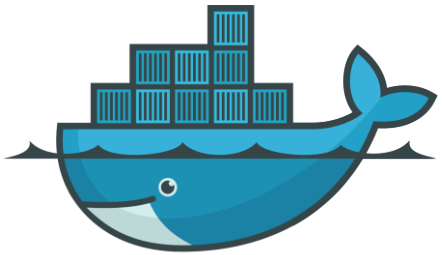
Docker vs Containerd

Ghazela Tech



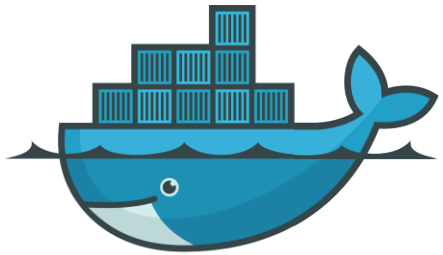
Docker

ctr

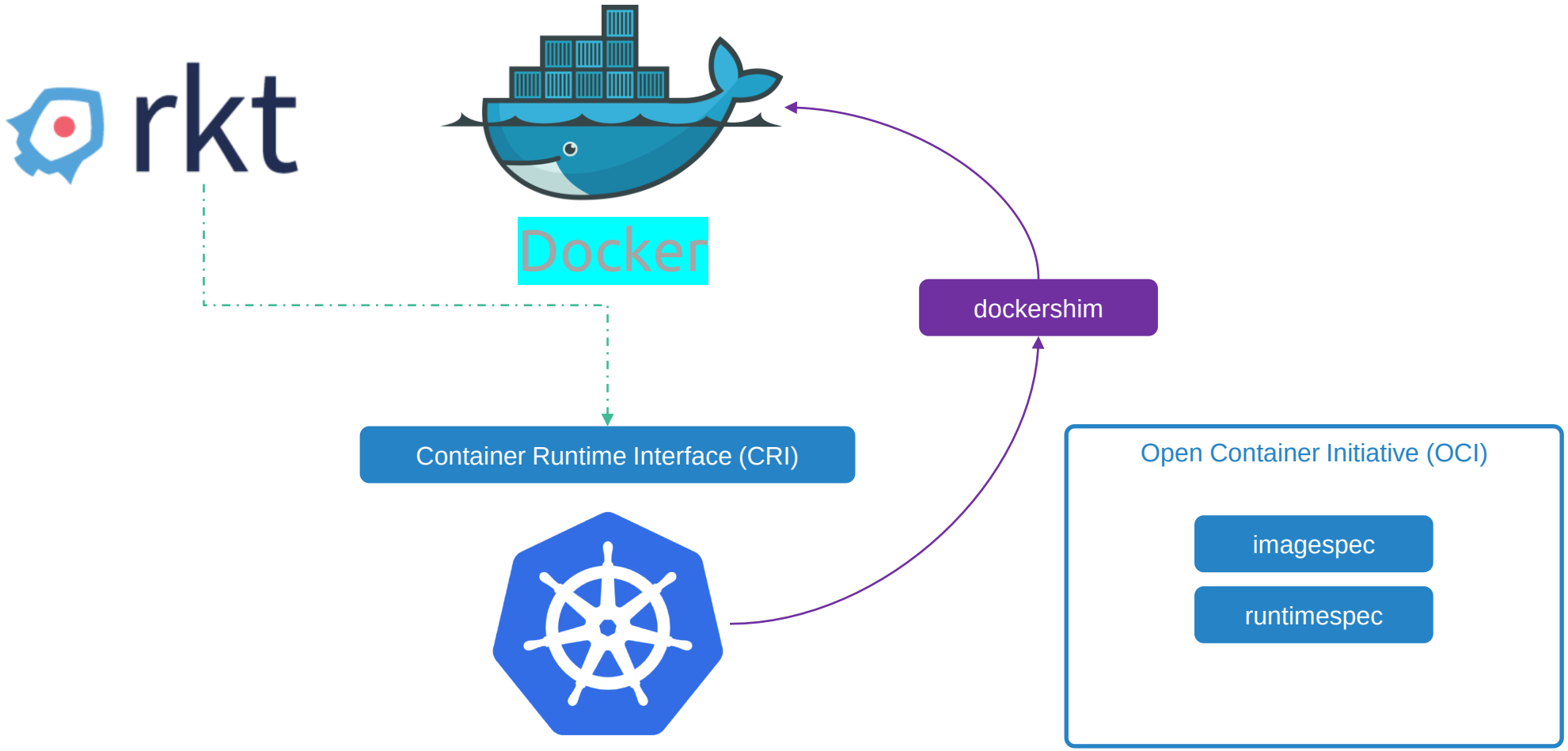
nerdctl

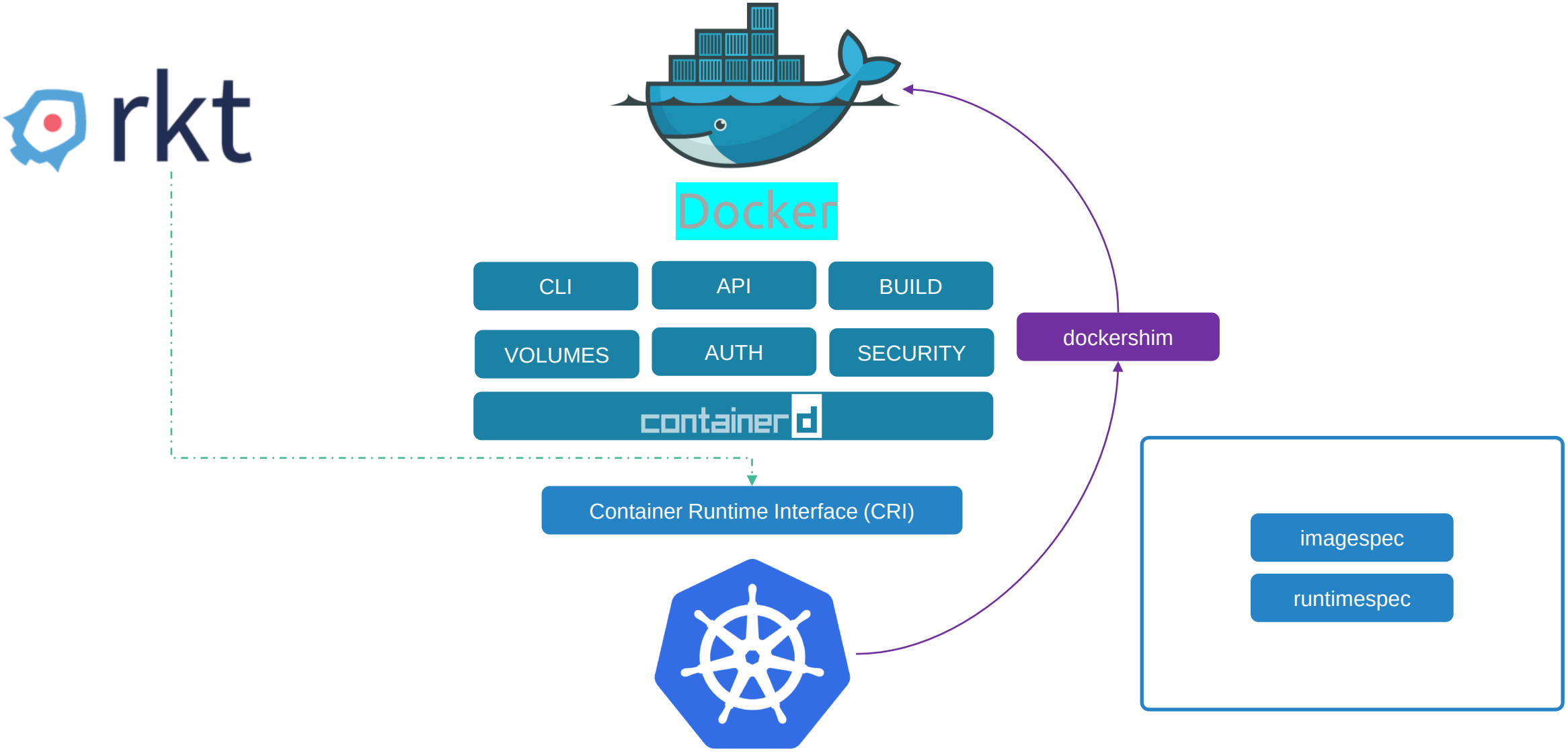
crictl

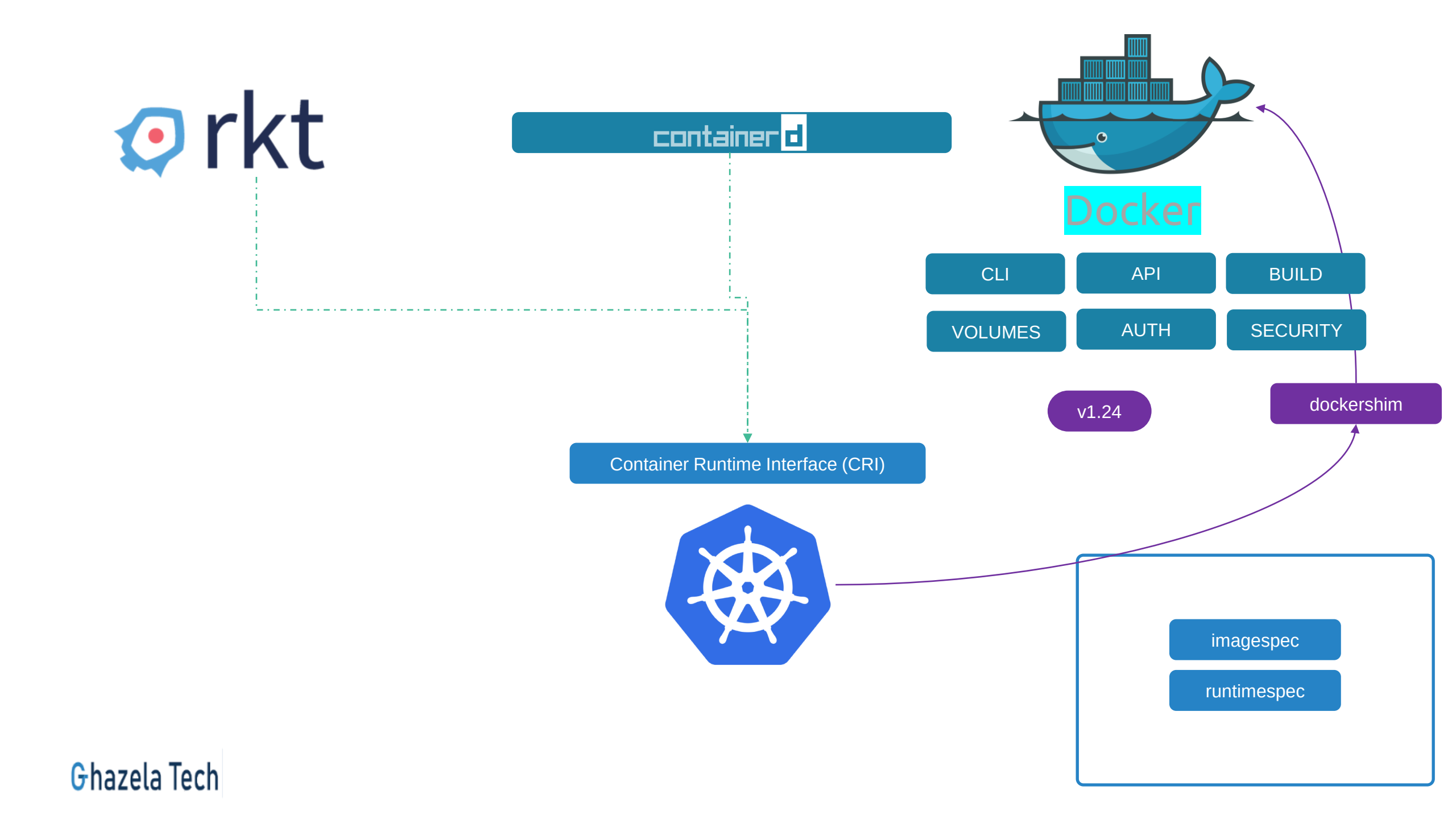
Ghazela Tech



Docker


rkt
Docker
dockershim
Container Runtime Interface (CRI)
Open Container Initiative (OCI)
imagespec
runtimespec


rkt
Docker
CLI
API
BUILD
VOLUMES
AUTH
SECURITY
containerd
Container Runtime Interface (CRI)
dockershim
imagespec
runtimespec

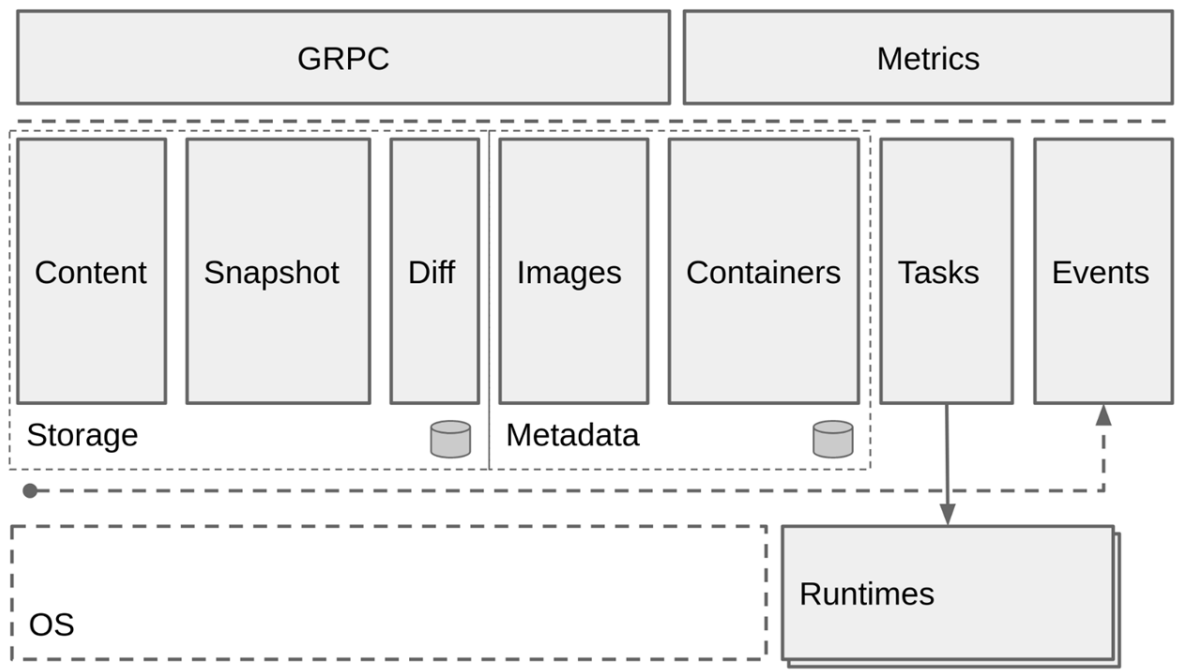

rkt
containerd
Docker
CLI
API
BUILD
VOLUMES
AUTH
SECURITY
v1.24
dockershim
Container Runtime Interface (CRI)
imagespec
runtimespec

README.md

containerd is an industry-standard container runtime with an emphasis on simplicity, robustness, and portability. It is available as a daemon for Linux and Windows, which can manage the complete container lifecycle of its host system: image transfer and storage, container execution and supervision, low-level storage and network attachments, etc.

containerd is a member of CNCF with 'graduated' status.

containerd is designed to be embedded into a larger system, rather than being used directly by developers or end-users.



Getting started with containerd

Installing containerd

Option 1: From the official binaries

The official binary releases of containerd are available for the `amd64` (also known as `x86_64`) and `arm64` (also known as `aarch64`) architectures.

Typically, you will have to install runc and CNI plugins from their official sites too.

Step 1: Installing containerd

Download the `containerd-<VERSION>-<OS>-<ARCH>.tar.gz` archive from https://github.com/containerd/containerd/releases , verify its sha256sum, and extract it under `/usr/local`:

```
$ tar Cxzvf /usr/local containerd-1.6.2-linux-amd64.tar.gz
bin/
bin/containerd-shim-runc-v2
bin/containerd-shim
bin/ctr
bin/containerd-shim-runc-v1
bin/containerd
bin/containerd-stress
```

The `containerd` binary is built dynamically for glibc-based Linux distributions such as Ubuntu and Rocky Linux. This binary may not work on musl-based distributions such as Alpine Linux. Users of such distributions may have to install containerd from the source or a third party package.

> **FAQ**: For Kubernetes, do I need to download `cri-containerd-(cni-)<VERSION>-<OS-<ARCH>.tar.gz` too?
>
> **Answer**: No.
>
> As the Kubernetes CRI feature has been already included in `containerd-<VERSION>-<OS>-<ARCH>.tar.gz`, you do not need to download the `cri-containerd-....` archives to use CRI.
>
> The `cri-containerd-...` archives are deprecated, do not work on old Linux distributions, and will be removed in containerd 2.0.

CLI - ctr

- ctr comes with containerD
- Not very user friendly
- Only supports limited features

While the `ctr` tool is bundled together with containerd, it should be noted the `ctr` tool is solely made for debugging containerd. The `nerdctl` tool provides stable and human-friendly user experience.

CLI - ctr

```
>_

$ ctr

$ ctr images pull docker.io/library/redis:alpine

$ ctr run docker.io/library/redis:alpine redis
```

https://github.com/containerd/containerd/blob/main/docs/getting-started.md

CLI - nerdctl

- nerdctl provides a Docker-like CLI for containerD
- nerdctl supports docker compose
- nerdctl supports newest features in containerd
  - Encrypted container images
  - Lazy Pulling
  - P2P image distribution
  - Image signing and verifying
  - Namespaces in Kubernetes

CLI - nerdctl

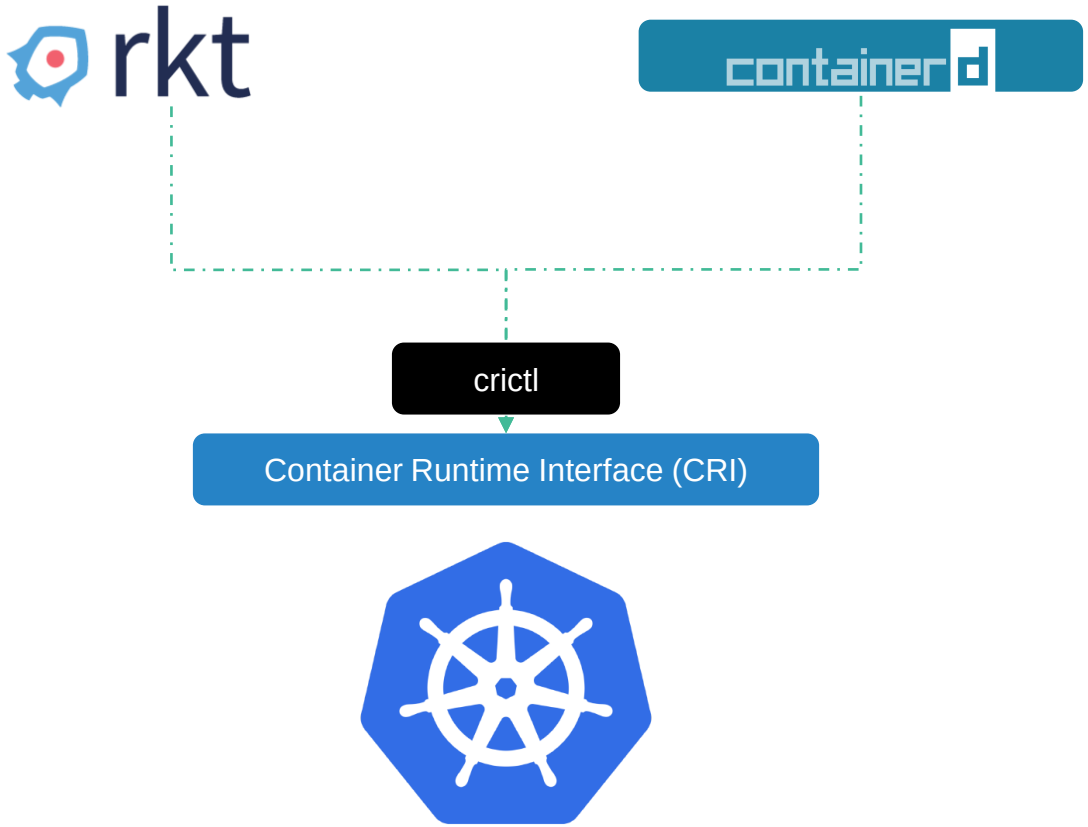
```
>_
```

```
$ docker                                    ➡ $ nerdctl

$ docker run --name redis redis:alpine      ➡ $ nerdctl run --name redis redis:alpine

$ docker run --name webserver -p 80:80 -d nginx ➡ $ nerdctl run --name webserver -p 80:80 -d nginx
```

https://github.com/containerd/containerd/blob/main/docs/getting-started.md

CLI - crictl

- crictl provides a CLI for CRI compatible container runtimes
- Installed separately
- Used to inspect and debug container runtimes
  - Not to create containers ideally.
- Works across different runtimes



CLI - crictl

```
$ crictl

$ crictl pull busybox

$ crictl images

$ crictl ps -a

$ crictl exec -i -t 3e025dd50a72d956c4f14881fbb5b1080c9275674e95fb67f965f6478a957d60 ls

$ crictl logs  3e025dd50a72d956c4f1

$ crictl pods
```

https://github.com/containerd/containerd/blob/main/docs/getting-started.md

docker vs crictl

Retrieve debugging information

docker cli	crictl	Description	Unsupported Features
`attach`	`attach`	Attach to a running container	`--detach-keys` , `--sig-proxy`
`exec`	`exec`	Run a command in a running container	`--privileged` , `--user` , `--detach-keys`
`images`	`images`	List images	
`info`	`info`	Display system-wide information	
`inspect`	`inspect` , `inspecti`	Return low-level information on a container, image or task	
`logs`	`logs`	Fetch the logs of a container	`--details`
`ps`	`ps`	List containers	
`stats`	`stats`	Display a live stream of container(s) resource usage statistics	Column: NET/BLOCK I/O, PIDs
`version`	`version`	Show the runtime (Docker, ContainerD, or others) version information	

https://kubernetes.io/docs/reference/tools/map-crictl-dockercli/

docker vs crictl

Perform Changes

docker cli	crictl	Description	Unsupported Features
`create`	`create`	Create a new container	
`kill`	`stop` (timeout = 0)	Kill one or more running container	`--signal`
`pull`	`pull`	Pull an image or a repository from a registry	`--all-tags` , `--disable-content-trust`
`rm`	`rm`	Remove one or more containers	
`rmi`	`rmi`	Remove one or more images	
`run`	`run`	Run a command in a new container	
`start`	`start`	Start one or more stopped containers	`--detach-keys`
`stop`	`stop`	Stop one or more running containers	
`update`	`update`	Update configuration of one or more containers	`--restart` , `--blkio-weight` and some other resource limit not supported by CRI.

https://kubernetes.io/docs/reference/tools/map-crictl-dockercli/

CLI - crictl

```
>_
```

```
$ crictl --runtime-endpoint

$ export CONTAINER_RUNTIME_ENDPOINT
```

- unix:///var/run/dockershim.sock or
- unix:///run/containerd/containerd.sock or
- unix:///run/crio/crio.sock or
- unix:///var/run/cri-dockerd.sock

https://github.com/containerd/containerd/blob/main/docs/getting-started.md

ctr

nerdctl

crictl

Purpose	Debugging	General Purpose	Debugging
Community	ContainerD	ContainerD	Kubernetes
Works With	ContainerD	ContainerD	All CRI Compatible Runtimes