

# containerd: Project Update and Deep Dive

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Intro

v2.0 recap

Brief project updates:

- v2.1 coming soon!
- New release cadence
- Changes to the LTS model
- Improved KEP process
- Runwasi 1.0!

*and*

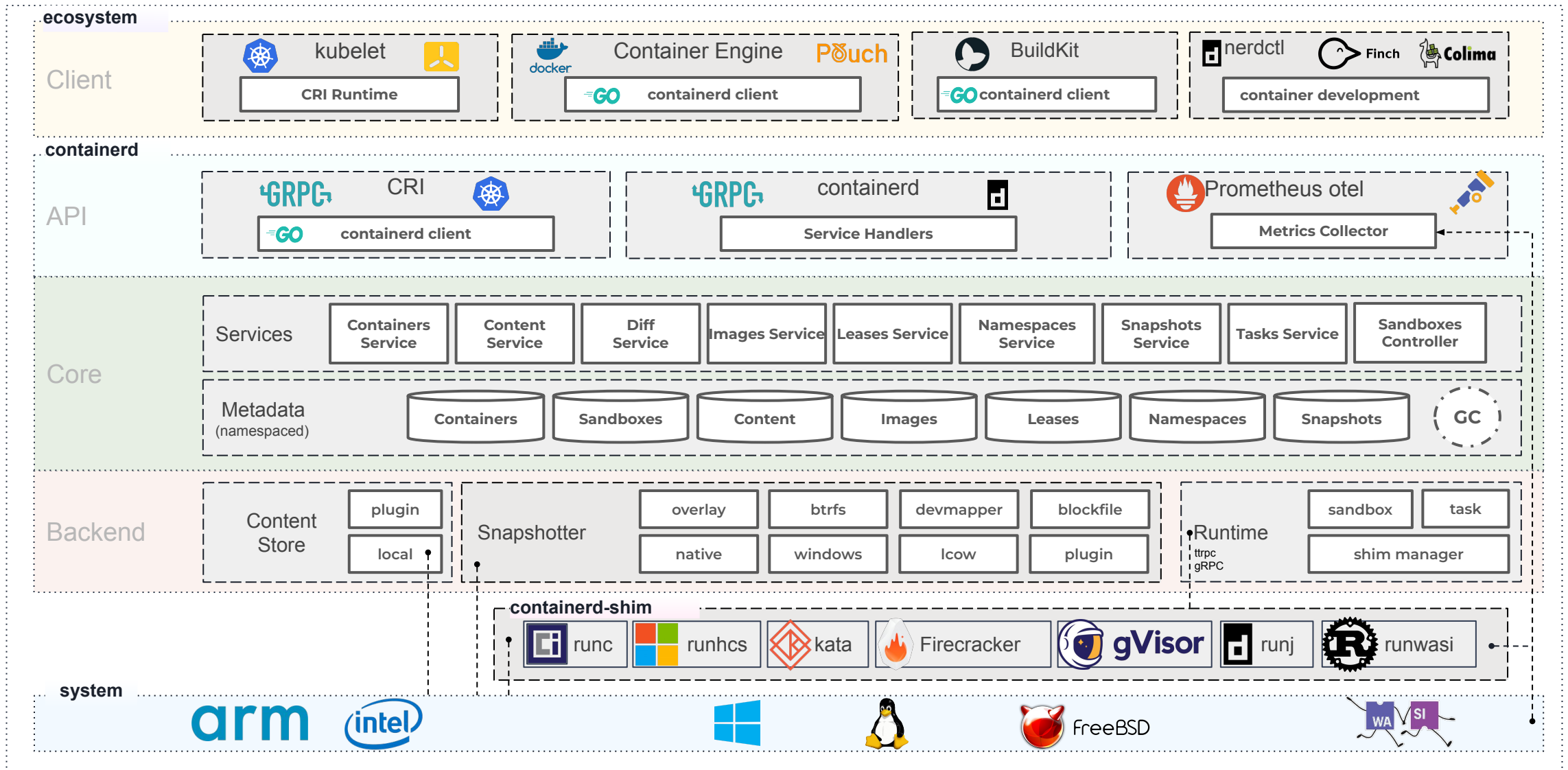
Maintainer panel discussion!



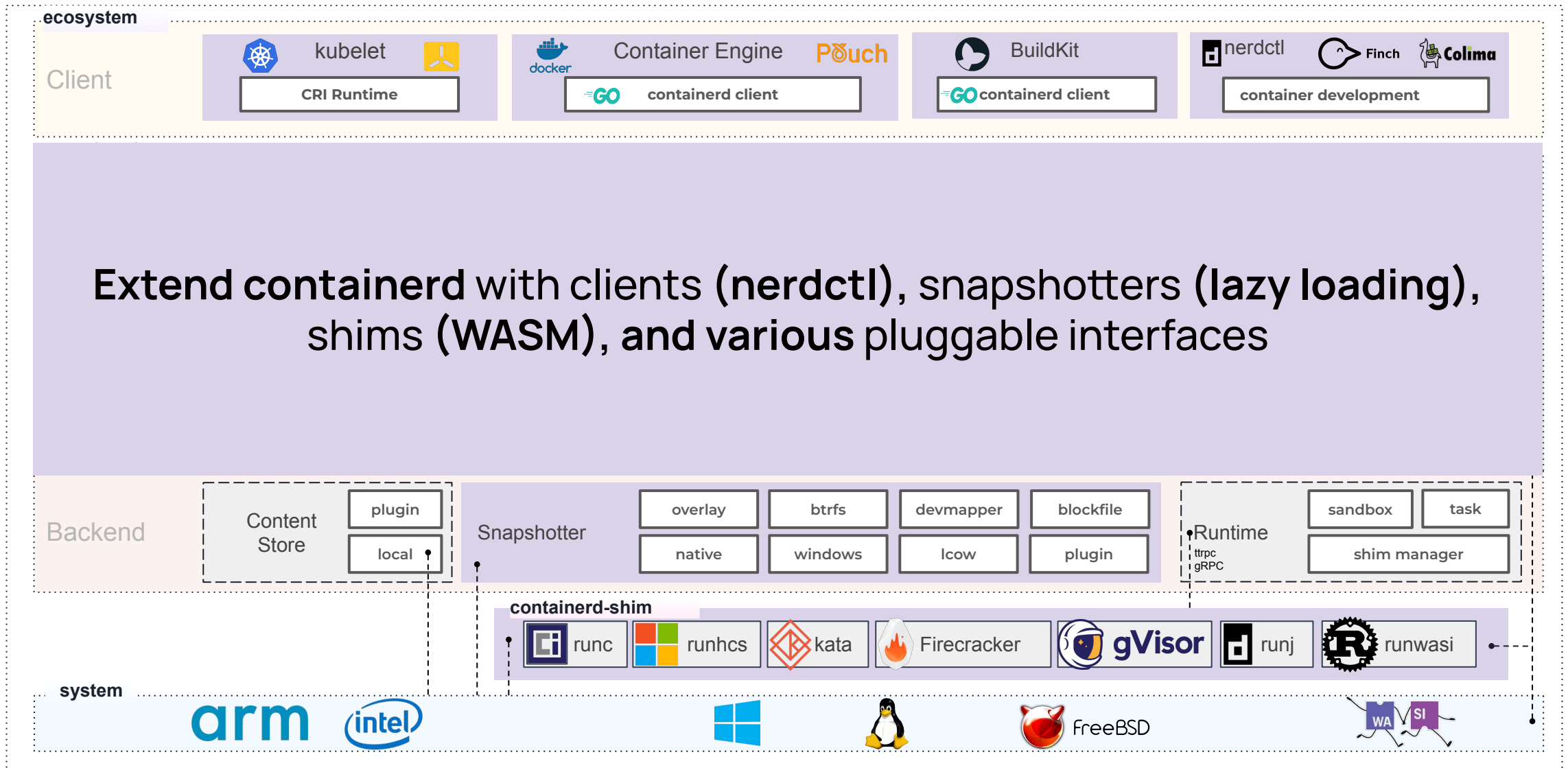
<https://containerd.io/>

- The industry's standard container runtime, supporting both Docker and Kubernetes
- Adopted by well-known enterprise Kubernetes services and distributions
  - Amazon EKS, Azure Kubernetes Service, Google Kubernetes Engine, ...

# Introduction to containerd



# Introduction to containerd



# Introduction to containerd: nerdctl



<https://github.com/containerd/nerdctl>

- Same UI/UX as the docker CLI (including Compose)
- Originally made for facilitating new experiments in the containerd platform (e.g., stargz, fast rootless with bypass4netns)
- Useful for debugging Kubernetes nodes too

```
$ nerdctl run hello-world  
$ nerdctl compose up
```

- Released in November 2024
- The first major update since v1.0 (December 2017)
- Stabilized experimental APIs
- Removed deprecated features

# v2.0 breaking changes

- Docker Schema 1 (migrate images to Schema 2 and OCI Image Spec)
- Legacy V1 shims (use containerd-shim-runc-v2)
- CRI v1alpha2 (use CRI v1)
- AUFS (use OverlayFS)
- `io_uring_*` syscalls disallowed by default
- Removed `LimitNOFILE`
- Removed `cri-containerd-*.tar.gz` release bundles



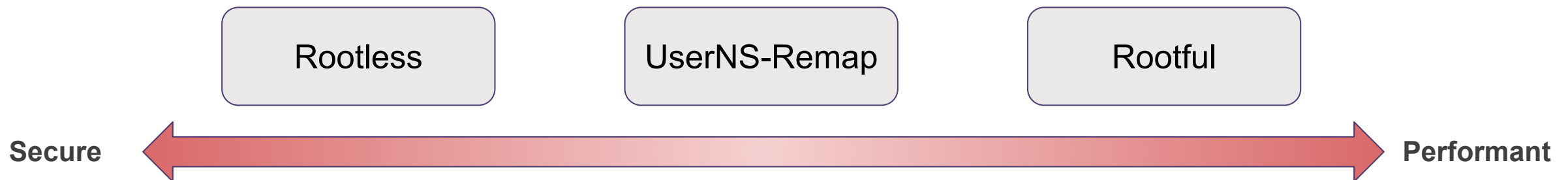
# v2.0 new features

- Transfer service (Stable)
- Sandbox API (Stable, enabled by default)
- NRI (Enabled by default)
- CDI (Enabled by default)
- Image verifier plugins (New)
- CRI support for user namespaces
- CRI support for recursive read-only mounts
- Plugin introspection (New)
- igzip support (New)

- EROFS (Enhanced Read-Only File System) ([#10705](#))
  - Suitable for images with many layers
- Image volumes ([#10579](#))
  - Allow mounting an image as a Kubernetes volume
  - Useful for distributing AI models, etc.  
so as to split the code image from the data image

- Writable /sys/fs/cgroup ([#11131](#))
  - Allow a container to self-control the resources (CPU, memory, ...)
- More flexible support for UserNS-remap ([#10722](#))
  - The UID mapping range can be now non-contiguous  
e.g., uidmap=0:666:1000,1000:6666:64536'

- UserNS-remap mode ([#3941](#), WIP)
  - Not to be confused with Rootless mode (available since v0.6)
  - **Rootless**: execute everything as a non-root user
  - **UserNS-remap**: execute containers as a non-root, but containerd per se still runs as the root



- gomodjail ([#4012](#), WIP, experimental)
  - Imposes syscall restrictions on a specific set of Go modules so as to mitigate potential vulnerabilities and supply chain attacks (Caveat: Not applicable to ones that use unsafe pointers, reflections, etc.)

```
//gomodjail:confined
module github.com/containerd/nerdctl/v2

require (
    github.com/Masterminds/semver/v3 v3.3.1
    ...
    golang.org/x/sys v0.31.0 //gomodjail:unconfined
    ...
)
```

# New release cadence!

- New minor releases (2.x) every 6 months
- Starting with the 2.1 release in **May** and 2.2 in **November**
  - (and continuing May and November after that)
- Beta builds start 8-10 weeks before a minor release (March and September)
- Feature freeze and RCs start 2-4 weeks before a minor release (April and October)

March 2025	2.1 Beta
April 2025	2.1 feature freeze and RC
May 2025	2.1 release!
June - August 2025	Development focused on 2.2
September 2025	2.2 Beta
October 2025	2.2 feature freeze and RC
November 2025	2.2 release!

# Changed Long-Term Supported model

- Named volunteer maintainers for each LTS branch
- LTS releases are supported for a minimum of 2 years
  - Can be longer at discretion of branch owners
- containerd 1.7 is now LTS, with EOL scheduled for March 10, 2026
- containerd 1.6 EOL scheduled for July 23, 2025

Release	Status	EOL
1.6	LTS	July 23 2025
1.7	LTS	March 10 2026
2.0	Active	November 7 2025 (tentative)

- Goal: improved visibility and communication
- Tracking issues in containerd/containerd repo (New!)
- “KEP shepherd” containerd maintainer to help move PRs along (New!)
- “SIG-Node liaison” containerd maintainer to improve containerd project <-> SIG-Node communication (New!)
- Covers KEPs and minor non-KEP integration issues
- See more: <https://containerd.io/keps>





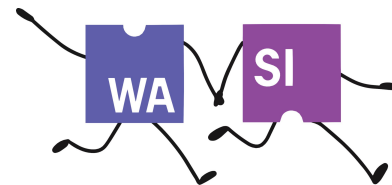
- A rust [containerd-shim library](#) designed to facilitate running WebAssembly workloads managed by containerd.
- Includes ready-to-use shims for wasmtime, WasmEdge and more.
- Adopted by SpinKube and used in production in Azure Kubernetes Service, Civo etc.

```
apiVersion: v1
kind: Pod
metadata:
  name: wasm
labels:
  app: wasm
spec:
  runtimeClassName: wasmtime
  containers:
    - name: ...
```

```
apiVersion: node.k8s.io/v1
kind: RuntimeClass
metadata:
  name: wasmtime
handler: wasm
```

```
# /etc/containerd/config.toml
```

```
version = 3
[plugins.'io.containerd.cri.v1.runtime'.containerd.runtimes.wasm]
runtime_type = "io.containerd.wasmtime.v1"
```

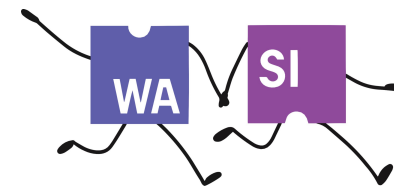


[github.com/containerd/runwasi](https://github.com/containerd/runwasi)

[v1.0.0-rc.1](#) was released on March 30th, 2025:

- Shim and Sandbox traits to implement containerd shims for Wasm workloads
- Extensive benchmarking
- Support OCI artifacts and optimizations including precompilation of the modules
- Can execute Linux container and Wasm side-by-side thanks to youki

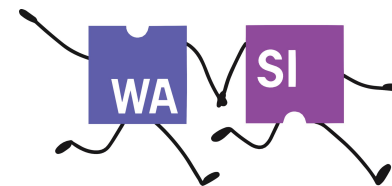
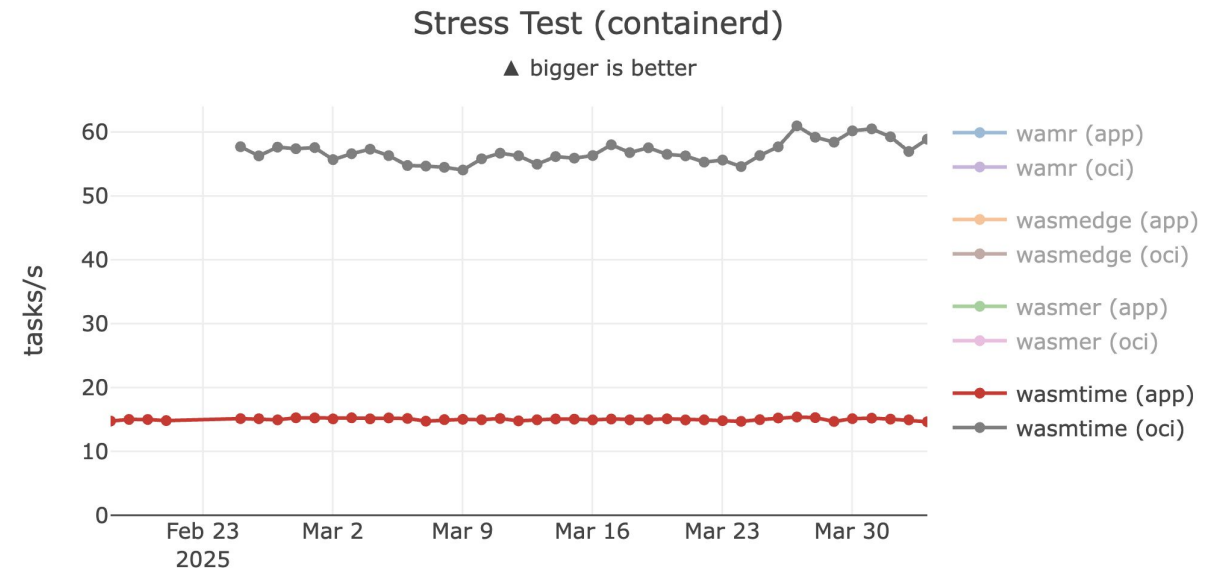
[github.com/youki-dev/youki](https://github.com/youki-dev/youki)



# runwasi v1.0 Performance

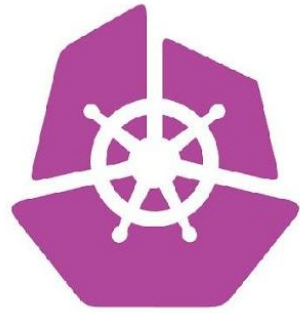
[runwasi.dev/benchmarks](https://runwasi.dev/benchmarks)

Runtime	Tasks	Time	Throughput
runwasi wasmtime	1000	3s 31ms	329.85 tasks/s
runc distroless wasmtime	1000	11s 795ms	84.78 tasks/s

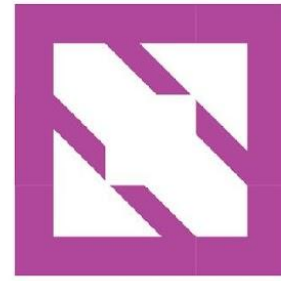


# Panel discussion

- **GitHub:** <https://github.com/containerd>
- **Slack:** <https://slack.cncf.io/>  
(Channels: `#containerd` `#containerd-dev`)
- **X (former Twitter):** [@containerd](https://twitter.com/containerd)
- **Bluesky:** [@containerd.dev](https://bsky.app/profile/containerd.dev)



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