

CNCF TAG-Runtime: Cloud Native Open Source Core Components

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Agenda

- TAG-Runtime overview
- Batch System Initiative Working Group
- Edge IoT
- Autoscaling & KEDA
- Confidential Computing

Charter

“TAG-Runtime objective is to help enable the adoption and execution of the full spectrum of workload types, including both general latency-sensitive and batch, as well as more specialized categories listed as in scope, in cloud-native environments.”

- TOC Liaisons: Ricardo Rocha, Davanum Srinivas, Richard Hartmann
- Chair: Ricardo Aravena, Quinton Hoole, Diane Feddema
- Tech Leads: Klaus Ma, Alexander Kanevskiy
- Meeting: 1st & 3rd Thu of each month at 8am Pacific
- Email: <https://lists.cncf.io/g/cncf-tag-runtime>
- Slack: <https://slack.cncf.io/#tag-runtime>

Scope



Wasm

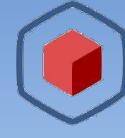


Metal3.io



WasmEdge

OpenYurt



CONFIDENTIAL
CONTAINERS



Kubernetes

containerd



Harbor



K3s



Akri



Tinkerbell



KubeEdge



Volcano



CRI-O



Sysbox



KEDA



Virtual Kubelet

Scope Areas

General Workload Orchestration

- Kubernetes, Volcano, Armada
- KEDA, NRI.
- Metal3-io, Tinkerbell
- Etc

Runtimes/VMs/Containers

- Containerd, CRI-O
- WASM: WasmEdge, Wasmtime, WASM Cloud
- Trow, Harbor, Quay
- Sysbox, Confidential Containers

Serverless Workloads

- Knative
- OpenFunction

Special Purpose Operating Systems

- Vorteil, FlatCar, Talos.
- Etc

AI/Edge/MLOps

- KubeEdge, OpenYurt, SuperEdge, K3s
- KubeDL, Kubeflow, MLflow, TFX, etc
- Seldom Core

Working Groups

- Container Orchestrated Device
- Batch System Initiative
- Edge IoT (In progress)

Activities & Presentations



K8s Cluster Management

- Clusternet 
- Open Cluster Management 

Serverless Workloads

- Knative 
- OpenFunction 

Workload and App Mgmt

- OpenKruise 

Kubernetes & Edge

- KOs 

Confidential Computing

- Confidential Containers 
- Inclavare Containers 

Workload Constraints & Scheduling

- Turnbuckle 
- Pallet 

Batch System Initiative













How to Join In

If you are in any way, shape, or form interested in batch scheduling on Kubernetes, join the conversation:

- 7:30am PST, every other week
- <https://zoom.us/j/97020374449>

Slack:

- [#batch-wq](#) at the **cloud-native.slack.com** Slack workspace

Reach out to us directly:

- Alex Scammon (alex@gr-oss.io)
- Klaus Ma (klaus@xflops.cn)
- Weiwei Yang (abvclouds@gmail.com)



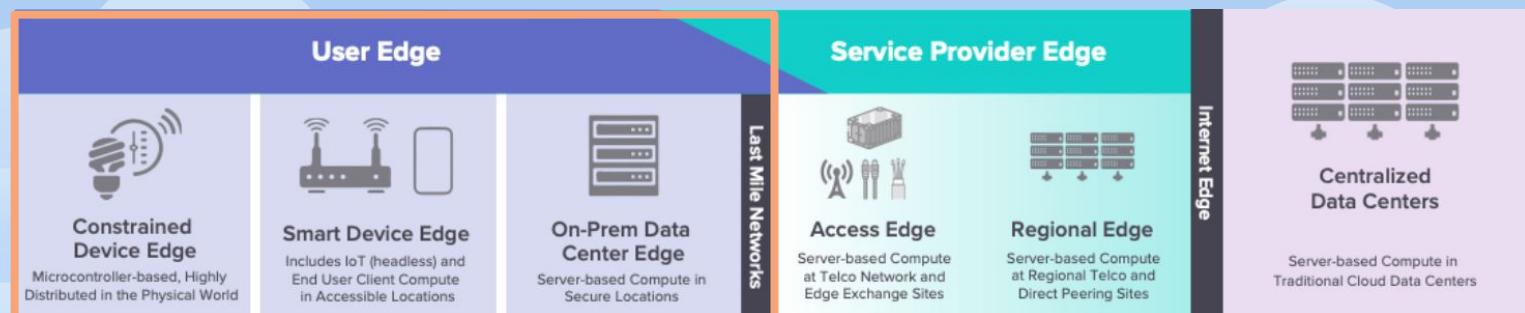
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Edge & IoT



IoT Edge Projects

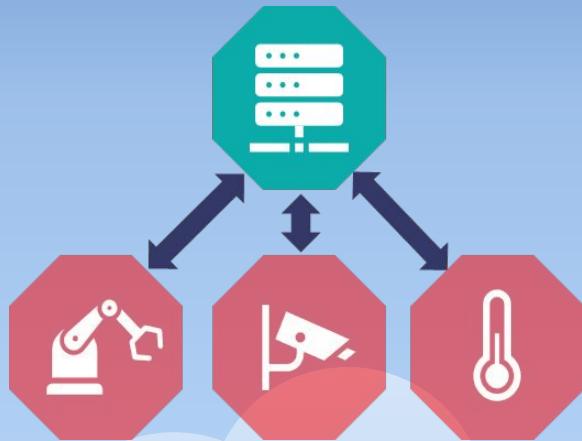
1. On-Prem/Edge Workload Orchestration: [KubeEdge](#), [SuperEdge](#), [OpenYurt](#), [K3s](#), [WasmCloud](#), [WasmEdge](#)
2. On-device workloads: WebAssembly runtimes
3. Integrating constrained devices to edge computing solutions: [Akri](#)



Source: LF Edge white paper [Sharpening the Edge: Overview of the LF Edge Taxonomy and Framework](#)



Akri - A Kubernetes Resource Interface



```
resources:  
limits:  
  akri.sh/onvif-camera-<id>: "1"  
requests:  
  akri.sh/onvif-camera-<id>: "1"
```

Discovers IoT devices. Handles dynamic appearance and disappearance of devices

Connects IoT devices to a Kubernetes cluster by representing them as a native Kubernetes resources

Schedules workloads based on what devices are connected to the cluster

Kubernetes Native: K8s operator, CRDs, Helm

IoT Edge Working Group

- Transitioning from Kubernetes WG to CNCF
- Build cohesion around heterogeneity of devices and solutions on the edge
- Collaborates with Linux and Eclipse Foundation edge projects
- Join Slack: <https://kubernetes.slack.com/messages/wg-iot-edge>

Autoscaling & KEDA



KEDA

- Kubernetes **E**vent **D**riven **A**utoscaling dead simple
- Automatically scale Kubernetes Deployments, Jobs & Custom Resources **based on events**
- Save resources with **scale to 0**
- 50+ built-in scalers, users can build external scalers
 - ▷ Kafka, Prometheus, RabbitMQ, AWS services, Azure Services,...

KEDA

Example:

App consuming messages from Kafka topic

- Application is deployed as standard **Kubernetes Deployment**
- Can be autoscaled only via standard **k8s HPA: CPU & Memory**
- **No event-driven** autoscaling

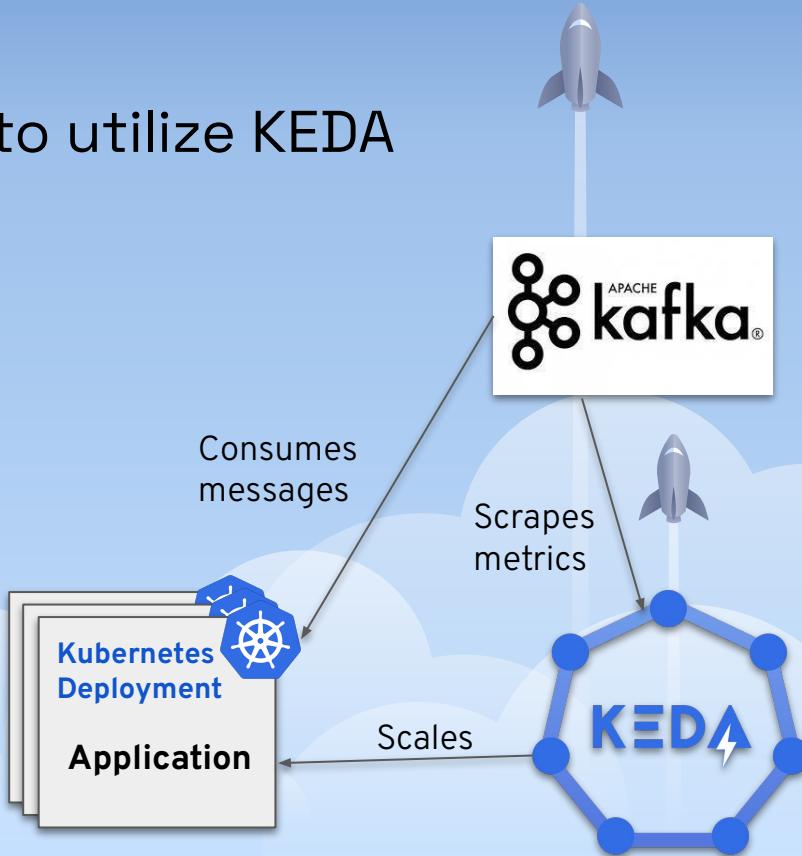


KEDA

Example:

Application redesigned to utilize KEDA

- Application remains the same and is being **deployed the same way**
- **Event-driven autoscaling** enabled by KEDA



KEDA

- 4.9k stars on GitHub
- ~190 contributors
- Releases ~ every 3 months
- 2.7 released a few weeks ago
- Bi-weekly community standups
- <https://keda.sh/community>



Confidential Computing



Cloud Native Confidential Computing

Run k8s workloads in confidential enclaves

Each workload gets its own, dedicated enclave

Different from Confidential Node (One enclave per node)

Protect the workloads code and data

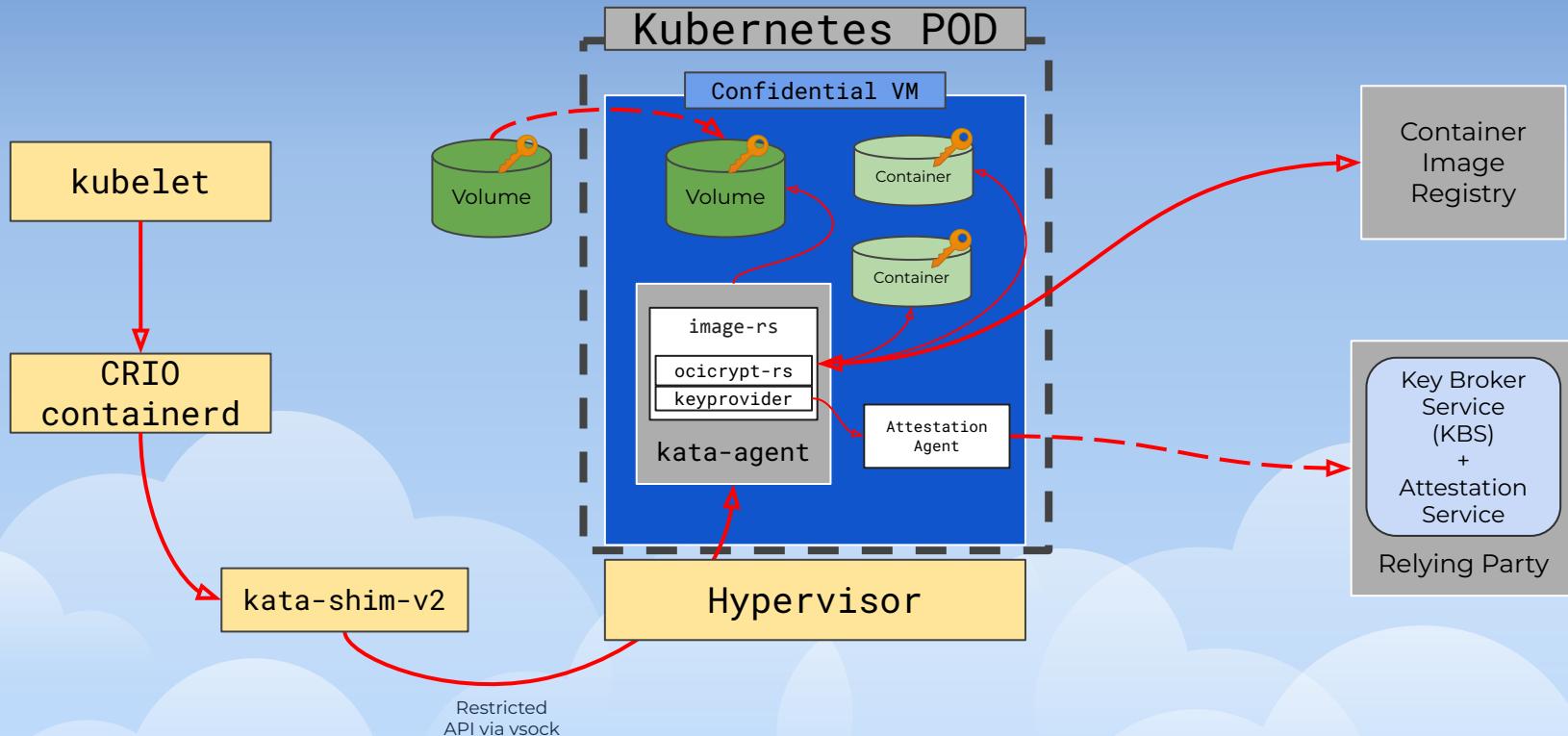
From the host - Remove the host from the TCB

From other workloads - Dedicated enclave

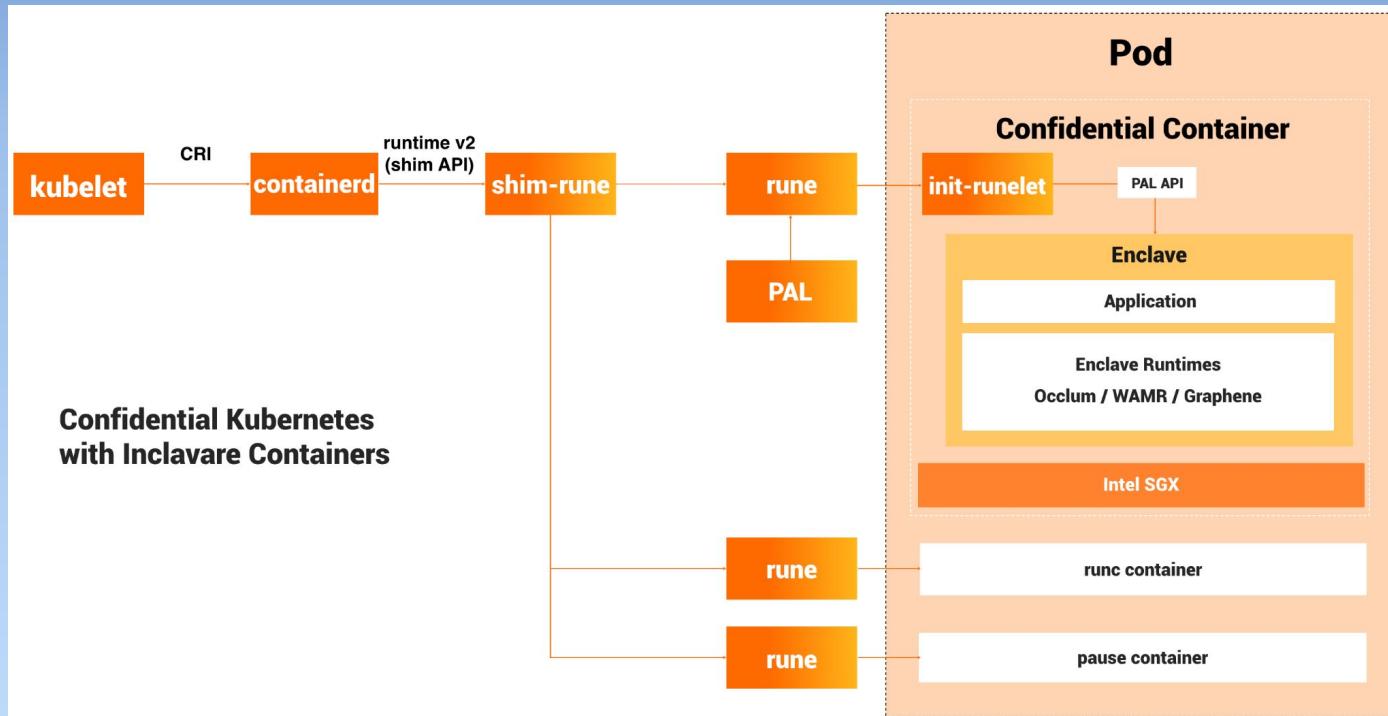
Confidential Computing Projects

1. Confidential Containers
 - a. One Pod - One Enclave
 - b. Multiple HW support (TDX, SGX, SEV, SE)
2. Inclavare
 - a. One Container - One Enclave
 - b. Intel SGX based

Confidential Containers



Inclavare



Join Us!

<https://github.com/confidential-containers>

Thursday@2pm UTC <https://zoom.us/j/98038141932>

CNCF Slack



Thanks!

Any questions?

Join the community!

You can find us:

- Alex Scammon @stackedsax
- Kate Goldenring @KateGoldenring
- Zbynek Roubalik @zroubalik
- Samuel Ortiz @sameo
- Ricardo Aravena @raravena80