Extend Kubernetes Using Rust:

A *Quick* Introduction to kube-rs

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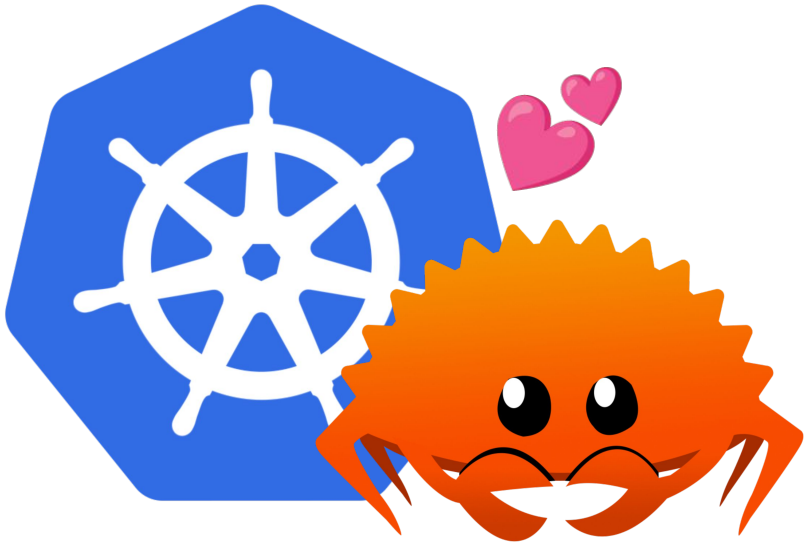
Rust Talks Bern, 20.02.2025

Agenda

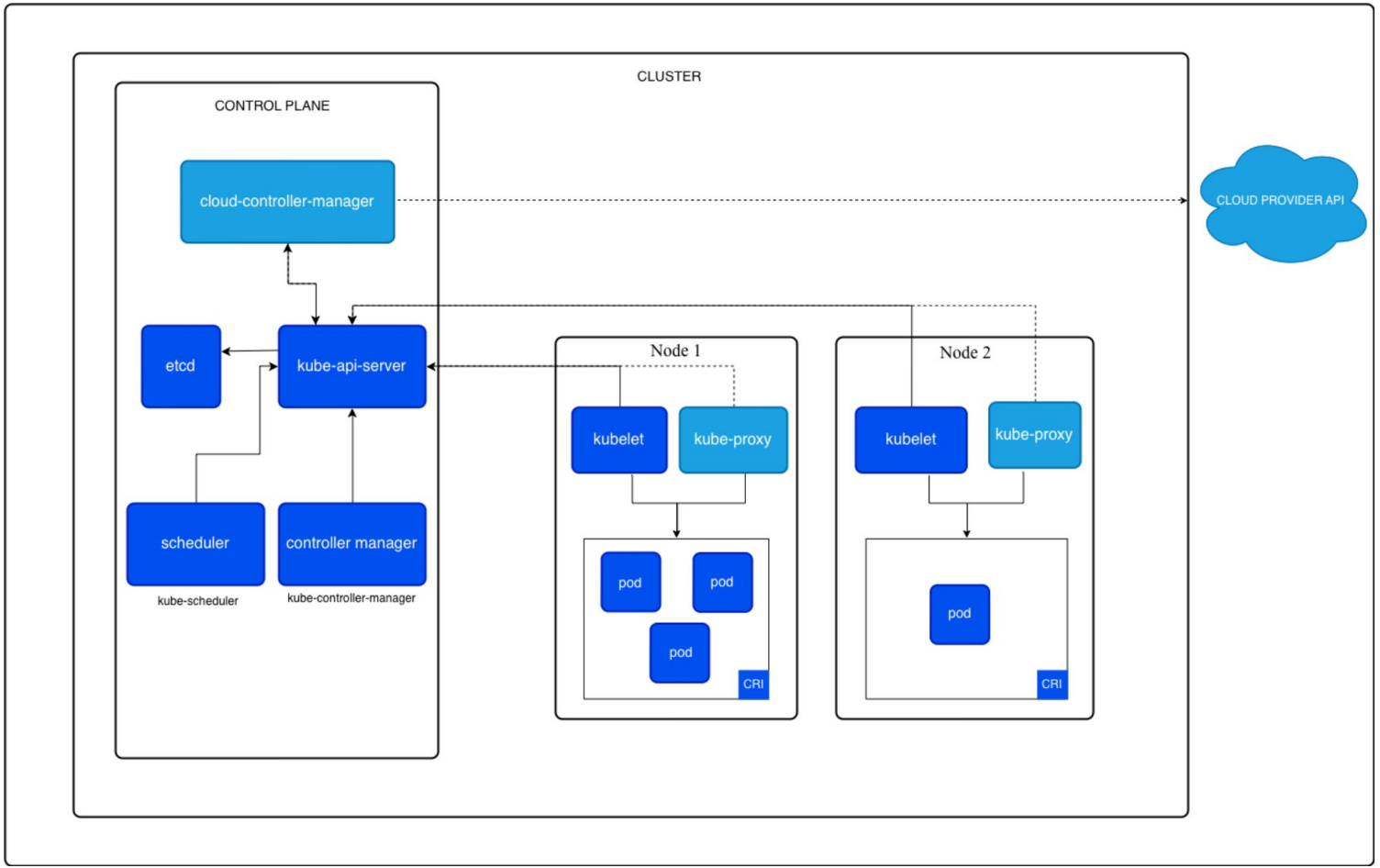
- Introduction to Kubernetes
- kube-rs
- Demos



What Is Kubernetes?

Kubernetes is a portable, extensible, open source platform for managing containerized workloads and services, that facilitates both declarative configuration and automation.

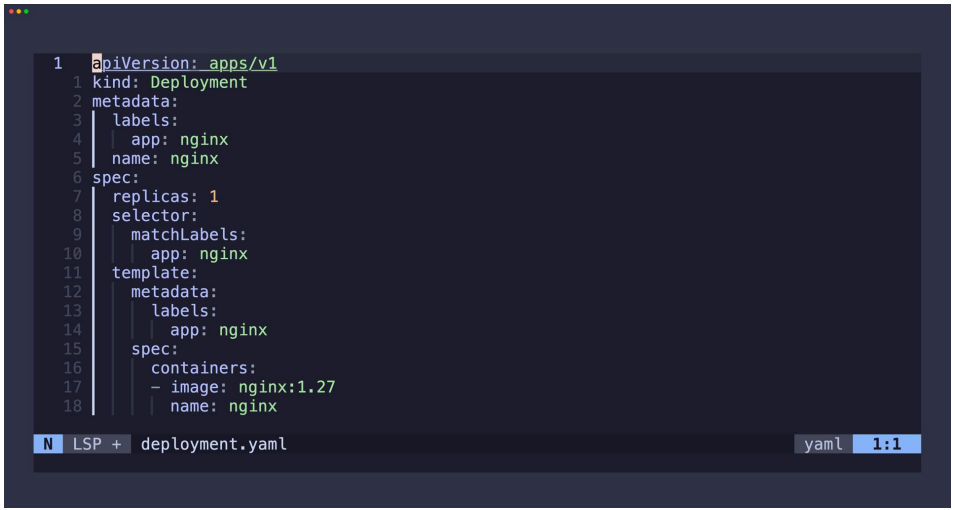
https://kubernetes.io/docs/concepts/overview/

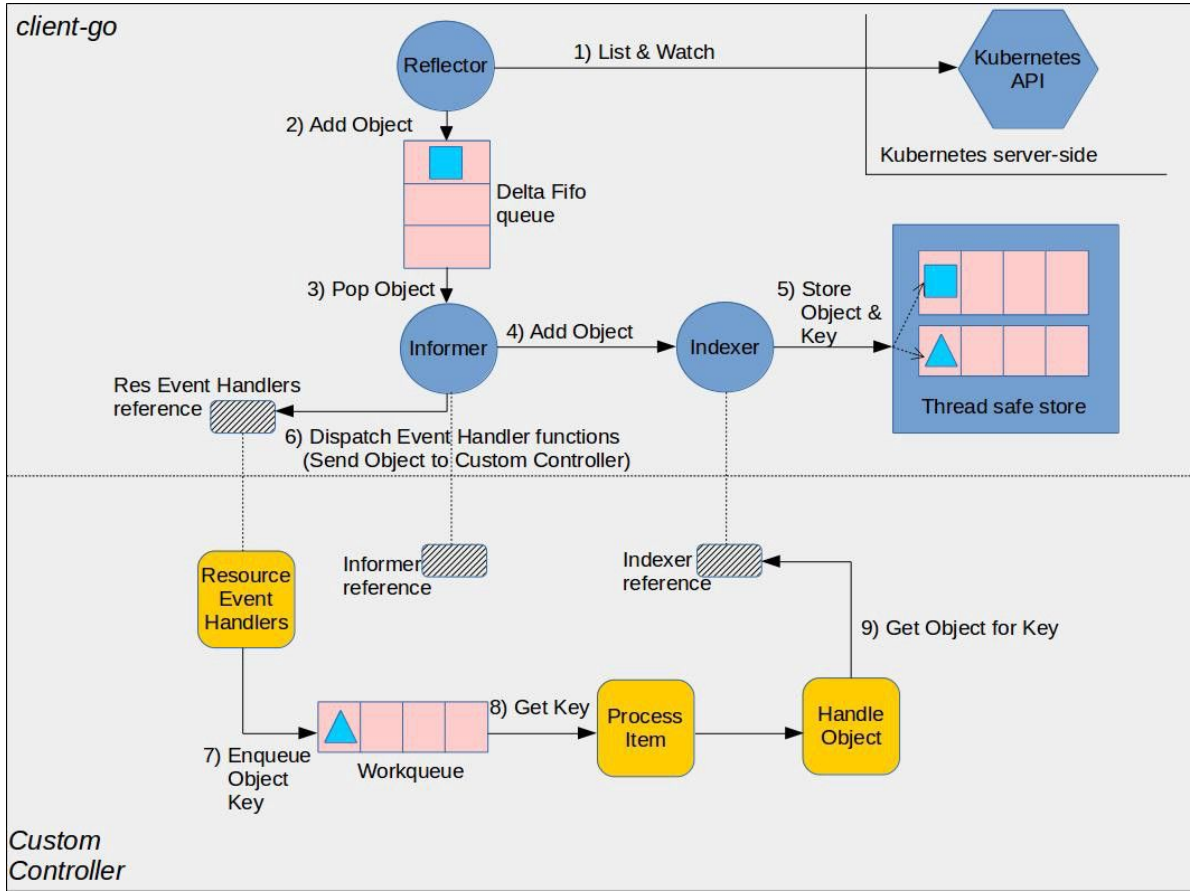


https://kubernetes.io/images/docs/kubernetes-cluster-architecture.svg

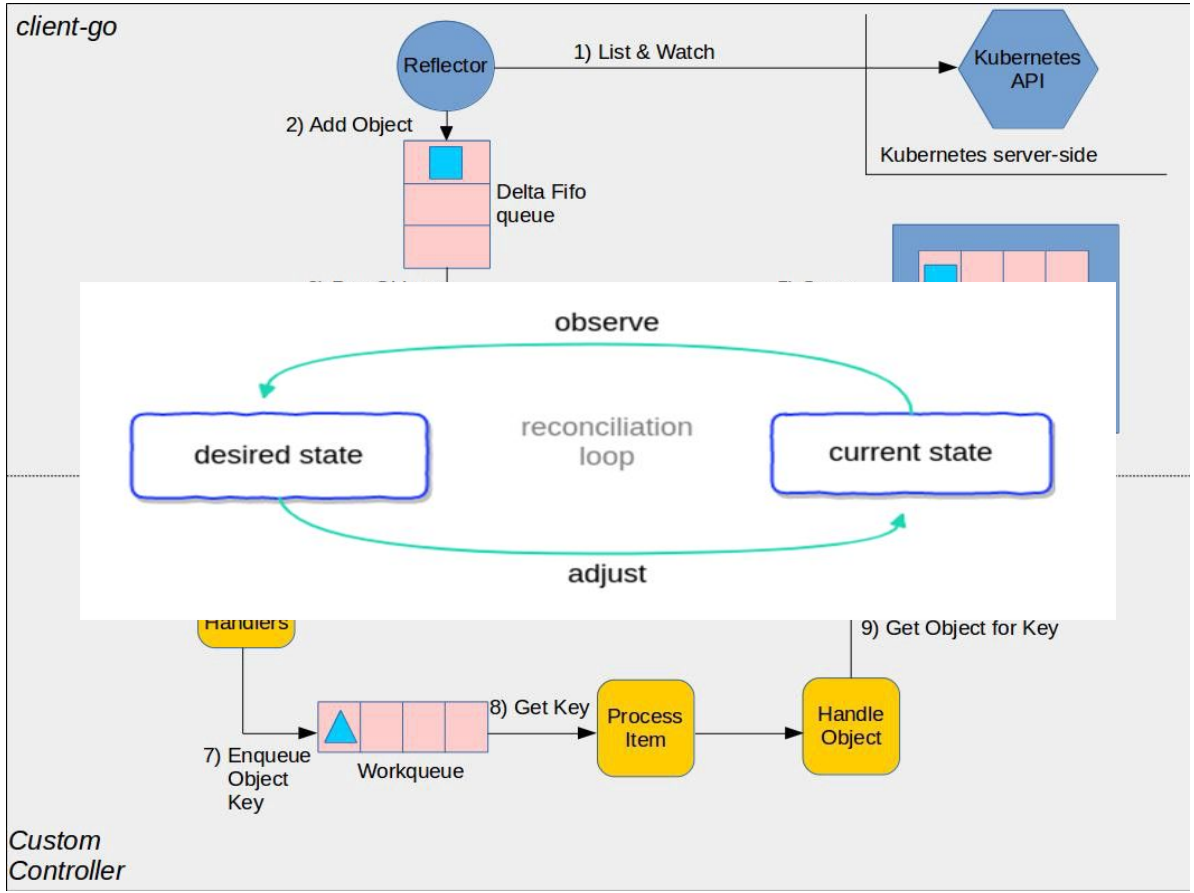
Kubernetes API

- Resources (Pods, Deployments, Services, etc.)
- Controllers and Operators
- Custom Resource Definitions (CRDs) allow extending the API





https://github.com/kubernetes/sample-controller/blob/master/docs/images/client-go-controller-interaction.jpeg



https://github.com/kubernetes/sample-controller/blob/master/docs/images/client-go-controller-interaction.jpeg
https://blog.container-solutions.com/hs-fs/hubfs/kubernetes_operators_diagram1.png

kube-rs

- Rust client for Kubernetes
- Runtime abstraction
- Derive macro for CRDs

- First release: April 29, 2019
- Hosted by CNCF as a Sandbox Project since November 16, 2022

kube-rs: Runtime

- `watcher`: stream of events
- `reflector`: `watcher` + store
- `controller`: `reflector` + *n* `watchers` + reconciler

Demos

Resources

- https://kube.rs/
- https://github.com/kube-rs/version-rs
- https://github.com/kube-rs/controller-rs
- https://github.com/kube-rs/kube/issues/584
- https://github.com/olix0r/kubert
- https://ahmet.im/blog/controller-pitfalls/
- https://github.com/linkerd/linkerd2/tree/582f1afa5ebf0f3d227a0260bc611e987fcd261e/policy-controller