1. Cluster Architecture

A person standing in front of a computer screen

AI-generated content may be incorrect.

* Controller-Manager:
  + Controller-Manager
  + Node-Controller
  + Replication-controller
* The Kube API server is responsible for orchestrating all operations within the cluster. It exposes the Kubernetes API, which is used by external users to perform management operations on the cluster, as well as the various controllers to monitor the state of the cluster necessary changes as required, and by the worker nodes to communicate with the server.
* The container runtime engine
* In Kubernetes, a Kubelet is an agent that runs on each node in a cluster. It listens for instructions from the Kube API server and deploys or destroys containers on the nodes as required.
* The kube proxy service ensures that the necessary rules are in place on the worker nodes to allow the containers running on them to reach each other.
* Kube Scheduler that is responsible for scheduling applications or containers on nodes, we have different controllers that take care of different functions like the node controller, replication controller, ..

1. Docker vs containerD

A screenshot of a computer

AI-generated content may be incorrect.

* Container Runtime Interface (CRI) allowed any vendor to work as a container runtime for Kubernetes as long as they adhere the OCI standards.
* OCI: Open Container Initiative consists of an image spec and a runtime spec.
  + Image spec: the specifications on how an image should be built.
  + Runtime spec defines the standards on how any Container runtime should be developed.
* ContainerD is CRI compatible and can work directly with K8s as all other runtimes
* From version 1.24: K8s remove support for Docker.
* Docker followed the image spec from the OCI standards so these image still can be used.
  1. ContainerD
* CLI-ctr: used for debugging containerD
* CLI-nerdctl:
  + Provides a Docker-like CLI for containerD
  + Support docker compose
  + Support newest features in contianerd
* CLI-crictl:
  + Provide a CLI for CRI compatible container runtimes
  + Installed separately
  + Used to inspect and debug container runtimes
  + Works across different runtimes

1. ETCD