Kubernetes Cluster Architecture

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Components Present in Kubernetes

Master Node Components

1) Kube-apiserver

Kube-apiserver exposes the Kubernetes API. The API server is the front end for the Kubernetes control plane.
Every request that we do from command with first reach to kube-apiserver.

2) Controller Manager

Each controller is a separate process, but to reduce complexity, they are all combined into a single binary and run in a single process.
We have multiple types of controllers. Below were some of the examples

Node Controller
It is responsible for targeting the available node in the cluster and it will take an action if any node goes down i.e., It will create a new Node.

Job Controller
Watches for kubernetes Jobs that represent one off tasks then creates pod to run those tasks to completion.

EndPointSlice Controller
Populates endpoint slice objects in kubernetes.

ServiceAccount Controller
Create default ServiceAccounts for new namespaces.

3) Scheduler

Control plane component that watches for newly created pods with no assigned node, and selects a node for them to run on it.

There are different factors that scheduler consider for selecting a node to deploy the pods. Below were such factors.

- CPU availability.
- Memory availability.
- Taints and Tolerations.
- Node Affinity rules etc.

4) ETCD

Consistent and highly available key value store used as kubernetes backing store for all cluster data. For example information about number of nodes, pods etc.

Worker Node Components

1) Kubelet

It is the service/agent that runs on each node on the cluster.
It makes sure that containers are running in a pod.
Any action that happens on the worker node, Kubelet is the one that provides that information to master nodes.

2) Kube-Proxy

It will be running on each node in the cluster. Kube-Proxy maintains network rules on nodes. These network rules allow network communication to your pods.

3) CRE(Container Runtime Engine)

It is responsible for running containers in the kubernetes cluster. It also maintains lifecycle of the containers.

Architecture Diagram

components on master
1) kube-api server
2) controller manager
3) scheduler
4) etcd

Components on worker
1) kubelet
2) kube-proxy
3) container runtime engine