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K8s Basics - Quick Recap

Will Boyd
DEVOPS TRAINING ARCHITECT

LESSON BREAKDOWN

K8s Basics - Quick Recap

What Is Kubernetes?

What Does “K8s” Mean?

The K8s Cluster

K8s Features

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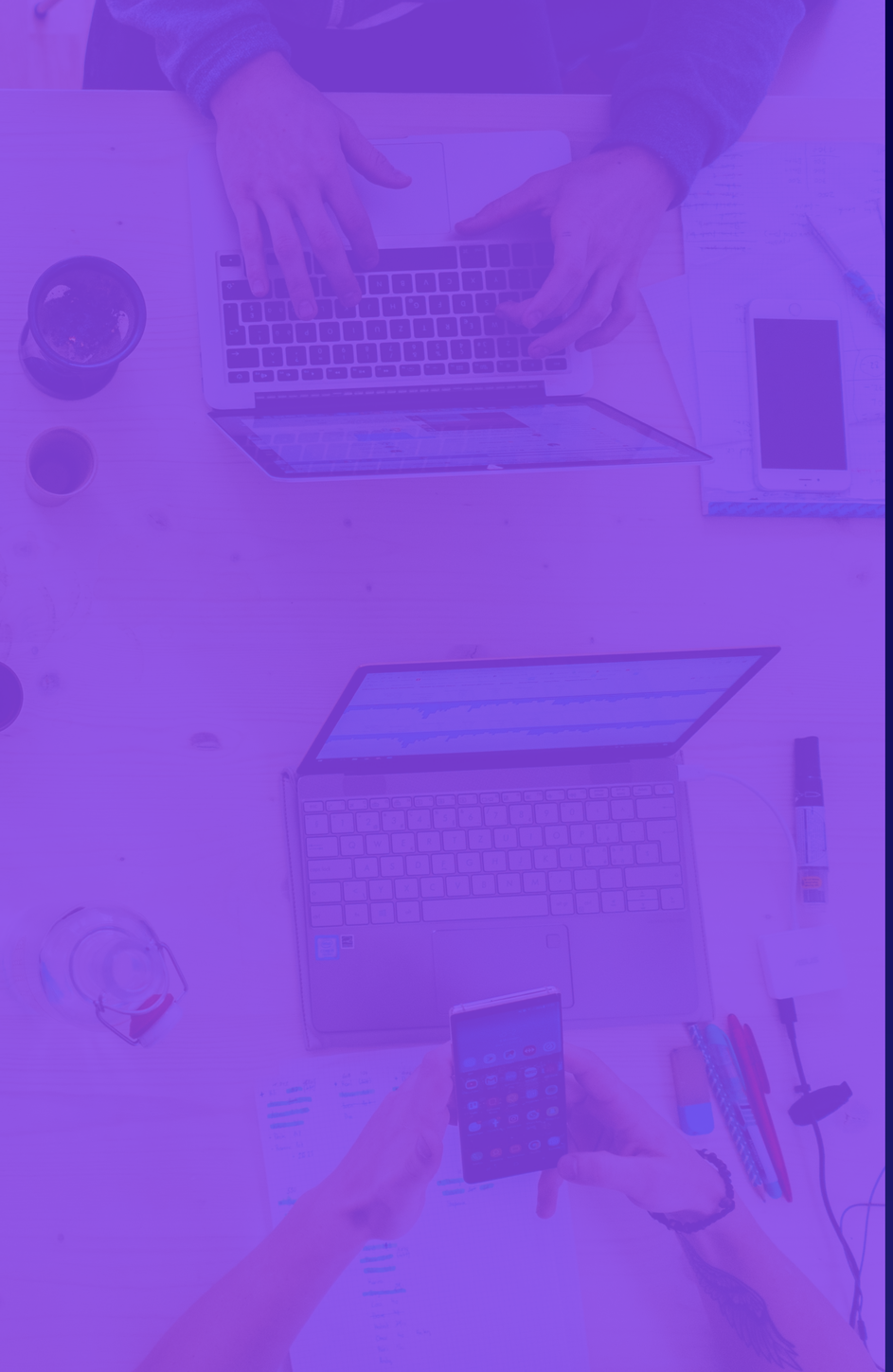
“Kubernetes is a portable, extensible, open-source platform for managing containerized workloads and services, that facilitates both declarative configuration and automation.”

Kubernetes Official Documentation



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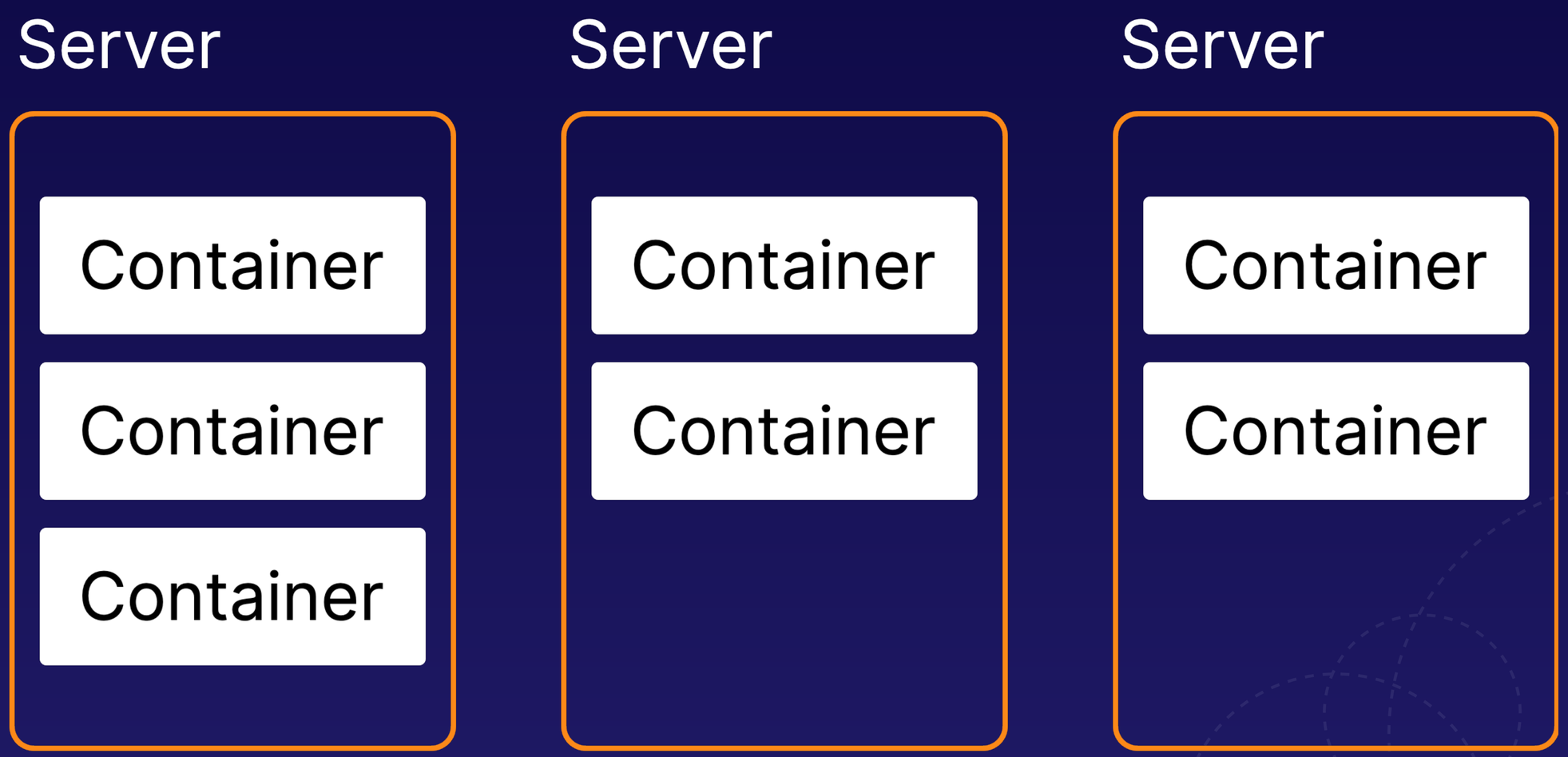
What Does “K8s” Mean?

K8s is simply short for Kubernetes. The 8 represents the 8 letters between K and S!

K8s Cluster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Container
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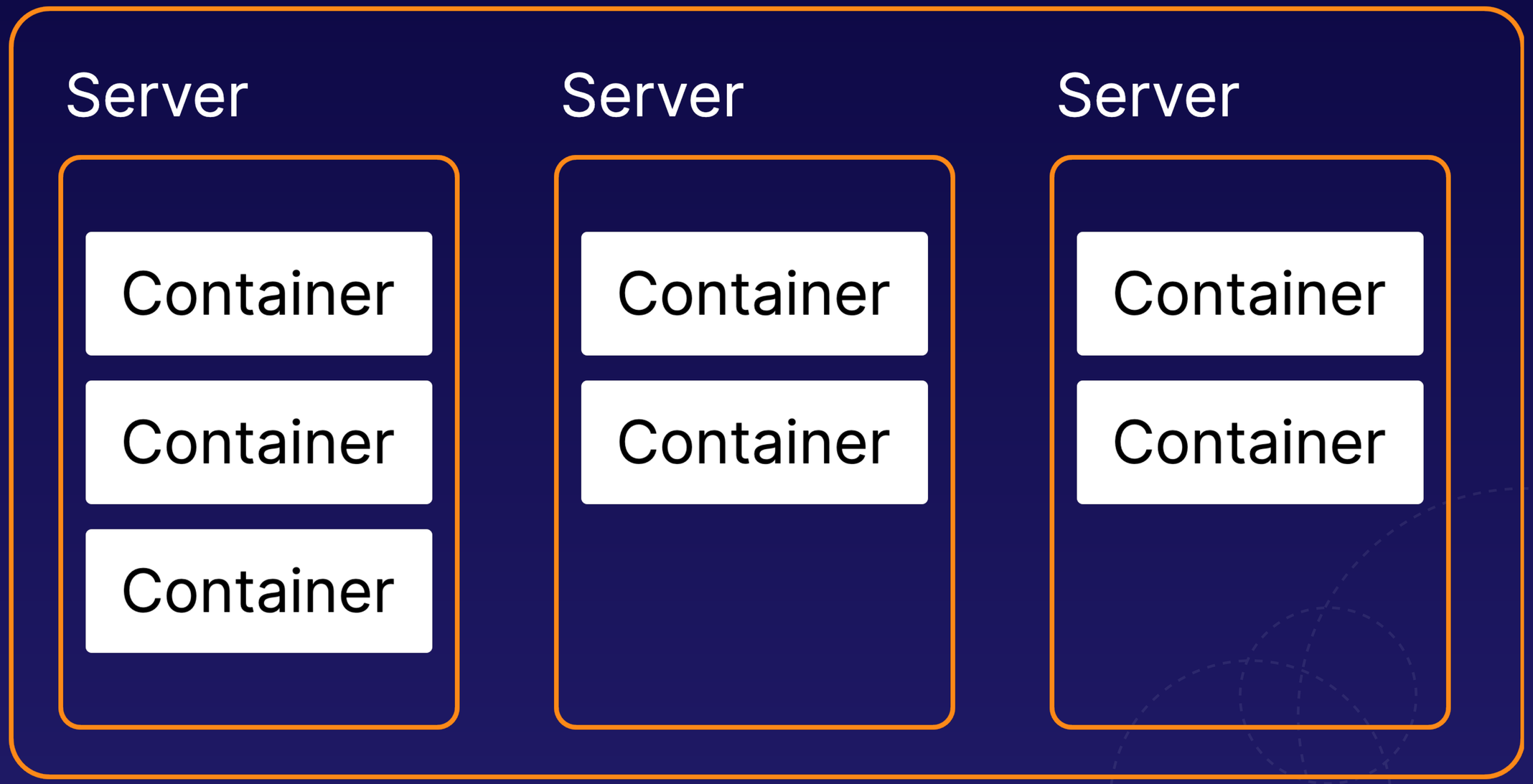
K8s Cluster


K8s Cluster
Server
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K8s Basics

K8s Features

Container Orchestration

The primary purpose of Kubernetes is to dynamically manage containers across multiple host systems.

Application Reliability

Kubernetes makes it easier to build reliable, self-healing, and scalable applications.

Automation

Kubernetes offers a variety of features to help automate the management of your container apps.

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K8s Architectural Overview

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LESSON BREAKDOWN

K8s Architectural Overview

K8s Control Plane

K8s Nodes

A K8s Cluster - The Big Picture

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K8s Control Plane

K8s Control Plane

Control Plane

The control plane is a collection of multiple components responsible for managing the cluster itself globally. Essentially, the control plane controls the cluster.

Individual control plane components can run on any machine in the cluster, but usually are run on dedicated controller machines.

K8s Control Plane

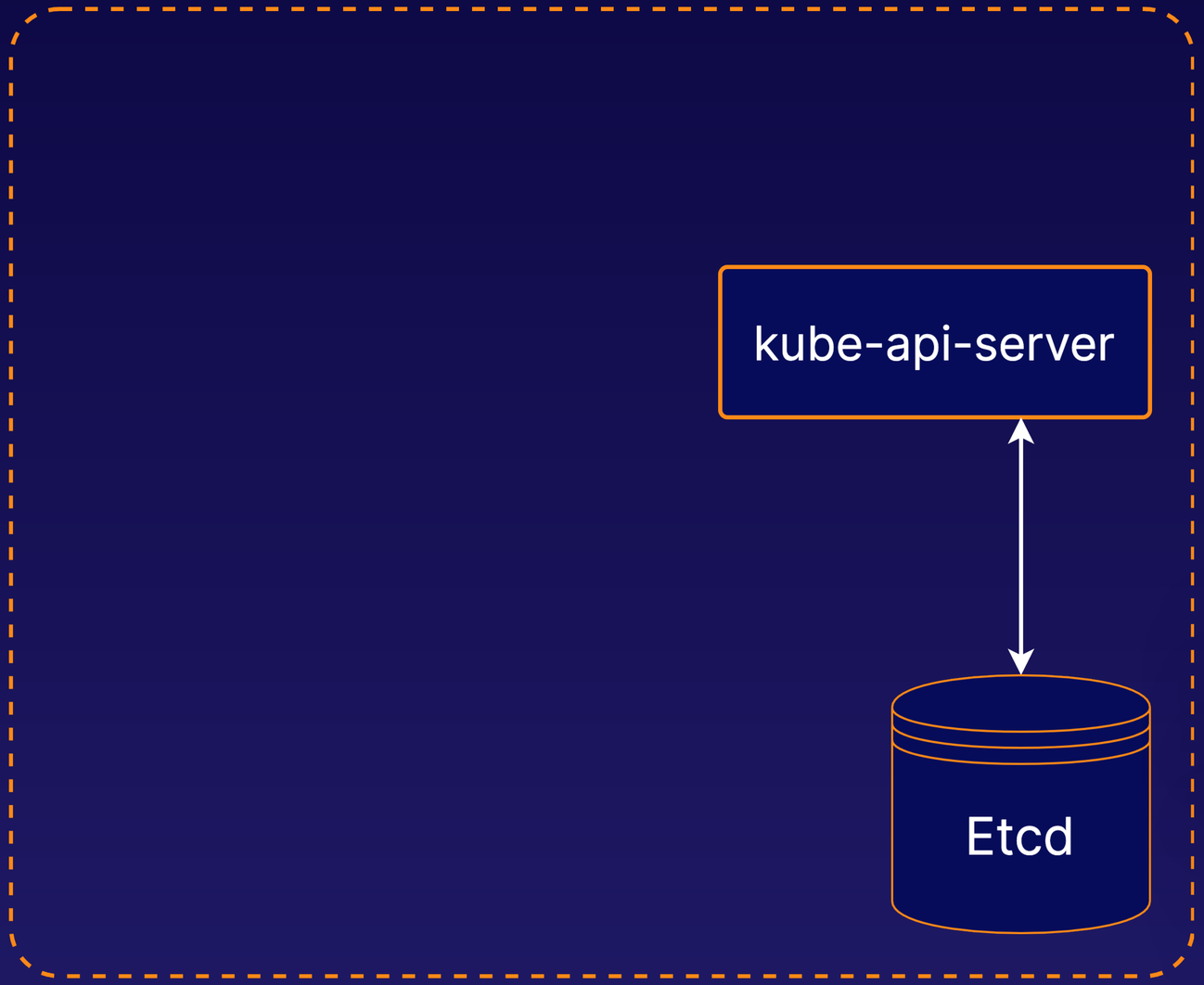
Control Plane

kube-api-server serves the Kubernetes API, the primary interface to the control plane and the cluster itself.

When interacting with your Kubernetes cluster, you will usually do so using the Kubernetes API.

K8s Control Plane

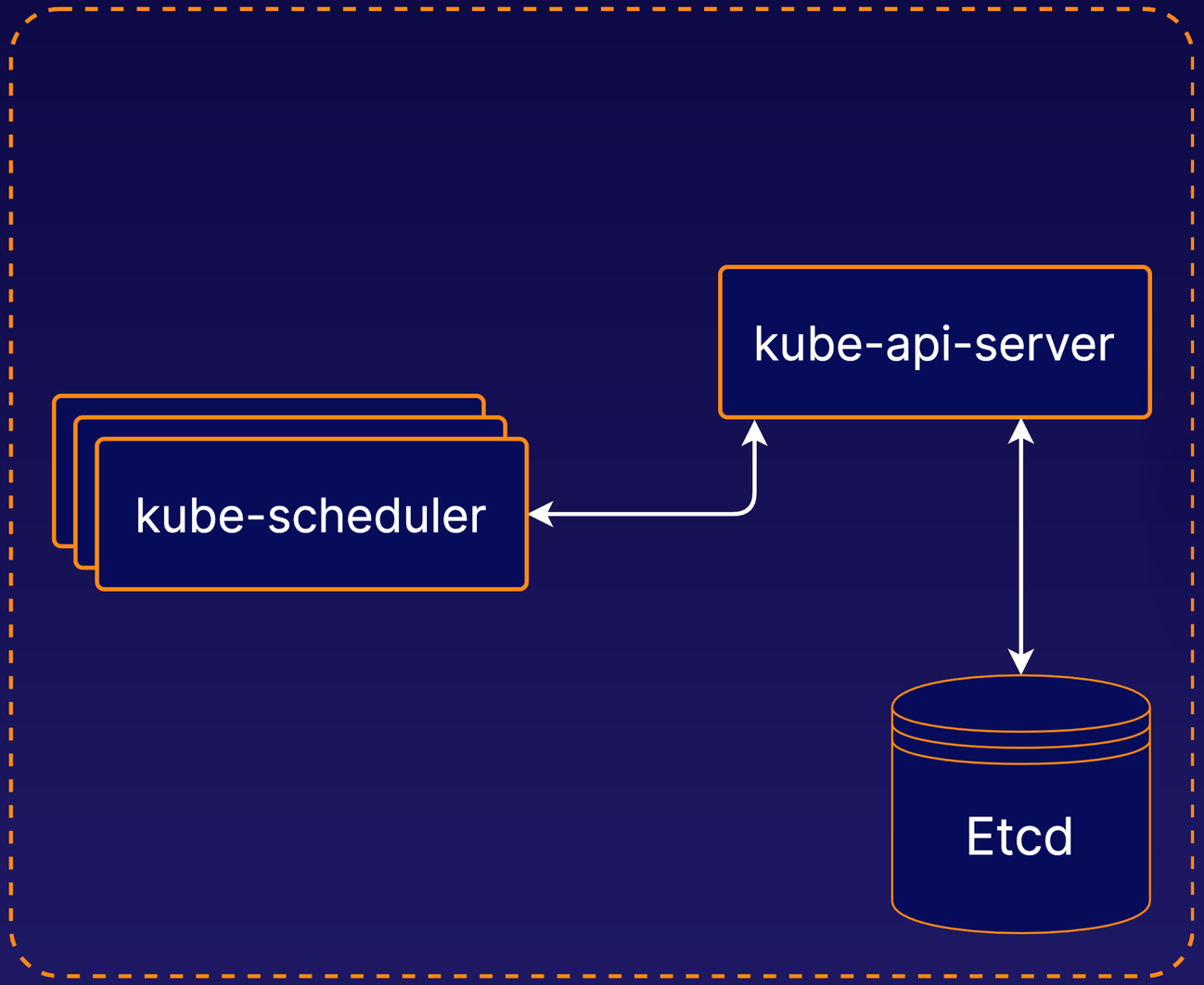
Control Plane



Etcd is the backend data store for the Kubernetes cluster. It provides high-availability storage for all data relating to the state of the cluster.

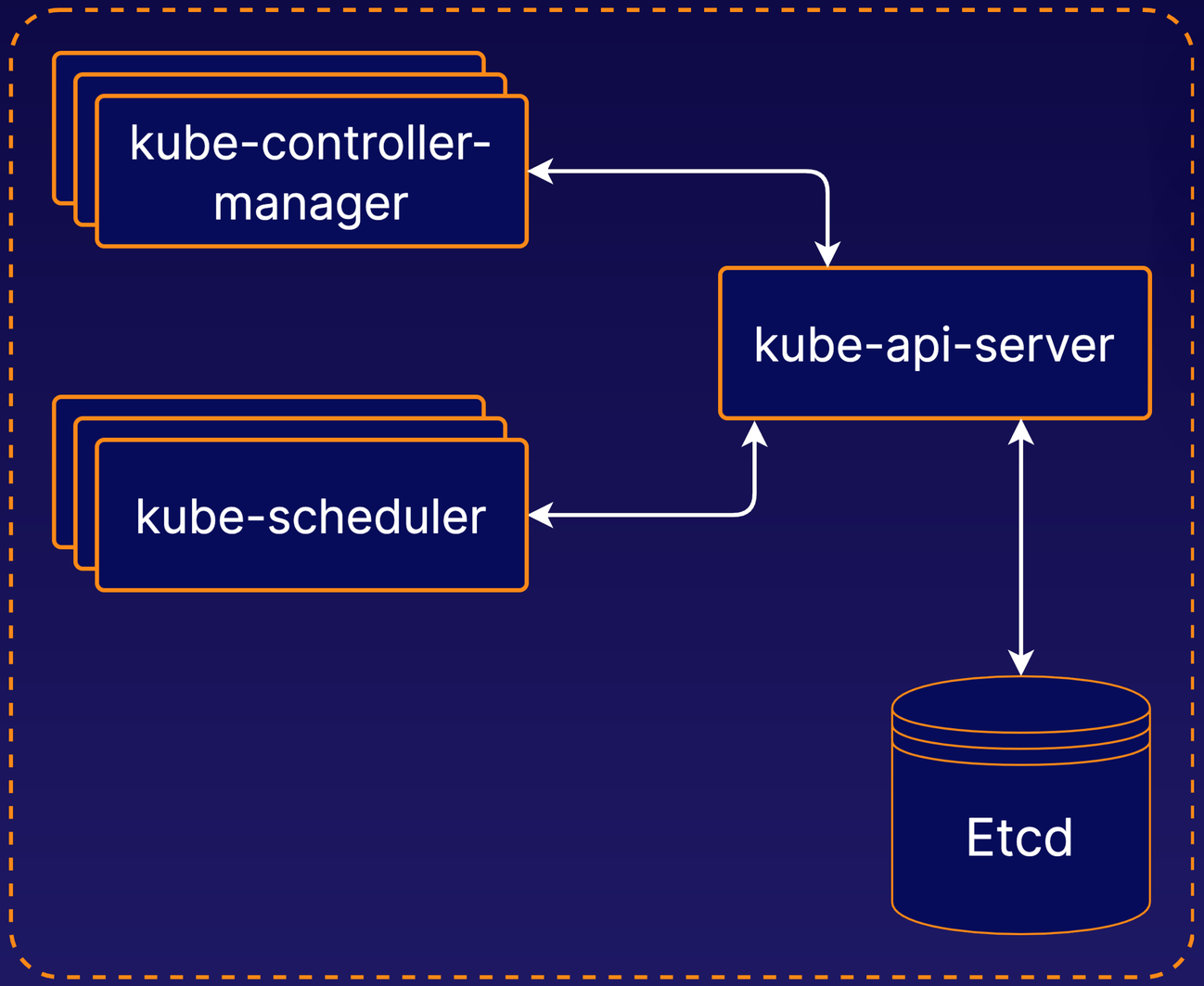
K8s Control Plane

Control Plane



kube-scheduler handles scheduling, the process of selecting an available node in the cluster on which to run containers.

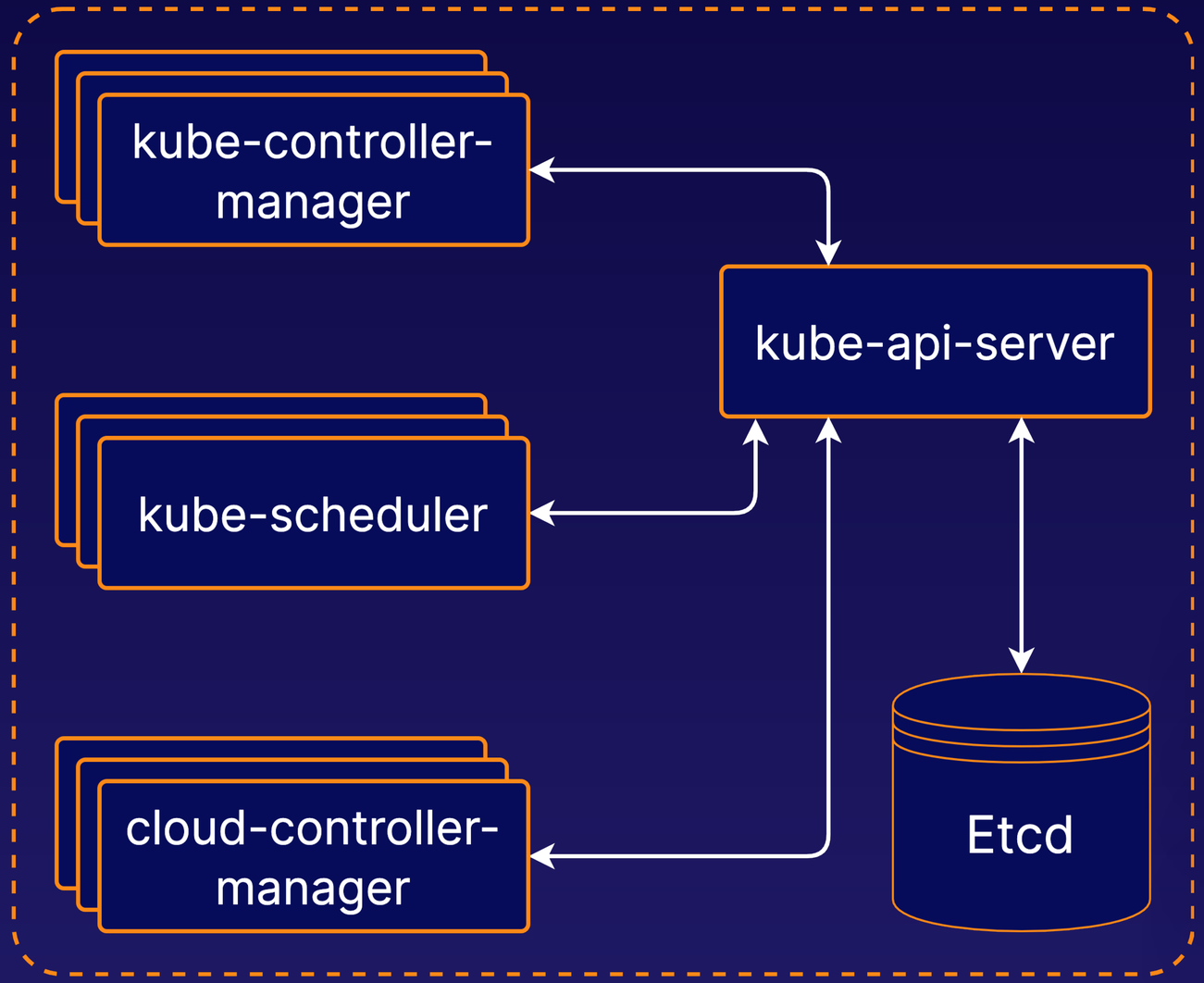
K8s Control Plane



kube-controller-manager runs a collection of multiple controller utilities in a single process. These controllers carry out a variety of automation-related tasks within the Kubernetes cluster.

K8s Control Plane

Control Plane



cloud-controller-manager provides an interface between Kubernetes and various cloud platforms. It is only used when using using cloud-based resources alongside Kubernetes.

K8s Nodes

K8s Nodes

Nodes

Kubernetes Nodes are the machines where the containers managed by the cluster run. A cluster can have any number of nodes.

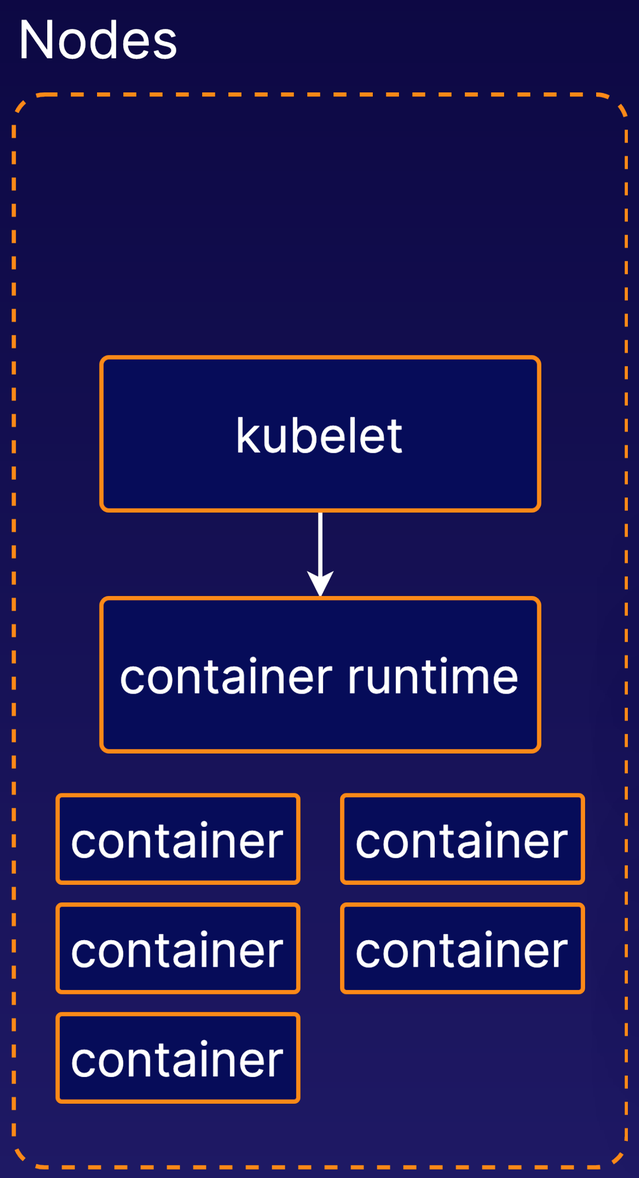
Various node components manage containers on the machine and communicate with the control plane.

K8s Nodes

Kubelet is the Kubernetes agent that runs on each node. It communicates with the control plane and ensures that containers are run on its node as instructed by the control plane.

Kubelet also handles the process of reporting container status and other data about containers back to the control plane.

K8s Nodes

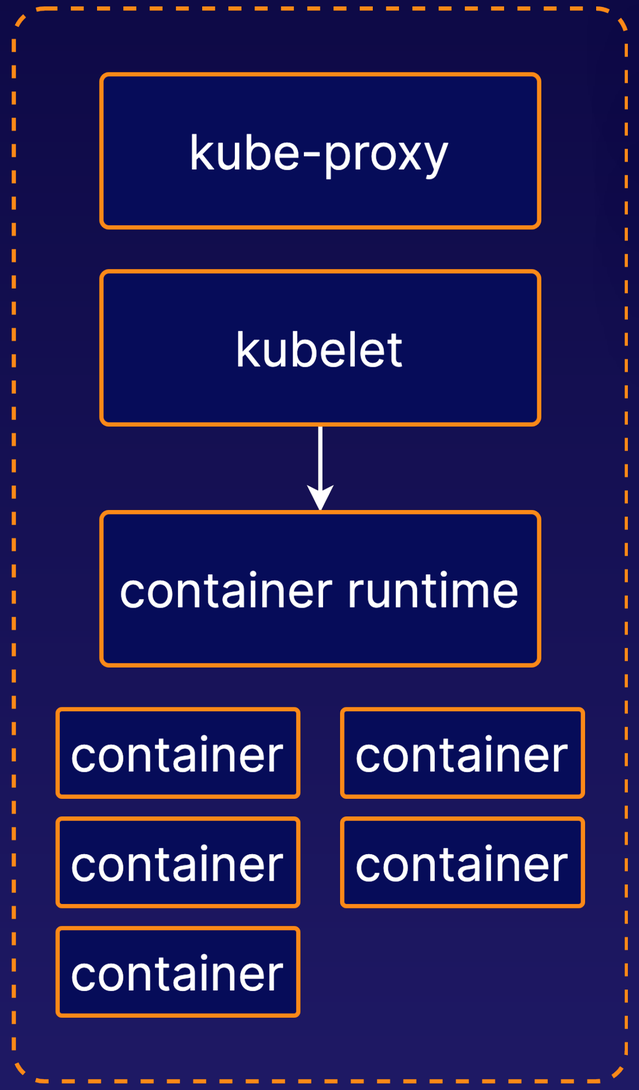


The container runtime is not built into Kubernetes. It is a separate piece of software that is responsible for actually running containers on the machine.

Kubernetes supports multiple container runtime implementations. Some popular container runtimes are Docker and containerd.

K8s Nodes

Nodes



kube-proxy is a network proxy. It runs on each node and handles some tasks related to providing networking between containers and services in the cluster.

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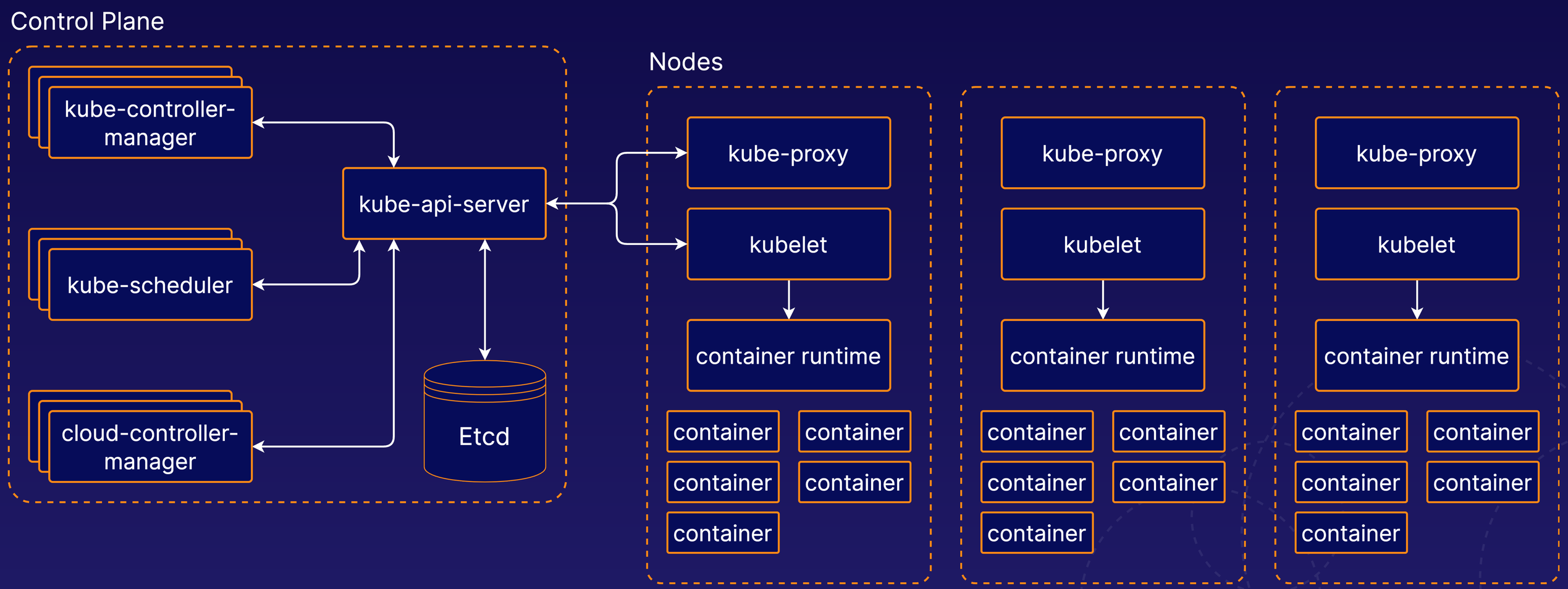
A K8s Cluster - The Big Picture



LESSON BREAKDOWN

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Building a Cluster With Kubeadm

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LESSON BREAKDOWN

Building a Cluster With kubeadm

- What Is kubeadm?
- kubeadm Configuration
- Ignoring Preflight Errors
- Playground Server Setup
- Hands-on Demonstration

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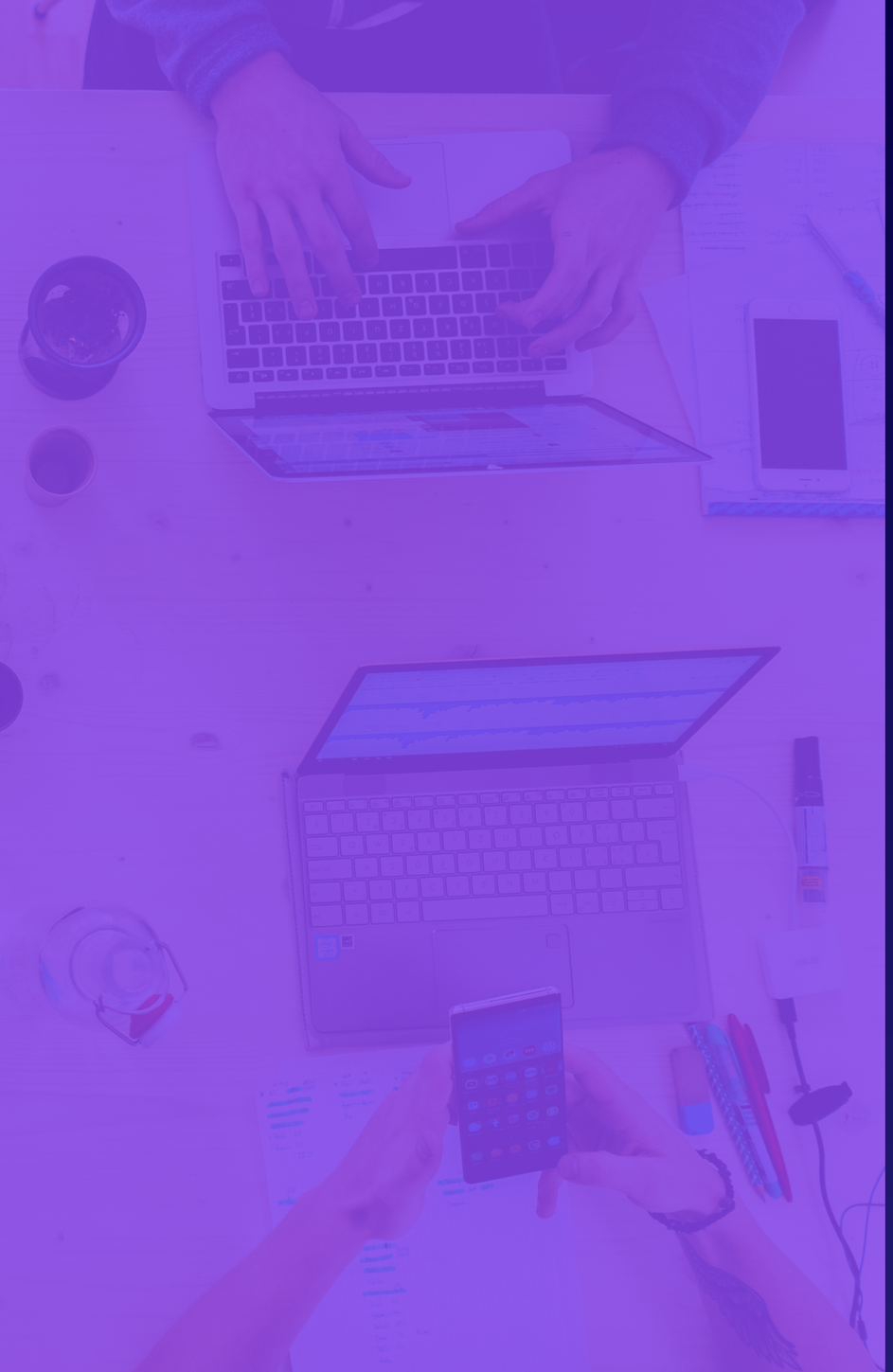

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What Is kubeadm?

kubeadm is a tool that simplifies the process of building Kubernetes clusters. The `kubeadm init` command initializes a control plane. The `kubeadm join` command can be used to join a new node to the cluster.

kubeadm Configuration

You can use the `--config` flag to pass a yaml file containing custom configuration for the cluster that will be created with `kubeadm init`.

```
$ kubeadm init --config my-config.yml
```

Refer to the documentation for a full list of configuration options.

Ignoring Preflight Errors

kubeadm performs a series of preflight checks to verify that the current environment is suitable for creating or joining to a cluster. By default, kubeadm will halt execution if any of these preflight checks fails.

You can use the `--ignore-preflight-errors` flag to force kubeadm to ignore these errors and attempt the operation anyway.

```
$ kubeadm init --ignore-preflight-errors all
```

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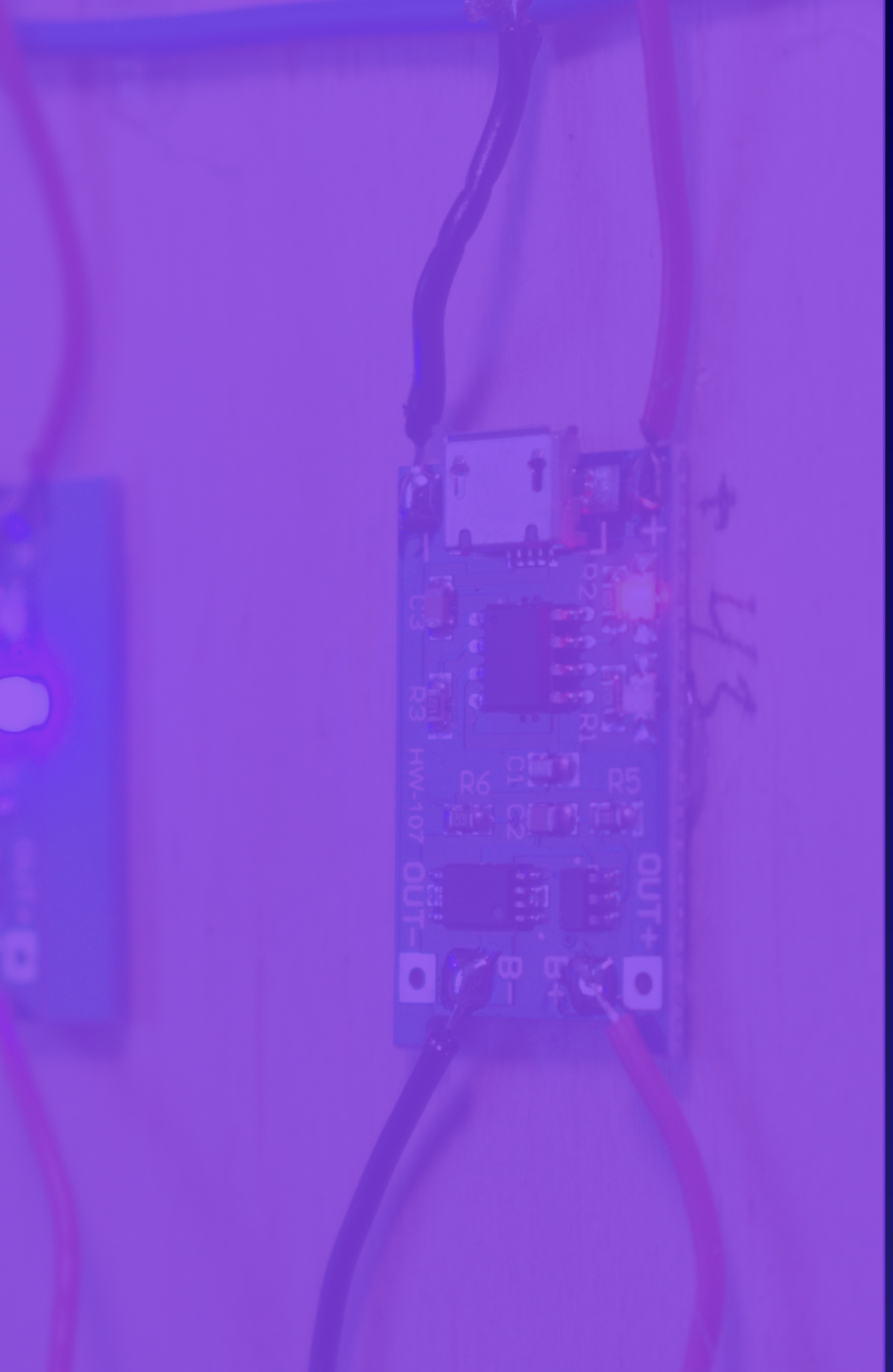
Networking Add-On

In order to become fully functional, your cluster needs a networking add-on. You can install one after the cluster has been initialized. We will be using Calico.



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Playground Server Setup

You can follow along using Cloud Playground!

To do so, create three could playground servers with the following settings:

- Distribution - Ubuntu 18.04 Bionic Beaver LTS
- Size - Medium

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Hands-on Demonstration

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Using Namespaces in K8s

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LESSON BREAKDOWN

Using Namespaces in K8s

- What Is a Namespace?
- List Existing Namespaces
- Specify a Namespace
- Create a Namespace
- Hands-on Demonstration

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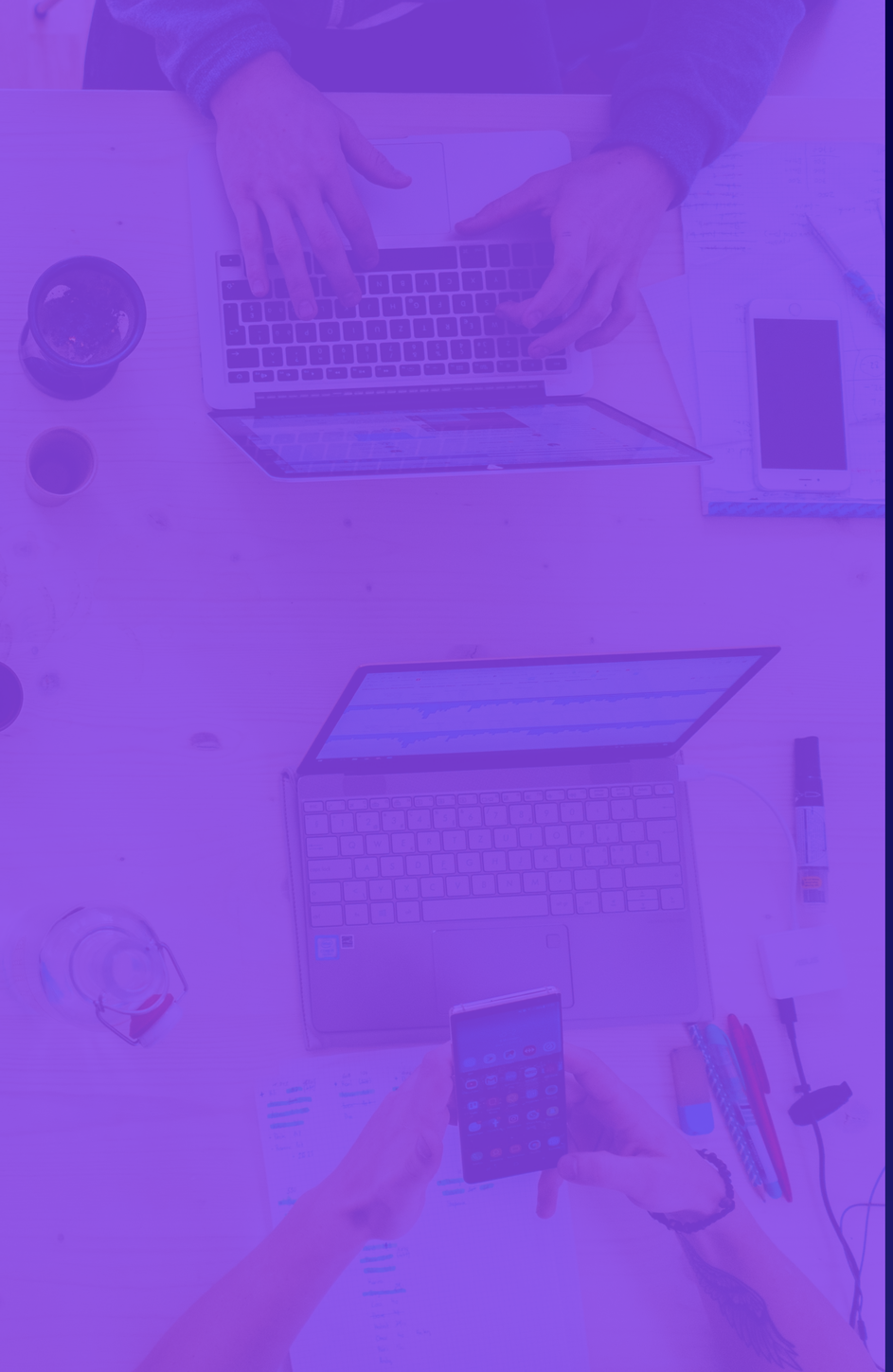

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What Is a Namespace?

Namespaces are virtual clusters backed by the same physical cluster. Kubernetes objects, such as pods and containers, live in namespaces. Namespaces are a way to separate and organize objects in your cluster.

List Existing Namespaces

You can list existing namespaces with `kubectl`:

```
$ kubectl get namespaces
```

All clusters have a default namespace. This is used when no other namespace is specified. kubeadm also creates a kube-system namespace for system components.

Specify a Namespace

When using kubectl, you may need to specify a namespace. You can do this with the --namespace flag.

Note that if you do not specify a namespace, the default namespace is assumed.

```
$ kubectl get pods --namespace my-namespace
```

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Create a Namespace

You can create your own namespaces with kubectl.

```
$ kubectl create namespace my-namespace
```

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Hands-on Demonstration

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