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Case Study

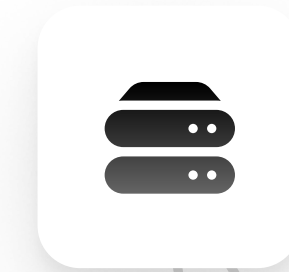# Kubernetes on-premises deployment

Involved deploying and managing a Kubernetes cluster on-premises for a cloud distributor company.
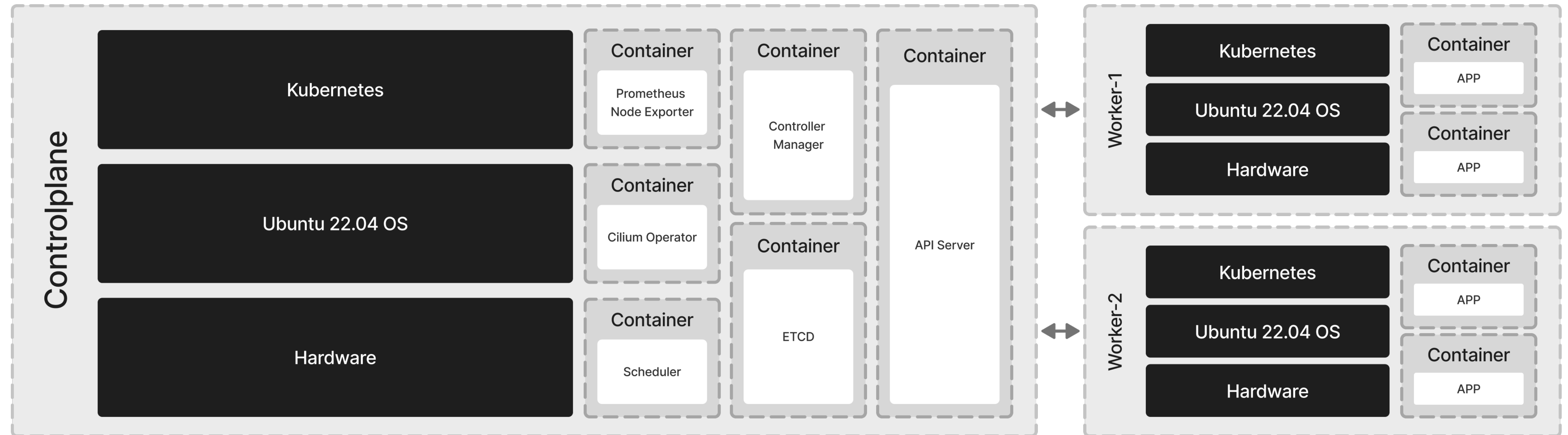
Overview

This project involved deploying and managing a Kubernetes cluster on-premises for **a cloud distributor company**. The cluster was deployed directly on three bare metal servers using **kubeadm** and configured for networking security and persistent storage.

The setup also integrated **Cilium** for networking, **NFS** for storage, **Velero** for backup and migration, and **Prometheus** for alerting and monitoring.

The Challenge

This cloud distributor company was a newly established business, having been in operation for less than one year when we undertook this project. They managed multiple websites—some for internal operations and others for external purposes, such as landing pages and cloud storage services. **Their DevOps team was small, consisting of only two people**, one handling infrastructure and the other responsible for development. Due to these constraints, they needed an infrastructure that was developer-friendly, scalable, and easy to manage.
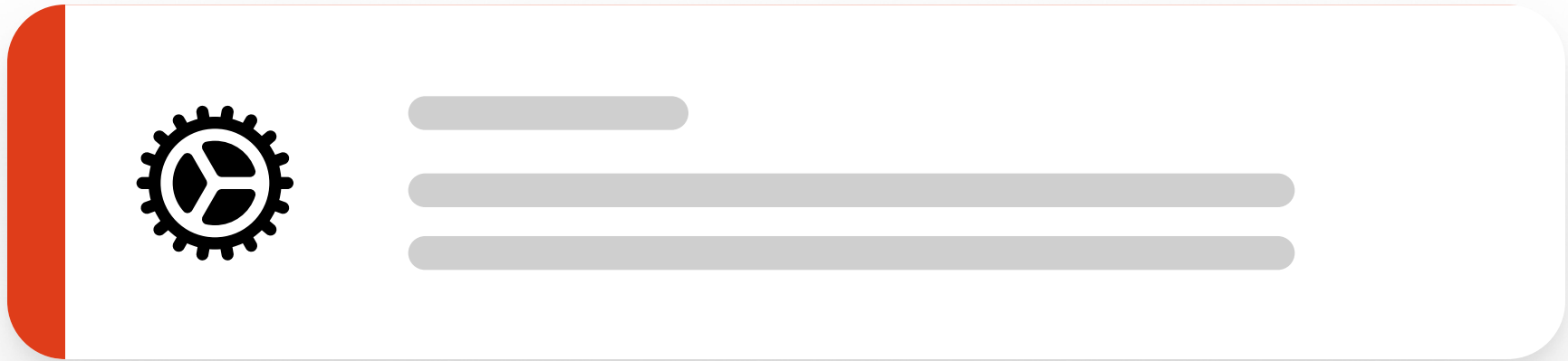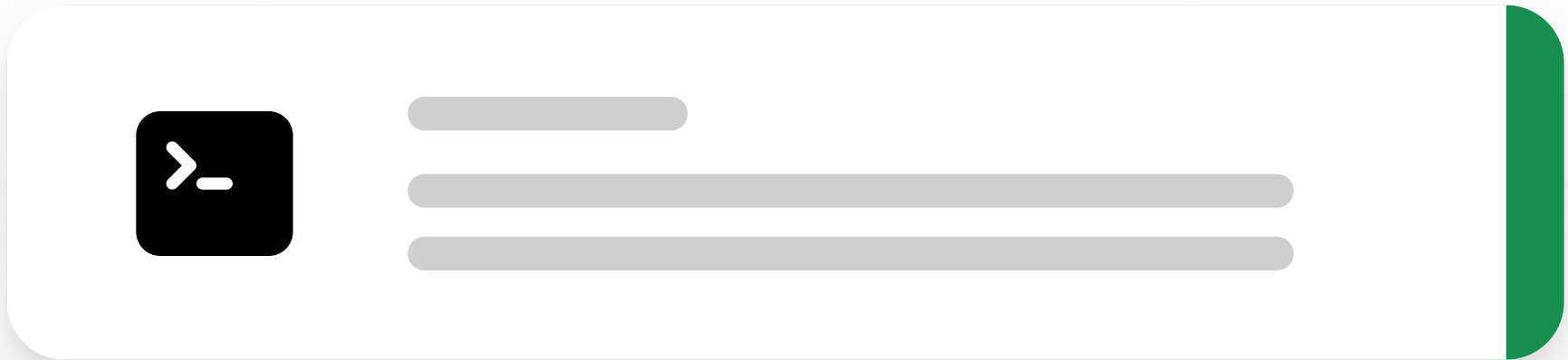
From a developer's perspective, traditional virtual machines were complex and resource-intensive, making them less suitable for rapid application development. Instead, they opted to focus on containers, which provided greater flexibility. Containers could run on virtual machines, bare metal servers, and public cloud environments, as well as within their own data center. Given this, Kubernetes became the ideal choice for orchestrating their containerized applications.

Project Objective

01

Deployed Kubernetes Clusters on three nodes.

03

Ensure secure networking with Cilium.

05

Implement a reliable backup and disaster recovery strategy with Velero.

02

Deploy a scalable and resilient Kubernetes cluster.

04

Enable persistent storage using NFS.

06

Facilitate secure external access to services.

Features

01

Kubernetes cluster on three bare metal servers using kubeadm.

02

Cilium CNI for advanced network security and observability.

03

Persistent storage via NFS-backed PVs.

04

Ingress for traffic management.

05

Velero backup for workload migration and disaster recovery.

06

Prometheus for monitoring and alerting.

MASTER

WORKER

Deployment Process

01 Cluster Setup

- Installed **kubeadm** on three bare metal servers.
- Initialized the control plane and joined worker nodes.

02 Networking Configuration

- Installed **Cilium CNI** for improved network security.
- Configured **LoadBalancer and Ingress** for routing traffic.

03 Storage Integration

- Set up an **NFS server** for persistent storage.
- Configured **NFS CSI driver** for dynamic PV provisioning.

04 Backup and Migration

- Deployed **Velero** for backup and restoration of workloads.
- Tested **PVC and PV restoration** to ensure data consistency.

05 Monitoring and alerting

- Deployed **Prometheus and Grafana** for advanced monitoring and alerting.
- Exposed it using **Ingress**.

The Result

As a result, we managed to deploy a fully operational Kubernetes cluster on bare metal, providing the company with a scalable and efficient infrastructure.

The company has benefited from greater portability since Kubernetes provides a consistent API; they can move their web application very easily between namespaces for experimental purposes.
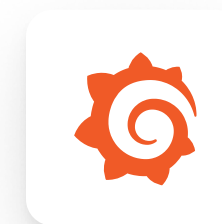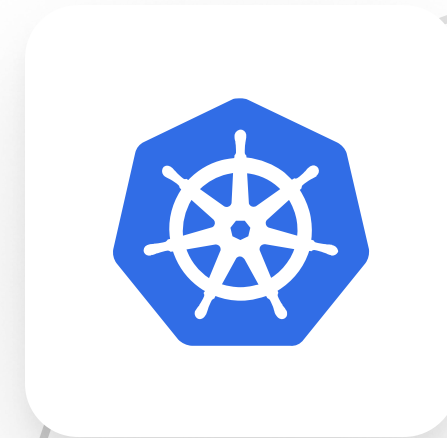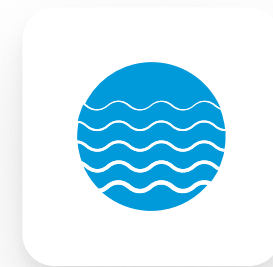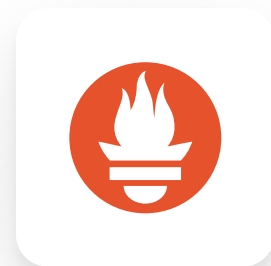
Being able to use their own servers when appropriate is lowering costs and providing them access to hardware that they wouldn't necessarily have access to in the cloud. As long as the utilization is high, the costs are much lower.

Launching a development and staging environment in different namespaces also takes far less time.

Overall, the new infrastructure enabled the company to run its workloads more efficiently, securely, and with greater flexibility, all while being developer-friendly and easy to maintain.

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Let's talk!

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