Building Software Systems

Lecture 2.7

Kubernetes

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Kubernetes Basics

- **Kubernetes (K8s)**: An open-source system for automating the deployment, scaling, and management of containerized applications.
- **Containers**: Lightweight, portable, self-sufficient packages that can run cloud-native applications. Containers run applications in isolation from other processes.

Key Components

- **Pod**: The smallest and simplest Kubernetes object. A Pod represents a set of running containers on your cluster.
- **Node**: A worker machine in Kubernetes, which may be either a virtual or a physical machine, depending on the cluster.
- **Cluster**: A set of Nodes that run containerized applications. The Kubernetes cluster coordinates resources for container applications.
- **Control Plane**: Manages the worker nodes and the Pods in the cluster. In production environments, the control plane usually runs across multiple computers and a cluster usually runs multiple nodes, providing fault-tolerance and high availability.

Key Concepts

- **Service**: An abstract way to expose an application running on a set of Pods as a network service.
- **Deployment**: Manages the creation and updating of instances of your application.
- **Volume**: A directory containing data, accessible to the containers in a pod, which survives restarts and resets.
- **Namespace**: Kubernetes supports multiple virtual clusters backed by the same physical cluster. These virtual clusters are called namespaces.