# Kubernetes Fundementals

- 2 Days
- Lecture and Hands-on Labs

## Course Overview

This class introduces students to Kubernetes! This is the best place to start before embarking on your Certified System's Administrator (CKA), or Certified Application Developer (CKAD) learning track. Kubernetes is a Cloud Orchestration Platform providing reliability, replication, and stability while maximizing resource utilization for applications and services. By the conclusion of this hands-on training you will go back to work with all necessary commands and practical skills to empower your team to succeed, as well as gain knowledge of important concepts like Kubernetes architecture and container orchestration. We prioritize covering all foundational objectives and concepts necessary for performing common operations on a Kubernetes Cluster. You will command and configure a high availability Kubernetes environment capable of demonstrating all "K8s" features discussed and demonstrated in this course.

Review this course online at https://www.alta3.com/courses/kubernetes

## Who Should Attend

- Anyone who plans to work with Kubernetes at any level or tier of involvement
- Any company or individual who wants to advance their knowledge of the cloud environment
- Any Developer/Engineer/SA beginning their Kubernetes Learning
- Project Managers/Leads

## What You'll Learn

- Understand Kubernetes architecture and core cluster components
- Deploy and manage workloads using Kubernetes primitives (Pods, ReplicaSets, Deployments)
- Create, modify, and manage Kubernetes resources using YAML manifests
- Configure container health checks, security contexts, and observability tools
- Manage compute resources through limits, requests, and quotas
- Collect and analyze logs from containers and Pods
- Configure and use persistent storage with PersistentVolumes and PersistentVolumeClaims
- Implement and scale application workloads (Deployments, ReplicaSets, DaemonSets, StatefulSets)
- Expose applications internally and externally using Services (ClusterIP, NodePort, LoadBalancer)

## Outline

From Containers to Kubernetes

- 💬 Lecture: Kubernetes Architecture
- 💬 Lecture: Pods and the Control Plane
- 💬 Lecture: Kubernetes the Alta3 Way
- 💻 Lecture + Lab: Deploy Kubernetes using Ansible

Cluster Basics

- 💬 Lecture: Namespaces and Fundamental Kubectl Commands
- 💻 Lecture + Lab: Creating and Configuring Namespaces
- 💬 Lecture: Kubectl get and sorting
- 💻 Lecture + Lab: Listing Resources with kubectl get

Pod Basics

- 💬 Lecture: YAML
- 💬 Lecture: Manifests for Pods
- 💻 Lecture + Lab: Create and Configure Basic Pods
- 💬 Lecture: API Versioning and Deprecations

Container Health, Security, and Observability

- 💬 Lecture: Kubectl port-forward
- 💻 Lecture + Lab: Kubectl port-forward
- 💬 Lecture: Kubectl exec and cp
- 💻 Lecture + Lab: Performing Commands inside a Pod
- 💬 Lecture: Readiness and Liveness Probes
- 💻 Lecture + Lab: Implement Probes and Health Checks
- 💬 Lecture: Pod Security Contexts
- 💻 Lecture + Lab: Applying Security Contexts

Resource Management

- 💬 Lecture: Limits, Requests, and Namespace ResourceQuotas
- 💻 Lecture + Lab: Defining Resource Requirements, Limits and Quotas
- 💻 Lecture + Lab: Kubectl Top and Application Monitoring
- 💬 Lecture: Admission Controller
- 💻 Lecture + Lab: Create a LimitRange AdmissionController

Logging

- 💬 Lecture: Utilize Container Logs
- 💻 Lecture + Lab: Kubectl Log Command

Persistent Storage

- 💬 Lecture: Persistent Volumes, Claims, and StorageClasses
- 💻 Lecture + Lab: Using PersistentVolumeClaims for Storage

Deployments

- 💬 Lecture: Labels
- 💻 Lecture + Lab: Labels and Selectors
- 💬 Lecture: Annotations
- 💬 Lecture: ReplicaSets
- 💻 Lecture + Lab: Create and Configure a ReplicaSet
- 💬 Lecture: Deployments - Purpose and Advantages
- 💻 Lecture + Lab: Create and Configure a Deployment

Services: ClusterIP, NodePort, Loadbalancer

- 💬 Lecture: Networking with Services
- 💻 Lecture + Lab: Expose Applications via Services

## Prerequisites

- Linux for Absolute Beginners
- Or any other Formal Linux Training

## Next Courses

- CKA 3-Day (https://alta3.com/courses/ckaft)
- CKAD 3-Day (https://alta3.com/courses/ckadft)