

**Docker with Kubernetes Administration**

**Course Number:** CLD-110
**Duration:** 5 days

**Overview**

This Docker and Kubernetes Administration training teaches attendees how to use these technologies in enterprise and cloud environments. First, attendees learn the core features of Docker, including container creation, container management, and interacting with Docker Hub. Next, they learn the basic concepts and architecture of Kubernetes, such as its initial installation and setup, Kubernetes Pods, deployments and services, networking, and more. This Docker and Kubernetes course is hands-on, so attendees can practice what they learn using real-world examples.

**Prerequisites**

Students should have:

* Proficiency with the Linux CLI (or have taken our [Linux Fundamentals course](file:////training/linux-fundamentals))
* A broad understanding of Linux system administration (or have taken our [Enterprise Linux Systems Administration course](file:////training/enterprise-linux-system-administration))

**Materials**

All Docker with Kubernetes training attendees receive comprehensive courseware.

**Software Needed on Each Student PC**

A complete remote environment is included for each student with the class. You will need Internet access, a modern web browser, and an SSH client to access the environment.

**Objectives**

* Create and manage containers
* Interact with Docker hub
* Use Dockerfile to create and manage custom images
* Safely expose container services to the world and link containers
* Use Docker Volumes to manage persistent data
* Use Docker Compose to build multi-container applications
* Secure Docker installations and containers
* Understand the basic concepts and architecture of Kubernetes
* Initial install and setup Kubernetes Pods as well as deployments and services
* Use persistent storage, networking, automating deployment, scaling, and management of containerized applications
* Log and monitor facilities
* Apply best practices

**Outline**

* Introduction
* Container Technology Overview
	+ Docker Demo
	+ Application Management Landscape
	+ Application Isolation
	+ Resource Measurement and Control
	+ Container Security
	+ OverlayFS Overview
	+ Container Security
	+ Open Container Initiative
	+ Docker Alternatives
	+ Docker Ecosystem
	+ Container Concepts runC
	+ Container Concepts Systemd
* Installing Docker
	+ Installing Docker
	+ Docker Architecture
	+ Starting the Docker Daemon
	+ Docker Daemon Configuration
	+ Docker Control Socket
	+ Enabling TLS for Docker
	+ Validating Docker Install
* Managing Containers
	+ Creating a New Container
	+ Listing Containers
	+ Managing Container Resources
	+ Running Commands in an Existing Container
	+ Interacting with a Running Container
	+ Stopping, Starting, and Removing Containers
	+ Copying files in/out of Containers
	+ Inspecting and Updating Containers
	+ Docker Output Filtering & Formatting
* Managing Images
	+ Docker Images
	+ Listing and Removing Images
	+ Searching for Images
	+ Downloading Images
	+ Uploading Images
	+ Export/Import Images
	+ Save/Load Images
	+ Committing Changes
* Creating Images with DOCKERFILE
	+ Dockerfile
	+ Caching
	+ docker image build
	+ Dockerfile Instructions
	+ ENV and WORKDIR
	+ Running Commands
	+ Getting Files into the Image
	+ Defining Container Executable
	+ HEALTHCHECK
	+ Best Practices
	+ Multi-Stage builds with Dockerfile
* Docker Volumes
	+ Volume Concepts
	+ The docker volume Command
	+ Creating and Using Internal Volumes
	+ Internal Volume Drivers
	+ Removing Volumes
	+ Creating and Using External Volumes
	+ SELinux Considerations
	+ Mapping Devices
* Docker Compose/SWARM
	+ Writing YAML Files
	+ Concepts
	+ Compose CLI
	+ Defining a Service Set
	+ Compose Versions
	+ Docker Engine Swarm Mode
	+ Docker Swarm Terms
	+ Docker Swarm Command Overview
	+ Creating a Swarm
	+ Creating Services
	+ Creating Secrets
	+ Stack Files
	+ Stack Command
	+ Swarm Placements
	+ Swarm Resource Limits & Reservations
	+ Swarm Networking
	+ Swarm Networking Troubleshooting
* Docker Networking
	+ Overview
	+ Data-Link Layer Details
	+ Network Layer Details
	+ Hostnames and DNS
	+ Service Reachability
	+ Container to Container Communication
	+ Container to Container: Links (deprecated)
	+ Container to Container: Private Network
	+ Managing Private Networks
	+ Remote Host to Container
* Docker Logging
	+ Docker Logging
	+ Docker Logging with json-file and journald
	+ Docker Logging with syslog
	+ Docker Logging with Graylog or Logstash
	+ Docker Logging with Fluentd
	+ Docker Logging with Amazon or Google
	+ Docker Logging with Splunk
* Kubernetes Core Concepts
	+ CKA Objectives Covered
	+ Kubernetes Architecture
	+ Cluster Communication
	+ Objects
	+ Object Properties
	+ Labels & Selectors
	+ Annotations
	+ Object Management
	+ Image Fundamentals
	+ Container Fundamentals
	+ Pod Fundamentals
	+ Working with Pods
* Installation
	+ CKA Objectives Covered
	+ Installing HA Control Plane
* Application Lifecycle Management
	+ CKA Objectives Covered
	+ Pod Lifecycle
	+ Container Lifecycle
	+ Init Containers
	+ Container: command and args
	+ Container: Defining Environment
	+ ReplicaSet
	+ Deployments
	+ Working with Deployments
	+ Deployment Rollouts
* Networking
	+ CKA Objectives Covered
	+ Network Overview
	+ Service Discovery & CoreDNS
	+ Container Network Interface (CNI)
	+ Services
	+ Ingress Objects
* Storage
	+ CKA Objectives Covered
	+ Storage
	+ Volume Types
	+ Static Volumes
	+ ConfigMaps
	+ Secrets
* Scheduling
	+ CKA Objectives Covered
	+ Controlling and Tracking Resources
	+ Scheduler Operation
	+ DaemonSet
	+ Node Affinity & Anti-affinity
	+ Pod Affinity & Anti-affinity
	+ Taints & Tolerations
* Jobs and CronJobs
	+ Jobs
	+ CronJobs
* Linux Containers
	+ Application Management Landscape
	+ Application Isolation
	+ Resource Measurement and Control
	+ Container Security
	+ OverlayFS Overview
	+ Container Security
	+ Open Container Initiative
* Conclusion