

**Kubernetes for Developers on AKS**

**Course Number:** CLD-118  
**Duration:** 3 days

**Overview**

This Kubernetes for Developers on AKS (Azure Kubernetes Service) training course teaches attendees how to get up and running quickly with Kubernetes and Docker before diving into Azure Container Registry and Azure Container Instances. Participants learn the core concepts of Kubernetes on AKS, including design, workload, deployment, logging, monitoring, and troubleshooting.

**Prerequisites**

Attendees must:

* Have taken [Architecting Microservices with Kubernetes, Docker, and Continuous Integration](file:////training/microservices-kubernetes-docker-continuous-integration) or have the equivalent knowledge
* Be familiar with a modern programming language and be comfortable with basic Linux command lines and file editing

**Materials**

All AKS training students receive comprehensive courseware.

**Software Needed on Each Student PC**

* Visual Studio 2019, 2022, or later
* Modern web browser
* Access to an Azure DevOps instance
* Related lab files that Accelebrate will provide

**Objectives**

* Build a Docker image with Dockerfile
* Work with Docker Compose
* Work with Container Registry and Container Instances
* Push Docker images into ACR
* Access the Kubernetes API in AKS
* Access Applications in AKS
* Deploy ACR images to AKS
* Work with Kubernetes workloads in AKS
* Implement the sidecar pattern
* Use persistent storage in AKS
* Use AKS volume with Azure file share
* Log, monitor, and troubleshoot in AKS

**Outline**

* Docker Introduction
  + What is Docker
  + Docker Containers vs. Traditional Virtualization
  + Where Can I Run Docker?
  + Docker as Platform-as-a-Service
  + Docker Integration
  + Docker Services
  + Docker Hub Container Registry
  + Alternative Container Registries
  + Competing Containerization Systems
  + Docker Command-line
  + Starting, Inspecting, and Stopping Docker Containers
* Building Docker Images
  + Docker Images
  + Containerizing an Application
  + Building The Image
  + Building Docker Images using Dockerfile
  + Sample Dockerfile
  + Environment Variables
  + Arguments
  + Multi-stage Builds
  + Stop at a Specific Build Stage
  + Build the Image
  + .dockerignore
  + Dockerfile – Best Practices
  + Published Ports
  + Docker Documentation Link
  + Docker Registry
  + Hosting a Local Registry
  + Deploying Docker Images to a Kubernetes Cluster
  + Running Commands in a Container
  + Multi-Container Pod
* Azure Container Registry and Azure Container Instances
  + Azure Container Registry (ACR)
  + ACR Typical Workflow
  + Container Registry SKUs
  + Creating ACR
  + Pushing Existing Docker Images into ACR
  + Build Images in ACR
  + Obtaining ACR Credentials
  + Azure Container Instances (ACI)
  + Azure Container Instance Workflow
  + Working with ACI
  + Deleting Container Instances and Container Registry
* Kubernetes Core Concepts
  + Kubernetes Basics
  + What is Kubernetes?
  + Container Orchestration
  + Kubernetes Architecture
  + Kubernetes Concepts
  + Cluster and Namespace
  + Using Pods to Group Containers
  + Label Syntax
  + Annotation
  + Label Selector
  + Replication Controller and Replica Set
  + Storage Volume
  + Secret
  + Resource Quota
  + Authentication and Authorization
  + Routing
  + Docker Registry
  + Azure Kubernetes Service (AKS)
  + AKS Diagram
  + Deploying an AKS Cluster
  + Application Deployment on AKS
* Deploying and Exposing Applications
  + Configuring AKS for Deployment
  + Deploying to Kubernetes
  + Kubernetes Services
  + Service Resources
  + Service Type
  + ClusterIP
  + NodePort from Service Spec
  + LoadBalancer from Service Spec
  + ExternalName
  + Accessing Applications
  + Service Without a Selector
  + Ingress
    - Ingress Resource Example
    - Ingress Controller
  + Service Mesh
* Design
  + Traditional Applications
  + Virtual Machines
  + Containerized Applications
  + Decoupled Resources
  + Transience
  + Flexible Framework
  + Application Resource Usage
    - Measuring Resource Usage
    - Docker Resource Usage Statistics
    - Docker Container Resource Constraints
    - Docker Run Command Resource Flags
  + Using Label Selectors
  + Equality-Based Label Selector
  + Set Based Label Selector
  + Multi-Container Pods
  + Sidecar Container
  + Adapter Container
* Kubernetes Workload
  + Kubernetes Workload
  + Managing Workloads
  + Imperative commands
  + Imperative Object Configuration
  + Declarative Object Configuration
  + Configuration File Schema
  + Understanding API Version
  + Obtaining API Versions
  + Stateless Applications
  + Sample Deployment Manifest File
  + Working with Deployments
  + Stateful Applications
  + Sample Stateful Manifest File
  + Working with StatefulSet
  + Jobs
  + Sample Job Manifest File
  + Working with Batch Job
  + DaemonSets
  + Sample Daemon Manifest File
  + Rolling Updates
* Deployment Configuration
  + Introduction to Volumes
  + Container OS file system storage
  + Docker Volumes
  + Kubernetes Volumes
  + Volume Specs
  + K8S Volume Types
  + Cloud Resource Types
  + emptyDir
  + Using an emptyDir Volume
  + Other Volume Types
  + Persistent Volumes
  + Creating a Volume
  + Persistent Volume Claim
  + Persistent Volume
  + Pod that uses Persistent Volume
  + Dynamic Volume Provisioning
  + Requesting Dynamic Storage
  + Secrets
    - Creating Secrets from Files
    - Creating Secrets from Literals
    - Using Secrets
  + ConfigMaps
    - Creating configMaps from Literals
    - Creating configMaps from files
  + Security Context Usage
  + Deployment Configuration Status
  + Replicas
  + Scaling
* Shared Volume using Azure Files share
  + Volumes
  + Azure Disks
  + Azure Files share - Workflow
  + Creating a Kubernetes Secret
  + Configuring the Volume in the Container Specification
  + Verifying the Azure Files share is Mounted
* Logging, Monitoring, and Troubleshooting
  + Differences Between Logging and Monitoring
  + Logging in Kubernetes
  + Basic Logging
  + Debugging Pods
  + Debugging Nodes
  + Debugging Replication Controllers and Services
  + Azure Monitor
  + Container Insights
  + Log Queries in Azure Monitor
  + Log Analytics Query Language
  + Logging Agents
  + Fluentd and Elastic Stack
  + Monitoring with Prometheus
  + Alerting
  + Upgrade Process
  + Troubleshooting
  + YAML Syntax Exceptions
  + nodeSelector
  + Troubleshooting a Failed Image Pull
  + Resource Issues when Scaling
* Conclusion