

DevOps Tools: Kubernetes, Jenkins & GitLab CI

Learn to manage source code, orchestrate containers with Kubernetes, and build CI/CD pipelines with Jenkins and GitLab CI.

13 Days

8 HOURS A DAY

31

MODULES

158

TOPICS

COURSE OVERVIEW

This course begins with Git and GitHub fundamentals, covering version control basics, repositories, remotes, tagging and branching. It then moves into Kubernetes, exploring core concepts, configuration, multi-container pods, observability, pod design, services and networking, and state persistence, followed by Azure Kubernetes Service (AKS) topics such as cluster creation, resource management, scheduling, application lifecycle management, storage, security, autoscaling, and logging and monitoring. The course continues with Jenkins and GitLab CI, addressing Jenkins installation, Docker and Maven integration, security, email notifications, pipelines through Jenkinsfile, GitLab CI fundamentals, and building and deploying a Java application, alongside monitoring with Elasticsearch, Logstash, Fluentd, Kibana, Prometheus and Grafana, and testing with Selenium. It closes with real-time projects integrating SonarCloud with GitLab and automating continuous development, integration, testing, monitoring, delivery and deployment, plus an introduction to Elastic Kubernetes Service (EKS).

WHO THIS COURSE IS FOR

DevOps Engineers

System Administrators

Software Developers

Release Managers

Cloud Engineers

QA Engineers

LEARNING OBJECTIVES

- Explain version control concepts and core Git commands
- Configure Kubernetes clusters, pods and multi-container deployments
- Apply Kubernetes deployment strategies such as blue/green and canary
- Manage Kubernetes storage using volumes, persistent volumes and claims
- Configure Azure Kubernetes Service clusters, security and autoscaling
- Build Jenkins pipelines integrating Docker, Maven and GitLab
- Implement GitLab CI pipelines to build and deploy Java applications
- Monitor applications using Prometheus, Grafana and the Elastic Stack

31 Modules, 158 Topics

Git and GitHub

01

Git

TOPICS

- Introduction to Version Control System
- History of Git
- Git Basics
- States in Git
- Installing Git
- Configuration of Git
- Working with Repositories
- Basic Git Commands
- Working with Remotes
- Tagging
- Git Branching

Certified Kubernetes Application Developer

01

Core Concepts

TOPICS

Overview of Container Orchestration · Introduction to Kubernetes · Kubernetes Architecture · Design a Kubernetes Cluster

02

Configuration

TOPICS

- Discover and Use Resources that Extend Kubernetes (CRD)
- Understand Authentication, Authorization and Admission Control
- Understand ConfigMaps
- Understand Security Contexts
- Define an application's resource requirements
- Create and consume Secrets
- Understand Service Accounts

03

Multi Container Pods

TOPICS

Understanding Multi-Container Pods · Creating Multi-Container Pods

04

Observability

TOPICS

- Understand API Deprecations
- Understand Liveness Probes and Readiness Probes
- Understand container logging
- Understand how to monitor applications in Kubernetes
- Understand debugging in Kubernetes

05

Pod Design

TOPICS

- Define, Build and Modify Container Images
- Use Kubernetes Primitives to Implement Common Deployment Strategies (e.g. Blue/Green or Canary)
- Understand Deployments and how to perform rolling updates
- Understand Deployments and how to perform rollbacks
- Understand Jobs and CronJobs
- Understand how to use Labels, Selectors, and Annotations
- Use the Helm Package Manager to Deploy Existing Packages

06

Services & Networking

TOPICS

Understand Services · ClusterIP · Ingress Networking · Basic understanding of NetworkPolicies

07

State Persistence

TOPICS

- Volumes
- Persistent Volumes
- Persistent Volume Claims
- Using PV and PVC in PODs
- Storage Classes
- Difference between stateless and stateful sets applications
- Stateful Sets
- Storage in Stateful Sets

01

Core Concepts

TOPICS

Overview of Container Orchestration · Introduction to Kubernetes · Kubernetes Architecture

02

Create Azure AKS Cluster

TOPICS

Introduction to Azure AKS Cluster · Create AKS Cluster · Explore AKS Cluster using kubectl · Setup Azure CLI on Local Desktop

03

Managing Resources

TOPICS

Managing Pods · Managing Labels & Selector · Managing Replication Controller & Replica Set · Managing Service

04

Scheduling

TOPICS

Manual Scheduling · Taint and Tolerations · Node Selector · Node Affinity

05

Application Lifecycle Management

TOPICS

Overview of Deployment · Deployment Strategies · Managing Deployment

06

Environment Variable

TOPICS

Plain Key · Config Map · Secret · Mount Variable as Volume

07

Storage

TOPICS

- Volumes
- Persistent Volumes
- Persistent Volume Claim
- Azure Disks for AKS Storage
- Create Storage Class
- Managing Persistent Volumes
- Managing Persistent Volume Claims
- Use AKS Provisioned Storage Class instead of Custom Storage Class

08

Security

TOPICS

- Introduction to Active Directory Authentication for AKS admins
- Create AD Group and User and Enable AD for AKS
- Access Azure AKS Cluster Resources using Azure AD User
- Manage Roles and Rolebindings
- Manage ClusterRole and ClusterRoleBindings

09

Autoscaling

TOPICS

- Introduction to Cluster Autoscaler
- Create AKS Cluster with Autoscaling enabled using Azure AKS
- Introduction to Horizontal Pod Autoscaler
- Create Horizontal Pod Autoscaler

10

Logging and Monitoring

TOPICS

- Understand how to Monitor all Cluster Components
- Understand how to Monitor Applications
- Manage Cluster Components Logs
- Manage Application Logs

11

Networking in Kubernetes

TOPICS

Kubernetes Networking · Understand CNI · Understand Pod Networking Concepts · Configure Manual DNS · Configure and Manage Ingress Rule · Namespace · Load Balancer Service

01

Introduction to Jenkins

TOPICS

Introduction to Jenkins · Jenkins Installation · Introduction to Jenkins UI · Create First Job · Add Parameters to your Job

02

Jenkins and Docker

TOPICS

- Configure SSH for Docker Container
- Install SSH Plugin in Jenkins
- Integrate Docker SSH Server with Jenkins
- Run a Jenkins Job on Docker Remote Host through SSH

03

Jenkins Security

TOPICS

Enable/Disable Login in Jenkins · Allow Users to Sign up · Create Users Manually in the Jenkins DB · Create and Manage Roles for Jenkins Users

04

Jenkins Email Integration

TOPICS

Install a Mail Plugin Integration · Jenkins and Gmail · Add notifications to your jobs

05

Jenkins and Maven

TOPICS

Introduction to Jenkins and Maven · Install the Maven Plugin · Install the GIT Plugin · Clone Git repository from Jenkins · Build a JAR using Maven · Test your Code · Deploy your Jar locally · Archive the artifact

06

Jenkinsfile

TOPICS

Introduction to Pipeline · Introduction to Jenkinsfile · Install the Jenkins Pipeline Plugin · Create first Pipeline · Add multi-steps to your Pipeline · Environment Variables · Post Actions

07

Gitlab CI Fundamentals

TOPICS

Introduction to Gitlab · Create a New Project · Building the project locally · Building the project using Gitlab CI · Adding a test stage · Running jobs in parallel · Running jobs in the background

08

Gitlab CI to Build and Deploy Java Application

TOPICS

Introduction to the Java Application · Continuous Integration Pipeline Overview · Building a Java Application Locally · Building a Java Application with Gitlab CI · Deploy to Servers from Gitlab CI

09

Monitoring

TOPICS

- Introduction to Elasticsearch, Logstash, Beats, Fluentd and Kibana
- Deploy Elasticsearch, Logstash, Fluentd and Kibana
- Configure Elasticsearch
- Configure fluentd for collect the logs from Kubernetes Microservices
- Configure Index Pattern
- Kibana Visualization
- Install Prometheus and Grafana
- Monitor application with Prometheus and Grafana

10

Testing

TOPICS

Introduction to Selenium · Set up Selenium Project · Static Analysis of Selenium Source Code · Integrate Selenium with Jenkins · Send notification to Email ID

11

Projects

TOPICS

- **Project 1:** Integration of SonarCloud with GitLab
- **Project 2:** Automate everything (Continuous Development, Continuous Integration, Testing, Monitoring, Continuous Delivery and Deployment)

01

Introduction to EKS

TOPICS

- Introduction to EKS
- Difference between On prem Kubernetes, AKS and EKS

WHAT IS INCLUDED

Everything You Need to Succeed

- Koenig course material for every module
- Delivery by certified instructors and subject matter experts
- Hands-on exercises throughout the course
- Course completion certificate from Koenig

ABOUT KOENIG

Who We Are

Established in 1993, Koenig Solutions is a globally recognised training provider with 35+ technology partnerships, 5,000+ training programmes and a network of certified instructors and subject matter experts, supporting individuals and enterprise teams worldwide.

FLEXIBLE DELIVERY

Learn the Way That Suits You

Classroom Training

Live Online Classes (ILO)

Fly-Me-A-Trainer (FMAT)

Flexi (Self-Paced)

1-on-1 Training

Ready to Get Started?

Talk to a learning advisor about schedules, group training and customised delivery.

Visit koenig-solutions.com

✉ info@koenig-solutions.com