Kubernetes Native App Development

- 2 Days
- Lecture and Hands-on Labs

Course Overview

Learn how to build container-native applications and continuous integration chains powered by Kubernetes. In this Cloud Native course, developers will learn how to build containerized applications targeted for enterprise-grade production environments. You'll explore patterns in containerized application architecture, techniques for eliminating friction in the development process, how to test and debug containerized applications, and how to instrument applications with healthchecks, monitoring tools, and common container logging patterns. After mastering these techniques, we'll turn our attention to devops and building container-native continuous integration pipelines

Who Should Attend

- Motivations: Develop container-native applications, and implement fully containerized CI
- Roles: Developers, application architects, devops

What You'll Learn

- Rapid code-build-test iteration cycles
- Developer-local Kubernetes environments
- IDE & debugger container integration
- Optimizing container startup
- Gracefully handling container failure
- Containerizing legacy applications
- Instrumenting containers with health checks
- Log management strategies
- Instrumenting containers with Prometheus monitoring
- Unit and integration tests for containerized applications
- Containerized continuous integration pipelines
- Image and config hierarchies in CI
- Build server management
- Unit and integration testing pipelines
- Integrating Jenkins with registries, Kubernetes clusters and standalone Docker engines
- Securing and packaging applications for production

Outline

Container Fundamentals

- 💻 Lecture + Lab: Write & Build a Simple Containerized App
- 💻 Lecture + Lab: Push Container Images to a Registry

Deploying Applications to Kubernetes

- 💻 Lecture + Lab: Deploy Kubernetes using Ansible

- 💻 Lecture + Lab: Deploy a Basic App with Deployment & Service
- 💻 Lecture + Lab: Explore Pod Lifecycle Events

Configuration Management

- 💻 Lecture + Lab: Create ConfigMaps
- 💻 Lecture + Lab: Debug CrashLoopBackOff Pods
- 💻 Lecture + Lab: Create Secrets

Application Health & Resiliency

- 💻 Lecture + Lab: Add Liveness & Readiness Probes
- 💻 Lecture + Lab: Use Init Containers for Dependency Ordering
- 💻 Lecture + Lab: Optimize for Slow Startups & Readiness
- 💻 Lecture + Lab: Graceful Shutdown: Handle SIGTERM in Apps

Observability: Logs and Metrics

- 💻 Lecture + Lab: Container Logging Best Practices
- 💻 Lecture + Lab: Aggregate Logs with Loki
- 💻 Lecture + Lab: Expose Application Metrics for Prometheus
- 💻 Lecture + Lab: Visualize Metrics with Prometheus & Grafana

Testing in Kubernetes

- 💻 Lecture + Lab: Write and Run Unit Tests Inside Containers
- 💻 Lecture + Lab: Automate Tests with Kubernetes Jobs
- 💻 Lecture + Lab: Run Integration Tests Against Kubernetes

Legacy & Stateful Applications

- 💻 Lecture + Lab: Containerize a Legacy App with Health Checks
- 💻 Lecture + Lab: Break a Stateful App: Persistence Anti-Patterns

Security & Best Practices

- 💻 Lecture + Lab: Secure Container Images
- 💻 Lecture + Lab: Scan Images for Vulnerabilities

CI/CD in Kubernetes

- 💻 Lecture + Lab: Deploy to Kubernetes via Jenkins Pipelines
- 💻 Lecture + Lab: Integrate CI Pipelines with Container Registries

Prerequisites

- GK 100816 Kubernetes Application Essentials or equivalent experience
- Familiarity with the Bash shell
- Filesystem navigation and manipulation
- Command line text editors like vim or nano
- Common tooling like curl, wget and ping
- Familiarity with YAML and JSON notation
- Basic familiarity with common software development patterns and tools like version control, testing, continuous integration and logging

Next Courses

- Certified Kubernetes Administrator (CKA)
- Certified Kubernetes Application Developer (CKAD)
- Certified Kubernetes Security Specialist (CKS)