AI TACTICAL SKILLS:

BUILD & SECURE KUBERNETES

In this hands-on program, you will gain the essential skills to master Kubernetes.

5 DAYS | Online / In person / Hybrid | ALL LEVELS

Through practical, real-world training, you will develop the expertise needed to deploy, manage, and secure Kubernetes environments with confidence.

We will explore Kubernetes concepts and system architecture, the challenges it addresses, and its model for managing containerized deployments and scaling. You will learn critical concepts such as clustering, scaling, extending, and securing Kubernetes.

Additionally, we will cover essential topics like monitoring and troubleshooting deployments and installations across various environments, including local, on-premise, cloud, and multi-cloud scenarios.

Finally, we will discuss long-term strategies for supporting and maintaining Kubernetes solutions, ensuring you are well-prepared for ongoing management and optimization.

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TARGET AUDIANCE

The learner has gained an understanding of cloud technologies, practices, and principles, enabling them to contribute at a foundational level in meetings and discussions. They should be able to showcase basic skills in modern cloud services, tools, terminology, and processes. Additionally, more advanced learners will find these topics valuable.

- Entry DevOps Personnel
- Network and system administrators
- Developers
- Cloud computing personnel
- Cloud project managers
- Operations support looking for career advancement

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COURSE OUTLINE

This outline ensures a comprehensive, hands-on learning experience, progressing from basic concepts to advanced Kubernetes topics, enabling participants to gain both theoretical knowledge and practical skills.

Day 1: **Introduction to Kubernetes and Setup**

Introduction to Kubernetes

- Overview of container orchestration
- Key concepts and architecture (Nodes, Pods, Services, Deployments, Namespaces)
- Benefits and use cases

Setting Up Kubernetes

- Installing Minikube or using a managed Kubernetes service (GKE, EKS, AKS)
- Setting up kubectl CLI
- Basic kubectl commands

Kubernetes Objects and Resources

- Understanding YAML configuration files
- Creating and managing Pods
- Exploring Deployments and ReplicaSets
- Introduction to Services and Networking basics

Hands-On Labs

- Deploying a simple application (e.g., nginx)
- Scaling applications with Deployments
- Exposing applications using Services

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Day 2: **Application Deployment and Management**

Advanced Pod Configuration

- ConfigMaps and Secrets
- Environment variables and resource limits/requests
- Volume management (emptyDir, hostPath, ConfigMap, Secret)

Managing Applications with Deployments

- Rolling updates and rollbacks
- Deployment strategies (Recreate, Rolling Update, Blue/Green Deployments)

Stateful Applications

- StatefulSets overview
- Persistent Volumes (PVs) and Persistent Volume Claims (PVCs)
- Dynamic volume provisioning

Hands-On Labs

- Configuring and using ConfigMaps and Secrets
- Deploying a StatefulSet application
- Managing Persistent Volumes

Day 3: **Kubernetes Networking and Security**

Kubernetes Networking

- Cluster networking basics
- Ingress Controllers and Ingress resources
- Network policies

Service Discovery and Load Balancing

- Internal and external services
- Headless Services
- Service mesh overview (Istio/Linkerd)

Security in Kubernetes

- Role-Based Access Control (RBAC)
- Network policies for security
- Pod Security Policies

Hands-On Labs

- Setting up and configuring Ingress
- Implementing basic network policies
- Configuring RBAC for user and service accounts

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Day 4: **Monitoring, Logging, and Scaling**

Monitoring and Logging

- Kubernetes monitoring tools (Prometheus, Grafana)
- Logging solutions (ELK Stack, Fluentd)
- Health checks (Liveness and Readiness Probes)

Horizontal and Vertical Scaling

- Horizontal Pod Autoscaler (HPA)
- Vertical Pod Autoscaler (VPA)
- Cluster Autoscaler

Resource Management

- Resource requests and limits
- Quality of Service (QoS) classes
- Namespaces and resource quotas

Hands-On Labs

- Setting up Prometheus and Grafana for monitoring
- Implementing Horizontal Pod Autoscaling
- Configuring resource requests and limits for applications

Day 5: **Advanced Topics and Best Practices**

Kubernetes Operators

- Introduction to Operators
- Creating a simple Operator with Operator Framework

CI/CD Integration

- Integrating Kubernetes with CI/CD pipelines (Jenkins, GitLab CI, GitHub Actions)
- Managing deployments with Helm

Disaster Recovery and Backup

- Backup strategies for Kubernetes (Velero)
- Disaster recovery best practices

Best Practices and Troubleshooting

- Best practices for Kubernetes cluster management
- Troubleshooting common issues
- Reviewing and analyzing logs

Hands-On Labs

- Building and deploying a Helm chart
- Setting up a simple CI/CD pipeline for a Kubernetes application
- Implementing a backup and restore strategy

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