Oracle Cloud Infrastructure DevOps Professional (2025): Hands-on Workshop

Oracle Cloud Infrastructure

DURATION	MODULES	COURSE CODE
3 Days	**19 Lectures**	**—**

Course Overview

After completing this course, you should be able to: Build containerized microservices and deploy them using managed Kubernetes services. Set up and manage continuous integration and continuous delivery (CI/CD) pipelines. Provision, configure, and manage infrastructure using code and templates. Implement DevSecOps practices. Apply DevOps measurement and instrumentation techniques. Analyze Capacity, Forecast Usage, and Performance.

What You Will Learn

Module 01: DevOps Fundamentals and OCI DevOps Overview

- OCI DevOps Professional Course Overview
- Course Speakers
- Target Audience and Prerequisites
- Course Outline and Big Picture
- What the OCI DevOps Professional Exam Validates
- Getting the Most Out of the Course
- OU Community Value
- Ratings and Feedback
- DevOps Foundations
- DevOps Overview
- DevOps Story: Challenges and Turning Point
- DevOps Definition and Importance
- Why DevOps Matters
- DevOps Lifecycle
- DevOps Lifecycle and CI/CD
- The Continuous Paradigm
- Benefits of DevOps
- DevOps in Oracle Cloud Infrastructure
- DevOps in the Cloud

- OCI DevOps Service Overview
- DevOps as a Service
- Benefits of DevOps as a Service
- Case Study: Cloud-Native Solutions on OCI
- Developing Cloud-Native Solutions
- Migrating a Static Website to OCI Compute
- Enhancing the Website Using OCI Services
- Designing a Scalable Cloud-Native Application
- Monitoring, Alerting, and Logging for Application Performance

Module 02: Microservices and Containerization

- Microservices Architecture
- Microservices Architecture Overview
- OCI DevOps Journey
- Microservices vs Monolithic Architecture
- Sample E-Commerce Microservices Application
- Communication Mechanisms
- Microservices Design Methodology
- 12-Factor Application Methodology
- Benefits and Drawbacks of Microservices
- Containerization Fundamentals
- Containerization Overview
- Containers vs Virtualization
- Benefits of Containerization
- When to Use Docker Containers
- Docker Essentials
- Docker Architecture and Components
- Virtual Machines vs Containers
- Basic Docker Commands
- Demo: Docker Commands
- Docker Images and OCI Registry
- Working with Docker Images
- Dockerfile Fundamentals
- Demo: Building and Managing Docker Images
- Oracle Cloud Infrastructure Registry (OCIR)
- OCIR Concepts, Benefits, and Terminology
- Managing Repositories, Images, and Security
- Demo: Managing OCIR
- OCI Image Standards and Layout
- Image Anatomy and Layers
- OCI Container Instances
- Introduction to OCI Container Instances
- Features and Use Cases
- IAM Policies and Shapes
- Container Configuration (Basic and Advanced)
- Demo: Deploying a WordPress Application Using Container Instances

Module 03: Kubernetes Fundamentals

- Introduction to Kubernetes
- Kubernetes Architecture Overview
- Kubernetes Components and Features
- Cluster Components and Node Pools
- Supported Shapes and Operating Systems
- Kubernetes Versions and Version Drift
- Kubernetes Operations
- Basic kubectl Commands
- Managing Pods, Deployments, and Services
- Editing, Debugging, and Deleting Resources
- Node Operations
- kubectl Aliases

Module 04: Oracle Kubernetes Engine (OKE) Architecture

- Introduction to Oracle Kubernetes Engine (OKE)
- OKE Cluster Architecture
- Basic vs Enhanced Clusters
- Managed Nodes vs Virtual Nodes
- Supported Images and Shapes
- Worker Node Customization
- Creating OKE Clusters
- Prerequisites and IAM Policies
- Quick Create vs Custom Create Workflows
- Network Configuration for OKE
- Pod Networking (Flannel vs OCI VCN-Native CNI)
- CIDR Planning and Network Considerations
- Cluster Creation Examples
- Demos: Creating OKE Clusters

Module 05: Accessing and Managing OKE Clusters

- Accessing Clusters Using kubectl
- Kubeconfig Files
- Cloud Shell and Local Access Setup
- Demo: Cluster Access Setup
- Secure Access
- SSH Access to Worker Nodes
- Public vs Private Subnets
- OCI Bastion Overview
- IAM Policies for Bastions
- Secure Access to Kubernetes API and Nodes
- Demos: Bastion Setup and Secure Access

Module 06: Virtual Nodes and Cluster Scaling

- Managed Nodes vs Virtual Nodes Comparison
- Resource Allocation and Pricing
- Pod Networking and Load Balancing
- Scaling Clusters and Node Pools
- IAM Policies for Virtual Nodes
- Virtual Node Pool Management
- Resource Limits and Requests
- Demos: Virtual Node Cluster Creation and Management

Module 07: Self-Managed Nodes

- OKE Self-Managed Nodes Overview
- Use Cases and Benefits
- Prerequisites for Self-Managed Nodes
- Demo: Creating and Managing Self-Managed Nodes
- Key Design Considerations

Module 08: Application Deployment and Networking

- Deploying Multi-Tier Applications on OKE
- Demo: Guestbook Application Deployment
- Pulling Images from OCI Container Registry
- Creating Docker Registry Secrets
- Editing Application Manifests
- OCI and Kubernetes Integration
- OCI Architecture Basics
- Regions, Availability Domains, and Fault Domains
- Kubernetes Node Labels and Scheduling
- OCI Service Operator for Kubernetes
- Demo: Deploying OCI Services from Kubernetes
- Load Balancing and Ingress
- Kubernetes Services of Type LoadBalancer
- OCI Load Balancer Integration
- SSL/TLS Termination
- Load Balancer Shapes and Policies
- Health Checks and Network Security Groups
- Ingress Controllers Overview
- OCI Native Ingress Controller Setup
- Specialized Workloads
- Running Applications on ARM-Based Nodes
- Running GPU-Based Workloads
- Node Affinity and Scheduling
- Demos: ARM and GPU Workloads

Module 09: Storage for Kubernetes

- Persistent Storage Fundamentals
- Storage Options for Kubernetes on OCI
- Persistent Volumes and Persistent Volume Claims
- Block Volume Storage
- Provisioning PVCs Using Block Volume Service
- CSI Volume Plugin
- Demo: Block Volume PVC Provisioning
- Expanding Block Volumes
- Performance Configuration
- File System Types
- File Storage Service
- Provisioning PVCs Using File Storage Service
- Creating PVCs on New and Existing File Systems
- CSI-Based File Storage Integration

Module 10: OKE Cluster Operations and Scaling

- OKE Dashboard and Cluster Management
- Kubernetes Dashboard Overview
- Deploying and Accessing the Kubernetes Dashboard
- OKE Dashboard Usage and Considerations
- Demo: Accessing the OKE Dashboard
- Cluster and Node Pool Management
- Modifying Kubernetes Cluster Properties
- Managing Node Pools
- Create, List, Update, and Delete Node Pools
- Advanced Deletion Options
- Demo: Managing Node Pools
- Modifying Node Pool and Worker Node Properties
- Worker Node Management: Tips and Best Practices
- Instance Metadata and Capacity Management
- Configuring IMDS for Kubernetes Clusters
- Disabling IMDSv1 and Verification
- Worker Node Capacity Types
- Reserved Capacity
- Preemptible Capacity
- IAM Policies for Capacity Reservations
- Demo: Using Capacity Reservations
- Node Initialization and Scaling
- Custom cloud-init Scripts for Managed Nodes
- Scaling Kubernetes Clusters and Node Pools
- Autoscaling Node Pools and Pods
- Kubernetes Cluster Autoscaler
- Deployment Options

- Production Recommendations
- Demo: Cluster Autoscaler
- Metrics and Autoscaling
- Kubernetes Metrics Server
- Horizontal Pod Autoscaler (HPA)
- Vertical Pod Autoscaler (VPA)
- Demos: Metrics Server and Autoscalers
- Cluster Upgrades and DNS
- Kubernetes Versions and OKE
- Control Plane and Worker Node Upgrades
- Managed, Self-Managed, and Virtual Node Upgrades
- Configuring DNS for Kubernetes Clusters
- ExternalDNS Configuration
- Observability
- Monitoring and Observing Kubernetes Clusters
- Viewing Work Requests
- Viewing OKE Service Logs
- Kubernetes API Server Audit Logs
- Application Logs on Virtual, Managed, and Self-Managed Nodes
- Kubernetes Metrics

Module 11: Kubernetes Security and Access Control

- Authentication and Authorization
- Adding Service Account Tokens to kubeconfig
- IAM and RBAC in OKE
- Kubernetes Roles, RoleBindings, ClusterRoles
- Demos: RBAC Configuration
- Secrets and Image Security
- Managing Secrets in Kubernetes
- Container Image Security Principles
- Integrity
- Trusted Sources
- Image Vulnerability Scanning
- Image Signing and Verification
- Enforcing Signed Images from OCIR
- IAM Policies for Image Enforcement
- Data Encryption
- Encrypting Data at Rest and In Transit
- Block Volume Encryption Options
- Storage Class Configuration with Oracle-Managed and Customer-Managed Keys
- File Storage Service Encryption
- New and Existing File Systems

Module 12: OCI DevOps IAM, Projects, and Repositories

- DevOps IAM Policies

- IAM Policy Model and Syntax
- DevOps-Specific Policy Options
- Demo: Configuring OCI Security for DevOps
- DevOps Projects and Code Repositories
- OCI DevOps Service Overview
- DevOps Projects: Benefits and Use Cases
- Code Repositories (OCI, GitHub, GitLab)
- Demos: Creating Projects and Repositories
- SSH Authentication Tokens
- Repository Mirroring
- Collaboration and Insights
- External Connection Validation
- Forking Repositories and Pull Requests
- Synchronization Strategies
- Code Repository Settings
- Code Repository Insights and Metrics
- Artifacts and Registries
- DevOps Environments (BM, VM, Containers, OKE, Functions)

Module 13: CI/CD with OCI DevOps

- CI/CD Fundamentals
- CI/CD Concepts and OCI DevOps Integration
- Build Pipelines and Continuous Integration
- Build Pipeline Flow and Prerequisites
- Build Pipelines
- Creating and Managing Build Pipelines
- Build Specification Files (build_spec.yaml)
- Build Stages and Managed Builds
- Artifact Delivery and Build Triggers
- Monitoring and Managing Builds
- Demos: Build Pipelines and Artifacts
- Deployment Pipelines
- Continuous Delivery vs Continuous Deployment
- Deployment Pipeline Concepts and Workflow
- Deployment Stages and Release Strategies
- Rollback (Manual and Automatic)
- Demos: Deployment Pipelines and Automation
- Advanced Pipeline Features
- Shell Stages in Deployment Pipelines
- Running CLI Commands
- Demo: Adding a Shell Stage

Module 14: Deployment Strategies

- Blue-Green Deployment
- Blue-Green Deployment Concepts

- Environment Design and Stages
- Benefits and Drawbacks
- Demos: Blue-Green Deployment
- Canary Deployment
- Canary Deployment Concepts
- Environment Design and Stages
- Benefits and Drawbacks
- Demos: Canary Deployment

Module 15: Helm and Continuous Testing

- Helm Fundamentals
- Helm Overview and Architecture
- Helm Charts and Structure
- Helm Commands
- Helm Deployments to OKE
- Demos: Helm Deployments with OCI DevOps
- Security and Integrity
- Helm Provenance and Verification
- Helm Attestation
- Continuous Testing
- Continuous Testing in DevOps Pipelines
- External Tools and Plug-ins
- Jenkins Integration with OCI CD Pipelines

Module 16: Infrastructure as Code with Terraform

- IaC Fundamentals
- What is Infrastructure as Code
- Benefits and Use Cases
- Terraform Concepts
- Terraform Architecture
- Commands, Variables, Providers, Resources
- Outputs, Modules, and State
- Terraform in Practice
- Terraform Setup and Workflow
- Configuration File Structure (main.tf)
- Environment Variables and Security Tokens
- Updating Infrastructure
- Modularizing Terraform Configurations

Module 17: OCI Resource Manager

- OCI Resource Manager Overview
- Stacks, Jobs, and Templates
- Configuration Source Providers
- Creating and Managing Stacks

- Importing Existing Infrastructure
- Drift Detection
- Private Templates
- Remote Exec and Endpoints

Module 18: DevSecOps on OCI

- DevSecOps Fundamentals
- DevSecOps Concepts and Shift-Left Security
- Applying DevSecOps in OCI
- DevSecOps Best Practices
- OCI Vault and Key Management
- OCI Vault Overview
- Keys and Encryption
- Oracle-Managed vs Customer-Managed Keys
- Vault Integration with OCI Services
- Secrets Management
- Demos: Vault and Secrets
- Application Dependency Management
- Dependency Management Concepts
- Integrating with OCI DevOps
- IAM Policies
- Demo: CVE Scanning in Build Pipelines

Module 19: Observability and Event-Driven DevOps

- Observability Platform
- Observability Concepts and Priorities
- Monitoring and Management Capabilities
- Monitoring and Logging
- OCI Monitoring Service
- Metrics, Alarms, and MQL
- Notifications Service
- OCI Logging Service
- Audit Logs and DevOps Logs
- Demos: Monitoring and Logging
- Events and Automation
- OCI Events Service
- Event Types and Rules
- DevOps-Generated Events
- Metrics and Use Cases
- Demo: Events Service