

Longhorn Deployment and Operations

Course Duration: 16 Hours

Course code: LHN201v1.5

1. Course Overview

This course provides comprehensive knowledge of deploying, managing, and operating Longhorn, a cloud-native distributed block storage system for Kubernetes. Learners will gain hands-on experience in setting up Longhorn, managing persistent storage, ensuring data reliability, and performing day-to-day operations in containerized environments.

2. What you'll learn?

By the end of the course, you will be able to:

- Understand Longhorn architecture and components
- Deploy Longhorn in Kubernetes environments
- Manage persistent storage and volumes
- Configure replication and data protection
- Monitor and troubleshoot Longhorn clusters
- Perform backup and disaster recovery operations
- Optimize storage performance and reliability
- Integrate Longhorn with Kubernetes workloads

3. Target Audience

- Kubernetes Administrators
- DevOps Engineers
- Cloud Engineers
- System Administrators
- Platform Engineers

4. Pre-Requisites

Before taking this course, you should have:

- Basic knowledge of Kubernetes
- Understanding of containerization concepts
- Familiarity with Linux systems
- Basic storage concepts (block storage, volumes)

5. Course content

Module 1: Course Introduction

- Course objectives and structure
- Overview of cloud-native storage
- Introduction to Longhorn

Module 2: Longhorn Architecture Overview

- What is Longhorn
- Longhorn components and design
- Distributed storage concepts
- Use cases and benefits

Module 3: Kubernetes Storage Fundamentals

- Persistent Volumes (PV) and Persistent Volume Claims (PVC)
- Storage classes
- Dynamic provisioning
- Container storage interface (CSI)

Module 4: Longhorn Installation and Setup

- Prerequisites for Longhorn deployment
- Installing Longhorn on Kubernetes
- Using Helm and YAML manifests
- Initial configuration and UI access

Module 5: Volume Management

- Creating and managing volumes
- Attaching and detaching volumes
- Volume expansion and resizing
- Snapshots and backups

Module 6: Data Replication and Reliability

- Replica management
- Data redundancy and fault tolerance
- Node and disk failure handling
- Self-healing mechanisms

Module 7: Backup and Disaster Recovery

- Backup targets (NFS, S3)
- Scheduling backups
- Restoring volumes from backups
- Disaster recovery strategies

Module 8: Monitoring and Troubleshooting

- Monitoring Longhorn components
- Logs and metrics
- Troubleshooting volume and node issues
- Debugging common problems

Module 9: Performance Optimization

- Tuning storage performance
- Managing replicas and resources
- Optimizing I/O performance
- Best practices for production environments

Module 10: Security and Access Control

- Securing Longhorn UI and API
- Role-based access control (RBAC)
- Network security considerations
- Data protection best practices

Module 11: Maintenance and Upgrades

- Longhorn version upgrades
- Node maintenance
- Disk management
- Handling cluster changes

Module 12: Integration with Kubernetes Workloads

- Deploying stateful applications
- Using Longhorn with databases
- Integration with Helm charts
- Multi-tenant environments

Module 13: Advanced Longhorn Features

- Recurring jobs and automation
- Disaster recovery volumes
- Backup store management
- Advanced scheduling

Module 14: Hands-On Labs and Real-World Scenarios

- Deploying Longhorn cluster
- Managing volumes and backups
- Simulating failures and recovery
- Performance tuning exercises

Module 15: Capstone Project

- Deploy and manage Longhorn in a production-like environment
- Implement backup and DR strategies
- Optimize performance and reliability
- Final project evaluation and presentation

