

**Enterprise Linux High Availability Clustering**

**Course Number:** LNX-124
**Duration:** 5 days

**Overview**

This Enterprise Linux High Availability Clustering training focuses on two key areas: Linux high availability (HA) clustering and HA storage administration. Attendees learn how to make use of clustered storage technologies to enable active/active configurations.

NOTE: This class can be taught using the Linux distribution of your choice.

**Prerequisites**

This course requires advanced knowledge of Linux system administration as taught in Accelebrate’s [Linux Fundamentals](file:////training/linux-fundamentals) and [Enterprise Linux Systems Administration](file:////training/enterprise-linux-system-administration).

**Materials**

All Linux training attendees receive comprehensive courseware.

**Software Needed on Each Student PC**

Attendees will not need to install any software on their computer for this class. The class will be conducted in a remote environment that Accelebrate will provide; students will only need a local computer with a web browser and a stable Internet connection. Any recent version of Microsoft Edge, Mozilla Firefox, or Google Chrome will be fine.

**Objectives**

* Assemble a realistic three-node Linux cluster utilizing best practices. Each node has three network interfaces and each student's cluster has its own dedicated cluster VLAN.
* Perform very real-world tasks in a real-world setting, including multipathing, redundant ring communication, last man standing cluster, and shared storage scenarios.
* Work with Cluster Architecture & Design, Pacemaker, Corosync, Fencing, Resource Management, Advanced Resource Management, Multipathing, Cluster LVM, and Global File System v2.

**Outline**

* Introduction to Clustering And Storage Management
	+ Clustering Introduction
	+ Cluster Building Blocks
	+ Shared Storage
	+ Hardware and Software Requirements
	+ Network Considerations
	+ Split Brain Prevention with Fencing
	+ HA Components
	+ Clustered Resources
	+ Configuration Tools
	+ Red Hat Cluster Stack Roadmap
	+ Running Commands on Multiple Systems
* Corosync And Quorum Management
	+ Vocabulary
	+ Network Topology
	+ Ethernet Bonding
	+ Communication Methods
	+ IPv6 Considerations
	+ Cluster Node Preparation
	+ Enable and Configure pcsd
	+ PCS & PCSD
	+ Cluster Quorum
	+ Advanced Quorum Techniques
	+ Corosync
	+ Corosync - Redundant Ring Protocol (RRP)
	+ Corosync Security
	+ Joining and Leaving the Cluster
	+ Quorum Administration
	+ Upgrading
* STONITH and Fencing
	+ Fencing Introduction
	+ Node Level Fencing
	+ Node Fencing: External
	+ Node Fencing: Internal
	+ Node Fencing: Pseudo
	+ Resource Level Fencing
	+ Fencing Architecture
	+ STONITH Subsystem
	+ Fencing Agents
	+ Fencing Agents listing
	+ STONITH Resources
	+ Working With stonith\_admin
	+ Manual Fencing
	+ Best Practices
* Pacemaker Cluster Resource Manager
	+ Cluster Architecture Revisited
	+ Pacemaker Architecture
	+ Pacemaker Cluster Information Base (CIB)
	+ Resource Management Overview
	+ Component Relationships
	+ Resource Agents
	+ Types of Resources
	+ Resource Naming Conventions
	+ Resource Specific Parameters/Options
	+ Resource Meta Parameters/Options
	+ Resource Agent Operations
	+ Discover Resource Agents
	+ Available Resource Agents
	+ Resource Spotlight: IPAddr2
	+ Add a Primative Resource
	+ Resource Group Management
	+ Resource Group Example
	+ Resource Actions: Monitoring
	+ Resource Administration
	+ PCS vs. CRM\_\*
* Advanced Resource Configuration
	+ Resource Placement Basics
	+ Resource Ordering
	+ Location Constraints
	+ Relocating Resources
	+ Relocation on Failure
	+ Resource Standard: Clones & Multi-State
	+ Resource Operations
	+ Troubleshooting
	+ Cluster Maintenance
* Storage Technologies
	+ Remote Storage Overview
	+ Remote Filesystem Protocols
	+ Remote Block Device Protocols
	+ Distributed Lock Manager
	+ dlm\_controld & dlm\_tool
	+ Block Devices and the Device Mapper
	+ Managing Loopback Devices
	+ ISCSI
	+ iSCSI Architecture
	+ iSCSI Target Implementations
	+ iSCSI Target Node Preparation & targetcli
	+ iSCSI Target Administration
	+ iSCSI Target Defining Storage Objects
	+ iSCSI Target LUN Administration
	+ iSCSI Target Network Portal Configuration
	+ iSCSI Target Security
	+ iSCSI Target Examples
	+ Open-iSCSI Initiator Implementation
	+ iSCSI Initiator Discovery
	+ iSCSI Initiator Node Administration
	+ Mounting iSCSI Targets at Boot
	+ iSCSI Multipathing Considerations
* Kernel Device Management
	+ Managing Linux Device Files
	+ Kernel Hardware Info â€“ /sys/
	+ /sys/ Structure
	+ udev
	+ I/O Elevators
* Device Mapper and Multipathing
	+ SAN Multipathing
	+ Multipath Configuration
	+ Multipathing Best Practices
* Advanced Lvm & Cluster Lvm
	+ Logical Volume Management
	+ Implementing LVM
	+ Creating Logical Volumes
	+ Activating LVM VGs
	+ Exporting and Importing a VG
	+ Examining LVM Components
	+ Changing LVM Components
	+ Advanced LVM Overview
	+ Advanced LVM: Components & Object Tags
	+ Advanced LVM: Automated Storage Tiering
	+ Advanced LVM: Thin Provisioning
	+ Advanced LVM: Striping & Mirroring
	+ Advanced LVM: RAID Volumes
	+ cLVM
* Global File System (GFS) 2
	+ GFS2 Overview
	+ GFS2 Capabilities
	+ GFS2 Theory of Operation
	+ GFS2 Configuration Prerequisites
	+ Setting Up Cluster LVM
	+ GFS2 Filesystem Creation & Mounting
	+ GFS2 Filesystem Management
	+ GFS2 Fencing Requirement
* Conclusion