Current Technologies
Computer Learning Centers

+1 (219) 764-3800
6210 Central Ave, Portage IN
sales@ctclc.com
www.ctclc.com

Cisco Partner
Platinum Learning

WHERE GREAT TRAINING HAPPENS EVERYDAY!

Cisco Multilayer Director Switch (MDS) Administration

Cisco Multilayer Director Switch (MDS) Administration

In this Cisco Multilayer Director Switch (MDS) Administration updated four-day course (2026) focuses on the current generation of 32GB / 64GB MDS Switches with modern FC Analytics ASICs and provides a deep technical exploration of Cisco MDS 9000 Series 64 GB SAN architectures, advanced congestion control, and modern Intent-Based Automation (IBN) using Unified Cisco Nexus Dashboard 4.x. Unlike traditional SAN courses that focus primarily on manual CLI configuration, this training emphasizes automated SAN operations, monitoring, predictive Analytics, and self-healing and fabric design. Students learn how modern Cisco SAN environments leverage software-driven Policies, automation frameworks, and advanced analytics to detect, analyze, and remediate performance and FC SAN congestion issues using SAN Insights before they impact production storage environments. Different Zoning options will be discussed such as Smart Zoning, IVR Zoning, Basic, Enhanced, and Auto Zoning.

Throughout the course, participants gain practical experience configuring Cisco MDS fabrics using both CLI and Unified Nexus Dashboard policy-based automation. The training focuses on real-world SAN operational challenges such as FC SAN congestion due to Slow Drain devices or Overutilization, lossless flow control behavior, and FC SAN fabric stability. Engineers learn how Cisco SAN Analytics, IO Flow metrics and performance metrics streaming analytics, and congestion remediation automated actions such as DIRL, FPIN, congestion isolation and other mechanisms enable intelligent Level-1, Level-2, Level-3 congestion detection and automated remediation.

Throughout the course, participants learn about FC SAN fabric software and hardware architecture and operation, stability, high-availability, non-stop forwarding, stateful process restarts, non-disruptive software upgrades (ISSU), and Stateful Supervisor Switchover SSO.

By combining scalable non-blocking internal hardware architecture with Virtual Output Queuing (VoQ) and specialized centralized arbitration with the understanding of modern software automation techniques, students develop the skills required to design, operate and deploy large-scale, high-performance storage fabrics supporting 32G and 64G Fiber Channel with automated SAN Analytics environments.

How our CTCLC MDS Course is superior to the rest!

- Intent-Based Automation using Unified Nexus Dashboard
- Advanced FC SAN Congestion Control
- Understanding IO Flow Metrics and Performance metrics
- FC Lossless Flow control impact on Congestion backpressure within MDS Architecture using Arbiter and across the FC links
- Unified Nexus Dashboard Infrastructure and FC SAN Insights
- Intelligent Zoning & Routing support in Unified Nexus Dashboard or CLI
- FSPF Routing and Port Channeling for FC SAN Fabric Stability and per-exchange load balancing and per-flow load balancing
- FC SAN Fabric Stability Analytics

Course Duration
4 days

Course Price
$4,295.00 or 43 CLCs

Methods of Delivery
- Instructor Led
- Virtual ILT
- On-Site

- FC SAN Principal Switch Selection, Domain ID Assignment, Exchange Fabric Parameters, Fabric stability Timeout values, Error Detection Timeout etc..
- Predictive Analytics with Unified Nexus Dashboard
- Understanding Congestion Analytics Level-1, Level-2, Level-3 in Unified Nexus Dashboard
- Understanding Congestion due to slow Drain device or Oversubscription in FC SAN network and typical events that are triggered by congestion
- Understanding PortMonitoring Policy and PortGuard actions in Unified ND
- Architecture, Operation,Scale and Deployment modes of FC Analytics ASICs 64G and 32G ASICs
- MDS Software and Hardware Architecture Mastery
- FPIN, DIRL, Congestion Isolation, Fabric Performance Manger with congested devices database
- FCIP Tunnel Performance optimizations
- FC SAN Design Criteria and Scale
- All features are covered using CLI Configuration and using Unified Nexus Dashboard

Why Attend with Current Technologies CLC

- Our Instructors are in the top 10% rated by Cisco
- Our Lab has a dedicated 1 Gig Fiber Connection for our Labs
- Our Labs run up to Date Code for all our courses

Who Should Attend

This course is ideal for SAN administrators, storage engineers, and IT professionals responsible for managing Cisco storage networks in enterprise and data center environments. It emphasizes operational best practices and prepares attendees to optimize SAN performance, improve resilience, and simplify network management.

Prerequisites

- Basic Foundations and Networking Knowledge
- Familiarity with Virtualization Platforms
- Hands-on Experience in Cisco Networking (Preferred)

OUTLINE

Module 1: Cisco MDS Intent-Based SAN Automation
Introduces self-healing SAN operations and AI-powered network automation.
- Lesson 1: Cisco MDS Intent-Based SAN Automation
- Lesson 2: Automated SAN Network Analytics

Module 2: Overview of Cisco MDS SAN Switches
Explores the MDS product line and switch capabilities for modern SAN architectures.
- Lesson 1: Cisco MDS Switching Portfolio Overview
- Lesson 2: MDS 9124V, MDS 9148V, MDS 9396V, MDS9220i Fabric Switches
- Lesson 3: MDS 9700 Series Director-Class Switches
- Lesson 4: Key Features of Cisco MDS Switches
- Lesson 5: High Availability, Reliability, and Redundancy (ISSU, SSO, NSF,…)
- Lesson 6: Use Cases for Cisco MDS SAN Switches

Module 3: Cisco Unified (ND) Nexus Dashboard Overview
Demonstrates Unified ND's role in FC SAN intent-based automation, SAN analytics, and Policy Enforcement.
- Lesson 1: Unified Nexus Dashboard Overview
- Lesson 2: Unified Nexus Dashboard Architecture & Integration
- Lesson 3: Unified Nexus Dashboard Connectivity & Deployment

- Lesson 4: Deploying Unified ND Cluster (SAN)
- Lesson 5: Unified ND VMM Integration with Virtualized Environment
- Lesson 6: Monitoring Fabric and Intended State / Performance Monitoring
- Lesson 7: Unified ND4.1 New Features

Module 4: Cisco Smart Licensing using Policy (SLP) Model
Covers Smart Licensing using Policies and transition from traditional licensing.
- Lesson 1: Feature-Based Licensing and On-Demand Port Activation License
- Lesson 2: Smart Licensing Model
- Lesson 3: Smart Software Licensing Model using Policy (SLP)
- Lesson 4: Enabling SLP
- Lesson 5: SLP Deployment Models
- Lesson 6: Example of SLP on 9124V and 9148V
- Lesson 7: Converting Traditional Mode Licenses to Smart Mode
- Lesson 8: SLC Reports and Alerts

Module 5: Designing & Implementing SAN Fabrics
Focuses on SAN design, VSANs, zoning, and Unified ND operations.
- Lesson 1: SAN Fabric Design Principles & Topologies
- Lesson 2: VSANs and Inter-VSAN Routing
- Lesson 3: Use Case and Benefits of Using Multiple VSANs
- Lesson 4: Implementing VSAN Fabric in ND
- Lesson 5: Zone, Zonesets and CFS Distribution
- Lesson 6: Configuring Zones, Autozones, Smart Zoning and Zonesets in ND/CLI
- Lesson 7: Configuring ISL Trunking, Port Channeling and Load-Balancing in ND
- Lesson 8: Other ND Features: Device Alias, Image Managements, Event Analytics, Programmable Reporting, Alarms, Templates

Module 6: Automated SAN Analytics & Telemetry
Provides insight into SAN performance with telemetry and analytics.
- Lesson 1: SAN Analytics Architecture and Solution Components (F64 and F32 Analytics ASICs)
- Lesson 2: SAN Fabric Analytics Deployment
- Lesson 3: SAN Analytics Configuration and Verification using ND/CLI
- Lesson 4: Core Capabilities and Benefits of SAN Analytics
- Lesson 5: Key Performance Metrics in SAN Analytics/SAN Insights
- Lesson 6: Use Cases for SAN Analytics/SAN Insights
- Lesson 7: Automated Proactive Fabric Monitoring, Predictive Analytics, Predicting and Avoiding Congestion (Slow Drain and Overutilization Congestion, Level-1, Level-2, Level-3 Congestion in ND, Port Monitoring Policy with DIRL, FPIN, Congestion Isolation,…)

Module 7: CLI-based Troubleshooting
Teaches congestion mitigation, DIRL, and FPIN-based acceleration.
- Lesson 1: SAN Analytics & Troubleshooting
- Lesson 2: Key Performamce Metrics
- Lesson 3: Automated Detection of SAN Congestion
- Lesson 4: Detection & Alerting of SAN Congestion
- Lesson 5: Automated Alerting of SAN Congestion on MDS using PMON
- Lesson 6: Automated Congestion Prevention
- Lesson 7: Congestion Prevention using DIRL
- Lesson 8: Congestion Prevention using FPIN
- Lesson 9: Troubleshooting SAN Congestion

Module 8: Cisco MDS SAN Security
Focuses on fabric and link-layer security, TrustSec, and secure boot.

- Lesson 1: Cisco MDS SAN Management Security
- Lesson 2: Fabric Target Access Security
- Lesson 3: Fabric Control Plane Security
- Lesson 4: FC and FCIP Link Security
- Lesson 5: Secure Boot and Anti-Counterfeit Technology
- Lesson 6: Secure Erase

Module 9: SAN/MDS Programmability and Automation
Introduces MDS automation tools including Python, NX-API, and Ansible.
- Lesson 1: MDS 9000 Programmability Options
- Lesson 2: NX-API
- Lesson 3: MDS Python API
- Lesson 4: Cisco MDS SDK
- Lesson 5: Ansible
- Lesson 6: ND Automation (Terrafom)

Module 10: Appendix FC SAN Concepts
Provides a foundational overview of SAN protocols and operations.
- Lesson 1: Why FC Today
- Lesson 2: FC SAN Overview
- Lesson 3: FC-0
- Lesson 4: FC-1
- Lesson 5: FC-2
- Lesson 6: Login Parameters, Flow, and Class
- Lesson 7: FC Switch Fabric
- Lesson 8: Error Management
- Lesson 9: FC Zoning Concepts
- Lesson 10: FC SAN Flow Control
- Lesson 11: FC SAN Topology and Port Types
- Lesson 12: FC Services
- Lesson 13: NPV and NPIV
- Lesson 14: Device Alias
- Lesson 15: Port Channel
- Lesson 16: Introduction to SCSI and NVMe

LAB OUTLINE

Lab 1: Lab Access
- Task 1: Access the lab

Lab 2: Initial Setup of Cisco MDS 9000 Series Switch
- Task 1: Perform the Initial Setup Procedure on the Cisco MDS 9148V Series Switch
- Task 2: Perform the Initial Setup Procedure on the Cisco MDS 9124V Series Switch

Lab 3: Perform the ISSU Upgrade on Cisco MDS 9000 Series Switch
- Task 1: Perform the ISSU Upgrade on Cisco MDS 9148V Series Switch
- Task 2: Perform the ISSU Upgrade on Cisco MDS 9124V Series Switch
- Task 3: Perform the ISSU Upgrade on Cisco MDS 9710 Director Series Switch

Lab 4: Install vND (Virtual Nexus Dashboard) for SAN Single-node Cluster
- Task 1: Deploy and Install vND Cluster for SAN Controller with SAN Insights
- Task 2: Verify/Troubleshoot the vND Cluster for SAN

Lab 5: Configure FC VSANs, FC Port Types and ISLs, VSAN Trunking Links on MDS 9000 Series Switches using CLI

- Task 1: Configure VSAN on MDS 9000 Series Switches
- Task 2: Configure F Ports to ESX Hosts and to Storage Array
- Task 3: Configure E/TE Ports on MDS 9000 Series Switches
- Task 4: Verify E/TE, Trunking VSAN Ports on MDS 9000 Series Switches
- Task 5: Verify F Ports on MDS 9000 Series Switches

Lab 6: Configure Basic and Enhanced Zoning on MDS 9000 Series Switches using CLI

- Task 1: Configure Zones and Zonesets on MDS 9000 Series Switches in different VSANs using Basic Zoning Mode using CLI
- Task 2: Verify Zoneset and Zones on MDS 9000 Series Switches in different VSANs using Basic Zoning Mode using CLI
- Task 3: Delete Basic Zoneset and Zones on MDS 9000 Series Switches in different VSANs using CLI
- Task 4: Configure Enhanced Zoning Mode on Cisco MDS 9000 Series Switches in different VSANs using CLI
- Task 5: Verify Enhanced Zoning Mode on Cisco MDS 9000 Series Switches using CLI

Lab 7: Configure VM Disk Partition on the FC Storage Array with Multipathing Access

- Task 1: Configure the Host Disk Partition basedo on MPIO across the Primary and Secondary VSAN to FC LUN

Lab 8: Configure Device-Aliases on Cisco MDS 9000 Series Switches using NX-OS CLI

- Task 1: Configure the Device Aliase Database using CLI
- Task 2: Abort, Commit, Verify the Device Aliase Database Session and CFS Sesssion Lock

Lab 9: Configure CFS Application Distribution on Cisco MDS 9000 Series Switches using CLI

- Task 1: Configure CFS Application Distribution for NTP using CLI
- Task 2: Verify the CFS Application Distribution for NTP using CLI

Lab 10: Discover FC SAN Fabric and Configure VSAN in Nexus Dashboard for SAN

- Task 1: Initialize POD MDS Fabric Switches in ND for SAN
- Task 2: Discover POD FC SAN Fabric in Nexus Dashboard for SAN
- Task 2: Configure VSANs on POD Switches in ND for SAN
- Task 3: Configure E Ports and VSAN Trunking ISLs in POD VSAN

Lab 11: Configure ISLs and FC Port Channel in ND for SAN

- Task 1: Configure E Ports / ISLs between POD Fabric Switches
- Task 2: Configure FC Port Channel in ND for SAN

Lab 12: Perform ISSU on MDS 9000 Series Switch using ND Image Policy

- Task 1: Manually Downgrade the MDS 9000 Series Switch
- Task 2: Upload the NX-OS Kickstart and System Image for the ISSU Upgrade to the ND
- Task 3: Create Image Policy for the ISSU Upgrade in the ND for SAN
- Task 4: Attach the Image Policy for the ISSU Upgrade in the ND to MDS 9000 Series Switch
- Task 5: Monitor the ISSU and Verify the Result in ND for SAN

Lab 13: Configure F Ports and Device Aliases with CFS Distribution in ND for SAN

- Task 1: Configure F Ports and connect FC Initiator and FC Storage Target in ND for SAN
- Task 2: Configure Device Aliases in ND for SAN

Lab 14: Configure Alarm Policies, Generate Events and Programmable Reports in ND for SAN

- Task 1: Configure an Alarm Policy in ND for SAN
- Task 2: Verify an Alarm Policy in ND for SAN
- Task 3: Configure and Generate Programmable Reports in ND

Lab 15: Configure Zoning in ND for SAN

- Task 1: Verify the Initial Fabric State
- Task 2: Configure Basic Zoning and Activate Zoneset in ND for SAN
- Task 3: Verify the Activated Zoneset in the Basic Zoning and in ND for SAN

Lab 16: Integration of VMM and Storage Array with Nexus Dashboard for SAN

- Task 1: Configure IP Routes to VMWare vCenter Server and Esxi Hosts on Cisco Nexus Dashboard for SAN
- Task 2: Adding vCenter Visualization by Integrating VMWare vCenter Server and ESXi Hosts in Cisco ND for SAN
- Task 3: Integrating Storage Array with Cisco ND for SAN (Optional/Informational Task)

Lab 17: Enable the Enhanced Zoning Mode in ND for SAN

- Task 1: Configure Enhanced Zoning Mode

Lab 18: Configure Smart Zoning in ND

- Task 1: Configure Smart Zoning in ND for SAN
- Task 2: Verify Smart Zoning in ND for SAN

Lab 19: Performance Analytics, Congestion Detection and Root Cause Analysis using ND with SAN Insights

- Task 1: Verify the Initial State of the Fabric
- Task 2: Enabling FC SAN Analytics/Insights in ND
- Task 3: Generate SCSI/FC IO Workload using the Storage Performance Tool
- Task 4: Monitor Fabric Performance Metrics DAL, ECT and other SAN Analytics IO Flow Metrics and Detect the Congestion in ND with SAN Insights
- Task 5: Root Cause Analysis of Congestion in ND with SAN Insights

Lab 20: Configuring DIRL and FPIN For Automated Proactive Congestion Control

- Task 1: Initialize the Fabric Topology – POD Y
- Task 2: Initialize the Fabric Topology - POD X
- Task 3: Configure a new Smart Zoneset - POD Y
- Task 4: Enable Performance Analytics and SAN Insights - POD X and POD Y Switches
- Task 5: Configuring PMON Policy with DIRL using CLI (Informational)
- Task 6: Configuring PMON Policy with DIRL in ND for SAN
- Task 7: Verify DIRL in ND for SAN
- Task 8: Configure FPIN using CLI

Lab 21: Review Cisco ND Journey and Configure Fabric Backup

- Task 1: Configure the Journey in ND for SAN

Lab 22: Enabling VM Visibility and SAN Analytics for VM using ND integration with VMM Manager (vCenter)

- Task 1: Initialize the POD X and POD Y Fabric
- Task 2: Enable VMM integration with ND for SAN
- Task 3: Configure VSANs, Zonning and Device Aliases
- Task 4: Configure LUN Masking on the Storage Array

- Task 5: Configure POD VM FC HBA in NPIV Mode
- Task 6: Configure LUN Masking on the Storage Array
- Task 7: Configure SAN Analytics and Perform per-VM Traffic Flow Analytics

Lab 23: Inter-VSAN Routing Lab with NAT

- Task 1: Initialize the Fabric
- Task 2: Enable VSAN and VSAN Trunks on your POD
- Task 3: Configure IVR Zone and IVR Zoneset in ND for SAN
- Task 4: Configure IVR Zone and IVR Zoneset using CLI
- Task 5: Verify IVR Zone and IVR Zoneset