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Learning Style: Virtual Classroom

Technology: NetApp

Difficulty: Intermediate

Course Duration: 5 Days

NetApp Certified Implementation Engineer (NCIE) - SAN Specialist (NCIE-SAN)

About this Course:

This 5 day course incorporates the NetApp Portfolio: Exploring SAN Architectures and Configurations (SANARCH) and Data ONTAP SAN Implementation (SANIMP) courses, which are required as preparation for the NCIE - SAN Certification. Delegates will learn how to differentiate among the three SAN architectures that are available from NetApp: FAS SANs with the Data ONTAP operating system, E-Series SANs, and V-Series SANs and how to connect Windows® and Linux® hosts via Fibre Channel (FC) and iSCSI protocols to NetApp® SANs.

A NetApp Certified Implementation Engineer can earn up to **$109,000/-** on average, per annum.

Course Objectives:

By the end of this course, you should be able to:

- Describe the three types of SANs that NetApp supports: FAS SANs, E-Series SANs, and V-Series SANs
- Explore the storage architectures for Data ONTAP and SANtricity software
- Examine the basic configuration of a FAS Data ONTAP SAN
- Investigate an E-Series array SAN with SANtricity
- List the supported configurations for a V-Series SAN
- Describe solution scenarios that are better supported on a FAS SAN, an E-Series SAN, or a V-Series SAN
- Define and describe SANs that use FC, FCoE, and iSCSI protocols
- Configure Windows Server 2012, Red Hat® 6.4, and Data ONTAP® systems for iSCSI connectivity
- Configure Windows Server 2012, Red Hat 6.4, and Data ONTAP systems for FC and FCoE connectivity
- Use FC and iSCSI protocols to create and access LUNs from Windows Server 2012 and Red Hat 6.4 systems
- Install and use SnapDrive® for Windows and SnapDrive for Linux software to create LUNs and Snapshot™ LUNs, to restore LUNs from Snapshot copies, and to remove LUNs
- Size, clone, back up, and recover LUNs on Windows Server 2012 and Red Hat 6.4 systems
- Troubleshoot SAN connectivity and performance issues

Audience:

This course is not an entry-level course. It is designed for individuals who meet the prerequisites and who want to successfully complete the NCIE-SAN exam and professionals who implement SAN solutions that use NetApp storage systems.

Pre-requisites:

Delegates should be certified as a NetApp Data Management Administrator or have

completed the following courses:

- SAN Fundamentals on Data ONTAP WBT

AND either:

- NA-D7ADM or
- NA-ANCDABC or
- ONTAP Cluster Administration and Data Protection Bundle (ONTAP 9.6) (CDOTDP9) or
- ONTAP Cluster Administration (ONTAP 9.6) (ONTAP9ADM)

Course Outline:

Module 1 Architecting SAN on NetApp Storage

- Module 1 NetApp SAN Architectures
- Describe the difference between SAN and NAS
- Explain the SCSI architecture model
- List the NetApp SAN platforms
- Describe the current hardware that is supported in the different types of NetApp SANs

Module 2 NetApp Storage Architectures

- Describe storage architectures and basic configurations for the Data ONTAP operating system and for SANtricity software
- List the management tools for Data ONTAP and SANtricity
- Explain the architectural features of Data ONTAP and SANtricity that contribute to optimized performance for each data workload
- Describe the NetApp flash portfolio

Module 3 FAS and Data ONTAP SANs

- Briefly describe the Data ONTAP dataprotection and disaster-recovery software
- Describe FlexClone LUN technology
- Describe deduplication and compression technologies
- Discuss failover and giveback in FAS SAN environment
- Discuss SAN software and tools

Module 4 FAS SANs Implementation Overview

- List the steps for implementing a SAN on the Data ONTAP operating system
- Describe the Data ONTAP simulator (Simulate ONTAP software)

Module 5 E-Series, EF Series, and SANtricity SANs

- Explain E-Series failover and failback technology
- Describe SANtricity protection features

- Discuss SANtricity efficiency and caching features
- Manage an E-Series array with SANtricity management software

Module 6 E-Series SANs Implementation Overview

- List the steps for implementing a SAN on SANtricity
- Install the SANtricity simulator

Module 7 V-Series and Third-Party SANs

- Provide an overview of NetApp V-Series systems and storage arrays
- Describe how V-Series provides the advantages of Data ONTAP with third-party SANs
- Describe the V-Series supported topologies
- Explain the advantages of using E-Series and V-Series together

Module 8 V-Series SANs Implementation Overview

- Describe the LUN-to-aggregate mapping strategies
- Explain the pathing assignments for different types of storage arrays
- Describe the NetApp recommended best practices for fabric and array maintenance
- Deploy V-Series systems for a typical storage array and verify the high availability of these systems
- Diagram the topology of a V-Series system deployment by using standard Data ONTAP commands

Module 9 NetApp SAN Solutions

- Describe the target workloads for FAS, V-Series, and E-Series platforms
- List FAS and V-Series use cases
- Discuss E-Series use cases
- Help customers decide between FAS, V-Series, and E-Series platforms
- Explain data migration and tools
- Describe basic sizing tools

Lab Exercises

- Lab 2-1 Identify the exercise environment
- Lab 2-2 Log in to the exercise environment
- Lab 4-1 Use netApp OnCommand System Manager to create a SVM for iSCSI
- Lab 4-2 Configure iSCSI sessions on Microsoft Windows Server 2012
- Lab 4-3 Create an iSCSI-attached LUN for Windows
- Lab 4-4 Use an iSCSI-attached LUN in Windows
- Lab 6-1 Launch the SANtricity simulator
- Lab 6-2 Navigate the Enterprise Management and Array Management Windows
- Lab 6-3 Create a RAID 6 Volume Group
- Lab 6-4 Create a volume in a Volume Group

- Lab 6-5 Assign a Hot Spare Disk
- Lab 6-6 Create a Disk Pool
- Lab 6-7 Create a volume on a Disk Pool
- Lab 6-8 Change volume settings
- Lab 6-9 Delete a volume
- Lab 6-10 Define a host
- Lab 8-1 Verify controller support with the Interoperability Matrix Tool
- Lab 8-2 Discover supported connectivity configuration with the Interoperability Matrix Tool
- Lab 8-3 Prepare documentation with the Interoperability Matrix Tool
- Lab 9-1 Design a NetApp solution for the info-r-us scenario
- Lab 9-2 Design an alternate NetApp solution for the info-r-us scenario

Data ONTAP SAN Implementation Module 1 SAN Concepts

- Describe the difference between SAN and NAS
- Explain the SCSI architecture model
- List the NetApp SAN technologies
- Define basic SAN terminology
- List the basic steps for implement a Data ONTAP SAN
- Describe the educational lab environment for this Course

Module 2 Windows IP Connectivity

- Describe multiple path implementation with iSCSI connectivity
- Configure network ports on Windows and NetApp systems
- Identify the node name on Windows and NetApp systems
- Implement and verify multiple path iSCSI connectivity between Windows and NetApp systems

Module 3 Windows LUN

- Discuss LUN access for Windows Server 2012
- Create a LUN by using wizards
- Explore techniques to configure a LUN for Windows Server 2012
- Explain how SnapDrive for Windows simplifies LUN management

Module 4 Linux IP

- Describe multiple path implementation with iSCSI connectivity for Red Hat and NetApp systems
- Configure network ports on Red Hat systems
- Identify the node name on Red Hat systems
- Set up and verify multiple path IP connectivity between Red Hat and NetApp systems

Module 5 Linux LUN Access

- Describe the steps that you take to allow a Red Hat initiator to access a LUN on a storage system

- Review the Data ONTAP LUN configuration steps
- Find and prepare a LUN on a Linux operating system
- Configure multipath I/O on Linux
- Create and protect LUNs by using SnapDrive for UNIX

Module 6 FC Architecture

- Describe the architecture of the FC topology
- Explain the FC initialization process
- Identity the layers in the FC protocol

Module 7 FC Fabrics

- Discuss fabric layouts
- Describe FC switch concepts
- Explain fabric services
- Describe routing in FC switches
- Examine zoning in FC switches

Module 8 Windows FC Connectivity

- Describe multiple path implementation with FC connectivity
- Configure FC ports on Windows and Data ONTAP storage systems
- Use commands and utilities to identify the worldwide node name (WWNN) and worldwide port name (WWPN) on Windows and Data ONTAP storage systems
- Use commands and utilities to examine FC switch Activity

Module 9 Unified Connect

- Describe NetApp Unified Connect
- Examine the FC over Ethernet (FCoE) enabling technologies
- Configure FCoE on a host, a switch, and a NetApp storage system
- Explain how to leverage older FC technologies with FCoE

Module 10 Linux FC

- Describe multiple path implementation with FC connectivity for Red Hat and NetApp systems
- Configure FC ports on Red Hat systems
- Identify the worldwide node name (WWNN) and worldwide port name (WWPN) on Red Hat systems
- Set up and verify multiple path FC connectivity between Red Hat and NetApp systems

Module 11 LUN Provisioning

- Describe how and when a LUN consumes space from its containing volume
- Discuss backup guarantees through NetApp Snapshot reserve
- Discuss the overwrite guarantee for space-reserved LUNs

- Analyze the default LUN configuration and two thinprovisioning Configurations

Module 12 Host Considerations

- Explore the disk structure of popular file systems
- Describe flow-control issues on a host
- Identify techniques for growing and shrinking a LUN
- Discuss copy offload capacities

Module 13 SAN Management

- Perform administrative tasks on FC target ports
- Perform administrative tasks on LUNs
- Discuss LUN protection schemes

Module 14 SAN Troubleshooting

- Explain how to diagnose a problem within a SAN environment
- Review diagnostic tools and techniques for NetApp Data ONTAP software