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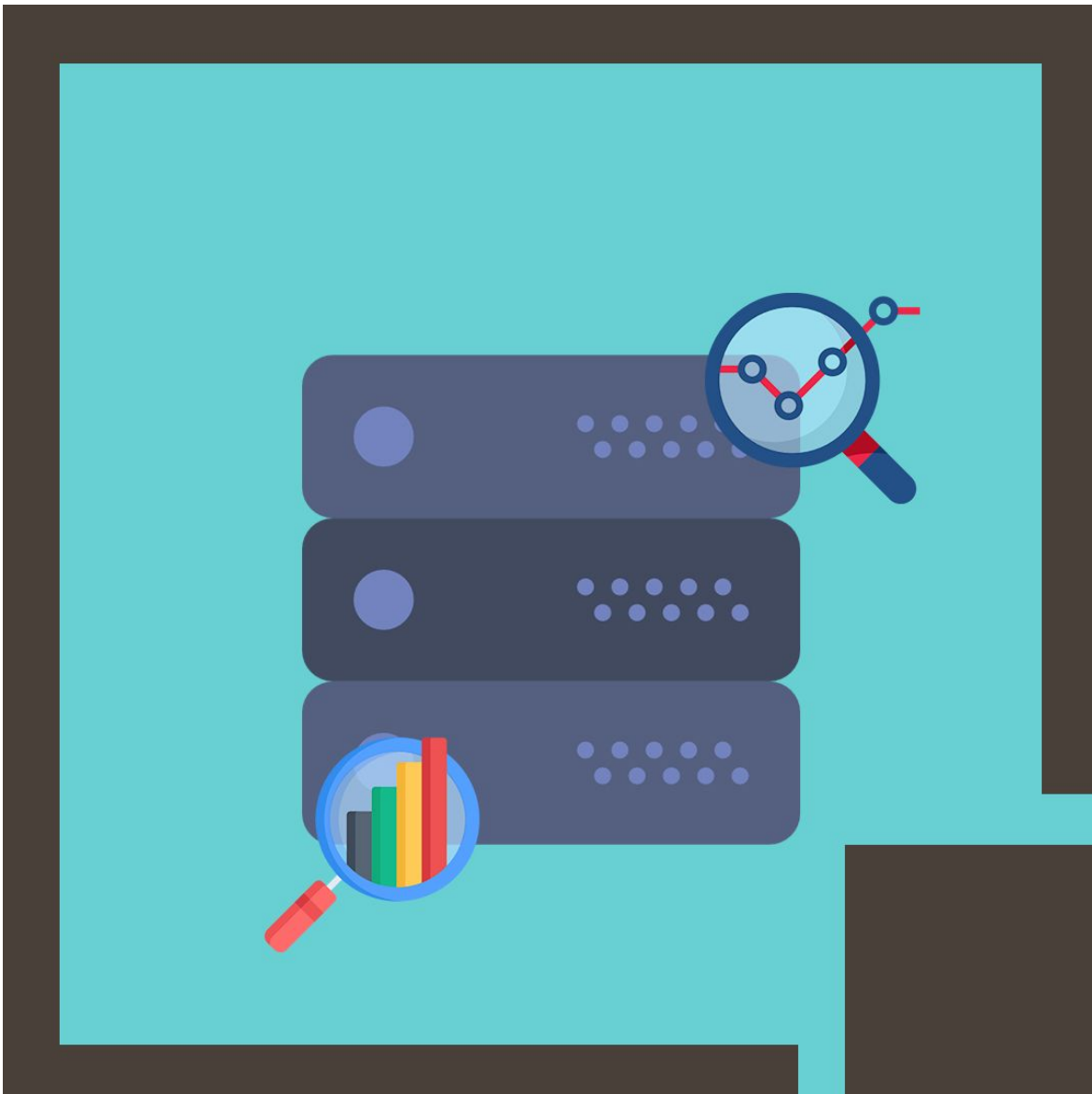
Learning Style: Virtual Classroom

Technology: NetApp

Difficulty: Intermediate

Course Duration: 5 Days

## Managing NAS and Performance on ONTAP 9 (NASPAD)



## About the Course:

QuickStart's premier NAS and Performance Analysis training combines NFS, CIFS, and performance analysis into a single, detailed, one-week course. The course has been designed to provide all the information needed to develop the skills which will help you in administering the NFS versions 3, 4, and 4.1, and CIFS version 1.x to 3.x into a clustered Data ONTAP® operating system. Learn the skills you require for collecting as well as analyzing performance related data obtained from the NetApp® storage systems from a NetApp Authorized Learning Partner.

This course is a combination of ONTAP NFS Administration (NFSAD), SMB (CIFS), and performance analysis courses into a single, in-depth one-week course. It provides the knowledge and skills that you need to administer SMB version 1.x to 3.x and NFS versions 3, 4, and 4.1 in a clustered Data ONTAP® operating system. You also learn the knowledge and skills that you need to collect and analyze system performance data from NetApp storage systems that are running ONTAP 9.

A NetApp Storage Administrator can earn up to **\$128,000/-** on average, per annum.

## Course Objectives:

Once the course is complete, the candidates enrolled in this course will be able to;

- Define and describe NFS protocol versions
- Configure clustered ONTAP 9 for NFSv3, NFSv4, and NFSv4.1 with parallel NFS (pNFS)
- Configure Kerberos in a Linux and NetApp ONTAP 9 environment using Windows Active Directory authentication
- Discuss performance management and troubleshooting for NetApp storage systems and clients
- Explain the CIFS and SMB protocol
- Demonstrate the Windows PowerShell CLI
- Configure SMB features using ONTAP 9 software
- Create and manage SMB shares and sessions
- Secure SMB sessions
- Configure ONTAP for multiprotocol data access
- Discuss SMB advanced topics, such as opportunistic locks (oplocks), BranchCache, auditing, group policy, automatic home shares, symbolic links (symlinks), and widelinks
- Understand how a storage system running ONTAP 9 functions
- Identify the commands and tools to use to collect and monitor storage system performance
- Interpret performance data and identify hindrances to storage system performance
- Use system commands and features to enhance storage system performance and efficiency

## Audience:

This course is intended to be undertaken by those professionals who are responsible for managing the NetApp Storage Systems and thus, require a greater understanding of the performance and protocols in a clustered Data ONTAP environment.

## **Pre-requisite:**

Prior to opting for this course, the candidate should have;

- ONTAP Cluster Administration and Data Protection Bundle (ONTAP 9.6) (CDOTDP9)
- Familiarity with Microsoft Windows Server 2012
- Familiarity with Microsoft Active Directory
- Familiarity with UNIX and Linux operating systems

## **Course Outline:**

### **Module 1: NFS Overview**

- Data fabric layers
- NFS
- NFS protocol versions
  - NFSv2 and NFSv3
  - Ancillary protocols
  - NFSv4
- ONTAP 9 NFS enhancements
- ONTAP 9 configuration
- SVM with Infinite Volume

### **Module 2: NFS Version 3**

- Capabilities
- Features
- Client support
- NFSv3 implementation
- NFSv3 export policy
- Export policies and volumes
- Access cache
- Mounts
- User authentication
- Accounts
- Auxiliary GIDs
- ANON setting
- UNIX permissions

### **Module 3: NFS Version 4**

- Features
- NFSv4 connection

- Mount process
- Referrals
- Delegation and usage
- NFSv4 Implementation
- Security
  - RPCSEC\_GSS
  - Key distribution center
  - Kerberos authentication
  - Access control lists
  - ACE permissions
- NFSv4 infrastructure
- UID and GID
- Snapshot directories

#### **Module 4: NFS Version 4.1**

- Connection
- Reliable callbacks
- Sessions
- Layouts
- pNFS
- pNFS vs. referrals
- ONTAP 9 support
- NFSv4.1 implementation
- pNFS status

#### **Module 5: Performance and Basic Troubleshooting**

- Performance management
- Performance issues
- Factors that affect NFS performance
- RAID factors
- NFS data collection
- Performance and statistic collector (Perfstat)
- Recommended statistics
- The SIO utility
- Multiprotocol
- Security style interaction
- UNIX user access
- Storage system configuration
- Linux client troubleshooting
- NFS troubleshooting
- Network troubleshooting
- Check access command

#### **Module 6: SMB Overview**

- Data fabric
- Data fabric layers
- CIFS and SMB protocols

- NT LAN manager
- Kerberos authentication
- Active Directory
- Workgroup environments
- NetApp PowerShell toolkit

## **Module 7: SMB Setup**

- SMB implementation
- Licensing CIFS
- SVM for SMB access
- FlexVol volumes
- DNS entries for the SVM
- SMB share access

## **Module 8: SMB Shares and Sessions**

- SMB share
- Creating a share
- Client access
- SMB automatic referrals
- SMB sessions
- Session administration
- SMB encryption
- Offline folders
- Offloaded data transfer

## **Module 9: Access Control**

- Share permission administration
- Access-based enumeration
- Dynamic access control
- File blocking policies
- Local users
- Workgroup authentication
- Multiprotocol access

## **Module 10: Advanced Topics**

- Microsoft opportunistic Lock (oplock) features
- Automatic home share
- Group policy object (GPO)
- Symlinks
- Widelinks

## **Module 11: BranchCache**

- Versions
- BranchCache environment configurations
- ONTAP 9 BranchCache

- BranchCache installation on Windows Servers
- BranchCache configuration on Windows clients

## **Module 12: Auditing**

- Auditing concepts
- Terminology
- ONTAP 9 auditing process
- Implement auditing
- Output file format

## **Module 13: How a NetApp Storage System Works**

- NetApp FAS system architecture
- ONTAP architecture layers
- Data access
- NVRAM

## **Module 14: Performance Analysis Tools**

- Performance terminology
- Performance guidelines and methodologies
- Analysis tools and commands
- Output commands
- Tools for performance measurement
- AutoSupport tools
- Perfstat
- OnCommand Insight

## **Module 15: OnCommand Performance Manager**

- Features
- Dashboard
- Performance troubleshooting
- Events
- User defined thresholds

## **Module 16: CPU and Memory Performance**

- CPU performance bottlenecks
- Resolving bottlenecks
- Memory performance bottlenecks
- Resolving bottlenecks

## **Module 17: WAFL Performance**

- WAFL functions
- Inodes
- WAFL readahead
- Resolving WAFL issues

- Best practices

## **Module 18: Disk I/O Performance**

- Disk subsystem hardware and software
- Subsystem bottlenecks
- Analyzing bottlenecks with Statit
- Resolving bottlenecks
- RAID-DP technology

## **Module 19: Flash Cache and Flash Pool Performance**

- Virtual Storage tier
- Flash pool
- Flash cache
- Automatic workload analyzer
- Cache performance issues

## **Module 20: Cluster Interconnect Performance**

- Cluster interconnect uses
- Switchless and switched configurations
- Cluster interconnect bottlenecks
- Bottleneck resolutions

## **Module 21: Storage QoS**

- Managing system performance with QoS
- QoS policies
- Reactive storage QoS
- Proactive storage QoS
- Monitoring commands

## **Module 22: NAS Performance**

- NAS functions
- Bottlenecks
- NAS protocol traffic
- Monitoring NFS usage commands
- Monitoring SMB usage commands
- Bottleneck resolutions

## **Module 23: SAN Performance**

- SAN overview
- Protocols
- FCoE
- iSCSI
- SAN LIFs
- SAN performance issues

- SAN multipathing
- SAN load balancing
- I/O misalignment
- Queue depth

## **Module 24: Using What You Learned**

- Performance overview
- Performance tools
- Windows monitoring and analysis
- Linux monitoring and analysis
- VMware monitoring and analysis
- Slow application performance
- Using performance manager
- Best practices

## **Labs**

- Adding a cluster
- Configuring a storage virtual machine for NFSv3
- Configuring a storage virtual machine for NFSv4
- Configuring a storage virtual machine for NFSv4.1
- Configure clustered ONTAP for NFS active directory authentication
- Configuring Windows for NFS active directory authentication
- Configuring Linux for NFS active directory authentication
- Installing NetApp PowerShell Toolkit and configure for use
- Creating a Storage Virtual Machine (SVM) and configure it for SMB access
- Creating an SMB share, connect to the share from your Windows client, and manage SMB sessions
- Creating a domain user, restrict share-level permissions
- Creating a local user group and give share-level permissions
- Creating a multiprotocol configuration and enable a root Linux user to be mapped to the Windows domain administrator
- Configuring home directories and symbolic links on the SVM
- Identifying cluster components
- Analyzing performance statistics
- OnCommand performance manager thresholds, events and alerts
- Identifying and resolving storage controller performance issues
- WAFL performance monitoring and analysis
- Identifying and resolving disk I/O bottlenecks
- Exploring cache performance
- Cluster interconnect performance
- Workload management with storage QoS
- NAS performance
- SAN protocol performance

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