Managing NAS and Performance on Clustered Data ONTAP (NASPAD)

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
- Implemtent 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