

NETAPP SYLLABUS

Introduction to storage fundamentals

RAID Concepts - RAID4 and RAID_DP
WAFL FileSystem
Snapshot

1. Data ONTAP Overview

- 1.1. Storage System Architectures
- 1.2. Unified Storage
- 1.3. Network Appliance Hardware
 - 1.3.1 *Netapp FAS*
 - 1.3.2 *NearStore*
 - 1.3.3 *Near-Line Storage*
 - 1.3.4 *V-Series Systems*
- 1.4. Network Appliance Software
- 1.5. FAS2000 Series
- 1.6. FAS6000 Series
- 1.7. Disk Shelves
- 1.8. NAS vs. SAN Topology
- 1.9. Supported Protocols
 - 1.9.1 *NFS*
 - 1.9.2 *CIFS*
 - 1.9.3 *HTTP*
 - 1.9.4 *FTP*
 - 1.9.5 *WebDAV*
 - 1.9.6 *FCP or iSCSI*
- 1.10. Tier Storage Architecture
- 1.11. Data ONTAP
 - 1.11.1 *Network Interface*
 - 1.11.2 *Protocol Stack*
 - 1.11.3 *WAFL*
 - 1.11.4 *RAID Layer*
 - 1.11.5 *Storage*
 - 1.11.6 *NVRAM*
- 1.12. NOW (Support.netapp.com)
- 1.13. Simulator Installation

2. Installation and Configuration

- 2.1. Product Documentation
- 2.2. Additional Information
- 2.3. Software
- 2.4. System Configuration Guide
- 2.5. Parts Finder
- 2.6. Configuration Work Sheet
- 2.7. Network Interface configuration
- 2.8. Console Access
- 2.9. Boot Sequence
- 2.10. Accessing the Flash Boot Commands
- 2.11. Secret Boot Commands
- 2.12. Normal Boot Sequence
- 2.13. The setup script
- 2.14. Checking Software and License Status using CLI
- 2.15. The /etc/syslog.conf File
- 2.16. Options to Upgrade

- 2.17. The software install command
- 2.18. Download and Boot
- 2.19. LAB

3. Basic Administration

- 3.1. Filerview
- 3.2. Operations Manager
- 3.3. Alternative GUI's
- 3.4. CLI
 - 3.4.1. *Console*
 - 3.4.2. *Telnet*
 - 3.4.3. *RLM*
 - 3.4.4. *BMC*
 - 3.4.5. *FilerView CLI*
 - 3.4.6. *RSH*
 - 3.4.7. *SSH*
- 3.5. The Secureadmin Command
- 3.6. Administrative Commands
- 3.7. Basic Administrative Commands
- 3.8. Advanced Administrative Commands
- 3.9. Command Line Syntax
- 3.10. Viewing Manual Pages
- 3.11. Command Reference on FilerView
- 3.12. Console Commands
- 3.13. Options Commands vs. Configuration Files
- 3.14. Options Commands
- 3.15. Registry Database
- 3.16. Editing Boot Configuration Files
- 3.17. Editing Configuration from a Host
- 3.18. Admin Hosts
- 3.19. Console Editing
- 3.20. System Configuration Using FilerView
- 3.21. What is Autosupport?
- 3.22. LAB

4. Administering Security

- 4.1. RBAC
- 4.2. Predefined Capabilities
- 4.3. Roles
 - 4.3.1. *Predefined Administrative Roles*
- 4.4. Groups
 - 4.4.1. *Predefined Groups*
- 4.5. Local Users
- 4.6. Security Options
- 4.7. Restricting Access
- 4.8. Admin Hosts
- 4.9. LAB

5. Networking

- 5.1. Interface Configuration.
 - 5.1.1. *Configuration Parameters*
- 5.2. Manage Interface - FielrView
- 5.3. Maintaining Host Information
- 5.4. Specifying a Search Order for Resolution
- 5.5. /etc/hosts

- 5.6. DNS
- 5.7. NIS
- 5.8. Routing
 - 5.8.1. *Modifying the Routing Table*
 - 5.8.2. *What is Interface Grouper (VIF)*
 - 5.8.3. *Single Mode Trunk*
 - 5.8.4. *Multi-Mode Trunk*
 - 5.8.5. *Load Balancing*
 - 5.8.6. *Creating VIFs*
 - 5.8.7. *VLANs*

6. Physical Storage Management

- 6.1. Supported Disk Topologies
- 6.2. Disk Qualification
- 6.3. Disk Firmware Updates
- 6.4. Disk Ownership
- 6.5. Disk ID
- 6.6. Disk Numbering: Loop_id
- 6.7. Fibre Channel Loop IDs
- 6.8. The fcstat device_map Command
- 6.9. Disk Speed Matching
- 6.10. Mixing and Matching Disks
- 6.11. Spare Disks
- 6.12. Disk Sizing
- 6.13. Right Sizing
- 6.14. FC vs. ATA
- 6.15. Usable Disk Space
- 6.16. Disk Space Allocation for Traditional Volumes
 - 6.16.1. *Aggregates*
 - 6.16.2. *Traditional Volumes*
 - 6.16.3. *Snapshot reserve*
- 6.17. Disk Space Allocation for Flexible Volumes
 - 6.17.1. *Aggregates*
 - 6.17.2. *Flexible Volumes*
 - 6.17.3. *Snapshot Reserve*
- 6.18. RAID Groups
- 6.19. RAID 4 Technology
- 6.20. RAID-DP Technology
- 6.21. RAID Group Size
- 6.22. Disk Striping
- 6.23. Data Reliability
- 6.24. Disk Scrub
- 6.25. RAID Group Options
- 6.26. Disk Commands
- 6.27. Disk Failures
- 6.28. Replacing Disks
- 6.29. Degraded Mode
- 6.30. Replacing Failed Disks
- 6.31. FAS3000 Active-Active Configuration
- 6.32. Multipath I/O
- 6.33. Aggregates
 - 6.33.1. *Aggregate Names*
 - 6.33.2. *Language*
 - 6.33.3. *Commands*
- 6.34. LAB

7. Logical Storage Management

- 7.1. Volumes
- 7.2. Root Volumes
- 7.3. Traditional Volumes
- 7.4. The vol Command
- 7.5. Creating a FlexVol
- 7.6. General Volume Operations
- 7.7. Destroying Volumes
- 7.8. Qtrees
 - 7.8.1. Creation
 - 7.8.2. Limitations
 - 7.8.3. Qtree Advantages
 - 7.8.3.1. Qtree for Backup
 - 7.8.3.2. CIFS Oplocks
 - 7.8.3.2.1. Security Styles
 - 7.8.3.2.1.1. NTFS
 - 7.8.3.2.1.2. UNIX
 - 7.8.3.2.1.3. Mixed
 - 7.8.3.2.2. MultiProtocol Security Administration Security Styles
 - 7.8.4. Creating Qtrees Using FilerView
 - 7.8.5. Commands
- 7.9. Multiprotocols
- 7.10. The /etc/usermap.cfg File
- 7.11. Format for File Entry
- 7.12. Guidelines for Using Asterisks
- 7.13. NFS Clients to NTFS
- 7.14. CIFS Client to UNIX Permissions
- 7.15. Mapping
- 7.16. Functions of Quotas
- 7.17. Quota Commands
- 7.18. /etc/quotas
- 7.19. LAB

8. Snapshot Copies

- 8.1. Overview
- 8.2. WAFL Files and Inodes
- 8.3. How Snapshot Works
- 8.4. Snapshot Copies
- 8.5. Snapshot Commands
- 8.6. Snapshot Options
- 8.7. The .snapshot Directories
- 8.8. Snapshot Directories
- 8.9. Viewing Snapshot Copies from a Windows Client
- 8.10. Restoring a File
- 8.11. Snaprestore
- 8.12. The snap sched Command
- 8.13. The snap list
- 8.14. LAB

9. Network File System

- 9.1. NFS
- 9.2. Exported Resource Overview
- 9.3. NFS Configuration
- 9.4. Configure NFS
- 9.5. Rules
- 9.6. /etc/exports
- 9.7. Manage Exports
- 9.8. LAB\

10. Common Internet File System

- 10.1. User Authentication
- 10.2. Joining a Storage System into a Windows Domain
- 10.3. Providing Access to Shares
- 10.4. LAB

11. Storage Area Networks

- 11.1. What is SAN?
- 11.2. SAN Protocols
- 11.3. Components of SAN
- 11.4. How are FC SANs Implemented?
- 11.5. How are iSCSI SANs Implemented?
- 11.6. Initiator/Target Relationship
- 11.7. What is a LUN?
- 11.8. Configuring the initiator
- 11.9. Installing Microsoft Initiator
- 11.10. Methods of LUN Creation
- 11.11. Accessing a LUN
- 11.12. SnapDrive for Windows
- 11.13. LAB

12. Writes and Reads

- 12.1. Data ONTAP Operating System
- 12.2. Write Request Processing
- 12.3. Consistency Point Initiated
- 12.4. WAFL
- 12.5. RAID Layer
- 12.6. Storage Layer
- 12.7. NVRAM
- 12.8. Read Cache
- 12.9. Read Request from Cache
- 12.10. Read Request from Disk
- 12.11. LAB

13. Performance Troubleshooting

- 13.1. Checking the System
- 13.2. Verifying Fibre Channel Shelf Connections
- 13.3. Syslog Messages
- 13.4. Commands for Researching Write Performance
- 13.5. Checking CPU Status Using the sysstat Command
- 13.6. Gathering Data About Write Performance
- 13.7. Disk Fragmentation
- 13.8. Relationship Between Volumes and RAID Groups
- 13.9. Determining RAID Groups Size and Composition
- 13.10. Mixed Disks
- 13.11. Recommendations for Adding Disks to Existing RAID Groups
- 13.12. Monitoring Connectivity Issues: MAC Level
- 13.13. Measuring NFS Performance
- 13.14. Measuring CIFS Performance
- 13.15. Running the statit command
- 13.16. Multiprocessor Statistics
- 13.17. CSMP Domain
- 13.18. WAFL Rates
- 13.19. Network Interface Statistics
- 13.20. Disk Statistics
- 13.21. Aggregates, Spares and Disk Statistics
- 13.22. LAB

Advanced Topics:

Online Backup and Recovery

1. Introduction to data protection
2. Snapshot Management
3. Data recovery using SnapRestore
4. Data protection using SnapMirror
5. Data Protection using SnapVault
6. Space savings with deduplication
7. Data replication using volume copy
8. Data Mirroring using Sync Mirror
9. Database protection using NVFAIL
10. Virus protection using CIFS

Active\Active Configuration

1. Active/Active configuration
2. configuration active\active
3. Management of takeover and giveback
4. Management of Disk shelves
5. Nondisruptive hardware changes
6. Controller failover and single point of failure

Ontap Upgrade

Ontap Upgrade Planning
Ontap Upgrade Implementation
Disk FW update
Disk Shelf FW update
RLM FW update
BIOS update
Disruptive Upgrade
Non Disruptive Upgrade

Space Management

1. Space Guarantee
2. Thin Provisioning
3. Space Reservation
4. Fractional Reserve
5. Automatic Space Reserve

Real time storage tasks

1. Data migration using snapmirror
2. Migrating snapmirror destination and source volumes
3. Snapmirror DR
4. Data Compression
5. Deduplication
6. NDMP copy

V-File Administration

1. Creation and setting up V-Files
2. Adding and removing resources
3. Executing commands on v-filers
4. Starting and Stopping v-filers
5. DR using v-filers

Troubleshooting

OPEN SYSTEM TECHNOLOGIES