NETAPP UNIVERSITY

NS0-502 Study Guide

1. SAN SOLUTION ASSESSMENT

1.1 *Ensure that all prerequisites for the installation of NetApp system and switches (if needed) are met and that the required information to configure NetApp systems is collected.*

    1.1.1   Collect NetApp storage system configuration information.

    1.1.2   Collect Switch configuration information.

    1.1.3   Gather power information such as circuit availability, wiring in place, etc…

    1.1.4   Collect Host configuration information.

    1.1.5   Collect Application configuration and requirements.

    1.1.6   Collect potential DEDUPE information.

    1.1.7   Collect backup and retention information.

1.2 *List a detailed inventory of SAN components including:*

    1.2.1   NetApp storage system configuration details

    1.2.2   Host details

    1.2.3   FC switch details

    1.2.4   Ethernet switch details

    1.2.5   Current zoning configuration

    1.2.6   Current iSCSI implementation details

    1.2.7   CHAP settings

    1.2.8   IPSEC configuration details

    1.2.9   Snapshot configuration details

    1.2.10   Current data layout (aggregates, raid groups, volumes)

    1.2.11   Consider listing out system names, IP addresses, current zoning configuration, OS versions, OS patch levels, driver versions and firmware versions

1.3 *Ensure that the solution design and the hardware provisioned do not fall short of the customer's requirements and expectations.*

    1.3.1   Validate requirements with the customer. Consider the following:

        1.3.1.1 Sizing needs

        1.3.1.2 Connectivity needs

        1.3.1.3 Zoning types

        1.3.1.4 Expected level of functionality

        1.3.1.5 Performance requirements

        1.3.1.6 Solution requirements being provided by a third party

2. SAN IMPLEMENTATION PLAN CREATION

2.1 *Verify and plan for dual power feeds for all components.*

    2.1.1   *Ensure all components outlined in plan have power feeds from separate power sources.*

2.2 *Be able to create cabinet diagrams or be able to read and interpret a cabinet diagram. Diagrams should include the cabinet's storage systems and switches with all connections shown.*

2.3 *Create a connectivity diagram. Be able to read and interpret a connectivity diagram.*

    2.3.1   Identify port details and connections for NetApp storage device(s)

    2.3.2   Identify port details and connections for Hosts

    2.3.3   Identify port details and connections for FC switches

    2.3.4   Identify port details and connections for Ethernet switches

2.4 *Plan storage controller configuration.*

    2.4.1   Plan for single/dual controller configuration.

    2.4.2   Plan for and create diagram for a multipath HA configuration.

    2.4.3   Create capacity plan to include aggregates (RAID groups), volumes, and LUNs. Consider snapshot requirements and plan for space reserve strategy.

2.5 *Plan host configuration.*

    2.5.1   Plan/verify host hardware configuration including HBAs, PCI slots that will be used along with firmware and drivers.

    2.5.2   Plan/verify installation of supporting software such as 3rd party volume managers or applications.

    2.5.3   Validate entire solution and ensure it is supported using the IMT (Interoperability Matrix Tool). Determine if PVRs need to be filed.

    2.5.4   Plan creation of igroups for all hosts that will not have SnapDrive installed.

2.6 *Create a Snapshot plan.*

    2.6.1   Create Snapshot plan for each host. Consider customer RPO (Recover Point Objective) and RTO (Recovery Time Objective) requirements as well as what space reserve strategy is most appropriate to use.

    2.6.2   Create SnapDrive installation plan.

2.7 *Plan Ethernet switch configuration.*

    2.7.1   Plan VLAN configuration.

    2.7.2   Plan IPSEC configuration.

2.8 *Plan zoning configuration.*

    2.8.1   Be able to plan the alias list based on the type of zoning that was decided.

    2.8.2   Provide a name for the alias that describes the port/WWPN (targets and initiators).

    2.8.3   Plan the zones, including the number of zones, members of each zone and the name of each zone. Be able to plan for single initiator zoning.

2.9 *Plan iSCSI configuration.*

    2.9.1   Be able to plan for the creation of discovery domains and discovery domain sets in iSNS.

    2.9.2   Be able to create a plan for CHAP implementation if required.

3. SAN IMPLEMENTATION

3.1 *Prepare site for installation.*

    3.1.1   Be able to review implementation flowchart with customer and assign task areas.

    3.1.2   Verify site infrastructure including: dual power, floor space, floor loading plan, HVAC.

    3.1.3   Validate equipment move path to installation location.

    3.1.4   Validate logistics plan for staging and installation of equipment.

    3.1.5   Verify Ethernet cabling plan and availability of cable supports.

    3.1.6   Verify fiber cabling plan and availability of cable supports.

3.2 *Following the rack diagram, install systems and FC switches.*

3.3 *Perform basic power on tests for all equipment.*

3.4 *Configure NetApp storage systems (stage 1).*

    3.4.1   Configure controller name.

    3.4.2   Configure controller failover.

    3.4.3   Configure multipath HA and verify cabling.

    3.4.4   Perform ALUA controller configuration.

    3.4.5   Configure FC interfaces utilizing fcadmin.

    3.4.6   Configure Ethernet interfaces with IP addresses defined in plan.

    3.4.7   Configure interfaces for iSCSI.

    3.4.8   Configure CHAP.

3.5 *Configure FC switches.*

    3.5.1   Configure basic switch settings (IP address, switch name).

    3.5.2   Configure zoning as defined by implementation plan*.*

3.6 *Configure Ethernet switches.*

    3.6.1   Configure basic switch settings (IP address, switch name).

    3.6.2   Configure and validate VLANs.

3.7 *Configure NetApp storage systems (stage 2).*

    3.7.1   Connect NetApp systems to switches (FC and Ethernet).

    3.7.2   Configure and validate aggregates (including RAID groups), volumes, LUNs, and qtrees.

    3.7.3   Configure portsets for later attachment to igroups according to plan.

3.8 *Configure hosts (stage 1).*

    3.8.1   Validate host hardware configuration.

    3.8.2   Ensure that the correct PCI cards are installed in the correct location on the host (validate this).

    3.8.3   Install host utility kits on all hosts.

    3.8.4   Configure the host Ethernet interfaces for iSCSI

    3.8.5   Configure Internet storage name service (iSNS).

    3.8.6   Configure CHAP on hosts.

    3.8.7   Configure host FC interfaces.

    3.8.8   Configure hosts to Ethernet and FC switches.

    3.8.9   Install Snapdrive, ensure SDW Service account is a member of built-in\Administrators, if System is part of a domain service account must be a domain account, Ensure Service

account is part of Local\Administrators on the host. For SDU install and administer using the root account.

3.9 *Configure NetApp storage systems (stage3).*

    3.9.1   Create igroups and perform LUN management for hosts without SnapDrive.

    3.9.2   Attach portsets to igroups.

    3.9.3   Set alias for the WWPN and controllers.

3.10   *Configure hosts (stage 2).*

    3.10.1   Configure host multipathing both FC and iSCSI.

    3.10.2   Perform ALUA configuration tasks.

    3.10.3   Check for LUN misalignment; check that the LUN and host parameters are properly matched.

    3.10.4   Create snapshot schedule for each host according to implementation plan.

3.11 *Perform SAN implementation tasks within virtualized environments utilizing SAN best practices.*

    3.11.1   Identify VM best practices with regard to data deduplication.

    3.11.2   Identify VM best practices with regard to thin provisioning.

    3.11.3   Identify VM best practices with regard to alignment issues.

    3.11.4   Identify VM best practices with regard to backup and recovery.

    3.11.5   Determine the type of switch firmware required to support NPIV.

3.12 *FCoE and Unified Connect Enabling Technologies*

    3.12.1   Identify Ethernet segments using 802.1Q.

    3.12.2   Describe bandwidth priority classes (QoS).

    3.12.3   Define data center bridging.

    3.12.4   Define what is Lossless Ethernet (PAUSE Frame)

    3.12.5   VN_ports, VF_ports and VE_ports

3.13 *FCoE and Unified Connect Hardware*

    3.13.1   Identify supported Converged Network Adapters.

    3.13.2   Identify supported Unified Target Adapters.

    3.13.3   Identify supported switches.

    3.13.4   Jumbo frame configuration

3.14 *FCoE and Unified Connect Hardware.*

    3.14.1   Switch configuration including ports, VLAN, VSAN (Cisco) and QoS

    3.14.2   Data ONTAP configuration including fcp topology, fcp zone show, can show

    3.14.3   Initiator configuration

    3.14.4   FC to FCoE

    3.14.5   NAS protocols over CAN and UTA adapters

4. SAN IMPLEMENTATION TESTING

4.1 *Be able to create an acceptance test plan.*

4.2 *Test host to storage connectivity (native Vol. Mgr., file systems).*

4.3 Test LUN availability during failover scenarios (multipathing).

4.4 Test controller failover scenarios (multipath HA).

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4.4 Test controller failover scenarios (multipath HA).