

## Test Range NetApp Build Document

**Purpose:** This document describes the hardware, software, cabling and configuration for the NDB Test Range NetApp as built during NetApp SE onsite support visit. In addition, this document covers the configuration of the ESXi hosts and switches to support NetApp connectivity.

### Net App Hardware:

- Model: FAS2552
- Double Controllers
- (24) 1.2T SAS disks

### Software:

- NetApp Clustered Data ONTAP Release 8.3RC2
- This software version makes more efficient use of storage space by striping root partitions across multiple disks. With this software version, each disk has two partitions: one small partition for root and one large partition for data.

### Physical Cabling:

Followed the NetApp cabling guide for “switchless Clustered Data ONTAP” (guide included in the box with NetApp). All cabling is described in the table below:

NetApp Port	Connected Host/Interface	Description
Node 1 e0a	EMPTY	
Node 1 e0b	EMPTY	
Node 1 e0c	SAN-SW-1 TE1	IP Storage
Node 1 e0d	SAN-SW-2 TE1	IP Storage
Node 1 e0e	Node 2 e0e	Cluster Connection
Node 1 e0f	Node 2 e0f	Cluster Connection
Node 1 e0M	TR-CORE-1 g1/5	Wrench port (for mgmt cx)
Node 1 SAS 0a	Node 2 SAS 0b	For Shelf-Shelf Comms
Node 1 SAS 0b	Node 2 SAS 0a	For Shelf-Shelf Comms
Node 2 e0a	EMPTY	
Node 2 e0b	EMPTY	
Node 2 e0c	SAN-SW-1 TE2	IP Storage
Node 2 e0d	SAN-SW-2 TE2	IP Storage
Node 2 e0e	Node 1 e0e	Cluster Connection
Node 2 e0f	Node 1 e0f	Cluster Connection
Node 2 e0M	TR-CORE-1 g1/6	Wrench port (for mgmt cx)
Node 2 SAS 0a	Node 1 SAS 0b	For Shelf-Shelf Comms
Node 2 SAS 0b	Node 1 SAS 0a	For Shelf-Shelf Comms

### Net App Configuration:

- Node 1 and Node 2 configured as an Active/Passive Cluster named cluster01. In an

Active/Passive cluster, there is only 1 large data aggregate and it is assigned to Node 1. Node 2 will take over the data aggregate if Node 1 fails. Node 1 and Node 2 also each have their own root partition.

- NetApp can be managed through SSH or through web client (<https://10.9.8.30>)
- Networking Configurations:
  - Create if\_groups (2) – these create the Etherchannel for IP Storage connections
    - a1a – e0c and e0d on Node 1 are members
    - a2a – e0c and e0d on Node 2 are members
    - both if\_groups use Create Policy multimode LACP
  - Create Broadcast Domains (4)
    - Default
      - Physical interfaces e0a and e0b on both Nodes are assigned to this Broadcast Domain
      - This broadcast domain is just a parking lot for unused interfaces
      - IP space 'Default' assigned to this broadcast domain
    - Cluster
      - Physical interfaces e0e and e0f on both Nodes are assigned to this Broadcast Domain
      - This broadcast domain is used for Cluster communications
      - MTU is set to 9000
      - IP Space 'Cluster' assigned to this broadcast domain
      - 'Cluster' IP space is dynamically assigned
    - IP-Storage
      - if\_group a1a on Node 1 and a2a on Node 2 are assigned to this Broadcast Domain
      - MTU is set to 9000 for IP storage optimization
      - IP space 'Default' assigned to this broadcast domain
    - Management
      - Physical interfaces e0M on both Nodes are assigned to this Broadcast Domain

- This broadcast domain is used for management traffic
  - IP space 'Default' assigned to this broadcast domain
- Create Subnets (1)
  - IP-Storage – IP range 10.0.7.30 – 10.0.7.35
  - These IPs will automatically be allocated to a new Datastore when it is created
- Create lifs – (4) Logical interfaces for Volumes
  - lif\_vmw\_ds01 through lif\_vmw-ds04 created
  - lifs are needed so that each Volume is assigned its own IP
  - When a Volume is moved to a different node, the lif will move to the new Node, preventing suboptimal routing, for example Node 1-> Node 2-> Volume
  - Subnet IP-Storage assigned to lifs
  - Storage Virtual Machine vmw\_svm assigned to lifs
- Other Management Network Interfaces
  - Cluster Management – 10.9.8.30
  - Node 1 Management – 10.9.8.31
  - Node 2 Management – 10.9.8.32
  - Node 1 Service Port – 10.9.8.33 (this is an OOB console port)
  - Node 2 Service Port – 10.9.8.34 (this is an OOB console port)
- Create Aggregates – 2 root and 1 data
  - n1\_aggr\_root – Total space 368.42GB striped across 10 disks
    - Assigned to Node 1
  - n2\_aggr\_root – Total space 368.42GB striped across 10 disks
    - Assigned to Node 2
  - n3\_aggr\_data – Total space 19.59T striped across 23 disks
    - Assigned to Node 1 (Node 2 will take over if Node 1 fails)
  - All aggregates configured with RAID-DP

- Enter License Keys
  - Cluster Base License
  - NFS License
  - CIFS License
  - iSCSI License
  - FCP License
- Create a Storage Virtual Machine (SVM) – this is a virtual machine to manage the storage
  - vmw-svm – there are 3 main sections to configure:
    - Storage
      - Create Volumes (4 data and 1 root)
        - vmw\_ds01 through vmw\_ds04 created for data- 4TB each
        - Storage efficiency enabled (deduplication)
        - Security Style = UNIX
        - Vmwsvm\_root is the root volume and storage efficiency is disabled
      - Mount Volumes to Namespace
        - Namespace is the root volume
        - Mount each Volume
        - Apply Default Export Policy to root volume vmwsvm\_root
        - Apply vmw\_policy Export Policy to data volumes
    - Create Export Policies (2)
      - Default – allows everyone read-only access to root volume via NFS protocol (Access Details – select all read-only)
      - vmw\_policy – allows IP Storage subnet (10.0.7.0/24) full access to data volume via NFS protocol (Access Details - select UNIX read-write)
    - Configure Protocol Services – enable NFS for this SVM

## **TR SAN-SWITCH Configuration**

- Set system MTU 900 to enable jumbo frames globally. Jumbo frames are recommended by NetApp to optimize performance on the storage network.
- Port-channel 1 created to support Etherchannel for Node 1 IP Storage connectivity
  - Interfaces TE1/1/1 and TE2/1/1
  - channel-group 1 mode active
  - switchport access vlan 7
  - spanning-tree portfast
- Port-channel 2 created to support Etherchannel for Node 2 IP Storage connectivity
  - Interfaces TE1/1/2 and TE2/1/2
  - channel-group 2 mode active
  - switchport access vlan 7
  - spanning-tree portfast

#### **TR-CORE-1 Configuration**

- Ports g1/5 and g1/6 configured in VLAN 98 for NetApp Management traffic
- g1/5 – Node 1 management
- g1/6 – Node 2 management

#### **TR ESXi Host Configuration**

- Vswitch1 – 120 ports
  - MTU set to 9000
  - Active adapters – vmnic2, vmnic3
  - Load-balance – route based on originating virtual port
- Vmk1 – IP-storage networking interface
  - MTU set to 9000
  - VLAN ID 7
  - Load-balance – route based on originating virtual port
  - Active Adapters – vmnic2, vmnic3
- Added (4) NetApp NFS datastores to the ESXi hosts in a cluster named cluster\_ds
  - vmw\_ds01 – 10.0.7.30

- vmw\_ds02 – 10.0.7.31
- vmw\_ds03 – 10.0.7.32
- vmw\_ds04 – 10.0.7.33
- Total storage capacity – 16TB
- Installed NetApp VSC plugin TR-monitor (10.9.8.22) and registered to vCenter server
  - Optimized NFS settings on ESXi hosts through VSC
  - Allows management of NetApp through VMware
- Installed NetApp VAAI plugin on each ESXi host via command line
  - From SSH prompt on ESXi server, type:
    - esxcli software sources vib list –d NetAppNasPlugin.zip
    - esxcli software vib install –n NetAppNasPlugin –d NetAppNasPlugin.zip
  - Enabled hardware acceleration on datastores through VMware