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PROFESSIONAL SERVICES TECH NOTE #054

Multipath High-Availability Cabling

The Concept

A standard NetApp clustered storage system has multiple single-points-of-failure on each shelf which can trigger a cluster failover. Cluster failovers can disrupt access to data and put an increased workload on the surviving cluster node. Multipath High-Availability (MPHA) cabling adds redundancy, thereby decreasing the conditions that will trigger a failover.

Examples

Here is a clustered system with a single connection (A channel) to disks:

```
fas1> storage show disk -p
PRIMARY PORT SECONDARY PORT SHELF BAY
-----
0a.16      A                1      0
0a.18      A                1      2
0a.19      A                1      3
0a.20      A                1      4
```

Here is a clustered system with MPHA connections (A and B channel) to disks:

```
fas1> storage show disk -p
PRIMARY PORT SECONDARY PORT SHELF BAY
-----
0a.16      A      0c.16      B      1      0
0c.17      B      0a.17      A      1      1
0c.18      B      0a.18      A      1      2
0a.19      A      0c.19      B      1      3
```

Use the WireGauge tool to verify clustered systems are cabled properly even when each disk has an A and B port.

What It Means To You

With only a single connection to the A channel, a disk 'loop' is technically a daisy chain. When any component (fiber cable, shelf cable, shelf controller) in the loop fails, access is lost to all shelves after the break, triggering a cluster failover event. MPHA cabling creates a true loop by providing a path into the A channel and out of the B channel. Multiple shelves can experience failures without losing communication to the controller. A cluster failover is only triggered when a single shelf experiences failures to both the A and B channels.

The benefits of MPHA cabling are it increases cluster resiliency, it load balances I/O in a disk loop by using the A and B channels, and it can prevent loop saturation on high I/O systems. MPHA cabling can easily be implemented on existing systems or removed later when more FCP ports are needed.

The downside is MPHA reduces the maximum number of shelves a cluster can manage because twice as many Fiber Channel ports are used (HBA cards often need to be installed to use MPHA). MPHA cabling will also not work on systems using hardware based disk ownership (FAS900 and most FAS3020/3050). Standalone systems are not supported because they can be dual-path cabled.

Note: MPHA cabling must be unplugged to run diagnostics on a cluster node or the running node may panic.

More Information

Common MPHA Cabling Errors: <https://now.netapp.com/Knowledgebase/solutionarea.asp?id=kb52026>

Storage Best Practices and Resilience Guide: <http://media.netapp.com/documents/tr-3437.pdf>

Data ONTAP Active/Active Configuration Guide: Managing disk shelves in Multipath Storage Configurations:
<http://now.netapp.com/NOW/knowledge/docs/ontap/rel733/html/ontap/aaconfig/frameset.html>

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