Module 5: Exercise on FC SAN Design

Scenario:

The IT infrastructure of an organization consists of three storage arrays direct-attached to a heterogeneous mix of 45 servers. All servers are dual-attached to the arrays for high availability. Because each storage array has 32 front-end ports, each could support a maximum of 16 servers. However, each existing storage array has the disk capacity to support a maximum of 32 servers. The organization plans to purchase 45 more servers to meet its growth requirements. If it continues using direct-attached storage, the organization needs to purchase additional storage arrays to connect these new servers. The organization realizes that its existing storage arrays are poorly utilized; therefore, it plans to implement FC SAN to overcome the scalability and utilization challenges. The organization uses high-performance applications; therefore, it wants to minimize the hop count for the server's access to storage.

Task:

Propose a switched fabric topology to address organization's challenges and requirements. Justify your choice of the fabric topology. If 72-port switches are available for FC SAN implementation, determine the minimum number of switches required in the fabric.

Solution:

Full mesh topology is not suitable for environment that requires high scalability. Partial mesh, although, provides more scalability than full mesh, but several hops or ISLs may be required for the network traffic to reach its destination. Therefore, the recommended solution is core-edge topology. The core-edge topology provides higher scalability than mesh topology and provides one-hop storage access to all servers in the environment. Because of the deterministic pattern (from the edge to the core) of FC traffic movement, it is easy to calculate traffic load distribution across ISLs.

Total number of server ports = 90 servers × 2 ports = 180 ports

Total number of array ports = 3 arrays × 32 ports = 96 ports

Number of switches required at the core = 96 array ports/ 72 ports per switch = 2 switches

The core switches provides 144 ports of which 96 ports will be used for array connectivity. Remaining 48 ports can be used for ISLs and future growth.

Number of switches at the edge = 180 server ports/ 72 ports per switch = 3 switches

The edge switches provide 216 ports of which 180 ports will be used for server connectivity. Remaining 36 ports can be used for ISLs and future growth.

Number of edge switch ports used for connecting to core switches = 6, this is less than the remaining edge switch ports.

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So, at minimum, 2 core switches and 3 edge switches are required to implement the core-edge fabric.