Storage Manufacturer Virtualizes Data Center Applications

NetApp used the Nexus family to build a cloud-computing environment.

EXECUTIVE SUMMARY
NETAPP
• Manufacturer
• Sunnyvale, California USA
• 8000 Employees
BUSINESS RESULTS
• Contributed to 40 percent savings on infrastructure
• Reduced network edge costs by US$150,000
• Enabled cost-effective scalability

Business Challenge

A global company headquartered in Sunnyvale, California, NetApp creates innovative storage and data management solutions. NetApp's two California data centers, which house critical business applications, had outgrown the available space and power capacity. The company decided to consolidate those two data centers and build a new data center on the East Coast, both because of the region's lower power costs and for disaster recovery. Virtualizing all applications in the new data center would minimize equipment costs, management overhead, and energy consumption. To adopt virtualization, NetApp would need to overcome the following technical challenges:

- Meeting the increased I/O and network performance demands imposed by server virtualization
- Supporting higher 10 Gigabit Ethernet demand at the server access layer
- Enabling virtualization features like VMware VMotion and Data Distribution Services (DDS)
- Preparing for future adoption of Fibre Channel over Ethernet (FCoE) and IEEE 802.1 Data Center Bridging (DCB)
- Creating a highly available, scalable, and repeatable design with no single point of failure

Solution and Results

NetApp met the business and technical needs by using Cisco® Nexus switches to build a cloud-computing environment. "Of all the data center switches we evaluated, the Cisco Nexus 5000 Switch best matched the 300 requirements we identified for application virtualization, including Layer 2 access support, an enhanced 10 Gigabit Ethernet backbone, 10 Gigabit Ethernet server connectivity, and FCoE support," says Kamal Vyas, lead network design engineer, NetApp.

The new data center comprises independent microzones, which are groups of eight racks containing similar devices, such as blade servers, rack-optimized servers, or storage. An application can operate on any available server in a compute microzone, increasing server utilization. Each microzone connects to its own Cisco Nexus 5020 Switch at the access layer. Blade servers connect to the Cisco Nexus 5020 Switch by way of a Cisco Catalyst® 3100 Switch integrated inside blade server chassis. Rack-optimized servers with 10 Gigabit Ethernet adapters connect directly to the Cisco Nexus 5000, and those with Gigabit Ethernet adapters connect by way of Cisco Nexus 2148 Fabric Extenders. The Cisco Nexus 5020 Switches, in turn, connect over 10 Gigabit Ethernet to a Cisco Nexus 7000 Switch at the aggregation layer. Microzones connect to the SAN through a Cisco Multilayer Director Switch (MDS). All network services in the new data center are consolidated at the services layer, which comprises a pair of Cisco Catalyst 6509 Switches and Cisco ACE Application Control Engine modules. Later, NetApp will add new services modules, possibly including Cisco Proactive Automation of Change Execution, Cisco Firewall Services Module, and Cisco Network Analysis Module.

NetApp is experiencing the following benefits from its Cisco Nexus data center design:

- **Reduced capital expense:** "Application virtualization reduced our infrastructure costs by 40 percent, and the Cisco Nexus 2000 and 5000 access switches are an important enabler," says Mike Morris, Manager—IT Communications Engineering.
- **Network edge cost savings:** Rather than deploying two physical switches to separate internal and external traffic, NetApp separated a single physical Cisco Nexus 7000 Switch into two virtual device containers (VDC), each of which connects to a separate Cisco Nexus 5000 Switch. "The VDC support on the Cisco Nexus 7000 saved $150,000 on our DMZ, or 43 percent of the total budgeted costs," says Morris.

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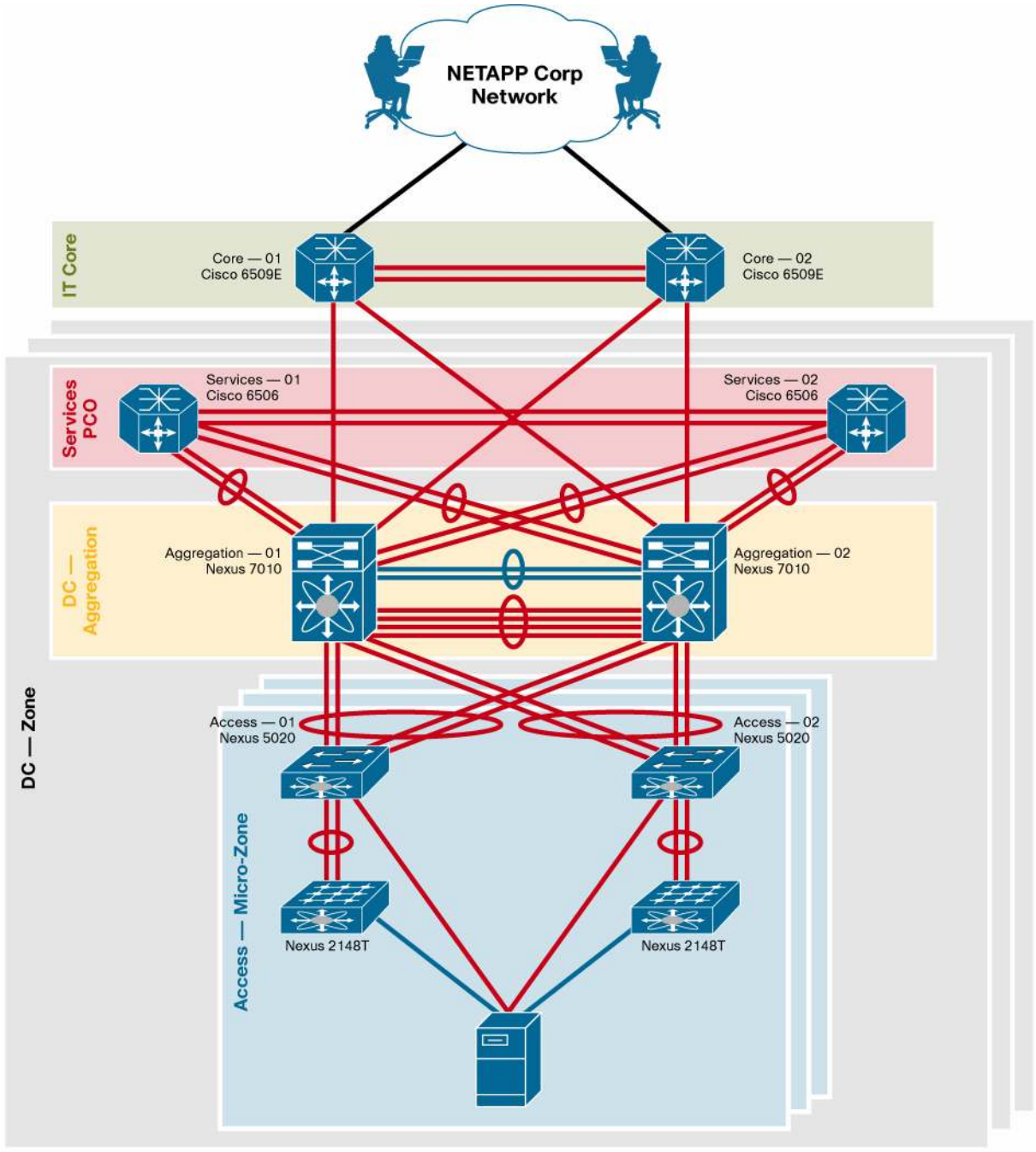
—Kamal Vayas, Team Lead—Data Center Services, NetApp

- **Cost-effective scalability:** NetApp built the data center network at the right size to meet current needs and can scale easily as needed to meet fast-paced growth. The modular design of Cisco Nexus switches simplifies scalability. When a microzone needs more ports, NetApp can purchase expansion modules for the Cisco Nexus 5020 Switch or add Nexus 2148 Fabric Extenders instead of purchasing a new switch.
- **Reduced management overhead:** Management is simplified because the IT department can configure and manage all Cisco Nexus 2000 Fabric Extenders through the Cisco Nexus 5020 Switch, as if they were one device. "We found a lot similarity between the Cisco IOS Software and the NX-OS, so it was a smooth transition to Nexus switches," says Vyas.
- **Excellent application performance:** The Cisco Nexus 5020 Switch delivers very low latency for 10 Gigabit Ethernet.
- **Energy efficiency:** NetApp's data center has a hot-aisle/cold-aisle layout. The front-to-back airflow and rear-facing ports on Cisco Nexus switches made it possible to install the pressurized cooling system directly above the cold aisles, significantly reducing cooling costs. The data center has achieved a Power Usage Effectiveness (PUE) rating of 1.2, far exceeding the U.S. Environmental Protection Agency (EPA) recommendation of 2.0.
- **Simplified cabling:** The rear ports of the Cisco Nexus 5020 Switch simplify cabling from the servers to the switch.
- **Support for a unified fabric:** NetApp purchased FCoE licenses for the Nexus 5000 Switches to consolidate the separate data network and storage area network into a single fabric.

Vyas received the Network Professional Association Award for Excellence for the Cisco Nexus-based data center design.

Technical Implementation



Call to Action

For more information on the Cisco Nexus family of data center switches, visit http://www.cisco.com/go/nexus.

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