Internal NetApp Reference Document

Consolidating BT's Servers and Storage on NetApp Saves 2.2 Million USD a Year

KEY HIGHLIGHTS

Industry
Telecommunications

The Challenge
Improve data center efficiency by adding capacity, reducing space, power and cooling requirements, increasing systems utilisation, and shortening server and storage provisioning time

The Solution
Consolidate old servers and direct-attached storage using VMware ESX Server and NetApp shared storage area network (SAN) technology

Benefits

- 100% payback in eight months
- 15:1 consolidation ratio for production servers
- 99% faster backups through NetApp Snapshots™ (96 hours to 31 minutes)
- 2.2 million USD annual power savings (2.5 million USD/year reduced to 270,000 USD/year)
- 50% improvement in storage utilisation through thin provisioning
- 99% reduction in server provisioning time (2-3 weeks to 12 minutes)

CUSTOMER PROFILE

No doubt you've heard about the cost savings and efficiencies virtualisation can offer. Maybe you've even experimented with small deployments to catch a glimpse of its potential. But if you were to virtualise your entire IT infrastructure—servers and storage—how much could that save you, and how would your data center change?

One example to study is BT Group plc (www.bt.com), the world's oldest telecommunications company. Headquartered in London, it operates in 170 countries, and is England's largest provider of communications solutions and services. Few companies in any industry have lasted as long or innovated as much as the institution formerly known as British Telecom. From its start as a telegraph company in the early 1800s, the company has always stayed on the leading edge of technology—as evidenced by its recent virtualisation initiative.

THE CHALLENGE

The door through which BT entered the world of virtualization was actually a window—the company's backup window for its eight UK data centers, to be precise. In 2003 those locations were only backing up six terabytes of data, but disparate storage systems and a multitude of tape libraries made the process long, complex and laborious.

"We actually had two people wheeling supermarket carts around with different tapes to load up different tape drives," says a BT executive in charge of Microsoft Windows consolidation. "It took four days to get around to all the systems."

BT was also facing space, power and cooling challenges at its UK data centers, which were consuming $2.5 million per year in electricity and generating a considerable amount of heat. Average CPU utilisation was low, and there was no capacity to add new physical servers.

The company was determined to reduce complexity and shrink its UK data center footprint, and virtualisation of servers and storage would be its central strategy. NetApp played a central role.

THE SOLUTION

BT has been a NetApp customer for eight years, and more than nine petabytes of NetApp storage is deployed across BT's worldwide organisation on multiple platforms. In 2004, however, BT's Microsoft Windows-based environment in the UK hadn't yet standardised on NetApp. As a short-term solution to reduce its backup time at one large campus, BT combined all storage

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devices into one room. In an effort to make its many file servers more manageable, the company evaluated virtualisation software from several manufacturers, and chose VMware ESX Server.

After successfully condensing 47 racks of file servers into just three racks, BT saw the power of virtualisation—and decided to virtualise its UK testing and development environment. Because of NetApp's existing presence and reputation at the company, BT standardised on NetApp storage for what it began calling its Windows Consolidation Project. BT implemented NetApp FAS6070, FAS3070, and FAS3040 storage arrays in shared SANs, as well as NetApp NearStore R200 nearline storage systems. NetApp Global Services delivers fully contracted, managed services, including 24x7 coverage as well as rapid provisioning and deployment.

After successfully virtualising its testing and development servers, BT moved on to its UK production environment, targeting 3,103 servers. So far, the company has exceeded its goal of a 15:1 server consolidation ratio for production, and is consolidating its eight data centers into five. NetApp SnapMirror® software replicates stored data nightly between the five sites to enhance disaster recovery. NetApp FlexVol® enables the creation of virtual storage volumes that can be managed independently from physical storage, allowing BT to create and resize virtual volumes without downtime as its application needs change.

After testing and evaluation, BT arrived at a standard formula for equipping a site for virtualisation. Each of its five sites now runs 36 HP Proliant BL45 server blades with 32 gigabytes of RAM and two internal 146 GB disks in a RAID1 array, as well as three HP ProLiant DL385 servers to support its VMWare VirtualCenter interface, Microsoft SQL Server database, and Novell Platespin application. Each data center requires only 10 racks, and is equipped with a rack of four 32-port Brocade SAN switches, 20 terabytes of storage, and 168 RJ45 connections.

The overall transformation is remarkable: 2,133 servers have been consolidated and virtualised on only 134 physical boxes. [1] The virtual images of the servers are stored on the NetApp storage arrays for easy backup with NetApp Snapshots.

BUSINESS BENEFITS

The benefits of virtualisation to BT's UK operations are sweeping. Backup time is no longer an issue, thanks to NetApp SnapMirror software, based on NetApp Snapshot technology. Each virtual machine has its own logical unit number (LUN), and SnapMirror replicates each LUN in just three seconds. The result is that a 96 hour full backup time has been reduced to 31minutes.

SnapMirror enhances disaster recovery by taking a snapshot of each server, storing it on the SAN, and then copying it overnight to another site. NetApp deduplication technology backs up only the blocks that have changed, making disaster recovery that much easier.

Standardising on NetApp has also streamlined administration and training. "Since we standardised on NetApp, we no longer have to deal with different interfaces and operating systems," says the BT executive. "We have one interface for storage—the NetApp Data ONTAP® 7 operating system—and VMware VirtualCenter for the hardware infrastructure. Training is easy because storage and servers are centrally managed now."

[1] The 2,133 servers consist of 778 test and dev machines and 1,355 production servers. These totals are as of October, 2007.

SAVING 2.2 MILLION USD A YEAR

Perhaps the most compelling benefit of BT's Windows Consolidation Project is the reduction in power consumption across its five data centers. Instead of 700 racks at eight sites. BT now has 40 racks at five sites, or an average of eight racks per site. The old infrastructure cost 2.5 million USD per year in electricity alone. By contrast, the new solution costs around 270,000 USD per year, for a total annual savings of more than 2.2 million USD.[2] The energy savings come with a corresponding 2.8 million BTU reduction in heat output—roughly the equivalent of 73 household furnaces running 24x7.

BT has also been able to save money and increase efficiency by recovering three network ports per server that are no longer necessary because of the virtual network. With the new infrastructure, only 168 physical network connections per site are required. In total, BT will recover 8,469 network ports, a value of more than 500,000 USD at the industry average of 60 USD per port. Server and hardware maintenance costs have also decreased by replacing thousands of disparate servers and direct-attached storage with 134 new servers and one NetApp SAN systems at each of the five locations.

A TRUE CAPACITY-ON-DEMAND MODEL

By replacing its direct-attached storage with shared SAN technology, BT has increased its average disk utilisation from 40% to 60%, a 50% improvement. Through thin provisioning of storage—which means allocating storage that doesn't exist yet to applications that may require that storage in the future—the company can charge internal customers for more storage than is actually on the floor while still satisfying business requirements.

Here's how it works: BT has 40.8 terabytes of SAN storage for its test and development environment and 23.9 terabytes for production—both are over-provisioned at 48 terabytes and 31 terabytes, respectively. In both environments, only half the storage capacity is being used. Knowing that internal customers will not immediately use their entire allocation, BT can add capacity on demand, instead of paying to keep unused disks spinning.

A NEW VIRTUAL MACHINE IN 12 MINUTES

Server provisioning is much faster in the virtual world, since BT no longer has to wait for physical boxes to be configured and deployed. "If you put a gun to my head, I can get you a new virtual machine in 12 minutes," says the BT executive. "We've taken server provisioning time down from literally weeks to minutes."

BT was able to provide internal customers with 289 new virtual servers—servers they had asked for in the past, but couldn't get until now because there was no capacity for them. Because the new servers are virtual, the company avoided 72 racks, 289 physical servers and 202.3 kW of added power usage annually.

100% PAYBACK IN EIGHT MONTHS

Even though BT chose to consolidate on a completely new hardware infrastructure, it has been able to recoup its costs in just eight months with the power savings alone. "Getting our money back in eight months on a project of this scope is very unusual," says the BT executive. "It's been a phenomenal success."

[2]3103 servers * 700 W (servers, storage and screens) = 2172 kW @ .13 USD/kWh = 282.36 USD/kWh * 24 hrs = 6,777.64 USD/day * 365 = 2,473,474 USD/year. Replace with 47 kW * 5 sites = 235 kW @ .13 USD/kWh = 30.55 USD/kWh * 24 = 733.20 USD/day * 365 = 267,618 USD/year.

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A BT executive in charge of Microsoft Windows consolidation

ENVIRONMENT

Applications: Microsoft Exchange, Novell PlateSpin
Databases: Microsoft SQL Server
Server platform: HP ProLiant servers running Microsoft Windows Server 2003 on VMware ESX Server
Storage: NetApp
Users: 106,000 employees

Protocol
FC-SAN

SOLUTION COMPONENTS

NetApp Products

- NetApp FAS6070 storage systems
- NetApp NearStore R200 storage systems
- NetApp Data ONTAP® 7 operating system
- NetApp SnapMirror® software
- NetApp FlexVol® software

NetApp Global Services

- Managed Services
- Implementation Services

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