

| CHALLENGE | SOLUTION | BENEFIT |
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| Upgrade the company's IT systems to handle growing business demands—without interrupting operations | A cluster configuration of two Dell™ PowerEdge™ 2550 servers with Intel® Pentium® III processors running the Novell® NetWare® 6 operating system; each server has a Dell PowerEdge Expandable RAID Controller (PERC) that connects to the Dell PowerVault® 210S RAID array | Enhanced application performance and a reliable, highly available environment |

The industrial evolution

U.K.-based manufacturer Industrial and Tractor upgrades its IT system with Dell servers to achieve high reliability

Businesses today increasingly rely on IT systems to streamline their day-to-day functions. As the IT industry forges ahead with innovation after innovation, companies worldwide are taking notice and evolving their IT systems to enhance performance and improve reliability.

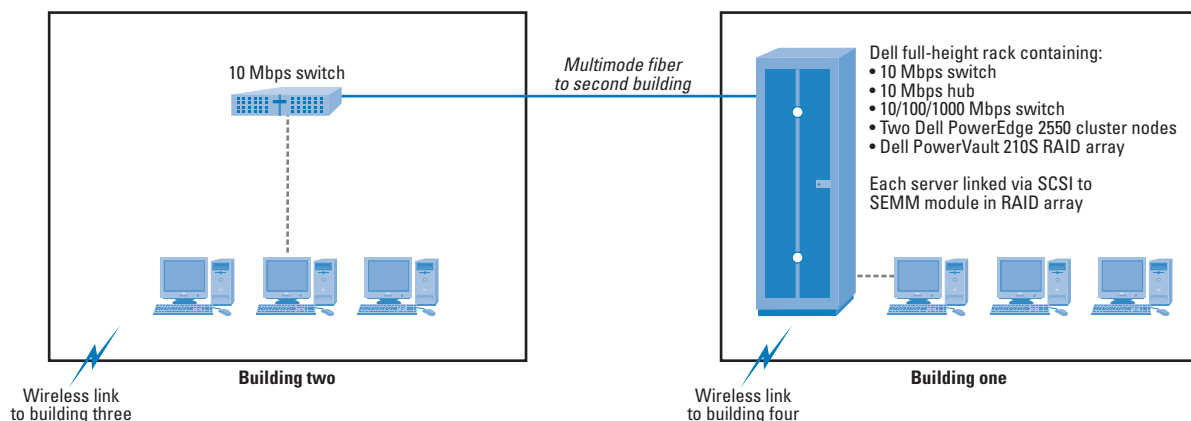
One company taking advantage of the latest technology is Industrial and Tractor Limited, a Worcester, U.K.-based manufacturer of tubes and related products for major equipment manufacturers. To keep pace with its ever expanding and increasing business loads, the company decided to upgrade its IT infrastructure. According to Managing Director Michael Outwin, the server systems—although reliable—were reaching the end of their lifespan and system utilization was increasing steadily.

As years pass, demands increase

Industrial and Tractor relies heavily on its IT systems to perform routine business functions such as word processing and e-mail,

and to run an advanced manufacturing control system, which adheres to stringent deadlines for customers. Developed in-house, this manufacturing control system serves as a central data store for several manufacturing components including a sub-LAN that controls tube-forming machines, four multi-axis-coordinate measuring machines, and a computer-controlled zinc electroplating line and associated effluent disposal arrangements.

The company's LAN infrastructure was based on a mirrored server pair running the Novell® NetWare® 4.11 operating system and a separate server running NetWare to provide backups. Each server of the mirrored pair resided in a separate building on the Industrial and Tractor campus, and the buildings were linked by multimode fiber for data transfer between buildings. Each building had the same set of 10/100 Mbps Category 5 data cabling and 10 Mbps Switched Ethernet, also linked by multimode fiber. This design—one mirrored server, one set of cabling, and client



Industrial and Tractor upgrades its LAN to a cluster of Dell PowerEdge servers running Novell NetWare 6

systems in each building—maximized redundancy and proved resilient for more than four years.

The rise of a new IT infrastructure

Industrial and Tractor sought new IT systems that would maintain the current level of redundancy and also include well-tested hardware and software. The systems also needed to provide reliability, speed, and simplicity of use and management. Most importantly, the company required a 24x7 solution that would provide little or no interruption to business operations. As Outwin put it, the company needed “Reliability, reliability, reliability.”

The IT consulting firm ITNS helped Industrial and Tractor develop a new IT solution based on Dell™ hardware and Novell software. The company chose Novell NetWare software because of its proven reliability, redundancy capabilities, manageability, and affordability. Prior positive experiences with Dell servers and workstations encouraged Industrial and Tractor to stay with Dell hardware.

Dell: Advances in hardware

For its new IT system, Industrial and Tractor installed two Dell PowerEdge™ 2550¹ rack-mounted servers running Intel® Pentium® III processors. Each server has an on-board Dell PowerEdge Expandable RAID Controller (PERC) to run the Novell NetWare 6 operating system and a separate cluster-aware RAID controller to connect to the Dell PowerVault™ 210S¹ external RAID array. The servers also include an on-board Broadcom® Gigabit BaseT interface used with a Cisco® Catalyst® 3500 Series XL switch to provide a gigabit² backbone for the servers.

For backups, the company deployed a Dell PowerVault 110T Linear Tape-Open™ (LTO™) backup unit. This backup unit connects to an Adaptec® SCSI controller in one server and it runs VERITAS Backup Exec™ for NetWare.

To house the new hardware and the current switch/hub infrastructure, Dell supplied a full-height rack enclosure with a pull-out, flat-panel monitor; a keyboard; a KVM (keyboard, video, mouse) switching unit; and an APC® uninterruptible power supply (UPS) for the entire rack.

Novell: More software capabilities unfold

The decision to continue using a Novell NetWare-based platform was based on the proven reliability of the outgoing NetWare 4.11 operating system. In the last four years, the company experienced no unplanned downtime. In fact, the servers were shut down only for routine maintenance or power outages caused by maintenance operations. NetWare provides 24x7 computing access for users and enables scheduled maintenance for hardware and software

upgrades with no downtime. Therefore, the logical path for the company’s IT system was to upgrade to the Novell NetWare 6 operating system.

The NetWare 6 operating system includes Novell Cluster Services™ 1.6, a built-in clustering tool that provides near-continuous access to storage, and Novell Storage Services™ 3.0 software that works with Novell Cluster Services to help manage storage environments. Supporting up to 32 servers per cluster and up to 32 processors in each server, Novell Cluster Services enables a company to accommodate escalating storage needs and to increase resources within the cluster. Because NetWare 6 supports multi-processor configurations, the Dell PowerEdge 2550 servers included dual processors.

The expansion of storage clusters

External storage was divided into two logical storage devices, allowing both servers in the cluster to share storage access. Each server was configured to use one particular logical storage device, and the company’s data and applications were split between the two devices.

Both servers are always in use, creating an active-active cluster, which can deliver twice the performance capabilities of a traditional active-passive cluster configuration where one server acts only as a standby or failover device. Because the servers are configured as a cluster, either server can seamlessly serve each logical data device so that users will experience no downtime if a server fails.

A method in the migration

Tests of the main manufacturing database showed that the database ran 20 times faster on the new hardware and software configuration. The manufacturing application tests also displayed a dramatic increase in speed, especially for sequential disk reads. The current client level was appropriate, but the company implemented an updated Broadcom Gigabit driver as a precaution.

Although the NetWare 4.11 queue-based printing worked seamlessly across the former server pair, the printers were migrated to the NetWare 6 Novell Distributed Print Services™ software, which is cluster-enabled to provide “queue-less” printing for all users.

Evolving to the next level

By upgrading its IT infrastructure, Industrial and Tractor was able to improve system performance and prepare for future growth. The new Dell cluster configuration helped to ease the migration from NetWare 4.11 to NetWare 6. The IT systems could remain redundant and thus highly reliable, enabling the company to maintain its 24x7 operations. With the help of Dell and Novell, Industrial and Tractor has experienced its own industrial evolution. ☺

¹ Newer models are available at <http://www.dell.com>.

² Gigabit Ethernet indicates compliance with IEEE® 802.3ab and does not connote speeds of 1 Gbps.