



VMware helps Luxembourg Stock Exchange trade on existing investments for optimal performance

Mission-critical Linux, Unix and Windows systems run side-by-side on the same physical hardware; hardware costs reduced by 50%

RESULTS

- First stock exchange worldwide to completely virtualise all systems
- Mission-critical Sun Solaris 10 applications to be added to virtual infrastructure using VMware Infrastructure 3.0
- 50% saving on hardware acquisition costs
- 50:1 server consolidation ratio for non-critical and administrative systems
- Less space required for servers, less power, less air-conditioning
- 40 VMs running on just one server
- Windows and Linux (Solaris end 2006) applications now running as part of virtual infrastructure
- Enhanced flexibility and disaster recovery with VirtualCenter and VMotion

Managing a heterogeneous IT environment

The Luxembourg Stock Exchange began operating as a limited company in 1929, and has since then gained extensive experience in listing and trading of securities from multiple regions. Today the Exchange has two markets, regulated and Euro MTF, with 28,000 international bond issues representing 60% of the international bond segment. It lists some 6,500 investment funds in around twenty currencies, as well as 200 Global Depositary Receipts from issuers based in emerging economies, and a co-operative agreement with the Euronext exchanges. The Luxembourg Stock Exchange (BdL) is the major European listing centre of corporate bonds.

The Exchange prides itself on its own, in-house developed trading, listing and market information systems, including two information portals, www.bourse.lu and www.cclux.lu. These systems give the Exchange a strong competitive edge and to maintain this advantage, its IT department employs more than 90 people to develop and manage its infrastructure and applications.

In the past, systems development at the Exchange had always been driven by the desire to be vendor and platform-independent. This approach had its advantages, but also one major disadvantage – a heterogeneous, constantly growing infrastructure with multiple hardware and OS platforms. With no consistent view of the server farm, management of these systems became ever more difficult and due to new applications, investment in more server systems was necessary, the IT team's ability to adapt and react to the dynamics of the stock market was limited.

In 2004, the Exchange saw an explosion in the volume of trade orders, caused by a number of local and foreign operators acting as market makers. This growth in volume exhausted the existing systems' capacity, and to ensure continued growth, the IT team urgently needed to find a way of improving the performance and management of its systems.

VMware ESX Server Expands Capacity While Cutting Hardware Costs

Two years earlier, in 2002, the Exchange's IT team had started to experiment with virtualisation in order to get away from the expensive and difficult one application per server model. Using VMware ESX Server, the team had established a proof of concept for a number of the Exchange's non-critical and administrative applications, which were difficult to manage and required some forty physical x86 servers to guarantee performance levels. "The results of the pilot were very positive," says Marcel Hoffmann, IT Advisor at the Luxembourg Stock Exchange and co-founder of the Luxembourg VMware User Group. "So we quickly moved the pilot implementation into full production, with 40 virtual machines running on just one HP DL760 server, mirrored to an identical server in a remote location for disaster recovery purposes."

When trading volumes surged in 2004, the majority of the Exchange's critical systems were still running on physical hardware, putting the UNIX database servers under particular strain. In order to improve the performance of the databases, Marcel Hoffmann and Bernard Simon, Head of IT at the Exchange, acquired two new 64-bit, 4-way single-core Sun V40Z x86 servers. These middle-capacity servers

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Bernard Simon
Head of IT, Luxembourg Stock Exchange



VMWARE ESX SERVER, VIRTUAL CENTER AND VMOTION AT WORK

- 6 x Sun V40Z 64-bit, 4 way dual-core AMD Opteron servers, 3 production, 3 back-up (to be expanded up to 20 servers)
- 2 X HP DL760 servers, 1 Development, 1 Testing
- 2 x IBM DS 8100 SAN, 1 production, 1 back-up
- Windows [XP,NT,2000,2003], Linux , Sun Solaris 10
- Microsoft Office suite, CRM, portals, middleware, document management (Documentum), accounting

easily delivered the required performance boost against their high-end UNIX servers currently used, but ran at only 50% of CPU capacity. The IT team realised that they could apply the same strategic approach with their critical applications as they had with their non-critical applications: use commodity-based (low-cost) servers with virtualization.

By deploying VMware ESX Server and its management console, VirtualCenter, the Exchange was able to make much efficient use of its server capacity, running Windows operating systems and applications on the same physical boxes as the Linux application Servers. This approach brought considerable cost savings, as Marcel Hoffmann explains: "VMware allowed us to optimally leverage our existing resources and investments instead of investing heavily in more new hardware. In effect, we reduced our potential hardware costs by more than 50%, whilst improving performance and saving on space, power and air-conditioning."

From partial virtualisation to total virtual infrastructure

Today, the Luxembourg Stock Exchange has expanded its Sun V40Z server farm to a total of twenty servers, ten at the main site and ten at a mirror site, with both groups linked to an IBM DS 8100 SAN.

Currently, three of the Sun servers at each site run VMware ESX Server 2.5.2 and host nearly 150 virtual machines in total – constituting almost the entire Windows and Linux application set used by the Exchange. The IT team makes extensive use of VMware VirtualCenter and VMotion to manage these applications.

VirtualCenter and VMotion have given us huge flexibility in how we manage, upgrade and migrate servers," says Bernard Simon. "Provisioning a new server really is easy now, and we can plan better for peaks and downtime."

Most of the 14 other physical servers are currently dedicated to running and backing up the Exchange's most important databases. But this is set to change : following the launch of VMware Infrastructure 3.0, which supports Sun Solaris as a host OS, the Luxembourg Stock Exchange plans to use these servers to virtualize all of its databases, and in the process, become the first Exchange in the world to completely standardise on virtual infrastructure.

"We're confident that VMware Infrastructure 3.0 will deliver very significant returns for the Luxembourg Stock Exchange," concludes Bernard Simon. "As a V13 beta customer, we were able to run extensive tests of Sun Solaris under virtualisation, and believe me, we can't wait to get the migration done."

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