

Flintshire builds end-to-end virtualised infrastructure with IBM

Overview

■ The Challenge

Ensure availability and performance for more than 350 business-critical systems, while continually adding new systems; maintain low-cost, high-efficiency infrastructure with small carbon footprint; create scalable platform capable of responding rapidly to temporary or permanent growth in demand for services

■ The Solution

Flintshire County Council has worked with IBM with the aim of consolidating and virtualising the major components of its infrastructure, using IBM System i to run systems under AIX, i5/OS and 64-bit Linux, IBM System x and IBM BladeCenter to host virtualised Windows servers, and with a fully virtualised storage area network based on IBM technologies

■ The Benefits

Compact, flexible, scalable, highly available infrastructure supporting growing number of business systems; extremely rapid provisioning of new servers; fewer physical machines to manage; reduced costs in acquisition, operation, maintenance and disposal of IT equipment; lower environmental impact



Flintshire County Council (www.flintshire.gov.uk) provides municipal services to 150,000 citizens, and has a combined annual revenue/capital budget of £360 million. In addition to maintaining local schools and roads, the council's 7,500 employees are responsible for collecting taxes, running social services, and maintaining the county's extensive leisure facilities. As a unitary authority, Flintshire offers around 750 distinct public services, and runs some 350 business-critical systems to support them.

With ambitious plans to develop new services for citizens and to improve its own internal efficiency, Flintshire County Council needed to ensure that its IT infrastructure was sufficiently flexible, responsive and scalable. The council wanted to standardise the infrastructure as far as practical, and to create a set of shared computing resources that could adapt rapidly to new demands in any area. The key

challenge was to reduce the size, complexity and running cost of the infrastructure while simultaneously gaining flexibility in service provision.

John Thomas, Operational Services Manager at Flintshire, comments: "We want our focus to be on the system architecture and how it supports the business. We need the underlying technology to work seamlessly and reliably, and to adapt and scale to new demands with minimal disruption. Where the server and storage landscapes are concerned, we've worked with IBM to create a small number of very powerful and flexible computing resources that can be subdivided to meet any requirement."

He adds: "In every area, IBM gives us the connectivity, the scalability, the support and the price-points we need to achieve our goals. The result is a scalable, reliable, efficient infrastructure that offers superb availability and performance."

“Virtualisation reduces the amount of hardware we need to buy, maintain, then dispose of. It also significantly cuts the lifetime electricity consumption and cooling requirements at the point of use. The business perspective is that these efficiency gains translate into significant savings in capital and operational expenditure.”

John Thomas
Operational Services Manager
Flintshire County Council

Virtualised infrastructure

At the heart of Flintshire’s infrastructure is the concept of virtualisation – enabling resources residing on different physical systems to be pooled, then flexibly allocated to support multiple services more efficiently. The Council has employed virtualisation for a number of years on the IBM System i and System p platform, and today runs IBM i5/OS, IBM AIX and Linux side-by-side in virtual partitions on two IBM System i 570 servers.

Flintshire consolidated a total of 18 older IBM iSeries and pSeries servers to the two i570s. The council has since upgraded the systems and increased the number of partitions from 18 to 30 – which could otherwise have required 30 stand-alone machines. Each i570 has 16 IBM POWER5+ processors, four of which are held in reserve and can be activated when required using IBM On/Off Capacity on Demand.

“We migrated our entire AIX workload to logical partitions on the i570s. We have since added a number of new AIX partitions – each of which has saved us from having to buy another new physical server,” says Thomas. “Beyond the direct cost-savings in terms of hardware acquisition and maintenance, we’re also keeping the physical infrastructure more simple and manageable.”

The i570s now handle around 80 percent of the total business workload at Flintshire, including IBM Domino® for 2,500 users, financial applications, human resources, payroll and numerous public administration systems.

“The business value of the IBM System i solution is its ability to simplify the infrastructure by acting as a platform for consolidation,” says Thomas.

“Most organisations need to run multiple operating systems, which typically results in a sprawling, costly infrastructure that is both difficult to maintain and unresponsive to new demands. By consolidating to System i, we have created a compact and robust infrastructure in which we can concentrate all our investment in redundancy and high availability, leaving our staff with more time to focus on service delivery.”

The organisation has also virtualised its storage, using IBM System Storage SAN Volume Controller to create a more flexible and efficient SAN. The SAN is built around three tiers of storage, including two IBM System Storage DS8100 and two DS4700 storage devices. Without virtualisation, John Thomas estimates that the Council would require another 30 per cent more capacity on top of its existing 60TB.

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Extending the benefits of virtualisation

Based on its positive experience of virtualisation on System i and on its SAN, Flintshire decided to virtualise its Microsoft Windows infrastructure to VMware virtual servers on the IBM System x platform.

“We wanted to create a more flexible, available and scalable platform for our Windows systems. We undertook a Cobra study with IBM to determine what cost savings and other benefits we could expect from virtualising

our Intel-based servers,” says John Thomas. “The Cobra study helped us quantify the savings that virtualisation could deliver, and the benefits we’ve achieved are effectively direct results of that engagement. We also had the benefit of an IBM study tour to Greenock towards the end of the Cobra study, which provided an excellent opportunity to see new technology in action, demonstrated by genuine experts.”

He adds, “We aim to participate in an IBM study tour every 12 to 18 months. The study is a very useful tool in terms of making the right decisions for the future, and one of the main drivers for how we’ve developed the strategy for the server and storage architecture.”

Flintshire implemented four 8-way IBM System x3950 servers, currently running a total of 40 VMware servers. A further two 3950s are now being implemented in preparation for new workload – a major, 500-user social care system and a new payroll solution for 7,500 direct employees.

Says John Thomas, “It’s clear that the experience and research from other IBM server lines are shared with System x – and that innovations in System x also feed back to the other lines. For us, this is one of the key benefits of working with IBM: its end-to-end capabilities create a constant cycle of improvement, as new ideas in one area tend to propagate to others.”

Rapid adoption, enormous flexibility

VMware virtualisation on the x3950s has given Flintshire a highly available, flexible and scalable infrastructure that also offers extremely rapid provisioning of new services. The organisation can deliver a fully patched Windows virtual server, configured and ready for use as a business system, in under four

minutes. Setting up an equivalent physical server would take one person at least four hours in the best-case scenario.

In the virtualised environment on the 3950s, Flintshire can reallocate the available resources whenever required, so that each virtual server is the right size for its workload.

“One of the key benefits of virtualisation on System x is the ability to get additional capacity on demand – a technology available to us for a number of years on the System i platform,” says John Thomas. “We can now ramp up the capacity and performance of a given virtual environment to meet a particular business need, so that it gets handled without any loss of performance or availability. In the x3950 environment, we’re already using this facility to speed up the year-end processing on our council tax revenue systems.”

Moving towards full virtualisation

Most of the business systems at Flintshire are two- or three-tier, typically with a DB2 database running under i5/OS or AIX on the System i platform, an application layer running under Windows on multiple clustered VMware virtual servers on the System x platform, and a thin-client front-end served by Citrix running on IBM BladeCenter.

“The virtualisation of our Windows servers provides for that tier of the infrastructure the same kind of flexibility we already had in the other tiers,” says John Thomas. “In the past, we could ensure very high availability for the database and front-end tiers, but the middle tier was more difficult. With virtualised application servers running under VMware on the 3950s, we can easily create clustered environments without the cost and

complexity that would entail in a physical environment.”

Flintshire’s strategic platform policy is that all new Windows applications or databases will be installed in the VMware environment whenever possible. More demanding applications – and in particular the organisation’s Citrix environment – will go onto IBM BladeCenter. Only as a last resort will Flintshire use rack-mounted servers.

Shrinking the server landscape

The infrastructure at Flintshire is divided across two strategic data centres, linked by dual dedicated fibre connections. All environments – the SAN, System i, System x, BladeCenter – are fully mirrored to ensure high availability and protection against disaster.

Says John Thomas, “What we’re moving towards is an infrastructure composed of a relatively small number of very powerful and flexible servers and storage resources. Our underlying policy is to consolidate and virtualise all elements of the infrastructure, and IBM’s holistic capabilities make it the ideal partner for Flintshire.”

The total number of servers in Flintshire’s infrastructure currently stands at 150, and this number will drop by around 40 over the next 12 months as the Council continues to virtualise its Windows servers. The aim is to achieve the kind of compact, efficient and highly flexible environment that Flintshire already has for its i5/OS, AIX and Linux systems.

Says John Thomas: “We’re effectively applying mainframe technologies with System i running i5/OS, AIX and Linux. And applying the same principles on the 3950s. We want a very small number of very powerful servers, and

the ability to carve up their resources in whatever way is most appropriate at any given time.”

To manage its infrastructure, Flintshire uses IBM Director software, and plans to introduce the Active Energy Manager (AEM) plug-in. AEM enables the creation of intelligent power policies, with the ability to automatically throttle back or power down System x servers when not in use. “IBM Director is a very powerful tool that enables us to manage almost the entire infrastructure from a single point of control,” says John Thomas. “The ability to control power usage fits perfectly with our aim of having energy-efficient systems, and is another example of how the end-to-end approach from IBM meets our strategic needs.”

Distributed learning environment

The Council also has two IBM System x3850 M2s, that will run up to 25 VMware servers between them, supporting a distributed online learning environment for primary and secondary schools. Previously, the education department was trying to run all of its virtual learning environments on two physical servers, and could not ensure adequate performance or scalability.

“The online learning system is extremely resource-hungry, and the IBM System x3850 was the only platform we knew of that could sustain it,” says John Thomas.

The IBM System x3850 M2 server has four quad-core processors and includes an embedded hypervisor capability. Combined with the VMware ESX Server 3i hypervisor, the x3850 won “Best of Show” at the VMWORLD 2007 conference.

Moving to virtual servers on the x3850 platform gives the education department at Flintshire the power of dozens of separate physical servers but at a significantly lower cost and with far greater flexibility.

Says John Thomas, “With VMware on the x3850s, we effectively have a pool of processing resources that we can split flexibly between the different schools, so that nothing goes to waste.”

End-to-end capabilities

By consolidating its server and storage infrastructure onto a relatively small number of physical systems from IBM, Flintshire has gained a highly available, efficient, scalable and reliable infrastructure that should respond rapidly and cost-effectively to new business requirements.

“The dynamic infrastructure at Flintshire provides an excellent example of how the breadth and diversity of the IBM hardware offerings can deliver tremendous benefits in the future-ready data centre,” says David Lockwood of IBM System x.

Chris Guest, Head of ICT at Flintshire concludes: “Rather than attempting to piece together technology from multiple different vendors, we prefer to work with a single vendor that has end-to-end capabilities: IBM. This ensures interoperability, and gives us access to excellent support resources. Flintshire faces many challenges over the next few years with increasing budget pressures, efficiency targets, rising customer expectations and the push for shared services. We feel that with IBM’s help we have an ICT infrastructure that is flexible, scalable and reliable – which can assist the Council in meeting these challenges.”



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