Table of Contents

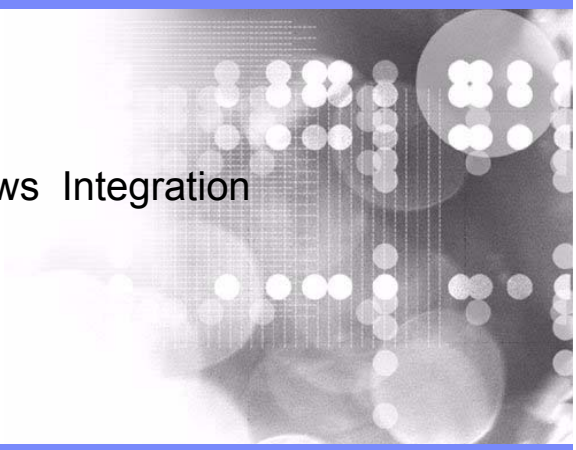
Introduction 3
iSeries and Microsoft Windows Servers 4
Server Farm Costs 5
iSeries Windows and Intel Server Integration 6
Integrated xSeries Server 7
Integrated xSeries Adapter 8
xSeries servers Supported with IXA 10
Recent iSeries and Windows Integration Enhancements 11
Recent iSeries and Windows Integration Enhancements (continued) 12
The Next Generation iSeries Servers… 13
Autonomic Computing 14
Autonomic Computing 15
Integrated Systems 16
Server Management 17
Reliability 18
Integrated Backup 19
User Administration 20
Windows Server 2003 Support 21
Virtualization 22
Virtual Networking 23
Virtual Storage 24
iSeries Storage Virtualization for Windows 2000 Server 25
iSeries Storage Virtualization for Windows 2000 Server—Testing 26
iSeries Storage Virtualization for Windows 2000 Server—Availability 27
iSeries Storage Virtualization for Windows 2000 Server—Switched Disks 28
Microsoft Cluster Service (V5R2) 29
Open Standards 30
Summary 31
For More Information 32
Trademarks 33

Author Biographical Information

Dean Henkel,
Certified iSeries Specialist
IBM eServer Solutions Enablement

Dean Henkel is a certified iSeries specialist working for IBM eServer Solutions Enablement in Rochester, Minnesota. Dean has more than 15 years of software development experience in a broad range of platforms and development environments. His role within IBM PartnerWorld is to assist Business Partners in developing new e-business applications for the iSeries server using IBM strategic tools and technologies such as WebSphere and Java.

IBM® eServer™ iSeries™



iSeries and Microsoft Windows Integration Overview

Dean Henkel

January 2004

Introduction

The IT industry is rapidly changing into a virtualized, heterogeneous computing environment. Enterprise servers now have capabilities to self manage, self heal, and self configure. These changes bring new challenges for IT departments that must manage the basic infrastructure to allow multitudes of people access to IT information and resources.

The IBM® eServer® iSeries™ family of servers has made the management of heterogeneous platforms easy to administer, manage, and backup through its integrated IBM eServer xSeries™ offerings. This course, titled “iSeries and Microsoft Windows Integration Overview,” will introduce you to the integrated xSeries offerings, how they play in an on-demand environment, and how they add value to a solution developer’s enterprise class application set.

iSeries and Windows Servers

- Large majority of iSeries users have Windows servers installed.
- Solution providers and IBM are delivering complementary applications with Windows servers.
- Businesses want to consolidate servers.

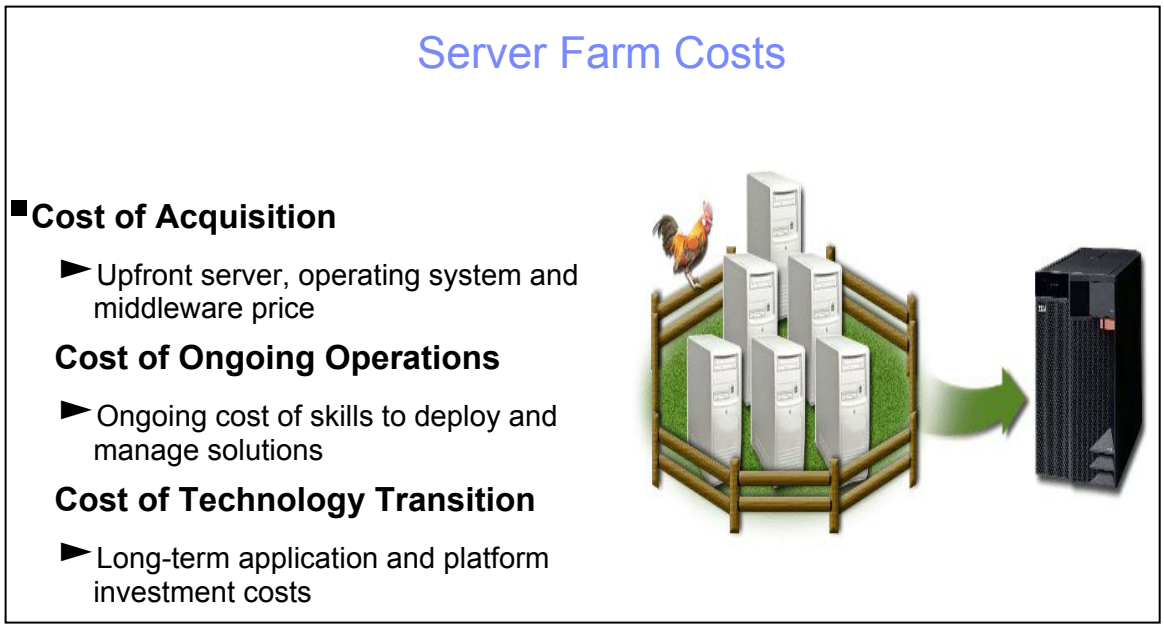
iSeries and Microsoft Windows Servers

By some estimates, 90% of iSeries users have at least one Microsoft® Windows® server in their data center. A single Windows server requires user maintenance, security updates, hardware failures, and system backups—costing businesses time and money.

Many iSeries solution developers have developed Windows components to their core OS/400®-driven applications which require the addition of a Windows-based server. For many, this has opened new markets and replenished existing ones with applications that provide a modern look and feel to an already robust, stable OS/400 application. It has allowed iSeries users to continue to retain their investment in OS/400, while marrying some of the strengths that an Intel®-based system can offer.

But there is a problem. Businesses are getting tired and frustrated as data centers constantly grow larger and more Windows servers are added. Security concerns and the work required to install security patches, the constant rebooting of servers, adding and deleting users, and password management from multiple domains are costing businesses many millions of dollars annually. Add to that the complexity of system backups and restores across multiple servers and things can get out of control quickly.

How can this problem be resolved? Simply by (1) consolidating servers in such a way that a small footprint is maintained, (2) using an easy-to-manage heterogeneous server, and (3) utilizing server hardware in such a way that failover is responsive and almost effortless.



Server Farm Costs

So what are the challenges businesses face if the proliferation of Windows/Intel (Wintel)-based servers is not managed correctly?

First is the cost of acquisition and other upfront costs of the physical server, additional network infrastructure, cabling, tape backup systems, disk storage, space requirements, racks, monitors, and software.

Second is the cost of ongoing operations, which is the people, the space, and the power to manage solutions. People are typically the largest cost factor in the equation. Imagine a server farm with just 25 PCs. The time to manage user IDs and passwords, perform backup and recovery, and apply operating system patches can easily consume several people in an organization. Moreover, companies do not always consider the space or the power requirements of a server farm. It is, however, significant and can quickly occupy many square feet in a data center.

Then, there are always the longer term costs to consider. Servers are like cars, houses, or boats when it comes to usage and depreciation. With age, costs go up to keep an older system running. Over time, it starts costing more per month to keep an older system running than it does to purchase a new one. The installed operating system may no longer be supported, the disk drives may have reached their end of life, the processing speed performs too slow for new applications.

iSeries Windows and Intel Server Integration

- **Solutions**
  - Extend OS/400 applications with Windows
  - Consolidate Windows servers

- **Approach**
  - Leverage xSeries hardware
  - Use standard Windows server software
  - Add value to Windows servers

- **Choice of Offerings**
  - Server "under the covers" - Integrated xSeries Server
  - Direct-attach xSeries Server - Integrated xSeries Adapter

iSeries Windows and Intel Server Integration

Many solution developers have extended their portfolio of software from an OS/400-only base, to include applications running on Windows servers. This new software can add significant value to their longstanding applications, but also adds complexity to an iSeries data center. This complexity can be reduced by leveraging existing xSeries hardware and by using IBM's integrated xSeries hardware.

IBM has two choice offerings for iSeries users who still want reliability and ease-of-use for their Windows servers: the Integrated xSeries Server and the directly attached Integrated xSeries Adapter. Integrated xSeries servers can add more value to a solution developer's application at virtually no additional cost to the final customer. It is this cost edge in the sales cycle that can mean the difference between closing and losing a sale.

Integrated xSeries Server

- **Low-voltage, 2.0 Ghz Xeon Processor**
  - With Hyperthreading technology
  - Up to 4 GB Memory
- **Integrated 10/100 Mbps Ethernet Adapter**
- **Leverages iSeries resources**
  - Virtual disk storage - up to 2 TB
  - Virtual 1 Gbps Ethernet connections
  - Shared Tape, DVD and CD-ROM
- **Supported on iSeries Models****
  - OS/400 V5R2 Required
- **Hot spare supported with 1.6 Ghz Integrated xSeries Server**
- **Windows Server 2003 support**
  - Standard, Enterprise & Web Editions
- **Windows 2000 Server support**
  - Windows 2000 Server
  - Windows 2000 Advanced Server

Integrated operations and server management

** iSeries 270, 8xx; Not supported on iSeries Model 250

Integrated xSeries Server

The integrated xSeries server, known as an IXS, is an Intel server “on a card” that is installed directly inside the iSeries cabinet. IXS runs a single Xeon® processor, supports up to four gigabytes of memory, and includes built-in 10/100 Ethernet connections and also allows for the attachment of USB devices. Up to three additional iSeries network cards may be added, including a token ring card and a gigabit Ethernet card. The Integrated xSeries Server leverages iSeries’ system management, communication, and storage resources; but otherwise operates as if it were a standalone Windows server.

This server is ideal for smaller businesses with lighter Windows workloads that do not need the scalability offered by IBM’s multiprocessor xSeries models.

Integrated xSeries Adapter

- **Attaches the latest 2, 4, 8-way xSeries Servers***
  - 1 GBps High-Speed Link
  - xSeries 235 (2w), xSeries 255 (4w), xSeries 360 (4w), xSeries 440 (8w), xSeries 445 (8w)
- **Retains features and value of Integrated xSeries Server**
  - Virtual disk storage
  - Virtual 1 Gbps Ethernet connections
  - Shared Tape, DVD & CD-ROM
- **Supported on iSeries Models****
  - OS/400 V5R1 or V5R2
- **Windows Server Support**
  - Windows 2000 Server and Windows 2000 Advanced Server
  - Windows Server 2003 Standard, Enterprise & Web Editions

Enterprise X-Architecture™

Integrated operations and server management

* Selected Open Bay models of xSeries 235, xSeries 255, xSeries 360, xSeries 440 & xSeries 445

Details at: ibm.com/eserver/iseries/windowsintegration/xseriesmodels

** iSeries Models 270, 8xx; Not Supported on iSeries Model 250

Integrated xSeries Adapter

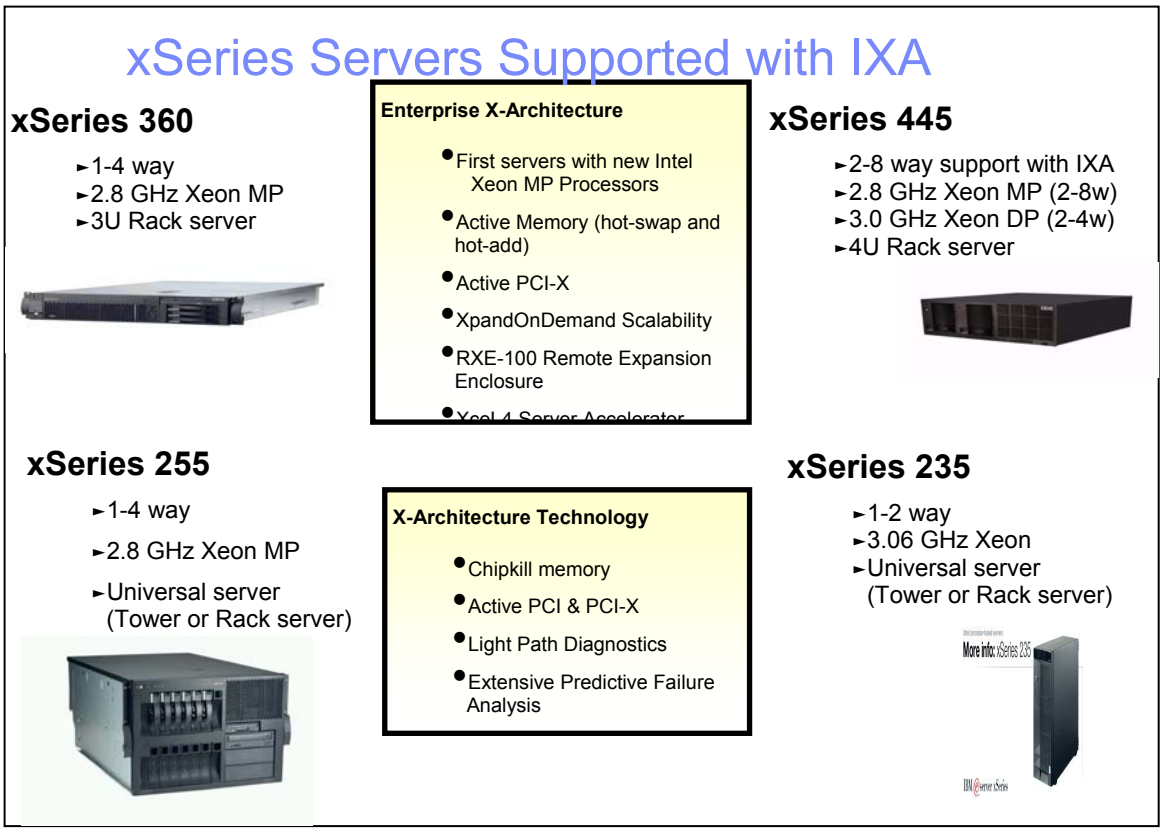
Businesses that do place greater computing demands on their Windows server(s) should consider the Integrated xSeries Adapter. This offering is targeted at the solution developer or end business user that needs a faster, more scalable Windows-based solution, yet still wants to leverage its iSeries hardware and simplicity of management.

The Integrated xSeries Adapter (IXA) is a PCI-based interface card that installs inside selected models of xSeries servers, providing a one-gigabit link to an iSeries server. Integrated xSeries Adapters enable the direct attachment of as many as 60 xSeries servers to a single iSeries server—allowing the deployment of greater Intel processing power and taking full advantage of the latest IBM X-Architecture™ innovation. Each xSeries server has its own processors, memory, and Integrated xSeries Adapter, and like the Integrated xSeries Server, shares iSeries' disk, tape, DVD, and systems management resources.

Five models of xSeries servers can currently be integrated with an iSeries server. These models are the xSeries 235, xSeries 255, xSeries 360, xSeries 440 and the xSeries 445. These server models cover a broad performance gamut within

the xSeries product line. Communications between the IXA and iSeries server is accomplished with the use of the High Speed Link (HSL)—the same interface that connects additional I/O towers.

Either offering demonstrates how solution developers and businesses with Windows server requirements can easily take advantage of the integrated xSeries products to (1) reduce the number of servers required in a solution, (2) shrink hardware footprints, (3) tighten system management costs, and (4) maintain the reliability of the iSeries hardware while boosting the reliability of the Intel servers.



xSeries servers Supported with IXA

xSeries servers have some of the most advanced technologies in the industry, including support for scalability up to 8-way with the Xeon multiprocessor technologies. Active memory mirroring capabilities reduce unscheduled downtime for memory failures through a RAID-like mirroring of memory data. Predictive failure analysis monitors key components, such as CPU, memory, fans, power supplies, and memory cache—warning an operator in advance of an impending failure. Light path diagnostics allow service support to quickly pinpoint a failed or failing component, further expediting hardware repairs and dramatically reducing service downtime.

To learn more of the available server models and a complete list of supported servers, refer to the Web references found in the “For More Information” section of this course.

Recent iSeries and Windows Integration Enhancements

- **Support for new iSeries models**
  - iSeries 800, iSeries 810, iSeries 825, iSeries 870, iSeries 890
- **Integrated xSeries Server/Adapter maximums increased**
  - Enables iSeries to support larger and more complex Windows server environments
- **iSeries 825, iSeries 870, iSeries 890 Enterprise Edition includes Integrated xSeries Server**
  - Integrated xSeries Server
  - Education Voucher valid for ILS iSeries Windows Implementation Class
  - Service Voucher valid for iSeries Windows Integration Services

Integrated xSeries Server (IXS)

Model	Max IXS	Model	Max IXS
		800	4
270	3	810	13
820	12	825	36
830	28	870	48
840	32	890	

Integrated xSeries Adapter (IXA)

Model	Max IXA	Model	Max IXA
		800	3
270	2	810	7
820	8	825	18
830	16	870	60
840	32	890	60

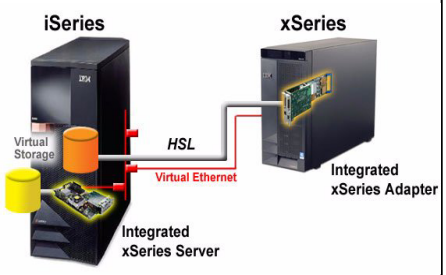
Recent iSeries and Windows Integration Enhancements

IBM's newest iSeries hardware models have significantly increased the number of integrated servers supported. This allows enterprise-level iSeries users who have complex Windows server environments to consolidate servers, yet still take advantage of the iSeries support provided by its system management functions.

In addition to supporting more servers, all iSeries 825 Enterprise Edition models and larger models ship with an Integrated xSeries server at no charge. Businesses that purchase these models are provided with no-charge service and an education voucher. This voucher entitles the company to have an onsite IBM representative install and cable all hardware, load the Windows operating system of choice, and provide the education necessary for the business to maintain and manage the Integrated xSeries Server.

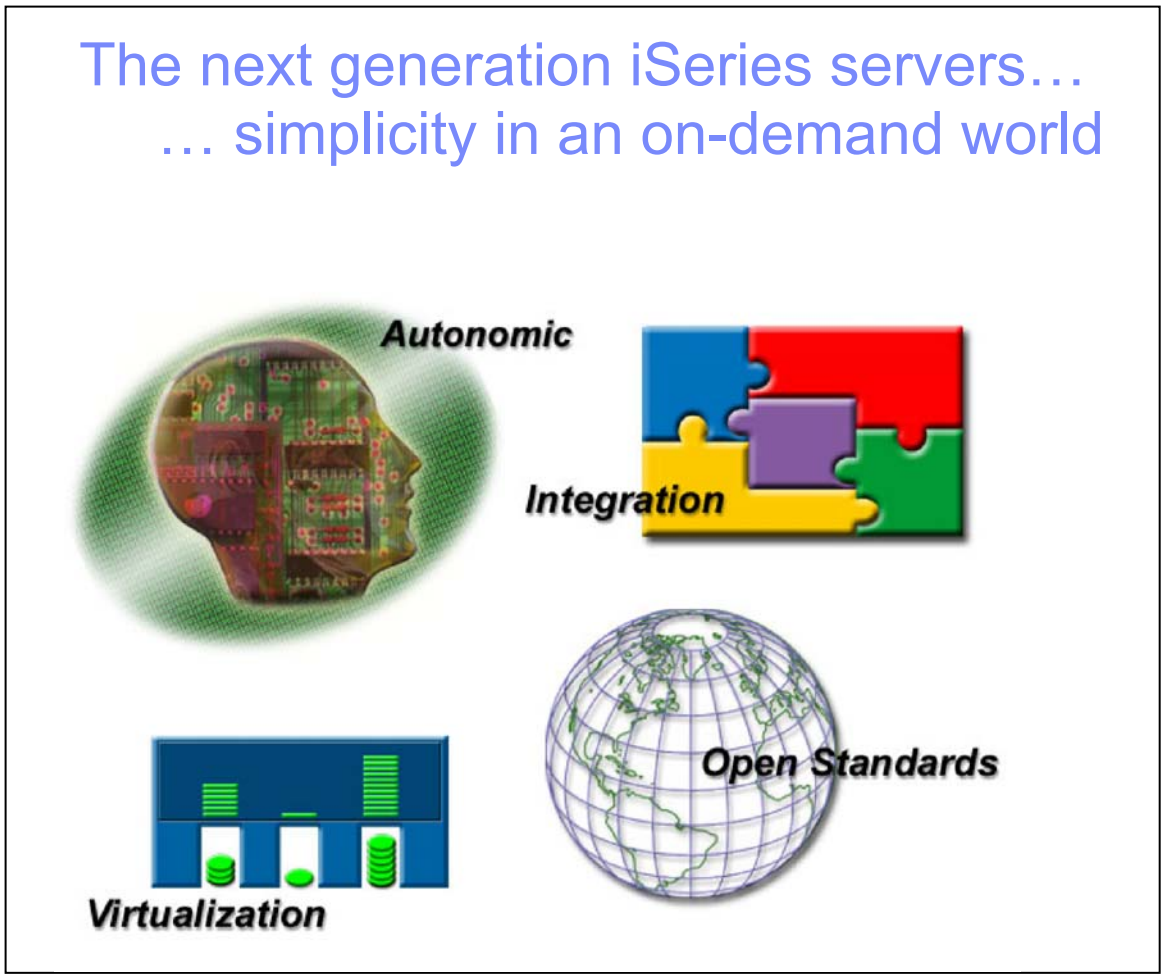
Recent iSeries and Windows Integration Enhancements (continued)

- **Integrated xSeries Solution support for Microsoft Windows Server 2003**
  - Including Microsoft Cluster Service
  - Standard, Enterprise & Web Editions
- **Integrated xSeries Adapter support for the latest xSeries servers**
  - Leverage IBM's Enterprise X-Architecture to enhance your Intel ® server infrastructure
  - xSeries 235 uni or 2-way up to 3.06 GHz Xeon
  - xSeries 255, xSeries 360 uni to 4-way up to 2.8 GHz Xeon MP
  - xSeries 445 2-way, 4-way up to 3.0 GHz Xeon DP
  - xSeries 445 2-way, 4-way and even 8-way up to 2.8 GHz Xeon MP



Recent iSeries and Windows Integration Enhancements (continued)

In addition to supporting more Integrated xSeries offerings, recent enhancements include support of Windows Server™ 2003 and Microsoft clustering. Large numbers of enterprises will be migrating to Windows 2003 in the coming months when Windows NT® support is dropped by Microsoft. During this transition, many enterprises will also be looking to upgrade or replace existing applications. This is a perfect opportunity for solution developers to test and support their applications using Integrated xSeries Servers—providing the opportunity for these same developers to articulate to their customers the value this IBM offering has to their total solution.



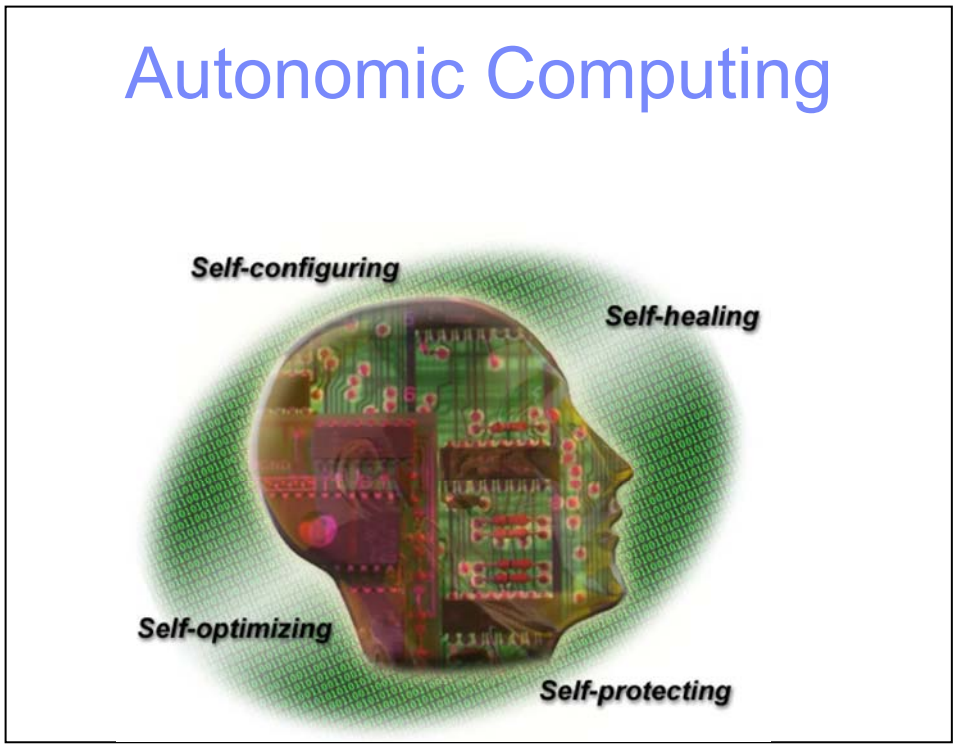
The Next Generation iSeries Servers…

Now that you have learned about the Integrated xSeries offerings, let's see how these offerings can assist solution developers and their customers.

You have probably heard the term "On-demand" or "business on-demand", but it may be a bit unclear exactly what this means.

"On-demand" is a term that is used to describe computer systems and applications that have the ability to participate in an autonomic or self healing environment. On-demand servers can integrate between heterogeneous systems and can take advantage of system virtualization, such as: disk, memory, and computational computing power. Virtualization allows computers to dynamically scale up or down, based on the computing needs at any instant in time. Solution developers that develop on-demand applications need to consider using open standards and open computing environments.

The Integrated xSeries offerings play into each of these on-demand categories in many ways. Let's look at that now.

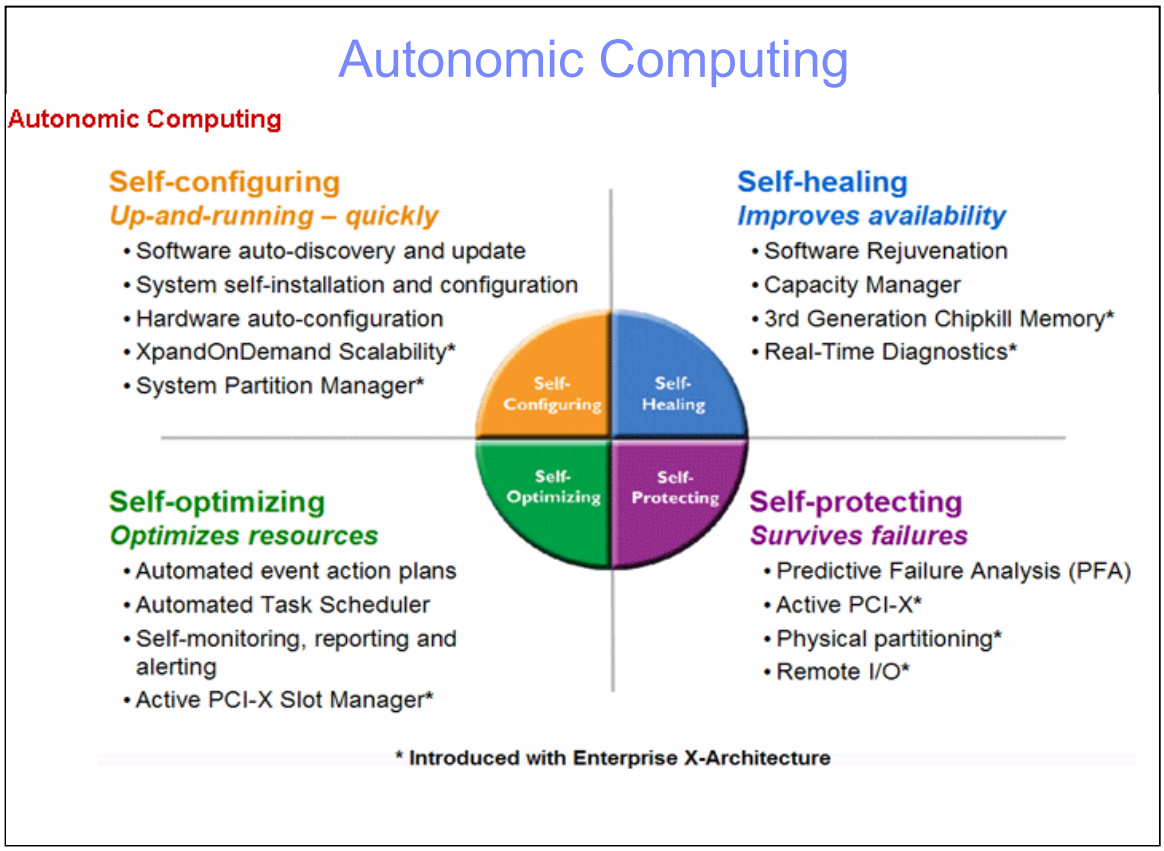


Autonomic Computing

Enterprise users want to interact with computing solutions in a way that is intuitive and minimizes human interaction. Ideally, they would like computing systems to pretty much take care of the mundane elements of management by themselves.

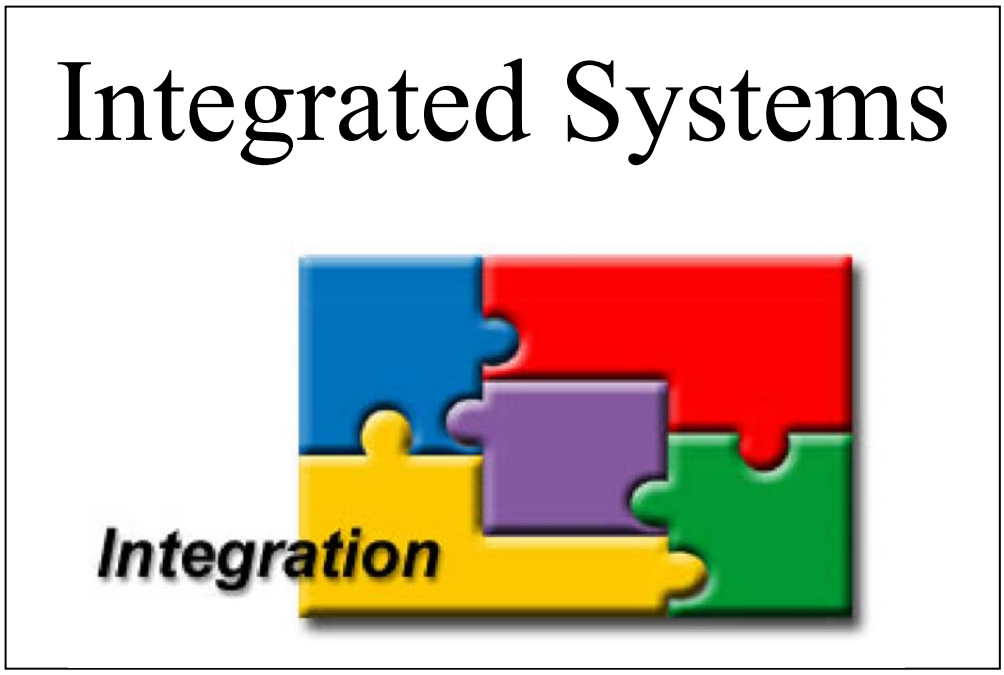
The most direct comparison to autonomic computing is the function of the human central nervous system. Autonomic controls use motor neurons to send indirect messages to organs at a subconscious level. These messages regulate temperature, breathing, and heart rate—without conscious thought. The implications for computing are immediately evident; a network of organized, "smart" computing components that give us what we need, when we need it, without a conscious mental or even physical effort.

Autonomic computing is a new view of computing that will necessitate changing the industry's focus on processing speed and storage to one of developing distributed networks that are largely self-managing, self-diagnostic, and transparent to the user.



Autonomic Computing

The Integrated xSeries offerings are an ideal partner for iSeries users because many of the enterprise class features that have been available on the iSeries platform have migrated to xSeries servers. Autonomic computing functions have become standard features in the Enterprise X-Architecture, making the integration of xSeries and iSeries servers exciting. Enterprise X-Architecture makes the most of autonomic computing through features such as Chipkill Memory or memory mirroring, and predictive failure analysis to accurately predict a failure in key components, such as: processors, memory, power supplies, and fans. These features and others provide the autonomic computing capabilities that iSeries devotees have come to expect from an enterprise server.



Integrated Systems

Integration is another key component to on-demand computing. Heterogeneous computing environments should be easily managed, provide fast communication, and distribute workloads transparently. iSeries and Integrated xSeries Servers have a very strong integration story that can add enormous value to a solution developer’s application.

Server Management

Problem

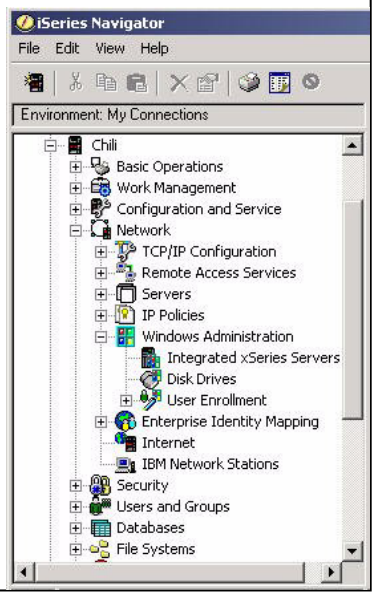
- Duplicate processes, monitoring and resources to manage multiple server platforms

iSeries Solution

- iSeries Navigator provides centralized administration and management of multiple environments from a single interface

Benefit

- n Enables customers to reduce cost and complexity by leveraging iSeries operations and resources to monitor and manage integrated xSeries servers



Server Management

iSeries Navigator provides a Windows-based GUI for managing both iSeries and Windows servers. Administrators may easily start and stop servers, enroll OS/400 users to a Windows domain, and perform storage management tasks—such as adding new virtual disks to a Windows server. iSeries Navigator for Wireless enables administrators to view server status, start and stop servers, and run Windows commands for Integrated xSeries Servers from a Web-enabled cell phone, Personal Digital Assistant (PDA), or Web browser.

iSeries Navigator allows Windows administrators to help themselves to key management functions without the need for an iSeries specialist or knowledge of the underlying command line interface. The key benefit to users is that they can reduce their costs of managing complex data center environments via a single easy-to-use, familiar interface.

Reliability

Problem

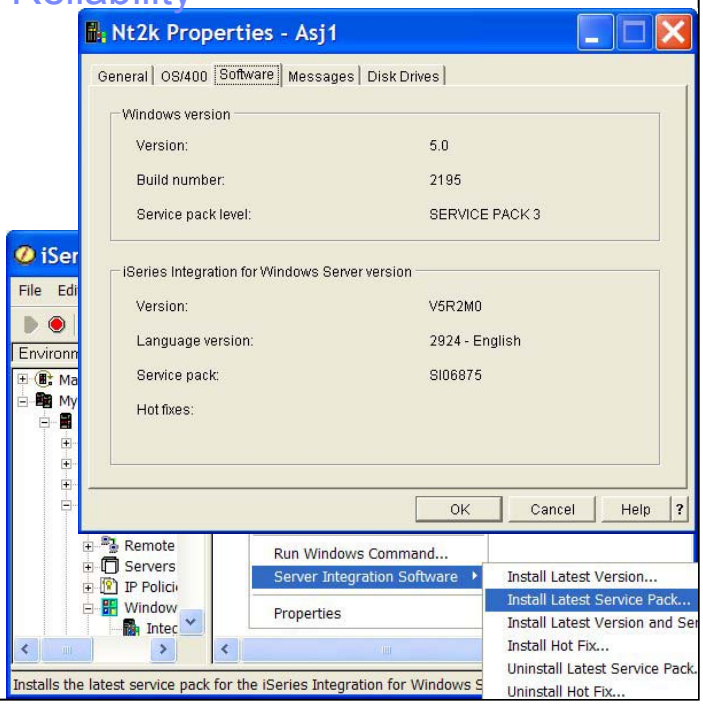
- Different hardware and device drivers can cause server instability.

iSeries Solution

- IBM provides a consistent set of disk, tape, CD, and LAN hardware and device drivers that are tested to work together.

Benefit

- Greater consistency can lead to better reliability.



Reliability

Enterprise solutions require reliability. That is exactly what IBM eServer solutions are all about—bringing the reliability of the iSeries platform to a company's critical Windows applications. Solution developers can significantly enhance their solutions by bringing to their customers a reliable and manageable Windows server infrastructure using IBM technologies.

With the Integrated xSeries architecture, there are no more device driver incompatibilities, no more guessing if a Windows Service pack will work or cause problems in a production environment. Using IBM's integrated offering, businesses know that when they load on Windows Service packs and fixes using IBM's standard iSeries CUM and Group PTF process that, if a Windows fix is applied, it has been tested by IBM. This assurance provides better stability and reliability for solution developer applications and increased end user satisfaction.

Integrated Backup

Problem

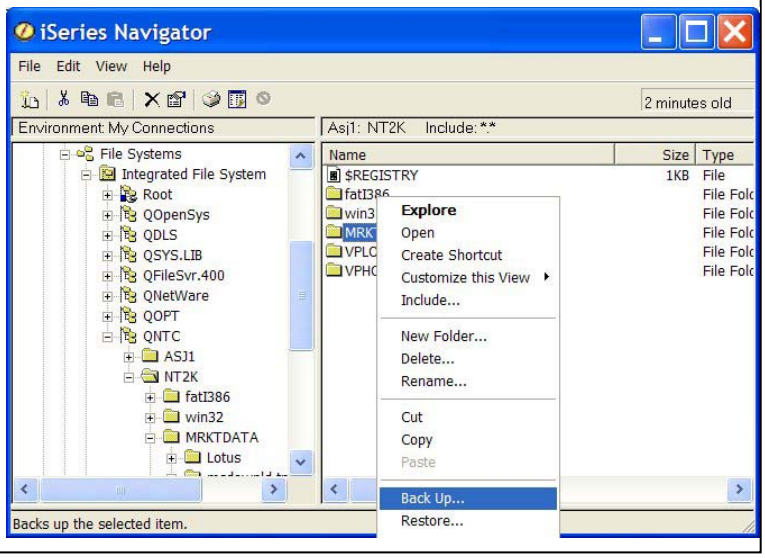
- Managing and automating heterogeneous backups

iSeries Solution

- Save OS/400 and Windows storage spaces to iSeries tape drives

Benefit

- Reduce costs by leveraging iSeries resources and skills
- Reduce time and complexity of an infrastructure restore



Integrated Backup

Backup and recovery can be easily incorporated into iSeries operations. Integration negates the need for a separate SAN and backup/recovery infrastructure for integrated Windows servers. This is especially advantageous for iSeries users who have limited staff and resources to develop and manage two disparate backup and recovery systems.

Businesses may be experiencing longer backup times due to increasing amounts of Windows storage. The Integrated xSeries solutions leverage the investment in iSeries technologies and the robust backup environment provided. Enterprises using high-speed tape with their iSeries servers will be happy to learn that the integrated xSeries Servers can utilize this same tape device from Windows. There are also options for saving the storage spaces at an iSeries object level—at the rate of 80-to-100 gigabytes per hour.

Recovery within an iSeries environment can be significantly faster and more straightforward than recovering or rebuilding a standalone Windows server. A 10-gigabyte Windows disk image residing on an iSeries server may be recovered from tape and rebooted in less than 20 minutes.

Integrated backup and recovery is all about reducing complexity and reducing costs.

User Administration

Problem

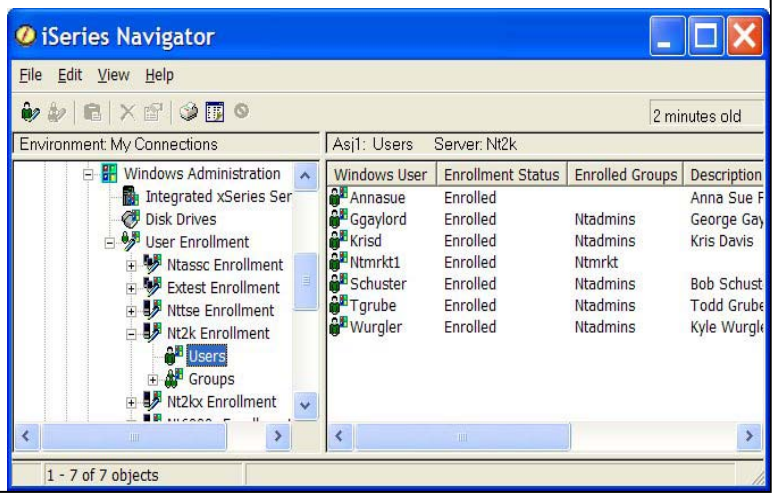
- ►Multiple system user management

iSeries Solution

- ►Adding OS/400 users and groups to Windows 2000 server domains and synchronizing

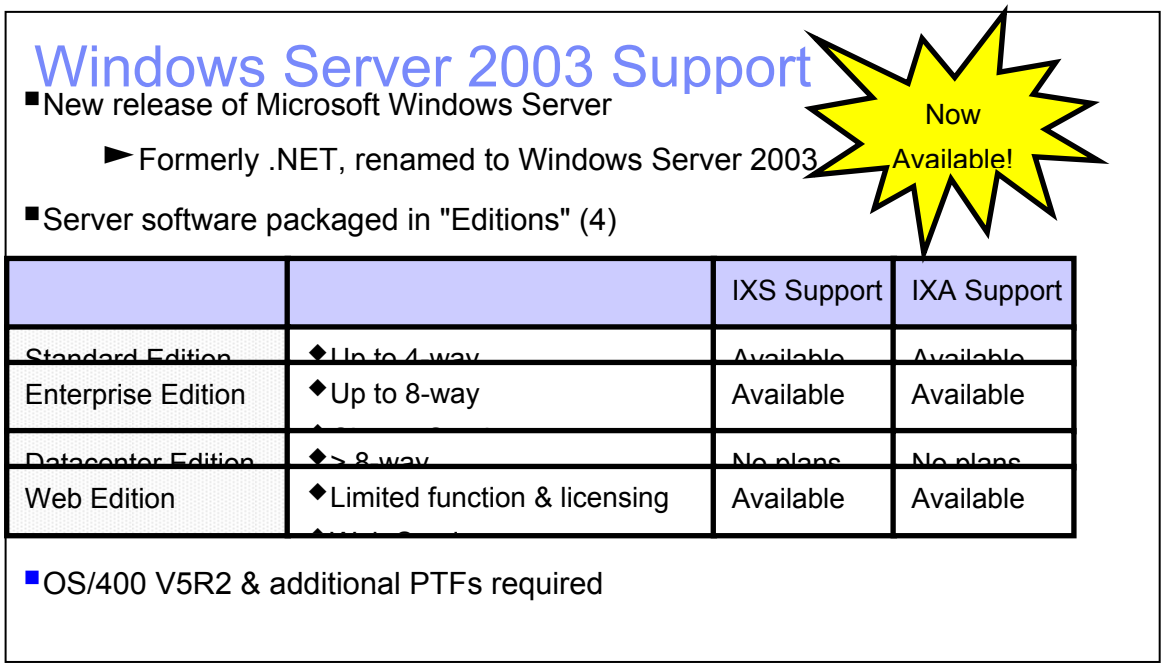
Benefit

- ►Can reduce costs with integrated user management



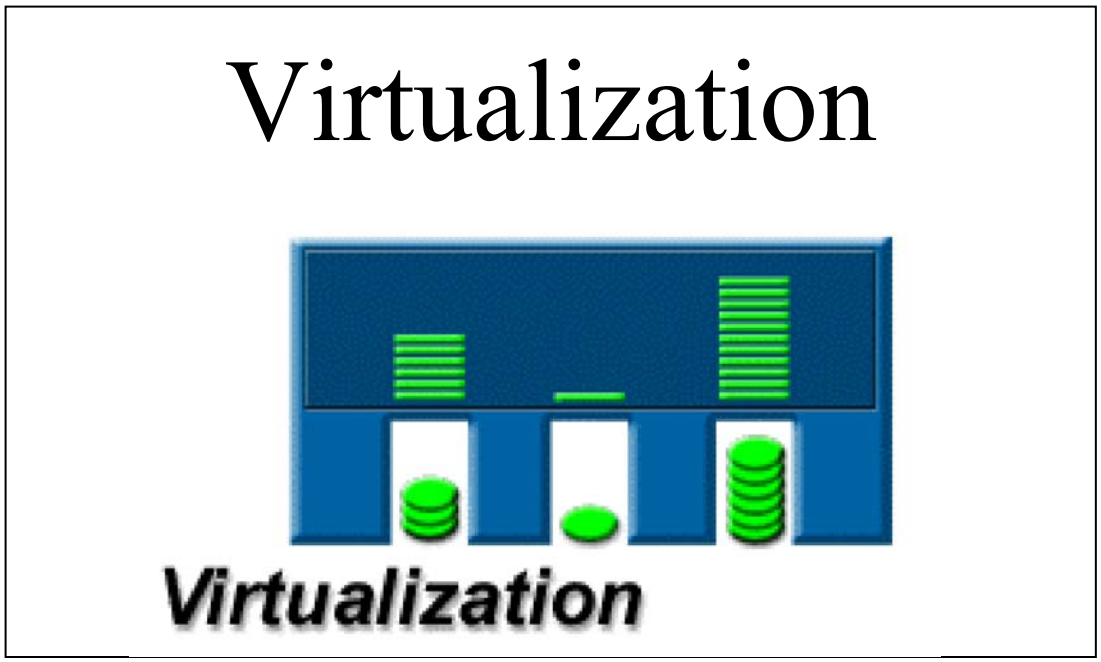
User Administration

OS/400 and Windows 2000 Server user IDs and passwords can be integrated and centralized. When a user is added to OS/400, the user can be automatically added to the Windows 2000 Server environment with proper authorities. In addition, when users change their OS/400 password, their Windows password can be automatically synchronized. This integration helps reduce user administration costs because it cuts down on juggling multiple user IDs, passwords, and authorizations across multiple IT environments. Businesses that have large numbers of users requiring passwords on multiple servers can experience significant savings using this technology. A solution developer offering their solutions to an iSeries client can gain a significant technical advantage when pointing out cost-saving capabilities that the integrated solution can offer.



Windows Server 2003 Support

Starting with V5R2, IBM has announced support of Windows Server 2003 for the integrated xSeries Servers. This includes support of the Standard, Enterprise, and Web Edition of Microsoft's latest version of Windows Server. Businesses running important applications or functions on Windows NT are going to want (or need to, perhaps, to comply with their audit requirements) to move to a "supported" Windows OS. When moving from Windows NT to Windows 2000 Server or Windows Server 2003, many will evaluate and update their Intel server hardware and potentially evaluate new solutions. Solution developers who understand the integrated offerings and can articulate the total cost of ownership savings can potentially have a competitive advantage over solution developers who only support stand-alone Intel servers.



Virtualization

Virtualization is a key concept in an on-demand world—allowing computing environments to be configured dynamically at runtime to meet business requirements. Key computing components, such as memory, disk, processing, and communication, can all be virtualized on iSeries servers. Integrated xSeries Servers can take advantage of some of the virtualization capabilities of iSeries servers without adding additional costs.

Virtual Networking

Problem

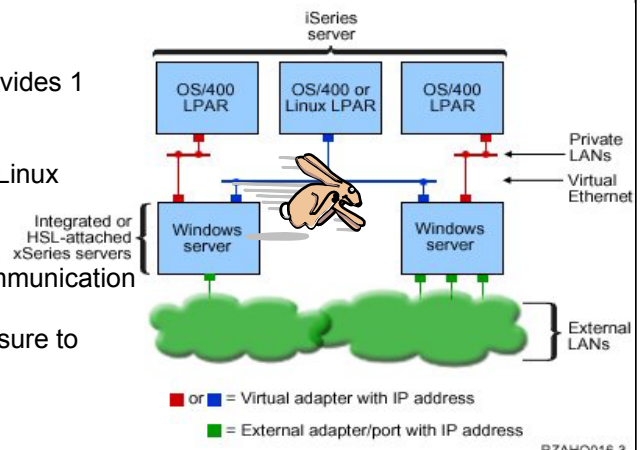
- Upgrading network infrastructure to support high-speed application communication is expensive in terms of time, resources and equipment.

iSeries Solution

- Virtual Ethernet at OS/400 V5R2 provides 1 Gb connections with no LAN adapters/switches.
- Windows-to-Windows-to-OS/400-to-Linux
- Up to 5 connections per IXS / IXA

Benefit

- Extremely secure/reliable server communication over high-performance connections
- Can reduce network traffic and exposure to "sniffing"



Virtual Networking

Virtual LAN support in OS/400 V5R2 provides high-speed Ethernet connections for server-to-server communications. Virtual LAN allows an xSeries server to communicate with iSeries applications or exchange data with OS/400 DB2® UDB for iSeries—over a one gigabit connection. It can do this without placing any additional traffic on a corporate network. Virtual Ethernet can eliminate network congestion on corporate networks, reduce expensive networking hardware, and deliver high reliability—because there are no cables or switches to fail.

Virtual LAN support can also be used between Integrated xSeries Servers or Linux running in iSeries logical partitions. Virtual LAN supports up to five connections per IXS/IXA providing a highly reliable, high performance connection.

Virtual LAN not only improves performance and reduces network traffic, but it also increases security since network traffic never leaves the server.

Virtual Storage

Problem

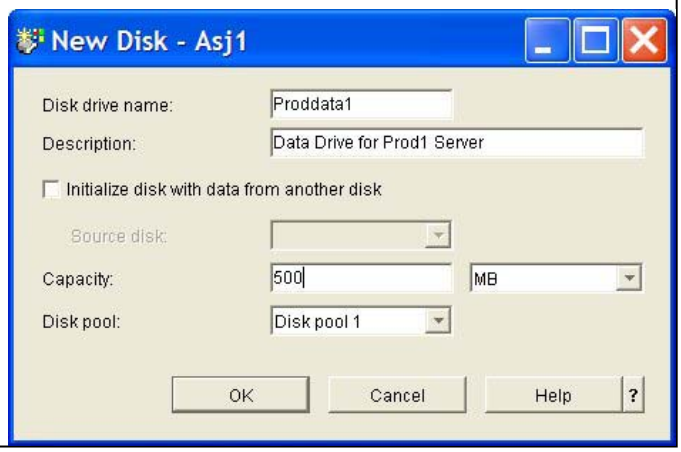
- ►Storage management across the server farm

iSeries Solution

- ►Flexible Virtual Disks from 1 MB to 64 GB (1TB in future release)
- ►Up to 2 TB per Windows server (32 TB in future release)
- ►Hot add of iSeries Storage Space to Windows 2000 Server

Benefit

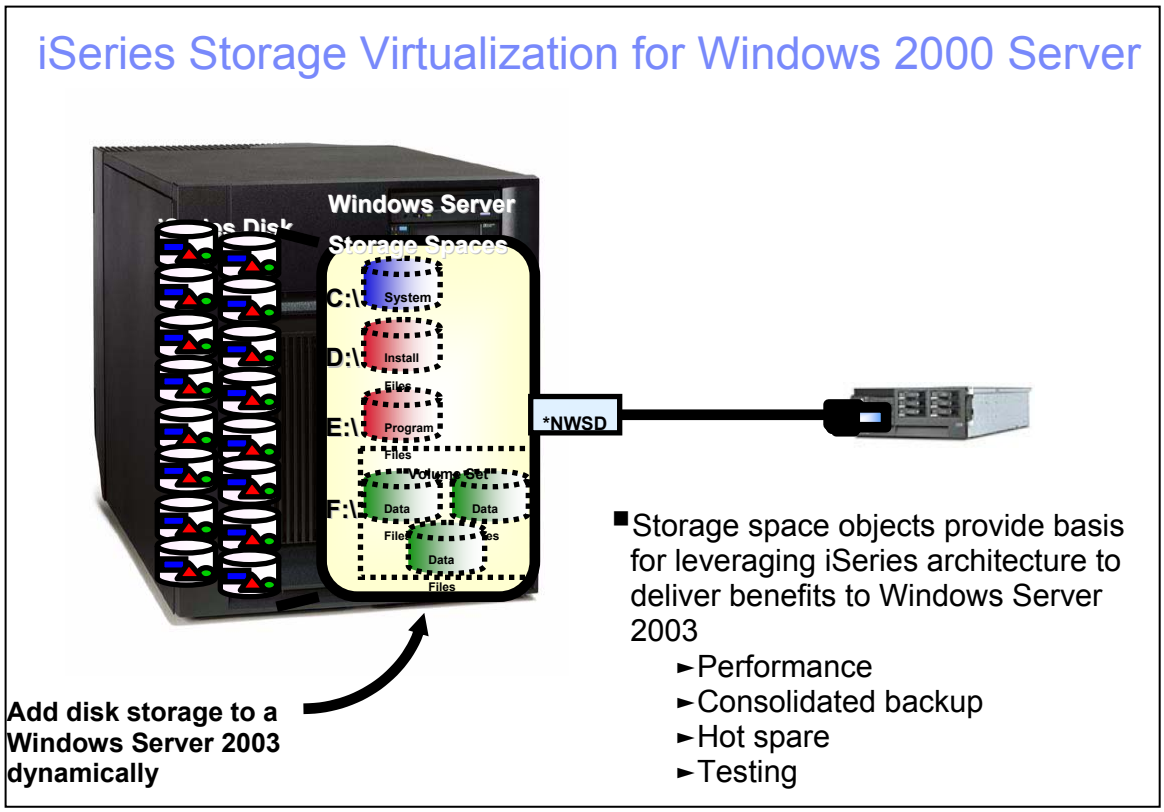
- ►Can improve Windows application performance
- ►Can reduce costs with flexible, centralized storage management



Virtual Storage

On iSeries servers, disk capacity and performance are managed dynamically across all disk arms in an auxiliary storage pool. This provides outstanding I/O performance and less server management. Within an Integrated xSeries Server, when Windows accesses an SQL database file, it has all of the disk arms on the iSeries server working for it to deliver data. The Intel processor is only doing a small amount of the I/O activity—most of the workload is on the iSeries I/O processor, freeing the Intel processor to perform more computational workloads faster with greater throughput.

In V5R2, 32 virtual disks, up to 64 gigabytes each, can be created, allowing a Windows server almost two terabytes of storage. In a future release, 32 virtual disks can be created (up to one terabyte each, or 32 terabytes of storage for a single server). Up to 16 of these storage spaces can be allocated dynamically at runtime, without rebooting the server. The flexibility of moving storage management to iSeries servers can significantly reduce the costs of downtime and maintenance required with traditional, standalone Windows servers.



iSeries Storage Virtualization for Windows 2000 Server

Virtual storage consists of a group of storage space objects that deliver performance, backup, hot spare, and testing functions to a Windows server. Storage space objects reside on the Integrated File System (IFS) and contain: the Windows operating system, IBM-specific installation files, additional drives, and a network storage object. The network storage object as an abstraction layer consisting of (1) pointers to the virtual drives and (2) physical hardware that makes up a Windows server.

Virtual storage offers enterprises the flexibility to dynamically adjust storage needs in realtime. This can be done by either creating a new drive and dynamically allocating it to the Windows server, or by expanding a volume set of several drives to create what appears to Windows as a single drive in realtime—without rebooting.

Imagine a situation where a critical enterprise application is running out of disk space. Most traditional Intel-based servers would require adding and rebuilding physical disks, which can be time-consuming and costly. With iSeries servers, users can request additional disk storage from the available pool and dynamically (at runtime) allocate that disk to the Windows server.

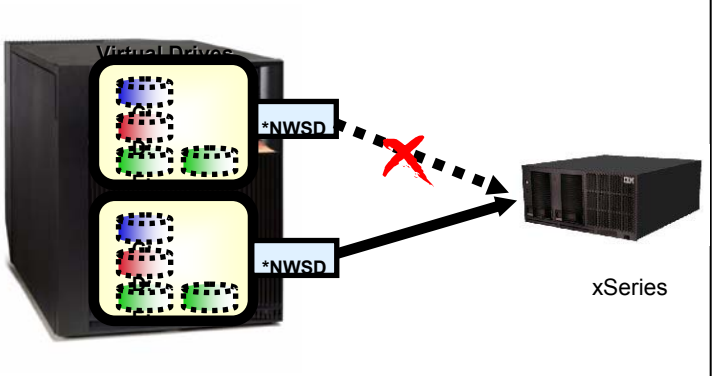
iSeries Storage Virtualization for Windows 2000 Server - Testing

Problem

- Adequately testing Microsoft Service packs, application fixes, device drivers before they are placed in production

iSeries Solution

- Logical servers allow testing with an exact copy of the production image and hardware.
- One test server can support multiple similar production environments.



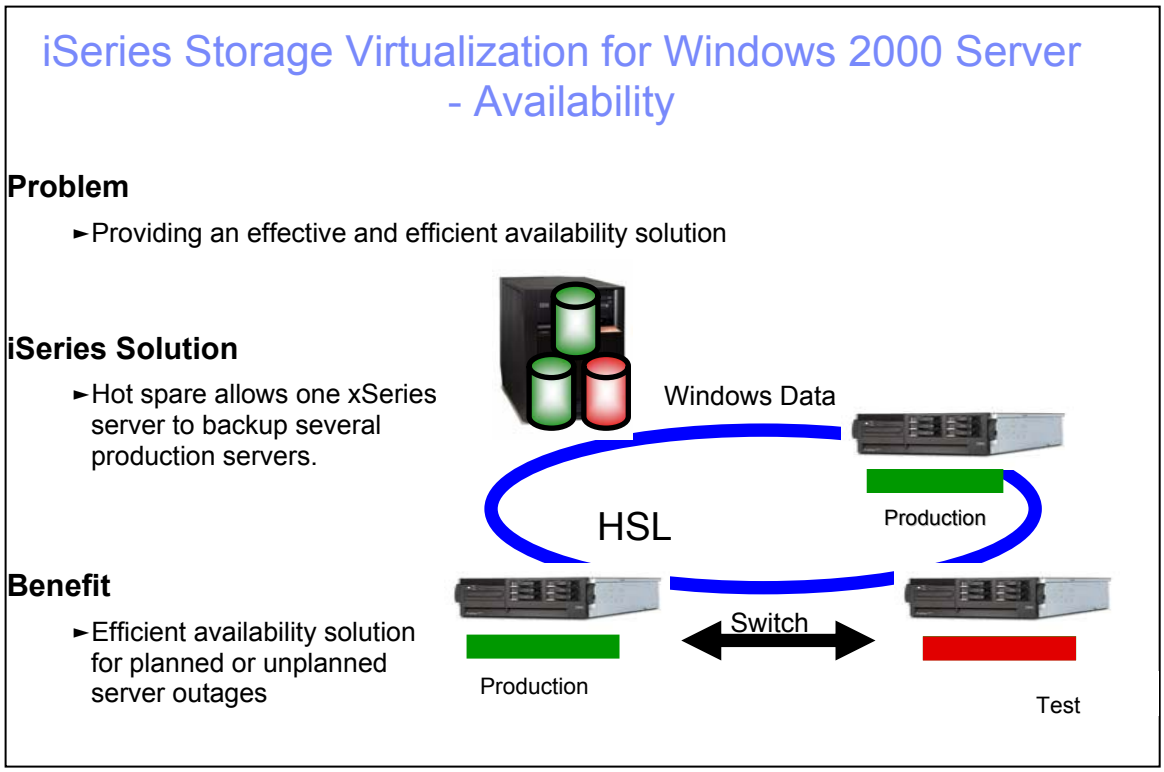
Benefit

- Reduce outages caused by change
- Reduce cost of test/development infrastructure

iSeries Storage Virtualization for Windows 2000 Server—Testing

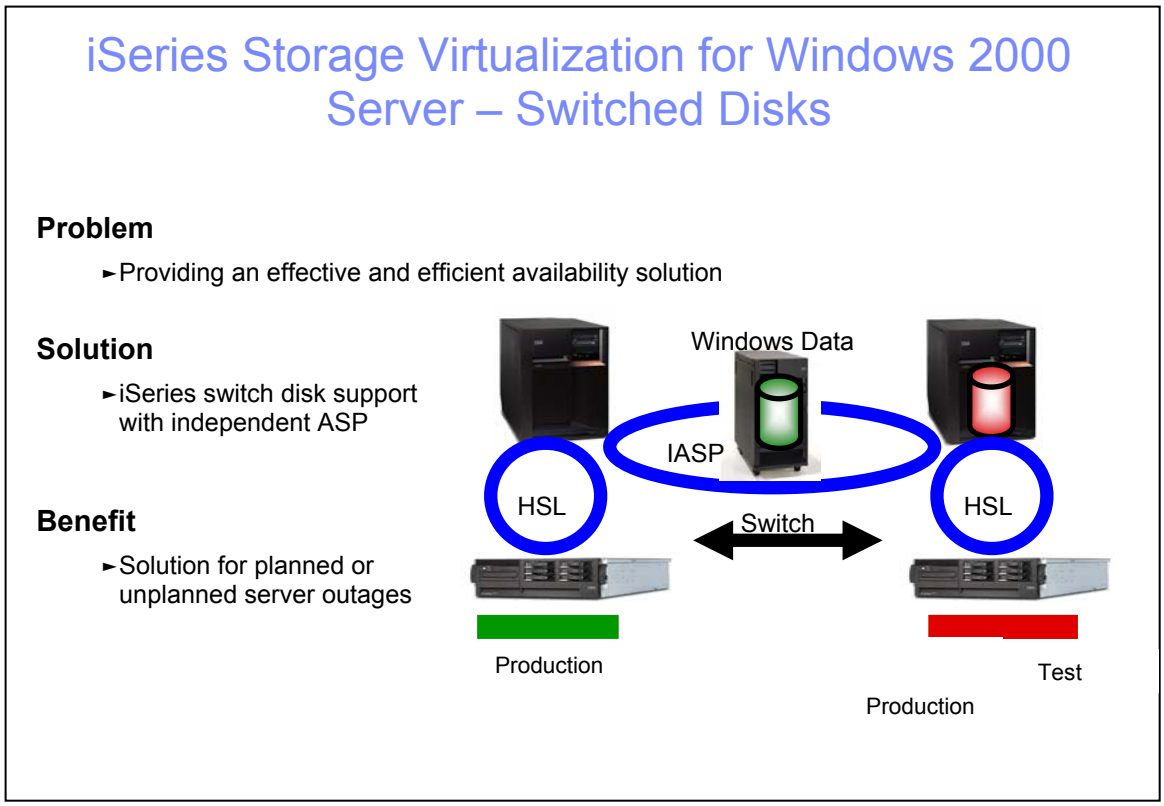
Disk virtualization adds considerable value when used for testing. Disk virtualization allows enterprises to make an exact replica of a server install, in effect creating a “Logical Server.”

Logical servers can then be used to apply service packs and new software for testing prior to production release. If a problem were detected, simply pointing the network storage space back at the original copy can minimize downtime. Some business may elect to add a single test server to their environment for this purpose—having never to take down a production server. A single server could be used to test multiple server images very effectively.



iSeries Storage Virtualization for Windows 2000 Server—Availability

The concept of network storage devices makes if very easy and cost-effective for enterprises to maintain a higher availability solution than could be delivered with just one additional server. Enterprises with multiple Integrated xSeries Servers may choose to add one server to the High-speed Link (HSL) loop as a “hot spare.” In the event of a production xSeries hardware failure, the network storage space could be quickly reconfigured to point to the hot spare server. Just reboot, and in minutes, the system is up and running.



iSeries Storage Virtualization for Windows 2000 Server—Switched Disks

Switched disks are disk units that are contained in a tower connected to two iSeries servers via an HSL loop. The tower and its devices are owned by one of the two servers and can be switched to the other if the owning server fails or needs to be powered down for maintenance. The units in a switchable tower are defined as a Disk Group or Independent Auxiliary Storage Pool (IASP) and objects are designated for placement in the IASP.

Integrated xSeries Servers can utilize the switchable disk because all Windows images reside on the iSeries drives. In the event of a hardware failure or planned server outage, the test iSeries server will take over the independent storage pools, and the integrated xSeries servers within the test loop can be booted to run the production version of Windows.

Microsoft Cluster Service (V5R2)

Switch Disk Cluster

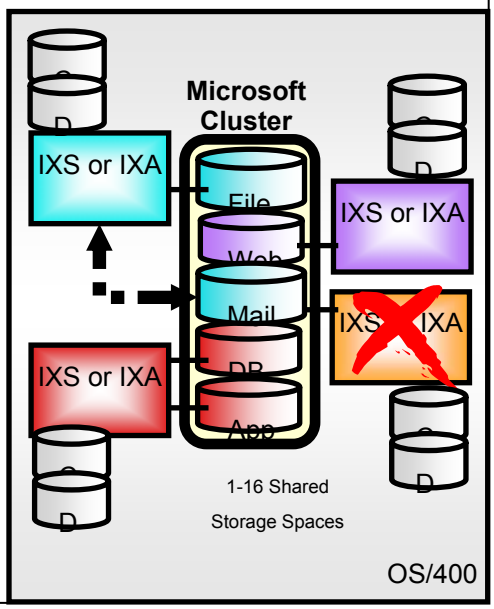
- ►Dynamically switch storage spaces between Windows servers
- ►16 New 1 MB to 64 GB shared storage spaces

Availability Improvements

- ►Planned or unplanned outages

Requirements

- ►iSeries 270, 8xx
- ►OS/400 V5R2
- ►Windows 2000 Advanced Server or Windows Server 2003 Enterprise Edition



Microsoft Cluster Service (V5R2)

In V5R2, IBM announced support for Microsoft Cluster Service. Microsoft Cluster Service allows Windows to dynamically switch storage spaces between Windows services. Typically with this service, two servers share a data store so that another server can continue to offer the same data and service if the original fails. Benefits include more than just fault tolerance to mitigate server or service failure, but also accommodation for planned maintenance downtime for upgrades and security patches.

This type of functionality is very similar to the “hot spare” concept described earlier—the difference being that the hot spare would require someone to point the network storage space at the hot spare and boot. Should a failure occur with Microsoft Cluster Service, the Clustering Service would automatically handle the failure without rebooting.

Open Standards

... including "de facto" standards like Wintel servers

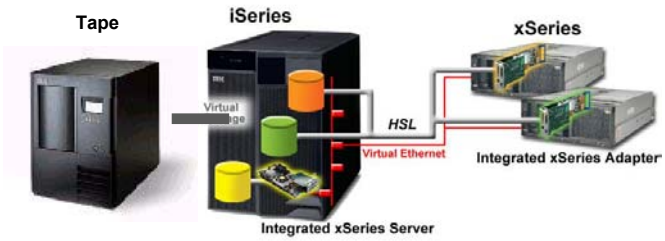
Open Standards

IBM believes that open standards represent a key functionality that all hardware and software vendors must participate in to remain competitive, both now and in the future. This includes languages such as Java™, Web services using XML, application servers like WebSphere® Application Server, and de facto standards like Wintel Servers.

Open standards will allow heterogeneous environments to communicate, integrate, and automate more easily and seamlessly to businesses. Enhancing OS/400-based applications using a Wintel environment can, and for many, does add value. Solution developers should consider using open technologies such as Java and WebSphere when developing solutions to take advantage of future enhancements using on-demand technologies.

Summary

- Leverage investment in iSeries resources and operations
- Integrate server management and user administration
- Simplify server test and deployment using virtual storage spaces
- Communicate more securely over 1 Gbps virtual Ethernet connections



Summary

Solution developers should consider supporting the Integrated xSeries offerings for their customers because of the value-add it brings to their solutions—for very little cost. Businesses using iSeries servers value its ease of use and the ability to leverage iSeries resources and operational skills. iSeries users appreciate the integrated server and user management capabilities, the simplification of testing efforts, improved performance, and increased customer satisfaction. Supporting the Integrated xSeries offering can be the differentiator that moves a prospect to a customer—purchasing your new solution, all for no additional cost.

For More Information

- Windows Integration:
  ibm.com/eserver/iseries/windowsintegration
- iSeries Information Center:
  ibm.com/iseries/Infocenter
- Redbooks:
  ibm.com/redbooks
  - Microsoft Windows Server 2003 Integration with iSeries, (SG24-6959-00)
  - OnDemand Announcements for the IBM eServer iSeries Server, (REDP-3750-00)
  - Consolidating Windows 2000 Servers in iSeries: A Guide to Implementing xSeries Server in iSeries (SG24-6056)
- xSeries Servers:
  ibm.com/eserver/xseries and
  ibm.com/eserver/iseries/windowsintegration/xseriesmodels
- IBM Solutions Enablement:
  ibm.com/servers/enable
- OS/400 PTFs:
  ibm.com/eserver/iseries/windowsintegration/win2003.html
- Microsoft server software packaged in "Editions":
  http://www.microsoft.com/windowsserver2003/evaluation/overview/family.mspx
- Windows Server 2003 (formerly .NET)
  www.microsoft.com/windowsserver2003
- iSeries Navigator
  ibm.com/eserver/iseries/navigator

Trademarks

IBM, eServer, iSeries, xSeries, OS/400, DB2, WebSphere, and X-Architecture are trademarks and registered trademarks are trademarks or registered trademarks of the International Business Machines Corporation in the United States or other countries or both.

Microsoft, Windows, Windows NT, and Windows Server are trademarks of Microsoft Corporation in the United States, other countries, or both.

Java and all Java-based trademarks are trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.

Intel and Xeon are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

Other company, product and service names may be trademarks or service marks of others.