

IBM eServer iSeries Advantage: Benefits of Integrated xSeries Adapter for J.D. Edwards OneWorld / ERP 8.0

*Utilizing xSeries attached via the Integrated xSeries
Adapter as front end web server to iSeries enterprise
server*

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Executive summary

J.D. Edwards® customers who choose to deploy the web application server components on Intel®-based servers can connect those servers directly to the IBM® eServer™ iSeries™ database server using the Integrated xSeries Adapter (IXA).

This combination of iSeries and IBM eServer xSeries™ using the IXA as the OneWorld® / ERP 8.0 web server provides extensive horizontal capacity to the system and offers the advantages of faster performance, advanced disk management, server flexibility, and centralized backup. The exclusive iSeries IXA solution provides the flexibility to run mixed server environments in a single, consolidated infrastructure with minimum complexity.

In order to demonstrate the performance advantage of the IXA solution in a J.D. Edwards environment, the IBM / J.D. Edwards International Competency Center conducted tests using J.D. Edwards standard test protocols. OneWorld web clients achieved as much as a 10 to 12% response time improvement when the xSeries was directly attached to an iSeries enterprise server using the IXA as compared to when the xSeries was a standalone server externally connected via a traditional ethernet network.

Background

Many businesses today, including those running J.D. Edwards OneWorld / ERP 8.0 software, operate mixed server environments that include Intel-based servers running Microsoft® Windows® 2000 Server applications in addition to core business applications on iSeries. This mix of servers may grow into a challenging environment that involves supporting many discrete Intel servers and can lead to higher costs and a more difficult infrastructure to manage.

Highlights

The iSeries Integrated xSeries Adapter (IXA) solution can leverage customers' existing investment in iSeries resources and take advantage of iSeries storage architecture and systems management. The IXA also delivers the potential for cost savings and reduced complexity over the traditional model of multiple standalone servers which are networked together, but administered and operated separately.

The IXA is a PCI-based interface card that installs inside selected models of xSeries servers. Each xSeries server has its own processors, memory and IXA, but shares the iSeries' dynamic storage, tape, DVD and systems management resources. Disk storage is allocated to Windows by creating a Storage Space object (i.e. dynamic virtual disk space) from the iSeries pool of disk resources. The IXA also offers tight integration with iSeries operations, applications and data over high-speed, internal network connections. For more information on the iSeries and xSeries models that support the IXA see **Appendix A**.

This report covers the tests that were run to quantify the performance of the solution and outlines the advantages of the iSeries IXA. An IBM xSeries 235 was set up to run as an OneWorld Xe web server communicating to an iSeries enterprise server:

- as a standalone web server, and then
- as a web server attached via the IXA.

J. D. Edwards standardized testing was used to compare the results. In the two tests, the same basic hardware was used and all other variables were held constant in order to measure response time. See **Appendix B** for an overview of the test architecture and methodology as well as the hardware and software of the two test environments.

The test with the IXA solution performed 10% faster than the standalone test.

Faster performance

As shown in Table 1, the response times of users were faster by at least 10% when the xSeries was attached to the iSeries via IXA. The improvement in response time is due to the efficient storage management model of the iSeries OS/400® operating system.

Highlights					
xSeries configuration	# of users	Response Time in seconds	xSeries CPU %	iSeries CPU %	Response Time % Improvement
Standalone	300	.49	18.3	41.4	
Integrated	300	.43	19.7	41.0	12 %
Standalone	500	.84	38.0	69.0	
Integrated	500	.76	39.2	67.3	10%

Table 1. Response Time comparison between standalone xSeries and direct-attached xSeries on IXA

The CPU utilization increased slightly on the xSeries web server, indicating that the improved I/O response from the iSeries disk drives transferred the data to the xSeries' CPU faster so it could perform more work. The CPU utilization on the iSeries was reduced by a similar amount as the iSeries CPU realized more efficient communications over the high-speed internal network.

Additional benefits

In addition to better performance, the IXA solution can provide the following benefits to a customer running the J.D. Edwards suite of applications.

Besides achieving faster response times for web clients, the Integrated xSeries Solution offers disk storage flexibility.

Exceptional storage management

Instead of a typical Windows environment consisting of dedicated disk drives attached to every server and managed separately, the iSeries architecture provides shared storage to OS/400 and Windows servers. All storage for both OS/400 and Windows can be managed by the iSeries as a single RAID-5 protected disk storage pool. Local consolidation of Intel servers and storage scattered across the iSeries' disks can provide more efficient use of hardware resources. The IXA solution also leverages additional disk arms customers already have on their iSeries server for potentially increased performance. Consequently, due to the unique iSeries storage architecture, there is no

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need to be concerned with the exact physical location of the data: the data is managed dynamically, transparently and simply by the iSeries.

In the integrated test, the iSeries accommodated the IXA by scatter-loading the space requirements for the xSeries' web server, along with the OneWorld logic and OneWorld database, equally across its 19 disk drives. By comparison, in the standalone test, the xSeries web server had 2 disk drives, which is the standard recommendation for a stand-alone xSeries web server.

Additionally, with the IXA solution, after the web server is configured, a backup version can be easily created on another set of storage spaces for redundancy. Storage spaces can also be switched between xSeries servers. They can be dynamically added to Windows 2000 Servers if additional capacity is required without rebooting the server. For more information, see the Redbook, Direct Attach xSeries for the IBM eServer iSeries Server:

<http://publib-b.boulder.ibm.com/Redbooks.nsf/RedbookAbstracts/sg246222.html?Open>

The integrated xSeries solution provides a high-speed, more secure network.

High-speed, secure server communication

As shown in **Appendix B**, the IXA connects xSeries to iSeries via a physical 1 GigaByte per second (GBps) high-speed link (HSL). The web server to enterprise server communications (Windows-to-OS/400) runs over this HSL and is called Virtual Ethernet. iSeries supports up to five Virtual Ethernet connections for each attached xSeries server (new with OS/400 V5R2). Each Virtual Ethernet network connection is configured as a 1 Gbps network link; however, there are no cables, connectors, hubs, or routers which means fewer potential points of failure. The web server to enterprise server traffic is secure traveling inside the iSeries, at high speed (1 Gbps logical connection traveling over the 1 GBps HSL medium), with no potential for external traffic to cause bottlenecks.

Thus Virtual Ethernet can reduce contention on an external network and can reduce security exposures while reducing the complexity of installing and maintaining physical network connections for server-to-

Highlights

server communication. For customers presently communicating over 10/100 Mbps ethernet networks, Virtual Ethernet can offer the significant performance improvements that 1 Gigabit ethernet can deliver for server traffic without the cost and complexity of migrating the existing external physical network to 1 Gigabit.

Although the test environment in the lab was controlled and therefore did not have traffic contention on its external network, LAN congestion is always a concern for customers: thus routing web server traffic over the Virtual Ethernet on the iSeries HSL is a recommended solution.

Consolidated backup

Since the direct-attached Windows server is using iSeries disk, server backups can be consolidated. Both the Intel-based web server and the JDE™ enterprise server on iSeries are all within the iSeries' control. The backup can be centrally executed via automated OS/400 commands and easily consolidated into customers' existing backup procedures and operations, leveraging customers' existing iSeries high performance tape drives. Additional tape drives may not be needed, which can provide additional savings. Backing up the entire JDE infrastructure at one point in time enables a simpler complete point-in-time recovery.

The integrated xSeries solution provides a consolidated backup strategy as well as tremendous server flexibility.

Flexible and reliable server management

After the web server is installed on the IXA, a test version (a bit level copy of the server) can be created by duplicating storage space objects. An upgrade to Windows, or WebSphere®, or the OneWorld / ERP 8.0 web server can be easily applied and tested on this test version. During testing of an upgrade, the physical xSeries server can be easily switched between the production version and the test version via a simple reboot.

In this manner, one physical xSeries server can be used to test multiple environments, reducing the number of physical servers used to support production Intel servers and changes in applications and Windows server maintenance (Service Packs). With the IXA, the

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server hardware is completely isolated from the storage spaces on which the web server is installed. There is no physical boot drive (C:) within the xSeries. Storage virtualization means all Windows “drives” are storage spaces in the iSeries disk storage pool.

In addition, a second xSeries with IXA can be configured so that if a production Windows server fails, the web server’s storage spaces can be easily switched to this “hot spare” used for testing without restarting the iSeries server.

The IXA solution is recommended for iSeries customers who choose to have Intel-based web servers for HTML clients.

Conclusions

If a mixed server environment is desired, the iSeries IXA solution provides a highly recommended alternative for operating the entire J.D. Edwards implementation as a single infrastructure with minimum complexity.

Customers can improve their users’ response time as much as 10% when the xSeries is attached to an iSeries directly (IXA) for OneWorld web client serving.

In addition, the advanced iSeries virtual storage architecture can provide more flexibility than traditional Windows implementations and an opportunity for server and storage consolidation which should reduce cost and complexity of operations.

Additional potential benefits include:

- The high-speed Virtual Ethernet can provide more reliable and more secure communications than an external LAN and can reduce the cost of implementing 1 Gbps ethernet for server-to-server communication.
- Consolidated OS/400 and Windows 2000 Server storage and backup allows customers to more fully leverage iSeries hardware and IT support resources and skills. Redundant server operations can be minimized.

Highlights

The IXA solution offers an iSeries customer a powerful advantage.

- The capability of multiple IXA installations and multiple copies of the Windows 2000 Server environment offers tremendous server flexibility for testing and redundancy.

For iSeries customers who choose to run their J.D. Edwards environment on mixed server platforms, the iSeries Integrated xSeries Adapter solution provides a powerful and flexible alternative to standalone Intel servers.

Highlights

Appendix A: iSeries and xSeries servers that support IXA

This powerful combination can integrate an iSeries server with up to 60 (depending upon iSeries model) direct-attached xSeries servers with one to eight processors. Each 8-way direct-attached xSeries can support up to 2000 OneWorld web clients, for example. Each xSeries server has its own processors, memory and Integrated xSeries Adapter (IXA), and shares iSeries' disk, tape, DVD, and system management resources.

The iSeries servers can support multiple IXA installations. Supported xSeries server models range from 1-ways to 8-ways.

The IXA has been designed to interface with the Service Processor in these selected xSeries n-way servers. In addition, IBM has made enhancements to these servers to support the power management requirements of the IXA. As a result, the IXA is not supported on OEM servers. Click on the following website to see the current xSeries models that support the IXA:

www.ibm.com/eserver/series/windowsintegration/xseriesmodels

The current iSeries models and the maximum number of IXAs they support are listed in Table 2.

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

Table 2. The current iSeries models and maximum IXAs supported

Highlights

Appendix B: Test architecture and methodology

These tests compared response times of J.D. Edwards web clients with the web server software running on an xSeries as a standalone web server vs. the xSeries directly attached to the iSeries (integrated). (OneWorld Xe code was used because ERP8.0 was not yet available). Launched by Mercury LoadRunner testing software, this standardized test scenario for web clients consisted of seventeen J.D. Edwards-provided scripts to simulate tasks for three types of users: Financials, Manufacturing, and Distribution. See Table 3 for a list of the applications that the scripts include.

The IXA solution is evaluated using JDE-supplied scripts and standardized testing software.

17 JDE scripts:		
Distribution:	Financial :	Manufacturing:
Inventory Adjustments	Standard Receipts Entry	Work Order Entry
Summary Availability	Standard Voucher Entry	Single Level BOM Inquiry
Confirm Shipments	Supplier Ledger Inquiry	Inventory Issues
Customer Service Inquiry	Journal Entry	Work Order Partial Completions
Purchase Order Entry	Trial Balance/Ledger Comparison	Supply/Demand Inquiry
Sales Order Entry		
Open Receipt Inquiry		

Table 3. J.D. Edwards' 17 standard scripts

Highlights

First the xSeries was configured to run as a standalone web server with WebSphere and HTTP software loaded on its own disk drives. Figure 1 depicts the standalone configuration.

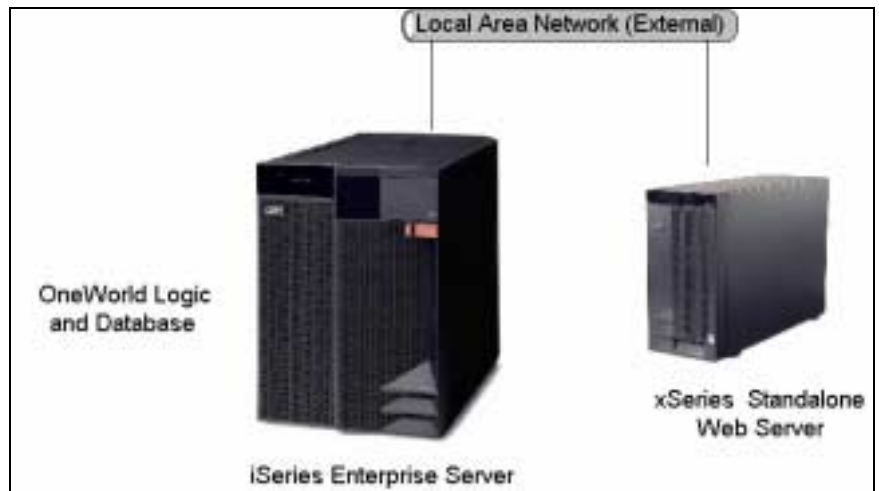


Figure 1. Standalone Test environment

The xSeries in a standalone configuration running OneWorld's web server with iSeries as enterprise server is shown.

A diskless xSeries 235 was then directly attached to the iSeries via the Integrated xSeries Adapter (IXA) and HSL. The IXA is a PCI-based interface card that installs inside selected models of xSeries servers. Windows 2000 Server was loaded from a CD via an OS/400 command on allocated storage spaces on iSeries disks. WebSphere and HTTP were next loaded on the storage spaces to run under Windows 2000 Server. A Virtual Ethernet connection using the iSeries' high speed link (HSL) over the internal bus was used. See Figure 2 for a schematic of the direct-attached xSeries to iSeries architecture.

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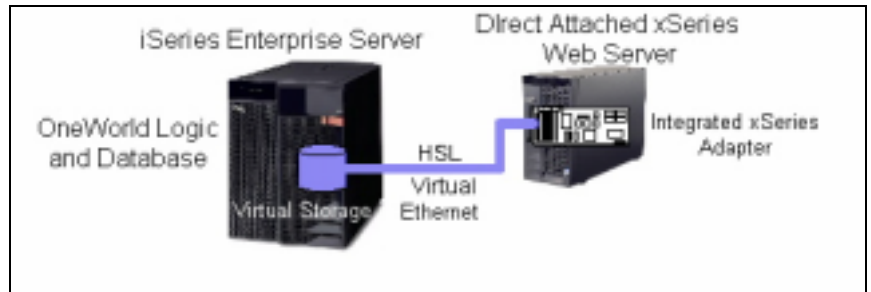


Figure 2. IXA Test environment

This configuration has OneWorld's web server running on an IXA with iSeries as enterprise server.

The tests were designed to hold all other variables equal in order to measure response time. In fact, CPU, memory and the network did remain comparable for the 2 sets of tests:

- The net effect of CPU utilization was consistent as the slight increase in web server CPU percentages was offset by the decrease in the enterprise server's CPU percentages. (See Table 1.)
- Similarly, the amount of memory used for WebSphere on the xSeries was around 800 MB, while the faulting rate on iSeries remained acceptably low at 30 or fewer non-database faults per second. Database faulting rates were in the single digits.
- The average LAN I/O remained consistent. Although the bandwidth of the external network was intentionally left unconstrained for the test scenario, an increased improvement in response time would be predicted with the integrated solution if the external LAN were congested.

Highlights

The hardware models used in the tests and their specifications are shown in Tables 4 and 5.

The two configurations for performance testing used the same basic iSeries and xSeries hardware.

	Web Server	Enterprise Server
System	IBM xSeries 235 2-way	IBM iSeries 270 2-way (Model 2434)
Memory	6 GB	12 GB
Disk	33 GB usable disk (RAID-1), 2 arms	263 GB usable disk (RAID-5), 19 arms
Network	One 1 Gbps ethernet adapter	One 100 Mbps ethernet adapter

Table 4. Hardware for standalone web server solution

	Web Server	Enterprise Server
System	IBM xSeries 235 2-way	IBM iSeries 270 2-way (Model 2434)
Memory	6 GB	12 GB
Disk	263 GB usable disk (RAID-5), 19 arms, with 20 GB of disk carved out for storage spaces for the integrated xSeries server	
Network	One 1 Gbps Virtual internal Ethernet adapter point-to-point on the IXA	

Table 5. Hardware for integrated web server solution with IXA card

The level of software used in the tests is shown in Table 6.

iSeries:	OneWorld Xe SP20 enterprise and database
	OS/400 V5R2 and DB2®/400 (5722-SS1)
	Integration for Windows Server (5722-WSV)
xSeries:	Windows 2000 Server
	WebSphere 4.0
	OneWorld Xe SP20 Java™ server
	IBM HTTP Server
Mercury LoadRunner 7.5	Test software to drive simulated users to create workload

Table 6. IBM and JDE software details

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For brochures on the IBM Integrated xSeries Adapter or additional information please visit <http://www.ibm.com/windowsintegration>

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