



IBM eServerJ iSeriesJ

GP03 Technical Overview - Part 2 The Next Generation iSeries... Simplicity in an On Demand World

January 2003 Announcements

ITSO iSeries Technical Forum

Enterprise IT management Made Simple

OS/400 V5R2 Highlights

- Performance at your fingertips
 - ▶ Flexible Capacity Upgrade on Demand i825, i870 and i890
 - ▶ Dynamic logical partitioning for award-winning 64-bit Linux⁷
 - ▶ Intuitive iSeries Navigator workload management tools
- Adaptive storage virtualization for high availability
 - ▶ Mainframe-class functionality with switched disk cluster management
 - ▶ Self-optimizing, multiple IBM DB2⁷ UDB images for business unit consolidation
 - ▶ Extensive Windows server management now supports Microsoft⁷ Cluster Service
- Flexible, secure management of e-business infrastructure
 - ▶ Industry's first IBM Autonomous Computing Initiative inspired Enterprise Identity Mapping facilitates true single signon
 - ▶ High performance Apache Web serving with secure sockets and caching accelerators
 - ▶ Simple and pervasive operations with wireless-optimized Web-ready micro-drivers

Notes: Enterprise IT Management Made Simple

OS/400 V5R2 builds on the mainframe-class management functions of OS/400 V5R1, such as dynamic logical partitioning with built-in graphical management tools such as iSeries Navigator. OS/400 V5R2 continues to focus on enterprise-class management tools with new self-managing technologies from IBM's Autonomic Computing project.

V5R2 also extends many of the virtualization technologies available on the iSeries, to further assist clustering and business continuity solutions. For example, switched disk cluster services are extended with V5R2 to support database objects. OS/400 V5R2 is also a significant database release with IBM DB2 UDB enhancements to further support open standards and with much greater compatibility with other IBM DB2 UDB platforms.

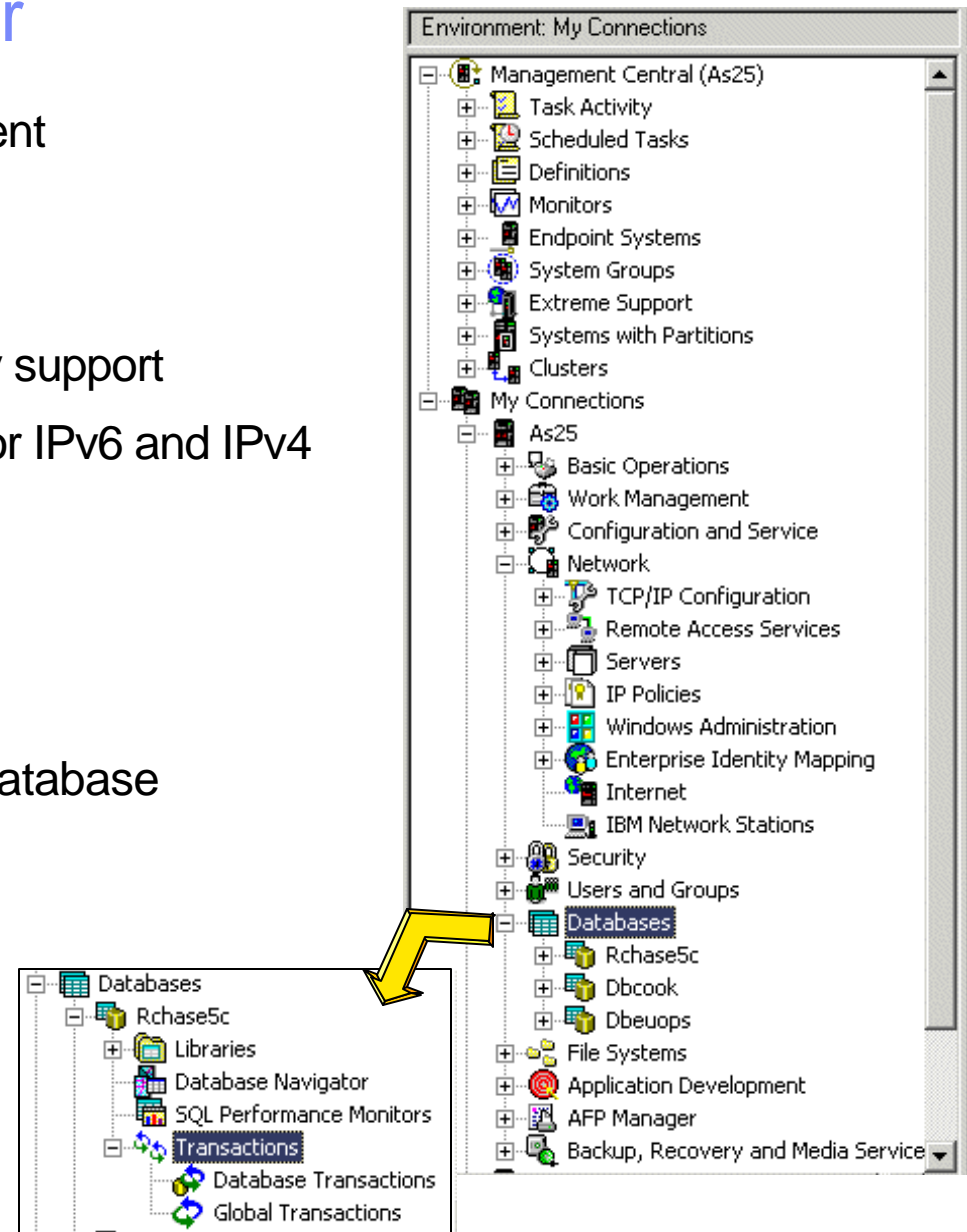
iSeries also extends its infrastructure for e-business applications with a range of performance and security enhancements for its WebSphere and Apache implementations, plus prepares for the wireless web revolution with new micro-edition drivers to enable applications from cell phones and PDAs.

Agenda

- Performance at Your Fingertips
 - Adaptive Storage Virtualization for High Availability
 - Flexible, secure Management of e-business Infrastructure

OS/400 V5R2 iSeries Navigator

- Extensive automation for workload management
 - ▶ New file and B2B transaction monitors
 - ▶ Systems and storage management
 - ▶ Additional BRMS backup and media policy support
 - ▶ Network management, including support for IPv6 and IPv4
- Extended IBM DB2 UDB support
 - ▶ Multiple databases
 - ▶ Transaction management
 - ▶ Improved ease of use for Run SQL and Database Navigator
- Switched disk cluster management
Linux dynamic partition management
Enterprise Identity Mapping security
Additional BRMS functions,
more



Notes: OS/400 V5R2 iSeries Navigator - 1 -

iSeries Navigator, the new V5R2 name for iSeries Operations Navigator of previous releases, provides extensive graphical user interfaces for managing and administering an iSeries server from a Windows desktop. iSeries Navigator's simple approach to managing complex operations tasks across multiple servers and operating systems helps customers reduce their cost of operations. It utilizes extensive self-guided graphical wizards to simplify management and configuration of a variety of tasks including security, logical partitioning, TCP/IP services, performance monitoring, applications, and more. For example, you can collect and manage inventory of hardware configuration information, software and fixes, system values and user and group profiles.

New with V5R2, inventory support also collects service attributes, contact information, and network attributes. This V5R2 information is included in the inventory information transmitted to IBM when you use the IBM Electronic Service Agent for iSeries function, already available with V5R1. Service Agent electronically sends this system information to IBM to be used as input to problem analysis and problem prevention functions. For more Service Agent information see website http://publib.boulder.ibm.com/as400_sd/sdsadoc.html

V5R2 takes another significant step towards reducing the requirement to access a 5250 terminal for day-to-day operational tasks, including the need to access Dedicated Service Tools (DST) and System Server Tools (SST) interfaces to assist with managing of disk storage and logical partitioning.

Some of the highlights for V5R2 include the new B2B transaction for monitor B2B transactions generated by applications such as Connect for iSeries or an e-marketplace. File monitors are designed to monitor updates to the file size, or a specific character string for byte stream files. As with the already available System, Job, and Message monitors, these new monitors provide the capability to run commands automatically when certain thresholds are triggered. Actually, B2B monitors are supported in V5R1 Operations Navigator with the February 2000 service pack SI02795.

For Run SQL Scripts you get the new SQL Assist support that provides advanced prompting for building your SQL statement, including table and columns within a table selection. This is similar to but more advanced than the 5250 STRSQL prompt support.

V5R1 introduced the Database Navigator support to graphically represent the relationships between database objects (table and views, tables and indexes, and more). In V5R2 there is new support to include Triggers and easier navigation in showing only the objects you want to see on the window. Selecting a new index to create under the Visual Explain functions is easier to do than in V5R1.

Notes: OS/400 V5R2 iSeries Navigator - 2 -

The Network component TCP/IP Configuration folder enables you configure and manage IP networks using IP version 4 (IPv4) capabilities as in previous releases as well as supporting, with V5R2, the newer IPv6 capabilities. Since most networks remain based on IPv4, this support enables the same iSeries server to connect to these networks as well as any network using IPv6. Current technology generally requires that IPv4 network routes be separate from IPv6 routes.

iSeries Navigator supports defining an Independent Auxiliary Storage Pool (IASP) to contain "library type" objects (database tables, programs and so forth with V5R2. You can continue to use a switchable IASP for system availability as delivered with V5R1 but with the enhanced support for many key QSYS.LIB objects. V5R2 switched disk cluster management adds the capability to switch among 4 nodes.

Starting with V5R2 you can also use a "non-switchable IASP" to contain "name space." a QSYS.LIB "database", or in SQL terminology, a database schema. With this support you can load each IASP with its own database schema to achieve multiple databases on a single system.

Multiple databases on a single system offers another tool to assist you with a "server consolidation" environment where a single instance of an application can access different databases with minimal or no applications changes by keeping the same object names in each database - IASP (not the system ASP). Note that in the example figure shown. Rchase5c is the normal (local) database, which includes all system APS libraries. Each of the other two databases are defined in an Independent Auxiliary Storage Pool. To see these databases, they must have been explicitly been "made available" (varied on).

More details on database-oriented enhancements for V5R2 are discussed later in this presentation.

Tasks that would normally take several commands, and an understanding of each and every parameter have been simplified further with more self-configuring graphical wizards. Examples include creating and managing Linux logical partitioning and enabling Enterprise Identify Mapping.

Notes: OS/400 V5R2 iSeries Navigator - 3 -

Applications such as Backup Recovery and Media Services for iSeries (BRMS/400) contain extensive self-guided wizards to assist with the set up and management of backup and media management policies. Many BRMS functions could be included as a plug in with V5R1. Many more BRMS functions are included as an iSeries Navigator plug-in with V5R2.

iSeries Navigator with BRMS as a plug-in integration enhancements in V5R2, include:

- Save System
 - New delay function for restricted save in System Policy
 - **Function of iSeries Navigator only**
- Native save/restore
- Movement
 - Move Policy Wizard
 - Perform Movement
 - Verify Movement
- Lotus Server Point in Time Recovery
 - **Available through iSeries Navigator only**
- Backup Policy
 - Tape Library Support
 - Subsystem and Job Queues added
 - Parallel, TSM servers, Save files, Save-While-Active (SWA), and Independent ASPs added
- List Management
 - Create and update of backup lists

Notes: OS/400 V5R2 iSeries Navigator - 4 -

Some additional V5R2 iSeries Navigator enhancements, not shown on the foils include:

Work Management: Core work management function support is now provided in iSeries Navigator. While not all work management functions are supported V5R2 provides the support needed for a typical system operator to control and manage the work on the system. In V5R2 you now have sub folders for Active Jobs, Subsystems, Server Jobs, Job Queues, Memory Pools, and Output Queues. For output queues you can see the files, manage the files on the queue including hold and release, and see writer information for any write- output queue assignment. You can drag files from one output queue to another.

The context menu for the Work Management folder now has a System Status function, similar to the 5250 Work with System Status (WRKSYSSTS) command capabilities already available.

You can also see threads for a specific job.

Quality of Service (QoS) adds LDAP server support: QoS allows you to request network priority and bandwidth for TCP/IP applications. Packet priority is important to you if you send applications that need predictable and reliable results, such as multimedia. You can use the New Quality of Service Configuration wizard to begin policy configuration. This wizard asks you to define some startup instructions for the different QoS parameters. The new QoS and LDAP integration may require use of a wizard to migrate QoS defined prior to V5R2.

Packet Rules and VPN can be viewed, edited and disabled with a text editor: A virtual private network (VPN) allows your company to securely extend its private intranet over the existing framework of a public network, such as the Internet. The New Connection wizard helps you to easily create a virtual private network (VPN) for your organization. Answer the questions on each of the dialogs, and the wizard will create a VPN based on your specifications. You can edit packet rules file with a text editor and have the ability to disable filter rules and to view rules from different servers at the same time.

Notes: OS/400 V5R2 iSeries Navigator - 5 -

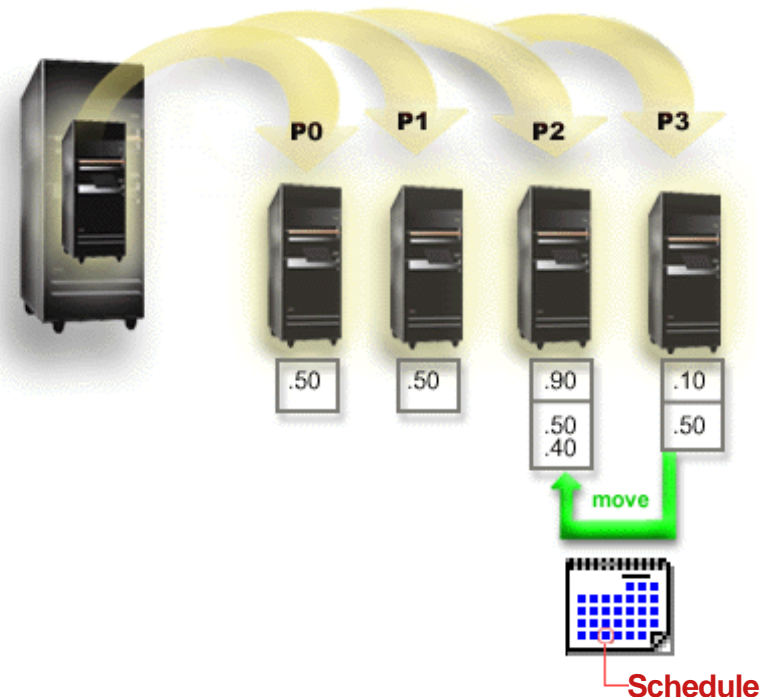
Software Management: The support for fixes inventory has been enhanced. You can select and deselect individual missing fixes and can choose to do a compare and update or only an update with the Compare and Update wizard. This enhancement allows you to update the target system directly from the model system without viewing the compare results. You can specify whether to collect fixes only when changes have occurred to the fixes data or to collect fixes even when no changes have occurred since the last collection.

Windows Administration: There is additional install and uninstall assistance for Windows OS fixes. A Windows Cluster Server can be managed as other Windows servers. Windows Cluster configured and fully managed from the Windows OS. Network Server Storage objects and Network Storage Server Description objects support parameters necessary for Windows Clustering. Full configuration and management is performed by the Windows Cluster management support.

Starting with V5R2 you can also run a windows command on one of the managed Windows servers.

Mainframe Class Logical Partitioning

- V5R2 provides additional LPAR management with iSeries Navigator
 - ▶ Sophisticated, Windows-based graphical management tool
 - ▶ Multi-partition (up to 32) management
 - ▶ Up to 10 partitions per processor, depending on the iSeries model
- Reduce costs via mixed workload consolidation and IT resource optimization
 - ▶ 44% of i840 customers exploiting LPAR
- Sub-capacity pricing on n-way servers
 - ▶ WebSphere™ Commerce Suite
 - ▶ WebSphere™ Application Server



Notes: Mainframe Class Logical Partitioning

OS/400 V5R1 was a breakthrough release for iSeries logical partitioning (LPAR) with the introduction of dynamic movement of processor and other I/O resources, plus the ability to create partitions of less than one processor unit. Since the introduction of LPAR, over 44% of i840 customers have exploited this mainframe-class technology and since V5R1 partitioning usage has soared on i820 uni-processor servers. The exceptional granularity of being able to move 100th of a processing unit between partitions is another example of how the iSeries continues to exploit the concept of resource virtualization - for memory, disk storage, or processors.

OS/400 V5R2 extends dynamic partitioning to Linux with the ability to move processing units between OS/400 and Linux partitions or between multiple Linux partitions. It also includes support to create and manage Linux partitions through iSeries Navigator.

V5R2 now supports up to 4 or 10 OS/400 partitions (see the next foil for more details) per processor with a total of up to 10 partitions per processor. That is, a single processors can support up to 10 Linux partitions. You can use combinations of OS/400 and Linux partitions per processors. 10 times the number of processors, minus the number of OS/400 partitions, equal the number of Linux partitions allowed. Maximum of 32 partitions on a system, with up to 31 Linux partitions.

OS/400 V5R2 also allows customers better manage their partition configuration data with new support to save partition configuration data into an HTML file for storage with other business continuity information.

A key enhancement to the flexibility of LPAR is the new sub-capacity pricing for WebSphere Commerce Suite, and WebSphere Application Server. Previously, WebSphere Application Server was priced per processor, so that on a 32-way machine, you would pay 32 times the charge for a uni-processor. Now, with sub-capacity pricing, you just pay for the number of processors that you are using in partitions running WebSphere (rounded up to the next full processor where you are using partial processor partitioning).

For example, if a 4-way i825 has WebSphere Advanced Application Server running in two partitions sized at 0.9 processor units and 0.8 processing units respectively, the total number of processing units allocated will be 1.7. Customers would require a license for 2 processors and will have the flexibility of moving resources between two WebSphere partitions as long as it does not exceed a total of 2 full processors.

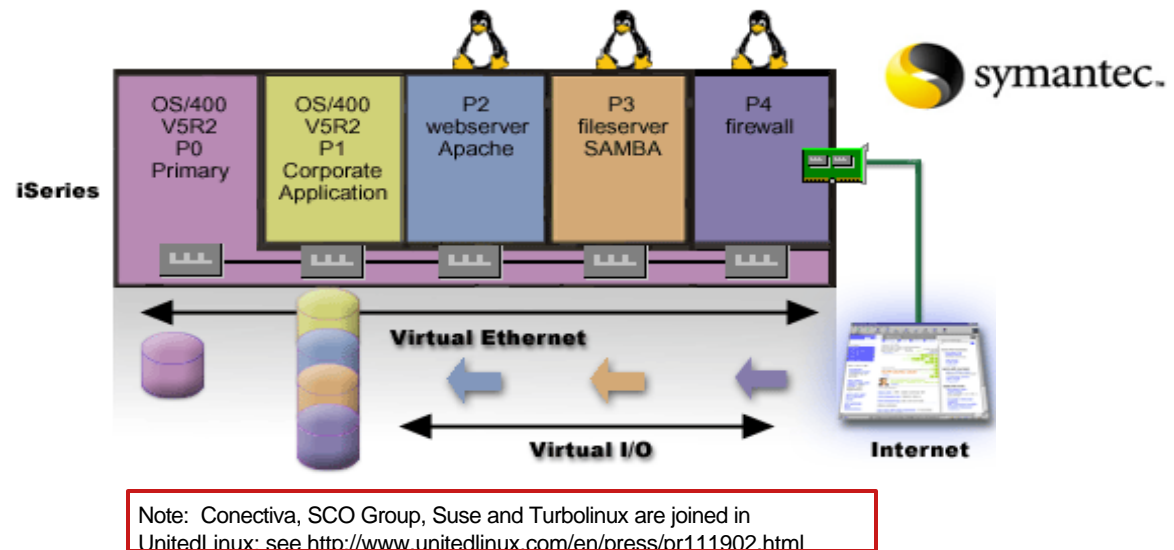
This more flexible approach to pricing clearly benefits customers who want to deploy WebSphere workloads on a large consolidated iSeries system where only fewer number of processors are required to meet their web transaction serving requirements. A future release of WebSphere Application Server (after version 4) will monitor number of processors usage compared to license agreement and issue message.

Logical Partitioning for the new iSeries Servers

iSeries	Max # of Processors	Processor Sharing	OS/400 Partitions per Processor	Linux Partitions per Processor	Max # of OS/400 Partitions per Server	Max # of Linux Partitions per Server	Max # of Partitions per Server
800	1	Y	4	9	4	9	10
i810	2	Y	4	10	8	19	20
i825	6	Y	10	10	32	31	32
i870	16	Y	10	10	32	31	32
i890	32	Y	10	10	32	31	32

Server Consolidation with Linux

- Dynamic virtual processor allocation for Linux partitions - up to 32 Linux partitions
- Shared, read only disks for Linux
- iSeries Linux now supports 64-bit kernel
- JDBC, ODBC drivers for Linux to OS/400 database access
- Symantec Enterprise Firewall planned for iSeries
- IBM DB2 Universal Database and WebSphere Application Server*



*Statement of Direction: This presentation contains IBM plans and directions. Such plans are subject to change without notice.

Notes: Server Consolidation with Linux

Earlier in this presentation we listed the expanded list of I/O devices added to direct I/O support for a Linux partition.. This foils lists other V5R2 enhancements for Linux. Our award-winning Linux implementation is enhanced to support dynamic allocation of virtual processor units between OS/400 and Linux partitions. This allows customers to get started with a small Linux partition, then dynamically add the capacity when needed, without restarting the Linux server or applications.

With OS/400 V5R1, iSeries Linux partitions already have exceptional support for accessing virtual disks in OS/400 partitions, or accessing their own directly attached I/O devices. OS/400 V5R2 also provides support for shared read-only virtual disks, so that multiple Linux partitions can share access to the same application or data, without having multiple copies on separate disks. In addition, Linux distributions for iSeries have been enhanced with additional direct I/O support for fiber channel and multiport serial device drivers.

A range of new options are provided for Linux application developers, including Linux library support for 64-bit Linux applications. Building on the JDBC connectivity that already provides Linux applications access to iSeries data and applications, ODBC connectivity is now supported to IBM DB2 UDB for iSeries. Linux SAMBA file system access is now available to Integrated File System and output queues via iSeries Windows Network Neighborhood (iSeries NetServer). iSeries Linux implementations also now support IBM Java 1.3.1.

Additionally, to promote the growth of business applications on Linux partitions, IBM has issued a statement of direction to support WebSphere Application Server and IBM DB2 UDB on PowerPC Linux implementations. Providing these key middleware products will both provide a base for robust business solutions on Linux and allow applications on Linux and OS/400 to better interoperate. Ultra-high speed connectivity across iSeries internal virtual Ethernet LAN already provides the connectivity fabric required for application connectivity.

In another example of how Linux ISVs are moving to support iSeries, Symantec Corporation recently announced their plans to deliver an enterprise-level, full application inspection proxy firewall for the iSeries' Linux offerings in late 2002. This will allow customers to run a secure firewall alongside their OS/400 and WebSphere applications. For information, please visit the following Web sites:

- Press release: <http://www.symantec.com/press/2002/n020415.html>
- Symantec's beta program for iSeries Linux offering: <http://www.symantec.com/calendar/ibmseries/>

Direct Attachments for LINUX with V5R2

- #2766 fiber channel disk controller #0612
- Two line WAN adapters #4745 and #2742
 - ▶ #0608 for #4745 / #0613 for #2742
- #2849 10/100 Mbps Ethernet adapter #0623
- Four line WAN modem adapters #2805 and #2806
 - ▶ #0616 for #2805 / #0617 for #2806
- Two line WAN with modem adapters #2793 and #2794
 - ▶ #0614 for 2793 / #0615 for 2794
- Two line WAN modem adapters #2772 and #2773
 - ▶ #0609 for #2772 / #0610 for #2773
- DASD adapters
 - ▶ #0618 for #2757 / #0619 for #2782 Disk Controllers
- #0624 for #5702 external tape and optical device adapter



Note: i825, i870, i890 Power4 Technology require 64-bit Linux kernels

Already existing Linux partition direct attach I/O features:

- 0607, 0601, 0602 100/10 Mbps Ethernet, and 1 Gbps Ethernet adapter
- 0603 100/10 Mbps Token Ring adapter
- 0604, 0605, 0606 disk adapters

Notes: Direct Attachments for LINUX

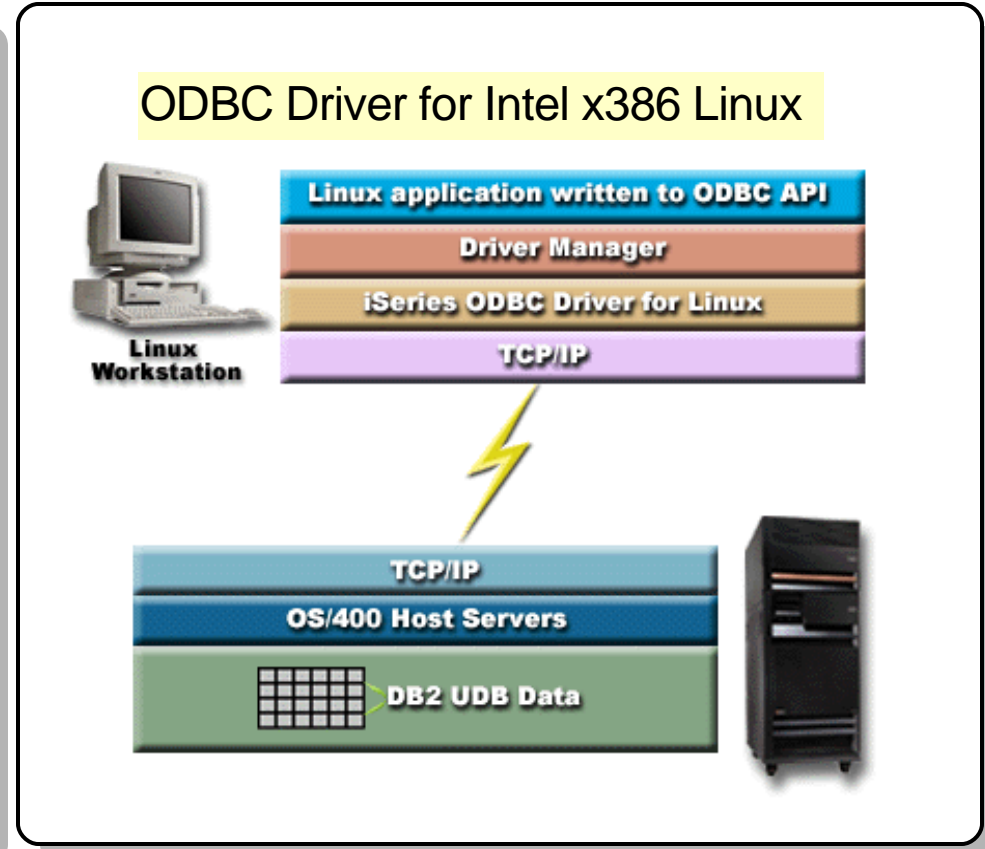
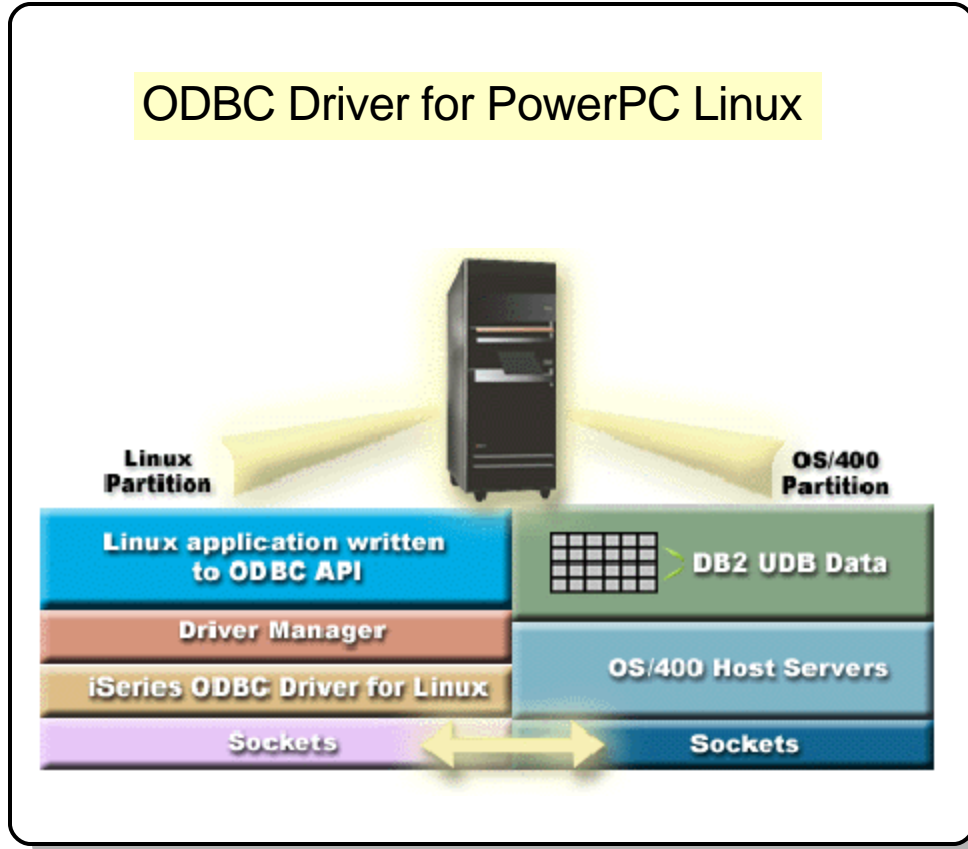
A number of new direct attachment features for Linux are available with V5R2. Cards being controlled by the Linux operating system do not use/require PCI IOPs. Linux direct attach PCI cards are supported only in a secondary LPAR partition. The existing direct attachments for Linux with V5R1 were limited to features #0607, #0601 and #0602 100/10Mbps Ethernet and 1 Gb Ethernet adapters, #0603 100/10Mbps Token Ring adapter and the #0604, #0605 and #0606 Disk adapters. The addition of the direct attachment features mentioned in this foil largely extend the possibilities to directly address a much wider set of device attachments directly from the Linux environment on the iSeries server.

The red hardware features are newly announced as of January 2003.

ODBC Drivers for Linux

Extending the Reach to iSeries Data

- ODBC provides access from Linux to DB2 UDB for iSeries
 - ▶ ODBC 3.5 ANSI
 - ▶ Unicode support



Notes: ODBC Drivers for Linux

The iSeries ODBC Driver for Linux allows you to access iSeries database data from a Linux application written to the ODBC API. It is based on the ODBC driver in the Client Access Express for Windows product. As in that driver, the Linux ODBC driver uses the iSeries database Host Servers as the access point to the system, using a socket connection. The iSeries ODBC Driver for Linux is an ODBC 3.5 ANSI driver with the ability to store and process Unicode data. Two versions of the driver exist:

- for Linux running in an iSeries LPAR.
- for Intel-based Linux workstations.

The iSeries ODBC Driver for Linux is a no charge iSeries licensed program -- 5733-LO1 and is available only as a web download at <http://www.unitedlinux.com/en/press/pr111902.html>

Download the iSeries ODBC Driver for Linux RPM module for your type of client:

- If you are using an Intel PC, download iSeriesODBC-5.1.0-0.xx.i386.rpm.
- If you are using an iSeries server logical partition (LPAR) or Power PC, download iSeriesODBC-5.1.0-0.xx.ppc.rpm.

OS/400 requirements for running iSeries ODBC Driver for Linux

The following server requirements must be met to use the iSeries ODBC Driver for Linux to access database data on an iSeries server.

- The driver is supported only when connecting to servers running OS/400 Version 4 Release 5 or above. The driver may work to earlier releases of OS/400, but is supported only on V4R5 and above.
- The QUSER user profile must be enabled.
- The host servers must be started.
- TCP/IP must be running.

Linux requirements for running iSeries ODBC Driver for Linux

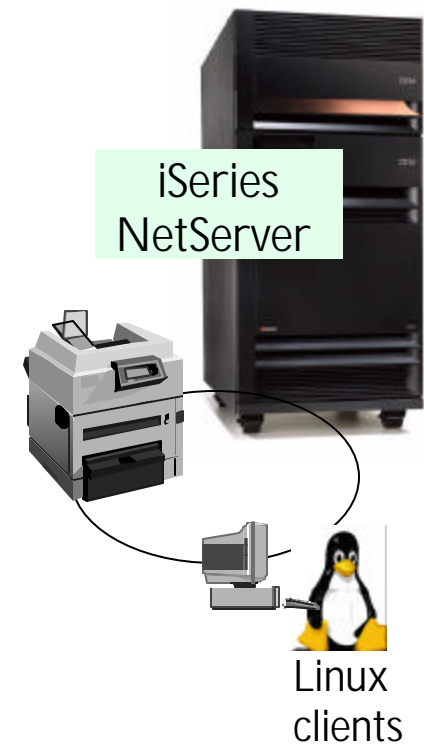
The following client requirements must be met to use the iSeries ODBC Driver for Linux to access database data on an iSeries server.

- Beta versions of the iSeries ODBC Driver for Linux must be removed
- The client must be running one of the following versions of Linux:
 - RedHat for Intel version 7.x
 - RedHat for iSeries version 7.x
 - SuSe for Intel version 7.x
 - SuSe for iSeries version 7.x
 - TurboLinux for Intel version 7.x
 - TurboLinux for iSeries version 7.x
- UNIX ODBC driver manager version 2.0.11 or greater must be installed on the client. Go to the UNIX ODBC Project web site (<http://www.unixodbc.org/>) for more information on the driver manager, and to download the latest level of the driver manager.

Note: if you recompile the UNIX ODBC driver manager, the `./configure --prefix` default is `/usr/local`. If you use this default, you may need to update your shared library (`/etc/ld.so.conf`) and executable paths to include it.

iSeries NetServer Supports Linux Clients

- OS/400 Support for Windows Network Neighborhood (iSeries NetServer) is expanded to support Linux clients
 - ▶ iSeries NetServer support of Linux (clients) provides the same file and print sharing function as the existing iSeries NetServer
 - ▶ Linux clients (with kernel Version 2.4.3 and higher) with SAMBA (Version 2.0.7 and 2.2) can access the iSeries NetServer functions
 - ▶ This function was available for OS/400 as a V5R1 PTF in 4Q01 and built into V5R2
- For additional information, see:
 - ▶ <http://www.ibm.com/eserver/series/netserver>



Notes: iSeries NetServer Supports Linux Clients

Beginning with OS/400 V5R2, iSeries NetServer has integrated support for the Samba client running on Linux. The support extends to Linux running on both Intel and PowerPC (running on an iSeries partition) architecture. The support is also available in V5R1 with a set of add-function PTFs.

The new support has been released as a set of V5R1 PTFs that were generally available as of November 30, 2001. One PTF is delayed, so it is recommended that all the PTFs are applied together, delayed. The PTFs are:

- SLIC MF27247 - General
- SLIC MF27248 - File
- SLIC MF27249 - Print
- SLIC MF27294 - Locking
- SLIC MF27295 - Security

This support allows a Linux client running Samba to connect to iSeries Support for Windows Network Neighborhood (iSeries NetServer) through the SMB client and submount client utilities. ASCII printing (text, PDF, postscript) is supported through the SMB client utility.

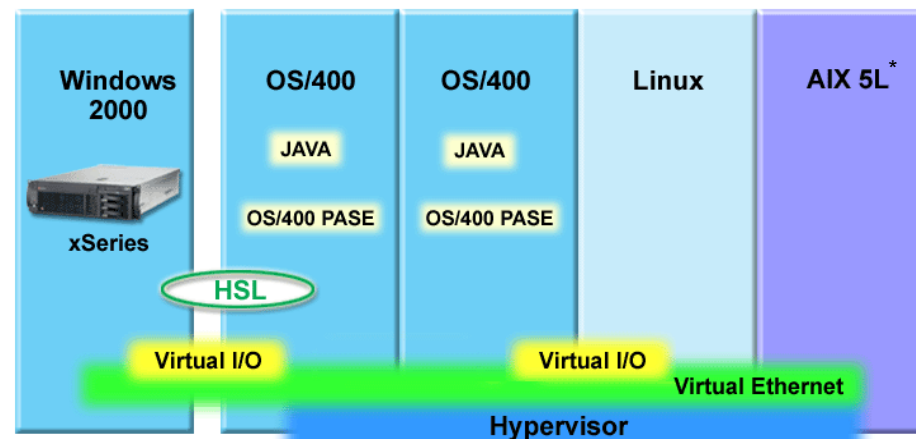
Requirements

- Linux kernel version 2.4.4+
- Samba versions 2.0.7 or 2.2+
- Tested Distributions: Turbolinux, SuSE, and Red Hat

Samba is an Open Source client and file server compatible with Microsoft Networking, that comes with many current distributions of Linux. For more information on Samba, Samba commands, or to download the latest version, see <http://www.samba.org>.

Enterprise IT Management Made Simple

- Lowering e-Infrastructure management costs across multiple environments
- V5R2 OS/400 PASE now provides integrated runtime for AIX(tm) 5L applications, and:
 - ▶ IBM VisualAge C++ Professional for AIX V6 (5765-F56) and IBM C for AIX V6 (5765-F57) compilers can be installed and used in OS/400 PASE*: significantly minimizes need to compile OS/400 PASE applications on a separate AIX system
 - ▶ OS/400 PASE programs can now launch the iSeries-integrated JVM. Also, the iSeries integrated JVM supports native methods implemented as procedures in an OS/400 PASE executable.
- IBM's autonomic computing initiative will extend to future management of AIX 5L in iSeries partitions**



*V5R2 PASE is no-charge, no order required option

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Notes: Enterprise IT Management Made Simple

There are clear challenges associated with managing multiple hardware and software infrastructures in today's complex e-business environment leave many customers striving to achieve cost efficiencies. In doing so, they also want better application integration and more common application and management tools to leverage their investment in skills and support personnel across the organization.

Today, iSeries provides arguably one of the industry's most flexible server platform, with options to consolidate multiple applications and operating system environments, from OS/400, Linux and Windows operating systems, to WebSphere Application Server, Domino and UNIX applications, through OS/400 Portable Application Solution Environment (OS/400 PASE).

OS/400 PASE is enhanced with OS/400 V5R2 natively to support the AIX 5L V5.1 application environment, with support for both 32 and 64-bit applications. OS/400 PASE now provides both a runtime and an application development environment for compiling applications. IBM VisualAge C++ Professional for AIX V6 (5765-F56) and IBM C for AIX V6 (5765-F57) compilers can be installed and used in OS/400 PASE. This "virtually" eliminates the need to compile OS/400 PASE applications on a separate AIX system .

Programs in OS/400 PASE can now launch the iSeries integrated Java Virtual Machine (JVM). Also, the iSeries integrated JVM supports native methods implemented as procedures in an OS/400 PASE executable. It's easier to port AIX applications that use a combination of Java and C/C++ code to OS/400 PASE.

Additionally, OS/400 PASE (OS/400 option 33) is now packaged as a no additional charge feature of OS/400, enabling use of OS/400 PASE by operating system functions, ISV applications or other IBM software such as the new Tivoli Storage Manager.

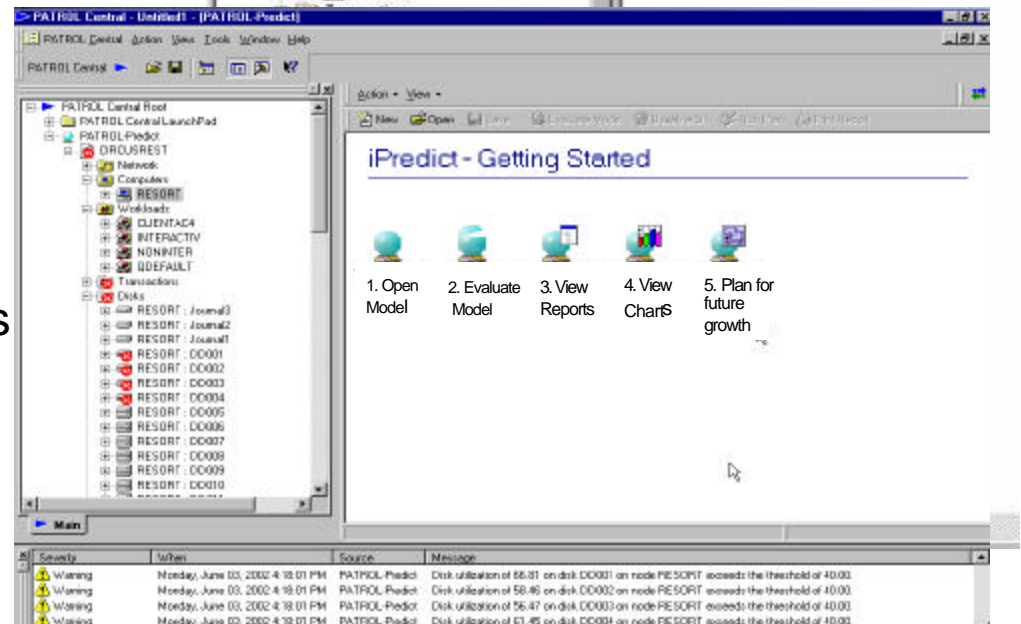
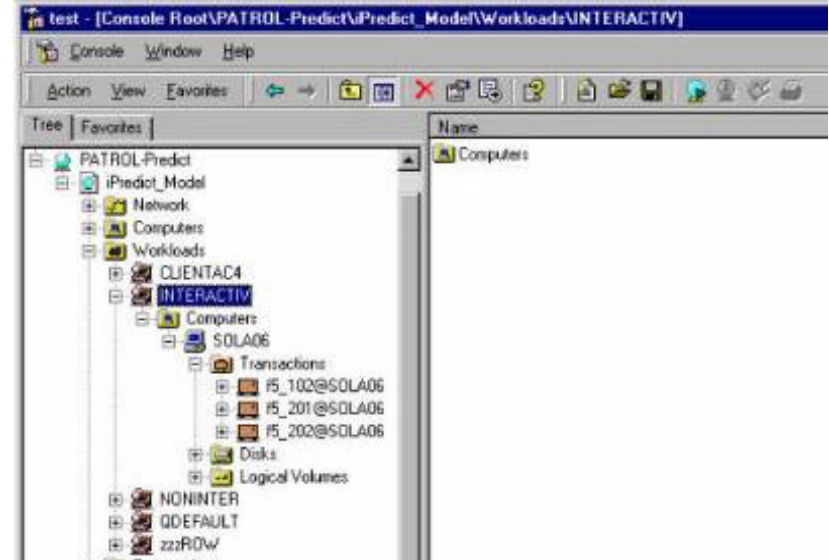
OS/400 PASE also includes Linux library support based on AIX 5L.

With the Statement of Direction* to support AIX in a logical partition in the future, the iSeries continues to open further consolidation opportunities for customers who want to deploy UNIX solutions in a single infrastructure server alongside OS/400 and iSeries other application environments. Customers will also benefit from the ongoing Autonomic Computing initiative, designed to common, self-managed technologies across IBM across products.

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BMC PATROL for iSeries - Predict

- PATROL - Predict* provides powerful graphical analysis tool for Capacity Planning
- Uses OS/400 performance data (QAPMccc files)
 - ▶ V4R2 or later
- Runs on V4R4 or later
- Comprehensive graphical analysis, "what-if" modeling
- Two "components:"
 - ▶ Analyze: Create model runs on iSeries
 - ▶ Predict: Capacity planning on PC workstation



Notes: BMC Patrol for iSeries - Predict

With V5R1 and previous releases, Performance Tools for iSeries, 5722-PT1, included display and printed reports of collected performance data, management of that data as database files, plus the BEST/1 capacity planning tool. BEST/1 is not supported in V5R2.

BMC Patrol for iSeries - Predict is an alternative tool for doing capacity planning for iSeries that becomes available during the last half of 2002. The "create model" component runs on iSeries under OS/400 V5R1 or V5R2. Patrol for iSeries - Predict is a separately priced product produced and support by BMC Software, Inc. Patrol for iSeries - Predict functions and user interface are based upon corresponding Predict for UNIX and NT operating systems products from BMC Software, Inc..

Collection Services used for collecting performance data, used by PM/400 and Performance Tools for iSeries, is part of OS/400, and enabled through iSeries Navigator. Customers will continue to use the existing Performance Tools for iSeries licensed program product (5722-PT1) to analyze or print performance reports.

IBM's web based tool, Workload Estimator, or BEST/1 running on V5R1 can be used for new workloads such as Domino or WebSphere or to evaluate upgrades on i270, i820, i830, and the i840 servers. Workload Estimator is has been updated with 890 support. It includes recommendations for incremental processor capacity enabling customers to take advantage of the Capacity Upgrade on Demand options on iSeries.

In screen captures on the right, you can see:

In the upper window, an example of the PC workstation component's navigation tree structure. Looking closely you can see:

- Components (folders) on a Predict model created on the iSeries that is worked with on the PC workstation. You can see the "default workloads" - CLIENTAC4 and INTERACTIV (5250 workstation jobs), NONINTER and QDEFAULT that correspond to equivalent BEST/1 default workloads. When using default workloads you specify to BEST/1 or Patrol - Predict, to automatically assign the jobs that have Client Access Express (iSeries Access in V5R2) attributes and jobs with interactive 5250 attributes to the CLIENTAC4 and INTERACTIV workloads. Other user non-5250 job work is automatically assigned to NONINTER. This would include HTTP server, Domino server, Management Central, and "traditional batch jobs" work. QDEFAULT contains other OS/400 work, such OS/400 Work Management subsystem jobs and microcode tasks work that cannot be assigned to any of the other default workloads.
- Logical Volumes folder represents any ASP groups of disks

In the lower window shown, you can see:

- The model name - CIRCUSREST, in our example
- The Disk folder expanded to show all disk drives on the system as recorded in the QAPMcccc database files used to create the model
- Several "red x" icons that indicate some disk resource usage (disk utilization - percent busy) threshold has been detected. This is also summarized in the indicated in the task pad - messages area.

The lower window, right side pane shows the 5 actions you can perform on the created model:

- Open: Open the model and view its contents
- Evaluate the Model: This means validate the model against collected performance data
- View Reports: View results of the most recent "what-if" capacity planning parameters
- View Charts: View the reports in graphical (for example, bar charts) format
- Plan for future growth: Enter the capacity planning growth parameters and do the "what-if" processing.

Patrol for iSeries - Predict

- Use instead of BEST/1 starting with V5R2
 - ▶ Developed by BMC Software (BEST/1 developers)
 - ▶ Not part of Performance Tools for iSeries
 - ▶ Supported by BMC
- Model created on iSeries with 5250 workstation BEST/1-like command interface
- "What-if" capacity planning performed through GUI on Windows 2000/NT PC workstation - "Predict Console"
- Beta available 07/02; General availability in 09/02
- BEST/1 and Patrol - Predict are different:
 - ▶ Does not have some of BEST/1's limitations
 - ▶ Does not have some of BEST/1's capabilities

Notes: Patrol for iSeries - Predict

This foil is a quick summary of Patrol for iSeries - Predict from the BMC Corporation.

Patrol - Predict is not part of the Performance Tools for iSeries, 5722 product . It will be composed of two components:

- On the iSeries: BEST/1-like Create Model functions for identifying OS/400 jobs and assigning work to Workloads based upon user id, job name, OS/400 subsystem and other BEST/1 categories. The familiar default workloads for interactive, non-interactive, pass-through, and Client Access, and Default are supported as derived from the familiar QAPMcccc performance database files. QAPMccc database files from V4R2 and later are supported for input to creating the model.
- On the PC Windows operating system: This new to iSeries users product using a PC workstation-based GUI for validating the model and doing "what if" capacity planning functions. The growth by period is supported and there are many more "analysis reports" than BEST/1 had. These reports are all in HTML format and can be printed.

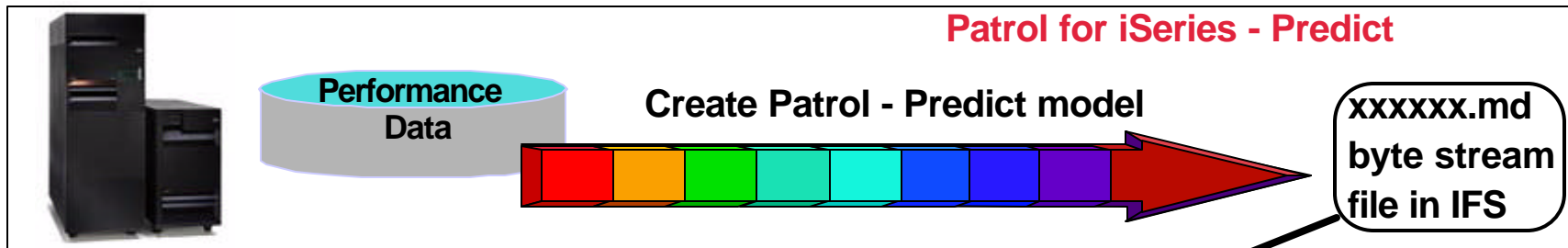
There will be separate prices for each of the two components. Product support is provided by BMC.

Following charts show the modeling process flow and some more details.

Patrol - Predict components and capacity planning process

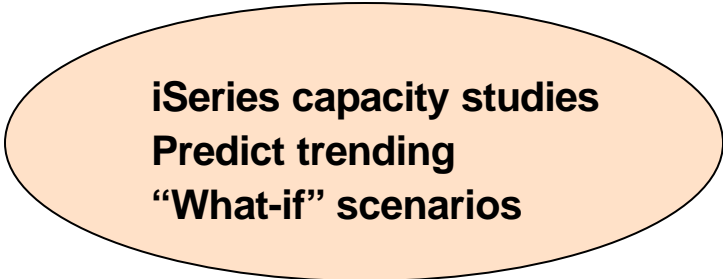
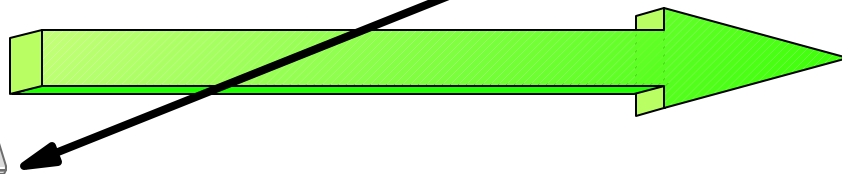
Analyze

OS/400



Predict

Windows
NT/2000



PATROL for iSeries - Predict
(Console component for model evaluation)

Predict: Summary

- Create Model (very similar to BEST/1)
 - ▶ Supports older releases:
 - Supports QAPMccc data from V4R2 and later; runs on V4R4 or later
 - ▶ Job Classifications like BEST/1 (user id, job type, job name, subsystem, account code....)
- Capacity planning
 - ▶ CPU, disk, ASP (logical volume)
 - ▶ Interactive feature utilization, variable interactive CPW for LPAR partition
 - ▶ Percent growth per "time period" relative to original base or previous time period (BEST/1)
 - ▶ HTML-based graphical displays for "reports" and bar charts
 - ▶ Many more reports than BEST/1
 - ▶ Validate model (predicted compared to measured)
 - ▶ Change computer, add disks
 - ▶ Task pads for status messages, icons to indicate warning (threshold reached), and guideline reached per resource

Predict: First Release Advancements over BEST/1

- Create model
 - ▶ Job Classifications like BEST/1 but with multi-category selection (for example, job name and subsystem name)
- Intuitive menu interface for "what-if" planning exercises
- Can support more than one "computer"
 - ▶ Workloads may span multiple computers/partitions
- Can support dependent transactions
 - ▶ If transaction xxx grows by 20% than transaction yyy grows by
- No hardware processor - I/O configuration tables
 - ▶ BEST/1 would not create a model if it determined there was an invalid configuration
- Improved graphical representation of planning exercise results

Predict: First Release Limitations Compared to BEST/1

- Limited batch modeling (no *BATCHJOB attribute)
 - ▶ Non-interactive transactions, CPU utilization, Disk utilization supported as with BEST/1
 - No modeling of individual storage pools
 - No configuration validation or recommendations
 - Limited RAID modeling details
-
- No "release-level adjustment," CISC, "application-type," or individual communication line modeling

Notes: First Release Limitations Compared to BEST/1

This foil shows known limitations in the first release of BMC Patrol - Predict.

The limited RAID and no IOP and IOA, recommendations, and configuration validation (you attempt to add a disk controller not supported on a specific iSeries system) are the most noticeable limitations. Please note that since V4R5 the hardware table used by BEST/1 for its configuration validation has not kept up with newer I/O attachments. As a result the BEST/1 configuration validation function was frequently not helpful.

The horizontal line separating the bottom limitations is used to indicate, very few BEST/1 users not use these functions. So they are not considered important limitations.

Additional details will become available as the Beta code becomes available mid-July.

Agenda

- Performance at Your Fingertips
- Adaptive Storage Virtualization for High Availability
 - ◆ DB2 UDB Enhancements
 - ▶ High Availability and Switchable ASP
 - ▶ Virtual Media Install
- Flexible, secure Management of e-business Infrastructure

OS/400 DB2 UDB for iSeries History Lesson

IBM Delivers Robust SQL Function

1970

- ✓ Codd Invents RDBMS

1973

- ✓ System R Project

1980

- ✓ S/38 Delivered with RDBMS Based on System R

1988

- ✓ IBM Defines COMMON SQL Language

1988

- ✓ AS/400 Delivered with SQL/400

1995/96

- ✓ SQL Optimization
- ✓ Referential Integrity
- ✓ DRDA DUW
- ✓ Net.Data
- ✓ Triggers
- ✓ Long Names
- ✓ Stored Procedures
- ✓ SMP Parallelism

+++



1995: RDBMS is named DB2/400

1997/98

- ✓ Cluster parallelism
- ✓ Data mining
- ✓ Parallel Index Build
- ✓ UCS-2
- ✓ BI Solutions
- ✓ Dynamic Bitmaps
- ✓ Encoded Vector Indexes
- ✓ Parallel Data Loader

+++



1997: Renamed to DB2 UDB

1999/2000

- ✓ Large Objects
- ✓ SQLJ
- ✓ Data Links
- ✓ UDTs, UDFs
- ✓ Op Nav Performance Monitor
- ✓ DB2 OLAP
- ✓ Visual Explain
- ✓ Java (tm) Stored Procedures

+++

2001

- ✓ SQL Triggers
- ✓ Database Navigator
- ✓ Generate SQL
- ✓ 2G LOBs
- ✓ 1 TB tables
- ✓ ODBC 3.5
- ✓ DB2 Extenders

2002/3

- ✓ **Self Optimizing Query Engine**
- ✓ **Migration Toolkits**
- ✓ **Multiple Name Spaces**
- ✓ **Switchable Disk Clustering**
- ✓ **Index Advisor**
- ✓ **New Statistics Manager**
- ✓ **Adaptive e-Business Transaction Services**
- ✓ **Enhanced DB2 Family Compatibility**
- ✓ **Add'l SQL Standards Support**

Notes: OS/400 DB2 UDB for iSeries History Lesson - 1 -

This chart summarizes the evolution of database and SQL functions to that database on the iSeries. Note that the iSeries has had since DAY ONE a very robust relational database management system.

SQL functionality first started showing up at V3R1 in 1995, when database parallelism, stored procedures, and triggers were first introduced. At V3R1, IBM gave the database a name: DB2!!

Since that time, a significant amount of function has been added (and will continue to be added) to the adherence to the ANSI SQL Standards in each new OS/400 release. At V4R2, the database name was changed again slightly - the Universal Database (UDB) acronym was added - to reflect the database's ability to extend into capabilities beyond typical relational data elements and to remain consistent with the other DB2 family members.

Some things to consider:

- You or your customer may not know whether they need the DB2 Symmetric Multiprocessing feature of OS/400 to get parallel database tasks
- DB2 UDB for iSeries was the first database running on any operating system to introduce SQL Stored Procedures, based on the industry standard
- Encoded Vector Indexes were introduced in V4R2 and have delivered significant performance improvements over several releases

Notes: OS/400 DB2 UDB for iSeries History Lesson - 2 -

Additional background information

While all DB2 UDB family members share research and development across various IBM laboratories, the delivery of DB2 UDB may differ. There are actually three core DB2 UDB family code bases - one for iSeries, zSeries and distributed platforms.

However, it is important to note that much of the code and technology is shared across all DB2 UDBs.

DB2 UDB for iSeries has the unique advantage of being integrated into the iSeries Operating System (OS), maintaining the iSeries' value proposition - low cost of ownership through INTEGRATION.

The commonality is in these areas:

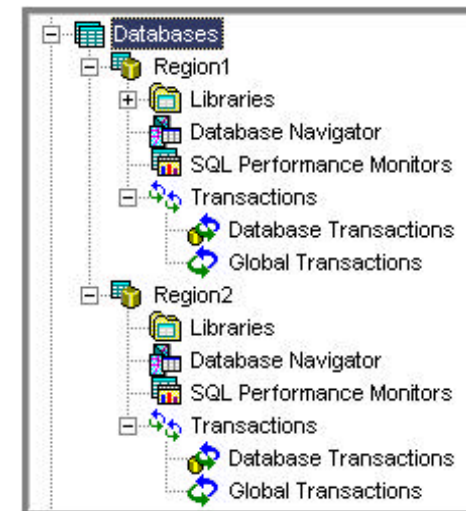
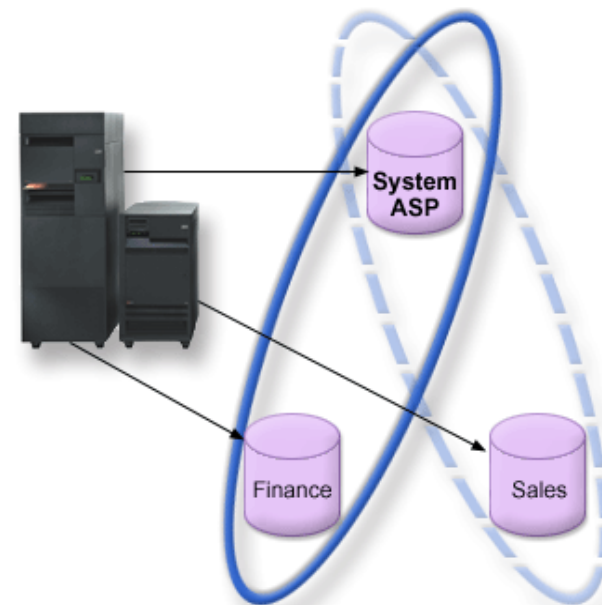
- **Shared SQL Standards:** and this website contains a paper on details (<http://www.ibm.com/servers/eserver/series/db2/common.html>)
- **Shared DB Utilities:** - and if you CLICK on the target it'll take you to an optional slide to provide an example. Also, the website links you to a document describing these utilities (<http://www.ibm.com/servers/eserver/series/db2/util.htm>)
- **Shared research:** as an example, Encoded Vector Indexes (EVIs), a V4R2 feature of DB2 UDB for iSeries, was actually developed out of our Silicon Valley Lab

Where the products differ:

- Each DB2 UDB is optimized for the platform. For instance, on iSeries, much of the database code is built into OS and microcode levels which is very efficient.
- Packaging. How the function is delivered may be slightly different in the DB2 UDBs. If you CLICK on the target, it'll take you to a slide that shows an example of this.
- DBA Facilities. Because DB2 UDB for iSeries is built into the OS, many of the DB2 management facilities are also built into the OS, and delivered through native operational menus or via Operations Navigator.
- Some functional differences due to development schedules/resources and customer requirements.

IBM DB2 UDB for iSeries

- Availability, consolidation enhancements
 - ▶ Multiple independent name spaces
 - ▶ Switched disk (IASP)
- Open standards support
 - ▶ SQL enhancements
 - ▶ Java Transaction API (JTA)
 - ▶ X/Open Distributed Transaction Processing (XA-DTP)
 - ▶ Enhanced DB2 UDB family compatibility
- iSeries Navigator Enhancements
 - ▶ Self-optimizing automatic index advisor and statistics collection, Database Navigator
 - ▶ Graphical management for local DB2 UDB and global WebSphere transactions



Notes: IBM DB2 UDB for iSeries

In V5R1, we introduced Independent Auxiliary Storage Pools (IASPs) to support switched disk capability for applications using the integrated file system file systems except for QSYS.LIB. This included Domino and Windows servers. With OS/400 V5R2, this capability is extended to support most QSYS.LIB objects, including database objects. Support for multiple independent *name spaces* allows multiple databases in separate independent storage pool on the same iSeries.

The next foils illustrates the use of non-switchable IASPs to support multiple databases on the same iSeries server. Some times one of these IASPs is referred to as a separate *name space*, because objects in addition to database objects (such as programs) can be placed in these IASPs as well.

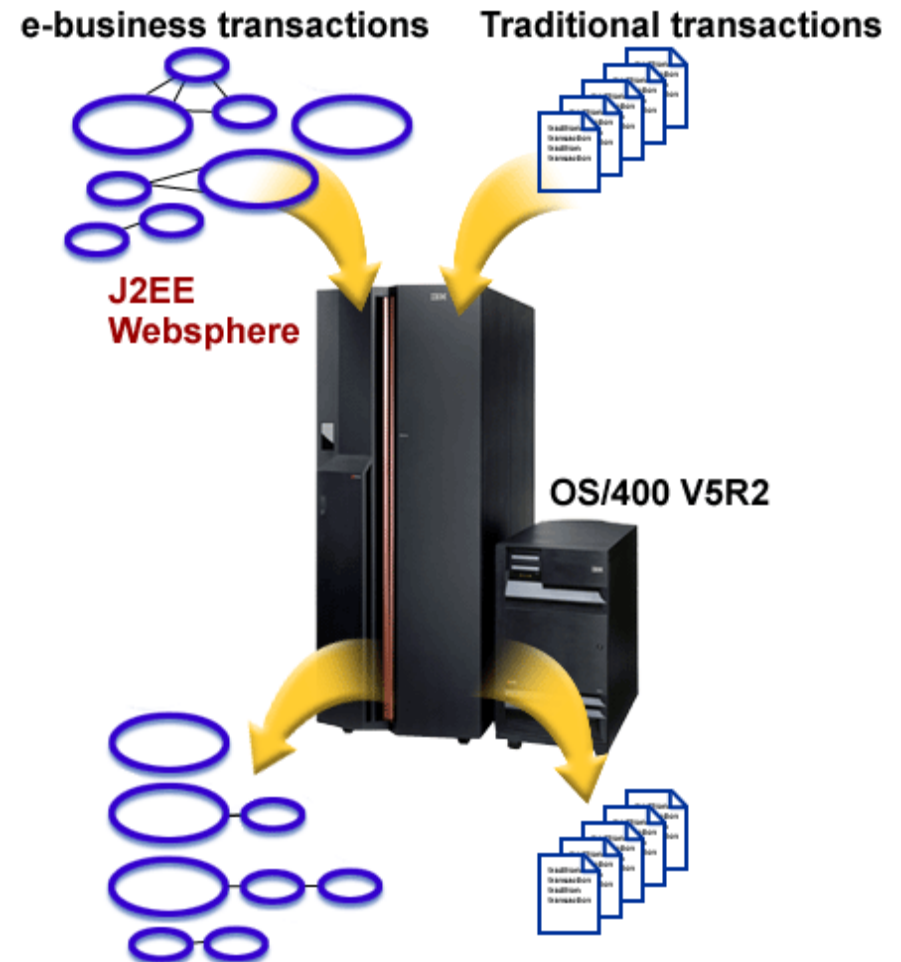
V5R2 is also a significant release for the iSeries as it continues to be at the forefront of meeting the requirements of open SQL standards, along with much greater compatibility between IBM DB2 UDB on iSeries and with DB2 UDB on our other IBM platforms.

New DB2 transaction services provide consistency for two established e-business industry standards - the x/Open Distributed Transaction Processing (XA-DTP) standard, and the Java Transaction Services API (JTI). Products like WebSphere Application Server should show performance improvements because of how we are handling multiple jobs using the new adaptive e-transaction services.

iSeries Navigator also provides a graphical view of database or global transactions. Database transactions are transactions that are local jobs using the iSeries database. These transactions are completely under the control of the application running within a single job. They would typically use SQL statements begin, followed by commit or rollback to identify transactional work. Global transactions may span multiple jobs, databases, or systems. These transactions are coordinated by an external Transaction Manager, such as WebSphere or Tuxedo. They use a standard set of APIs, such as the APIs defined in the XA or JTA specifications to identify transactional work.

Enterprise Class Adaptive e-transaction Services

- iSeries optimized for both traditional and e-business transactions
- Adaptive e-transaction Services
 - ▶ Extends robust iSeries transaction services to e-business applications
 - ▶ Transaction server automatically adapts to application requirements
 - ▶ No programming changes required
- Further optimizes iSeries for highly scalable WebSphere and Java™ transaction performance



Notes: Enterprise Class Adaptive e-transaction Services

The iSeries and AS/400 reputations as business servers have largely been built around their ability to process transactions. OS/400 has always featured a sophisticated transaction manager, and has been optimized to manage multiple applications transactions together with advanced workload management tools such as subsystems and dynamic performance management.

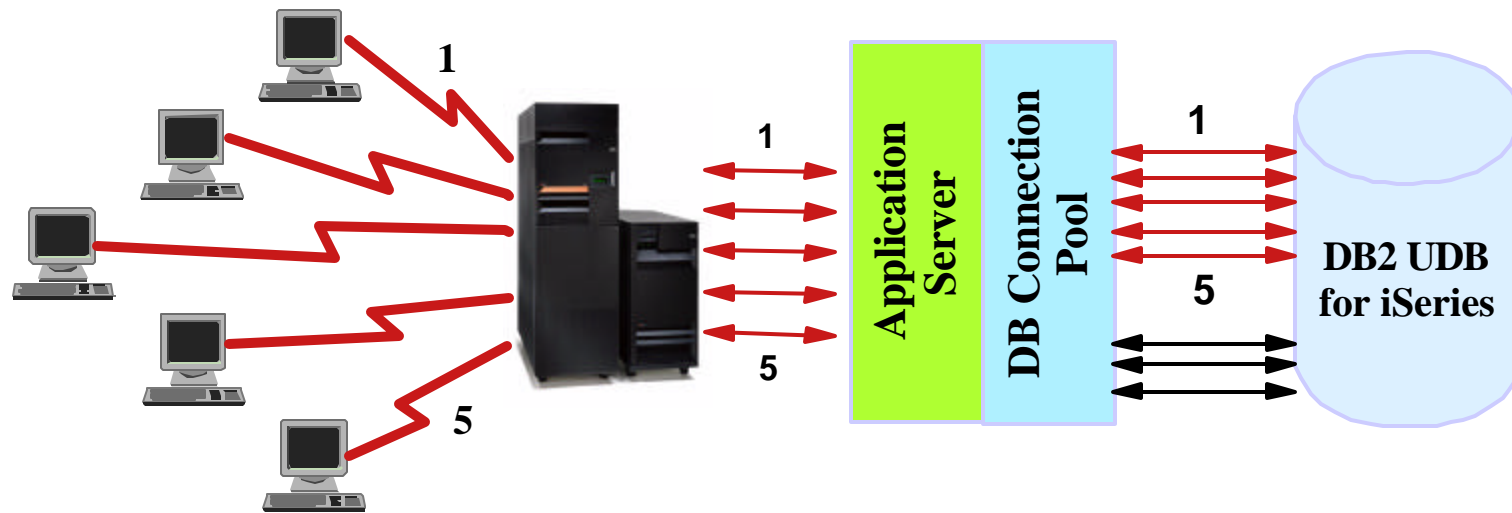
Many commercial applications, such as those in the banking, manufacturing or distribution industry, fit a common profile: small, single threaded order entry or account transactions that write an update to a single file in the database. Many of today's e-business transactions running in WebSphere Application Server and using Java are much more complex, require more processor and memory resources and often spawn multiple other tasks to complete the transaction.

The new adaptive e-transaction services is designed to enable OS/400 to adapt and self-optimize for both traditional transactions and new e-business applications that are using database transactions to multiple databases in a single "commit cycle." Now OS/400 has the ability to detect the transaction type and automatically adapt its transaction manager as appropriate. Traditional transactions (such as 5250, non commit cycle applications) are detected and handled as before, with no degradation in performance. When detecting a more complex, e-business transaction (using "commit cycles"), however, the OS/400 transaction manager will automatically adapt to process multiple tasks with fewer resources in previous releases.

The result is that WebSphere and Java transactions will now benefit from better operating system optimization and gain greater scalability (more active transactions per system resource consumed).

The next two foils and notes give a high level view of the reduced overhead because of this new support. This new support actually applies to "database transactions (commit cycles), not the familiar definition of "5250 transactions." This new implementation (can transparent to the applications) is very important to Java-based application servers, such as the WebSphere Application Server. As the number of concurrently active database transactions increases into the thousands the new implementation improves scalability of a single system by reducing the storage space required for each active database transaction.

Current Application / Transaction Support



1000s of clients

- 1 to 1 relationship between client transaction and system resources
 - One connection associated with each commit definition
- Resources not reusable until client completes transaction

Notes: Current Application / Transaction Support

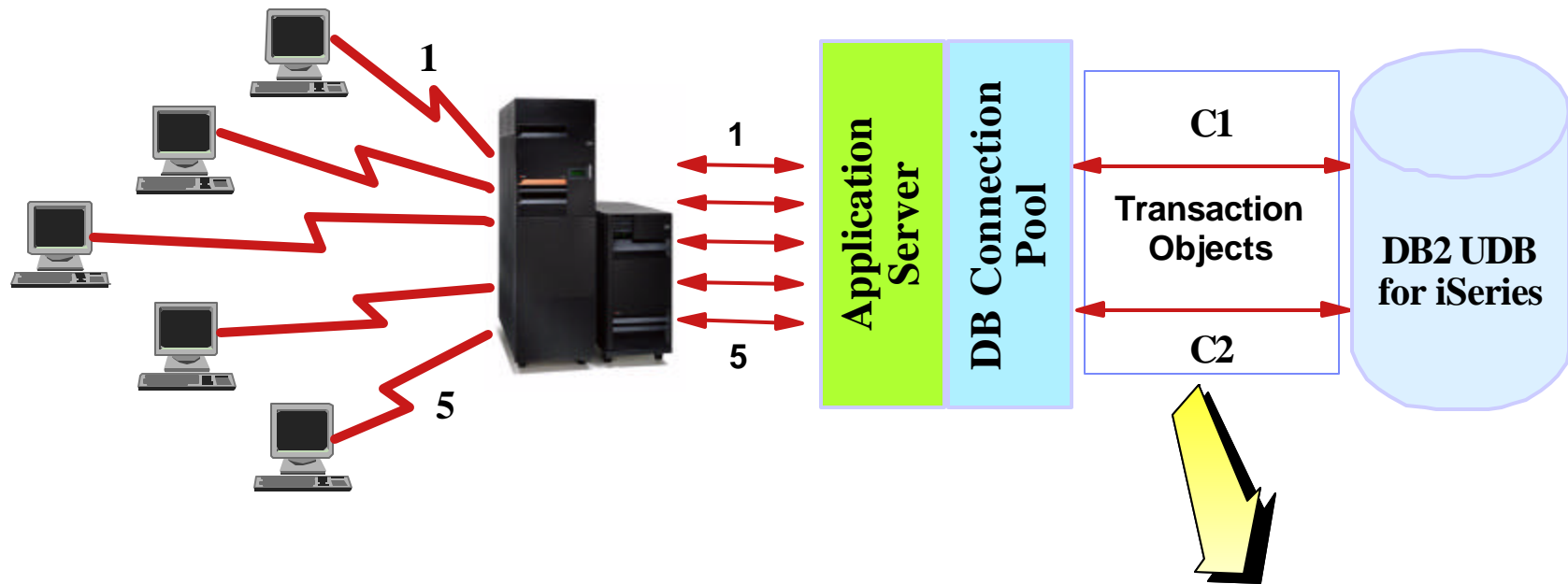
The current infrastructure in the iSeries to provide access to shared resources, such as DB2, is performed via host server jobs - QSQSRVR job names. These jobs are called whenever a request is brokered against the shared resource. This implies that the transaction boundaries are known only within the instance of the server job that will perform the entire access to the shared resource, even if this would require the job to access another platform. Each transaction is linked with the atomicity of the server job in which it is running.

Although this model requires little or no work to set up and has given proof of stability, it nevertheless has some implications on transaction management, compatibility and scalability. The major drawbacks being that there is a one-to-one relation between a client transaction and system resources and that resources, locked up by one transaction, cannot be made available before the transaction has terminated.

In our example we have five application server jobs each doing a "remote" connection with one of five QSQSRVR jobs. Each QSQSRVR job is responsible for all functions associated with a single connection - commit cycle transaction. The internal "transaction object" (sometimes referred to as "lock space") that maintains transaction status is assigned to one specific transaction for the life of that transaction.

In the next foils you see how transaction management can be done starting with V5R2 of OS/400.

New Transaction Service Implementation



- Multiple connections per transaction in SQL server job or Multiple transactions per connection in SQL server job
- Implemented using industry transaction specifications (JTA, XA, CORBA, JTS)
- WebSphere Application Server, Tuxedo provide transaction management

Adaptive
e-transaction
Services

Notes: New Transaction Service Implementation

When JTA and JDBC are used together, there are a series of steps between them to accomplish transactional work. Support for XA is provided through the XADataSource class. This class contains support for setting up connection pooling exactly the same way as its ConnectionPoolDataSource superclass. With an XADataSource instance, you can retrieve an XAConnection object. The XAConnection object serves as a container for both the JDBC Connection object and an XAResource object. The XAResource object is designed to handle XA transactional support. XAResource handles transactions through objects called transaction IDs (XIDs).

The XID is an interface that you must implement. It represents a Java mapping of the XID structure of the X/Open transaction identifier. This object contains three parts:

- A global transaction's format ID
- A global transaction ID
- A branch qualifier

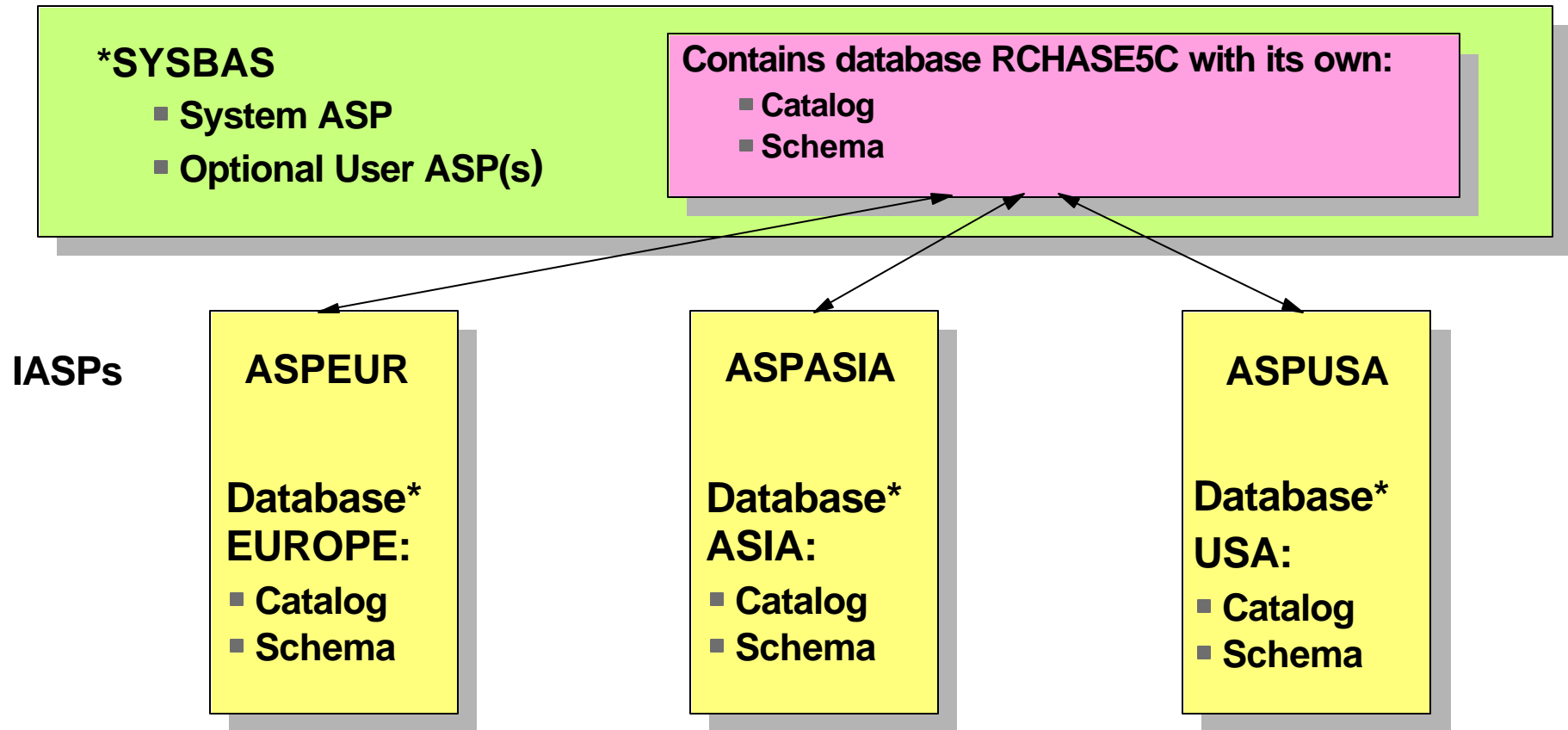
The JTA API is designed to decouple transactions from JDBC connections. This API allows you to have either multiple connections work on a single transaction or a single connection work on multiple transactions concurrently. This is called multiplexing and many complex tasks can be performed that cannot be accomplished with JDBC alone - and take less system resource to perform a function.

A key implementation object is a new internal "transaction object" that maintains the transaction status, object lock, and all necessary information to maintain transaction integrity. A single transaction object than can be processed by multiple threads or a single thread can process the different transaction object that is passed to it. Under OS/400 the V5R2 QSQSRVR jobs/threads provide this new support.

Use of the new transaction model is optional. It can be enabled through the use specific XA APIs by an application program or it can be enabled by the application transaction manager - for the application. When enabled by the transaction manager, there is no change to the application program as the resource management implementation can be independent of the application programming.

Transaction managers known to support this implementation include WebSphere Application Server Advanced Edition 40. or later and Tuxedo.

Multiple Database Support - Sample Layout



***You can have the same library name and object names within each IASP**
To access an IASP use new Job Description parameter - Initial ASP Group, or new Set ASP Group command, SQL Connect statement, or DDM file

Notes: Multiple Database Support - Sample Layout

Although each IASP can contain several QSYS.LIB object types (programs, data queues, message queues, database file/tables, indexes, and so forth) this foil focuses only on libraries and database objects in that library (in SQL terminology a database schema). In V5R2 there are some QSYS.LIB objects that are not supported in an IASP. Two examples are a job queue and a spool output queue.

In V5R2, the system ASP (ASP 1) and optionally any dependent ASPs (now called a Base ASP) are collectively referred to as *SYSBAS. Certain objects, such as user profiles can exist only in ASP1. **You can have the same library and object names in each IASP, but a library name in an IASP cannot be the same name as a library in *SYSBAS.**

You need to consider this when planning to a non-switchable or switchable IASP. You can have the same name objects in each IASP. There are other "planning to use IASPs" considerations that are beyond the scope of this presentation. You can review V5R2 Information Center, contact the Rochester iSeries Technology Solution Center, or refer to following foils in this presentation or the Availability presentation in this set of Technical Overview presentations.

By default, any applications can access objects in *SYSBAS and a single IASP, provided they use new support to specify they want to use an IASP.

When performing database functions the already available SQL CONNECT statement can specify a database name. That database name must be already defined as either a local or remote database with the Add Relational Database Directory Entry (ADDRDBDIRE) command. For multiple local databases, the local system database (SYSBAS) must specify "LOCAL" in its ADDRDBDIRE and, for an IASP database, the ADDRDBDIRE must specify LOOPBACK for its remote location parameter. This is instead of a remote IP address or host name.

A non-SQL program or SQL program that does not use the CONNECT statement can access one of the multiple local databases or a remote database through:

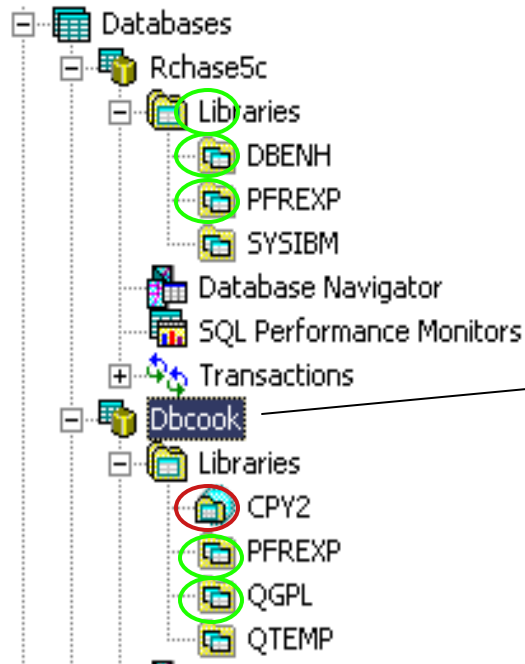
- a Distributed Data Management File (with a new *RDB parameter value).
- the new with V5R2 Set ASP Group (SETASPGRP) command that specifies the IASP name
- The V5R2 job description (CRTJOB/CHGJOB) has a new Initial ASP group parameter that you can associate with a user profile to implicitly invoke the SETASPGRP function when the job is started..



Several, but not all, V5R2 OS/400 commands support new ASP number and ASP device name parameters with the appropriate values.

Examples include Create Library, Make Directory, Restore Library/Directory/object commands. For other situations you may find either the new SETASPGRP command or the new job description command parameter works best for you.

Multiple Database Name Spaces

iSeries Navigator view:



-  Schema / Library in IASP database
-  Schema / Library in system ASP database

Relational DB Directory (WRKRDBDIRE) view:

Relational Database	Remote Location
AS20	RCHASX20
DBC COOK	LOOPBACK
D BEUOPS	LOOPBACK
RCHASE5C	*LOCAL

- DDM access of IASP database objects controlled with new RDB parameter
 - ▶ CRTDDMF ... RMTLOCNAME(*RDB) RDB(DBCOOK)

Notes: Multiple Database Name Spaces

The iSeries Navigator Database view shows the configured databases on the system whose corresponding IASP has been varied on (made available in iSeries Navigator terminology). On the right of this foil, we used the Work with Relational Database Entries (WRKRDBDIRE) command to show the primary (default) database name - Rchase5C and the two additional local databases - Dbcook and Dbeuops - each with the LOOPBACK values for Remote Location. Rchase5c is contained in *SYSBAS. Dbcook is actually stored in IASP named DBITSC.

Database DBEUOPS is not shown in the Operations Navigator window because its IASP is not varied on.

In V5R2 a database name is associated to an IASP when it is configured. You can view the database name to IASP name mapping in the following ways:

- iSeries Navigator -> Database -> Database name -> Properties. The associated IASP must be varied on ("made available" term with iSeries Navigator).
- 5250 command line: WRKCFGSTS *DEV *ASP -> For an ASP listed chose Work with descriptions -> Display Device Description
- 5250 command line: WRKRDBDIRE -> Display one of the entries showing LOOPBACK for remote location. Note, the IASP-associated database file name is automatically placed as an entry into the Relational Database Directory when it is first varied on after its creation. If the IASP is currently varied off, you can see the RDB entry, but cannot see what its associated IASP name is. Once that IASP has been varied on, the RDB directory entry shows the IASP name.

Notes:

- iSeries Navigator uses two different icons to represent a library in *SYSBAS or in an IASP. In this example you can see the library CPY2 icon has a blue circle behind the "warehouse icon." This indicates the library is within the IASP. Library PFREXP is in *SYSBAS and, as such it can be listed under either database Rchase5c or Dbcook.
- V5R2 Information Center for the Database topic has additional operational details for using database within IASPs

SQL Enhancements: Overview - 1 of 2

- ROWID data type and ROWID scalar function
- IDENTITY column attribute
- CREATE TABLE AS (subselect)
- DECLARE GLOBAL TEMPORARY tables
- User-defined Table Functions
- COMMIT ON RETURN procedures
- UNION in views
- Scalar subselect enhancements
- READ ONLY and READ WRITE in SET TRANSACTION
- ITERATE and nested Compound statements in SQL procedures, SQL functions, and SQL triggers
- Full select in derived tables and common table expressions
- Parameter markers in labeled durations
- Savepoints

*Continuing to bring you SQL industry standard,
DB2 UDB family, and iSeries-based enhancements*

SQL Enhancements: Overview - 2 of 2

- SET SCHEMA and SET SQLID
- HOLD LOCATOR
- ORDER BY expression not required in the select-list
- ORDER BY and FETCH FIRST n ROWS ONLY in derived tables and common table expressions
- Length of SQL statements increased to 64K
- Length of delimited column name identifiers increased
- SUBSTRING enhancements
- VARCHAR concatenation enhancement
- Debug of original source statements in SQL procedures, SQL functions, and SQL triggers
- Multiple relational databases on iSeries
- Standard and ODBC and JDBC catalog views
- C derived variables

Notes: SQL Enhancements - 1 -

This is a list of the various industry-standard and iSeries-based SQL enhancements available with V5R2 DB2 UDB for iSeries. We explain only a few of these enhancements in this overview presentation.

See the detailed Database presentation for more information.

ROWID

Using ROWID is a way to have the system assign a unique value to a single column in a table. This identity value is calculated by a complex formula that takes into account, for example, the machine's serial number, so that even each row of data in tables residing in different machines of the same organization can be uniquely identified with a very low possibility of duplicated ROWID values. ROWID is similar to IDENTITY columns, but rather than being an attribute of a numeric column, it is a separate data type. A column or a host variable can have a row ID data type. A ROWID column enables queries to be written that navigate directly to a row in the table. Each value in a ROWID column must be unique. The database manager maintains the values permanently, even across table reorganizations. When a row is inserted into the table, the database manager generates a value for the ROWID column unless one is supplied. If a value is supplied, it must be a valid row ID value that was previously generated by either DB2 UDB for OS/390 and z/OS or DB2 UDB for iSeries.

IDENTITY column

The AS IDENTITY attribute specifies that the column is an identity column for the table. The intended function is to have the DB2 automatically set a key value, that could be, for example, the next order number values. A table can have only one identity column. AS IDENTITY can be specified only if the data type for the column is an exact numeric type with a scale of zero (SMALLINT, INTEGER, BIGINT, DECIMAL or NUMERIC with a scale of zero, or a distinct type based on one of these types). An identity column is implicitly NOT NULL.

You can compare this function with a "technical key" that you would create using DB2 Warehouse Manager to uniquely identify a row in a table: every time that a new row is added to a table with an identity column, the identity column value in the new row is incremented (or decremented) by the system; however, there is no implicit within this function to force uniqueness of the contents: if uniqueness is required, the user must add a UNIQUE or PRIMARY KEY constraint or add a UNIQUE index.

Notes: SQL Enhancements - 2 -

CREATE TABLE AS

CREATE TABLE AS to easily create a new table and copy in selected column data as is from another table - an SQL syntax way to perform the OS/400 Create Duplicate Object and Copy File. It also enables an "SQL interface" to simulate the OS/400 database support of an OS/400 "field reference file" (that has been used on OS/400 for years). That is, define a physical file that merely contains the field (column) definitions - no data. Use this as a reference file for specific field/column definitions when defining another table/file "based on" this reference file.

CREATE TABLE AS creates a table from the result of a SELECT statement. All of the expressions that can be used in a SELECT statement can be used in a CREATE TABLE AS statement. You can also include all of the data from the table or tables that you are selecting from.

If you compare this with existing functions, such as the Create Duplicate Object (CRTDUPOBJ) or Copy File (CPYF) commands, you will notice that this tool is far more powerful than the existing ones, since it allows join, projection, select and ordering functions as part of the subselect.

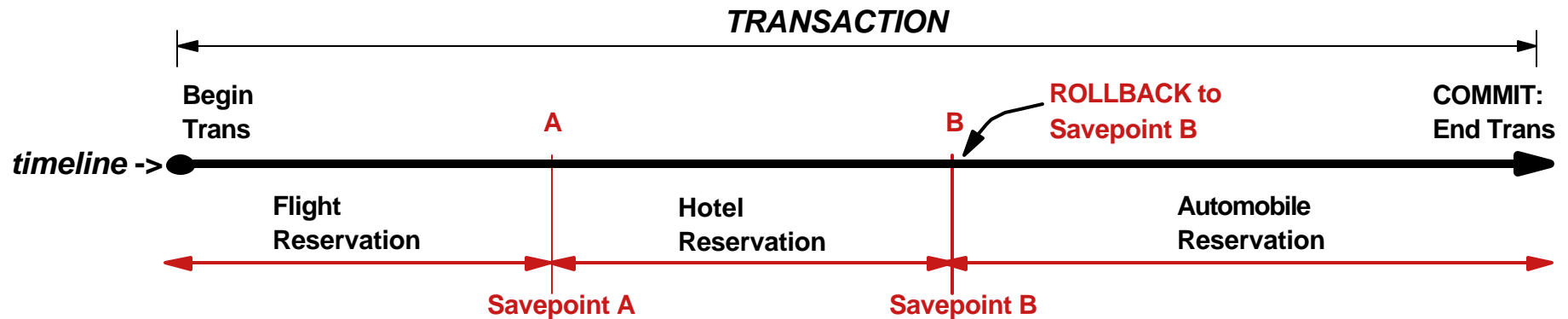
Savepoints

The Savepoint support enables an application to setup savepoints as sub-transactions of a larger transaction - or as part of a set of related transactions. This enables an application to be able to "restart" at a known "interim" step. This capability becomes more important as applications become more interdependent and use more than one system. One example would be the set of related transactions - airline flight reservation, hotel reservation, and auto rental reservation. You could rollback just to the save point, representing the start of the auto rental "sub transaction."

The SAVEPOINT statement sets a savepoint within a unit of work to identify a point in time within the unit of work to which relational database changes can be rolled back. The SAVEPOINT statement includes control of cursor positioning within the tables in the unit of work, as well as control of any "object locks" associated with the "sub-transaction."

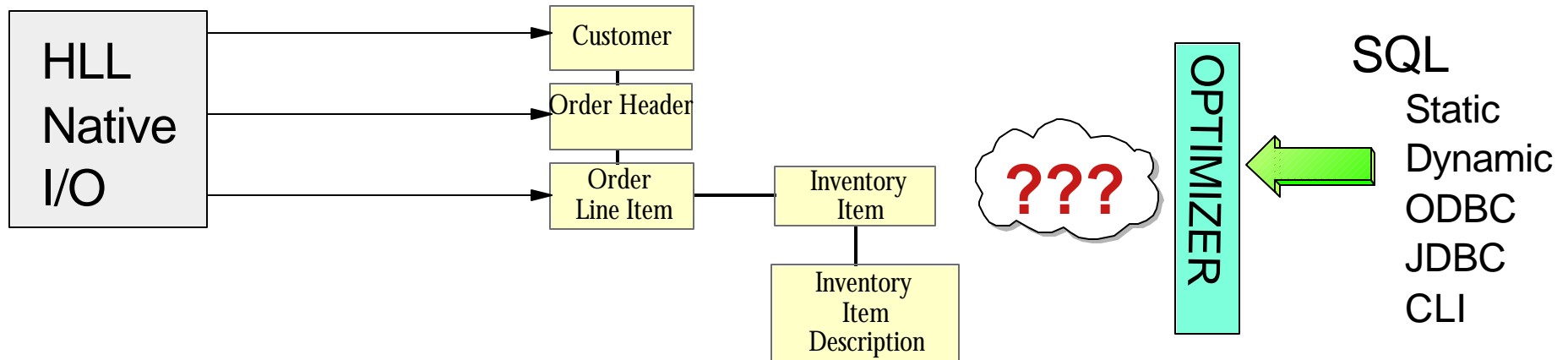
Availability, Recovery Enhancements: Savepoints

- Faster transaction recovery with database Savepoints
 - ▶ Instead of starting over from the beginning of related transactions, start from a known "interim" step



- ROLLBACK TO <savepoint> rolls back changes only to the specified savepoint instead of all changes made by the transaction
 - ▶ RELEASE SAVEPOINT statement deletes a savepoint
 - ▶ COMMIT or ROLLBACK
- Savepoints in a distributed transaction are scoped to the current connection

SQL Access: The DB2 Optimizer



■ Native Access

- ▶ Programmer Controlled
- ▶ Read a Record, do something, write a record
- ▶ Select next record

■ SQL Access

- ▶ Build/Update Access Plan
 - Determine query complexity
 - Review database statistics
 - Build/Update Plan to get data
 - physical table scan?
 - use/create an index?
 - build a temporary file?

Only the Optimizer knows!!

Notes: SQL Access: The DB2 Optimizer

A review of the "optimizer responsibilities" for finding the rows and columns that match the specified search criteria with operating system-specific efficiency is illustrated on this foil.

To the left of the Optimizer we show the OS/400 "native file access" (for example READ, WRITE) and on the right a representation of the SQL access (for example SELECT, INSERT).

Since the industry standard interface to database is through SQL (it has much more powerful facilities than the OS/400 native database interfaces), it is imperative to constantly improve the efficiency of the "optimizer."

Self-Optimizing SQL Query Availability

- New State of the Art SQL Query Engine (SQE)
 - ▶ Phased Approach providing
 - Improved SQL Performance
 - Minimizes system resource utilization during SQL Processing
 - ▶ Delivery Method - see Informational APAR II13486
 - DB2 PTFs planned to be available 1H 2003

Notes: Self-Optimizing SQL Query Availability

The query optimizer of previous releases is being improved in V5R2.

Note that while some improvements were included in the original V5R2 general availability software, the "total package" of performance improvements is planned to be made available through software fixes (PTFs) during 1H 2003.

In V5R2, DB2 UDB for iSeries redesigned the query engine, which may provide performance improvement for SQL read-only queries. Individual results may vary, but many workloads run within the lab up through January 21, 2003, have shown an up to 2X performance gain. Individual query performance may degrade. When the new DB2 PTFs become available, there will be significant information available providing details on the performance improvements, which types of queries can take advantage of the redesign, and how to aid the optimizer in taking advantage of the new improvements.

These sources of information include:

- Info APAR I113486 describes how to order the improvements
- www.ibm.com/eserver/series/db2/sqe.html on preparing for the new optimizer
- Performance Capabilities Reference Manual V5R2 updates, available at <http://www.ibm.com/eserver/series/perfmgmt>
- Red Draft (formerly Redpiece) SG24-6598, to be updated 1H 2003

Important: The query optimizer of previous releases handles queries from a number of different interfaces. The V5R2 SQE query optimizer only handles queries from SQL interfaces. For example, queries from OPNQRYF and Query/400 are not supported. Ensure you read the information referenced in this presentation when the support becomes available.

V5R2 Performance Summary with 1H 2003 PTFs

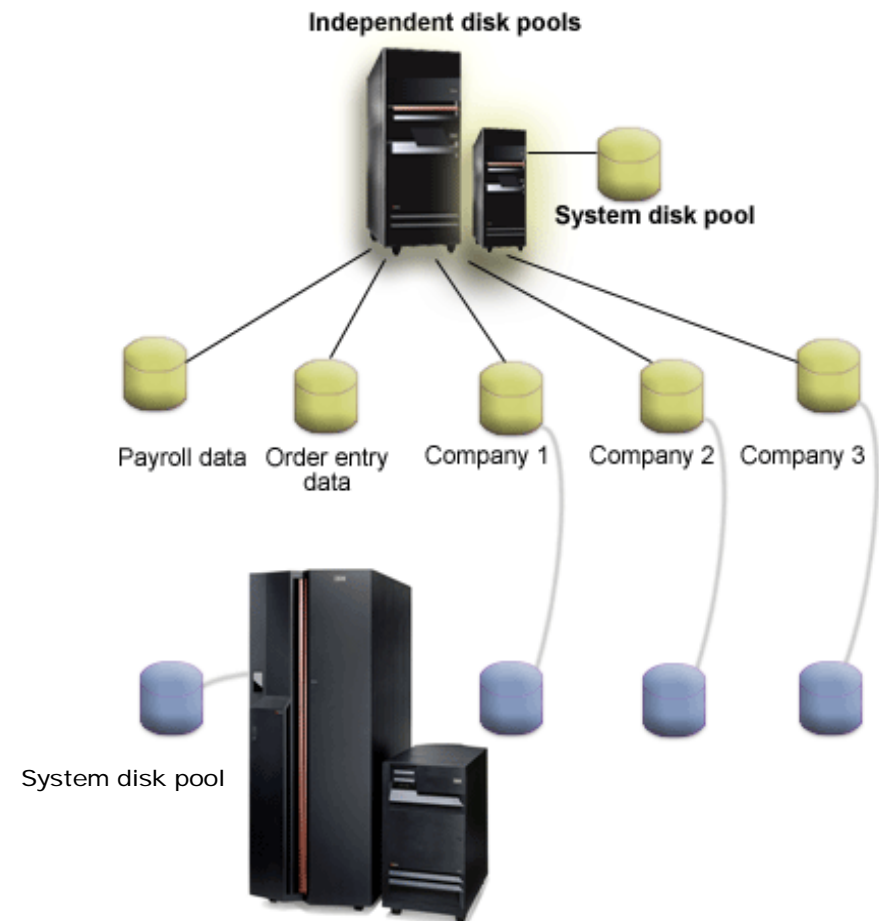
- Performance of some read-only queries involving complex joins and selection logic showed improvement
- Some simple queries showed a slight degradation
- On average, most workloads tested showed up to a 2 X improvement
- Individual results may vary
- See the following sources of performance information:
 - ▶ Info APAR II13486 describes how to order the improvements
 - ▶ www.iseries.ibm.com/db2/sqe.html on preparing for the new optimizer
 - ▶ Performance Capabilities Reference Manual V5R2 updates, available at <http://www.ibm.com/eserver/series/perfmgmt>
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Agenda

- Performance at Your Fingertips
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 - ▶ DB2 UDB Enhancements
 - ◆ ▶ High Availability and Switchable ASP
 - ▶ Virtual Media Install
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Switched Disk for High Availability and Clustering

- Consolidate data with multiple name spaces within single server
 - ▶ Multiple independent databases, system libraries, library names
- Support for switching supported most file system objects between servers
 - ▶ Switch disk for scheduled maintenance and upgrades
 - ▶ Can be used for improved availability for unscheduled outages



V5R2 Information Center: Systems management -> Clusters -> What's new in V5R2?

Notes: Switched Disk for High Availability and Clustering

Another valuable feature of OS/400 V5R2 is the ability to have multiple independent name spaces, essentially allowing for same library names to be duplicated across independent disk pools. This is ideal for customers considering consolidation of multiple regions or multiple companies where the business applications contain the same library names. Multiple names spaces, combined with IASP provide yet another tool to the already rich server consolidation portfolio on the iSeries. The key advantage here is that customers can consolidate multiple regions or business units within a single server with one operating system image or potentially one application image - without having to deploy logical partitioning or going through the complex task of consolidating multiple database files. Another advantage that IASP provides here is the ability to archive historical data to an independent disk pool, enabling customers to reduce their save and restore times and bringing historical data on-line when needed.

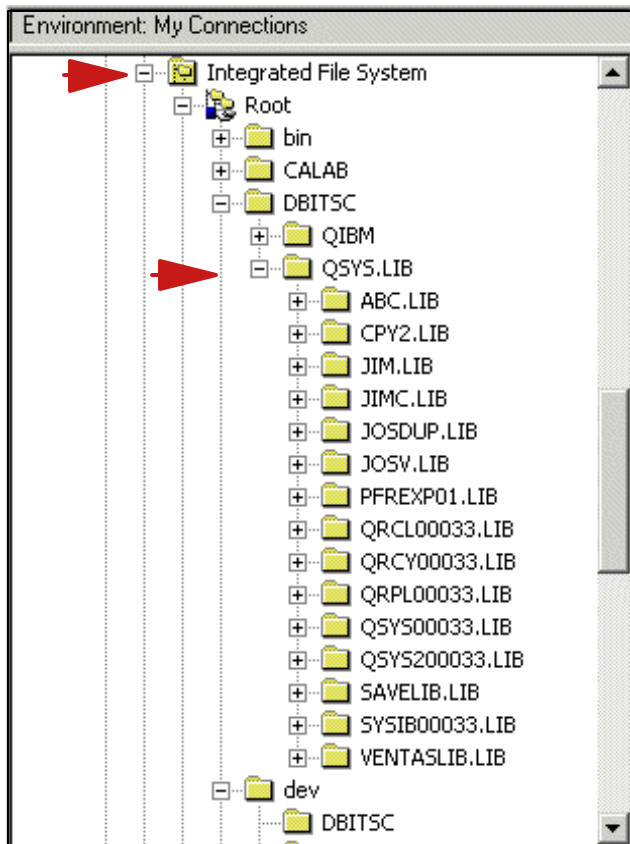
Note: Use V5R2 Information Center to find out more details on IASP support (**Systems management -> Clusters -> What's new in V5R2?**), including the complete list of QSYS.LIB objects supported and not supported. Key supported objects are database objects, programs, message queues and data queues. Key objects not supported are job queues and output queues.

The new for V5R2 support of most QSYS.LIB objects in an IASP also facilitates more widespread use of the "switched disk" support introduced in V5R1 (but without QSYS.LIB objects support). This assists you when performing scheduled maintenance for datacenter infrastructure, which can be a real challenge.

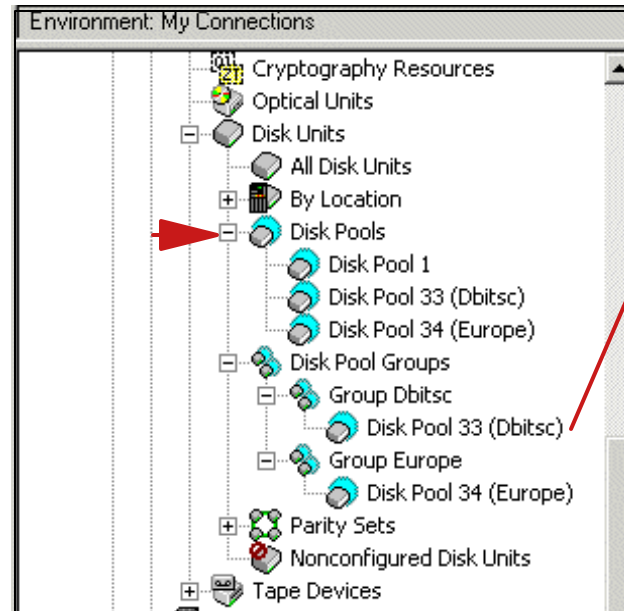
With the switched disk clustering capability in OS/400 V5R2, customers can further reduce the downtime for maintenance and upgrades. For example, applications running on independent disk pool can be switched from one system to another system connected within the High Speed Link (HSL) when performing maintenance tasks on the first system. Once maintenance is complete, the application can be switched back - thus reducing the downtime associated with maintenance.

Of course, for maximum application resiliency and for the highest level of availability, IBM's recommended solution continues to be the solutions provided through our IBM High Availability Business Partners, such as LakeView Technologies, Vision Solutions and Data Mirror. These data replication solutions not only provide options for business contingency, but also provide an active-standby cluster system that can be used productively for day-to-day read operations such as Web serving, application testing, and performing save operations without interrupting business applications running on the primary system. These solutions also integrate some of our ClusterProven™ ISV applications that provide automated application and user switchover capabilities as part of our clustering solutions for the iSeries.

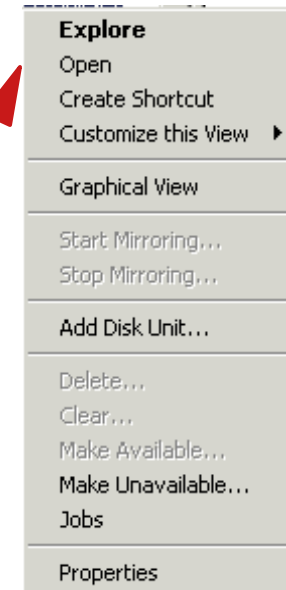
A Look at IASPs



WRKLIB LIB(*ALL) ASPDEV(DBITSC)



WRKCFGSTS *DEV *ASP



Notes: A Look at IASPs

In this foil we have several "looks" at configured IASPs - Independent Disk Pools from iSeries Navigator and some OS/400 commands..

On the left, we show a portion of an iSeries Navigator window with the expanded the root directory to show the varied on (available) IASP DBITSC. As a directory itself, you can see the QSYS.LIB objects contained in this IASP. Under the Dev directory you see the IASP as a "device."

Under this left window, we show the V5R2 Work with Libraries (WRKLIB) command that would show the QSYS.LIB libraries within that IASP.

On the right of this foil we show a portion of an iSeries Navigator window under Configuration and Service -> Hardware -> Disk Pools. We have selected the already varied on (available) DBITSC disk pool group. Note the capability to see jobs that are using objects within this IASP.

Under this window we also show the Work with Configuration Status (WRKCFGSTS) command to show IASP "devices."

Enterprise High Availability Management

- Safeguard OS/400 software upgrades with virtual media installation
- Simplified enterprise backup and media management with iSeries Navigator tools
- Journal standby mode improves availability with faster restart of clustered system
- Enhanced performance and recovery options for DB2 UDB access path protection
- Reduced disk upgrade downtime through new disk migrate while active (STRASPBAL options)
- IBM Tivoli⁷ Storage Manager V5.1 - OS/400 PASE



Notes: Enterprise High Availability Management

Besides supporting database objects within independent disk pools, OS/400 V5R2 delivers several additional availability enhancements ranging from simplifying journal management through to the new Tivoli Storage Manager V5.1.

With virtual media installation, you now have the option of using image catalogs which are particularly useful for optical media verification, for unattended installations, and for upgrading software within a network. Image catalogs are stored in the Integrated File System (IFS) and are created prior to performing a software release upgrade. Customers will be able to point to this image catalog through a virtual media emulating an installation device during their next system restart to automate their OS/400 release installation. This support is also available through PTFs for OS/400 V5R1, enabling customers to take advantage for installing V5R2. The V5R1 PTF-based interface is different than the V5R2 interface.

Backup Recovery and Media Services for iSeries (BRMS/400) contains extensive self-guided graphical wizards to enable customers quickly define and manage backup and media policies, including support for automating management of Domino, Linux and Windows. In V5R2, an additional set of BRMS functions have been integrated into the iSeries Navigator interface when BRMS is installed as a plug-in.

In a replication cluster environment, failover (and switchover) times need to be significantly reduced. One of the tasks that typically consumes time during failover is the starting of journaling on the new primary system. By providing the new journal standby mode, the time to start journaling during a failover can be significantly reduced. This allows customers to have journaling pre-started on the target machine in a HA replication environment without incurring a significant performance penalty. Customer can expect to see much more rapid failover time from a production to backup machine in high availability cluster environments.

The default settings for DB2 UDB access path protection (SMAPP) have been lowered 70 minutes to account for the growth in processor performance, protecting customers from spending more than 70 minutes of access path rebuild time during an abnormal system restart. It also provides additional granularity allowing customers to explicitly journal access paths defined over physical files which are attached to standby journals.

Disk Migrate While Active with OS/400 V5R2 further enhances availability by supporting concurrent migration of disk subsystem data during normal operations. This capability is available through the Start ASP Balancing (STRASPBAL) command with options to mark and move data off disk subsystems. These new options provide customers the options to migrate the majority of data, for example, from SPD-attached I/O towers to HSL-attached I/O and significantly reduces the time required to keep the system in a restricted state.

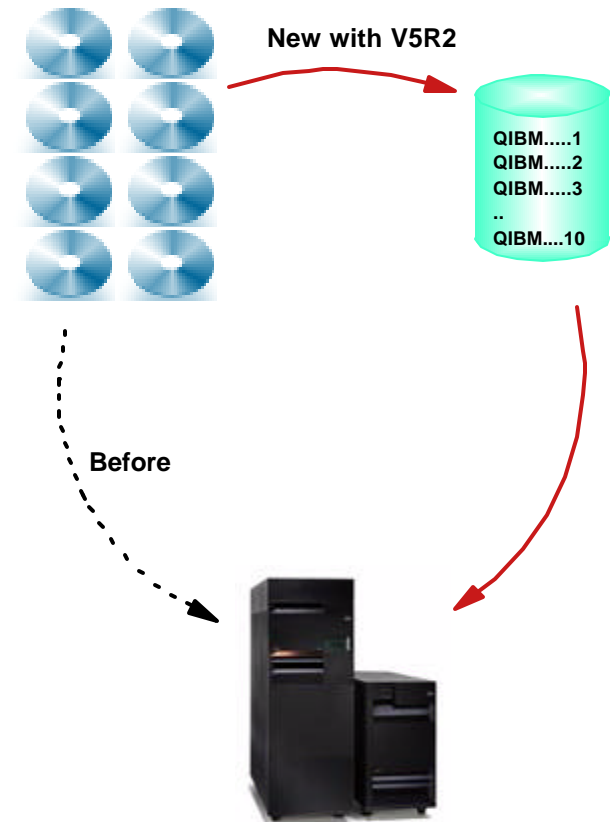
IBM Tivoli Storage Manager (TSM) V5.1 product becomes available on iSeries in October, 2002 (available on other supported platforms in April 2002). The support interface is similar to the support on IBM's AIX operating system, because of its running under V5R2 PASE. This makes the level of Tivoli Storage Manager functions on iSeries generally equivalent to V5.1 on other supported operating systems. Prior to this announcement, iSeries TSM was at V3.1 level. Plans call for TSM on iSeries to be kept up to date with all new releases of TSM. TSM V5.1 improves performance on all supported operating systems. We have a few foils on Tivoli Storage Manager V5.1 for iSeries later in this presentation.

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 - ▶ DB2 UDB Enhancements
 - ▶ High Availability and Switchable ASP
 - ▶ Virtual Media Install
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Virtual Media Install

- Automate OS/400, LPP and PTF install through virtual media
 - ▶ Isolated from media errors, and user intervention
 - ▶ Improves system availability
- Enabled with OS/400 V5R2
 - ▶ Release upgrades extended to support V5R1 through PTFs (PTF SI03120, Optical Support)
- Easy configuration steps
 - ▶ Create a virtual image catalog and point installation or PWRDWNSYS command to IFS path:
 - CRTIMGCLG IMGCLG(JIMCIC) DIR(jimc)
CRTDIR(*YES) TEXT('New V5R2 Image Catalog')
 - PWRDWNSYS RESTART(*YES)
IPLSRC(*IMGCLG) IMGCLG(image-catalog-name)



Notes: Virtual Media Install - 1 -

In addition to using optical media, tape, or an alternate installation device to install a new release, you now have the option of using image catalogs. Image catalog installation is particularly useful for optical media verification, for unattended installations and for upgrading software within a network. You can use an image catalog to perform a software upgrade, install PTFs (fixes), or install single licensed programs that you receive on media.

Information about upgrading from V5R1 to V5R2 will be made available through V5R1 PTF SI03120, Optical Support.

An image catalog is an object on the server that can contain up to 64 optical images. Each catalog is associated with one user-specified integrated file system directory. The system-recognized identifier for the object type is *IMGCLG.

When you use an image catalog, you preload all your media so that you do not need to handle the physical media when you perform the installation. You do this by copying the images from the physical media to a file in the integrated file system and then use these preloaded images to install.

Image catalog requirements:

- An image catalog upgrade works like a D-mode IPL without a console during the installation of Licensed Internal Code.
 - System reference codes (SRCs) are used to display the status.
 - Installations done by using image catalogs require a command line to initiate the installation.
 - An installation cannot be performed if an independent auxiliary storage pool (ASP) is accessible. Image files cannot reside in an independent ASP.
 - Virtual optical devices do not support the following:
 - The LODRUN command using multiple media.
 - Changing a primary language from secondary language media.
 - The load-source disk unit must be at a minimum 4-gigabyte.
 - To perform an installation using image catalogs, you must have at least 1 GB of free storage on the load-source disk unit.
 - Use the Start ASP Balance (STRASPBAL) command, if needed, to free up space on the load-source disk unit
- Details ahead in the presentation

Notes: Virtual Media Install - 2 -

To install PTFs

To install the PTFs you only need to point to the Virtual Optical Device.

Example: - You can say Go PTF -- Option 8 and on the next screen in the device option give the name of the Virtual Optical device and it will install the PTFs.

To install LPPs

To install the LPPs also you only need to point to the Virtual Optical Device.

Example: - You can say Go LICPGM -- Option 1 (Install all) and on the next screen in the Installation device option give the name of the Virtual Optical device and it will install the LPPs.

To perform a Software Upgrade from V5R2-to-V5R2 and above

When performing a software upgrade you point to the image catalog instead of the Virtual Optical Device.

When preparing for an upgrade, you need to verify that the required media for an upgrade exist and are sorted in the correct sequence. To begin the Upgrade issue the following command on the command line:

- PWRDWNSYS RESTART(*YES) IPLSRC(*IMGCLG) IMGCLG(image-catalog-name)
 - IPLSRC - Specifies the image catalog used when IPLSRC(*IMGCLG) is selected
 - IMGCLG - the name of the image catalog in library QUSRSYS which contains the install media for the upgrade.

After the system is powered down, an install using the specified image catalog is performed. RESTART(*YES) must be used when this parameter is specified.

Notes: Virtual Media Install - 3 -

To perform a Software Upgrade from V5R1-to-V5R2

The PTF SI03120 provides this support in V5R1 to upgrade from an image catalog. As the support is provided by a PTF, you get the same functionality but not all the commands are same.

In V5R1 the major differences are

- the system-recognized identifier for the image catalog object type is a *USRSPC instead of *IMGCLG. These will get converted to *IMGCLG objects as part of the upgrade.
- The image catalog name is restricted to QUPGRADE1, QUPGRADE2 and QUPGRADE3
- The 632B (Virtual Optical Device) device type doesn't exist in V5R1. Customers will be given instructions on how to create it via CRTDEVOPT command with a special resource name of QVRTOPT.
- PTF and LPP installation is not supported.

After preparing the image catalogs and verifying that the required media for an upgrade exist and are sorted in the correct sequence, issue the following command on the command line:

- STRVRTINS IMGCLG(catalog-name)
 - IMGCLG - the name of the image catalog in library QUSRSYS which contains the install media for the upgrade

This is a new command which comes along with this PTF. On issuing this command, the media in the catalog is verified. If any problems are found, a message will be issued and the command will return. Otherwise a PWRDWNSYS RESTART (*YES) command will start with the IPLSRC coming from the image catalog.

Notes: Virtual Media Install - 4 -

Image catalog installation requires at least 1 GB of free space on the load-source disk unit of your server. If you are using an image catalog to install software, perform the following steps to clean up the disk unit, verify how much free space you have available and if less make it available:

General cleanup tasks

- Use the automatic cleanup option in Operational Assistant to keep your system free of unnecessary clutter
- Permanently apply any PTFs that are temporarily applied on your system
- Delete PTF save files and cover letters
- Delete any software applications that you installed from software sampler CD-ROMs.
- Delete licensed programs or optional parts that you no longer used
- Delete any user profiles that you no longer need.
- Delete the enrollment for any user who is no longer with your organization

For V5R2:

Use the Work with Disk Status (WRKDSKSTS) command to determine if your load-source disk unit (unit 1) has at least 1 GB of free space. If you do not have 1 GB of free space, continue with the following steps:

- Use the Start ASP Balance (STRASPBAL) command to end the allocation for storage in the load-source disk unit:
 - STRASPBAL TYPE(*ENDALC) UNIT(1)
- Use the STRASPBAL command to move data off of the load-source disk unit:
 - STRASPBAL TYPE(*MOVDTA) TIMLMT(30)

Use the WRKDSKSTS command to monitor when the disk unit has 1 GB of free space. Repeat the previous step until you have 1 GB of free space.

For V5R1


Use the Work with Disk Status (WRKDSKSTS) command to determine if your load-source disk unit (unit 1) has at least 1 GB of free space. If you do not have 1 GB of free space, continue with the following steps:

- Use the STRASPBAL command to move data off of the load-source disk unit:
 - STRASPBAL ASP(1) TYPE(*CAPACITY) TIMLMT(30)

Use the WRKDSKSTS command to monitor when the disk unit has 1 GB of free space. Repeat the previous step until you have 1 GB of free space.

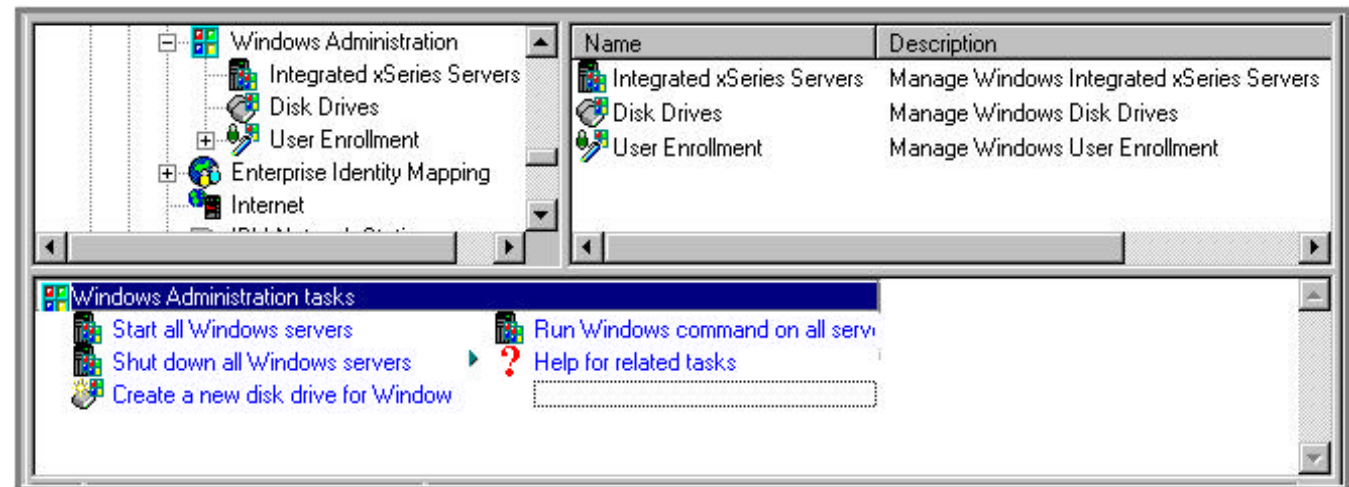
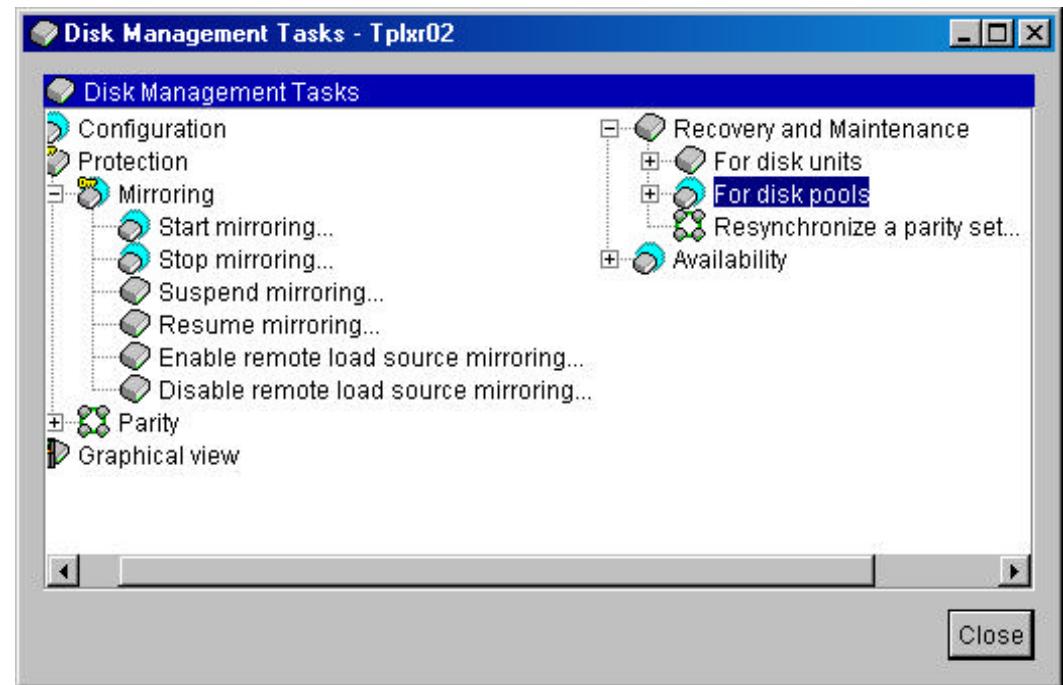
Note: You need to have enough free space in ASP1. The STRASPBAL command will balance (by percentage) the storage allocated to each unit within the specified ASP.

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Self-Configuring Disk Management

- Create, manage and monitor storage virtualization on iSeries
 - ▶ Base (user) pools
 - ▶ Primary, Secondary Independent pools
- Self-guided configuration wizards
- Simplification of complex disk management tasks
 - ▶ RAID-5 and Mirroring
- SAN-like storage management for Windows Servers through IXA/IXS
 - ▶ RAID-5, mirroring
 - ▶ Switched disk



Notes: Self-Configuring Disk Management

Managing your disk units and disk pools is a straightforward process with the help of iSeries Navigator that implements a graphical view so that customers can see exactly where their disk units are located and obtain configuration information about each of the disk units within their configuration. iSeries Navigator offers several wizards that simplify configuration tasks allowing customers to manage their storage. Most of the Dedicated Service Tools (DST) or the System Service Tools (SST) interfaces to manage disk storage have been automated through iSeries Navigator replacing multiple menus and command options with a simple, easy to use, secure graphical interface. OS/400 V5R2 also provides several options for parity set optimization within RAID-5 configuration.

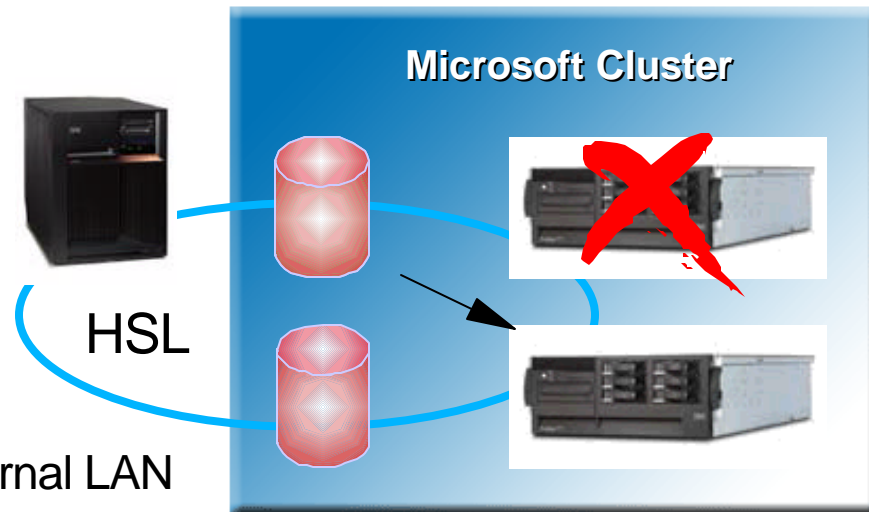
You can now create as many as 223 independent disk pools. Previous releases only supported 67 independent disk pools. In V5R1 independent disk pools were numbered from 33-99. That range has been expanded to 33-255 at V5R2.

V5R2 also introduces a new terminology called a disk pool group - made up of primary and secondary disk pools, used in a clustered environment with switched disks. For example, customers can create a disk pool group to isolate journal receivers from the objects for which they contain journal entries. The primary disk pool could contain the libraries, journal and objects to be journaled, while the secondary disk pools could contain the associated journal receivers. The journals and journal receivers would remain separate for maximum performance and recoverability, but they would function together in the disk pool group, and will be switched together also.

Managing storage requirements for Windows users through OS/400 provides additional simplicity and extends the rich functions such as dynamic disk add, automatic disk protection through RAID-5 or mirroring, and the ability to extend switch disk capabilities to Windows server environments. iSeries' integrated SAN-like storage virtualization environment extends storage automation to Windows application allowing customers to consolidate multiple Windows servers through the Integrated xSeries Server of the Integrated xSeries Adapter.

Windows Server Management

- Microsoft Cluster Service
 - ▶ Availability solution for planned and unplanned outages
 - ▶ Dynamically switch storage spaces (disks) between Windows servers
- xSeries™ servers
 - ▶ IXA now supports latest x360 and x440 servers
- Virtual Ethernet
 - ▶ Higher performance (1 Gbps) for multi-tier applications and backup
 - ▶ High-speed interconnect without external LAN
 - ▶ Connects multiple Windows servers, Linux and OS/400 partitions
- Run Windows command, use new wizards to install of versions, service packs, hot fixes



See <http://www-1.ibm.com/servers/eserver/series/windowsintegration/>
Select xSeries Server Models Supported.

Notes: Windows Server Management

With OS/400 V5R1, the Integrated xSeries Adapter (IXA) that attaches up to a 4-way xSeries server directly to the iSeries through the High Speed Link (HSL), with the management of storage and users controlled from iSeries. With this announcement, we are supporting the 4-way x360 and the new x440 with its Enterprise-x architecture. The x440 models have a wide range of multiple processor configurations. Review iSeries documentation at August general availability for specific iSeries support.

Microsoft Cluster Service now enables Integrated xSeries Servers (IXS) for xSeries connected internally or through an internal Integrated xSeries Adapter to have their disk clustered inside iSeries, switching disk storage from one server to another server in case of a failure. The Microsoft cluster support is managed through the Microsoft cluster support interface - not through iSeries Navigator. However, iSeries Navigator has the same start/stop, resource utilization displays, user enrollment and disk management functions for this server as other Windows servers.

The Opportunities to sell the Integrated xSeries Server and Integrated xSeries Adapter, with new xSeries hardware and Microsoft Clustering support, include:

- **Branch Office:** The IXS is a great solution for a branch office environment where a small number of users need access to OS/400 and Windows applications. One iSeries server (e.g., 270) with an IXS can support these users. This environment can be managed centrally with tools like Operations Navigator, Management Central, and Windows 2000 Server Terminal Services.
- **Large Consolidation:** Consolidate multiple Windows servers with the IXS and IXA. iSeries provides storage area network services, server management, and user management for the attached Windows servers.
- **Windows Server:** The IXS is a Microsoft logo'ed Windows NT and 2000 server. The xSeries servers that support the IXA are Microsoft logo'ed for Windows 2000 Server. As a result both of these offering support the various Windows server applications including File/Print, IIS, Exchange, and SQL Server.
- **Citrix Metaframe:** This Citrix product supports running the heavy Windows client application on server (IXS or direct attach with IXA) and sending the user interface to client. In this environment a new Windows application can be used by older, smaller, and even non-Windows clients.
- **Complementary Application Support:** Application requires OS/400 and Windows servers.

OS/400 V5R2 also enables Virtual Ethernet LAN support for Windows servers to communicate with OS/400 and Linux partitions. A three tier application with the front end installed on the Windows server can now use the Virtual Ethernet for high speed interconnect to the iSeries database.

In addition with V5R2 Windows Administration , you can run a Windows command and perform Windows Service functions on a Windows server to install or uninstall:

- the latest version
- the latest service pack
- a hot fix

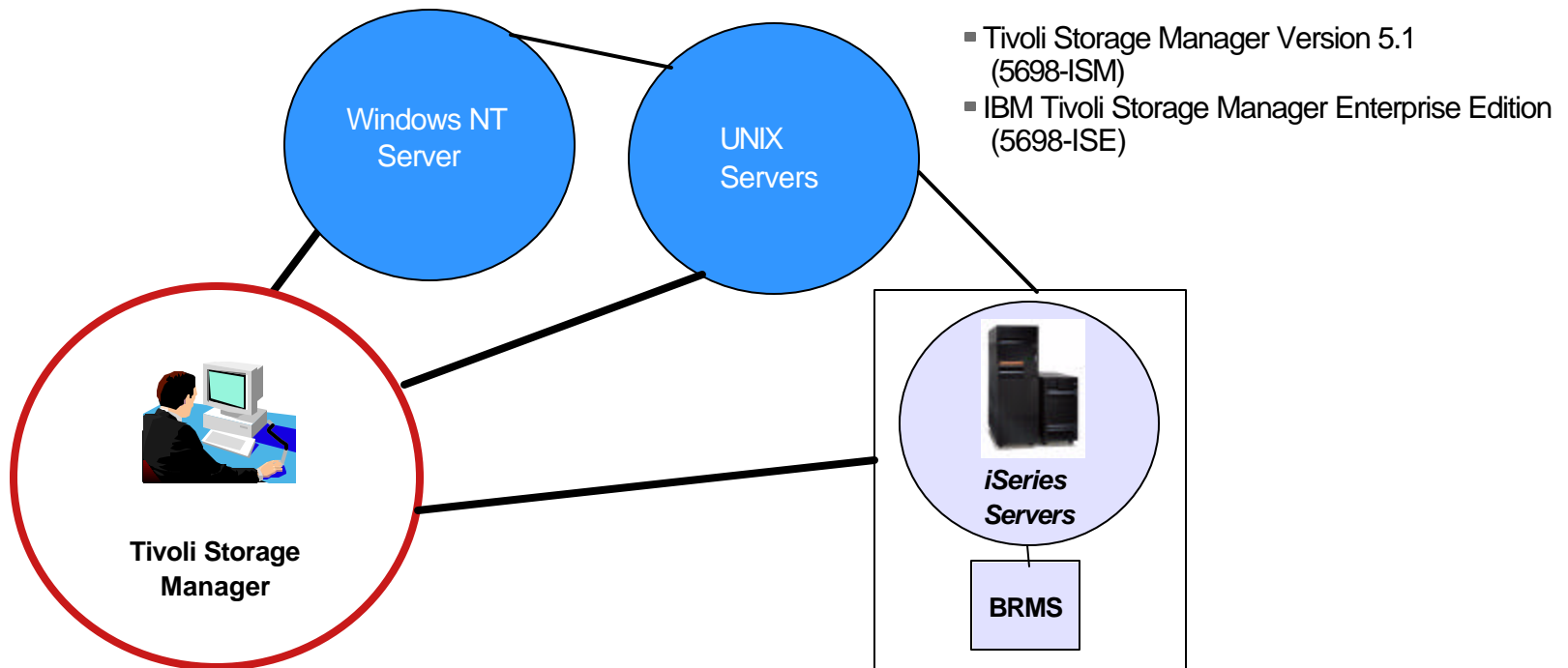
Note: the iSeries Navigator folder name has changed to "Integrated xSeries Servers."

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- Performance at Your Fingertips
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 - ◆ Tivoli Storage Manager
 - ▶ Enterprise Identity Mapping
 - ▶ Secure High Performance Apache Web Serving

Tivoli (TM) Storage Manager

- Version 5.1.5 on iSeries generally corresponds to V 5.1.5 on other operating systems
 - ▶ Centralized backup processes for iSeries and other platforms
 - Servers: OS/400, Windows NT, Sun Solaris, HP-UX, IBM AIX, MVS
 - Clients: OS/400 using BRMS, Window 95/98/NT/2000, AIX, Apple Macintosh, HP-UX, NewWare, OS/300 UNIX System Services, OS/2, SCO UnixWare, Sequent PTX, SGI IRIX, Sun Solaris, Tru64, Windows 32-bit DEC Alpha
 - ▶ Significant improvement in function and performance over previously available V3.1 on iSeries



Notes: Tivoli (TM) Storage Manager

This foil places the new Tivoli Storage Manager V5.1 for iSeries along with TSM V5.1 on other platforms.

TSM is used by 80 Fortune 500 companies to protect approximately 1 million systems worldwide on the platform operating systems shown in this foil.

Tivoli Storage Manager has two unique features - its incremental backups that only backup the files that have changed since the last backup, and its ability to effectively utilize the disk and tapes in its storage hierarchy. The combination of these two mean less data being sent over your network, less tape drives needed to write the data and fewer tapes needed to store that data.

Tivoli Storage Manager does more than just backup your clients data - it has numerous products that integrate directly with the centralized server. These products allow you to backup your application databases, help you generate a plan for recovering from a disaster, move seldom used files off of clients local disk to near line storage, and generate in-depth reports to help you analyze and forecast your backup procedures.

Notes: Tivoli (TM) Storage Manager - 2 -

On iSeries TSM can be optionally combined with Backup and Recovery Media Services (5722-BR1) to provide a single centralized backup and recovery solution to your entire storage server environment. TSM helps reduce management costs by enabling users to perform backups and recoveries from a graphical interface on Web clients and set up automated backups according to the time considerations for each network environment.

There are two separately packaged Tivoli Storage Manager products:

- IBM Tivoli Storage Manager Version 5.1 (5698-ISM) — for basic backup-archive over a LAN
- IBM Tivoli Storage Manager Enterprise Edition V5.1 (5698-ISE) — to exploit advanced functions including LAN-free backup-restore to tape and disk, library sharing, space management, disaster recovery management, and NDMP support. IBM Tivoli Storage Manager Enterprise Edition is required if you want to use a library that has more than two drives or more than 40 tape slots. The functions that were in Tivoli Disaster Recovery Manager, Tivoli Space Manager, and Tivoli Data Protection (TDP) for NDMP, are included in IBM Tivoli Storage Manager Enterprise Edition. More about these "sub functions" functions later in this presentation.

Tivoli Storage Manager V5.1.5 for iSeries provides a significant set of enhanced functions and improved performance over the previous version available on the iSeries - at the V3.1 function level. TSM has made many changes since then and most, except for SAN-based support functions, apply to the new iSeries TSM V5.1.

Support for iSeries V5R1 and V5R2 became available in October, 2002. TSM 5.1 support on other operating systems ("platforms") became available during April 2002. iSeries support is integrated into the already existing TSM V5.1 support functions as follows:

- Customers ordering 5698-ISM after the October 5.1.5 GA will get the iSeries package with all the other servers; existing customers will get a refreshed autoship of the package which will include the iSeries server.
- Customers will get the new iSeries entitled publications (Quick Start) as part of the new or autoshipped package described above. After GA a user can download non Entitled documentation from the Tivoli Information Center or the IBM publication center or purchase from the IBM Publications Center.

The next few foils describe Tivoli Storage Manager (TSM) V5.1.5 capabilities on iSeries. There are some additional TSM V5.1.5 functions that are uniquely available in each platform (operating system) that would not be on iSeries.

TSM V5.1.5 for iSeries: General Information

- Significant enhancements over previous (V3.1) level TSM support on iSeries
- TSM V5.1.5 runs in OS/400 PASE
 - ▶ OS/400 V5R1, V5R2 under PASE
 - Starting with V5R2 OS/400 PASE (OS/400 option 33) is now a no-charge, no order required option
 - ▶ Install Tivoli Storage Manager V5.1.5 for iSeries, 5698-ISM or Tivoli Storage Manager V5.1.5 for iSeries Enterprise Edition, 5698-ISE, with RSTLICPGM
- Improved integration with Backup and Recovery Media Services (BRMS), 5722-BR1
- TSM V5.1.5 for iSeries Improved Availability
 - ▶ Application availability is improved during backups by providing on-line, non-disruptive image backups
 - ▶ High availability support is provided with HACMP failover for the AIX backup-archive and HSM clients

Notes: TSM V5.1.5 for iSeries: General Information

The IBM Tivoli Storage Manager V5.1.5 products provide a server that runs on OS/400 PASE (Portable Application Solutions Environment). OS/400 PASE is an integrated runtime environment for AIX (or other UNIX®-like) applications running on the IBM iSeries system. With V5R1 OS/400 you must explicitly order PASE, option 33. Starting with OS/400 V5R2, option 33 comes with OS/400. In both cases Option 33 must be installed.

The IBM Tivoli Storage Manager V5.1.5 OS/400 PASE server has a UNIX look and feel, but contains the necessary modifications to permit it to function in the PASE environment. Tivoli Storage Manager V5.1 OS/400 PASE server, which generally supports the non-SAN environment enhancements that are part of V5.1, as discussed in this set of foils.

BRMS for iSeries, 5722-BR1 contains many save and restore functions on iSeries, which can optionally be used with TSM V5.1.5 as some TSM V5.1.5 functions provided on other platforms (operating systems) can be performed by BRMS on iSeries.

TSM V5.1.5 Availability enhancements for iSeries:

- Online Image Backups: Application availability is improved during backups by providing online, non-disruptive image backups. Applications remain available while online image backups create a point-in-time image backup of the file system. Image backups complement progressive incremental backups and can be used for faster recovery of large amounts of data in file systems with large numbers of files. Online image backups are available for Windows 2000 for FAT, FAT32, NTFS, and RAW volumes and for Linux x86 for Ext2, ReisterFS, and RAW LVM volumes.
- HACMP (High Availability Cluster Multiprocessing) support: Support for high availability is provided with HACMP failover for the AIX backup-archive, HSM (Hierarchical Storage Management) and API clients. HACMP failover automatically resumes normal operation on another node in the cluster after failover. Scheduled processes which have not completed are automatically restarted within the schedule start window. Otherwise, normal operation resumes with the next scheduled event. Support for automatic fallback when failed node rejoins the cluster is also provided as an option.

Limitations

iSeries OS/400 Save Security Data (SAVSECDTA), Save Configuration (SAVCFG), Save System (SAVSYS) command functions not supported. This is because the restore of the objects saved are included in a disaster recovery scenario, which requires the system to be in a restricted state. TSM cannot run in a restricted state.

SAN attached tape and disk (ESS) devices are supported. However, the Tivoli Storage Manager running under OS/400 PASE does not support specific Storage Area Network (SAN) capabilities, including support for LAN-free clients, tape library sharing, and server-free backup. Also, SNMP support and optical device support are not available with TSM V5.1 running under OS/400 PASE.

TSM V5.1.5 for iSeries: Improved Recovery

- Performance:
 - ▶ Recovery performance on Windows 2000 and Linux enhanced by utilizing fast image restores
 - ▶ Recovery performance further enhanced with parallel restores provided by multisession restore
 - ▶ Time to create recovery tapes for local and off-site vaulting is reduced with simultaneous writes to multiple copy storage pools during backup and archive with LAN clients
 - ▶ Self-tuning
 - ▶ Restore time can be improved by staging data to disk or by consolidating data on tape
 - ▶ Client backup set restore times are also improved
- Adaptive Differencing minimizes the amount of data transmitted over a network
- Improved backup performance available with journal-based backup supported on cluster configurations
- Disaster Recovery Manager functions included in Enterprise Edition
- Considerations:
 - ▶ Storage Area Network (SAN) capabilities, including support for LAN-free clients, tape library sharing, and server-free backup, not supported
 - ▶ SAVSECDTA, SAVCFG, SAVSYS not supported

Notes: TSM V5.1.5 for iSeries Improved Recovery - 1 -

Fast Image restores: Recovery performance on Windows 2000 and Linux x86 is enhanced by utilizing fast image restores. Image backups complement progressive incremental backups to provide full file system restores for disaster recovery or when a large percentage of a file system is to be restored.

Multisession Restores: Restore time is reduced when multisession restore sessions are used with the backup-archive clients. This enables restores from tape to run in parallel when data is stored on multiple tapes and the tape drives needed are available at restore time. The maximum number of tape drives that can be used concurrently can be configured by the administrator.

Simultaneous Writes To a Copy Storage Pool: The time to create recovery media for local and off-site vaulting is reduced with simultaneous writes to multiple copy storage pools. Duplicate copies of data for disaster recovery can now be created concurrently when backing up or archiving data with the LAN clients, provided that there are sufficient devices for each of the primary and copy storage pools. This can reduce the need for the sequential procedure of first completing the backup or archive and then creating the copies for vaulting.

Self Tuning: Tivoli Storage Manager uses an intelligent, adaptive algorithm to optimize performance for individual customer environments, while minimizing administrative intervention.

- The batch size and the threshold for server migration and storage pool backup will be adjusted to obtain better performance without running out of log space
- Server expiration processing will reset the database buffer pool, based on the cache hit ratio

Backup-Archive Client Multiple Sessions: Exploitation of backup-archive client multi-threading allows automatic multiple sessions for backup and archive tasks. Both the GUI and the command line are enhanced to display data from multiple backup streams.

Backup Sets: Backup sets can be used to create media for rapid recovery or instant archive. Backup sets can be used to restore data to backup-archive clients locally without a network or Tivoli Storage Manager server.

Instant Archive: Instant archive enables client archive sets to be created from backup versions of files already stored on the Tivoli Storage Manager server. In a networked storage management environment, this enables LAN-free (non-networked) records retention (archive) capabilities. The archive sets are created when the BACKUPSET command is issued to any supported sequential media, such as tape volumes. At creation, the sets can optionally be given a description and retention period to simplify tracking and expiration. The sets are tracked in the volume history file.

Notes: TSM V5.1.5 for iSeries Improved Recovery - 2 -

Fault-Tolerance: Enhanced fault-tolerant server support permits the skipping over of read-errors on tape if no readable copy of the file can be found. Before skipping over the error, the server will attempt to restore the file from a copy stored in an online storage pool, if any. The error will be reported to the server and the client. It is also possible that a good copy may reside in an off-site copy storage pool volume. If so, an informational message will inform the administrator that a volume can be brought on-site to help with the restore.

Full File System and Raw Logical Volume Backups: Full file system or raw logical volume images can be backed up and are managed as a single object by Tivoli Storage Manager policy like any other object on the server. **The function is implemented on the supported versions of the AIX, HP-UX, and Solaris backup-archive client platforms.** The Tivoli Storage Manager backup-archive client has a new option in the command line and GUI programs to create a file system image to backup which the client will send to the server as a single object. When using image backup at the same time with progressive incremental, the user will be able to restore images and incremental backups based on the image. A new option allows the user to perform an incremental by image date backup. Restores of single files from within an image will not be possible.

Out-of-Band Database Backups to Media: You need to prepare for disaster recovery by taking database backup media off-site. Out-of-band (snap shot) backups allow you to create Tivoli Storage Manager server database backups for movement off site, while maintaining your full and incremental database backup series on site, for availability purposes. Off-site management of the Tivoli Storage Manager server database snap shot backups can be performed by the Tivoli Disaster Recovery Manager.

TSM V5.1 for iSeries performance test results are planned to be documented during September 2002 at:

- Server side: <http://www.tivoli.com>
- Client side: <http://www.ibm.com/servers/eserver/series/service/brms/adsmperf.htm>

Notes: TSM V5.1.5 for iSeries Improved Recovery - 3 -

Tivoli Storage Manager for iSeries V5.1 functions continued - client-based functions:

- **Adaptive Differencing:** Adaptive Differencing technology fundamentally changes the way data may be transferred throughout the enterprise. Available for the AIX, Sun Solaris, HP-UX, Windows NT, Windows 2000, OS/400 PASE, and MVS™ **server platforms**, Adaptive Differencing technology transfers data by byte, block, or file level based on data size. This technology supports a variety of connectivity strategies, including LANs, WANs, Internet, and dialup connections. This application is designed for mobile computer users and other users with a need to minimize the amount of data transmitted over a network.

Mobile user data protection is enhanced with support for adaptive subfile level backup and encryption of data before it is transmitted over the network. With Tivoli Storage Manager Progressive Backup Methodology, only files that have changed are candidates to be backed up, therefore, eliminating unnecessary data transfers that rob your network and CPUs of vital power and productivity. With Adaptive Differencing, the backup-archive client dynamically determines the most efficient approach for creating backup copies changed bytes, changed blocks or changed files, delivering improved backup performance over dialup connections. With encryption, the backups being sent over the public phone lines are more secure, as are the files being stored on the Tivoli Storage Manager server.

Adaptive Differencing and encryption technology are supported on Tivoli Storage Manager backup-archive clients for Windows NT, Windows 2000, Windows ME, and Windows XP.

A file backed up using Adaptive Differencing initially sends a reference file to the Tivoli Storage Manager. Subsequent backups for that file send a delta file, which consists of the changed data from the reference copy. A restore operation reconstructs the file on the Tivoli Storage Manager client using the reference file and the delta file that represents the point in time for the restore request.

- **Windows 2000 Support:** The Tivoli Storage Manager client for Windows 2000 offers comprehensive protection of the Windows 2000 System State, including Active Directory, COM+ Class Registration Database, System Volume, and System Files. Other new Windows 2000 changes include disk quotas, encrypted files, distributed file systems, certificate server databases, MS cluster databases, reparse points utilized by volume mount points, directory junctions and removable storage manager databases, which are also fully protected through Tivoli Storage Manager backups and archives.
- **Journal-Based Backups:** Tivoli Storage Manager client journaling improves overall incremental backup performance for Windows NT and Windows 2000 clients. Performance is improved because the files to be backed up are tracked in a journal. Journal-based backups eliminate the need for the client to scan the local file system or query the server to determine which files to process. It also reduces network traffic between the client and server.

Notes: TSM V5.1.5 for iSeries Improved Recovery - 4 -

Tivoli Disaster Recovery Manager functions (included in the Enterprise Edition) helps you maintain business continuance by:

- Establishing and helping to automate a thorough disaster recovery plan
- Automating vital recovery steps to bring your business back to normal
- Managing and identifying off-site media needed for recovery
- Tracking and reporting systems destroyed, in event of disaster
- Performing restores in order of priority

The Tivoli Space Manager function uses hierarchical storage management (HSM) to automatically and transparently migrate rarely accessed files to Tivoli Storage Manager storage while the files most frequently used remain in the local file systems. By migrating rarely accessed files to the server

storage, Tivoli Space Manager frees administrators and users from manual file system pruning tasks by enabling you to have sufficient free storage at your workstation or file server, deferring the need to purchase additional disk storage. **The Tivoli Space Manager function is supported on the AIX and Sun Solaris platforms.** For the iSeries environment you can use TSM along with Backup and Recovery Media Services (BRMS) product, 5722-BR1, to accomplish corresponding HSM capabilities.

The Tivoli Data Protection for NDMP function provides backup and recovery support on Tivoli Storage Manager servers for network-attached storage (NAS) file servers from Network Appliance. NAS file servers often require a unique approach to providing backup and recovery services, because these file servers typically will not run third-party software. Tivoli Data Protection for NDMP utilizes the Network Data Management Protocol (NDMP) to communicate with and provide backup and recovery services for NAS file servers. NDMP is an industry-standard protocol that allows a network storage-management application to control the backup and recovery of an NDMP-compliant file server without installing third-party software on that server. The implementation of the NDMP server protocol enables the NAS file servers to be backup-ready and enables higher-performance backup to tape devices without moving the data over the LAN.

Planned Tivoli Storage Manager for iSeries support

- Currency with iSeries TSM on all supported platforms:
 - ▶ iSeries PASE TSM currency with other TSM servers will be maintained
- Exceptions:
 - ▶ No Storage Area Network (SAN)-based support planned (LAN Free, ...)
 - ▶ Domino support changes
 - TSM Domino support will not depend on nor require BRMS
 - June 2002: BRMS-based solution to backup Domino (data does not go to TSM)
 - Future: TSM for Mail/Domino solution will backup to TSM

IBM plans and directions are subject to change without notice

Notes: Planned Tivoli Storage Manager for iSeries support

Limitations

As previously stated The Tivoli Storage Manager V5.1 OS/400 PASE server does not support and has no plans to add the SAN-based functions, including support for LAN-free clients, tape library sharing server-free backup, and Server free, There are no plans to add SNMP support and optical device support.

Additional information:

See the following for additional information:

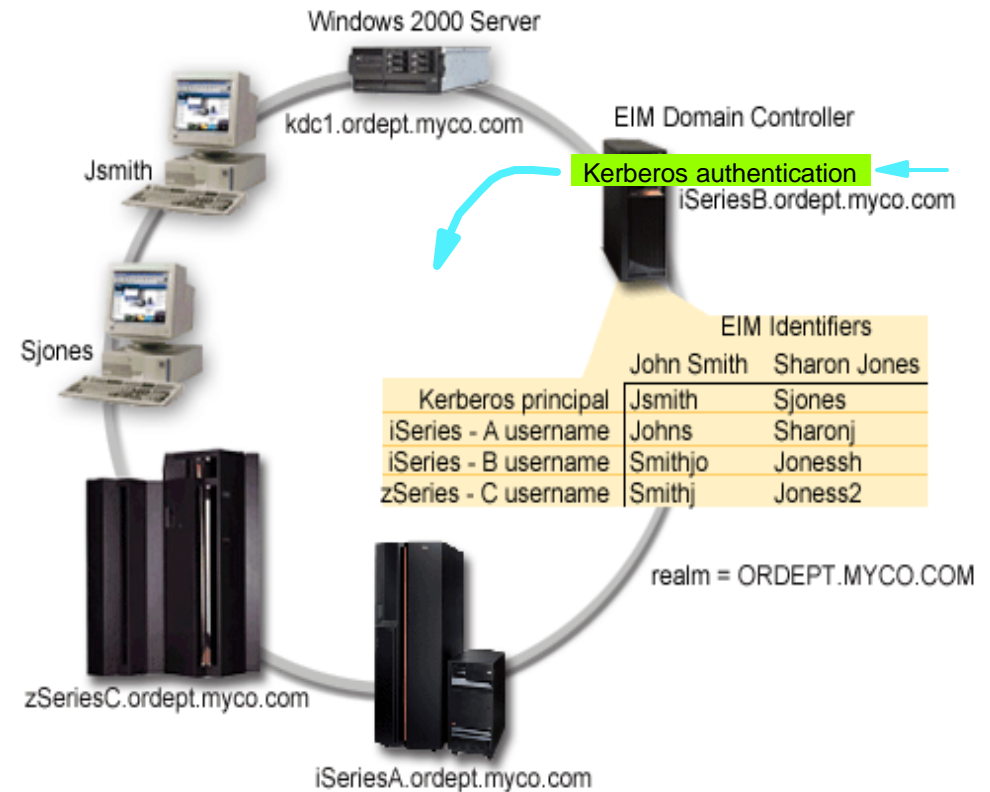
- The Tivoli Storage Manager V5.1.5 announcement letters, at <http://www.ibm.com/support> -> Announcement Letters for:
 - US: 202-078, April 09, 2002
 - EMEA: ZP02-0172, April 09, 2002
 - AP: AP01-1106, April 09, 2002
- <http://www.tivoli.com/products/solutions/storage/news.html>
- Server side: <http://www.tivoli.com>
- Client side: <http://www.ibm.com/servers/eserver/series/service/brms>

Agenda

- Performance at Your Fingertips
- Adaptive Storage Virtualization for High Availability
- Flexible, secure Management of e-business Infrastructure
 - ▶ Tivoli Storage Manager
 - ▶ Enterprise Identity Mapping
 - ▶ Secure High Performance Apache Web Serving

Enterprise Identity Mapping

- The industry's first Enterprise Identity Mapping implementation
- Simplifies authentication process for users on multiple operating systems
- Enables single signon
- Helps reduce the costs of user identity, password and network administration
- Simplifies the development of multi-tier, multi-server applications



Notes: Enterprise Identity Mapping

Most computer users today access multiple servers and applications with different user identities and passwords. As a result, the most common help desk call is to reset a password driving up the cost of security administration. Aside from complex security administration, there is also no common standard today for application developers to enable security, resulting in unique and complex implementations of user registries and security semantics for each major application..

OS/400 V5R2 delivers the first implementation of Enterprise Identity Mapping (EIM), a self-protecting security element of IBM's autonomic computing initiative. EIM helps customers reduce the costs of security administration by associating and tracking a user's multiple security identities across a multi-server, multiple application network. EIM provides an infrastructure that allows users to easily and inexpensively build applications or interfaces to **enable single signon environment**, regardless of the server platform. It also enables programmers to write simpler and more secure applications without forcing users to sign on and authenticate to each server in a network.

iSeries exploits both EIM and Network Authentication Services (NAS), IBM's implementation of Kerberos and the General Security Service (GSS) APIs. Configured together, these two technologies (EIM and Kerberos), allow administrators to enable a single signon environment.

Windows⁷ 2000, XP, AIX⁷ and zSeries[™] use the Kerberos protocol, allowing iSeries to extend EIM to these platforms as well as enabling EIM support in iSeries Navigator (its associated Host Servers) , PC5250 Emulation (Telnet servers), SQL, DDM, DRDA⁷, NetServer and QFileSrv.400 environments.

The following foils provide additional information on using EIM and Kerberos together. Note the Kerberos Principle name as one of the EIM identifiers.

The detailed Security presentation has more details. There is also expanded EIM information on V5R2 Information Center under Security -> Enterprise Identity Mapping.

EIM Terminology

- Multiple technologies are incorporated into Enterprise Identity Mapping functions. Although some EIM terminology may be familiar, some of the EIM terminology and other terms may be new to you.
- Understanding these terms will help you plan and implement EIM capabilities and single signon enablement.
 - ▶ Alias
 - ▶ EIM authorities
 - ▶ EIM domain controller
 - ▶ EIM identifier
 - ▶ EIM identity mapping association
 - ▶ Identity mapping lookup operation
 - ▶ LDAP distinguished name
 - ▶ LDAP parent distinguished name
 - ▶ User identity
 - ▶ User registry

- User identifier <-> EIM identifier
 - ▶ Source association
 - ▶ Target association
 - ▶ Administrative association

Notes: EIM Terminology - 1 -

This foil and these notes are provided because some of the EIM terms are used in the examples that follow.

Alias

You can create one or more aliases for an "EIM identifier" or a "User registry" to provide additional information by which the identifier or registry is known. Aliases can be used to help find a specific EIM identifier or user registry during a search or "Identity mapping lookup operation". **An alias does not have to be unique within the EIM domain** because it is additional information, not an actual object name.

You can "Add an alias to a user registry" either for an EIM identifier or for a user registry. An EIM identifier alias supplies more information about the person or entity that the EIM Identifier name represents.

EIM authorities

EIM authorities describe and provide authorization for an EIM user to perform specific administrative tasks or "Identity mapping lookup operation." Only users with EIM administrator authority are allowed to grant or revoke authorities for other users. EIM authorities are granted to users identities that are known to EIM. These user identities can be LDAP distinguished names or Kerberos principals.

EIM domain controller

The EIM domain controller is an LDAP directory server that is configured to manage, and control access to, all EIM data for an EIM domain. The EIM domain controller can be either local or remote. A domain controller is considered to be local when it is configured on the same system that you are using to conduct EIM operations. A domain controller is considered to be remote when it is configured on a different server, separate from the server you are using to conduct EIM operations.

EIM identifier

An EIM identifier represents an actual person or entity in EIM. When you create an EIM identifier, you associate it with the "User identity" for that person or entity. Using these "EIM identity mapping associations", or identity mappings, helps you simplify the administrative task of keeping track of all of the user IDs that a person or entity has in the enterprise.

Notes: EIM Terminology - 2 -

EIM identity mapping association

A single signon enabled environment is made possible by associating the various user identities of a person or *entity* to a single "EIM identifier" for that person or entity. By associating all of a person's (or entity's) user identities with that person's corresponding EIM identifier, applications and operating system functions can then use EIM APIs to map from an authenticated ID in one user registry to a different ID in another user registry that represents the same person.

You can create three different types of associations between a user identifier and an EIM identifier

- Source association
 - Source association indicates that this "User identity" (ID) can be used as the source in a "Identity mapping lookup operation"
- Target association
 - Target association indicates that the user ID can be returned as the result of a mapping lookup operation.
- Administrative association
 - Administrative association with an EIM identifier is typically used to show that the person or entity represented by the EIM identifier **owns a user ID within a specified system or application user registry which requires special treatment.**

Identity mapping lookup operation

An identity mapping lookup operation is conducted by an application that uses the appropriate "APIs for EIM" (eimGetTargetFromSource() or eimGetTargetFromIdentifier() APIs). By allowing the operating system and applications to perform a mapping lookup operation to access this information at run-time, the operating system and applications can easily use one "User registry" for authentication while using an entirely different user registry for authorization.

LDAP distinguished name

An LDAP distinguished name (DN) is a Lightweight Directory Access Protocol (LDAP) entry that identifies and describes an authorized user for an LDAP server. The EIM wizard configures the iSeries Directory Server (LDAP server) to store the EIM Domain information. You can use LDAP distinguished names as a means of accessing and retrieving this EIM data so that your iSeries server can participate in a "Single signon enablement through EIM".

Notes: EIM Terminology - 3 -

LDAP parent distinguished name

An LDAP parent distinguished name (DN) is an entry in a Lightweight Directory Access Protocol (LDAP) directory server's namespace. LDAP directory entries are arranged in a hierarchical structure that reflects political, geographic, organizational, or domain boundaries. A distinguished name is considered a parent DN when the DN is at the highest level of the directory server's namespace.

User identity

A user identity (ID) is an entry in a "User registry". This entry is typically a string of alphanumeric characters, unique within the registry, that is used to represent a specific person or entity to a system or application. User IDs are associated with an "EIM identifier", which represents a person or entity within the enterprise.

User registry

A user registry contains a set of entries that represents a set of "User identity" that an operating system or an application either knows or trusts, or both. The set of user identities can be a complete system user registry or a subset of a system user registry that is used with a particular application.

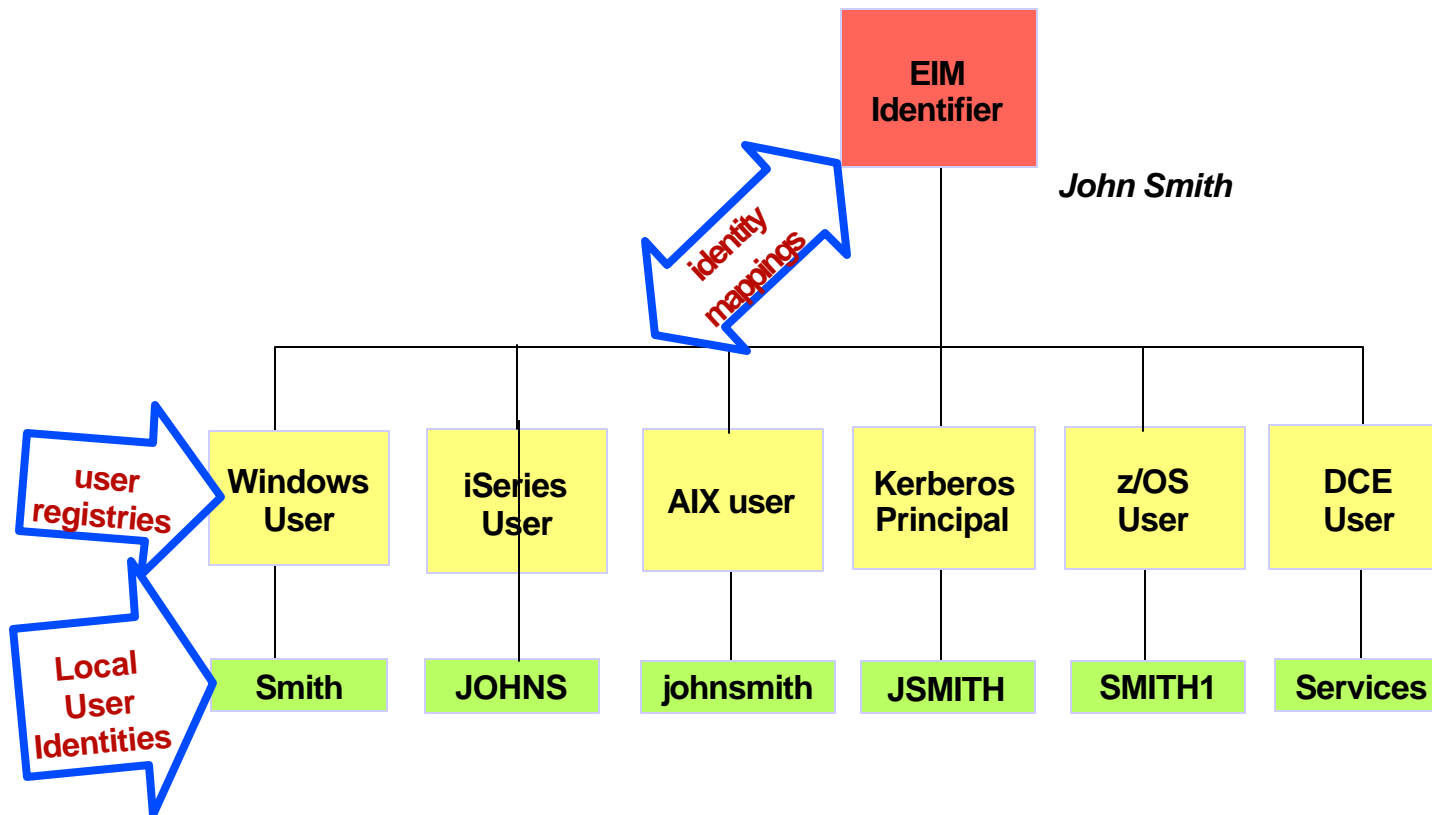
These user registry types are predefined in EIM:

- OS/400
- AIX R
- Kerberos
- Kerberos - case sensitive
- LDAP
- RACF
- Windows 2000
- Novell Directory Services
- Policy Director

The next few foils show how EIM can work for "**EIM identifier** Jon Smith."

A Pictorial view of EIM

- An EIM identifier represents an actual person or entity in EIM.
- The identity associations (mappings) are stored in a well known location, for example, LDAP, with common services across platforms to access the mappings.



A Pictorial view of EIM - example

- Having created the needed EIM identifiers and associated them using different “EIM identity mapping association” your systems and users are ready to participate in a single signon environment



Notes: A Pictorial view of EIM - example

An EIM domain is much like a typical network domain except that the domain controller not only controls the access to the domain, but also stores all of the EIM data for that domain. By participating in an EIM domain, these systems can also participate in the single signon environment.

To be able to participate in the EIM domain, you configure EIM on each system and to participate in the single signon environment, you must also configure network authentication service on each system. You then add the appropriate system or application user registries to the EIM domain and create EIM identifiers to represent each user in EIM.

In our example, John Smith, has user IDs on the following systems in the EIM domain:

- Windows NT/2000 PC - Smith
- iSeriesA server - JOHNS
- AIX server - johnsmith
- Windows 2000 server (Kerberos Principal) - JSMITH
- zSeries server: SMITH1

John's EIM identifier, John Smith, represents him as a person in EIM and the various user identities he has on the various systems. They can then be mapped to, or "EIM identity mapping association" with, his EIM identifier to establish the relationship between them. The types of associations that you create affect the way in which the associated user identity can be used in EIM.

In our example, the iSeriesA server (upper left system) is highly secure and you want to restrict John's access to the system so that he must authenticate directly to the server. To do this, you create an administrative association between the John Smith EIM identifier and the JOHNS user identity on iSeriesA.

With this type of association, you can see that John Smith owns an account on iSeriesA, but EIM cannot return information about this identity in a "Identity mapping lookup operation".

Having created the needed EIM identifiers and associations, your systems and users are ready to participate in a single signon environment.

Other Components in the EIM Domain - NAS

- Network Authentication Service (NAS) enables the iSeries to use Kerberos tickets for authentication instead of user ID and password
- Applications can identify users and securely pass on the identity to other services
- NAS builds on the Kerberos Network Authentication Service (RFC1510)
- By using APIs, EIM can also be used without NAS for other purposes



Notes: Other Components in the EIM Domain - NAS

You can use a Kerberos ticket as an optional replacement for a user name and password for authenticating a user. In a single signon network you would typically use Kerberos to provide the authentication function, though it is technically possible some other authentication function could be used.

Kerberos (primarily developed by the Massachusetts Institute of Technology (USA)) protocol allows a principal (a user or service) to prove its identity to another service within an insecure network - Kerberos provides an "authentication service." Network Authentication Service enables you to use Kerberos authentication on your iSeries server. EIM "just" provides the mapping capabilities. It does not provide any kind of authentication. In order sign on to the network and use the mapped information you need some authentication mechanism.

In theory, you could use any kind of authentication mechanism that is available and use the EIM APIs in your application to achieve the same functions without Kerberos. But in practical terms where authentication is to OS/400 services, such as host servers, Telnet server, SQL, DDM, DRDA⁷, NetServer and QFileSrv.400, IBM has chosen a single authentication mechanism for EIM and facilities provided with Kerberos is that mechanism.

The Kerberos Key Distribution Center (KDC) service provides the network authentication process and EIM provides the mapping to the local system's user id and password. OS/400 does not support the KDC function. Most Linux distributions and Windows 2000 and XP can provide the KDC service authentication function.

See the Security presentation for more details.

Network Authentication Service verifies the identity of a user or service in a network. Applications can securely authenticate a user and securely pass on his or her identity to other services on the network. Once a user is known, separate functions are needed to verify the user's authorization to use the network resources. Network authentication service implements the following specifications:

- Kerberos Version 5 protocol Request for Comment (RFC) 1510
- Many of the de facto standard Kerberos protocol APIs prevalent in the industry today
- Generic Security Service (GSS) APIs as defined by RFCs 1509, 1964, and 2743

Network authentication service on the iSeries interoperates with authentication, delegation, and data confidentiality services compliant with these RFCs, such as Microsoft's Windows 2000 Security Service Provider Interface (SSPI) APIs.

Note that Kerberos is well known in the industry, but is not "active" in all networks. Also, Tivoli has a product/function - Tivoli User Administration (TUA) that offers user management across multiple systems and multiple operating systems. Currently there are distinct capabilities between EIM and TUA. There are future plans to have some formal integration between EIM and TUA capabilities.

Enterprise Identity Mapping and Tivoli Identity Manager

- Enterprise Identity Mapping is an infrastructure for enabling:
 - ▶ mapping of an authenticated user to an identity user on a specific operating system (registry) with specific authorizations on that operating system
 - ▶ for example, use Kerberos to authenticate a user at the logon screen, map that Kerberos identity to an OS/400* user profile and access resources on OS/400
 - ▶ a specific set of attributes to manage in the identity mapping tables on each operating system.
 - ▶ is not a security management function or tool
- Tivoli Identity Manager (TIM) enables:
 - ▶ multiple-company identity management
 - ▶ policy-based identity management across legacy and e-business environments
 - ▶ browser based management interface for EIM and non-EIM enabled systems (EIM under the covers makes TIM's job easier)
 - Automates the submission and approval processes for access requests and changes to user information
 - Enables users to perform password resets, password synchronization, ...

Agenda

- Performance at Your Fingertips
- Adaptive Storage Virtualization for High Availability
- Flexible, secure Management of e-business Infrastructure
 - ▶ Tivoli Storage Manager
 - ▶ Enterprise Identity Mapping
 - ▶ Secure High Performance Apache Web Serving



Secure High Performance Apache Web Serving

- Web Caching Accelerator ("FRCA")
 - ▶ Provides high performance, high volume Apache Web serving
 - ▶ More than doubles the capacity for non-secure page Web serving
 - ▶ Self-activating, easy to setup
 - ▶ Exploits caching techniques developed by IBM Research
- Secure Sockets Accelerator (#4805)
 - ▶ Cryptography adapter delivers optimized performance for Internet security checking
 - ▶ Secure Sockets Level (SSL) and Transport Layer Security (TLS) protocols
 - ▶ Multiple accelerators per system enable ultrahigh volume throughout
- IPv6 with self-configuring wizards
 - ▶ Simple network configuration using latest industry standards
- Firewall-friendly VPN with UDP encapsulation
 - ▶ Application-transparent security allow servers to remain behind firewall

Notes: Secure High Performance Apache Web Serving

OS/400 V5R2 provides a broad range of performance and security enhancements for customers using iSeries for web serving.

With OS/400 V5R2, the IBM HTTP Server Powered By Apache takes advantage of the high-performance Web caching technology that IBM pioneered in IBM research and was featured at the Nagano Olympics. This caching technology is referred to as Fast Response Cache Accelerator (FRCA) and implemented both in the operating system and within the system licensed microcode. Internal test results, documented in the V5R2 Performance Capabilities Reference manual, demonstrate significant performance improvements for not SSL data exchanges.

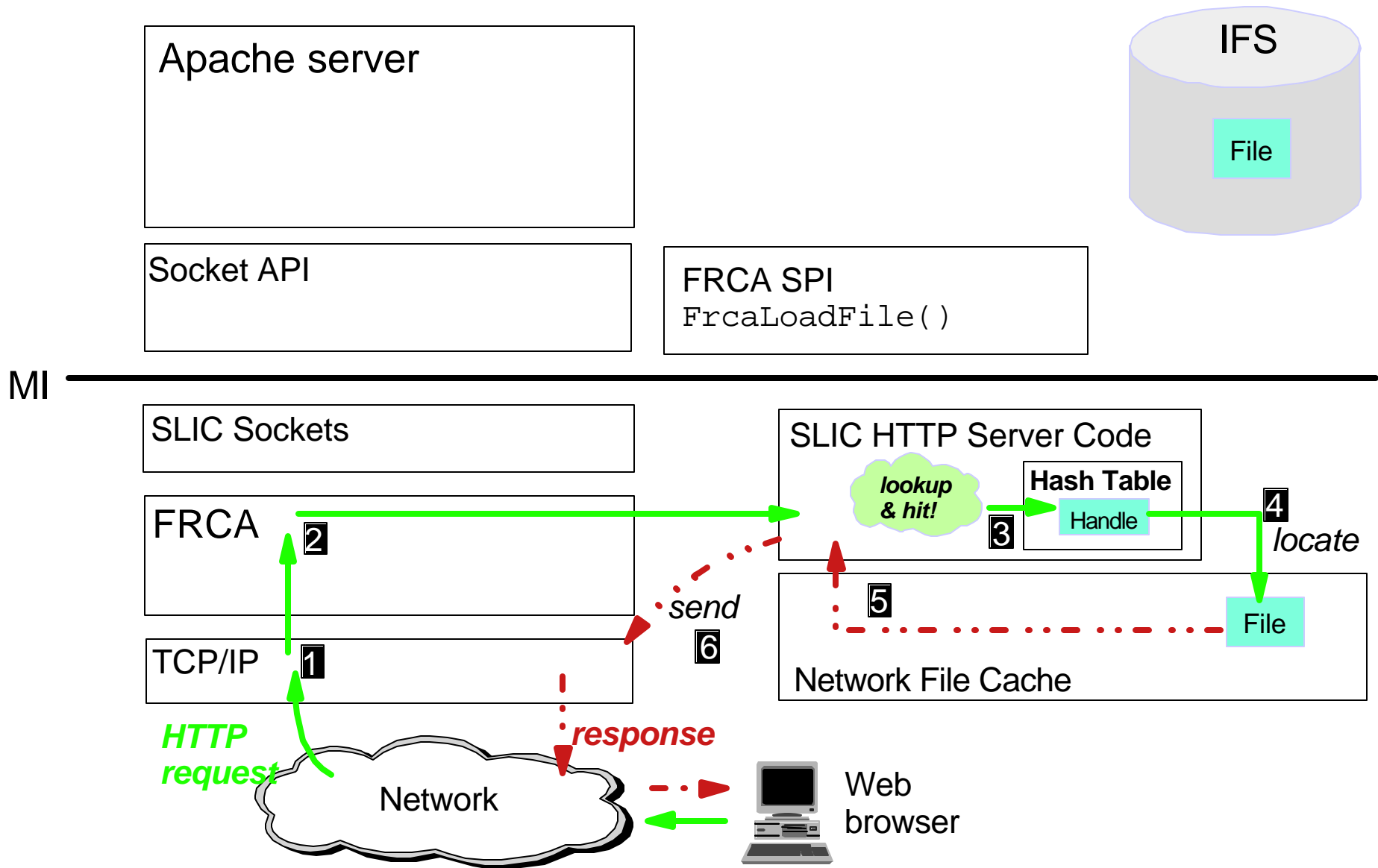
Most customers implementing secure web services uses secure sockets as part of their security infrastructure. With OS/400 V5R2, customers can now use the Cryptographic Accelerator for iSeries (#4805) as a high-performance, hardware-accelerator for their SSL handshaking processing. Originally designed to improve iSeries performance by rerouting the processing of private cryptographic keys away from the iSeries' main processor, this hardware assist feature provides ultrahigh performance to handle high volumes of SSL (Secure Sockets Layer) transactions.

OS/400 V5R2 incorporates the new IPv6 Internet Protocol version 6 (IPv6), which is designed to gradually replace Internet Protocol version 4 (IPv4). IPv6 was primarily intended to support that larger IP address scheme developed because the "world is running out of IP addresses!" IPv6 will have other enhancements as well, but it is currently an "evolving" protocol with frequent RFC documents suggesting changes. Customers using IPv4 today can continue using that level without reconfiguration if required.

Virtual private networking (VPN) is enhanced with OS/400 V5R2 with NAT compatible IPsec, also known as UDP encapsulation. By simply encapsulating the VPN traffic, it addresses the problem of incompatibilities between IPsec and network address translation (NAT) technologies. UDP encapsulation allows the iSeries to be located behind a firewall that uses NAT. It avoids locating iSeries on the perimeter of the network and using a public address when using VPN.

Note: The user interface to the iSeries provided by the HTTP ADMIN server has been significantly "re-engineered" for V5R2. This new look is based on customer survey feedback.

FRCA: Local Cache Hit Scenario



Notes: FRCA: Local Cache Hit Scenario

This foil shows the scenario when the file is found in the FRCA cache. That is, the cache hit scenario.

The steps from request through response are as follows.

- 1 An HTTP request received by TCP and passed to the FRCA.
- 2 The FRCA intercepts the HTTP request and passes it to the SLIC HTTP Server code.
- 3 The SLIC HTTP Server code parses the HTTP request and uses the URL as a search key into the HTTP logical cache (Hash table).
- 4 When the HTTP logical cache lookup is successful, Network File Cache (NFC) is called to locate the file data using the NFC handle found in the hash table.
- 5 NFC finds the file using the handle, and returns it to the SLIC HTTP Server code.
- 6 The SLIC HTTP Server code builds the HTTP response header and links the file data to it, and sends it as a response through TCP/IP.

The above path can result in a sizable performance (of a single transaction) and capacity (allowing more transactions per unit time) improvement due to:

- Never having to go above the MI. This results in:
 - No task switches to the threaded job model above the MI
 - Could (depending on a variety of things) save 2 copies of the data. FRCA will not copy the data it finds in the NFC. FRCA will directly send the data to the TCP/IP stack in the iSeries SLIC.
- Code path length should be shorter which will result in CPU utilization for cache hits to be lower.

FRCA Considerations

- No SSL/TLS supported for the FRCA enabled sessions/ports
- No authentication protection for the file in FRCA (NFC)
 - ▶ Contents should be for public access under FRCA
- No NLS code page conversion performed
 - ▶ IFS files are read in binary and loaded into the NFC cache as is

Notes: FRCA Considerations

FRCA does not support SSL and/or TLS (Transport Layer Security), therefore you cannot enable FRCA cache for the sessions or ports with SSL/TLS. The reason is because SSL and TLS works above MI while FRCA works below MI.

Since you can enable FRCA cache for each listen port, the ports with SSL and without SSL can coexist in the same server and can access them as a different server using virtual host.

Once the file has been loaded into the NFC, it can be accessed by any users accessing files in the same server instance. Entries in the NFC are keyed by instance so there is some protection between server instances that happen to be serving the same file (the file will actually be placed in the NFC twice in this case). This is because authorization check is also performed above MI.

When a request for the file that is already in the NFC comes, the file will be served without authorization check since FRCA has no way to do it. For this reason, you should enable the FRCA cache only for the contents that can be public.

Similarly, since the code conversion is also performed above MI, code conversion is not supported. IFS files are read in binary and loaded into the cache as is. Generally, you do not need any code conversion for the files in the IFS to be served by the HTTP server. So this limitation should have no impacts.

If you have the same contents in a different language, they contents must be in different files, or if they have the same name, they must be in different directories. Therefore, each file can be cached and served independently.

Note on Transport Layer Security (TLS) protocol: The TLS protocol provides communications privacy over the Internet. The protocol allows client/server applications to communicate in a way that is designed to prevent eavesdropping, tampering, or message forgery. The TLS protocol itself are based on the SSL 3.0 Protocol Specification as published by Netscape. The differences between this protocol and SSL 3.0 are not dramatic, but they are significant enough that TLS 1.0 and SSL 3.0 do not interoperate (although TLS 1.0 does incorporate a mechanism by which a TLS implementation can back down to SSL 3.0). See RFC 2246 for details. RFC 2246 can be found in several sources, one of which is V5R2 Information Center at Security -> Secure Sockets Layer -> SSL concepts.

Network File Cache Configuration

- IPL
 - ▶ The initialization of NFC occurs during IPL
- Configuration values in CHGTCPA command:
 - ▶ Enablement
 - ▶ Cached file time-out
 - ▶ Cache size

New

```
Network file cache:
  Enablement . . . . . *YES_____ *DFT, *CLEAR, *SAME, *YES, *NO
  Cached file timeout . . . . . 300_____ *NOMAX,30-604800 sec (1week)
  Cache size . . . . . 10_____ 10-100000 megabytes
```

Notes: Network File Cache Configuration

FRCA requires usage of the new for V5R2 Network File Cache. This foil explains Network File Cache is set up.

IPL

The initialization of the Network File Cache component will occur during the IPL when the other file servers are initialized.

Configuration values in Change TCP/IP Attributes (CHGTCPA) - new with V5R2

- Enablement
 - Specifies whether the Network File Cache (NFC) function will be enabled on this system. The default value is *YES.
 - When you specify *CLEAR for this parameter, it immediately clears the entire Network File Cache. After the cache is cleared, the previous Network File Cache values will be retained.
- Cached file time-out
 - Specifies the maximum amount of time, in seconds, that a file can be cached in the Network File Cache. This ensures that a file is refreshed at a regular interval. A value of *NOMAX is available.
 - A cache time can be specified when NFC is not enabled.
- Cache size
 - Specifies the maximum amount of storage that may be used by the NFC for the entire system. This is the accumulative storage used by all TCP servers for loading files.
 - A cache size can be specified when NFC is not enabled.

FRCA Configuration: Enablement

- FRCA cache can be enabled for each separate Listen
 - ▶ Listen [IP address:]port-number <optional parameter>
 - The <optional parameter> is "FRCA" and is used to enable FRCA cache
 - Examples:
 - Listen 10.5.5.5:80 FRCA
 - Listen 10.5.5.5:443
- Two directives to turn on/off other FRCA directives
 - ▶ To give you the ability to turn off FRCA without having to comment out numerous local cache or reverse proxy cache directives.
 - ▶ Local cache:
 - FRCAEnableFileCache On/Off
 - Enables/disables FRCA local cache for this server instance (server context)
 - ▶ Reverse proxy cache:
 - FRCAEnableProxy On/Off
 - Enables/disables FRCA reverse proxy cache for this server instance (server context) and VirtualHost context

Notes: FRCA Configuration: Enablement

This foils shows the primary HTTP server directives to put FRCA into effect for a specific server. There are additional directives that control additional "behavior" of FRCA, such as size of the local cache, FRCA cache activity logging, and what and when files are to be cached. These additional directives are not detailed in this presentation. For more details, see Information Center -> e-business and Web servers.

Directive to enable configuration and use of a specific IPaddr:port for FRCA

iSeries Apache Directive	Description	Syntax	Default	Context
Listen	To enable or disable using of the FRCA caching support for this IP Address:port	Listen IPaddr:port FRCA	off (FRCA parameter is blank)	Server Config

You can use this option on the Listen directive to enable or disable using of the FRCA caching support for this IP address and port. This directive can be used only in server configuration context.

Example:

```
Listen 10.5.5.5:80 FRCA
```

```
Listen 10.5.5.5:443
```

This example enables use of FRCA cache for this server instance on port 80. Any request that comes in for port 443 (assume that port 443 is SSL/TLS traffic) is not cached by FRCA.

The directive shown turns on or off the use of local cache and applies to each server instance.

You can optionally specify a *reverse proxy cache* which essentially tells the HTTP server that says when a specific URI (Universal Relocator Indicator (consider this a "prefix" within a URL) is received go to another server instance to find the requested page. The "other instance" responds with the page, which is then kept in the local Network File Cache on the local system. When "n seconds" have expired, get the same page "again" from the second server. This second server would be the one responsible for updating the web page (file).

Agenda

- Performance at Your Fingertips
- Adaptive Storage Virtualization for High Availability
- Flexible, secure Management of e-business Infrastructure
- **Integrate your business with e-business**
 - ◆ ▶ e-business Foundation: WebSphere Application Server
 - ▶ WebSphere Development Studio for iSeries
 - ▶ iSeries Access Products
 - ▶ Domino and WebSphere products

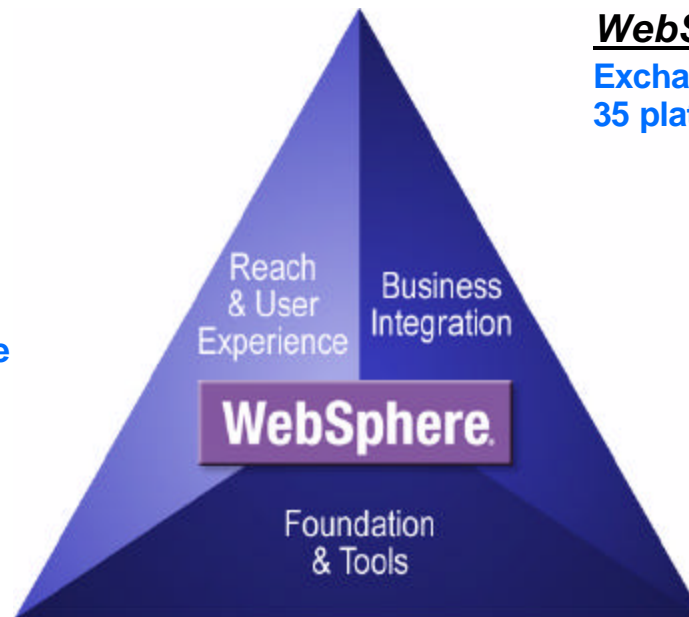
WebSphere: Foundation For e-business

WebSphere Portal Server

Access widespread and diverse data sources from anywhere, anytime, by anyone you allow

WebSphere Commerce

Powerful sell-side solutions to handle the broad range of challenges encountered in B2B and B2C environments



WebSphere MQ

Exchange information among more than 35 platforms with assured delivery

Not Categorized as WebSphere

- **WebFacing Tool**
 - Included in WDS
 - 1 copy in WebSphere-Express
- **iSeries Access for the Web**
 - Part of iSeries Access Family

WebSphere Studio

Professional development tools based on a common workbench technology

WebSphere Application Server

High performance and extremely scalable transaction engine for dynamic e-business applications

The dynamic e-business infrastructure for IBM, partner and customer solutions

Notes: WebSphere: Foundation for e-business - 1 -

The WebSphere family of products from IBM's foundations for e-business application implementations.

WebSphere Application Server: The WebSphere Application Server is at the base of this foundation, building upon basic HTTP serving functions. It is a highly flexible, performance-oriented and scalable Java servlet transaction manager, with consistent attention to the need to embrace new functions and technologies as defined by the industry.

WebSphere Studio: WebSphere Studio is the general term applied to a set of development tools based upon a common workbench technology to develop, integrate, and deploy your e-business solutions.

In addition to the base set of WebSphere family e-business facilities are other major WebSphere components, that include:

WebSphere Commerce: IBM WebSphere® Commerce software offerings provide power single "store" and multiple store "shopping mall" sell-side solutions to handle the challenges encountered in customer and trading partner environments, helping you to sell goods and services online to a global and mobile marketplace. Implement B2C, B2B, or private exchange business models using open, industry-accepted standards. And confidently engage with IBM WebSphere's proven technologies in next-generation e-commerce.

WebSphere Portal Server: Allows businesses to address multiple constituencies with personalization needs beneficial to both B2B and B2C commerce solutions. The Portal server, based on "your profile information" enables you to access a diverse set of data sources and applications - anywhere and anytime, governed by appropriate authorization.

WebSphere Message Queue (WebSphereMQ): For years the IBM Message Queue services functions have enable basic and expanded Message Queue application interfaces to route data requests and responses using a common interface and set of functions that are essentially operating systems and communications protocol independent. MQ services are not more fully integrated with other WebSphere functions and interfaces to be rebranded as WebSphereMQ.

All of the above have iSeries implementations.

Note: WebSphere products are, by design, enabled for integration with each other, your existing "pre-web" applications, and other products, such as Domino, that can take advantage of WebSphere's "design for integration."

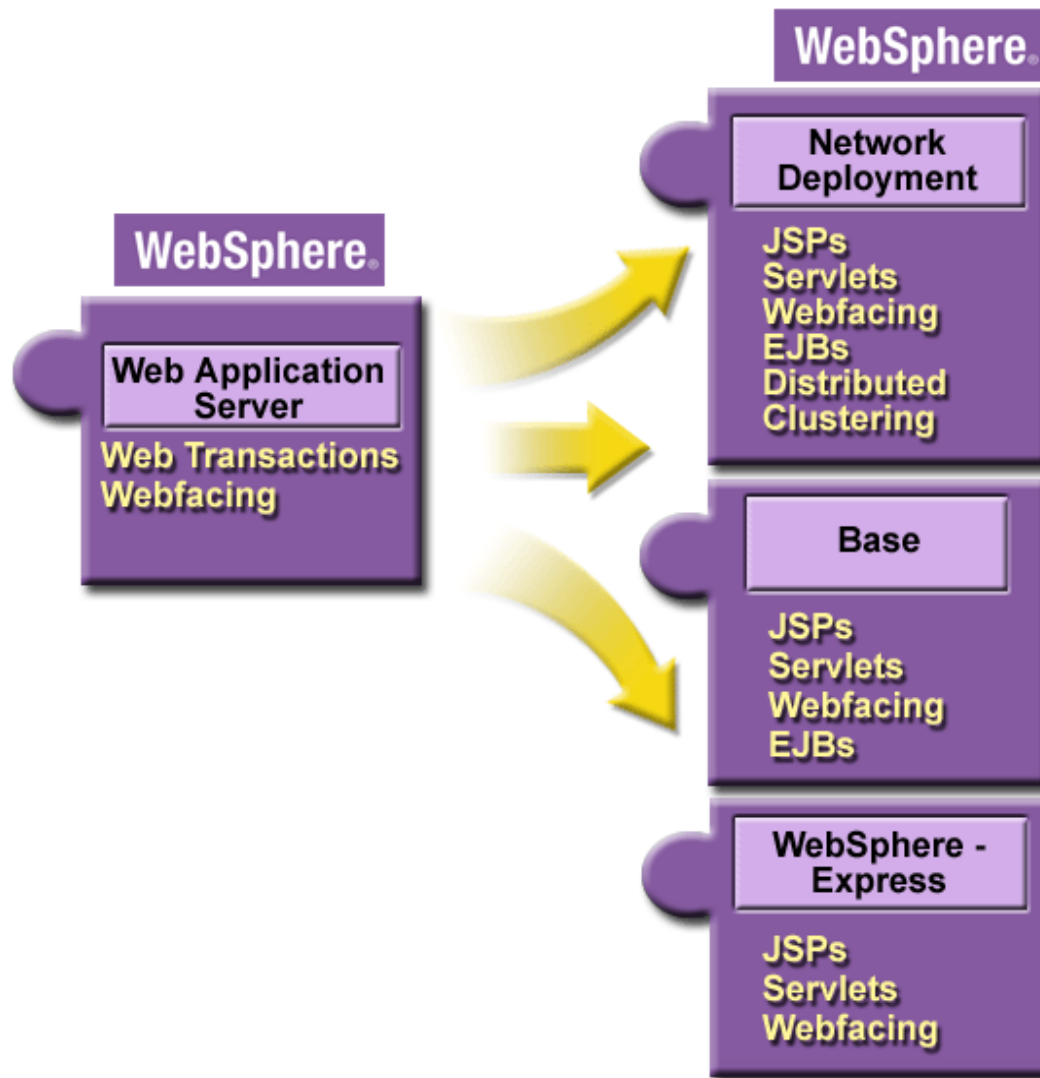
Notes: WebSphere: Foundation for e-business - 2 -

Though not formally categorized as part of the WebSphere family of products the following products build upon the WebSphere Application Server foundation element:

WebFacing Tool as part of the iSeries "WebSphere Development Studio for iSeries client" product: The WebFacing tool's objective is to enable your existing 5250 applications to run as an e-business Internet application (interfacing to browsers) with little or no changes to source programs. WebFacing functions require an active WebSphere Application Server.

iSeries Access for Web: This is a separate no-charge component of the iSeries Access family. iSeries Access for the Web enables **browser based interfaces** to all iSeries resources, including spooled output, messages queues, 5250 applications and more. It includes use of a powerful subset of the iSeries Navigator (Windows operating system on the client required) functions. iSeries Access for the Web functions require an active WebSphere Application Server or the Open Source Tomcat Java servlet server.

Integration: WebSphere Application Server V5



- Flexible choice of Web application server, packaged for range of customer sizes
- Network Deployment
 - ▶ Advanced clustering, distributed security, directory and systems management
- Base
 - ▶ Premier application server
 - ▶ Integrating enterprise data and dynamic e-business transactions
- Express
 - ▶ Development environment
 - ▶ Simple, dynamic Web sites

Notes: Integration: WebSphere Application Server V5

WebSphere Application Server V5 provides a flexible choice of Web application server, with three packages for customers of different sizes and e-business application requirements.

WebSphere Application Server – Express offers a cost-effective, out-of-the-box solution for managing simple, dynamic Web sites with a simplified Web application server and a development environment based on WebSphere Development Studio Client for iSeries.

WebSphere Application Server – Base V5 is IBM's premier Java 2 Enterprise Edition (J2EE) and Web services technology-based application platform, offering one of the first production-ready application servers for the deployment of enterprise Web services solutions for dynamic e-business. It provides J2EE 1.3 support to simplify enterprise applications by basing them on standardized, modular components. Its single, browser-based administration tools allows an administrator to move seamlessly between configurations with across all deployment options. It supports core Web services standards like XML, SOAP, and WSDL. Security can be maintained with WebSphere's extensive support of open, standards-based Java specifications and WebSphere software's pluggable security architecture.

WebSphere Application Server Network Deployment delivers world-class caching, high availability, and industry-leading Web services support on top of the base Java™ 2 Enterprise Edition (J2EE™) 1.3 WebSphere Application Server foundation. Its advanced Web services features include UDDI Registry that acts as a repository that allows storage of business units that describe basic Web services. It also provides a Web Services Gateway that enables Web services invocation by users from outside a firewall but with the benefit of robust security protection. Network Deployment also provides enhanced workload management with dynamic caching and performance management tools that provide for distributing workloads across multiple servers via sophisticated load balancing and clustering technologies.

Note: iSeries WebFacing is shown as an important part of implementing e-business applications under WAS V5. Except for being included with the Express for iSeries offering, it is not packaged with the WAS V5 base and Network Deployment offerings.

iSeries, Web Serving and Web Application Serving

Use for web transactions

iSeries Web Servers

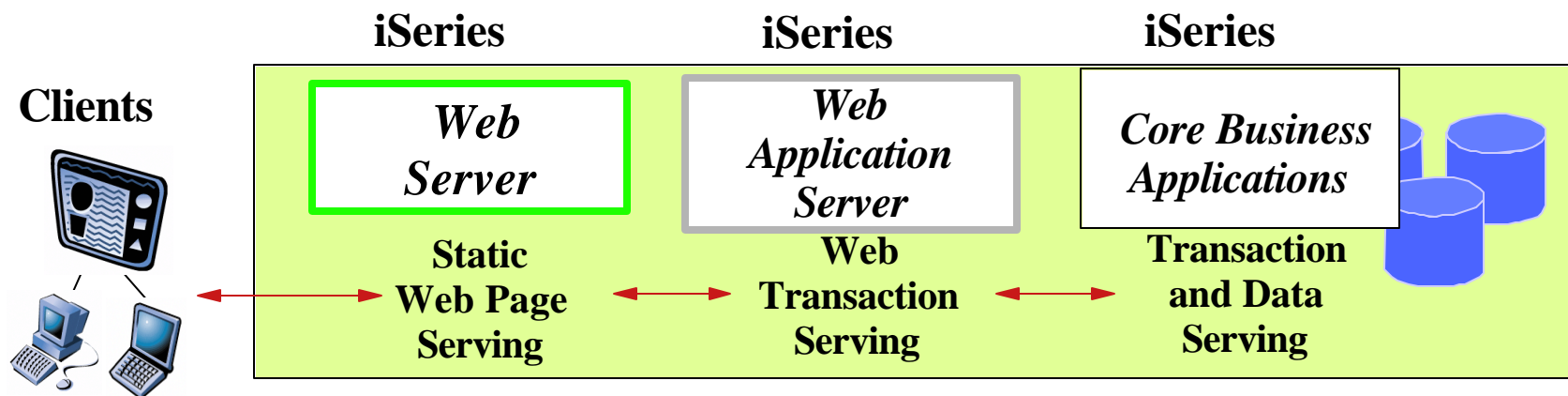
- IBM HTTP Server



- Domino HTTP server
- IBM HTTP Server for iSeries

Web Application Servers (WAS) for iSeries

1. **IBM WebSphere Application Server V5 (NEW)**
2. **IBM WebSphere Application Server V4.0 (WebSphere Advanced - single & multi-server)**
3. **IBM WebSphere Application Server V3.5 (Older - technical support ending 11/30/2003)**
4. **Apache Software Foundation's Jakarta Tomcat (Open Source)**



Notes: iSeries, Web Serving and Web Application Serving

This foil positions basic web serving (IBM primary web servers listed) with the IBM WebSphere Web Application Server products and the OpenSource offerings, along with the Web Server, Web Application Server, and Core (existing in most cases) Business Applications.

In the upper left rectangle, we list the primary IBM-provided Webserver software:

- IBM HTTP Server or iSeries Powered by Apache, included with 5722-DG1 (open interfaces, strategic, consistently enhanced)
Note: As of January 2003, the HTTP Server for iSeries powered by Apache, is at Apache level 2.0.43 on both V5R1 and V5R2.
- IBM HTTP Server or iSeries, included with 5722-DG1
- Domino HTTP Server, included with 5733-LD5, 5733-LD6

In the right rectangle we have listed the Web Application Servers, supported on iSeries. Note that Tomcat is useful for simple Java servlet serving and is no longer considered to be a strategic product as, though Open Source, it lags behind WebSphere and other non-IBM web application servers in level of functions supported.

WAS 3.5 Standard Edition:

- 5733-AS3 - up to 128 bit encryption support. Note that WAS 3.5 Standard Edition is "for free" on iSeries. Note also that neither 3.5 SE nor Advanced Edition (AE) are formally supported on V5R2. If you have WAS 3.5 installed on a V5R1 or earlier iSeries you have a free upgrade to version 4 or 5.

WAS 3.5 Advanced Edition:

- 5733-WS3 - up to 128 bit encryption support

WAS 4.0 Advanced Edition Single Server:

- 5733-WS4 - up to 128 bit encryption support

WAS 4.0 Advanced Edition Single Server:

- 5733-WS4 - up to 128 bit encryption support

WAS 5.0 - Express:

- 5722-IWE - up to 128 bit encryption support

WAS 5.0 (Base):

- 5733-WS5 - up to 128 bit encryption support

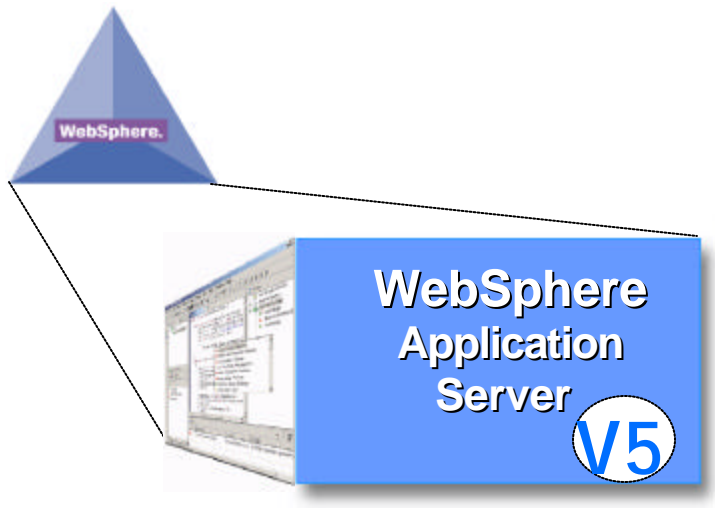
WAS 5.0 Network Deployment):

- 5733-WA5 - up to 128 bit encryption support

The bottom graphic reminds us of where these web-serving components are in the flow of requests and responses between a client browser and an HTTP server and any associated applications. The Performance Update presentation provides some additional details from a performance perspective.

IBM WebSphere Application Server

V5



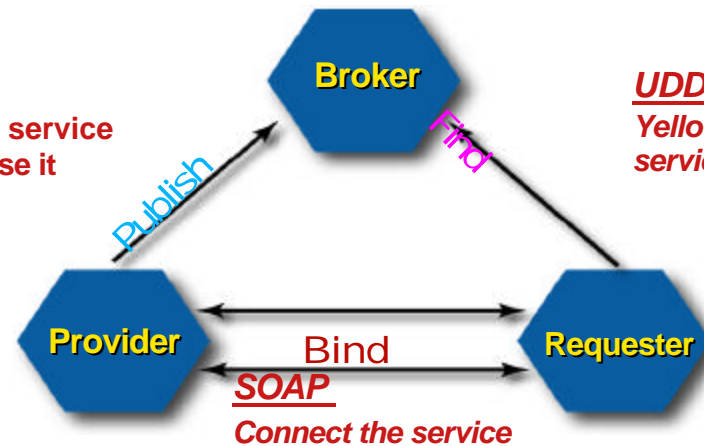
- A highly flexible application server platform based on industry leading J2EE & Web services architecture
- Configurations available to meet the changing needs of different usage scenarios
- Built to be cross-platform and fully open & standards-based

- Web Services are supported with WebSphere Application Server V4 & V5 (including WebSphere - Express)
- Build, connect and integrate applications, servers, and device
- Accelerate the pace of integration
- Access to partner and supplier services

Web Services

WSDL
Describe the service and how to use it

UDDI
Yellow pages for web services



Notes: IBM WebSphere Application Server - 1 -

The WebSphere Application Server is the product family that implements the latest industry and Java standards (Java 2 Extended Edition (J2EE)). Its primary purpose is to provide a common Java servlet deployment and management across multiple operating systems. This foil highlights V5 which is becoming available on iSeries 1H 2003.

Web Services: *Web Services* is the name given to the capability to allow disparate Internet-based programs to work together with minimal human intervention — in key industries such as financial services, health care and telecommunications. Specific web services can be used to accomplish some desired function. Web Services are described in WSDL. A Web Services description is registered in the UDDI directory. The following paragraphs provide more information on WSDL and UDDI.

WSDL: The *Web Services Description Language* has a lot of versatility in its methods of use. In particular, WSDL can work with UDDI registries in several different ways depending upon the application needs. WSDL is an XML language for describing Web services as a set of network endpoints that operate on messages. A WSDL service description contains an abstract definition for a set of operations and messages, a concrete protocol binding for these operations and messages, and a network endpoint specification for the binding.

Web Services Meta Language (WSML) is the "modern day" follow-on for having interoperable Web-based distributed applications that correspond to the "hot topic" of a few years ago - Electronic Data Interchange (EDI). The EDI market, which emerged well before B2B on-line e-commerce gained any significant presence -- and with the popularity of the B2B marketplace, interoperability has come into the spotlight again as a measuring stick for the newer interchange technologies..

The purpose of WSDL is to "describe" your Web services. Businesses will exchange WSDL files to understand the other's services. SOAP comes in once you know your partners' services and wish to invoke them. You can think of services as objects which are accessed by SOAP.

Most likely you will be communicating with potential partners via the Internet or through e-mail. The Internet, of course, uses HTTP and e-mail works on SMTP, making HTTP and SMTP the favored candidates for acting as "transport service providers" to SOAP.

WSDL describes the answers to the following questions:

- What are the services offered in your online business?
- How can you invoke your business services?
- What information do your business services need from the user when he or she invokes your service?
- How will the user provide the required information?
- In which format will the services send information back to the user?

SOAP: *Simple Object Access Protocol* is based upon XML and is a lightweight (simple) protocol that provides a service oriented architecture for applications on the web. A client composes a request and sends the request in a SOAP envelop to a provider. The provider replies within a SOAP response.

Simple Object Access Protocol (SOAP) is an XML based protocol that consists of three parts:

- An envelope that defines a framework for describing what is in a message and how to process it.
- A set of encoding rules for expressing instances of application-defined datatypes.
- A convention for representing remote procedure calls and responses.

SOAP can potentially be used in combination with a variety of other protocols.

Notes: IBM WebSphere Application Server - 2 -

UDDI: The *Universal Description, Discovery and Integration* project is a project that creates standard for a platform-independent, open framework for describing services, discovering businesses, and integrating business services using the Internet. It also includes an operational registry that is available today. UDDI is the cross-industry effort driven by all major platform and software providers, as well as marketplace operators and e-business leaders. The UDDI project takes advantage of WorldWide Web Consortium (W3C) and Internet Engineering Task Force (IETF) standards such as Extensible Markup Language (XML), and HTTP and Domain Name System (DNS) protocols.

Businesses of all sizes can benefit from UDDI, because the specifications comprehensively addresses problems that limit the growth and synergies of B2B commerce and Web services. UDDI is not industry-specific. Any industry, worldwide, offering products and services can benefit from this open initiative. UDDI creates a standard interoperable platform that enables companies and applications to quickly, easily, and dynamically find and use Web services over the Internet. UDDI also allows operational registries to be maintained for different purposes in different contexts. UDDI is under the OASIS standards consortium. For more information, see <http://www.uddi.org/>.

XML: *Extensible Markup Language* is used as the name of an entire suite of standards and practices for application design, and to refer to a particular meta-language, known as XML 1.0. XML carries the data and defines the data types and structures (you can use other things, but XML is the default).

Despite its name, XML is not a single markup language. Instead, it's a meta-language which lets you design your own markup languages. In essence, XML began as a simplified dialect of SGML, intended to allow groups of people, organizations, or industries to create their own customized markup languages for exchanging information in their domain (music, chemistry, bibliographies, mathematics, etc.).

Since all of these specific languages share a common structure, it becomes practical to build general tools that will manipulate any XML-based document. And since that structure is very simple and regular, it's also easily readable and manipulatable by humans.

Applications range from allowing web pages to move back from rendering-specific to conceptual markup, to allowing software to more easily gather information from many web pages (treating the web as a database rather than a collection of pamphlets), to providing a simple alternative to EDI for standardizing inter-enterprise and inter-device data transfer. **XML** is a key technology for device-independent user interaction and for Web Services.

The benefit is data independence. Instead of having to define the data types and structures separately and specifically for each language that you are using, the data types and structures can be defined in XML independently of any underlying programming language, database system, or middleware system. This eliminates complex data type mapping and other tedious programming when converting data from one format to another.

The primary difference between Web services applications and traditional applications is the use of XML and HTTP.

XML provides an independent data type and structuring mechanism for constructing messages, and HTTP provides a widely adopted network connecting virtually any system to any other.

IBM WebSphere Application Server V5

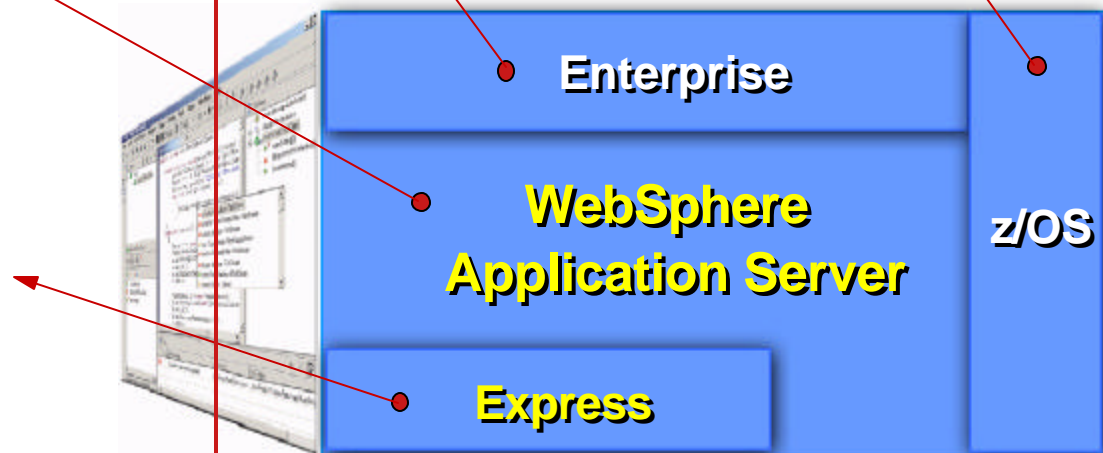
An extended J2EE & Web services
'build-to-integrate' platform for creating,
composing & choreographing adaptable networked
application flows and behaviors

iSeries Support

The mainstream Web services J2EE
1.3 application server enabling
industry leading QoS and flexible
deployment options

An easily approachable
"on-ramp" to
e-business, providing
fast and productive
development,
deployment of dynamic
web applications

A J2EE web services application
server specifically optimized to the
unique QoS of z/OS



Notes: IBM WebSphere Application Server V5

There are essentially 5 offerings under WebSphere Application Server Version 5.0

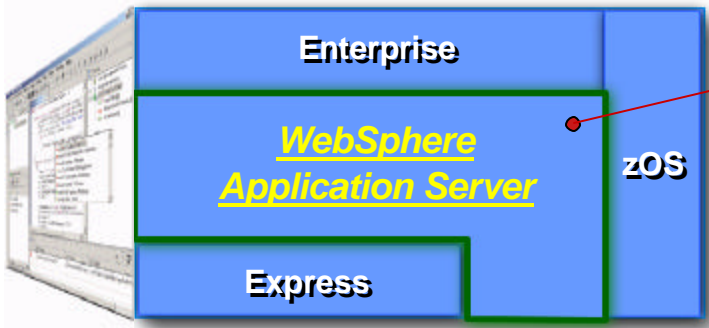
Enterprise: provides sophisticated workflow management that is not really needed by iSeries customers, given the Network Deployment support on iSeries.

- For zOS: offered as a special customized version for zOS, including applications running under zOS.
- Base: provides the latest suite of Java Version 2 Enterprise Edition (J2EE) 1.3 functions including EJB and other continuing enhancements from Sun Microsystems (TM) and takes advantage of iSeries' Quality of Service (QoS) capabilities.
- Network Deployment: provides multiple system clustering support and other network deployment facilities. including dynamic caching, IBM Tivoli Performance Viewer, and integration with third-party tools.
- Express: provides more basic Java servlet management (no EJB support), improved set up ease of use interfaces and faster start up of WAS instances on iSeries than earlier WAS versions.

The following foils provide additional details on the offerings supported on iSeries.

WAS V5.0: Base, Network Deployment

- WAS Advanced V4 (single-server) - is now WebSphere Application Server V5 - \$8,951 per cpu*
- WAS Advanced V4 (multi-server) - is now WAS Network Deployment V5 - \$13,441 per cpu*
 - ▶ Adds clustering, workload management, distributed security, systems management & directory
- **J2EE 1.3 (EJB's)** including a native, high performance JMS messaging server
- Provides a comprehensive XML Web services environment based on the latest open standards
- Improved, easy-to-use automated administration and management services



The diagram shows a 3D perspective of a server rack. The top section is labeled 'Enterprise'. The middle section is labeled 'WebSphere Application Server' and is highlighted with a green border. The bottom section is labeled 'Express'. To the right of the 'WebSphere Application Server' section, the text 'zOS' is visible. A red arrow points from the 'WebSphere Application Server' section to the text on the right.

WebSphere Application Server

The **mainstream** Web services application server enabling industry leading QoS and flexible deployment options

General Availability V5R2 - 1/24

*Sub-capacity pricing on iSeries

Notes: WAS V5.0: Base, Network Deployment

This foils summarizes the new WAS 5.0 capabilities but focuses on iSeries pricing considerations - sub-capacity pricing with currently planned US prices.

To use this on iSeries you must configure one or more logical partitions. This way you can selectively specify the number of processors in the one or more partitions that will be using WAS 4.0 or 5.0. The contract requires the iSeries to send its hardware and performance statistics to IBM for monitoring purposes.

Here is an LPAR example. The iSeries is an i890 24-way. WebSphere Application server would be quite expensive with a 24 processor (CPU) price. So the customer uses 2 partitions, one with 2.4 processors assigned and the other partition has 2.2 processors assigned. This would be, rounded up to 5 processors and a 5 processor price would be charged.

See the following web sites for more information on sub capacity pricing:

- <http://www-1.ibm.com/servers/eserver/series/announce/subcapprc.html>
- The above URL can be linked to by selecting the first category on right-hand side under Features for this URL:
 - <http://www-1.ibm.com/servers/eserver/series/software/>

	PID	Passport Advantage
IBM WebSphere Application Server Advanced Edition for iSeries, Version 3.5	5733-WA3	
IBM WebSphere Application Server Advanced Edition for iSeries, Version 4.0	5733-WA4	D5ALTLL
IBM WebSphere Application Server Advanced Single Server Edition for iSeries, Version 4.0	5733-WS4	D5CB9LL
IBM WebSphere Application Server (Base) for iSeries, Version 5.0	5733-WS5 #4421	Not Available
IBM WebSphere Application Server Network Deployment for iSeries, Version 5.0	5733-WS5 #4422	Not Available
IBM WebSphere Application Server - Express for iSeries, Version 5.0	5722-IWE	Not Available

WAS V5 Base, Network Deployment Comparison

	WAS V5 Base	WAS V5 Network Deployment
Full XML support	X	X
Full Web services support to host and consumer Web services	X	X
JDBC and Connection Management for access to DB2, SQL Server 2000 and Oracle 9i	X	X
Web services client for access to back-end Web services	X	
Basic platform support for rapid implementation on Windows, Windows NT, Windows 2000, Linux and OS/400	X	X
Extended platform support for IBM AIX, Sun Solaris operating environment, HP-UX	X	X
Full J2EE 1.3 support to maximize J2EE functionality	X	X
Microsoft component object model architecture to EJB support for integration with ActiveX client and server resources	X	X
Enhanced features for performance such as dynamic caching, Tivoli® Performance Viewer, integration with third-party tools		X
Advanced authentication and authorization such as JAAS and JCE for enhanced security		X
Support for some J2EE 1.4 features		X
Extended JDBC support for access to Informix and Sybase	X	X
Extended HTTP Server included for configuration flexibility and added security	X	X
Browser-based administration for remote administration across firewalls	X	X
Full Java Message Service (JMS) support message-driven beans, including embedded JMS transport	X	X
Migration tools and assistance	X	X
Support for private UDDI registries		X
Enhanced authentication and authorization through CSI, V2, single sign on, embedded LDAP		X
Restricted DB2 license (WAS for Developers also supports restricted DB2 license)		X
Web Services Gateway		X
Intelligent workload distribution across a cluster		X
Failure bypass		X
Clustering support		X

Integration: WebSphere - Express for iSeries

- Cost-effective deployment & management of world-class dynamic Web sites and applications
- Self-configuring install Wizard, exclusive for iSeries
 - ▶ Sets up WebSphere & IBM HTTP Server (powered by Apache)
- Includes WebSphere Development Studio Client for iSeries and Telephone Directory
- Ideal to run WebFaced applications



Notes: Integration: WebSphere - Express for iSeries

WebSphere Application Server – Express for iSeries Version 5.0 offers an affordable, approachable and rapid solution to develop, deploy and manage e-business applications. WebSphere - Express helps companies build static and dynamic Web sites, viewing information in databases, performing simple updates, and creating and using Web services.

It includes set up and customization wizards, available only on iSeries, templates and cross-industry samples to help developers through the process of installing and building a dynamic Web site. On the iSeries the installation Wizards set up both WebSphere – Express and the IBM HTTP Server (powered by Apache). The wizards and templates also generate code, with samples that can be used as a starting point and educational guide

WebSphere - Express provides the tools required to build e-business applications within a single package, including a simplified application server, development environment based on WebSphere Development Studio Client for iSeries (powered by Eclipse technology) with application samples and templates. The WebSphere Development Studio Client includes the server license, WebFacing tool and one workstation client.

WebSphere - Express helps companies exploit and transition their existing applications and development skills through a simplified programming model with support the latest for Java Server Pages, Java Servlets and Web services specifications.

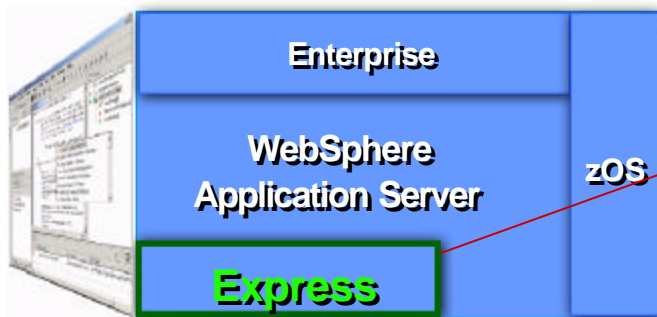
Companies can now modernize their 5250 OLTP (green screen) applications with the WebSphere Development Studio Client WebFacing tool, then deploy the resulting Java Server Page-based applications on WebSphere – Express.

WebSphere – Express includes a ready-to-use IBM Telephone Directory application providing an easy phone number and organization lookup for a company's intranet and allows an initial registration of up to 1000 users.

WebSphere – Express has been designed to run on small to medium enterprise servers iSeries servers such as the iSeries 800 and i810, requiring approximately 300 CPW for an entry configuration.

WAS - Express V5.0

- WAS-Express V5 includes:
 - ▶ Web application server - WAS-Express V5
 - ▶ Application development tool - WebSphere Development Studio Client (WDSClient)
 - ▶ Includes IBM Telephone Directory
- WebSphere Application Server - Express V5 for iSeries
 - ▶ OS/400 Support
 - V5R1 (GA - 2/21/2003)
 - V5R2 (GA - 3/14/2003)
 - ▶ Intel support
 - Windows 2000 & Linux



WebSphere Application Server - Express for iSeries

A cost effective, easily approachable **"on-ramp"** to e-business, providing fast and productive development, deployment & management of dynamic web sites

Notes: WAS - Express V5.0

This foil introduces some more details on WAS 5.0 Express for iSeries.

The next foil summarizes the major selling functions of Express:

Lower cost, primarily because it does supports Java Beans, but not J2EE EJBs support.

Easier, quicker to get up and running through improved wizards

Includes the WebSphere Development Studio for iSeries Client (WDS*c*) for quick development and deployment of Java servlets. WDS*c* includes the WebFacing tool highlighted in this announcement,

You see when Express is available on V5R1 and V5R2 OS/400 releases.

Note that Express for iSeries has been specifically implemented in Direct Execution (DE) mode to take less system resources during start up of the defined WAS instance. DE means no run time Java interpretation goes on.

See also the 300 CPW minimum and 500 MB of main storage requirement.

WAS - Express V5.0 Functionality

- Broad WAS 5.0 functionality with small investment:
 - ▶ Support for servlets, Java Server Pages, Web services, JDBC, JNDI, JavaMail, JavaBean Activation Framework (JAF) and Java API for XML parsing (JAXP)
 - ▶ Support for server-side JavaScripts using the Bean Scripting Framework (BSF)
 - ▶ Simplified application administration through WebSphere Development Studio Site Developer (included)
 - ▶ Basic platform for rapid implementation on Windows, Windows NT, Windows 2000, Linux and OS/400
 - ▶ Integration with:
 - HTTP server for iSeries and Domino for iSeries HTTP
 - OS/400 security for user authentication
 - ▶ Embedded HTTP server
 - ▶ Migration from WAS Standard Edition and ASF Jakarta Tomcat
 - ▶ Migration support to move to advanced WAS configurations
- Includes WebSphere Development Studio clients (WDS*c*) for iSeries
 - ▶ WebFacing, and more...
- Includes sample business application - IBM Telephone Directory V5.1
- Includes Web Services Object Runtime Support (WORF)

Notes: WAS - Express V5.0 Functionality - 1 -

IBM WebSphere Application Server - Express for iSeries is premier Java and Web Services technology-based application platform integrating enterprise data and transactions with the dynamic e-business world. It provides the rich e-business application deployment environment of the iSeries with a set of application services including capabilities for transaction management, security, performance, availability, connectivity, and scalability. It manages and integrates enterprise-wide applications while leveraging open technologies and application program interfaces (APIs). These enhancements solidify the iSeries role as the integrator of the WebSphere software platform. Industry-leading integrated support for key Web services open standards enable the iSeries with the first production-ready Web application server for the deployment of enterprise Web Services solutions for dynamic e-business.

WebSphere Application Server - Express for iSeries provides a tight integrated with the iSeries HTTP server through easy-to-use Web-based GUI. Wizards allow for easy configuration of multiple application server and deployment of applications. The wizards allow for easy configuration of both HTTP servers and access to iSeries databases.

WebSphere Application Server - Express for iSeries offers:

- Support for *servlets*, based on the Java Servlet 2.3 specification
- Support for *JavaServer pages*, based on the JSP 1.2 specification
- Support for *Web services* standards like SOAP, WSDL, and UDDI offers companies the ability to create secure distributed applications that integrate software components developed with disparate tools and architectures over the Web.
- Support for JDBC 2.0, JNDI, JavaMail 1.2, JavaBean Activation Framework (JAF) 1.0, and Java API for XML parsing (JAXP)
- Support for server-side *JavaScripts* using the Bean Scripting Framework (BSF)
- Browser-base administration with easy-to-use wizards for creating HTTP and application server instances, deploying J2EE applications, and management of HTTP and application servers and their applications
- Integration with IBM WebSphere Studio, built on Eclipse, the open systems development environment
- Integration with HTTP Server for iSeries and Domino for iSeries HTTP servers
- Integration with OS/400 security for authentication of users
- HTTP session support
- Migration support for WebSphere Standard Edition (SE) and Apache Software Foundation (ASF) Jakarta Tomcat
- Migration support to more advanced WebSphere Application Serving configurations

Based on the latest Java and Web services standards, WebSphere Application Server - Express for iSeries lets you convert static Web sites into dynamic Web sites by viewing and performing simple information updates in back-end databases. It also enables you to consume Web services and resources for integrating with packaged applications.

IBM WebSphere Application Server - Express for iSeries is based on the latest Java and Web Services standards. When more advanced development and deployment capabilities are needed, IBM WebSphere Application Server - Express offers smooth migration to other WebSphere Application Servers.

Notes: WAS - Express V5.0 Functionality - 2 -

Express versions of WebSphere Application Server V 5.0 and WebSphere Development Studio Client for iSeries

Express for iSeries includes a slimmed down version of WebSphere Application Server V5 and WebSphere Development Studio Client for iSeries. An integrated installation option is available if installing both the development environment and a Web application server on the same machine. This simplifies the user interface.

WebSphere Application Server - Express for iSeries includes a simplified administration interface to the basic functions of creating and configuring server instances, configuring data sources and ports, starting and stopping the server, publishing an application to the server, and stopping and restarting the application. Wherever possible, default settings are established so configuration is not required and maintenance efforts are minimized.

The WebSphere Development Studio Client for iSeries is the same product that comes with WebSphere Development Studio for iSeries except that there is only a single license of WDSi with Express, whereas you get an unlimited license of WDSi with WDS.

Quick start examples provided

Quick start samples -- document distribution/human resources, survey and voting booth, electronic catalog, customer self-service (customer logon for account update, FAQs, feedback form), MyRTPL home page (inclusion of information from various sources, cookie personalization, search, Web Service consumption), YourCo (demonstrates how an application might differ when written in JSPs and servlets compared to tag libraries and JavaScript, personalization based on login, search, conference room registration). These samples help speed application development.

Tag library & JavaScript support

Jakarta Tag Libraries are included within the development tool for easy use. JavaScript support is added on both the development and application server side. Existing programming skills can be leveraged.

Notes: WAS - Express V5.0 Functionality - 3 -

Application Server functions provided

- Tool-based application management and deployment
- Full support for migration to a higher functionality application server
- Operating system support: OS/400 V5R1, or later
- Specifications:
- Web container support includes:
 - JSP processor
 - Server-side JavaScript (Bean Scripting Framework)
 - WebSphere Common Control Model libraries
 - XML parser
 - XSL processor
 - Web Services -- SOAP client API only
 - Security runtime (simple WebSphere authentication, local OS authorization -- no LDAP or custom registry support)
 - RAS subsystem
 - HTTP session support -- in-memory session support
 - J2EE API libraries
 - Internal Web server
 - JVM 1.3.1
 - Simplified default server configuration
 - Connection Manager
 - JDBC providers
 - Debug libraries
 - Installs as Windows service (Windows platforms only)
 - HTTP Web administrator console extensions (iSeries platform only)

Notes: WAS - Express V5.0 Functionality - 4 -

Development Tools (IBM WebSphere Development Studio Client for iSeries) functions included:

- Rapid Web design and authoring tooling, including HTML, JSP and JavaScript
- Visual Page Designer to create Web user interfaces
- Wizards to create Web interfaces to databases
- GIF editing and animation tools
- Web services creation and consumption (supports WSDL, SOAP and UDDI)
- JSP debugging
- Interface to version control systems
- Simple deployment of applications to the application server
- Operating system support: Windows NT, 2000, XP

WORF

IBM is developing its programming models and application servers with the Web services and is providing development tools to automatically generate Web services from existing Java Beans, EJBs, and stored procedures. Web services Object Runtime Framework (WORF) is based upon DB2 XML Extender capabilities and enables submission of SQL statements and optionally control of the format of the returned data.

This support is relatively recent and includes the following supported Web services operations:

XML-based query or storage: That is, an XML document is stored in DB2 relational tables and composed again upon retrieval. This method of operation requires the presence of DB2 XML Extender support (5722-DE1 on iSeries).

SQL-based query: This includes calling stored procedures, or inserting, updating, deleting DB2 data.

WORF provides an environment to easily create simple XML-based Web services that access DB2. Using Apache Simple Object Access Protocol (SOAP) 2.2, or later, and the Document Access Definition Extension (DADX) standards, you can, with minimal knowledge of SQL or XML, specify a Web Service.

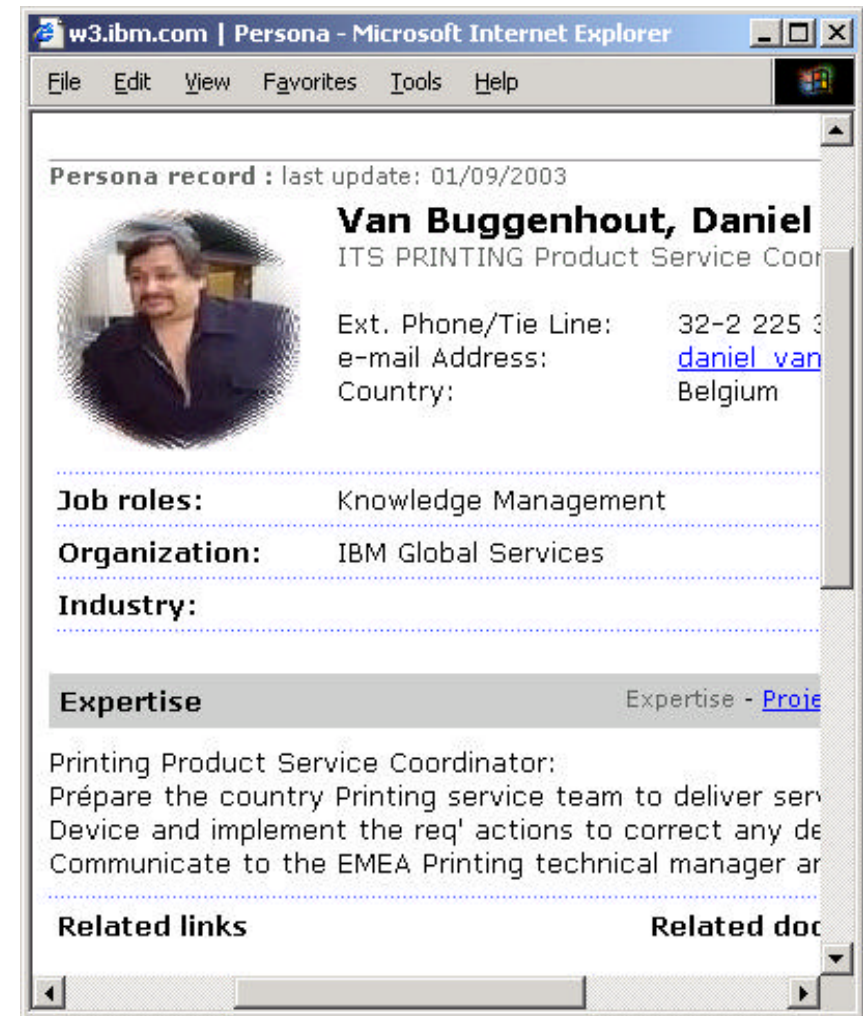
You can also use DB2 UDB Extenders (5722-DE1) to implement Web services within WORF. The DB2 XML Extender (part of 5722-DE1) consists of a set of stored procedures, user-defined types (UDT), and user-defined functions (UDF) that you can use to store and retrieve XML data using DB2. The DB2 XML Extender allows XML documents to be stored intact, and optionally indexed in side tables, using the XML column access method, or as a collection of relational tables using the XML collection access method.

WORF is integrated with WebSphere Application Server - Express for iSeries run time, allowing for easy administration and deployment of DB2 UDB Web services. A sample application is provided and easily deployed from the application server's integrated GUI.

A sample telephone applications is provided and discussed on the next foil.

WAS - Express V5.0 - Provided Application

- IBM Telephone Directory provides "out-of-the-box" functionality
 - ▶ iSeries-only offering for WAS V5 and WebSphere-Express V5 for iSeries
- Provide ISV's and customers with an application which can be used immediately
 - ▶ "Start simple" with WebSphere
 - ▶ Provide a valuable application all customers can use
 - ▶ Powerful search capabilities
 - Name - photo - phone - role - division - department - management chain, etc.
- IBM Telephone Directory is no-cost for first 1,000 entries
 - ▶ Small media charge in PPA (approx. \$25)
 - ▶ IGS special bid for 1,000+ entries



WAS V5 vs. WAS - Express V5.0 Capabilities

	WAS - Express V5	WAS V5 Base Network Deployment
Full XML support	X	X
Full Web services support to host and consumer Web services	X	X
JDBC and Connection Management for access to DB2, SQL Server 2000 and Oracle 9i	X	X
Sample applications	X	
Simplified administration using WebSphere Studio Site Developer	X	
WebSphere Studio Site Developer included	X	
Embedded HTTP Server	X	
Basic authentication and authorization to secure access to Web resources	X	
Web services client for access to back-end Web services	X	
Basic platform support for rapid implementation on Windows, Windows NT, Windows 2000, Linux and OS/400	X	X
Extended platform support for IBM AIX, Sun Solaris operating environment, HP-UX		X
Full J2EE 1.3 support to maximize J2EE functionality		X
Microsoft component object model architecture to EJB support for integration with ActiveX client and server resources		X
Enhanced features for performance such as dynamic caching, Tivoli® Performance Viewer, integration with third-party tools		X
Advanced authentication and authorization such as JAAS and JCE for enhanced security		X
Support for some J2EE 1.4 features		X
Extended JDBC support for access to Informix and Sybase		X
Extended HTTP Server included for configuration flexibility and added security		X
Browser-based administration for remote administration across firewalls	X (iSeries only)	X
Full Java Message Service (JMS) support message-driven beans, including embedded JMS transport		X
Migration tools and assistance	X (iSeries only)	X

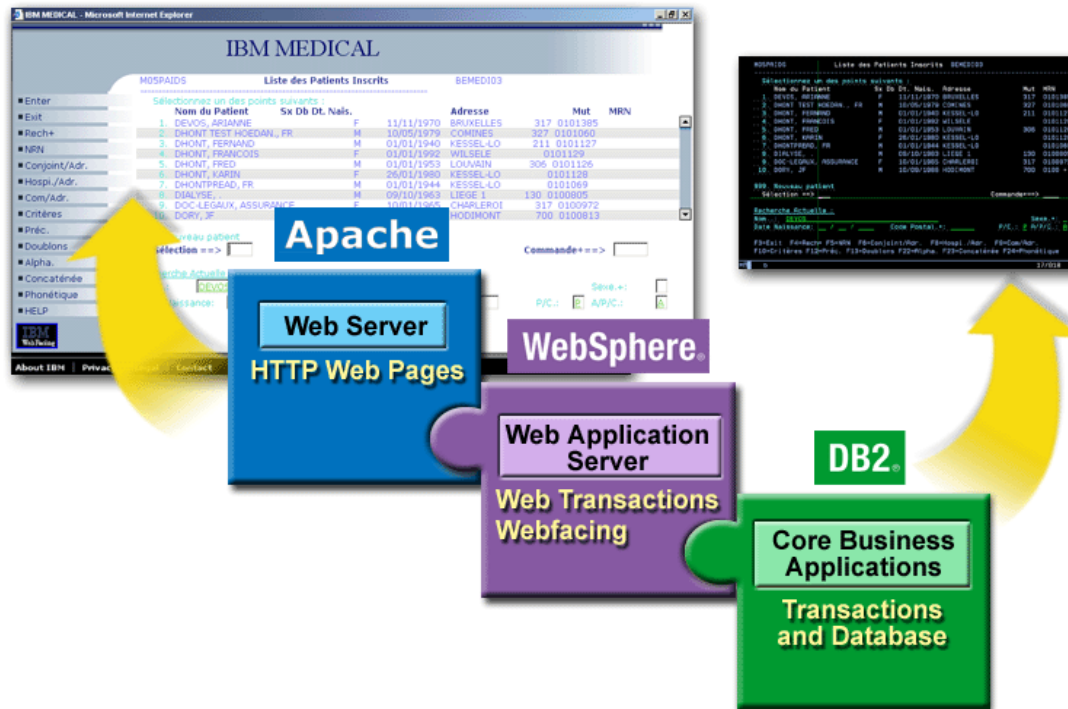
Agenda

- Performance at Your Fingertips
- Adaptive Storage Virtualization for High Availability
- Flexible, secure Management of e-business Infrastructure
- **Integrate your business with e-business**
 - ▶ e-business Foundation: WebSphere Application Server
 - ▶ **WebSphere Development Studio for iSeries**
 - ▶ iSeries Access Products
 - ▶ Domino and WebSphere products



Integration: WebSphere Development Studio Client

- One stop shopping for iSeries developers, includes Web and Java tools
- IBM WebFacing Tool enhanced and runs on WebSphere - Express for iSeries
- WebFaced applications run without 5250 CPW* on new models



*1CPW - Commercial Processing Workload

Notes: Integration: WebSphere Development Studio Client

Integration between core business and web applications is vital as company's develop their e-business strategies. WebSphere Development Studio Client for iSeries consolidates the key workstation development tools to simplify the integration and development of traditional and e-business application development via a single, Eclipse-based Integrated Development Environment (IDE), the WebSphere Studio Workbench.

WebSphere Development Studio Client provides the capability to maintain iSeries host applications using the Remote Systems Explorer, develop Web GUIs for iSeries applications using the IBM WebFacing Tool and other Web tools, develop client applications for iSeries using the Java tools and work with other integrated Site Developer Advanced tools.

The IBM WebFacing Tool converts existing 5250 applications into an interface that can run in a browser. The conversion process typically requires little to no modification to the existing iSeries program. The resulting application continues to support the DDS display source files, while also supporting a Web interface. Based on the DDS display source files, The IBM WebFacing Tool creates standard JavaServer Pages™, Java beans, and servlets that can run in any Java-compliant application server. With the WebFacing Wizard, you can also customize the design of your Web interfaces. There are several predefined styles to choose from, or you can design your own. If you would like to update the appearance of a previously converted project, simply run the WebFacing Tool again and select a new style.

The IBM WebFacing Tool has undergone substantial enhancements and now features: function key support, more DDS keywords support, full national language support, improved authentication, integration to WebSphere Workbench and full support of the WebSphere Application Server test environment.

WebFaced Applications and 5250 CPW

5250 OLTP applications modernized via the IBM WebFacing Tool do not require 5250 CPW (interactive feature) on the following iSeries servers with V5R2: i890, i870, i825, i810 and iSeries 800.

For more information see <http://www-3.ibm.com/software/ad/wdt400/>

WebSphere Development Studio for iSeries

- Combines Legacy and web development in one offering
 - ▶ iSeries host components: RPG, COBOL, C++, WebFacing Tool
 - ▶ iSeries-oriented client tools
 - Legacy client - CODE/400 & VisualAge RPG
 - Web client - Java, HTML, XML, & Web Services
- WebSphere Development Studio Client (WDScl) is PC-based client application development tool
 - ▶ 1 copy of WDScl is shipped with WAS-Express for iSeries
- Customer Benefits
 - ▶ Support existing application development as well as new web-development
 - ▶ Integrate the key tools of e-business, Java, and web development
 - ▶ Ability to "wrapper" RPG applications as web service!
 - ▶ Modernize 5250 applications via WebFacing Tool



70,000 copies shipped
since May 23, 2001!



Notes: WebSphere Development Studio for iSeries

WebSphere Development Studio for iSeries, 5722-WDS, is contains the host compilers and development tools and client-based development tools used by many developers of iSeries applications. It includes, in a packaged priced all the host compilers typically used for developing iSeries applications in RPG, COBOL, C, C++, and corresponding and complementary client workstation development tools.

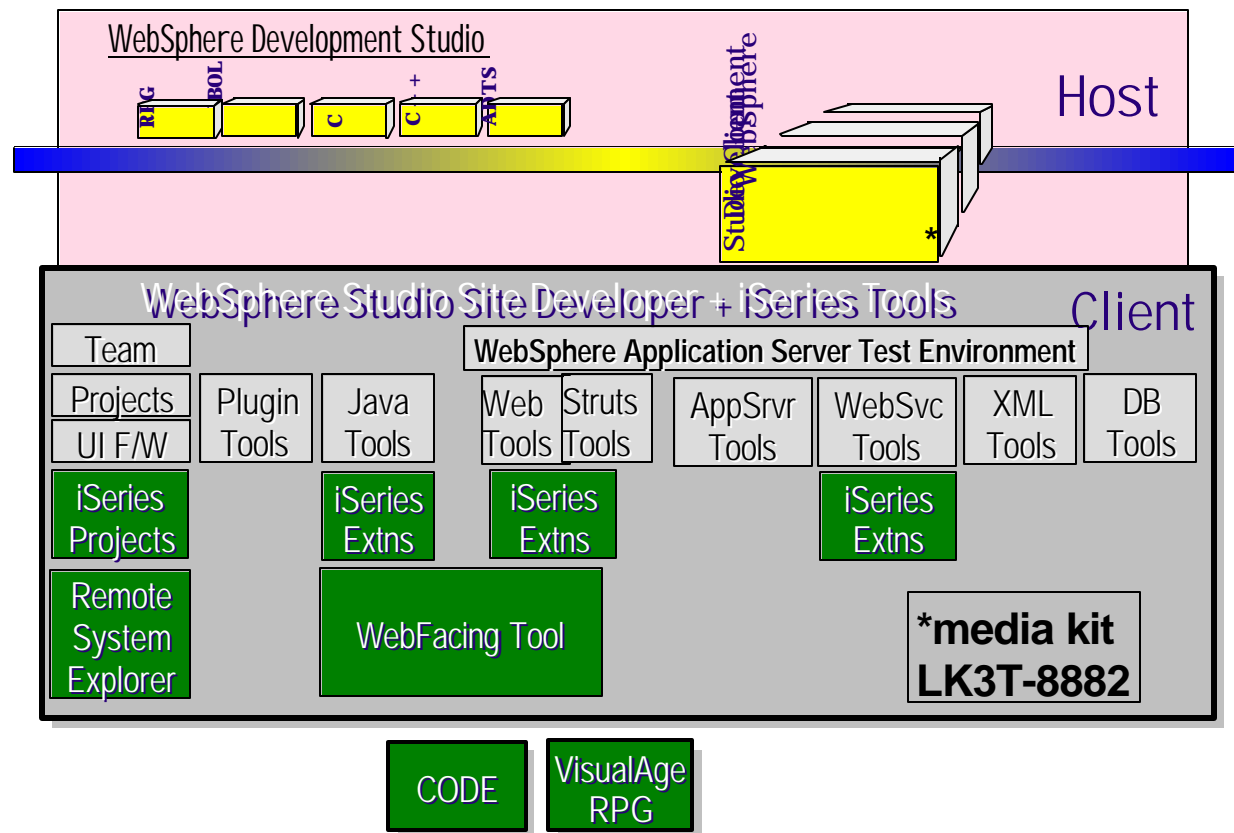
WDS enables support of existing applications development and new web-based application development. It includes support for integrating updated tools for e-business, Java, and web application development.

Note that a slimmed down version of WDS is included, with WebSphere Applications Server - Express for iSeries.

The following foils provide more details on WDS.

WebSphere Development Studio for iSeries, 5722-WDS

- One stop shopping for iSeries developers, includes Web and Java tools
- Host Development Tools
 - ▶ RPG, COBOL, C, C++ ADTS
 - ▶ WebFacing server**
- Client
 - ▶ Project management
 - ▶ CODE, VisualAge RPG
 - ▶ Java tools
 - ▶ HTML, XML, & Web Services tools
 - ▶ WebFacing development tool



**WebFaced applications run without interactive capacity (5250 CPW - Commercial Processing Workload) on iSeries 800, i810, i825, i870, i890 (2497, 2498)

Notes: WebSphere Development Studio for iSeries - 1 -

WebSphere Development Studio for iSeries is an attractively-priced, integrated, comprehensive suite of application development tools for both e-business and traditional iSeries development. This new suite of tools contains both server and workstation components that are optimized for iSeries development. WebSphere Development Studio for iSeries can be used to create new e-business applications, and to quickly and easily convert existing business applications to Web-enabled solutions.

WebSphere Development Studio for iSeries V5 offers existing tools such as RPG and ADTS for traditional development. It also offers new tools such as Web, Java, XML, Web Services, and IBM WebFacing Tool for e-business development.

For customers and solution providers who need to create e-business applications for the iSeries server, WebSphere Development Studio for iSeries provides a comprehensive, cost-effective suite of tools that helps them to:

- Convert existing 5250 interfaces to Web interfaces with minimal changes to the host application with the IBM WebFacing Tool.
- Create new Web applications that access iSeries data and applications
- Build new e-business applications with Java, ILE RPG, ILE COBOL, XML, Web Services, and Web tools
- Port e-business applications from other platforms
- Create Web enabled applications with little Java or Web skills

WebSphere Development Studio for iSeries V5R2 introduces the Eclipse-based IDE and WebSphere Studio Workbench, for integrating both IBM and non-IBM development tools.

WebSphere Development Studio Client for iSeries, V5.0 integrates the key iSeries development tools to IBM's Eclipse-based Integrated Development Environment (IDE), WebSphere Studio Workbench. This new IDE provides the infrastructure to integrate both IBM and non-IBM development tools and facilitate near seamless interoperation.

The availability of WebSphere Studio Workbench and the WebSphere Studio family of products is a significant advancement in application development.

The next foils group the development tools into host based tools and client workstation-based tools.

Notes: WebSphere Development Studio for iSeries - 2 -

Host components

5722-WDS	*BASE	5050	WebSphere Development Studio
5722-WDS	*BASE	2924	WebSphere Development Studio
5722-WDS	21	5050	Tools - Application Development
5722-WDS	31	5050	Compiler - ILE RPG IV
5722-WDS	31	2924	Compiler - ILE RPG IV
5722-WDS	32	5050	Compiler - System/36 Compatible RPG II
5722-WDS	32	2924	Compiler - System/36 Compatible RPG II
5722-WDS	33	5050	Compiler - System/38 Compatible RPG III
5722-WDS	33	2924	Compiler - System/38 Compatible RPG III
5722-WDS	34	5050	Compiler - RPG/400
5722-WDS	34	2924	Compiler - RPG/400
5722-WDS	35	5050	Compiler - ILE RPG IV *PRV -
5722-WDS	41	5050	Compiler - ILE COBOL
5722-WDS	41	2924	Compiler - ILE COBOL
5722-WDS	51	5050	Compiler - ILE C
5722-WDS	51	2924	Compiler - ILE C
5722-WDS	52	5050	Compiler - ILE C++
5722-WDS	52	2924	Compiler - ILE C++

WebSphere Development Studio for iSeries has two additional, separately priced components:

- Application Development Manager (ADM)
- Application Dictionary Services (ADS)

Note: IBM is planning to discontinue marketing ADM and ADS components in the release after V5R2. IBM is currently working with the key iSeries partners to provide competitive non-IBM products to replace ADM and ADS.

Notes: WebSphere Development Studio for iSeries - 3 -

Host components continued

IBM intends for V5R2 to be the final release to ship the Open Class Library, which is part of WebSphere Development Studio for iSeries and OS/400. You can find documentation to assist in migrating from IBM Open Class to the C++ Standard Library at:

<http://www.ibm.com/servers/eserver/series/support/planning/nav.htm>

Note: Customers with Software Subscription can upgrade, at no additional charge, to 5722-WDS from any of the products listed, except 5799-GDW.

ILE RPG and ILE COBOL are equally good choices for business logic for e-business application development. Both compilers are part of WebSphere Development Studio for iSeries and have added Java interoperability enhancements.

For solution providers who want to port e-business applications from other platforms to the iSeries, it's never been easier. WebSphere Development Studio for iSeries includes C and C++ compilers. The C compiler adheres to the ANSI C89 standard, and the C++ compiler adheres to the ANSI C++ 98 standard.

For iSeries provides comprehensive support through the RSE. RSE is the workbench perspective for iSeries development tools.

You can define your connections to server systems. Provide drill-down or filtered access to specific iSeries libraries, objects, members, jobs, IFS folders and files, Linux folders and files, Unix and Windows folders and files, and local folders and files. Two choices of editors, LPEX and CODE edited.

iSeries Project and Navigator provide support for project-based, team-sharable, development.

Notes: WebSphere Development Studio for iSeries - 4 -

Host components - January 2003

IBM WebSphere Development Studio for iSeries V5R1 and V5R2 refreshed

- No changes to the 5722-WDS host components (since original V5R2 availability)
- New visual builder for easily constructing Web applications conforming to the OpenSource Struts standard
- WebFacing Tool
- For existing IBM WebSphere Development Studio for iSeries (5722-WDS) customers with software subscription, this workstation tools refresh is a no-charge upgrade. Subscription can upgrade, at no additional charge, to 5722-WDS from any of the products listed.

Client components

WebSphere Development Studio for iSeries (5722-WDS) orders ship the workstation tools, WebSphere Development Studio Client for iSeries (**media kit LK3T-8882**), V5.0 as free automatic entitlement.

Notes: WebSphere Development Studio for iSeries - 5 -

Client Components continued

IBM WebSphere Development Studio Client for iSeries, V5.0 (media kit LK3T-8882)

IBM WebSphere Development Studio Client for iSeries, V5.0 consolidates the standard set of application tools for iSeries server and e-business development into one comprehensive, integrated and attractively priced iSeries product. The suite inherits the improved Web and Java development capabilities from WebSphere Studio Site Developer V5.0 that make it easy to create, test, deploy and maintain sophisticated e-business applications with little Java, Web or Web-Service programming. It also includes a new visual builder for easily constructing Web applications conforming to the OpenSource Struts standard. It also adds significant iSeries-specific value. The IBM WebFacing Tool makes it easy to quickly and cost effectively Web-enable your existing 5250 applications. iSeries-specific wizards, additions to the Struts builder and other extensions, make it easy to build e-business applications that reuse existing iSeries programs, data and skills. The improved iSeries host development capabilities of the new Integrated Development Environment (IDE) provides many compelling reasons for application developers to upgrade from Application Development ToolSet (ADTS) or CoOperative Development Environment (CODE).

The Eclipse IDE reduces the learning curve by providing a consistent interface for developing iSeries server applications and e-business applications. This allows your developers to progress easily to new levels in their application development. The IDE delivers on the promise of tool integration and interoperability. It includes seamless integration with best-of-breed tools from IBM and several key iSeries partners to support end-to-end application development life cycle.

WebSphere Studio Site Developer V5 for e-business development, which provides:

- Powerful Java, Web, Web Services, XML, and database tools that speed the creation, testing, and deployment of sophisticated e-business applications
- A builder for visually constructing Web applications based on the open-source Struts standard
- Significant iSeries-specific enhancements for Web, Web Services, and Java development, including extensions to the Struts builder
- IBM WebFacing Tool for cost-effectively Web-enabling 5250 applications
- A powerful, integrated iSeries environment for RPG, COBOL, CL, and DDS development
- Seamless integration with best-of-breed tools from IBM and key iSeries partners
- CODE - Classic version for the current users of CODE
- VisualAge RPG - Enhanced classic version to create event-driven GUI RPG applications for Windows or Java GUI-capable clients or browsers
- Distributed debugger - Classic version for multi-language, multi-tier e-business applications

Notes: WebSphere Development Studio for iSeries - 6 -

Client Components continued

IBM WebSphere Development Studio Client Advanced Edition for iSeries (media kit LK3T-8883)

WebSphere Development Studio Client Advanced Edition for iSeries is designed to meet the needs of the advanced iSeries developer. The Advanced Edition consolidates the standard set of application tools for iSeries server and e-business development into one comprehensive, integrated and attractively priced iSeries product. It inherits the improved Web and J2EE development capabilities from WebSphere Studio Application Developer V5.0.

AE includes all the functionality in WebSphere Development Studio Client for iSeries plus:

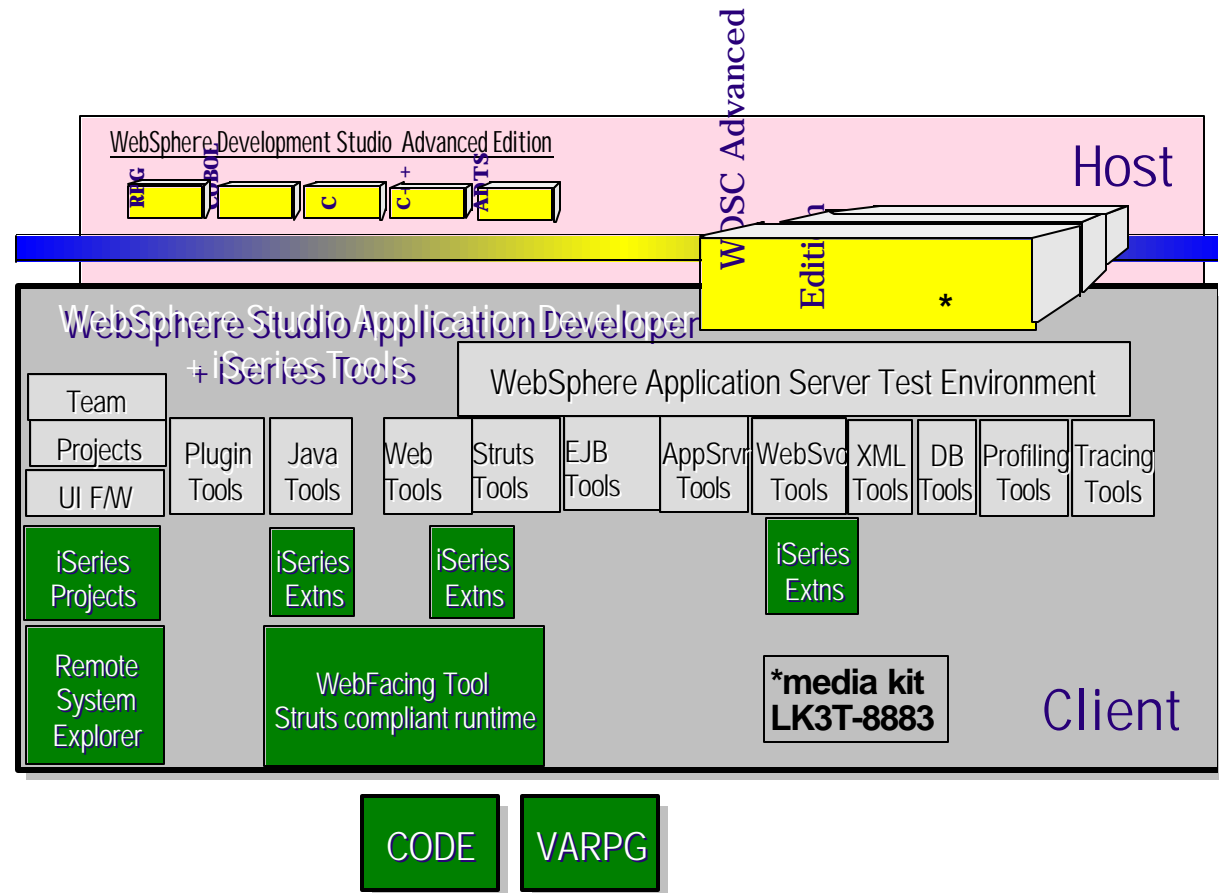
- A rich J2EE and EJB development and test environment.
- Java performance, measurement, analysis and memory leak tools.
- A Struts based runtime for the IBM WebFacing Tool. The Struts Visual Builder can be used to customize and extend the IBM WebFacing Tool application in an industry standard way.
- The iFrame portlet that makes it easy to add existing Web applications (including the IBM WebFacing Tool applications) to the WebSphere Portal environment

See the next foil for a graphical view of WebSphere Development Studio Client Advanced Edition for iSeries

WSDS Client Advanced Edition for iSeries

- 5722-WDS plus:
 - ▶ J2EE and EJB development and test environment
 - ▶ Java performance, measurement, analysis and memory leak tools
 - ▶ iFrame portlet: easy addition of existing Web applications to the WebSphere Portal environment
 - Includes the IBM WebFacing Tool applications

- Based on WebSphere Studio Application Developer for Linux and Windows, V5.0



Notes: WSDS Client Advanced Edition for iSeries

WebSphere Development Studio Advanced Edition for iSeries (**media kit LK3T-8883**) orders ship with the advanced workstation tools, WebSphere Development Studio Client Advanced Edition for iSeries, V5. The customer orders an optional chargeable feature to acquire the advanced workstation tools.

WebSphere Development Studio Client Advanced Edition for iSeries, V5 delivers:

- Powerful Java, Enterprise Java Beans (EJB), Web, Web Services, XML and database tools
- A builder for visually constructing Web applications based on the OpenSource Struts standard
- Significant iSeries-specific enhancements for Web, Web Services, and Java development including extensions to the Struts builder
- iSeries Extensions include:
 - IBM WebFacing Tool for cost-effectively Web-enabling 5250 applications. Also included are several features that improve the extensibility and customizability of the Web applications generated using the IBM WebFacing Tool. These features include an optional OpenSource Struts infrastructure, conversion-time extension points, an option to use IBM and user-defined custom tags, command-key action overrides for user-defined actions, and support for displaying and printing iSeries spool files.
 - An iFrame portlet and sample
 - A powerful, integrated file, project, edit, compile, and debug environment for iSeries RPG, COBOL, CL, and Data Description Specifications (DDS) development
 - Seamless integration with best-of-breed tools from IBM and key iSeries partners
- CoOperative Development Environment (CODE)
- VisualAge RPG
- Distributed debugger

WDS does not provide support for Enterprise Java Beans in its base version. WebSphere Development Studio Client Advanced Edition which will be available in the Spring of 2003 fills that gap.

WebSphere Development Studio Advanced Edition for iSeries is based on the IBM WebSphere Studio Application Developer (WSAD) product. IBM WebSphere Studio Application Developer for Linux and Windows, V5.0, became available December, 2002. It is IBM's premier Development Environment for the creation and maintenance of J2EE and Web Services Applications. For more information on WebSphere Studio Application Developer (WSAD), see the announcement letter 202-330, dated December 30 and 06, 2002.

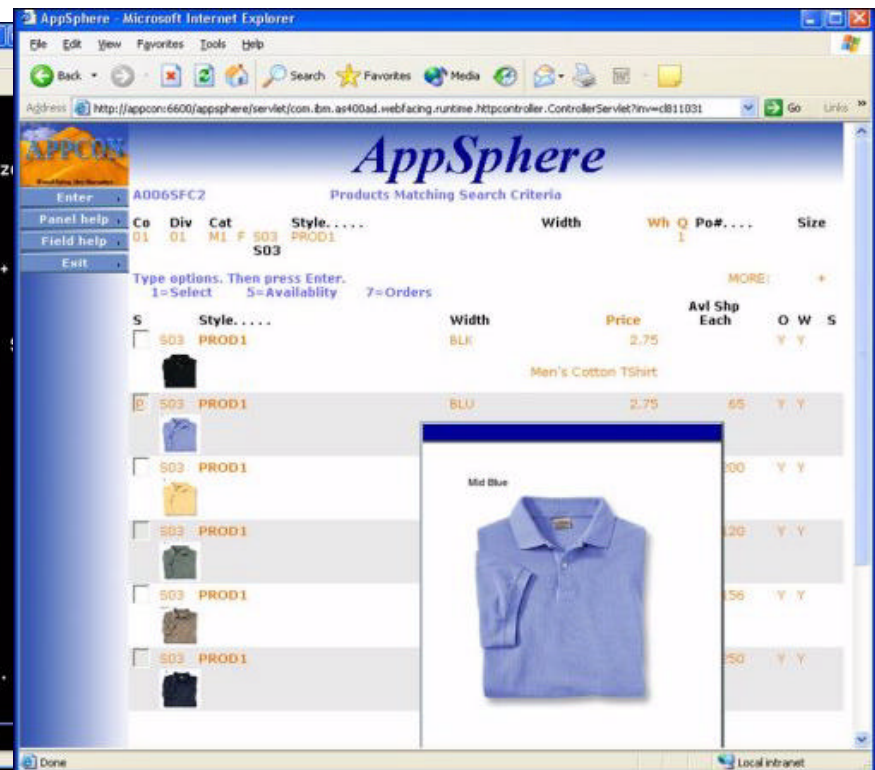
For cross platform customers, WebSphere Studio Application Developer may be a better choice of tooling although it is more expensive than WDS. A single developer license of WSAD is provided in all of the Host Integration software bundles.

WebSphere Development Studio Advanced Edition for iSeries (media kit LK3T-8883) orders ship with the advanced workstation tools, WebSphere Development Studio Client Advanced Edition for iSeries, V5.

For existing WebSphere Development Studio for iSeries (5722-WDS) customers, it is a price upgrade to acquire WebSphere Development Studio Advanced Edition for iSeries. Refer to the Announcement letters for ordering instructions.

WebFacing Tool

- Part of WebSphere Development Studio for iSeries (shipped with WDSaEc, WDSAEc)
- Supports 5250 and web interfaces
- Quickly convert RPG/5250 applications to Graphical User Interface (GUI)
- End-users access applications via browser
- iSeries 800, i810, i825, i870, i890 (2497/2498) models (only) do NOT require 5250 CPW



Notes: WebFacing Tool - 1 -

Ask your customer which existing applications they plan on:

- Access from browser
- Using GUI to enhance the application to user interface. For example, show the image of the product, hotel room, dependent sub portions of a hotel, air, and auto reservation

These are the candidates for use through WebFacing.

For customers and solution providers who need to move existing iSeries applications to the Web, the IBM WebFacing Tool component of WebSphere Development Studio for iSeries can be used to help convert 5250 interfaces to Web interfaces. The conversion is simple and minimizes the requirement for Java and Web development skills.

The IBM WebFacing Tool makes it easy to quickly and cost effectively Web enable your existing 5250 applications. The IBM WebFacing tool converts your 5250 application Data Description Specifications (DDS) display files, (User Interface Manager (UIM) menu source, and help files into Java Servlets, JSPs, JavaBeans, and JavaScript to allow your application to run in either WebSphere Application Server Version 5 or Version 4. Enterprise Java Beans are not used. This is an easy way to bring your application to either the Internet, or the Intranet, both quickly and inexpensively.

Tomcat is not supported.

Further customization of the Web enabled application can be accomplished using IBM WebSphere Development Studio Client for iSeries, V5.0, and IBM WebSphere Development Studio Advanced Edition Client for iSeries.

It is important to note, that 5250 applications running with the new GUI interface will generally take significantly more CPU resource than if run with the original "green screen" interface under a 5250 OLTP environment. The 5250 data stream and 5250 OLTP is extremely efficient and has been fine-tuned over many years. The magnitude of the resource increase is very dependent upon the application. At the time this was written there is not enough experience with enough real, production applications to provide generalized guidelines. It is clear that the larger the percentage of time spent doing screen I/O in a 5250 application, the larger the CPW increase when running with a GUI interface. Initial results show the application will require several times the processor resource.

Understanding the 5250 application functions being brought to the web and piloting those parts of the application is recommended. For additional tips and considerations, refer to the Performance Capabilities Reference manual. This and other documentation can be found at:

- <http://www.ibm.com/eserver/series/perfmgmt>

Also, check the eServer Workload Estimator to help predict the system characteristics for these IBM WebFacing Tool enhanced 5250 applications. This site is updated frequently, based upon continuous feedback. You can access this tool via the web with URL:

- <http://www.ibm.com/eserver/series/support/estimator>.

Notes: WebFacing Tool - 2 -

Hardware Requirements

iSeries System minimum requirements:

- WAS 4.0, any edition, WAS 5.0, any offering. WebFacing does not support Tomcat
- 370 CPW under WebSphere Application Server editions 4.0 or older and under WebSphere Application Server V5 Base or Networking editions.
- 300 CPW under WebSphere Applications Server V5 Express

Workstation minimum requirements:

- Server Development
 - Intel Pentium II processor
 - 256 MB RAM minimum
- Java/Web/WebFacing Development
 - Intel Pentium II processor minimum; Pentium III 500 MHz or higher, recommended
 - 512 MB RAM minimum
 - 768 MB RAM recommended for running or debugging in Unit Test Environment
- Required hard drive space: 1650 MB
- Additional 700 MB of temporary hard drive space is needed during product installation.
- Windows: VGA graphics card (800 x 600, or higher, recommended, 256 colors)
- CD-ROM/DVD drive
- Mouse or pointing device

WebFacing Tool - no 5250 CPW on January 2003 models

January 2003 Models & Packaging benefits WebSphere and WebFacing

- iSeries 800
 - WebFacing does NOT require 5250 CPW workload
 - Standard & Advanced Editions include WAS-Express
Value Edition does NOT include WAS-Express

- i810
 - ▶ WebFacing does NOT require 5250 CPW workload
 - ▶ Standard Edition does not include WAS-Express
 - ▶ Enterprise Edition includes WAS-Express

- i825, i870 & i890 (2497/2498)
 - ▶ WebFacing does NOT require 5250 CPW workload
 - ▶ Standard Edition does not include WAS
 - ▶ Enterprise Edition includes choice of WebSphere Application Server
 - WAS - Express for iSeries **OR**
 - WebSphere Application Server V4 (single server) **OR**
 - WebSphere Application Server V5

***ALL Older iSeries
Models Using
WebFacing Tool
Require 5250 CPW***

Agenda

- Performance at Your Fingertips
- Adaptive Storage Virtualization for High Availability
- Flexible, secure Management of e-business Infrastructure
- **Integrate your business with e-business**
 - ▶ e-business Foundation: WebSphere Application Server
 - ▶ WebSphere Development Studio for iSeries
 - ▶ **iSeries Access Products**
 - ▶ Domino and WebSphere products



iSeries Desktop Solutions with iSeries Access Family

- iSeries Access for Web (5722-XH2)
 - ▶ Browser based access to iSeries resources
 - ▶ Easily customizable front page
 - ▶ Improve security, central administration
 - ▶ Includes 'My Personal Folder'

- WebSphere Host Publisher 4.0
 - ▶ Rapid Web-enablement of 5250 applications
 - ▶ Fully translated, including DBCS languages
 - ▶ Runs on WebSphere Application Server 4.0
 - ▶ Supported on OS/400 V5R1 and V5R2

- iSeries Access for Windows (5722-XW1)
 - ▶ A leading Windows desktop connectivity alternative, includes iSeries Navigator
 - ▶ Enhanced to include new Personal Communications 5250 emulator - V5.5
 - ▶ Supports Kerberos, the emerging industry preferred method to authenticate users



Notes: iSeries Access Family - 1 -

This foil introduces iSeries Access Family (5722-XW1) "components" and focuses on those that can be part of an e-business solution.

Note that WebSphere Host Publisher is available as a separate product. In that packaging, it has some additional capabilities not available when available as an iSeries Access separately orderable feature.

WebSphere Host Publisher contains a powerful set of tools to integrated several different applications, database interfaces and workstation I/O interfaces into a single appearance to the workstation user.

iSeries Access for the Web can do simple "webizing of a 5250 applications" as well as define browser interfaces to such OS/400 facilities such as spool queues and messages.

You can also use iSeries Access for the Web with WDS WebFacing.

Notes: iSeries Access Family - 2 -

This next set of foils discuss some functions available with the iSeries Access Family of products, 5722-XW1. The full set of functions are listed below:

- Part of XE1, which is included for no charge with base OS/400, except for the functions noted below:
 - 5250 display and printer emulation (additional cost)
 - Data Transfer (additional cost)
 - SSL to secure network connections
 - Key middleware such as ODBC, OLE DB, ActiveX Automation Objects, Wizards for developing Visual Basic applications, iSeries Toolbox for Java
 - iSeries Navigator
 - Operations Console
 - EZ-Setup
- iSeries Access for Wireless (5722- XP1)
 - Integrated package of wireless functions and middleware
 - Delivered with iSeries at no additional cost
 - Management Central-Pervasive
 - Functional enhancements for V5R2
 - Worldwide enablement
 - iSeries Toolbox for Java Micro Edition
 - Access the iSeries through Java classes running on the device
 - Write Java Toolbox applications with the customized look of an installed client
 - JDBC Micro Edition
 - Access DB2 on the iSeries from Java running on a wireless device
 - Write full-featured JDBC applications (transactions, stored procedures, Database triggers,)
- iSeries Access for the Web (5722-HP2)
 - Provides access to iSeries through a browser
 - Can access the iSeries system through 5250 emulation running to a browser
 - Can access database, integrated file system, printers, output queues
 - Can run batch commands, send/receive messages, work with jobs, create and send .PDF and .xml
 - Contains 525-based subset of IBM Host Publisher functions
- WebSphere Host Publisher V4
 - Easily integrates existing host applications within industry-standard Web pages or WebSphere applications
 - Supports 3270, 5250, VT, and JDBC back-end data sources
 - Shields user from data source

Integration: iSeries Access for Web

- Simple, browser-based access to iSeries servers and Web applications
- Easy to configure, deploy and customize with central administration
- Runs on iSeries with Java servlet technology
 - ▶ No complex JVM setup and no-touch client footprint



Notes: iSeries Access for Web

iSeries Access for Web was introduced by IBM in September 2001. It provides a browser interface to iSeries resources such as: DB2 UDB, printer output, and OS/400 CL commands. iSeries Access for Web is implemented as a set of Java servlets which run on the iSeries server. Only a browser is required on the client.

If your iSeries server is part of your company's Intranet, you can use iSeries Access for Web to provide access to your resources for others within your company. If your iSeries server is part of the Internet, you can use iSeries Access for Web to provide access to your resources for your customers and suppliers. In this case, you also need to provide your customers and suppliers with a user profile to access your iSeries server.

You can build a quick and easy web site for your company with the customization support of iSeries Access for Web. No Java programming is required. You simply create HTML files and set configuration options. In this article, I demonstrate this capability by creating a web site to sell boats. This information is based on the functionality available with the V5R2 release of iSeries Access for Web.

It offers web browser based access to iSeries servers. iSeries Access for Web enables end users to leverage business information, applications, and resources across an enterprise by extending the iSeries resources to the client desktop through a web browser.

iSeries Access for Web must be configured with a web application server and an HTTP server.

Pure Java servlet-based access: iSeries Access for Web is a set of servlets that run on iSeries servers as extensions to the HTTP server. It provides access to common user functions such as database, file, print, jobs, 5250 sessions, and messages on the iSeries server. It enables easy access to DB2 Universal Database for iSeries information through built-in SQL requests and has a simple interface to work with information in the Integrated File System, including file download and view capabilities.

Industry-standard protocol: iSeries Access for Web uses the industry standard HTTP and HTTPS protocols, and does not use any proprietary TCP/IP ports and protocols. Firewall issues are much more manageable as a result.

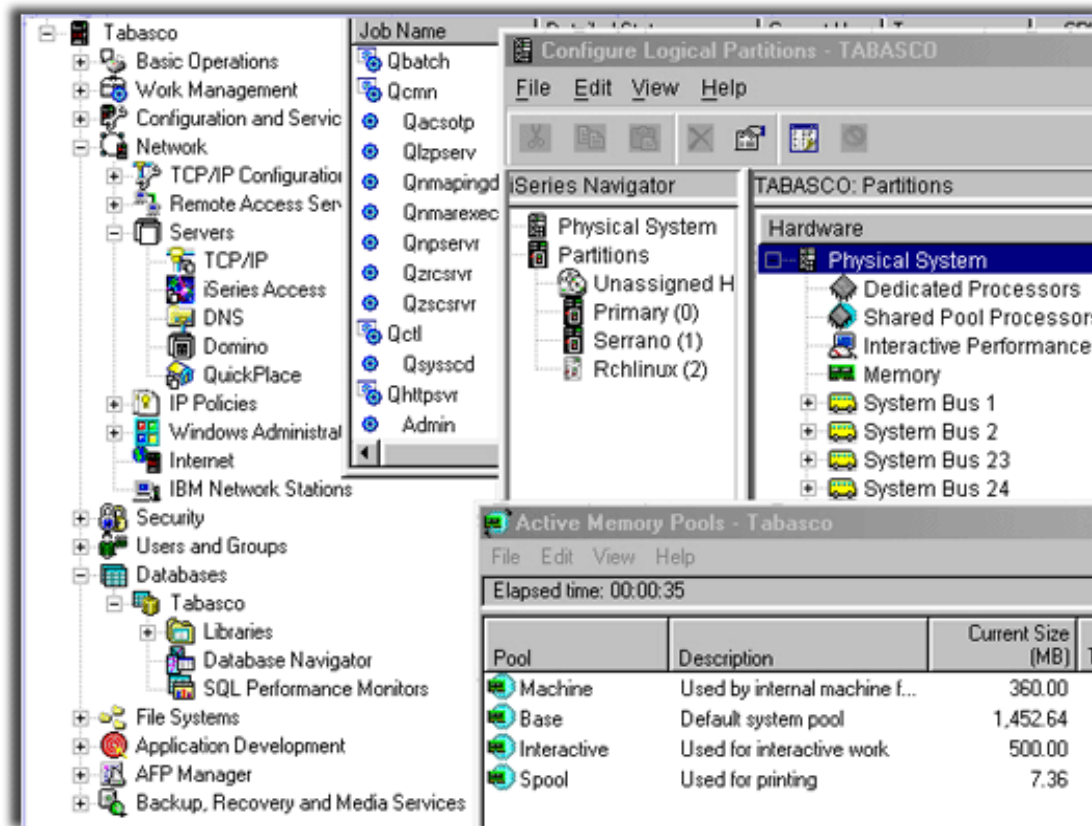
Lightweight Access: The intent of iSeries Access for Web is lightweight and casual access to iSeries servers from a Web browser. Most of the iSeries Access for Web functions have minimal browser requirements and would work with almost any browser on any platform.

Server-based: iSeries Access for Web is entirely server based. There is no client code to install and manage. You simply install and configure it on the server and access it from any Web browser.

Fully customizable: iSeries Access for Web functionality can be restricted for users and groups of users. iSeries Access for Web is fully customizable. Object level security is used to validate access to OS/400 resources. Users and groups can only access resources to which they are authorized. What users see when connecting to the iSeries server is fully customizable by the OS/400 Administrator

Host Publisher and Host Publisher Studio have been bundled with the 5722-XH2 iSeries Access for Web product to provide a complete web-to-host integration solution.

Autonomic: iSeries Navigator



- Improve operator productivity with extensive automation for workload management
- Centralized administration of multiple operating environments across LPARs and Integrated xSeries servers
- Integrated management for enterprise middleware solutions

Notes: Autonomic: iSeries Navigator

This foil introduces the iSeries Navigator capabilities including managing systems and system resource.

Examples of middleware plug-ins include Domino for iSeries, Backup Recovery and Media Resources, Advanced Job Scheduler, and Performance Tools for iSeries Display Performance Data graphics.

See the following foil on Sametime and iSeries Navigator.

iSeries Access for Web - Requirements

- iSeries Access for Web (V5R1, 5722-XH1)
 - ▶ Available 9/28/2001, English-only
 - ▶ Runs on WebSphere Application Server 3.5 (Support for OS/400 V4R5 / V5R1)
 - ▶ Can run one instance of iSeries Access for Web on WAS 3.5

- iSeries Access for Web (V5R2, 5722-XH2)
 - ▶ Fully translated, including DBCS NLVs
 - ▶ Runs on WebSphere Application (Advanced and Single) Server 4.0 and IBM HTTP Server with the "Tomcat" plug-in from the Apache Software Foundation (ASF) - Support for OS/400 V5R1 and V5R2
 - ▶ Can be configured to run with more than one web application server and can run concurrently.
 - WAS Advanced 4.0, WAS Single Server 4.0, and ASF Tomcat can all be installed, configured, and running on an iSeries server concurrently
 - iSeries Access for Web V5R1 (5722-XH1) and V5R2 (5722-XH2) can be installed and run on the same iSeries server concurrently, and V5R2 (5722-XH2) can be configured to run in more than one WebSphere administrative instance concurrently.

Wireless: Web Ready Java 2 Micro Edition

- iSeries Access for Wireless (5722-XP1)
 - ▶ Integrated package of wireless middleware
 - ▶ Includes iSeries Navigator features for wireless systems management
 - ▶ Includes V5R2 version of Management Central - Pervasive
- IBM Toolbox for Java 2 Micro Edition (J2ME)
 - ▶ "Miniature JVM" - core subset of Java classes and drivers optimized for pervasive device
 - ▶ Includes JDBC Micro Edition for Java application access to iSeries database and applications
- Micro Edition drives growth of secure wireless Web access to enterprise data
- Write customized wireless applications with power of iSeries



Notes: Wireless-Web Ready Java 2 Micro Edition

IBM iSeries Access for Wireless (5722-XP1) is part of the iSeries Access Family and provides access to iSeries servers from wireless, handheld devices.

It consists of the following separate services that can be used individually, or together, to provide the access you need:

- IBM Toolbox for Java 2 Micro Edition contains a subset core of Java classes (called "CLDC") that allow you to develop Java programs to access iSeries servers from wireless, handheld devices. You can use these classes to write client/server applications that work with data and resources on your iSeries server. For example, you can access iSeries database data using functions similar to Java Database Connectivity (JDBC), an industry standard.
- iSeries Navigator for Wireless provides a user interface for performing some systems management activities from wireless, handheld devices. The functions supported are essentially equivalent to the V5R1 Management Central - Pervasive (available via PTF) level of functions. As network administrator, it allows you to monitor your iSeries server while you are away from the office. With the iSeries Navigator you can:
 - Work with iSeries systems
iSeries Navigator for Wireless allows you to view the properties of systems, add or remove a system and customize the system list.
 - Work with Integrated xSeries Servers
iSeries Navigator for Wireless provides you with the ability to manage your Integrated xSeries Servers from your wireless device.
 - Work with tasks
You can view summary details for all your Management Central tasks.
 - Run commands across multiple systems
iSeries Navigator for Wireless makes it easy to run commands on iSeries systems from your wireless device.
 - View and interact with monitors
If you have pre-configured monitors to run in Management Central, you can view and interact with system monitors, message monitors, job monitors, file monitors, and B2B activity monitors using iSeries Navigator for Wireless. As with V5R2 Management Central - Pervasive, you can also start and stop Integrated xSeries Servers for iSeries that have been included in "inventoried hardware."

WebSphere Host Publisher V4.0

- Included in the iSeries Access Family product
 - ▶ 80% of iSeries customers purchase iSeries Access Family, thus have WebSphere Host Publisher
- ▶ Streamline and enhance 5250 or mainframe applications (including **system screens, host, or database** applications)
 - ▶ No change to back end applications -- don't even need source code
 - ▶ Enables **multiple** sources of data to be combined into a single Web page
- Works with Internet Explorer or Netscape
 - ▶ Any desktop operating system (Windows, Linux, Macintosh, UNIX....)
- Runs with:
 - ▶ WebSphere Application Server 4.0 or later



*modernize those green
screen applications...*

Notes: WebSphere Host Publisher V4.0

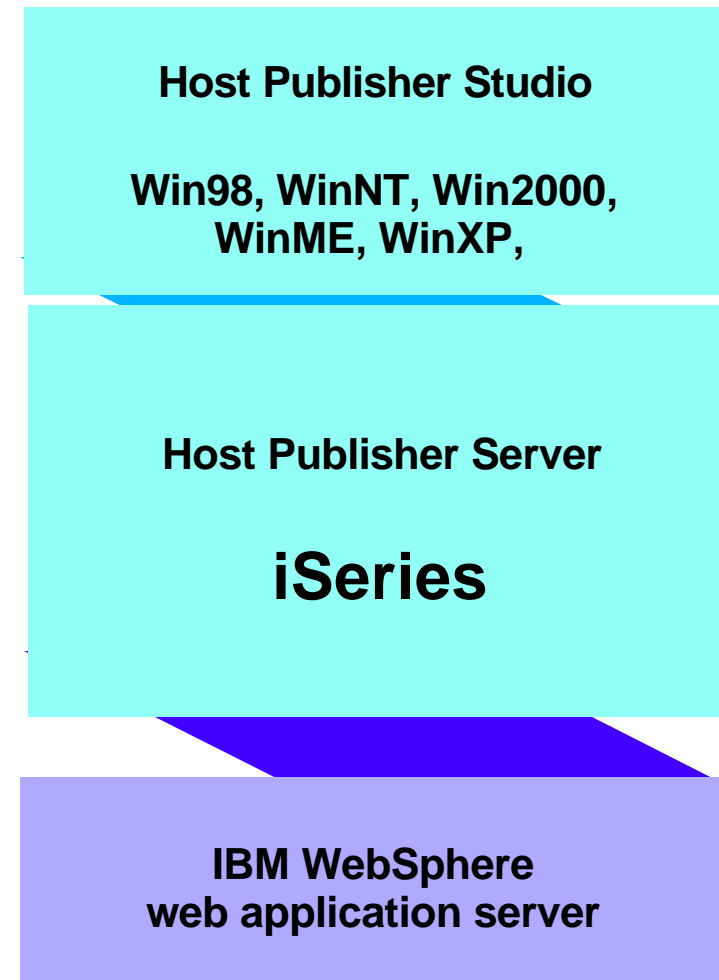
WebSphere Host Publisher (WHP) provides a quick and easy way to implement e-business by extending the reach of mission critical applications to the browser, requiring no changes to the existing applications. It delivers:

- Host Publisher Studio delivers an easy to use wizard like interface for creating web to host Java
- Beans, EJBs, web pages and web services projects
- Via WebSphere Workload Manager delivers enterprise scalability
- Leverages J2EE to support the latest web development and deployment standards
- Provides portal support for integrating 5250 applications into IBM portal server
- Provides programmed navigation through legacy applications
- Extends access capabilities to include Java, JDBC and virtual terminal
- Can be used as a bean generator to connect new web applications to existing legacy applications
- Enables legacy application extension via industry standard web services
- Provides XML host access via generated beans as well as 5250 access via an XML gateway
- Capabilities to managed a large set of Host Publisher implemented applications, including failover should one of the nodes in the network fail.

Any skill invested on behalf of an iSeries system can be utilized on several different supported operating systems, such as those running on zSeries servers and pSeries servers.

Host Publisher Components

- Development Environment
- Runtime Environment
- Runtime Infrastructure



Notes: Host Publisher Components

The main components to run Host Publisher are listed below.

Development Environment

- Creates reusable Host Integration Objects that encapsulate host interactions and data retrieval
- Generates fully customizable Web pages
- Uses task oriented, graphical user interface

Runtime Environment

- Provides session management, license monitoring, run-time administration, load balancing and log and trace management
- Supports SSL encryption and DES encrypted passwords
- Supports integration with other IBM connectors

Runtime Infrastructure

- Provides advanced runtime environment for Host Publisher Server and Host Publisher applications.
- Prerequisite but not a part of Host Publisher.

Note: The XML Gateway is no longer integrated as the 5250 interface for iSeries Access for Web, as iSeries Access for Web V5R2 provides an integrated 5250 interface. The XML Gateway, however, is required for Host Publisher Host Access.

The XML Gateway may still be configured with iSeries Access for Web, as a 5250 interface. Refer to the following publications for details of the installation of the Host Publisher Server and configuring the XML Gateway with iSeries Access for Web.

- Redbook *iSeries Access for Web V5R2 and WebSphere Host Publisher V4.0*, SG24-6804
- IBM WebSphere Host Publisher V4.0
- *IBM WebSphere Host Publisher Planning and Installation Guide*, SC31-8734
- *IBM WebSphere Host Publisher Administration and Users Guide*, GC31-8728

This is achieved by using the `-iwa` parameter on the `cfgHPsvr` command. This parameter allows Host Publisher to obtain an iSeries Access license from the license component of the iSeries Access Family product (5722-XW1).

Host Access Transformation Server (HATS)

- Web-to-Host emulator
 - ▶ Zero-footprint, zero-download
 - ▶ Only needs a browser on the client
 - ▶ Supports 3270 and 5250
- Rules-based transformation engine
 - ▶ Fast deployment:
 - No programming skills required
 - No customization needed
- Real time conversion of 5250 interface



*Included with Host
Integration Solution bundle*

Notes: Host Access Transformation Server (HATS)

Host Access Transformation Server (HATS) makes 5250 and 3270 applications available through the web browser while converting your host screens to a web-like look and feel. It is a zero foot print product - only the browser is required on the client.

HATS:

- Extends 5250 and 3270 applications to a web browser
- Converts host screens dynamically on the fly
- Employs an advanced, rules based transformation engine, making it unnecessary to customize each screen
- Exploits the scalability and security of WebSphere Application Server
- Delivers HTML directly to the desktop without client code or download
- Enables legacy content integration with WebSphere Portal Server
- Provides an open, extensible J2EE architecture that allows unlimited customization and integration of legacy applications

HATS is available through the Host Integration Solution bundle.

HATS and Host Publisher all have more capability to extend the web GUI than iSeries Access for the Web. HATS and Host Publisher can use normal flow or can be used to modify the screen flow. They have recordable, programmable scripts that allow users to navigate applications in ways programmed by developers that will alleviate the end user having to understand the flow of the screens. This is especially helpful for Internet deployment to users that have no background at all in how the application is used.

HATS uses a rules based engine for converting screens so a low skilled developer or even an end user can define how to handle specific aspects of the screen conversion for consistency.

HATS, Host Publisher and WebFacing all provide fairly sophisticated application of style sheets that supply a very nice GUI presentation. Some of the same kinds of end results can be accomplished easily with iSeries Access for the Web (displaying the company logo on the web forms for instance).

HATS is available exclusively as a part of the WebSphere Host Integration Solution. A "Limited Edition" version of the product will be available in iSeries Access in 2003 that is upgradeable to the full HATS server outside of iSeries Access. From an iSeries view, HATS provides a noninvasive tool for easily rendering 5250 applications to a high quality browser GUI without programming.

See the next set of foils for "Hats-Express."

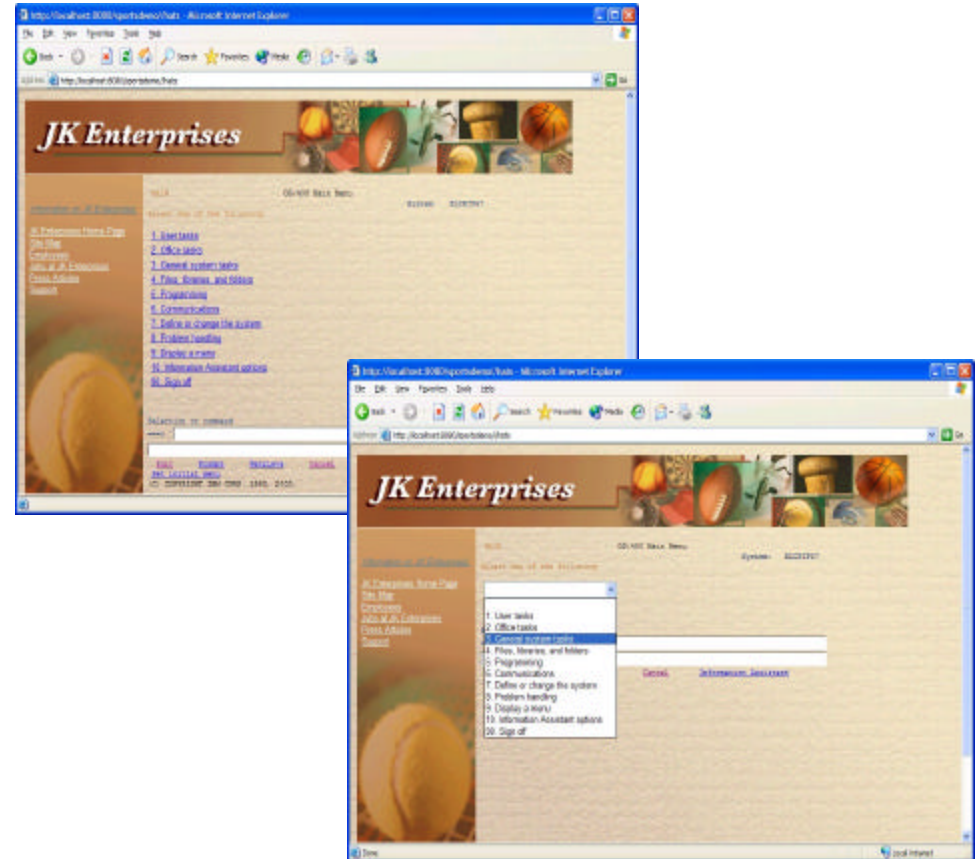
HATS - Express

■ Subset of HATS

- ▶ Converts 5250 screens on the fly, in real time, to a point-and-click Web interface
- ▶ HTML templates included or can use customer provided HTML
- ▶ No programming required

■ Packaging

- ▶ HATS - Express included with iSeries Access Family (5722-XW1) starting 6/30/2003
- ▶ Customers with 5722-XW1 can order chargeable upgrade to full HATS offering



A quick and easy way to put iSeries applications on the Web

Available June 2003

Notes: HATS - Express

Part of iSeries Access Family - 5722-XW1

Available 6/30/03

- Will automatically ship with new orders for 5722-XW1
- Existing 5722-XW1 customers can order no-charge Feature number to receive HATS - Express in iSeries Client Access Family

Requires **WebSphere Application Server** V4.0 or V5.0

- Supports WAS V5 - Express for iSeries

Supports Internet Explorer and Netscape browsers

Provides host keyboard support

Supports Secure Sockets Layer (SSL) security

Converts 5250 screens to a point-&-click Web interface

- Delivers HTML to the desktop
- Only software needed on the client is a Web browser

Works on all 5250 screens

- Use customer-provided HTML or stock HTML templates included with product


Screens are converted on the fly, in real time

- Selection lists can be converted to hot links, buttons, drop-down menus, or option lists (radio buttons)
- PF keys are can be converted to buttons or hot links

No programming necessary

- Does not break if changes are made to 5250 application
- No need to access source code

Agenda

- Performance at Your Fingertips
- Adaptive Storage Virtualization for High Availability
- Flexible, secure Management of e-business Infrastructure
- **Integrate your business with e-business**
 - ▶ e-business Foundation: WebSphere Application Server
 - ▶ WebSphere Development Studio for iSeries
 - ▶ iSeries Access Products
 - ▶  Domino and WebSphere Products

Integration: WebSphere Commerce

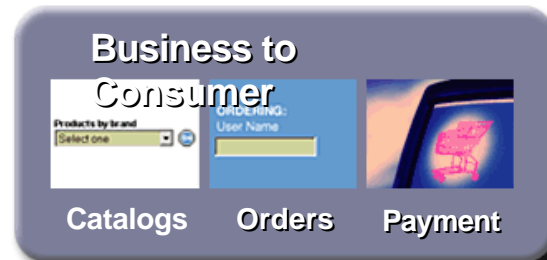
- Robust and integrated Framework for enterprise-class B2B and B2C e-commerce sites
- Pro Entry
 - ▶ Priced for SMEs, single store
- Professional Edition
 - ▶ Order & inventory management
 - ▶ Business campaign management
 - ▶ Integrated business intelligence
 - ▶ Live help (via Sametime®)
 - ▶ Auctions
 - ▶ Payment management
- Business Edition
 - ▶ Additional B2B capability



WebSphere Commerce

- Customize B2C & B2B catalog web sites
- Serious sell-side solutions integrated into existing applications
- Maximize revenues, improve customer service & extend reach worldwide
- Single store, multiple store, shopping-cart analogy

Business-2-Consumer



Business-2-Business



**WebSphere
Commerce for
web-based
e-commerce
Solutions**

Notes: WebSphere Commerce

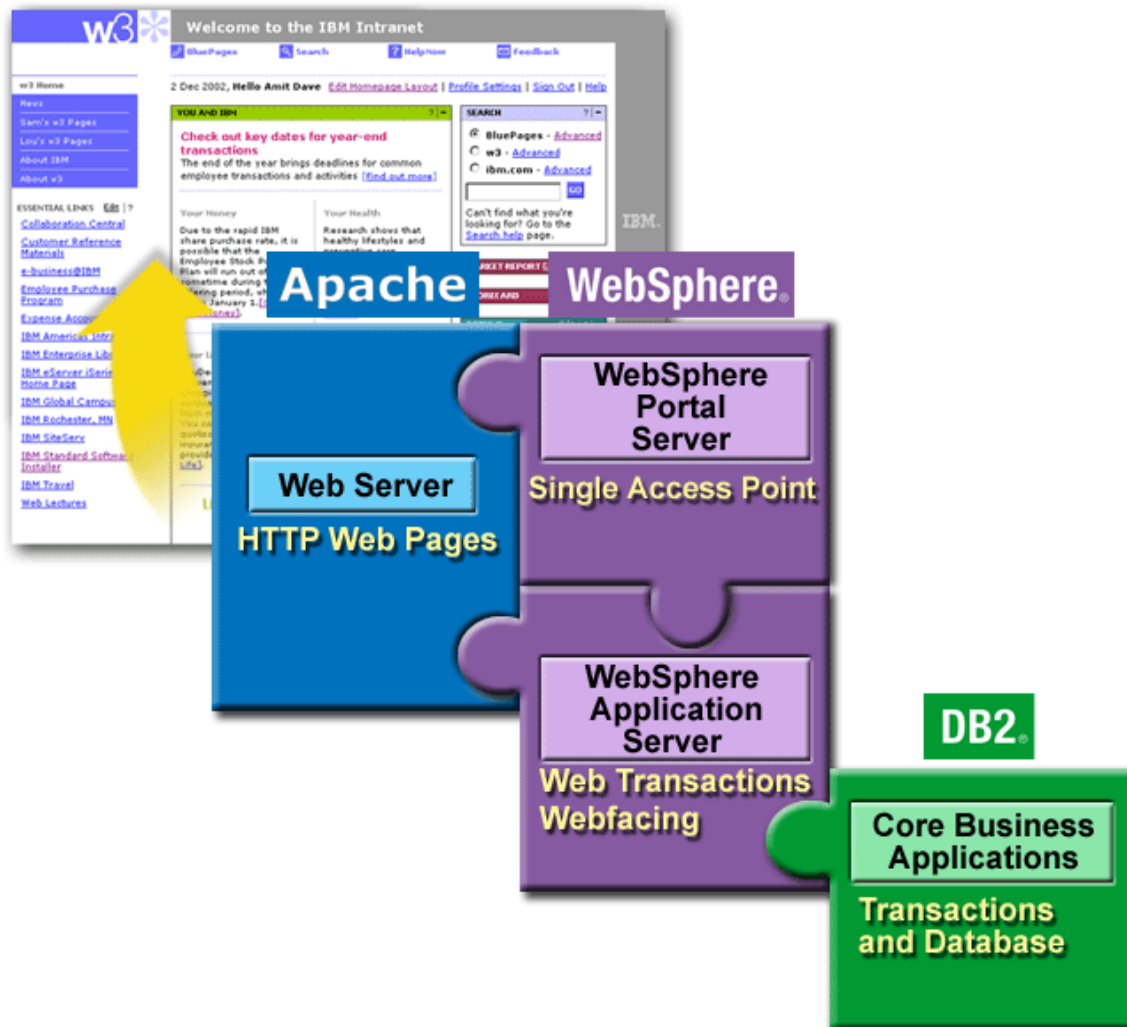
IBM's WebSphere Commerce includes a suite of products that implement sophisticated e-business applications. for serious product selling and inventory management.

There are several separate WebSphere editions and sub components, such as content management information (to use as the base for personalization), secured payments across the Internet. Editions are customized for, example, for Business to Customer (B2C), and Business to Business (B2B) as depicted on this foil and discussed on the next foil.

Here is a summary list of some of the functions available under WebSphere Commerce editions:

- Merchandising: associations such as cross-selling, Up-selling, Accessories, Packages and Bundling
- Rules based personalization: Rules builder/engine, Product Recommendations
- Auctions: Open cry: bidder names and bids are published during an auction time period (price bid up), Sealed bid: names and bids are confidential, Dutch: name and bids are published (price bid down)
- Quick Order/Buy: Multiple Lists, Scheduled Orders, Reorders
- Business Integration: XML messages (Order Create, Order Status Update, Product Quantity Update, New Customer, Update, Product Price Update)
- Page Designer: WYSIWYG style tool, Drag and drop dynamic content into JSPs
- Store Creation Wizard
- Store Profile editor
- NC publish/deployment
- Catalog Architect: Distributed database support, Enhanced XML support, NLV support, Integration with Studio and HotMedia design aids, Product Recommendations
- JSP Enablement for Catalog Display: Net.Data is still supported
- Mass Import - XML support
- LDAP Support
 - OS/400 Directory Services or
 - Domino for AS/400 R5.0 directory server Distributed database support
- X.509 Certificates

Integration: WebSphere Portal Server



- Improve productivity using WebSphere to provide a single access point to dynamic information, applications, people
- B2E, B2B and B2C portals
- Connectivity and integration
- Presentation and administration
- WebSphere Portal Server Enable 4.1
 - ▶ Includes WebSphere Application Server 4.x

Notes: Integration: WebSphere Portal Server

You can build highly scalable portals through a set of portlets. Portlets are the visible active components end users see within their portal page. This is similar to a number of windows under a Windows operating system PC client.

IBM application development tools simplify and personalize your own portal page construction.

This is an example of a portal for an IBM employee.

There are portal constructs for:

- Business to Business
- Business to Employee
- Business to Customer

IBM has a WebSphere Portal Server for its platforms. The latest one available on iSeries is WebSphere Portal Server Enable V4.1 for iSeries.

Note that sub-capacity pricing (LPAR partition) is not yet available for this product.

IBM WebSphere Portal Version 4.1 delivers a range of new features designed to consolidate and enhance a user's single point of contact with applications, people, content, and processes:

- New, industry-leading collaborative capabilities
- New event-management support
- Web Services capabilities
- Content publishing options
- Faster portlet development
- Enhanced security
- New search engine
- Pre-integration with commerce technology

Allowing businesses to collaborate more effectively, WebSphere Portal Version 4.1 provides a standards-based, e-business platform that enables employees, consumers, and other companies to easily and seamlessly interact with personalized information. In addition, the new WebSphere Portal Version 4.1 delivers out-of-the-box integration capabilities through a single integrated platform previously available only through multi-vendor solutions.

Lotus Notes, Domino 6, iNotes Web Access

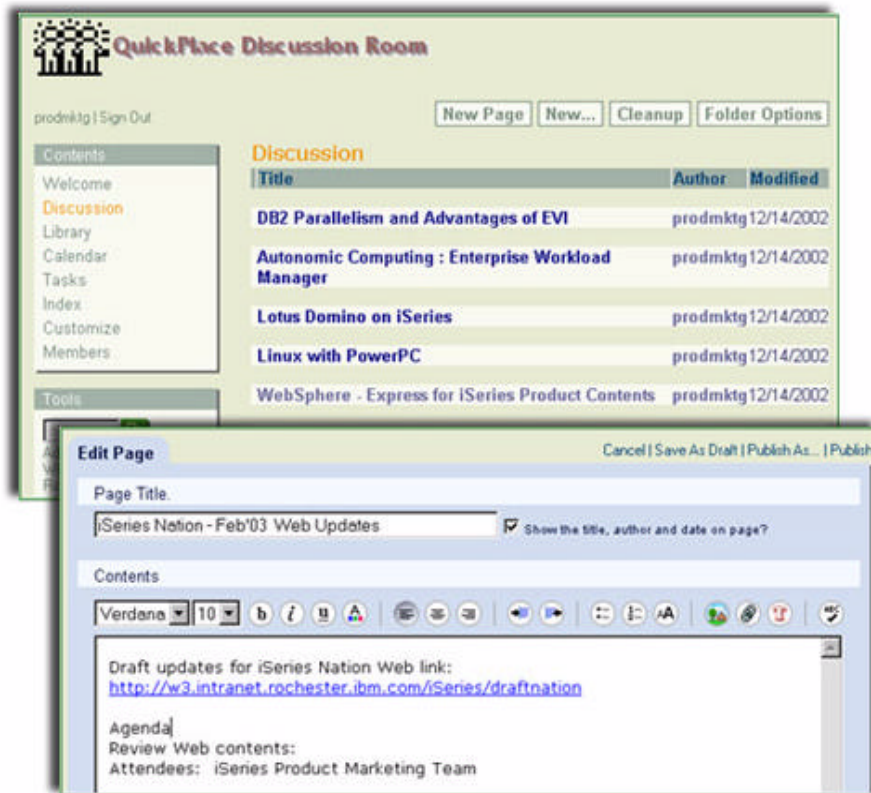
- Empower companies to create dynamic workplaces
- New capabilities of Lotus Notes®, Domino 6 deliver breakthrough performance, scalability and productivity
- iNotes™ Web Access delivers an intuitive browser-based interface to users throughout an organization
- Integration with Notes, WebSphere
 - ▶ iNotes to Microsoft Outlook®

The screenshot shows the Lotus Notes 6 iNotes Web Access interface. At the top, there's a 'Welcome' message and a search bar. Below are navigation icons for Mail, Calendar, Contacts, To Do List, and Personal Journal. The main content area displays a 'New Mail' table with columns for Who, Date, and Size. A yellow arrow points from this table to a puzzle diagram below.

Who	Date	Size
admin	02/04/2002	2377
admin	01/30/2002	2405

The puzzle diagram consists of several pieces: a yellow piece labeled 'Lotus', a blue piece labeled 'Information Management', a purple piece labeled 'Web Application Server', a green piece labeled 'Core Business Applications', and a large yellow piece at the bottom labeled 'Integrated Messaging Collaboration Services'.

Integration: IBM Lotus QuickPlace™ & Sametime



- Web-based team workspaces to store collective knowledge and manage projects (QuickPlace)
- Online Web conferences to share information with colleagues, suppliers and customers (QuickPlace)
- Get answers and make decisions faster with real time instant messaging (Sametime)
- Awareness to quickly locate available skills and resources (Sametime)

Notes: Integration: IBM Lotus QuickPlace™ & Sametime

Before discussing this foil, let us discuss the previous foil (Lotus Notes, Domino 6, iNotes Web Access).

Organizations always want to accomplish more. They want to reliably deliver information their customers need around the clock. Easily manage their entire infrastructure from a single point. Increase employee productivity. Communicate and collaborate in real-time. All with less effort, lower costs and fewer resources. Now you can take full advantage of the administration and performance power of IBM Lotus® Domino 6 server to make it easier to manage the complexities of your business. IBM Lotus Domino 6 server offers robust tools that can simplify your system management tasks and increase network performance and uptime. Achieve better administrative control with tools like policies, archiving, quota management and SPAM filtering. And smoothly evolve your Lotus messaging solutions to meet marketplace demands.

Key Features:

- Helps increase system availability with advanced reliability and security features
- Saves time by enabling update of client environments centrally with low-touch deployment
- Simplifies administration and saves time with central management of user configurations for individuals, groups or even an entire organization
- Reduces costs and eases administration by supporting multiple organizations and languages on one Domino server
- Helps maximize uptime with enhancements that enable sophisticated data collection and faster server restarts
- Helps keep users productive and connected with improved clustering, formula engine, full-text searching, network compression and replication
- Provides interoperability with existing application servers, such as Domino R5 server, WebSphere server, Sametime 3 server and QuickPlace server

QuickPlace, Sametime

In this foil we see QuickPlace enables a company to give users a way to work more securely with colleagues, suppliers, partners and customers. It's ideal for enabling Web conferences or meetings, and provides teams with workspaces where they can reach consensus through discussions, collaborate on documents and coordinate plans, tasks and resources.

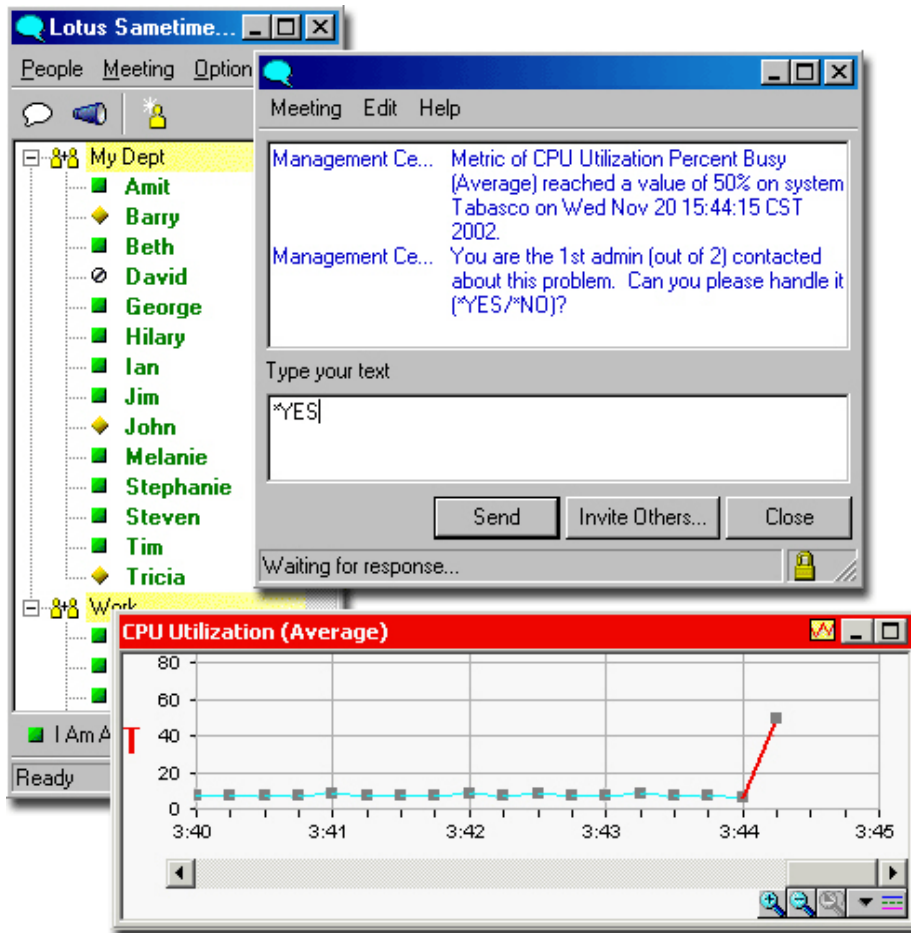
QuickPlace integrates with existing applications such as Lotus Notes 6 and Notes R5, Lotus Sametime and Microsoft Office XP to help users schedule meetings, manage tasks, communicate in real time, present ideas and create and edit documents using familiar tools.

It is a self-service application so once administrators install the software on the server, users can take responsibility for creating a new team workspace and managing users for the workspace.

Sametime 3.0a (released in February 2003) supports Domino 6.0.1 and later 6.0.x releases. This Sametime - Domino R6 release levels supported are unique to iSeries. Other Domino 6 platforms will support Sametime 3.1, targeted for June 2003.

Autonomic: Lotus Sametime & iSeries Navigator

Sametime Event Monitor for iSeries



- Improves operator productivity with instant message response to system events
- Integrates OS/400 monitoring with Sametime instant messaging
- Assures response with autonomic event delegation through hierarchy of designated operators

Notes: Autonomic: Lotus Sametime & iSeries Navigator

iSeries Navigator provides premier features such as real-time performance monitors across a single or network of iSeries systems. These monitors have the ability to set and log events based on thresholds, which can further be automated to take appropriate recovery actions. For example, upon reaching the threshold value set for CPU utilization, the administrator can define an OS/400 message to be sent to a particular user, a wireless device or invoke a corrective program to be run.

Another powerful example where threshold values can be used to trigger corrective events is the ability to integrate IBM Lotus Sametime instant messaging functions with iSeries Navigator performance monitors. Using the intelligent Sametime Event Monitor for iSeries Bot, events can be immediately notified to a hierarchy of system administrators. When an event is logged, such as the CPU utilization exceeding a set threshold, the Sametime Event Monitor for iSeries will use the awareness feature of Sametime to find the first available administrator and notify them using an instant message. The administrator can then run a simple command to perform corrective action or forward the problem to the next available administrator.

For additional information, see iSeries Navigator Web site: <http://alphaworks.ibm.com/tech/eventmonitor>


What is a Bot?

An Intelligent Agent, or bot, is a piece of software that can autonomously accomplish a task for a person or other entity. The software has some sort of "trigger" built into it and, once executed, the agent can carry out its function without further intervention. The term originates from the earlier classification of intelligent agents as "knowledge robots", which subsequently got shortened to just "knowbots" or even "bots". In short, "bot" is just another term for intelligent agent. Today most people use the terms intelligent agent or bot interchangeably.

For more information on Bots, see

- <http://www.botknowledge.com/>

Agenda

- Performance at Your Fingertips
- Adaptive Storage Virtualization for High Availability
- Flexible, secure Management of e-business Infrastructure
- Integrate your business with e-business
-  Additional Material

OS/400 Per Processor Pricing

- Hardware Model is determining factor of whether the per processor terms apply
 - ▶ 800, 810, 825, 870, new 890 have OS/400 priced per processor (1 way, 2 way, 4 way, etc.) rounded up
 - ▶ Other hardware models will continue to have OS/400 bundled for use on the entire machine
- OS/400 licenses will be included in Standard and Enterprise Packages for startup processors
- Upgrades to new hardware (800, 810, 825, 870, new 890) will get Package OS/400 entitlement
- License management support
 - ▶ Software License Manager/400 (SLM) will count processor usage on new models
- Software License Keys are not affected
 - ▶ Single key required for OS/400
- OS/400 licenses must transfer with the hardware

Software Maintenance Update

- V5R1:
 - ▶ May 31, 2003: Program services for V5R1 to end
 - ▶ May 31, 2004: Full usage and defect support for V5R1 OS/400 and selected licensed products extended via Software Maintenance agreement, Support Line contract, or special bid
 - End of support under these "plans" will be announced at least 12 months prior to termination

- V5R2:
 - ▶ September 30, 2004: Program services for V5R2 to end
 - ▶ September 30, 2005: Full usage and defect support for V5R1 OS/400 and selected licensed products extended via Software Maintenance agreement, Support Line contract, or special bid
 - End of support under these "plans" will be announced at least 12 months prior to termination

See January 28, 2003, announcement letter "LP Enhancements for iSeries" for more information

Notes: Software Maintenance Update - 1 -

V5R1 program products included in the extended SW Maintenance Agreement, Support Line contract, special bid statement:

- 5722 AC2 Cryptographic Access Provider 56-bit
- 5722 AC3 Cryptographic Access Provider 128-bit
- 5722 AF1 AFP Utilities
- 5722 AP1 APSU
- 5722 BR1 BRMS
- 5722 CE2 Client Encryption (56-bit)
- 5722 CE3 Client Encryption (128-bit)
- 5722 CM1 Communications Utilities
- 5722 CR1 Cryptographic Support
- 5722 DB1 System/38 Utilities
- 5722 DE1 DB2 Universal Database Extenders V7.1
- 5722 DFH CICS
- 5722 DG1 HTTP Server
- 5769 DL1 Dictionary and Linguistic Tools
- 5769 DP3 DB2 DataPropagator for iSeries V7.1
- 5722 DS1 BGU
- 5798 FAX Facsimile Support
- 5769 FN1 AFP DBCS Fonts
- 5733 FXD Domino Fax
- 5697 F49 MQSeries Integrator V1.1
- 5697 G24 QMF for Windows for AS/400
- 5733 ID1 Infoprint Designer
- 5733 IM3 Intelligent Miner V6.1
- 5722 IP1 Infoprint Server/400
- 5769 LNP LEI 3
- 5769 LNT Domino 5
- 5722 MG1 Managed System Services

Notes: Software Maintenance Update - 2 -

V5R1 program products included in the extended SW Maintenance Agreement, Support Line contract, special bid statement: continued:

- 5722 PD1 APD for AS/400
- 5722 PT1 Performance Tools
- 5722 QU1 Query
- 5722 RD1 OnDemand/400
- 5798 RZG Service Agent
- 5722 SM1 System Manager
- 5722 SS1 OS/400
- 722 ST1 DB2 Qry Mgr & SQL Dev Kit; DB2 Qry Mgr; DB2 SQL
- 5798 TBG NetView FTP
- 5722 V11 Content Manager
- 5798 WC5 WebSphere Commerce Suite
- 5722 WDS WDS/400
- 5722 XW1 Client Access Family*

* This V5R1 service extension for Client Access Family applies only to the Client Access Express for Windows and iSeries Access for Web components of the Client Access Family. Service for the WebSphere Host Publisher V3.5 component will end November 30, 2003.

Notes: Software Maintenance Update - 3 -

V5R2 program products included in the extended SW Maintenance Agreement, Support Line contract, special bid statement: continued:

- 5722 AC3 Cryptographic Access Provider 128-bit
- 5722 AF1 AFP Utilities
- 5722 AP1 APSU
- 5724 A18 WebSphere Payment Manager V3.1
- 5733 A38 MQSeries, V5.2
- 5722 BR1 BRMS
- 5722 CE3 Client Encryption (128-bit)
- 5722 CM1 Communications Utilities
- 5722 CR1 Cryptographic Support
- 5722 DB1 System/38 Utilities
- 5722 DE1 DB2 Universal Database Extenders V7.2
- 5722 DFH CICS
- 5722 DG1 HTTP Server
- 5722 DL1 Dictionary and Linguistic Tools
- 5722 DP4 DataPropagator for iSeries, V8.1
- 5722 DS1 BGU
- 5798 FAX Facsimile Support
- 5620 FIF PATROL for iSeries - Predict
- 5769 FN1 AFP DBCS Fonts
- 5733 FXD Domino Fax
- 5697 G24 QMF for Windows for iSeries
- 5722 IP1 Infoprint Server/400
- 5698 ISE Tivoli Storage Manager
- 5722 JS1 Advanced Job Scheduler

Notes: Software Maintenance Update - 4 -

V5R2 program products included in the extended SW Maintenance Agreement, Support Line contract, special bid statement: continued:

- 5722 JV1 Developer Kit for Java
- 5722 MG1 Managed System Services
- 5722 PD1 APD for AS/400
- 5722 PT1 Performance Tools
- 5722 QU1 Query
- 5722 RD1 OnDemand/400
- 5768 RZG Service Agent
- 5622 SM1 System Manager
- 5722 SS1 OS/400
- 5722 ST1 DB2 Qry Mgr & SQL Dev Kit; DB2 Qry Mgr;
- 5722 VI1 Content Manager
- 5733 WC5 WebSphere Commerce V5.4
- 5722 WDS WDS/400
- 5733 XT1 XML Toolkit
- 5722 XW1 iSeries Access*

* This V5R2 service extension for iSeries Access applies only to the iSeries Access for Windows and iSeries Access for Web components of iSeries Access. Service for the WebSphere Host Publisher V4.0 component will end March 30, 2005.

Software Tiers 270, 8xx Servers Before January 2003

i890	0	120	240	560	1050	2000	4550	10000	16500	20200	37400
24-32 way	P50	P50	P60	P60	P60	P60	P60	P60	P60	P60	P60
16-24 way	P50	P50	P60	P60	P60	P60	P60	P60	P60	P60	
i840	0	120	240	560	1050	2000	4550	10000	16500	20200	
18-24 way	P40	P40	P50	P50	P50	P50	P50	P50	P50	P50	
12-18 way		P40	P50	P50	P50	P50	P50	P50	P50		
8-12 way	P40	P40	P50	P50	P50	P50	P50	P50			
i830	0	70	120	240	560	1050	2000	4550			
18-24 way	P30	P30	P40	P40	P40	P40	P40	P40			
i820	0	35	70	120	240	560	1050	2000			
3700	P30	P30	P40	P40	P40	P40	P40	P40			
2350	P20	P20	P30	P30	P30	P30	P30				
1100	P20	P20	P30	P30	P30	P30					
670		P10	P20	P20	P20						
370		P10	P20	P20	P20						
i270	0	30	50	70							
2350	P20			P20							
1070	P10		P10								
465		P10									

- Multiple processor features
- Complex interactive features
- Interactive upgrade forced higher software tier
- No CUoD on base processors

Software Tier Simplification

i890	Standard	Enterprise
24-32 way	P50	P50
16-24 way	P50	P50
i870	Standard	Enterprise
8-16 way	P40	P40
i825	Standard	Enterprise
3-6 way	P30	P30
i810	Standard	Enterprise
2700	P20	P20
1450	P10	P10
1020	P10	P10
i800		
950/50	P10	
300/25	P05	

- Up to 89% price/performance improvements!
- Single software tier, choice of Standard or Enterprise Package
- On/Off CUoD on all i825, i870, & i890
- WebFaced applications without interactive
- Enterprise package features maximum on demand capabilities
 - ▶ Integrated IBM software value
 - ▶ Unrestricted interactive

Notes: Software Tier Simplification

This foil shows the new dramatically simplified iSeries product line, with far fewer processor features per model and two simple editions: standard and enterprise.

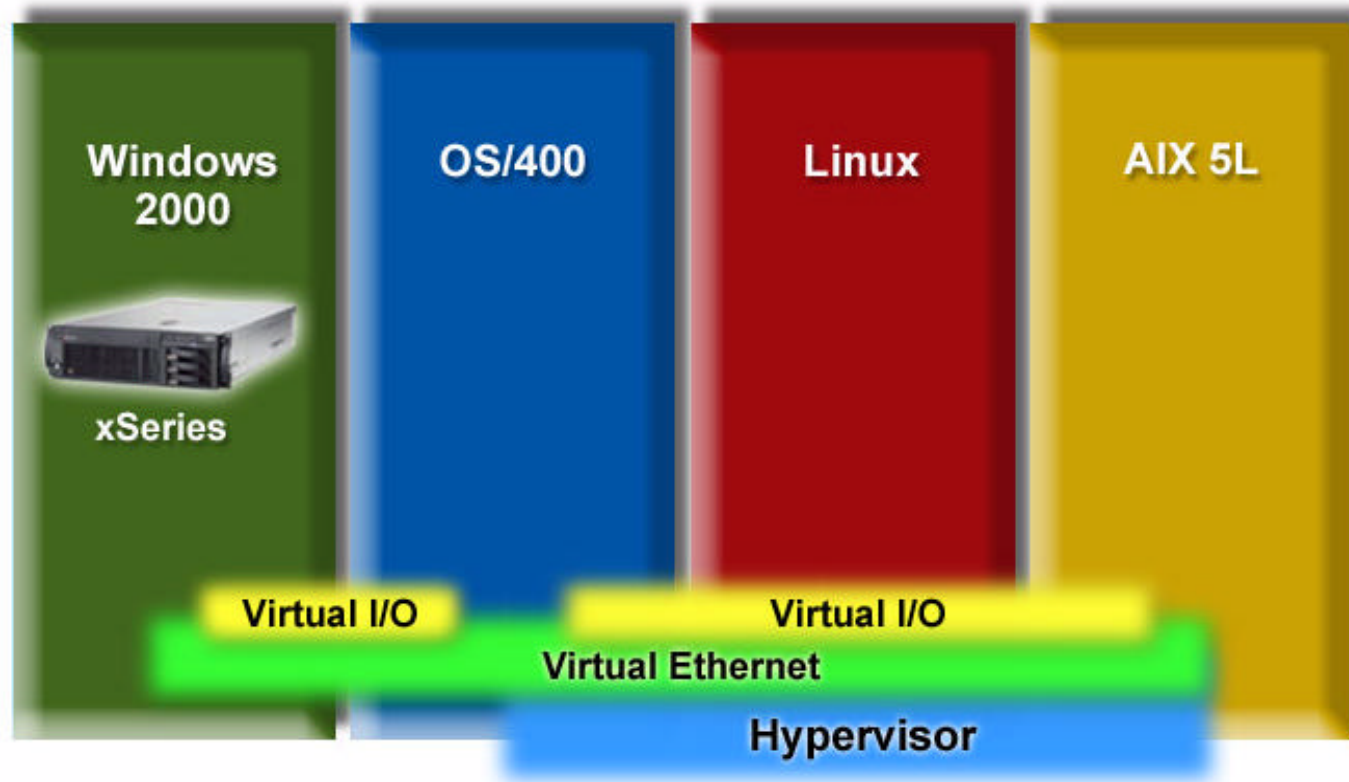
Each processor feature now has a single software tier regardless of the package option selected. Also, the highest software tier, the P60, has been eliminated.

All the i825, i870 and i890 (#2497/#2498) servers feature On / Off Capacity Upgrade on Demand with options for both temporary and permanent capacity.

For those customers who want to run modernized 5250 OLTP applications, these new servers allow WebFaced applications (using the IBM WebFacing Tool in the WebSphere Development Studio Client) to run from a browser without using interactive 5250 CPW with the Standard Edition.

The Enterprise Edition features maximum on demand capabilities, including a wide range of integrated IBM software products and unrestricted interactive capability.

eServer On Demand Operating Environment



The next generation iSeries...



...simplicity in an on demand world

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Advanced Function Printing	ClusterProven	Host Publisher	MQSeries Integrator	PCOM	VisualAge for Java
AFP	CODE/400	HTTP Server for AS/400	Net.Commerce	PowerPC	VisualAge for RPG
AIX	DataGuide	IBM	Net.Data	PowerPC AS	WebSphere
AnyNet	DB2	IBM Logo	Netfinity	Print Service Facility	WebSphere Advanced Edition
Application Development	DB2 Extenders	IBM Network Station	NetView	pSeries	WebSphere Commerce Suite
APPN	DB2 UDB for AS/400	Information Warehouse	NUMA-Q	PSF	WebSphere Development Tools for AS/400
AS/400	DB2 Universal	Integrated Language Environment	OfficeVision	S/390	WebSphere Standard Edition
AS/400e	e-business logo	Intelligent Printer Data Stream	OS/2	San Francisco	Workpad
AT	e(logo) Server,	IPDS	Operating System/400	Screen Publisher	xSeries
BrioQuery	Enterprise Storage Server	iSeries	OS/400	SmoothStart	

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