



IBM System i5™

IBM System i5 and i5/OS® 1Q 2006 Announcement Overview

Simplify your IT.

IBM System i5 and i5/OS V5R4

1. Promote Solutions Innovation

- Add new collaborative/infrastructure solutions or enhance your business processing applications on the 520 with the Accelerator for System i5 or Capacity on Demand

2. Simplify Your IT

- Maximize the flexibility to deploy the applications your business needs
- Drive down your infrastructure server costs with BladeCenter and System i5
- Deploy software upgrades on your schedule with new systems that run V5R3 or V5R4





IBM System i5™

Introducing System i5



Simplify your IT.

IBM System i5 520 – Value and Express

- Ideal for small companies expanding systems running core business applications to add Web-enabled or groupware solutions
- Boost capacity for new applications with **IBM Accelerator for System i5**
- Select from the fully configurable Value Edition or 7 pre-defined Express configurations



- Rack* or tower
- Optional I/O processors
- Optional HSL
- Up to 32 GB memory
- Up to 19 TB disk
- Up to 10 LPARs
- i5/OS V5R3 & V5R4

For Core Business Applications		
1200/60		P10
600/30		P5

Accelerator

Web-enabled, Java & Groupware and Core Business Applications		
1-way POWER5+ 1.9 GHz with L3 Cache		
3800/60		P10
1-way POWER5+ 1.9 GHz		
3100/30		P5

* Express tower configurations may be converted to a rack

IBM System i5 520 – Standard Edition

- Provides mid-sized companies a system to run multiple e-business solutions
- Run Java™ & WebSphere® programs alongside groupware applications such as IBM Workplace™ and Lotus Domino™
- Delivers rapid expansion with Capacity on Demand



- Rack or tower
- Optional I/O processors & HSL
- Up to 32 GB DDR2 memory
- Up to 19 TB disk
- Up to 20 LPARs
- i5/OS V5R3 & V5R4

For e-business and Java Applications

**1-way
POWER5+ 1.9 GHz
with L3 Cache**

3800 CPW P10

**1/2-way
POWER5+ 1.9 GHz
with L3 Cache**

3800/7100 CPW P20

IBM System i5 520 – Enterprise Edition

- Delivers growth and upgrade options for mid-sized companies running core business applications
- Delivers rapid expansion with Capacity on Demand
- Provides base for High Availability Edition & selected Solution Editions



- Rack or tower
- Optional I/O processors
- Optional HSL
- Up to 32 GB DDR2 memory
- Up to 19 TB disk
- Up to 20 LPARs
- i5/OS V5R3 & V5R4

For Core Business Applications		
<p>1200 CPW with full 5250</p> <p>P10</p>	<p>2800 CPW with full 5250</p> <p>P10</p>	<p>3800/7100 CPW with full 5250</p> <p>1/2-way POWER5+ 1.9 GHz with L3 Cache P20</p>
For e-business and Java Applications		

IBM System i5 550



- Up to 64 GB DDR2 memory
- Up to 39 TB disk
- Up to 40 LPARs
- i5/OS V5R3 & V5R4



- Provides mid-sized companies a flexible consolidation platform for multiple applications and operating environments
- 1/4-way with Capacity on Demand
- Available in Standard, Enterprise, Domino/Workplace, Solution and now High Availability editions

3800/14,000 CPW

1/4-way
POWER5+ 1.9 GHz
with L3 Cache P20

IBM System i5 570

- Simplifies product offering to help large companies consolidate multiple operating environments
- Extends flexibility in i5/OS & enterprise enablement licensing
- Starts at 2/4-way, upgrade options through 595

- Up to 512 GB DDR2 memory
- Up to 193 TB disk
- Up to 160 LPARs
- i5/OS V5R3 & V5R4



	i5/OS License*	Enterprise Enablement**
570 2/4-way	1	1
4/8-way	1	1
8/16-way	1	1

8400/58,500 CPW
 2/4-way up to 16-way
 POWER5+ 2.2 GHz
 with L3 Cache P30/P40

* With Standard & Enterprise Edition

** With Enterprise Edition

System i5 595

- Offers highly scalable transaction processing and multi-platform management with maximum flexibility for large enterprises requiring up to 64-way server
- Includes new Optimum Care* services to assist business successful deployment in complex implementations
- New options for scalable I/O expansion include up to 96 I/O towers and up to 31 HSL2 loops on both 1.65 and 1.9 GHz 595 systems



26,700/184,000 CPW

8/16-way up to 64-way
POWER5 1.9 GHz
with L3 Cache P50/P60

- Up to 1 TB DDR1 memory
- Up to 381 TB disk
- Up to 254 LPARs
- i5/OS V5R3 and V5R4

* Included in the Standard and Enterprise Edition

Note that the maximum CPW was achieved with two 32-way LPARS

IBM System i5 Optimum Care

Services to optimize your system deployment



- Assist customers to deploy complex systems
- Coordinate a broad range of proven IBM skills and processes
- Promote best practices to help reduce project risks and costs

Model	Eligible Editions	Upgrades Eligible?	Included?	Education and Services included
595	Enterprise Standard	Yes	Yes	<ul style="list-style-type: none"> ▪ Up to 160 Hours of Project Management Services ▪ <i>And</i> Improved Availability Technology Checkup to assess system health and availability ▪ <i>And</i> 5 ITES Education Vouchers
570	Enterprise (8/16-way)	No	Upon request	<ul style="list-style-type: none"> ▪ Either 1 Enterprise Edition Service voucher ▪ <i>Or</i> up to 80 Hours of Project Management Services ▪ <i>Or</i> Improved Availability Technology Checkup ▪ <i>And</i> 3 ITES Education Vouchers

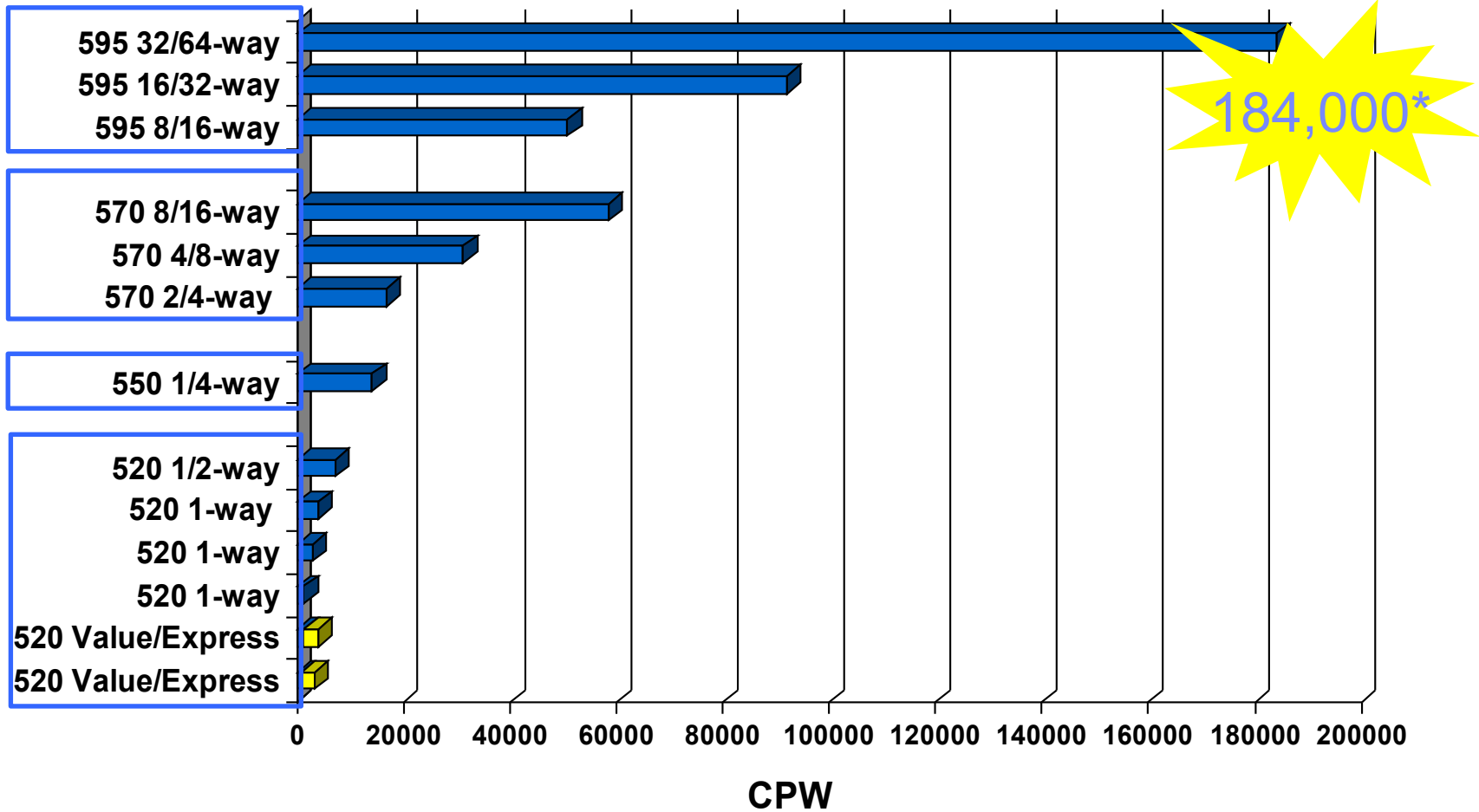
IBM System i5



	520	550	570	595
Processor	1, 1/2-way 1.9 POWER5+	1/4-way 1.9 POWER5+	2/16-way 2.2 POWER5+	8/64-way 1.9 POWER5
Max CPW	7100	14,000	58,500	184,000
Key Changes	Accelerator CoD DDR2 Memory Optional IOP/HSL	DDR2 Memory Optional IOP	Simpler Structure & Licensing DDR2 Memory Optional IOP	Expanded I/O Optional IOP
i5/OS Release	V5R3 & V5R4	V5R3 & V5R4	V5R3 & V5R4	V5R3 & V5R4

Value / Express	Y	EDITIONS		
		Y	Y	Y
Standard	Y	Y	Y	Y
Enterprise	Y	Y	Y	Y
Solution	Y	Y		
Domino (Workplace)		Y		
HA	Y	Y	Y	Y
CBU			Y	Y

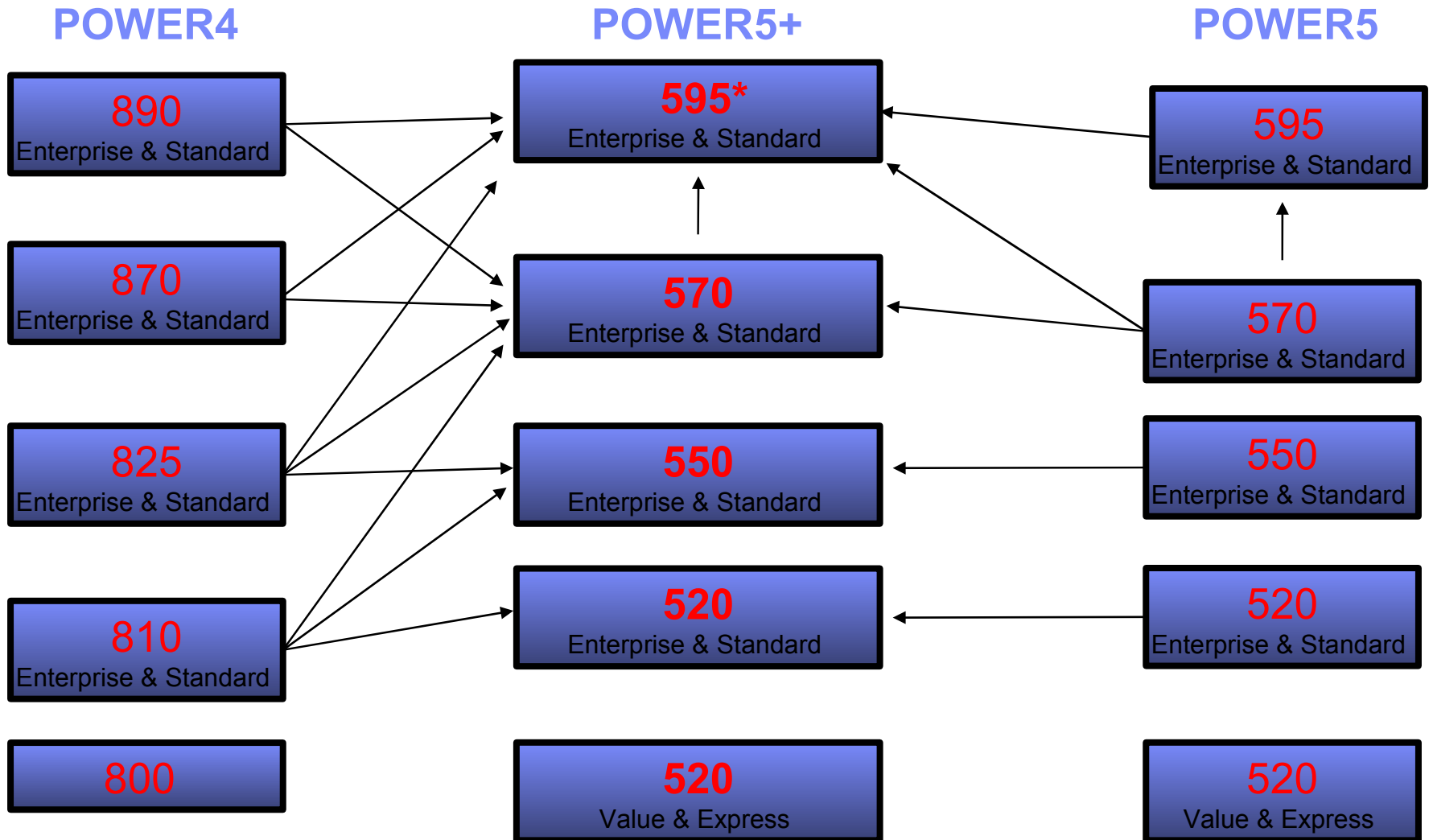
Scalable System i5 Options



Simple, Flexible Product Structure

		Enterprise Edition		
		Standard Edition		
		Base Processor Activations	Base i5/OS Licenses	Base Enterprise Enablement
595	32/64-way	32	4	4
	16/32-way	16	4	4
	8/16-way	8	4	4
570	8/16-way	8	1	1
	4/8-way	4	1	1
	2/4-way	2	1	1
550	1/4-way	1	1	1
520	1/2-way	1	1	1
	1-way	1	1	1

Upgrades



* The new 595 1.9 GHz is a POWER5 processor.



IBM System i5

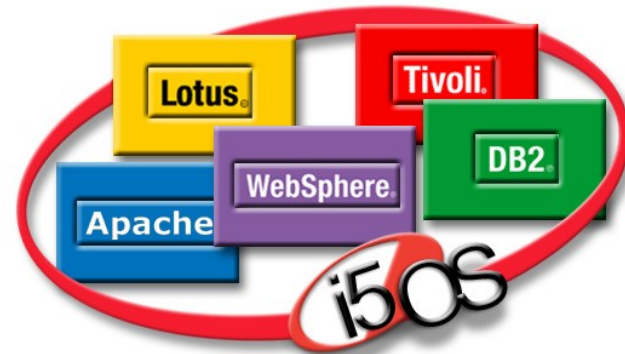
Introducing i5/OS V5R4



Simplify your IT.

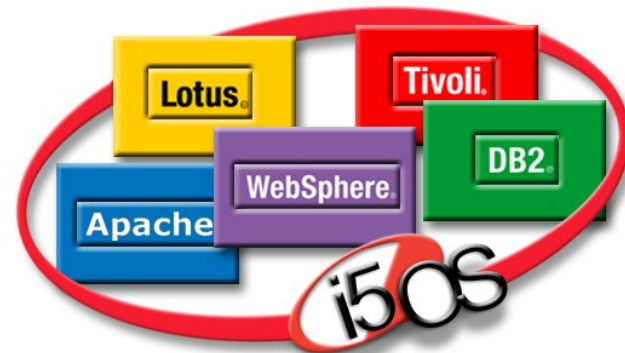
Promote Solutions Innovation

- Help companies exploit new business opportunities with proven, industry-specific solutions
- Integrate people, data and processes from multiple sources across a company's value chain
- Provide better access to information to help increase productivity of employees and improve responsiveness to customers
- Enable ISVs to integrate with IBM middleware and a broad range of popular open tools



Promote Solutions Innovation with i5/OS V5R4

- Improve application portability application and memory footprint with new 32-bit Java Virtual Machine
- Create one integrated WebFacing Deployment Tool that exploits the capabilities of both HATS and WebFacing
- Simplify RPG application deployment as a Web-service and use free-format SQL in RPG applications
- Extend CL productivity and development options with subroutines and support for new pointer variables
- Improve integration with Microsoft Windows™ applications with enhanced ODBC, OLE-DB and .NET support



New 32 bit JVM Improves Development Options

- A new 32-bit i5/OS JVM V1.5 is expected to reduce the memory footprint for Java applications, which is especially valuable on smaller systems
 - Note: JVM 1.5 will be supported with WebSphere Application Server 6.1*
- Implements a standard IBM JVM with consistent tooling and tuning options
- Simple to implement without code changes for the majority of applications
- The classic 64-bit JVM will continue to offer best scalability and performance for large enterprises with i5/OS V5R4



* This presentation contains information about IBM's plans and directions. Such plans are subject to change without notice.

IBM Technology for Java Virtual Machine - 1

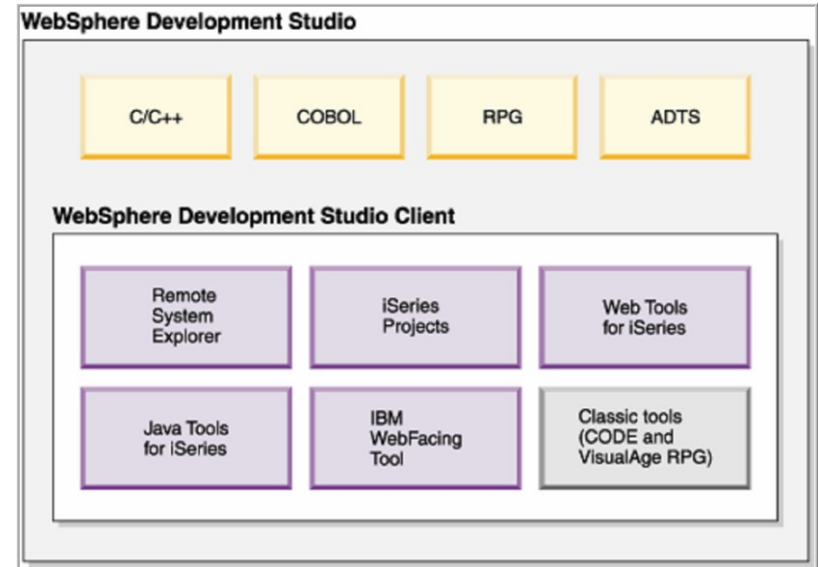
- I5/OS V5R4 delivers two JVM and SDK environments:
 - Java™ 2 Software Development Kit, Standard Edition
 - “Classic”, running in 64-bit mode
 - “32-bit” IBM Technology for JVM runs in 32-bit mode
- “32-bit” implements a standard IBM JVM 1.5 runtime environment and SDK:
 - Specifically focused for applications on smaller systems, with less impact on memory utilization
 - Simple implementation, mostly without code changes for the majority of the applications
 - Affects management of storage references
- The 64-bit JVM continues to offer the best scalability and performance for large enterprises with i5/OS V5R4

IBM Technology for Java Virtual Machine - 2

- Garbage Collection is similar as on most other platforms for the 32-bit JVM, while it remains unchanged for the 64-bit JVM
- Requires less storage and heap size than the 64-bit version
- Direct Execution is not applicable to the 32-bit JVM - only JIT or interpreted mode
 - **Starting with V5R3, JIT is always recommended for best performance**
 - **ADDEENVAR ENVVAR (JAVA_COMPILER) VALUE(jitc) JAVA CLASS(Test) **or****
 - **Set java.compiler system property on the iSeries command line -> JAVA CLASS(Test) PROP((java.compiler jitc))**

WebFacing Deployment Tool for WDS with HATS Technology

- **WebFacing Deployment Tool**
 - Delivers an integrated runtime -- that exploits the capabilities of both HATS and WebFacing
 - WebFacing Tool now uses the capabilities of HATS for on-the-fly Web-enabling of system screens and 5250 applications
 - Helps promote rapid, cost-effective conversion and customization of ISV applications
 - No 5250 OLTP required for HATS datastream conversion on i5/OS V5R4
- **IBM WebSphere Development Studio**
 - WDSC Lite* to develop i5/OS applications
 - Free-format SQL in RPG applications
 - Wizard enhanced to create SOA Web service from RPG application in a single step



For more information, see <http://www-306.ibm.com/software/awdtools/wds400/>

* Technology Preview This presentation contains information about IBM's plans and directions. Such plans are subject to change without notice.

WebSphere Development Studio

Current 5722-WDS customers with software subscription for V5R3, to upgrade to WDSc V6.0 use feature #2656

RPG	COBOL
C/C++	PDM SEU SDA RLU

Upgrade from WDS 6.0 to 6.0.1 using Rational Product updater

Unlimited Licenses

New WDSc Lite
Technology preview

+CODE
+VisualAge RPG

iSeries	iSeries	iSeries	iSeries	Web Facing WDHT support	iSeries Projects		
Java™	Debug	Struts Web	Web Service		RSE		
JSF	EGL Java generation	Trace	Profiling	DB	XML	App Server	HATS Toolkit

www.ibm.com/software/awdtools/iseries

WebSphere Development Studio Client V6.0.1 based on RWD V6

Notes:

This slide shows there is only one application development product sold by IBM, for iSeries, as of V4R5. This is WebSphere Development Studio (Development Studio), which includes all four host compilers, all traditional tools (ADTS = PDM+SEU+SDA+RLU+DFU+AFP+CGU), and unlimited licenses of the workstation-based toolset named WebSphere Development Studio Client (formerly WebSphere Development Tools).

If you are an existing customer who has a subscription, you can upgrade to Development Studio free of charge. Without a Software Subscription, there is an upgrade fee. New licenses of Development Studio are priced very competitive compared to the combined prices of all constituent products. As of V5R1, there is no way to purchase the compilers or tools individually. So if you have RPG at V5R1 or higher, you must have Development Studio and hence are entitled to Development Studio Client.

ILE RPG enhancements include the ability to access data in XML documents. Also with i5/OS V5R4, RPG developers will now be able to use free format SQL database access in their applications. With improved flexibility to recognize and analyze SQL statements, this enhancement should make it much easier for RPG developers to incorporate SQL into their current applications. ILE COBOL enhancements include the ability to output COBOL data records into XML format. Application Development ToolSet supports network server configuration objects in PDM and changing PDM defaults.

Development Studio has been a huge success, with over 80,000 licenses sold. Just as every development machine used to have PDM and SEU, every development machine will now have all the modern Application Development tools from IBM. This ubiquity is especially important for business partners who build and sell software. These Business Partners are now free to build software using any of the technologies or tools in Development Studio, and can assume their customers will have the tools required to tailor everything from RPG to Java and Web user interfaces. This effectively raises the lowest common denominator to a level unparalleled by any other operating system.

WebSphere Development Studio Client for iSeries has a new extension to the Web service wizard to create Web Services from ILE programs in one step, making it easier to create SOA applications.

WDS V6.0.1 packaging

Server Tools:

- ILE RPG
- LE COBOL
- LE C / C++
- Application Development ToolSet

Notes: - 2

Workstation Tools (via the entitlement of unlimited workstation licenses of WDSC V6.0 per System i5 with WDS installed):

- WDSC refresh pack V6.0.1
- RWD refresh pack V6.0.1
- Remote System Explorer - a powerful integrated development environment for i5/OS application development
- i5/OS plug-ins to help Java, Web, and Web services developers access i5/OS data and applications
- i5/OS re-facing tools:
 - IBM WebFacing Tool
 - Host Access Transformation Services Toolkit V6.0.4
- IBM integrated i5/OS debugger (Eclipse-based) for all languages
- Separate installation of CODE and VARPG

Enterprise Generation Language is a forth generation development tool, Enterprise Generation Language, is added to the workstation tool. This tool allows developers to rapidly generate Java applications (as well as iSeries COBOL green screen applications in the Advanced Edition) using the same fourth generation language. Enterprise Generation Language is the follow-on product to VisualAge Generator.

WDSC Standard Edition V6.0 packaging

- RWD (Rational Web Developer) V6.0
- WDSC V6.0 plug-ins
- Media package contains
 - DVD – RWD and WDSC
 - CD1 – CD7 RWD and WDSC
 - Seven other CDs
 - CODE and VisualAge RPG V6.0
 - IBM Agent Controller
 - WebSphere Test Environment Version 5.x (CD1, CD2)
 - WebSphere Application Server for Developers V6.0
 - **WebSphere Host Access Transformation Services Toolkit (HATS)**
 - DB2 for Windows

WebSphere Development Studio Client Advanced Edition 6.0.1

Workstation License
order through Passport Advantage

Upgrade from WDCS 6.0 to 6.0.1 using Rational Product updater

http://www.lotus.com/services/passport.nsf/WebDocs/Passport_Advantage_Home

+CODE
+VisualAge RPG

iSeries	iSeries	iSeries *	iSeries	Web Facing * WDHT support	iSeries Projects		
Java	Debug	Struts Web	Web Service		RSE		
JSF	EGL Java generation	Trace	Profiling	DB	XML	App Server	HATS Toolkit
	EGL * COBOL generation	EJB * J2EE *	Test * Cases	Portal * Toolkit			

New
WDCS Lite
Technology preview

www.ibm.com/software/awdtools/iseries

WebSphere Development Studio Client V6.0.1 Advanced Edition is based on RAD V6

WDSC Advanced Edition V6.0 packaging

- RAD (Rational Application Developer) V6.0
- WDSC V6.0 Advanced plug-ins
- Media package contains
 - DVD – RWD and WDSC
 - CD1 – CD7 RWD and WDSC
 - Seven other CDs
 - **Eighteen other CDs**
 - CODE and VisualAge RPG V6.0
 - IBM Agent Controller
 - WebSphere Test Environment Version 5.x (CD1, CD2)
 - WebSphere Application Server for Developers V6.0
 - Embedded messaging client and server
 - WebSphere Portal V5.0 Test Environment
 - **WebSphere Host Access Transformation Services Toolkit (HATS)**
 - DB2 for Windows
 - Crystal Enterprise Professional Edition V10 (CD1, CD2)
 - Crystal Enterprise Embedded Edition V10
 - WebSphere Portal for Multiplatforms (6 CDs)

New 6.0.1 version and feature details

- Web Developer for WebSphere Software (RWD) refresh pack V6.0.1 - including Eclipse based tools
- Web-enabled applications created with the WebFacing Tool to interoperate with 5250 applications in a browser
 - Requires IBM WebFacing Deployment Tool for WebSphere Development Studio - with HATS technology, V6.0.1, 5724-N52
- Packaged includes HATS Toolkit V6.0.4:
 - Delivers dynamic run-time transformation of the 5250 datastream with no requirement for Online Transaction Processing
- WDSC Lite technology preview
- Web Service wizard helps to create Web Services from ILE RPG/COBOL programs in one step, making it easier to create SOA applications

Notes: New 6.0.1 version and feature details

Key WDCS V6.0.1 enhancements:

It is based on Rational Web Developer for WebSphere Software (RWD) refresh pack V6.0.1 (part of the IBM Rational Software Development Platform) and it includes other Eclipse-based development tools that allow you to adapt and extend your development environments with IBM and partner tools.

IBM WebFacing Tool delivers extensions to allow Web-enabled applications created with the WebFacing Tool to interoperate with 5250 applications in a browser. (Deployment for applications using these extensions requires IBM WebFacing Deployment Tool for WebSphere Development Studio - with HATS technology, V6.0.1, 5724-N52.)

HATS Toolkit V6.0.4 delivers dynamic run-time transformation of the 5250 datastream with no requirement for Online Transaction Processing (OLTP) capacity starting with i5/OS V5R4.

A new WDCS Lite technology preview provides a light-weight edit/compile/debug environment for developing native i5/OS applications (256 MB of RAM is recommended to operate effectively).

It provides V5R4 support for RPG, COBOL, and CL.

It has a new extension to the Web Service wizard to create Web Services from ILE RPG/COBOL programs in one step, making it easier to create SOA applications.

The WebFacing Tool and Web Tools generate Common Base Event (CBE) logging data that can be used by the Log and Trace Analyzer, provided in WebSphere Development Studio Client Advanced Edition for iSeries.

Note: Eclipse is An Integrated Development Environment (IDE) an Open-source extensible platform for developing Java applications and integrating them. IBM Tools (Rational and WebSphere Studio) are built on the Eclipse framework. Eclipse was originally developed by IBM and donated to the Open Source community. Eclipse IDE is extended by building plug-ins, which are applications that run in Eclipse IDE.

A new WDCS Lite technology preview provides a light-weight edit/compile/debug environment for developing native iSeries applications (included is the objective to have 256 MB of memory recommended to operate effectively). We have a slide on this later in this presentation.

The following slides provides a short overview of the WebFacing Tool, HATS – before February 2006, and the new WebFacing Deployment Tool with HATS Technology (WDHT).

The IBM WebFacing Tool

- ✓ Part of WebSphere Development Studio client
- ✓ Eliminates interactive (OLTP) workload for 5250 applications
- ✓ Requires DDS source for screen formats in refaced applications
- ✓ Creates permanent Web artifacts which can be customized further
- ✓ Can be “linked to” and “linked from” other i5/OS web access tools like iSeries Access for Web, iSeries Navigator for Web, HATS, ...

The screenshot illustrates the IBM WebFacing Tool in action. On the left, a terminal window (Session A) shows a 5250-style screen with the following content:

```

A006SFC2      Products Matching Search Criteria

Co Div Cat      Style. . . . .      Width      Wh  Q Po# . . .
01 01  M1 F S03 PROD1
                S03

Type options. Then press Enter.
1=Select 5=Availablity 7=Orders

S      Style. . . . .      Width      Price      Avl Shp
S03 PROD1      BLK          2.75      Each
BLACK POLO.JPG
- S03 PROD1      BLU          2.75      65
BLUE POLO.JPG
- S03 PROD1      CREM         2.75      200
CREAM POLO.JPG
- S03 PROD1      EMR          2.75      120
EMERALD POLO.JPG
- S03 PROD1      KHA          2.75      156
KHAKI POLO.JPG
- S03 PROD1      NAVY         2.75      250
NAVY POLO.JPG

F1=Help F2=Field help F3=Exit F7=Page Bkwd F8=Page Fwd F12=Cancel
  
```

On the right, a Microsoft Internet Explorer browser window displays the same data as a modern web page. The browser title is "AppSphere" and the address bar shows the URL: `http://appcon:6600/appsphere/servlet.com.ibm.as400ad.webfacing.runtime.Httpcontroller.ControllerServlet?inv=c811031`. The web page features a search criteria section, a table of products with columns for Style, Width, Price, and Avl Shp, and a large image of a blue polo shirt.

Host Access Transformation Services (HATS)

- ✓ No source code required – “on the fly” conversion
- ✓ Programmable screen flow using scripts, variables & macros
- ✓ Sold as HATS for iSeries with a Limited Edition in iSeries Access
- ✓ Requires runtime enablement licenses – user or processor
- ✓ With V5R4 *eliminates* interactive (OLTP) workload for 5250 applications
- ✓ Can be “linked to” and “linked from” other i5/OS web access tools like iSeries Access for Web, iSeries Navigator for Web, HATS, ...

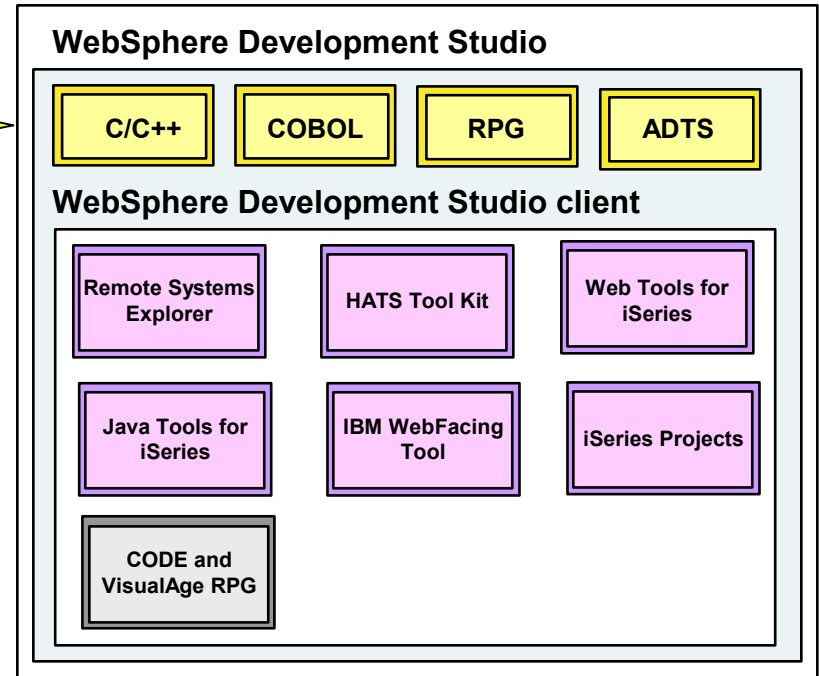
The left screenshot shows a 5250 terminal window titled "Session A - [24 x 80]". It displays a screen titled "A00BSFC2 Products Matching Search Criteria". The screen shows a list of products with columns for Co, Div, Cat, Style, Width, Wh, Q, PoH, and Avl Shp. The products listed are various polo shirts in different colors and styles.

The right screenshot shows a web browser window titled "http://localhost:8080/seriesd/hats - Microsoft Internet Explorer". It displays a web interface for "JK Enterprises". The interface includes a navigation menu, a main content area with an "Inventory Table" and "Inventory Graph", and a "Delivery Schedule" calendar. The inventory table lists items like Baseball glove, Catcher's mit, Baseballs, Baseball bat, Football, Basketball, Tennis balls, Golf balls, and Ice Skates with their respective stock quantities.

Inventory Table	Inventory Graph	Part Number
Description		
Baseball glove	35	
Catcher's mit	20	
Baseballs - 1 doz.	40	
Baseball bat	46	
Football	33	
Basketball	25	
Tennis balls - 1 doz.	41	
Golf balls - 1 doz.	27	
Ice Skates	17	
	Number in Stock	

WebFacing Deployment Tool and HATS

- WebFacing Deployment Tool with HATS Technology (WDHT)
 - Delivers a runtime enablement that exploits the capabilities of both HATS and WebFacing
 - Allows refacing projects to combine the strengths of both products using WDS
 - Provides a system wide solution for multiple applications, with or without source code
 - No interactive (OLTP) workload required for HATS or WebFacing with i5/OS V5R4
 - Deployment licenses required to use WDHT
 - User pricing
 - Per processor/tier for iSeries
 - No subcapacity pricing (special bid)
 - Per processor for non-iSeries



For more information, see <http://www-306.ibm.com/software/awdtools/wds400/>

Notes: WebFacing Deployment Tool and HATS - 2

The IBM WebFacing Tool and the HATS Toolkit are included with WebSphere Development Studio Client for iSeries and WebSphere Development Studio Client Advanced Edition for iSeries. WebFacing Tool customers who do not take advantage of the new capabilities can continue to create and deploy applications from the WebFacing Tool.

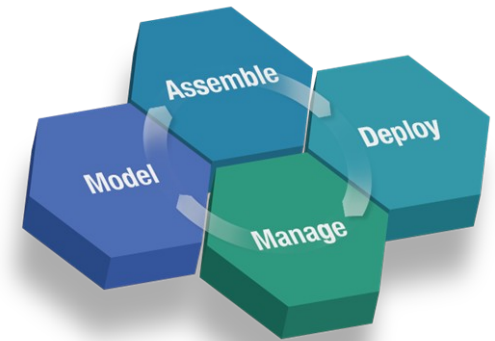
However, customers who take advantage of the new WebFacing Tool extensions will find that deployment for the new functions is limited to two user connections for testing purpose only. To enable the new functions for deployment to production, customers must purchase WDHT. Web-enabled applications created using the HATS Toolkit are limited to two user connections for testing purpose only. WDHT is required for deployment to production of HATS applications.

Though there will be pricing changes under this new version of WDSC (go to the WDSC Website for the latest information), the introduction of WDHT makes HATS more affordable by eliminating the requirement for OLTP capacity for HATS applications working through the WebFacing server. Without the OLTP requirement for deploying a HATS application to i5/OS starting with V5R4, the overall cost of HATS solutions is significantly reduced. HATS applications can be deployed to i5/OS Standard Edition configurations.

IBM WebFacing Deployment Tool for WebSphere Development Studio - with HATS technology, V6.0.1, 5724-N52, expected to be available during March 2006.

Basic Steps To Implement a Services Oriented Architecture

1. Implement component-based business design
 - Identify business processes, the applications that make them up, and who consumes them
 - Modernize existing applications
2. Deploy business processes elements as services
 - Create a web service from an RPG application with WebSphere Development Studio
 - Consume web services from RPG applications with XML Toolkit for iSeries
3. Connect services
 - i5/OS Data Queues, (connect i5/OS apps), WebSphere MQ (connect across multiple platforms) and WebSphere Application Server (JMS, Web services gateway)
4. Integrate & manage services
 - For SMBs start with WBI Server Express Plus
 - IBM WebSphere Process Server* for large enterprises



For more information,
see <http://www.ibm.com/soa>

* Statement of Direction for support on i5/OS. This presentation contains information about IBM's plans and directions. Such plans are subject to change without notice.

Notes:

Some Web Services terminology

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 Universal Description, Discovery and Integration (UDDI) project is a project that creates a 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.

Extensible Markup Language (XML) is the "data description" architecture for describing any data being exchanged over the internet. XML is used in many places. Note that with i5/OS there is a refreshed XML Toolkit, containing the latest industry standard XML parsers.

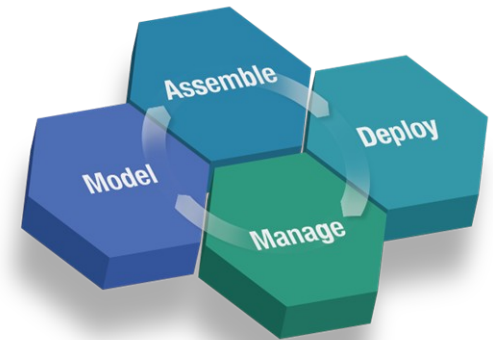
The Web Services Description Language (WSDL) can be used in several ways. In particular, WSDL can work with UDDI registries in several different ways depending upon the application needs. WSDL is an XML language for describing Web services as a set of network endpoints that operate on messages.

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.

Simple Object Access Protocol (SOAP) 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.

Integrating Web Services and RPG

- Deploy an RPG application as Web Service *provider*
 - Make your core applications available to others as a Web service
 - Uses SOAP engine in WebSphere Application Server and a Java wrapper to the RPG application
 - With V5R4, a new wizard in WSDC generates a Web service from RPG source in a single step
- Enable an RPG application as a *requester* to a Web Service
 - Link your core applications to Web applications and services provided by others
 - With V5R4 XML Toolkit now provides open APIs based on Apache AXIS to connect RPG out to a Web service



For more information,
see <http://www.ibm.com/soa>

Notes:

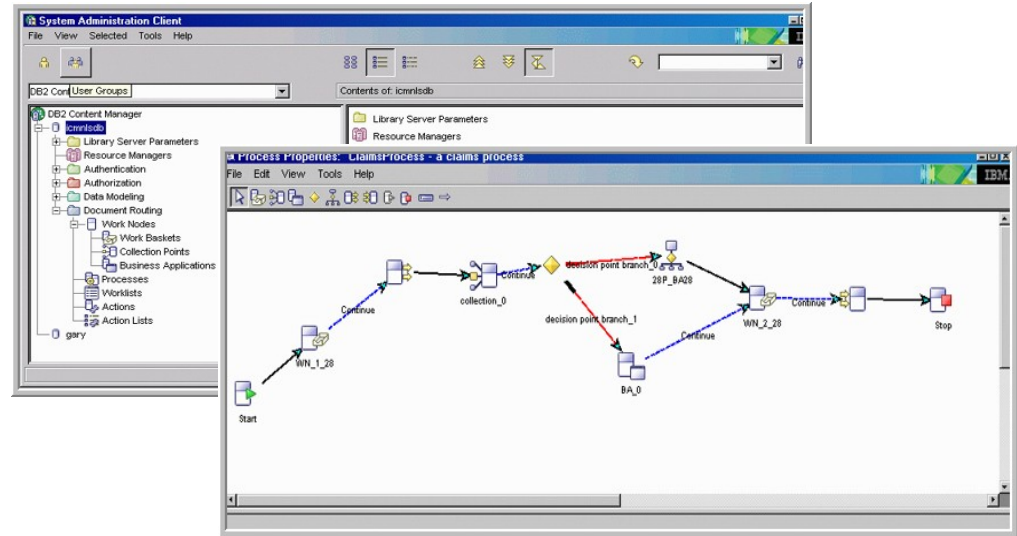
Today, there are a number of ways to extend the value of an existing RPG application to others as a Web Service. For example, a non-interactive RPG program can be generated using a wizard into a Web service using Java wrappers. Also DB2 Web Services invoking RPG stored procedures, EGL based Web Services can invoke an RPG application. In addition, Host Access Transformation Services (HATS) can be used to provide access to an 5250 interactive application as a Web service. With, V5R4 WebSphere Development Studio for iSeries has a new extension to the Web service wizard to create Web Services from ILE programs in one step, making it easier to create Web Services applications.

Also new in V5R4 is the Web Services Client Support to enable non-Java programs, such as RPG C, C++, and COBOL to invoke remote Web Services via an easy to use APIs shipped as part of the XML Toolkit for iSeries. The Web Services Client Support is ported from the Apache Software Foundation's open source Axis C/C++ version 1.5. Apache Axis is an implementation of the SOAP ("Simple Object Access Protocol"). SOAP is a lightweight protocol for exchanging structured information in a decentralized, distributed environment. It 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 data types, and a convention for representing remote procedure calls and responses.

Web Services Client Support consists of a set of libraries and Java tools that allow you to build ANSI C and C++ web service client from an existing WSDL file that will communicate over HTTP using TCP/IP with SOAP protocols to a Web Service. The C/C++ based client code can then be used from your traditional i5/OS applications via an easy to use API.

DB2 Content Manager Standard Edition 8.3

- Helps small to mid-sized businesses capture, integrate, manage and deliver digital content, such as Web content, e-mail, documents, reports and images
- Intended for new customers and not to provide a migration from CM for iSeries V5.3
- StorageView from MBS Technologies extends support for DR550 and many other storage devices



Storage Options & DB2 CM	Disk	Optical	DR550
DB2 Content Manager for iSeries			
V5.3	X	X	X (MBS)
Standard Edition 8.3	X	X (MBS)	X (MBS)
Content Manager OnDemand for iSeries			
Spool File Archive	X	X	
Common Server	X	X	Planned



- Announcement 11/29/2005
- General Availability 1/6/2006

For more information, see <http://www-306.ibm.com/software/data/cm/cmgr/mp/edition-standard.html>

Notes:

IBM Content Management software captures, stores, manages, integrates and delivers all forms of digital content across a company's value chain from employees to customers to suppliers and partners.

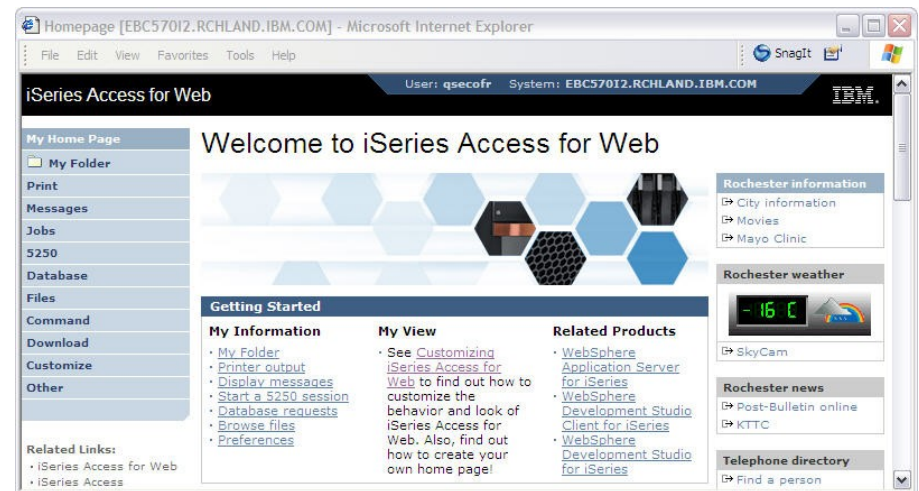
DB2 Content Manager Standard Edition V8.3 provides an entry-level content management solution for small and medium-sized businesses. provides a single, open, comprehensive, and consistent framework to manage, share, reuse, and archive all types of digitized content. Content types include HTML and XML Web content, document images, electronic office documents, and rich media. Standard Edition's tools include a Windows-based eClient and administrative clients for desktop or browser access and a single GUI interface to manage the system, servers to provide indexing, storage, retrieval, and archiving services to manage all types of digitized content and document routing and workflow options that support a formal, consistent, and repeatable document routing process.

DB2 Content Manager Standard Edition is initially available on the iSeries™ server platform for i5/OS™. Although Standard Edition shares a common code base and Windows-based management client with Enterprise Edition, it does not provide the full range of features for larger enterprises, such as Hierarchical Storage Management, migration services (from DB2 CM 5.3), full text search, and federated services (including advanced workflow).

Since Standard Edition does not support HSM to optical or DR550 devices, customers may consider StorageView from MBS Technologies that enables support for DR550 and any other TSM device to DB2 CM Standard Edition (and CM iSeries v5.3). For more information see <http://www.mbstechnologies.com/storageview.html> or contact Jim Engelking Director of Business Development +1-952-844-2645, jim.engelking@mbstechnologies.com

iSeries Access for Web

- Provides a quick and easy way to get started with the Web
- Deploy simple-to-run servlets or use the more advanced portlet option
- V5R4 servlet enhancements:
 - New, simple to customize home page
 - Single sign-on
 - 5250 emulation now includes bypass sign-on and hotspots for URLs
 - Import and run your existing IBM Query for iSeries and DB2 Query Manager requests from a browser
 - OpenOffice spreadsheet format (.ods) added to SQL uploads/downloads



iSeries Access for Web - V5R4 Functions

Print

- Printer output
- PDF Printer output
- Printers
- PDF Printers
- Internet Printers
- Internet Printer Shares
- Printer shares
- Output Queues

5250

- Active Sessions
- Start 5250 Session
- Configured Sessions
- **Bypass Sign-on**

Files

- Browse Files
- File Shares

Messages

- Display Messages
- Send Messages
- Sametime
- Operator Messages
- Message Queue

Database

- Tables
- My Request
- Run SQL
 - **Open Office Formats**
- Copy Data to Table
- Import Requests
 - **iSeries Access for Windows**
 - **Query Manager**
 - **Query/400**
- Extract Server Data

Commands

- Run commands
- My commands
- Search

My Personal Folder

Jobs

- User Jobs
- Server Jobs

Customize

- Preferences
- Policies
- Settings

Download

Other

- Bookmarks
- Change Password
- Connection Pool
- Status
- Trace

New in V5R4

CL Enhancements

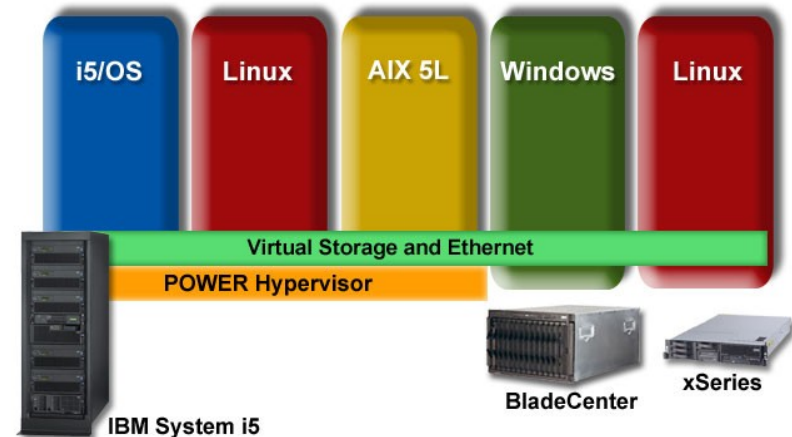


- CL enhancements in V5R3 made CL a stronger application development language
- CL is further enhanced in V5R4
 - Support for simple subroutines
 - New pointer data type and based CL variables
 - Support for structures using defined variables
- CL can now take advantage of the wide range of APIs shipped in i5/OS programs & service programs

```
PGM
:
CALLSUBR REALSUBR /* 1st call to
the subroutine */
:
CALLSUBR REALSUBR /* 2nd call to
the subroutine */
:
SUBR REALSUBR
/* Body of subroutine REALSUBR */
:
RTNSUBR
:
ENDSUBR
ENDPGM
```

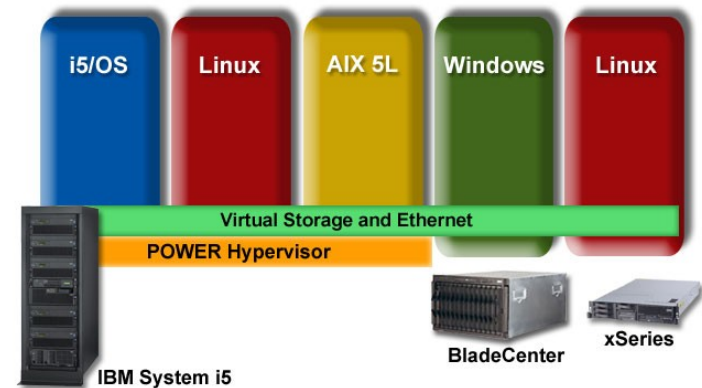
Simplify Your IT

- **Simplify infrastructure through integrated, easy-to-manage systems that deliver outstanding ROI**
- **Adapt without disruption to help growing businesses optimize their IT infrastructure investment**
- **Provide unrivaled flexibility to choose solutions that match business requirements**
- **Optimize resource utilization to help reduce operations costs**



Simplify Your IT with i5/OS V5R4

- **Extend Windows integration options with iSCSI connection to xSeries® & BladeCenter® ***
- **Simplify database performance management & index maintenance**
- **Scan & clean viruses in i5/OS, AIX 5L® and Linux™ partitions with Bytware StandGuard Anti-Virus**
- **Support SNA applications over IP networks with i5/OS Enterprise Extender**
- **Improve workload management with enhancements to i5/OS subsystems**

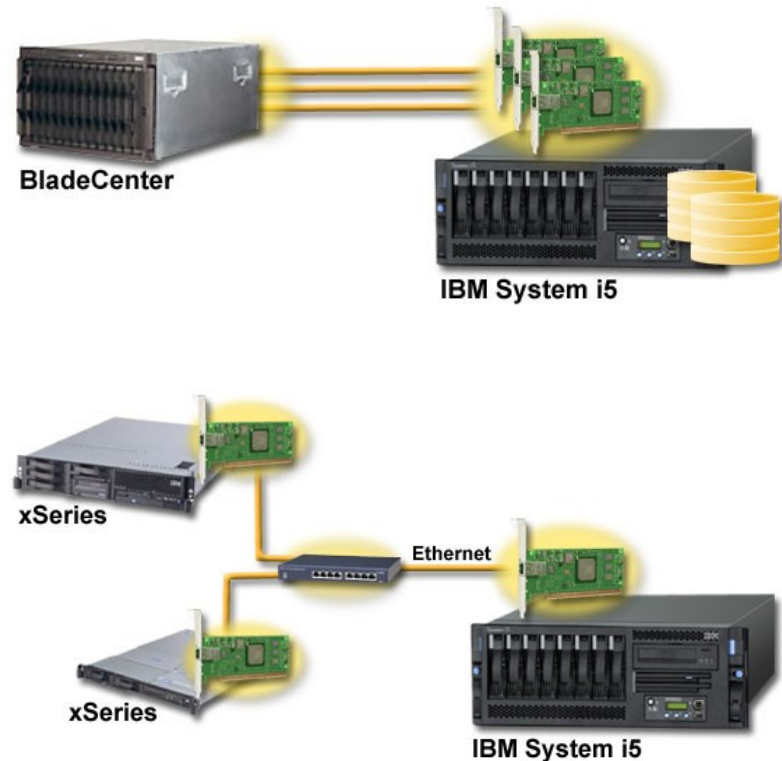


BYTWARE, INC.
iSeries Monitoring, Security & Notification

* Product Preview This presentation contains information about IBM's plans and directions. Such plans are subject to change without notice. (iSCSI = Internet Small Computer System Interface)

Integrate xSeries, BladeCenter via iSCSI (Product Preview)

- New iSCSI Host Bus Adapter (HBA) for System i5 connects selected xSeries systems & BladeCenter products via standard Ethernet cables/switches
- Requires an iSCSI HBA in each xSeries or blade server and supports Windows Server 2003
- Exploit i5/OS virtual storage to manage Windows storage
- Streamline communication between Windows & i5/OS applications with virtual Ethernet
- Integrate operations and backup



Notes:

Integrated xSeries solutions allow businesses to operate heterogeneous environments that include Intel-based servers running Microsoft Windows or Linux applications in addition to System i5 core business applications.

With i5/OS V5R4, the a System i5 iSCSI Host Bus Adapter will enable selected xSeries system or IBM BladeCenter to be connected to System i5 (all POWER5 and POWER5+ 5250, 550, 570,595) virtual storage across an iSCSI network. The features provided to xSeries servers will be very similar to today's Integrated xSeries Adapter, however, the connection to the iSeries system's storage will be via the industry standard iSCSI protocol, rather than across the System i5 High Speed Link (HSL) bus. Using iSCSI and industry standard network components should enable lower cost and more flexible connections to the System i5 from a wider range of xSeries servers. iSCSI is the Internet SCSI (Small Computer System Interface), an Internet Protocol-based storage networking standard for linking servers to storage over intranets, LANs and WANs.

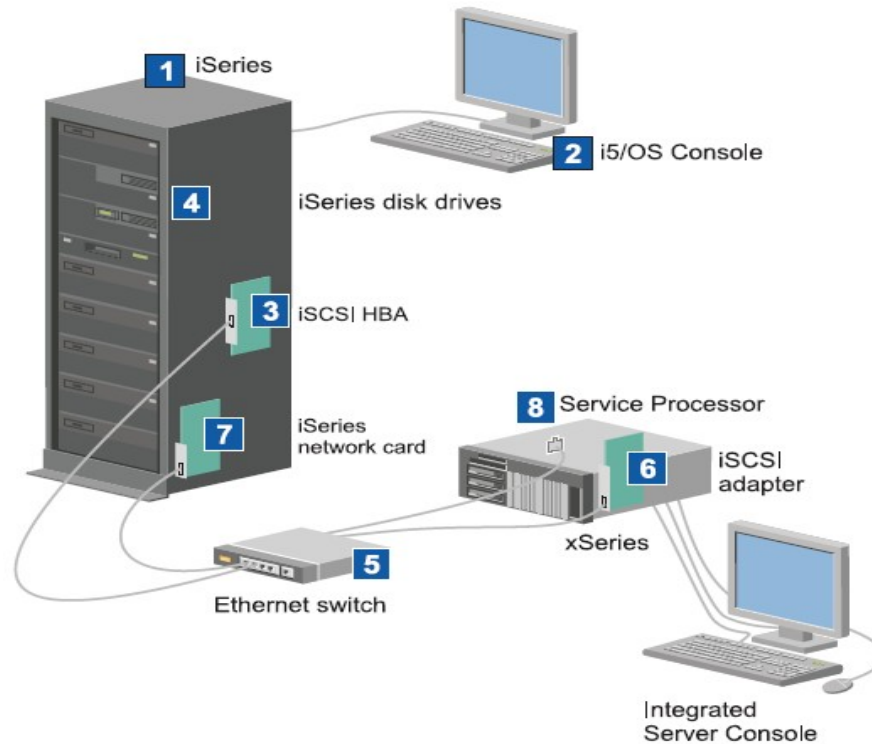
Each iSCSI Host Bus Adapter target can be addressed by 1-8 xSeries iSCSI HBA initiators (depending upon I/O requirements, multiple System i5 HBAs may be required). Performance testing will have been completed before formal announcement and performance guidelines will be provided at that time.

Each xSeries iSCSI HBA initiator can address 1-4 System i5 HBA targets. System i5 HBA will integrate with the IBM iSCSI HBA options for xSeries and BladeCenter. IBM plans to support selected 1U, 2U and 3U xSeries systems and Intel processor-based blade servers running Windows.

All of this new iSCSI support will coexist on the system with current xSeries integration using IXS and IXA hardware. The following slides provide some more details. However, as stated on the slides this support is in product preview status that says some things may change between when this presentation was created and actual announcement and general availability.

**Always go the following website for the latest information on System i5 and xSeries integration:
www.ibm.com/eserver/iseriess/integratedxseries**

iSCSI attached xSeries or BladeCenter installation



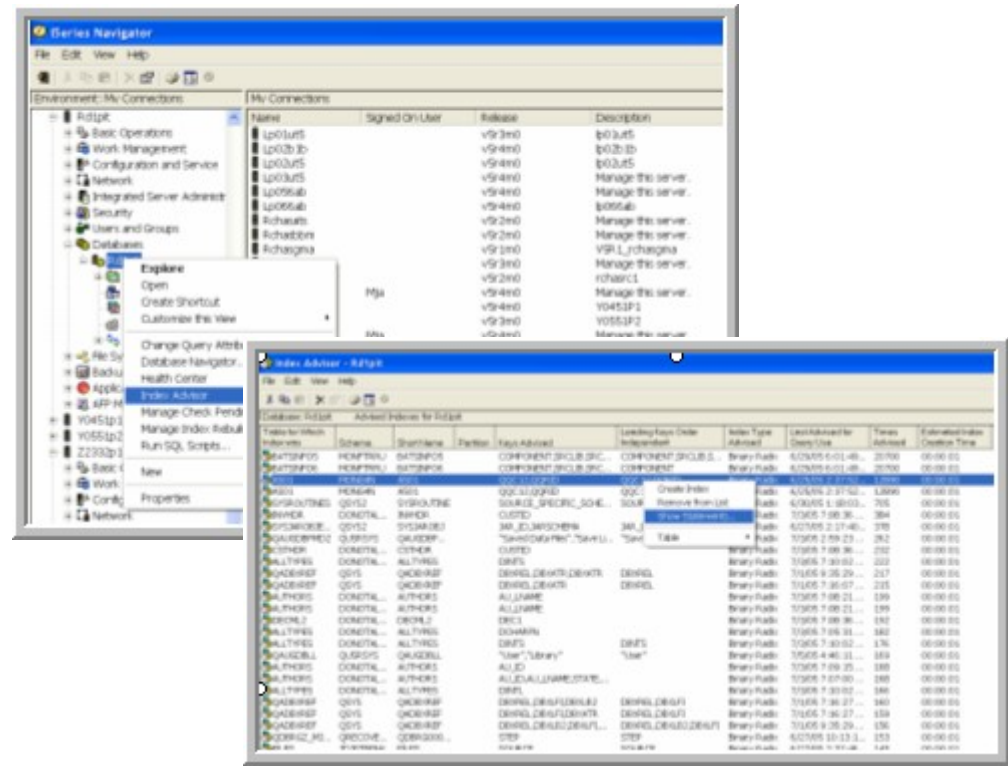
Standard Ethernet cables and switches

Notes: iSCSI attached xSeries or BladeCenter installation

- 1. You need a compatible iSeries. (Models 520, 550, 570 and 595)**
- 2. The i5/OS console, from which you connect to the iSeries using iSeries Navigator or the character-based interface, is shown to make clear the distinction between it and the Windows console.**
- 3. Depending on the type of the physical network, copper or fiber iSCSI HBAs are available. This iSCSI adapter serves as the target device and connects to an Ethernet network using standard Ethernet cables.**
- 4. An integrated server does not have its own hard disk drive. i5/OS emulates hard disk space for it to use from iSeries hard disk drive. These drives and other iSeries storage devices are accessed through the iSCSI HBA.**
- 5. The iSCSI HBA network cables are connected to a standard Gigabit Ethernet switch.**
- 6. An additional iSCSI HBA is required in the xSeries server. This adapter provides the connection to the iSCSI HBA for iSeries. This adapter can be viewed from the xSeries server as the storage adapter, where the disks are found across the network.**
- 7. A typical iSeries server will have a network card. An iSeries LAN connection is required by IBM Director to discover and manage the remote xSeries or IBM BladeCenter servers. (Use of IBM Director with iSCSI will be available at product announcement.)**
- 8. A service processor allows the iSeries server to discover and manage the remote system. The service processor may be a remote supervisor adapter (RSA II), a Baseboard Management Controller (BMC), or a Management Module of an IBM BladeCenter.**

New DBA Tools Help Simplify Database Management

- Broad enhancements to database tools help simplify database administration
- Resource governor helps control resource intensive queries
- New real time index advisor and tools to manage index rebuilds
- Enhanced tools to monitor and analyze SQL Performance
- New health center advises on use of database



Notes

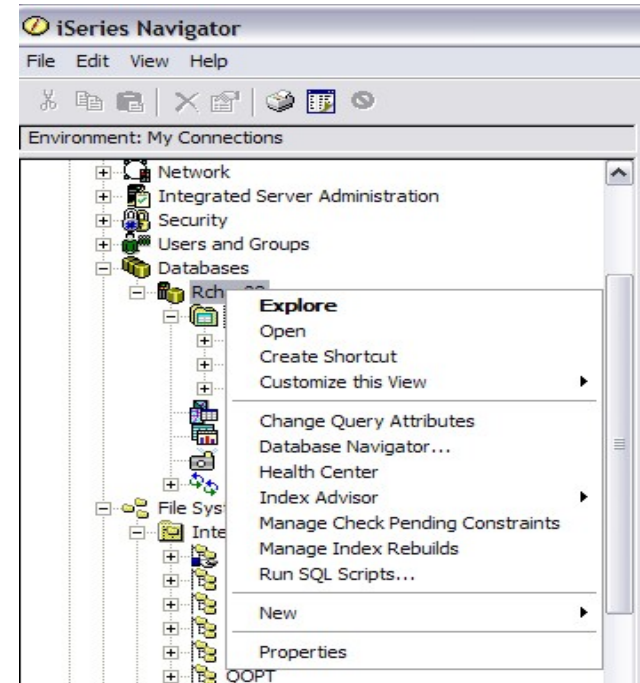
The integration and easy-to-use tools of DB2 UDB has enabled i5/OS to be widely regarded as one of industry's simplest databases to manage and administer. With i5/OS V5R4, the Database OnDemand Performance Center – accessed through iSeries Navigator -- enables a database administrator quickly to identify and correct database performance problems. For example, the system will automatically identify indexes that are not being used and indexes that are being referenced but do not exist. The Database OnDemand Performance Center should help reduce the time spent on day-to-day database maintenance and enable operators to focus on delivering projects of greater value to their business.

The resource governor that provides tools to control resource intensive queries includes a new option to limit the temporary storage taken by a query. New tools have been added to show materialized query tables, manage index rebuilds and advise on index maintenance. DBAs can now better monitor and analyze SQL performance with, for example, a new simpler option to compare SQL monitors. Database tools have also been enhanced to better analyze current activity, such as statistics requests and viewing the current SQL for a job.

The new health center helps customers see how their use of the database corresponds to system limits, such as the maximum number of physical files, the number of files on the system and the percentage of the limit. In i5/OS a number of database limits have been increased in response to various customer requests. The database now supports, for example, 2MB SQL statements, 128 byte column names, 1000 tables in a query and an increase of objects journaled to a single journal to 10,000,000.

DB2 Performance Analysis with iSeries Navigator

- Optimizer Information
 - Index and MQT use and statistics
 - Advised Indexes
 - Show Pending Statistics
- Performance Monitor
 - Pre and post filters
 - Drill-through, compare, summary
 - Plan cache support
- Health Center
- EDTRBDAP
- Import / Export
- Table Actions
- Show current SQL
- Delimiter option on CREATE



Notes: DB2 Performance Analysis with iSeries Navigator

There are many performance related enhancements and new tools for database with V5R4 iSeries Navigator interface.

▪ **Tools to Control Resource Intensive Queries**

- Resource Governor (new)
- Governor Exit Point (new)

▪ **Tools to Manage Indexes and MQTs**

- Show Indexes (enhanced)
- Show Materialized Query Tables (new)
- Manage Index Rebuilds (new)
- Index Advisor (new)

▪ **Tools to Monitor and Analyze SQL Performance**

- Performance monitor filtering (enhanced)
- Explainable Statement filters (enhanced)
- Analyze (enhanced)
- Compare monitors (new)

▪ **Tools to Monitor and Analyze the SQL Plan Cache**

- Filter and Show SQL Plan Cache (new)
- SQL Plan Cache Snapshots (new)
- Analyze (new)

▪ **Tools to Show Current Activity**

- Statistics Requests (enhanced)
- Current SQL for a Job (enhanced)

▪ **Tools to Show Current Database Limits and Sizes**

- Health Center

Show Indexes

The screenshot shows the iSeries Navigator interface. In the background, a table lists various tables in the MJATST schema. The 'Last Changed' column is highlighted with a red box. In the foreground, the 'Indexes for M.JATST.INX_P1 - Lp01ut5' dialog box is open, displaying a detailed list of indexes.

SQL Name	Type	Schema	Owner	Short Name	Text	Index Partition	Valid
INX_ILF1	Keyed Logical File	MJATST	MJA	INX_ILF1		INX_ILF1	Yes
INX_ILF1	Keyed Logical File	MJATST	MJA	INX_ILF1		INX_ILF1	Yes
INX_ILF2	Keyed Logical File	MJATST	MJA	INX_ILF2		INX_ILF2	Yes
INX_ILF	Keyed Logical File	MJATST	MJA	INX_ILF		INX_ILF	Yes
INX_ILFALT	Keyed Logical File	MJATST	MJA	INX_ILFALT		INX_ILFALT	Yes
INX_ILFD1	Keyed Logical File	MJATST	MJA	INX_ILFD1		INX_ILFD1	Yes
INX_ILFSO	Keyed Logical File	MJATST	MJA	INX_ILFSO		INX_ILFSO	Yes
INX_ILFSRT	Keyed Logical File	MJATST	MJA	INX_ILFSRT		INX_ILFSRT	Yes
INX_ILFSRT2	Keyed Logical File	MJATST	MJA	INX_ILFSRT2		INX_ILFSRT2	Yes
INX_ILFSRT3	Keyed Logical File	MJATST	MJA	INX_ILFSRT3		INX_ILFSRT3	No

Extended with Object Level Date Last Used and Number of Days Used

Notes: Show Indexes

Before V5R3, it was difficult to determine unnecessary indexes. However, you can now easily find all indexes and retrieve statistics on index usage as a result of new V5R3 iSeries Navigator and i5/OS functionality. To take advantage of this new feature, you must have the program temporary fixes (PTFs) SF99503 version 4 applied. This feature requires that your iSeries Access for Windows is at V5R3 with iSeries™ Access PTF number SI15176 installed or V5R4 iSeries Access for Windows.

In V5R4, new column "Last Used Date" and "Days Used Counts" are added in index list windows.

To access this through the iSeries Navigator, navigate to: Database > Schemas > Tables. Right-click your table and select Show Indexes.

Last Query Use (V5R3)

States the timestamp when the index was last used to retrieve data for a query.

Last Query Statistic Use (V5R3)

States the timestamp when the index was last used to provide statistical information.

Query Use Count (V5R3)

Lists the number of instances the index was used in a query.

Query Statistics Use (V5R3)

Lists the number of instances the index was used for statistical information.

Last Used Date (V5R4)

The century and date this index was last used.

Days Used Count (V5R4)

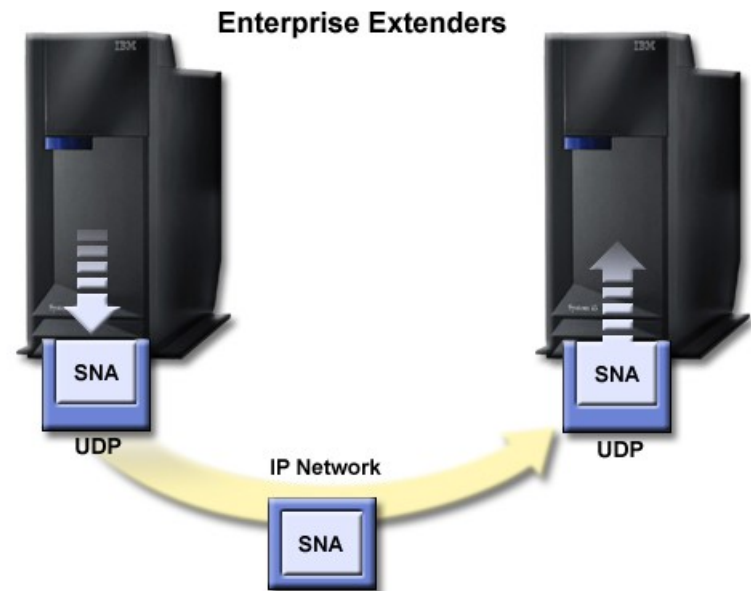
The number of days the index was used. If the index does not have a last used date, the count is 0.

Date Reset Days Used Count (V5R4)

The date that the days used count was last reset. You can reset the days used by Change Object Description (CHGOBJD) command.

SNA Applications over IP Networks with Enterprise Extender

- Enables businesses to run existing SNA applications over an IP network without the expense of a parallel network infrastructure
- Supports existing applications over new generations of routers and network equipment that do not support SNA
- Improves performance significantly versus AnyNet
- Supports a broad range of SNA protocols & applications



Notes:

I5/OS supports SNA functions and protocols. As time goes on, direct support of SNA capabilities by new LAN adapters, new routers, and new switches is typically not available. As a result IBM and specifically i5/OS has supported AnyNet for several years.

However, there are shortcomings with AnyNet support, including more system overhead when exchanging data and some SNA capabilities are support. High Performance Routing (HPR) is one of them.

V5R4 support of Enterprise Extenders provides expanded SNA capabilities and has improved performance characteristics over AnyNet.

Note, in V5R4, in addition to Enterprise Extenders support there are enhancements in the areas of:

- Expanded IPv6 support
- New alias names for IP interfaces
- New preferred interface list available for virtual IP addresses to assist in taking over for a failed component.

The following slides provide some additional information on these networking enhancements.

SNA Function Support under EE

▪ Full APPC support

- SNADS
- Distributed Data Management
- Display Station Pass-through
- Alerts support using MS-Transport
- Everything involving LU 6.2

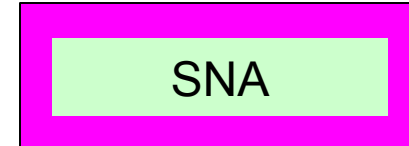
▪ Full APPN support

- NN, EN, BEX, are available.
- Path switch, and Real Time Protocol (used by HPR) are used to ensure communications reliability

▪ Support for dependent LU communications to mainframes over DLUR is a key function. DLUR over EE will support the following:

- Host devices, including 3270 emulation (*EML), remote job entry (*RJE), and program-to-program communications (*PGM)
- SNA Pass-through upstream devices
- DHCF display devices
- NRF display and printer devices
- SNUF devices (DSNX)

IP frame



Notes: SNA Function Support under EE

SNADS: System Network Architecture (SNA) Distribution Service

NN: Network node

EN: End node

BEX: Branch Extender

RTP: Real-Time Transport Protocol (Used by HPR)

Dependent LU Requester (DLUR): This allows dependent secondary logical units (LU 0, 1, 2, and 3) an entry point into the APPN network. DLUR support gives the appearance of having an adjacent connection to Virtual Telecommunications Access Method (VTAM), but allows traversing the APPN network through intermediate nodes to get the VTAM node.

DHCF: Distributed Host Command Facility (3270 pass through)

NRF: Network Routing Facility

SNUF: SNA Upline Facility

DSNX: Distributed Systems Node Executive

Notes: SNA Function Support under EE - 2

An APPN network is composed of three types (capability levels) of APPN node:

- Low Entry Networking (LEN) Node: An APPN LEN node provides peer to peer connectivity with all other APPN nodes.
- End Node (EN): An End Node is similar to a LEN node in that it participates at the periphery of an APPN network. An End Node includes a Control Point (CP) for network control information exchange with an adjacent network node.
- Network Node (NN): The backbone of an APPN network is composed of one or more Network Nodes which provide network services to attached LEN and End Nodes.

Enterprise Extender is an industry-standard solution defined by the APPN Implementer's Workshop (AIW) and the IETF (RFC 2353). With Enterprise Extender, the Rapid Transport Protocol (RTP) endpoint views its interface with the UDP layer of the stack as just another data link control, and treats the connection across the IP network the same as if it would any SNA connection.

HPR's Rapid Transport Protocol component provides:

- Error detection with selective retransmission of lost packets.
- Nondisruptive reroute based on class of service requirements. HPR preserves the session without impact to the end user for planned and unplanned outages in the session path. In the event that no alternate path is available, HPR can even be configured to preserve the session while the failing component is recovered.
- Proactive congestion control. Enterprise Extender brings with it an enhanced version of HPR's Adaptive Rate-Based (ARB) congestion control algorithm. The new version, Responsive-Mode ARB, is more aggressive in using available bandwidth and more tolerant of variations in network latency. Responsive-Mode ARB was introduced with EE to better allow HPR traffic to coexist with native IP traffic in the backbone network.
- Prioritization. The SNA priority field is mapped to the IP Type of Service (TOS) byte which is used by routing algorithms such as the Cisco Weight-Fair-Queuing algorithm. A set of standard UDP ports are also reserved based on priority with packets mapped to them according to the SNA priority field

SNA Functions Not Supported under EE

- EE does not provide Remote Workstation support. This could be an issue for:
 - Remote workstation controllers (5294, 5394, 5494)
 - Retail
 - Financial
 - Any operation involving direct connection to remote hosts
- Third Party solutions exist to address this issue
 - There are products from Perle, BosCom, etc.
 - However, they connect into the system via TCP/IP

Notes: SNA Functions Not Supported under EE

Enterprise Extender does not provide SNA based remote workstation support, such as 5294, 5394, or 5494 controllers. There are a number of OEM vendor solutions available that allow 5250 type workstations to attach to eServer i5 systems across a TCP/IP network. The 5250 workstations attach to OEM controllers, which encapsulate the workstation 5250 datastream into TCP/IP traffic. The telnet server handles the communications on the i5/OS system (the 5250 workstations appear as telnet clients).

There are multiple OEM vendors that provide this capability.

There are products from Perle and BosCom that allow customers to keep using twin-ax devices, but they connect into the system via TCP/IP. Here are a few good websites that describe some of this:

<http://www.e-twinaxcontroller.com/?source=adwords?adcopy=CtwinaxGsna1replacement20050713>

http://www.perle.com/products/prod_family/as_400/index.html

<http://www.affirmative.net/itwinax.html>

IPv6 and why it is needed

■ Rapid growth of the Internet

- China plans to roll out ~1 billion Internet nodes, starting with a 320 million student educational network
- Asia/Pacific, and to a lesser extent Europe, missed out on the early IPv4 address allocations

■ Growing need for IP addresses

- Multiple addresses per person
- Internet access from anywhere
 - Office, home, car, plane, etc
- Pervasive computing

■ Government Support

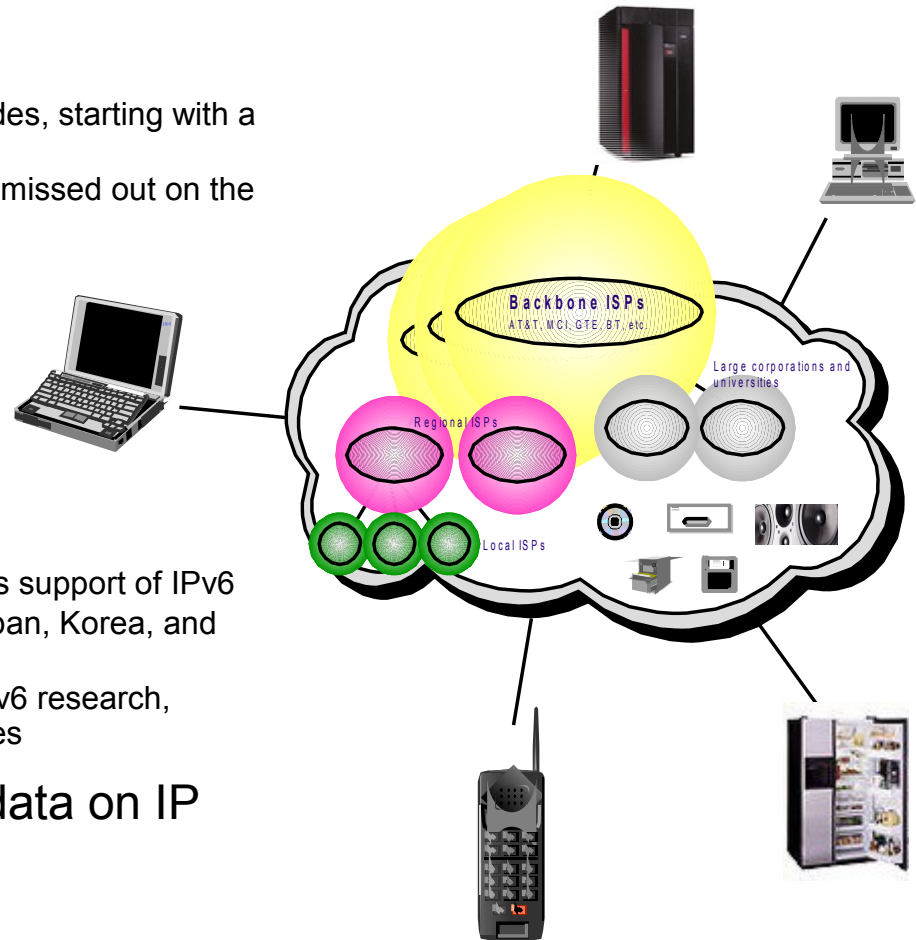
- US Department of Defense (DoD) mandates support of IPv6
- Wide-scale IPv6 promotion underway in Japan, Korea, and Taiwan
- European Commission (EC) encourages IPv6 research, education, and adoption in member countries

■ Convergence of voice, video and data on IP

- Need for reliable and scalable architecture
- "Always-on" connections

■ Security concerns with Network Address Translation (NAT) support

- Sufficient addresses to support end-to-end connectivity

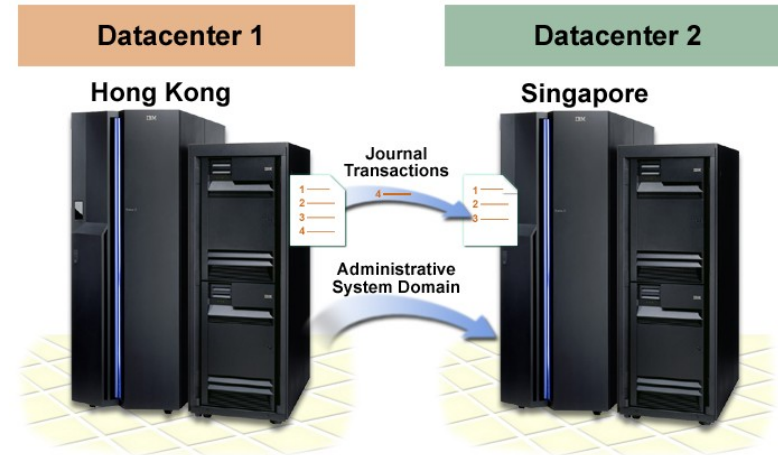


V5R4 IPv6 enhancements

- V5R4 IPv6 support is: “Production Ready”
- Supported over:
 - Loopback
 - All Ethernet adapters (10/100 MB, 1 GB, and 10 GB)
 - Virtual Ethernet between partitions
- Multiple Ethernet adapters may be enabled for IPv6
- Adapter Sharing:
 - IPv4, IPv6, and PPPoE can all be used on same adapter
- Multicast is now fully supported
- Fragmentation is now fully supported
- Complete support of:
 - RFC3494: Basic Socket Extensions for IPv6

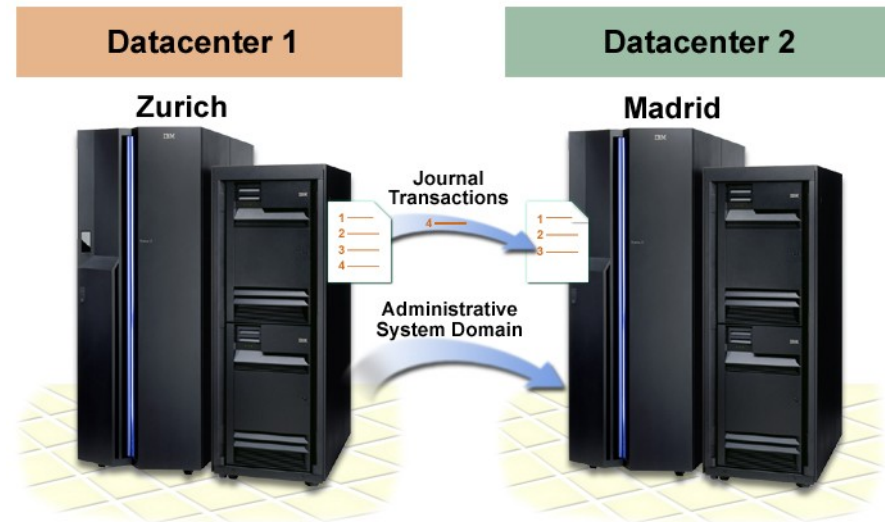
Promote Business Resilience & Compliance

- Make outages of any kind, planned or unplanned transparent to business operations
- Safeguard data by keeping hackers and viruses out
- Promote the highest levels of security, auditing and compliance management
- Deliver proven technology, backed by world-class service and support



Business Resilience & Compliance with i5/OS V5R4

- Help improve security and compliance with integrity protection, network intrusion detection and auditing enhancements
- Help protect company data with i5/OS hardware storage protection
- Help deliver continuous operations with concurrent firmware & non-disruptive fixes
- Improve backup and recovery with virtual tape and save/restore of spool files
- Reduce disk / network resources and improve auditor monitoring with journaling enhancements
- Clustering enhancements include administrative system domain
- Improve disk protection with RAID6



Backup Options Help Enable Continuous Operations

- **Improved backup flexibility with virtual tape support**
 - Multiple libraries or entire system can be saved
 - Integrated with BRMS
 - Duplicate volumes to media or send via FTP
- **Save/restore of spool data assists companies with record retention**
- **New non-dedicated option to save key system object changes between full saves**
- **Parallel save/restore for IFS files**



Virtual Tape Support Overview

▪ Key Advantages

- Supported on all Save/Restore Commands, Virtual I/O, and APIs (except SAVSTG)
- Can be faster than saving directly to tape
 - Similar performance as Save Files
 - Best performance in separate ASP
- Eliminates these Save File limitations:
 - One library per Save File
 - SAVSYS not supported on Save File
 - Parallel saves not supported on Save File
 - 1 TB size limitation on Save File
- Eliminates Media Error limitations:
 - Saves ending due to Tape Device or Media Errors
 - Save-while-active Checkpoint Restriction
 - Once Checkpoint Reached: Saves Can't be Restarted
- Duplicate Saves to Media (DUPTAP or DUPMEDBRM)
 - Save when tape devices are available
 - At your convenience
- Onsite and Offsite Storage
 - Keep Virtual Volumes on systems as needed
 - Keep duplicated Volumes offsite

Complete End User Interface and Tape Management with BRMS

**Redbook coming 2Q 2006:
SG24-7164**

Notes:

This slide lists the many advantages of using the V5R4 virtual tape support – primarily when you have lots of information to save during the same time period and do not have a large number of tape devices to do the saves directly, and need some “extras” not available with a save to a save file.

You see many of the saves to a save file restrictions are supported. Parallel saves are supported.

You see some of the advantages highlighted and bold text on the right also highlighting support by the Backup Recovery and Media Services (BRMS) product,5722-BR1.

There are some considerations you should take into account before implementing the new virtual tape support in your environment. You definitely need to do some management of “objects” created when using virtual tape support or your disk storage could become significantly “consumed” with unmanaged use of this capability.

Virtual Tape Support Overview - 2

▪ Considerations

- Additional DASD Requirements
- No use by DST/SST service tools interfaces
- No Install from SAVSYS Virtual Volume
 - D-IPL Only from Media
- May not be faster than tape
 - Depends on Tape Technology
 - Depends on your System Configuration and Environment
- Data Compaction Not Supported
- Data Compression Support
 - DTACPR(*YES) Parameter on Save Commands
 - Default is *NO
 - SNA Low Data Compression
 - Could be significant performance impact

Notes:

This slide lists important considerations.

Functions like dump to media from DST/SST are not supported. You cannot restore the operating system from virtual volumes, but you can do restore functions, such as Restore License Program (RTSLICPGM).

Note, although you cannot install from a save system to a virtual tape image, you are reminded that starting in V5R3 you could perform a SAVSYS in batch mode in subsystem QCTL, when the system is in a restricted state.

Virtual Tape Support Overview - 3

▪ **Implementation of Virtual Tape**

- Included in Base i5/OS V5R4
- Configures on RACL (Random Access Cartridge Loader) Tape Device
 - I/O to Disk instead of Tape Media
 - Behaves as Tape Library Mounting Specified Volumes
 - Up to 35 Virtual Tape Devices
 - Virtual Tape Volumes Support Multiple Optimum Block Sizes
 - Compatibility with Tape Devices
- Existing Image Catalog Commands used for Virtual Optical
- Tape Volume Management Interface with iSeries Navigator
- User Interface is i5/OS commands or iSeries Navigator
- Complete End User Interface and Tape Management with BRMS

▪ **Virtual Volumes Stored as IFS Stream Files**

- FTP to Other Servers or Partitions
 - Considerations
 - Bandwidth
 - Management of Transmitted Files
 - Disaster Recovery
- Consider use of Independent IASPs that can be switched to, or mirrored to a second system or partition

Notes:

The virtual tape volumes are stored as Type 2 IFS stream files. The stream files have a special attribute to prevent:

- Saving with storage free
- Scan processing
- Journaling

The stream files cannot be saved while the image catalog containing them is in a "Ready" status.

Note: Manual editing of the stream files could cause data corruption.

The stream files can be stored in Dependent or Independent ASPs. When using an iASP, the iASP can for example be created on a remote set of DASD that are Fibre Channel (FC) attached. This type of setup can facilitate or improve a Disaster Recovery (DR) scenario.

Virtual Tape Support Overview - 4

■ Image Catalog

- Commands modified to Support Virtual Optical and Virtual Tape Volumes
- Store Up to 256 1,000,000 MB Virtual Tape Volumes
- *ALLOBJ Authority No Longer Required
- Load of Image Catalog on Virtual Device Makes Virtual Volumes Accessible

■ Virtual Media

- Can Be Write Protected
- Virtual Volume Can be Opened by Multiple Virtual Tape Devices
- New Volumes Auto Created When End of Volume Reached and:
 - Tape Volume List Exhausted
 - Specified Volume *MOUNTED
 - End of Image Catalog Reached
 - Reply to Message CPA6798 by specifying a new volume

Notes:

The virtual tape I/O manager is reloaded whenever the virtual tape I/O manager is varied on with a reset.

The volume status must be LOADED or MOUNTED before it can be used.

PTF Support is Immediate.

Attributes of auto created volumes:

- Default values EXCEPT:
 - Maximum size: 1TB
 - Allocate Storage (*MIN)
- Same as previous volume:
 - Density
 - Type (Standard Label, Nonlabeled)
 - Encoding (EBCDIC, ASCII)

New volumes are placed in position 256 (IMGCLGIDX parameter)

Note: There is no auto create capability with BRMS.

Notes

This slide ends the overview of advantages and usage considerations. The next slides start showing how to set up the virtual tape support.

Transporting virtual images to another server

Here are some of the reasons why you may want the virtual tape image on another system or partition:

- On the system you are running a save or a restore operation, there is no hardware to support the media you use for backup. In this case you may decide to backup to virtual tape and then transfer the image to a partition or system which has a suitable physical tape device attached.
- For a straight forward restore of the data in the virtual tape image to another partition or server without using tape media there are also different options:
 - Virtual tape images can be used in an iASP or in a user ASP. When used in a user ASP or (non-switchable) iASP the only benefit is that the user ASP or iASP are separated on an other set of DASD than the system ASP. For switchable iASP the image can be used for backup/restore on multiple systems or partitions within the cluster domain, without requiring the image to be transferred to another system. You can simply switch the iASP.
 - There is also the option to use FTP for simply sending the image file to a remote server or partition.

Virtual tape fulfills a requirement for improved availability and recovery during system backup.

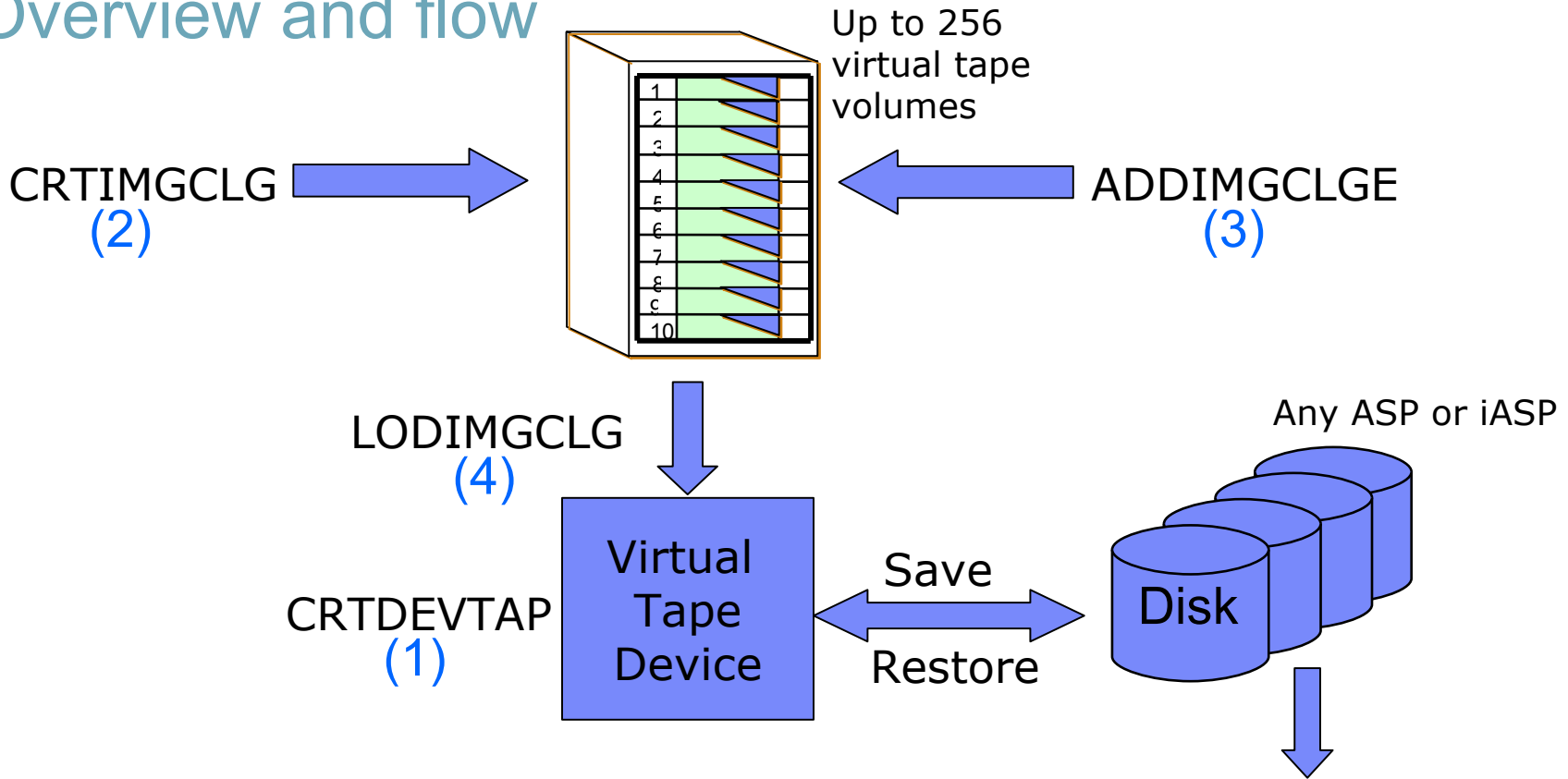
Virtual tape devices can be used for high speed backup with a much lower risk of having the backup fail due to media or other errors. A permanent media error causes a backup to fail, which implies that there is no complete backup. You have to restart the backup or keep the incomplete backup for that day. You can avoid this situation using virtual tape support.

Note: i5/OS Virtual Tape support is separate and distinct from “hardware virtual tape solutions” available in the market place. For example as of March 2006, i5/OS does not formally support the IBM Virtualization Engine TS7510 as a Virtual Tape Library (VTL). A VTL provides High Performance Backup and Recovery (HPBR) by utilizing disk arrays and virtualization software. In simple terms the TS7510 is an xSeries® server running Linux®. attached to an IBM DS4000 disk subsystem, running tape virtualization software.

Contact your IBM TotalStorage representative to investigate possible i5/OS support at a later date.

A redbook on i5/OS Virtual Tape support is planned for 1H 2006. Use SG24-7164 to search for its availability at www.ibm.com/redbooks

Overview and flow



- Ready to be:
- Duplicated to media
 - In IASP: switched to second system for use
 - In IASP: mirrored to second system for use (in progress)
 - Sent to another system via FTP, or other means

Notes

This slide is a good graphical representation to have in mind when learning about i5/OS virtual tape support. Obviously the objective is to save to virtual tapes that are really storage areas on the i5/OS partition. No physical tape devices need to be attached during backup (or restore).

The numbers represent the steps in setting up to use i5/OS virtual tape support:

- Create a tape device description with a “virtual attribute.”
- Create a tape image catalogue
- Add image catalog entries (up to 256) to the image catalogue. Entries represent a virtual tape volume.
- The Load / Unload Image Catalog (LODIMGCLG) command is used to associate an image catalog and its images to a virtual device.

After this you can save to the virtual tape or restore from it. Then you can copy the virtual tape image catalog entry data to an actual tape device or “other media,” such as sending it to a second system. If the catalog is in an Independent Auxiliary Storage Pool (IASP), the IASP contents can be switched to another system or be mirrored to a second IASP on another system.

As a reminder, you do need to manage this storage on the original system as well a second system if the data is switched or duplicated to a second system. If switched duplicated onto a second system, you do have to manage any function you want to perform. You also have to manage any new “tape catalog image entry” versus previously created entries. An example of this would be if you do the actual save to media on the second system. You need to determine when and how to use the new entry, as well as the space for multiple image entries, and when to discard the data. You may want to perform these functions manually first and then do them programmatically and or use the BRMS product to help you.

Spooled File Support

- **Save /Restore of Spooled Files Now Supported in i5/OS**
 - Preserves Spooled File Data, Spooled File Identity and Attributes
 - Spooled File Name
 - Spooled File Number
 - Creation Date/Time
 - Fully Qualified Job Name
 - Job System Name
 - Some attributes may not be preserved
 - System 36 Identifier
 - Output Queue Name/Library (Restored to Different Output Queue/Library)
 - ASP (Output Queue on Different ASP)
 - New Expiration Date (Restore Occurs After Expiration Date)
 - New Save/Restore Attributes of Spooled File

Spooled File Support

- **New SPLFDATA Parameter on Save/Restore Commands**
 - SPLFDTA(*NONE) is Default on Saves
 - SPLFDTA(*ALL) Supported
 - SPLFDTA(*NEW) is Default on Restores
 - Restore Spooled Files That Don't Exist
 - SPLFDTA(*NONE) Supported on Restores

Spooled File Support

- **Save and Restore Entire OUTQs**
 - No support to Save/Restore Individual Spooled Files
- **Save and Restore Menu Options**
 - Optionally Save and Restore ALL Spooled Files
- **Display Save/Restore Media to See List of Spooled Files**
 - DSPTAP, DSPOPT, and DSPSAVF Commands
 - Similar to Displaying Members in a Database File
- **Performance Improvement**
 - Faster than Existing Methods to Save/Restore Spooled Files
 - No Requirement for
 - Copying Spooled File to Database File
 - Document Library Objects (DLOs)
 - Spooled Files Saved and Restored Directly
- **BRMS uses new support**
 - No User Interface Changes to BRMS
 - Performance Improvement

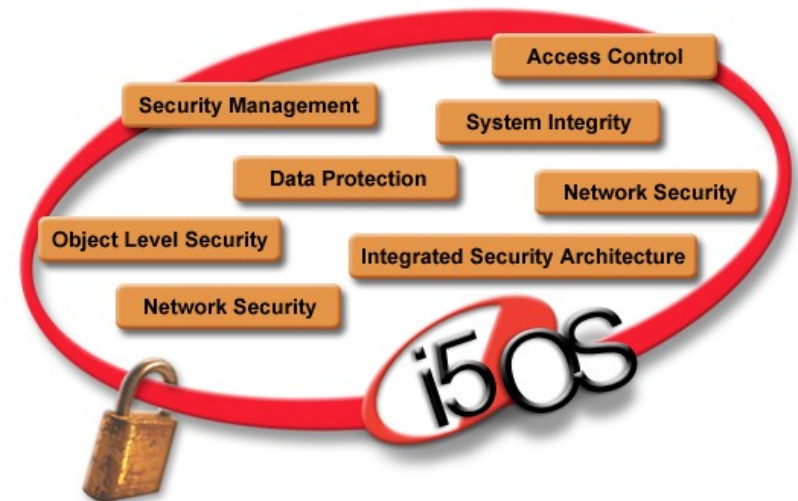
IFS Parallel Save/Restore Support

- **Single SAV or RST Command Using Multiple Tape Devices**
- **Reduces Save/Restore Window for LARGE IFS Objects**
 - Large Network Storage Spaces
 - Domino Databases

Note: Not Intended for Millions of Objects Less Than 1 MB in Size – Performance Decreases with Small Objects
- **Create Media Definition with QsrCreateMediaDefinition/QSRCRTMD API**
- **Specify Media Definition Object on Device (DEV) Parameter**
 - Up to 32 Tape Devices in Parallel
- **Save Entire IFS to Multiple Tape Devices Once Media Definition “X” Created**
 - SAV DEV('/QSYS.LIB/Y.LIB/X.meddfn') OBJ((/*) ('QSYS.LIB' *OMIT) ('/QDLS' *OMIT))
- **Supported on QsrSave and QsrRestore APIs**
- **End User Interface with BRMS**
 - Let BRMS create the Media Definition
 - Specify Minimum/Maximum Parallel Resources on BRMS Control Group

i5/OS V5R4 Security & Compliance

- System integrity
 - Help protect company data with i5/OS hardware storage protection
- Access control
 - Help companies secure systems with additional auditing features
 - Record special authority violations and prevent display of user audit attributes
- Network security
 - Help prevent network attacks with TCP/IP intrusion detection
 - Configure and create audit journal entries for events such as port scans
 - Extend support for VPNs with server side Network Address Translation (NAT) traversal



Notes

i5/OS V5R4 includes a wide range of security and compliance enhancements. For example, new hardware storage protection helps prevent against rogue or altered programs from directly accessing system objects, such as database records. Objects, including database and file system containers, will be accessible only to IBM Licensed Internal Code, helping protect against rogue system state programs. No changes are expected to be required for valid application programs.

New intrusion detection capabilities enable an administrator simply to configure intrusion event monitoring with entries created in the audit journal for intrusion events, such as scanning for open TCP/IP ports. A policy file allows the administrator to configure intrusion event monitoring and create audit journal entries created for intrusion events such as malformed packets, SYN floods, restricted IP options and protocols, traffic regulation events and port scans.

Additional auditing and compliance enhancements include the ability to audit special authority violations. So for example, an audit journal entry would be recorded if a user is authorized to CRTUSRPRF create user profile command without the corresponding *SECADM security administrator authority. Also, now users will not be able to display their audit attributes, this function will be limited to system administrators. Note that these capability add to the extensive enhancements to the audit journal in V5R3, with much more granular options to save only the security data required.

In i5/OS V5R2, support was added to VPN to allow a system initiate VPN connections that traverse NAT firewalls. In V5R4, server side NAT traversal support has been added and with this enhancement, i5/OS has a complete solution for establishing VPNs through NAT firewalls.

System Integrity

- V5R4 is first release for which all supported systems have Enhanced Hardware Storage Protection (Enhanced HSP)
- Stronger HSP “force field” will be applied to iSeries objects
 - Objects, including database record and file system containers, will be accessible only to Licensed Internal Code (LIC)
 - Altered programs are denied “back door” access, so a rogue program attempting an unsupported access will FAIL
 - Helps prevent against attacks via “rogue” system state programs
- No changes required for “valid” application programs. Internal object “hardware alignment” occurs on first touch on V5R4
- Data Base and other objects conversion required after V5R4 install
 - Conversion may take a considerable amount of time and disk space
 - V5R4 Memo to Users has some examples of conversion time
 - Default at first access/use includes adding 4K header to associated MI objects
 - DSPLIB or DSPOBJD or STROBJCONV for programs will trigger this conversion
 - Get a pre-V5R4 install assessment via PTF SI18716 (V5R2) or PTF SI18615 (V5R3) for database objects.

Notes: System Integrity - 1

The operating system creates objects using a hardware storage protection attribute. Each time a RISC instruction is executed, the hardware determines whether the page frame is hardware storage protected. This process allows for the control of access and what type of access to that object. As such, hardware storage protection allows a user domain object to be created so it can be read from a user state program but cannot be modified by the user state program.

To keep things simple, a process running on an i5 system under the i5 operating system is granted addressability (with a identified type of access) to a data object when it can obtain a valid system pointer. This validation is done by checking the hardware tag bits, a hardware controlled process. Even when an attempt is made to modify a hardware tagged pointer, the tag bit is cleared and the data object becomes un-addressable. The only allowed modification can be performed by an authorized MI instruction. This methodology prevents any type of change made to an object on the system by any type of program or other unsupported access that can not make use of an authorized MI instruction.

To help with restricting the existence of user domain objects on the system, QALWUSRDMN system value can be used. QALWUSRDMN system value specifies a list of libraries the allow user domain objects in these libraries. These libraries on the system may then contain the user domain user objects *USRSPC (user space), *USRIDX (user index), and *USRQ (user queue).

The internal representation of SQL statements in *PGM, *SRVPGM, *MODULE, and *SQLPKG objects changed in V5R4. *PGM, *SRVPGM, and *SQLPKG objects that were created prior to V5R4 will be converted automatically to the new format on first use. You can also initiate object conversions using the Start Object Conversion (STROBJCVN) command. *MODULE objects that were created prior to V5R4 cannot be permanently converted, and a conversion will be performed each time the *MODULE is bound into a program or service program. The amount of time to convert a single object is small, less than 160 milliseconds of CPU time on a model 890 system for a program approaching the system limit on number and size of SQL statements. On a model 840 system, it is less than 350 milliseconds. The conversion time is proportional to the number of SQL statements in the object and to the cumulative size of the SQL statements. If large numbers of objects need to be converted, the conversion time could be noticeable.

Notes: System Integrity - 2

In V5R4, many objects are "realigned" with new HSP security information upon first touch to ensure maximum performance on V5R4. This conversion is done in background SLIC tasks upon "first use," but will have some performance impact (varies, dependent on particular objects) on the system.

Key objects being converted include data queues, user queues, and database objects.

To enhance the run time performance of journaled data queue (*DTAQ object) synchronization and to increase the debug capabilities of all queues (*DTAQ and *USRQ objects), the first time a queue is touched after V5R4 is installed, an internal conversion takes place. This conversion might take a noticeable amount of time for large journaled data queues but should be relatively quick for other data queues. To avoid delays in a production environment, you might want to touch all queues immediately following the installation. One way that you can do this is to run the Display Library (DSPLIB) command, and then select either Option 5 or 8 (to display attributes) for each *DTAQ or *USRQ object. You can also use commands, such as Display Library (DSPLIB) or Display Object Description (DSPOBJD) within a submitted batch job.

Database files that were created on a release earlier than V5R4 are also converted to eliminate a performance degradation that might occur due to Enhanced Hardware Storage Protection support. Because database files (*FILE objects) consist of several machine interface (MI) objects, the time to convert them could be significant when an application that accesses many files is started for the first time after V5R4 has been installed.

Also, because the MI objects will have their header size increased to 4K during the conversion, each MI object associated with a database file will grow in size by 4K (4096 bytes). To spread the MI object conversion process out over a period of time, the database file conversion support is designed to be done when the database MI objects are first accessed or used after V5R4 is installed. Similar for data queues, the user can be proactive on this by setting up a time to do this "first access" via display commands before running a performance critical application for the first time on V5R4.

If you would like to evaluate the impact that the database file conversions might have on one or more of your applications and estimate how much time during your upgrade window to take the necessary steps to eliminate the startup performance degradation for your more critical applications, then run the QDBFIMIC program that is included in PTF SI18716 (if you are upgrading from V5R2) or PTF SI18615 (if you are upgrading from V5R3). See PTF cover letter for detailed usage instructions and what happens if a database file object is locked too long while QDBFIMIC is running.

The next slide shows an example using QDBFIMIC run on V5R3.

Print and Output Management

- i5/OS V5R4 provides save/restore of spool data assists companies with record retention and compliance requirements
- Infoprint Server, Designer
 - Document design reengineering
 - PDF, electronic document delivery
- IBM printers for System i5 include:
 - Combined RFID and barcode printers
 - Multi-function printers for device consolidation
 - Complete new line of IBM 15xx Series workgroup laser printers



Notes – Print and Output Management

Print and output management continues to be a strong opportunity for businesses to gain a strong Return on investment (ROI) with new solutions such as printers that support both barcodes and Radio Frequency Identification (RFID). Also, many businesses continue to gain costs savings from printer, fax and other output device consolidation to multi-function printers. Transformation to electronic delivery and storage of output continues to be a key element of business re-engineering, content management and compliance. Infoprint products continue to evolve. Infoprint Designer provides document design reengineering. Infoprint Server addresses the strongly growing demand for PDF conversion and electronic document delivery. Virtually every iSeries organization is seeking to adjust the mix of print and electronic delivery of business communications.

New support in i5/OS V5R4 to save and restore spooled file data and attributes helps companies with record retention and disaster recovery. Now system Save/Restore commands provide a new spool file data parameter, that can be used to save all spooled files or just new files. APIs are available to select and subset files to be saved or restored based on an extensive list of attributes including output queue, job name, job number, user name, spooled file name, and create date/time ranges. An expiration date can also be set on spool files. For companies that use traditional system menus, the save and restore menu options have been enhanced to offer the option to save and restore all spool files. Because spooled files are saved directly to tape, the new support is much faster than most existing methods of Save/Restore of spooled files, many of which used to convert the file to a document, then save the document. The new support is also integrated with Backup & Recovery Media Services (BRMS).

There are new QSPGETF and QSPPUTF APIS to make the spooled file library list become the library list of the job running the QSPPUTF API.

In industrial environments, reliable output management and radio frequency identification capability are becoming critical to supply chain efficiency. To keep your information flowing, IBM offers IBM Infoprint® 6700 (shown above middle right) thermal printers that provide flexible media handling, support for barcodes By integrating Infoprint 6700 printers with IBM's middleware architecture, you can monitor printer activities and output processes. With additional support for RFID tags, as well as an upgrade path to the next generation of RFID technology, IBM can provide you with an end-to-end output management solution.

Notes – Print and Output Management

The IBM Infoprint 1570 (shown above middle/left) is a new multi-function device for large workgroups with a print speed of up to 50 ppm letter/A4. The IBM Infoprint® 1570 with multifunction capabilities provides the means to increase efficiency and productivity while strengthening document security. Consolidate printers, copiers, scanners and fax machines by installing a single multifunction device that can help reduce costs, increase flexibility and enhance document security.

With a small footprint and a low acquisition price, the IBM Infoprint® 1512 (shown above bottom right) delivers the functions needed to support small businesses and small workgroups with powerful performance. With a 366MHz processor, flexible networking options, exceptionally intuitive operator interface, advanced printing options, and a 64-bit system driver, the Infoprint 1512 raises the bar for entry-level print performance. More importantly, the Infoprint 1512 is the entry model in the broad new line of Infoprint 15xx printers designed and integrated for iSeries environments.

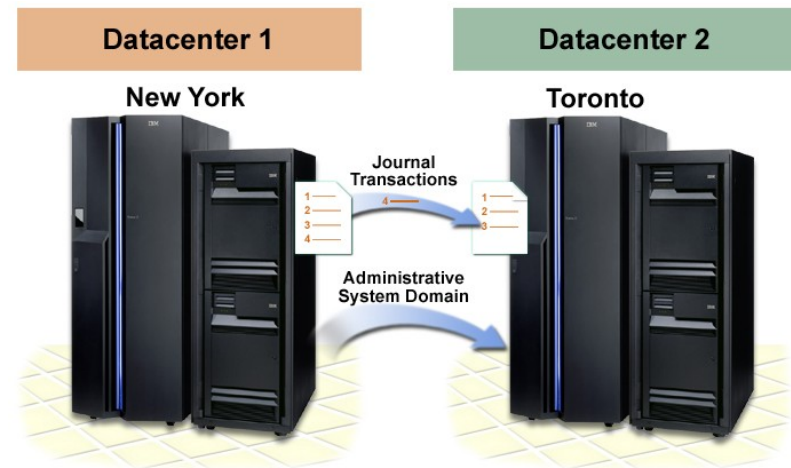
The following slides provide additional details. For more information than what is covered in this presentation, see www.printers.ibm.com

I5/OS Spool enhancements

- Spool file, policy-based OUTQ Management
 - Set expiration date or number-of-days for spooled files via new printer file attribute or by changing spooled file attributes of existing spooled files
- Changes to the WRKSPLF command allow for more specific targeted searches of spooled files
 - New filtering criteria has been added for the spooled file name, the qualified job name, generic name, and the starting and ending create dates and times
 - This additional filtering, especially the date and time range, allows the user to better manage spooled files that exist on the system and which ones would be good candidates to be saved or deleted
- Archive/Backup (save and restore) spool OUTQ includes option to include saving spool file data and restoring spool file data
- Enhanced job log management
 - Reducing the number of job logs
 - Additional control of the work producing a job log

i5/OS V5R4 Clustering Solutions

- i5/OS base cluster services enhanced with administrative domain support
 - Enables synchronization of environmental objects such as user profiles and system values or attributes across nodes
- i5/OS will now have the option automatically to journal non-DB objects in addition to new database files
- New journaling option helps auditors view data in journal entries minimized to improve performance



Notes

i5/OS cluster services have been enhanced with administrative domain support. An administrative domain enables changes made on a source system to be replicated to a target system for system objects such as user profiles, work management objects (such as job descriptions), storage pool descriptions, select system values and network attributes, system environment variables, and TCP/IP attributes. This adds to the remote journaling support that replicates data changes to the target system. With the new administrative domain support, it will be much easier to maintain and recover systems in a clustered environment.

Cross site mirroring has been enhanced to provide source side tracking of changes. Now the source system will keep track of changes even if there has been a break in the link to the target system. When the target system comes back on-line, then only the recent changes are sent to update the system. This capability removes the previous requirement for a full disk resynchronization to the target system.

Journaling: Better Usability, Larger Capacity

- Enhanced support for automatic journaling
- New default options when creating or changing journals (CRTJRN/CHGJRN)
- Additional Information on the output of the Work with Journal Attributes (WRKJRNA) and Display Journal (DSPJRN) commands
- Enhanced recovery support with the Work with Journals (WRKJRN) command
- New entries for data areas and data queues - data queues can now more easily be replicated

Journaling: Better Usability, Larger Capacity - 2

- Enhanced support for automatic journaling:
 - Includes support for data areas and data queues
 - Automatic start journaling for moved, restored or copied objects

Journaling: Better Usability, Larger Capacity - 3

- New default options when creating or changing journals (CRTJRN/CHGJRN):
 - Journal Number of Objects Limit (JRNOBJLMT) choice
*MAX250K | *MAX10M
 - Receiver Size Option (RCVSIZOPT) has a default of *SYSDFT, which is a combination of *MAXOPT and *RMVINTENT
 - Minimize Entry Specific Data (*MINENTDTA) allows specifying Field Boundary (*FLDBDY) as option
 - RCVJRNE, RTVJRNE and the QjoRetrieveJournalEntries API are capable of handling this option via the FMTINTDTA parameter
 - DSPJRN indicates whether or not the *FLDBY parameter has been selected
 - CHGJRN Journal Recovery Count (JRNRCYCNT) to reduce abnormal IPL duration

Notes: Journaling: Better Usability, Larger Capacity - 3

The maximum number of objects associated with a single journal can be set to either 250,000 or 10,000,000 using the Journal Object Limit (JRNOBJLMT) parameter on the Create Journal (CRTJRN) or Change Journal (CHGJRN). The value *MAX10M can only be specified for the Journal Object Limit (JRNOBJLMT) parameter if the Receiver Size Option (RCVSIZOPT) parameter has one of the receiver maximum values specified, or if RCVSIZOPT is *SYSDFT. *MAX250K is the default value. Once you have chosen the *MAX10M option, you cannot switch back to the *MAX250K value.

Increasing the quantity of objects associated with a single journal may increase your IPL time, independent ASP vary on time, or disaster recovery time. As a general rule, if the number of actively changing objects is likely to be greater than 5,000, consider journaling some of these objects to a separate journal. The larger the number of actively changing objects for a given journal at system termination, the longer it will take to recover the journal at IPL or vary on of an independent ASP. If the new JRNOBJLMT(*MAX10M) specified for your journal, you cannot restore the journal to a release prior to V5R4.

If JRNOBJLMT(*MAX10M) is specified for a local journal, the remote journal must exist on a system at a release of V5R4M0 or later.

The default value for RCVSIZOPT has changed to *SYSDFT. Specifying this value is equivalent to specifying *MAXOPT2 and *RMVINTENT:

- *MAXOPT2 means that the journal can have a maximum receiver size of approximately one terabyte (1,099,511,627,776 bytes) and a maximum sequence number of 9,999,999,999. Additionally, the maximum size of the journal entry which can be deposited is 4,000,000,000 bytes.
- *RMVINTENT means that the size of the receiver attached to the journal is reduced by the automatic removal of the internal entries required only for initial program load (IPL) or independent ASP vary on recovery when these entries are no longer required.

Minimize entry specific data (*MINENTDTA) accepts Field Boundary (*FLDBDY) as option, implying that, when journaled tables have journal entries deposited with minimized entry specific data, the minimizing will occur on field boundaries, and the entry specific data will be viewable and may be used for auditing purposes.

Notes: Journaling: Better Usability, Larger Capacity - 3

An optional parameter, Format minimized data (FMTMINDTA), is available on the Retrieve Journal Entries (RTVJRNE) command, the Receive Journal Entries (RCVJRNE) command, and the Retrieve Journal Entries (QjoRetrieveJournalEntries) API. This parameter allows you to specify whether entry specific data which has been minimized on field boundaries will be returned in a readable format, which allows you to determine what changes have been made. The possible values for the FMTMINDTA parameter are *NO or *YES, with the default being *NO. By default, the methods used by these commands provide the data in their raw format. The RTVJRNE command will indicate whether or not *FLDBDY has been specified for Minimized entry specific data with a value of '2' in the already existing "MINIMIZED ENTRY DATA" field for the appropriate entry formats. *FILE and *DTAARA will appear as '1' in their fields.

Using the Display Journal (DSPJRN) command, entries are viewable to the screen, an outfile, or printed output. The DSPJRN command will also indicate whether or not the *FLDBDY value has been specified for Minimized entry specific data on the "Display Journal Entry" panel and will indicate a value of '2' in the "Minimized entry specific data" field of the *OUTFILE and in the "Min" field of the printed output. *FILE and *DTAARA will appear as '1' in their fields.

The Journal Recovery Count (JRNR CYCNT) parameter in the CHGJRN command indicates how many journal entries can exist between the last deposited entry and the oldest forced entry for a journaled object. A value between 10,000 and 2,000,000,000 will be allowed. A value of *SYSDFT will also be allowed to reset the journal's recovery count to the system default journal recovery count.

The journal recovery count allows you to choose between faster abnormal IPL recovery and decreased run time processing. Specifying a smaller value decreases the number of changes that would need to be recovered from this journal during an abnormal IPL by increasing the frequency with which changed objects are forced. Specifying a larger value increases the number of changes that would need to be recovered for this journal during an abnormal IPL by decreasing the frequency with which changed objects are forced.

Note: Changing the journal recovery count value may affect overall system performance as it affects the utilization of auxiliary storage devices.

The WRKJRNA command indicates the Journal Recovery Count on the panel display and in the printed output. A value of *SYSDFT displays if the system default journal recovery count is being used. All journals are created with the system default journal recovery count, and if a value other than the system default (*SYSDFT) is specified, the system default journal recovery count will no longer be in effect for the journal. The Retrieve Journal Information API will also return the Journal Recovery Count.

Journaling: Better Usability, Larger Capacity - 4

- Enhanced support for automatic journaling
- New default options when creating or changing journals (CRTJRN/CHGJRN)
- Additional Information on the output of the Work with Journal Attributes (WRKJRNA) and Display Journal (DSPJRN) commands
- Enhanced recovery support with the Work with Journals (WRKJRN) command:
 - Allows for easier recovery when more than just data base objects are journaled

Notes: Journaling: Better Usability, Larger Capacity - 4

Changes to the WRKJRN command, supporting now all object types, including:

- Add JRN parameter to the WRKJRN command
- End and restart journaling for data areas, data queues, and IFS objects when recovering a damaged journal
- New ability to limit the journal receiver search when taking option 9 to reassociate journal receivers with a journal
- Forward recovery for data areas, data queues, and IFS objects
- Backout recovery for data areas

Journaling: Better Usability, Larger Capacity - 5

- Enhanced support for automatic journaling
- New default options when creating or changing journals (CRTJRN/CHGJRN)
- Additional Information on the output of the Work with Journal Attributes (WRKJRNA) and Display Journal (DSPJRN) commands
- Enhanced recovery support with the Work with Journals (WRKJRN) command
- **New entries for data areas and data queues - data queues can now more easily be replicated**

Notes: Journaling: Better Usability, Larger Capacity - 6

Since V5R4 allows to save both the description and the contents of a data queue when selecting the option *DTAQ for the parameter Queue Data (QDTA) of the Save Object (SAVOBJ) command. This makes it possible to start replication for a data queue while active and simply replay the subsequent journal entries.

The entries deposited for authority and attribute changes for data areas and data queues now includes:

- Change ownership
- Change primary group
- Change audit attribute
- Grant and revoke authority
- Change object description

IBM System i5 Console Considerations

V5R4 POWER5 and i5/OS Console support

- **New option: use imbedded LAN ports (not HMC ports) in 520, 550, 570 processor enclosure for Operations Console (LAN)**
 - Can save cost of LAN IOA and possibly IOP and associated PCI slot (s)
 - Two ports: if used for console, one port dedicated to console function *
 - Requires i5/OS V5R4 if 1.5/1.65GHz model 520 or any 550, 570, 595.
 - Single exception: Can use i5/OS V5R3 with V5R3M5 on 1.9GHz model 520.
- **New option: use #5706/5707 LAN adapter for Operations Console (LAN)**
 - Already available Smarter IOA (IOP-less) Ethernet 2-port LAN adapter. With V5R4 now can be used for Operations Console (LAN). If used for console, one port dedicated to console function *
- **Existing console options also remain available**
 - Twinaxial Console (IOP-based)
 - Operations Console (Direct Attach)to asynchronous port of WAN adapter (IOP-based)
 - Operations Console (LAN) to LAN adapter (IOP-based)
 - 5250 emulation interface via HMC
- **Advanced System Management Interface (ASMI)**
 - Access to detailed service functions, logs, ...
 - Secured browser interface to system service processor required even for non-LPAR configurations
 - Required to do some functions without HMC, such as activating capacity on demand, or activating the new i5 520 accelerator function on specific models

* Single adapter, 2 ports. Single partition owns both ports

Notes: V5R4 POWER5 Operations Console support

This slide summarizes the i5/OS console options available on POWER5-based systems. More detail slides follow.

Notes:

- With V5R4 you have the first opportunity to use the two port Ethernet LAN adapter features 5706 and 5707 for Operations Console (LAN) and the corresponding embedded two port Ethernet LAN adapter in the IBM System i5 520, 550, 570 models.
- When a system is managed by a Hardware Management Console (HMC), you specify which 5250 console type you want to use as the main console to an i5/OS partition through the HMC interface.
- When your system is not managed by the HMC, you have ordered the system to be managed by either a twinaxial attached 5250 workstation or Operations Console (Direct attach), or Operations Console (LAN attached). When shipped new, there are default algorithms used by the system to “find” the card or port to be used as the console. These rules should be understood. They are described on the succeeding slides that expand on the content of this slide.
- When not using an HMC, if you do not want to use the embedded Ethernet LAN adapter or, for a 595 model the first 5706/5707 in a base I/O drawer or tower, you can selectively turn this support on or off by following the steps in the PDF *System i5 and eServer i5Managing Operations Console*.

See the next slides and speakers notes pages for how to locate this document.

V5R4 i5/OS Console hardware update

- **All existing console options remain available**
 - #5540 Twinax (IOP-based)
 - #5544 Operations console (Direct) attached to WAN adapter (IOP-based)
 - #5546* Operations console (LAN) Token Ring adapter #2744 (IOP-based)
 - #5548 Operations console (LAN) Ethernet adapter #2849/#4838 (IOP-based)
 - #5550 Console on HMC (5250 Emulator)
- **New Operations Console (LAN) specify codes**
 - #5553 for using imbedded Ethernet ports on Models 520/550/570
 - #5557 Ethernet using IOA (#5706/5707, no IOP) for Model 595

* Supported but planned for withdrawal from marketing

Notes: V5R4 i5/OS Console hardware update

As always, the location of a console adapter (IOA) only pertains to those servers not managed by a Hardware Management Console (HMC). If an HMC is managing the server you will specify the actual IOA desired for the console.

Twinaxial Console: A twinaxial adapter card for use as the console can go into any location also supported for use by Operations Console (LAN). This statement is made to emphasize that designated PXI slots for both twinaxial and Operations Console (LAN) in the IBM system i5 processor enclosure unit are the same.

Operations Console (Direct): For Operations Console (Direct) you must select a supported Asynchronous adapter: 2742, 2793, 4745, 9771. These adapters require attachment to an IOP. Note, the ECS (Electronic Customer Support) communications adapter, usually a 2793, is used IOP-less only for ECS functions and remote service and support functions. Directly attached consoles using this or another supported adapter require an IOP.

There is only one card location assigned for use with Operations Console (Direct), by 520, 550, or 570 model.

Operations Console (LAN): For Operations Console (LAN) the supported adapters are: 2744 (TRN), 2838 (ETH), 2849 (ETH), 5706 (ETH), 5707 (ETH), or the embedded 2 port Ethernet adapter within the 520/550/570 processor enclosure. When either the embedded 2 port Ethernet adapter or the 5706/5707 2 port Ethernet adapter is used for the LAN console, only the "first port" can be used. The 5706/5707 adapter and the embedded 2 port adapter are the only "non-IOP" LAN adapters supported by Operations Console (LAN. Regardless of whether the two port adapter is used for Operations Console (LAN) or a normal communications adapter, both ports (the IOA) belong to the same partition.

Notes: V5R4 i5/OS Console hardware update - 2

There are specific LAN adapter (IOA) considerations for Operations Console (LAN) when an HMC is not used to specify which adapter to select. The next paragraphs describe the considerations.

520, 555, 570 models: If present (all models are shipped with this) the first port of the embedded 2 port Ethernet LAN adapter is used the default for the console. You must turn off this support if you plan to use a different supported LAN adapter in a card slot either in the 520, 550, 570 processor enclosure or a separate I/O tower or drawer

595 models: This model requires an HMC and therefore tagging the desired IOA directly through the HMC interface is used to specify the console instead of by card location.

For full details on Operations Console support on IBM System i5 and eServer i5, refer to the *IBM System i5 and eServer i5 Managing Operations Console* PDF found at the iSeries V5R4 Information Center. Instructions for turning off the default embedded 2 port adapter logic can be found in the document. See the last notes page for V5R4 console on how to locate this PDF.

The next slide repeats the some of the information in these notes pages but also discusses specific card slot requirements for Operations Console adapters in the processor enclosures of the POWER5-based models.

V5R4 i5/OS Operations Console Hardware

- **LAN: first port on imbedded Ethernet adapter**
 - In 520, 550, 570 processor enclosures: use the imbedded Ethernet Adapter for LAN-attached console wherever possible
 - Saves the cost of an additional LAN adapter and possibly an IOP and associated PCI-X slot(s)
 - Port dedicated to console function, second port available for normal utilization in the same partition
 - Requires i5/OS V5R4 on all i5 models, except on 1.9GHz model 520 with V5R3M5 LIC
- **LAN: first port of the 5706/5707, 2-port Ethernet adapter**
 - With V5R4, these adapters can be used for LAN console attach. First port dedicated to console function, second port available for normal utilization in the same partition
 - Initial order (#5557) on Model 595 only, however, this option can be used in LPAR configurations on all IBM System i5 Models
- **Operations Console (Direct) essentially unchanged**

Notes: V5R4 i5/OS Operations Console Hardware

Model i520

Operations Console (LAN): first embedded Ethernet port (T5) unless support has been turned off.

Card slots: C2 or C5 (no IOP)

Card slots: C2 driven by IOP in C1

Card slots: C5 driven by IOP in C3 or C6

Operations Console (Direct): Asynchronous communication adapter

Card slots: C3 (no IOP)

Card slots: C3 driven by IOP in C6

If an IXS is present it will occupy C5/C6

LAN or Asynchronous communication adapter goes into C2 and driven by IOP in C1, if needed.

Model i550

Operations Console (LAN): First embedded Ethernet port (T9) unless support has been turned off.

Card slots: C4 (no IOP)

Card slots: C4 driven by IOP in C3

Operations Console (Direct): Asynchronous communication adapter

Card slots: C2 (no IOP)

Card slots: C2 driven by IOP in C1

If an IXS is present it will occupy C2/C3

Asynchronous communication adapter goes into C5 and driven by IOP in C4, if needed.

Note: Console support using a LAN connection is provided by the embedded port only.

Model i570

If multiple Processor Enclosure Units, the one with the load source DASD is used for console support.

Operations Console (LAN): First embedded Ethernet port (T6) unless support has been turned off.

Card slots: C4 or C6 (no IOP)

Card slots: C4 and C6 can be driven by an IOP in C3

Operations Console (Direct): Asynchronous communication adapter

Card slots: C2 (no IOP)

Card slots: C2 driven by IOP in C1

Notes: V5R4 i5/OS Operations Console Hardware - 2

If you have selected Operations Console (LAN) we recommend that you install the server using the embedded port and then migrate the console to use another location if you wish. If you turn off the embedded port support for console an adapter card located in a specific location, by model, can be used. The only IOP-less LAN adapter is the 5706/5707 10/100/1000 Mbps Ethernet adapter. All other LAN adapters will require an IOP. Like all other console supported adapters, even though the 5706/5707 runs without an IOP it still must be located in a location specific to LAN console.

As shown on the previous notes slide there may be one or more locations available for use for the console.

When upgrading to a new System i5 520, 550, 570, or 595 your upgrade instructions should contain documentation on how to continue using the your current console hardware or change to one of the POWER5-based options discussed here.

For a comprehensive description of IBM System i5 and eServer i5 PCI card slot plugging rules, refer to:

- PCI Placement Rules for the IBM eServer i5 and iSeries Servers with i5/OS V5R3 and V5R4, REDP-4011-nn
- This can be found at the redbooks website: <http://www.ibm.com/redbooks>

For detailed cable connection information refer to the eServer IBM Systems Hardware Information Center at

- <http://publib.boulder.ibm.com/eserver/>
- Select IBM Systems Hardware Information Center (or go directly to this via <http://publib.boulder.ibm.com/infocenter/eserver/v1r3s/index.jsp>)
- Select the IBM Systems Hardware Information Center link
- Select Installing hardware -> Cabling your server

For full details on Operations Console support on IBM System i5 and eServer i5 refer to the *IBM System i5 and eServer i5 Managing Operations Console* PDF found at the iSeries V5R4 Information Center. This PDF includes information on how to turn off the POWER5-based default algorithm for selecting an Operations Console (LAN) adapter port. This document can be found in the iSeries Information Center, V5R4:

- <http://publib.boulder.ibm.com/eserver/>
- Select IBM iSeries Information Center (or go directly to this via <http://publib.boulder.ibm.com/eserver/iseries>)
- Select V5R4
- Select Connecting to iSeries -> Printable PDFS -> Right click Operations Console -> Save (Target) as PDF.

Notes: V5R4 i5/OS Operations Console Hardware - 3

A console options positioning (HMC, Operations Console, Twinaxial) whitepaper exists and is being updated for V5R4. You can access the latest version of this whitepaper at:

<http://www-1.ibm.com/servers/eserver/series/literature/index.html>

Additional documentation is being developed to include recommendations or “best practices” for having more than one console device to operate and manage your system. This will include considerations for:

- Having more than one HMC device be able to “hardware manage” your i5 system and use its 5250 emulation console for service tools functions as well as i5/OS functions
 - Having a single HMC perform hardware management, service tools functions, and i5/OS functions on multiple i5 systems.
 - Having combinations of the following console options to allow for “downtime” of a single console, such as:
 - HMC consoles (1 or more)
 - Twinaxial 5250 workstation
 - Operations Console (Direct)
 - Operations Console (LAN)
- The appendix section of this presentation contains Operations Console (LAN) cabling connection graphics as well as what these connection look like from the i5/OS Display Hardware Resource (communications) command windows.**

IBM System i5 and i5/OS V5R4

1. Promote Solutions Innovation

3. Simplify Your IT

System i5 & i5/OS V5R4 were announced on 1/31/2006 and are available 2/14/2006



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