



# IBM Forum 2008

IT na plný výkon!



Novinky v portfoliu System i, virtualizace v prostředí i5/OS V6R1, konsolidace prostředí a přidaná hodnota System i integrace, zajištění bezpečnosti a spolehlivosti

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12.3.2008

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## Agenda

- Power VM - converged portfolio
- I5/OS V6R1 general enhancement
- Blades for System i and virtualization on Blades
- Virtualization on non-Blades portfolio

IBM

## 2008 Power Systems: a converged portfolio

Management  
Energy  
Security  
Availability  
OS and Integration  
Virtualization

Power Systems Software

PowerVM

AIX

i5/OS

Power Blade & BladeCenter

Power 520

Power 550

Power 570

Power 595

POWERPC BUILD ON Power

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## i5/OS V5R1 - General Enhancement

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Over 5,800 solutions from over 2,500 ISVs run on i5/OS



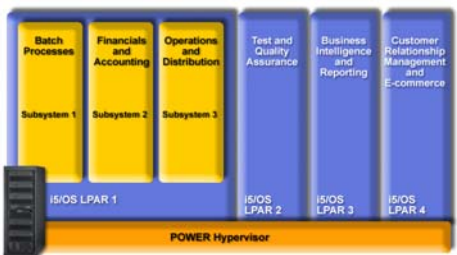

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## i5/OS – Efficient, Resilient Business Processing

- Integrated middleware for efficient business processing
- Virtualized to manage multiple applications and processes
- Optimized for exceptional business resilience
- Trusted security with auditing and compliance tools

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## Comparing Business Value



- ✓ System i required less IT staff time to manage
- ✓ System i servers had significantly better uptime
- ✓ System i servers supported more workloads
- ✓ System i systems supported more end users

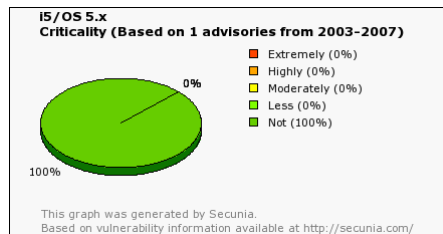
	System i	x86
<b>Operational Cost Metrics</b>		
Users per server	111	70
IT Staff per server	.30	.40
Workloads per server	5.86	1.21
<b>Service-Level Metrics</b>		
Downtime hours per server per year	0.58	15.50
Timer spent responding to virus attacks (hours per user, per year)	0.05	0.21

Source: IDC 2007

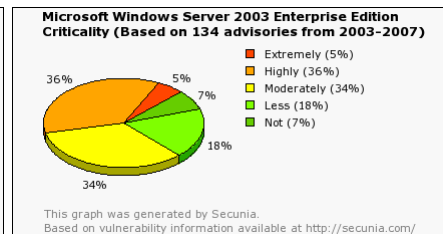
IDC Paper: The Business Value of IBM System i in Mid-Sized Business Deployments, July 2007

## Comparing Operating System Security

### i5/OS



### Windows Server 2003



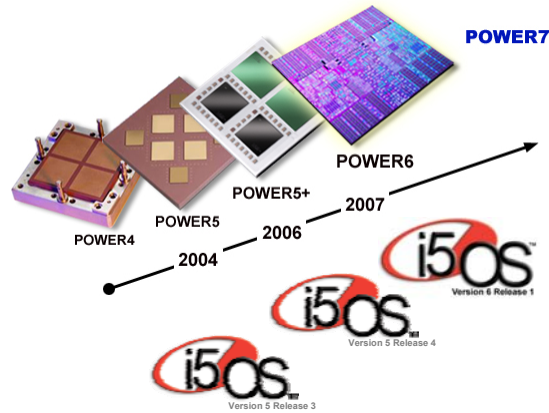
Between 2003 and 2007, i5/OS V5Rx was affected by 1 Secunia issued advisory which was non critical and has been fixed

Between 2003 and 2007, Microsoft Windows Server 2003 Enterprise Edition was affected by 134 Secunia issued advisories, 8% of which remain unfixed

Source <http://secunia.com/product/13949/?task=statistics> September 2007

Source <http://secunia.com/product/1174/?task=statistics> September 2007

## Power Systems and i5/OS Roadmap



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## Previewing i5/OS Version 6 ... Coming in 2008

- **Safe computing initiative**
  - i5/OS encryption, intrusion prevention & system integrity enhancements
- **High availability initiative**
  - Cross site mirroring and administrative system domain
- **Advanced virtualization**
  - Hosting storage for i5/OS partitions, virtual I/O server client support
- **Extended SAN integration**
  - New Fibre adapter & tools investments enhance interoperability & performance
- **Web-based multi-platform systems management**
  - IBM Systems Director offers alternative to current i5/OS Navigator product
- **Optimizing Java™ performance**
  - New IBM 64-bit JVM & data access performance enhancements
- **Integrated Web services environment**
  - Simpler deployment and better integration with Web services



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## Security Enhancements



- **Offer Encryption to Meet Regulatory Requirements**
  - Encrypted BRMS backups of user data to tape or virtual tape device
    - Encrypted Backup Enablement – i5/OS Option 44
  - Encryption of data at residing in an ASP satisfying regulatory requirements
    - Encrypted ASP Enablement – i5/OS Option 45
- **Enhanced Intrusion Detection**
  - Real time notification (E-mail, pagers) and improved auditing
- **Strengthen i5/OS Integrity**
  - Digitally sign all i5/OS executables
  - Eradicate any altered programs through automatic retranslation of i5/OS executables

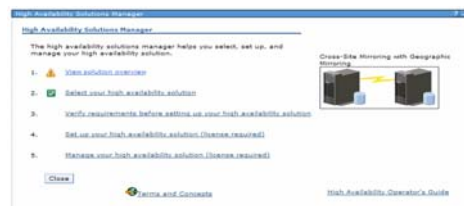


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## IBM Business Resiliency Enhancements



- **Switch Disk & Disk Replication**
  - Ease of use enhancements for deployment and switching operations
    - Navigator for i5/OS, Wizards, Administrative System Domain
  - Tighter integration with IBM storage solutions
- **IBM now offers iCluster as a logical replication option for HA/DR deployments**



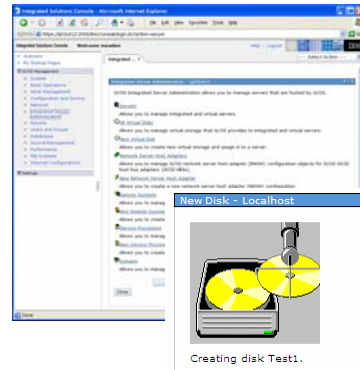
**DataMirror**  
An IBM® Company

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## Virtual Storage Enhancements



- **Virtual i5/OS Partitions\***
  - An i5/OS partition can use I/O resources from another i5/OS partition or from Virtual I/O Server partition
  
- **Storage Space Snap Shots**
  - Enables backup while partition/server is active (like a SAN Flash Copy)
    - Supports i5/OS, AIX, Linux\*\*, Windows, or VMware
  - New i5/OS Quiesce Function used with i5/OS snap shots
  
- **File level backup support for Linux\*\***



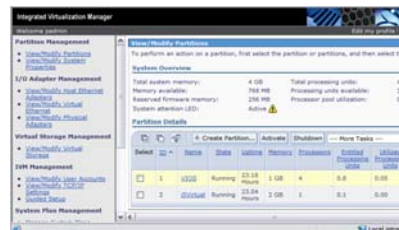
\* POWER6 based systems with i5/OS V6R1  
 \*\* Linux on POWER and x86

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## Partitioning Enhancements



- **Integrated Virtualization Manager\***
  - Alternative to HMC for LPAR management\*\*
  - Provides a Web-based interface to VIOS
  - Requires VIOS to own i5/OS I/O resources
  - Included with VIOS (5765-G34)
  
- **Shared Processor Pools\*\*\***
  - Group micro-partitions into separate pools and set limits on the amount of processor capacity each pool can consume
  - Can help limit required software licenses

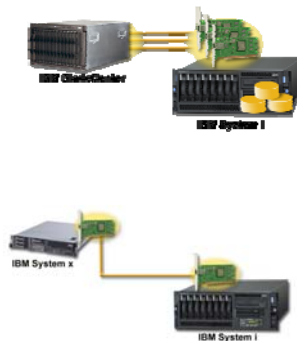


\*POWER6 based systems only with i5/OS V6R1  
 \*\*570 and 595 systems require an HMC  
 \*\*\* POWER6 based systems – V5R4 and V6R1

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## System i Integration with BladeCenter Enhancements

- **VMware VMotion Support**
  - Enabled by shared storage spaces between integrated servers
  - Supports VMotion, HA and DRS functions
- **Virtual Storage Enhancements**
  - Virtual storage space snapshot enables backup while server is active
  - File level backup support for Linux
- **Configuration Enhancements**
  - Direct connect – Systems can be directly connected without an Ethernet switch
  - System i cluster support - replicate iSCSI configuration objects
- **Management Enhancements**
  - Management included in Systems Director Navigator for i5/OS
- **New Operating System Support**
  - Windows Server 2008
  - Linux – SLES 10 and RHEL5



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## SAN Enhancements

- **New Fibre Channel Adapters**
  - 4Gbit, IOless, Dual Port Adapters
    - Improve performance
    - Increase capacity with up to 64 LUNs per port
    - Enhance flexibility with support for disk & tape attachment
    - Add support for booting off tape
  - i5/OS V6R1, POWER6 systems, and DS8000
- **Support for IBM's Midrange Storage Solution**
  - DS4000 supported by VIOS with i5/OS virtual partitions
- **Flash Copy enhanced with i5/OS Quiesce Function**
  - Flushes memory to disk before taking a Flash Copy

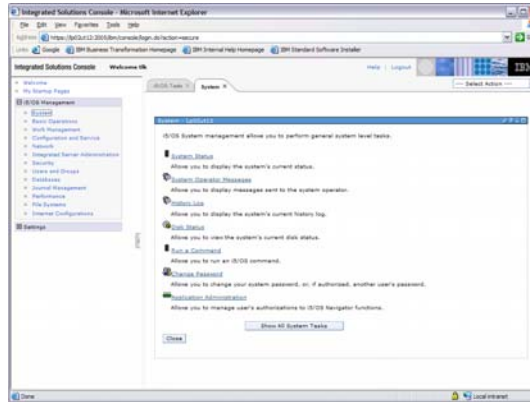


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## New Systems Management Tool



- **IBM Systems Director Navigator for i5/OS**
  - New web based tool for managing i5/OS
  - Alternative to iSeries Navigator
  - i5/OS option, automatically installed with i5/OS
  - Will snap into IBM Systems Director



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## New Java and Web Services Technology



- **IBM 64-bit Java Virtual Machine**
  - Help ISVs with application portability
  - Works with popular industry tools
  - Improved performance over Classic JVM

### Announce Oct 2007 for V5R4

- **i5/OS Integrated Web application server**
  - Simplifies the deployment of Java applications.
  - Supports applications written to use JSF, JSP, and servlets
  - Requires minimal system resources and administration
- **Integrated Web services environment**
  - Enables Integrated Language Environment® (ILE) programs to easily to invoke Web services
  - RPG and COBOL programs can be exposed as Web services

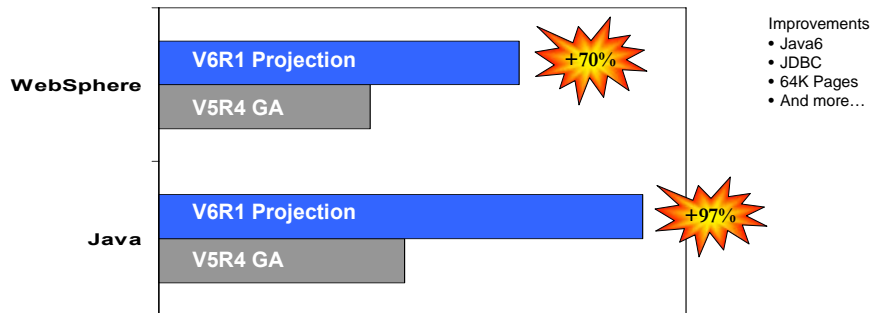
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## i5/OS Middleware Performance Improvements

- **V6R1 can provide significant performance improvements for WebSphere and Java workloads**
  - Performance projections for IBM 32-bit JVM with V5R4 vs V6R1
  - POWER5+ Hardware



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 \*Improvements shown above are valid only for these specific workloads -- Your results may vary and are dependent on the application.

## DB2 for i5/OS Enhancements



- **Extending standard leadership with additional database functions**
  - VALUES in FROM, Full Outer Join, INSERT in FROM, and more
- **Performance Improvements**
  - More queries will take advantage of the new SQL Query Engine
- **Full text searching through SQL**
  - OmniFind Text Search for DB2 on i5/OS (5733-OMF)
- **Enhancements to On Demand Performance Center**
  - Customizable reports, copy results to a spreadsheet, and more

IBM Information Management software



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## Go Green with i5/OS

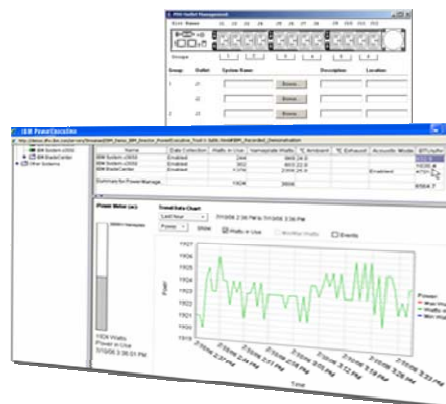
- **Business Processing Efficiency = Energy Efficiency**
- **Virtualization enables consolidation of under-utilized servers**
- **POWER6 systems offer more work per watt**
  - 350% more efficient than POWER4\*
  - 67% more efficient than POWER5\*\*
- **IBM PowerExecutive™ will measure, monitor, & control power usage**



\* System unit measurement CPW per KWh for 16-way POWER4 870 vs 4-way POWER6 570  
 \*\* System unit measurement CPW per KWh for 8-way POWER5 570 vs 4-way POWER6 570  
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## IBM PowerExecutive

- Helps companies meter, control and cap power usage
- Trend actual power consumption & corresponding thermal loading
- Hardware, firmware, and systems management software in servers and blades provides inventory of components
- IBM PowerExecutive adds power draw up for each server or blade and tracks that usage over time
- System i support in 11/07
  - Selected systems monitored with connection via HMC or direct to FSP
  - Support for other systems with iPDUs (Intelligent Power Distribution Units)



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## i5/OS Program Conversion Preview



- ✓ Ensures unprecedented system integrity
  - ✓ Delivers improved performance
  - ✓ Enables exploitation of future system and processor capabilities
- Program conversion will be required to run with next i5/OS release
    - Program conversion automatically upgrades software to exploit latest system enhancements
    - Not *required* for POWER6, which can run i5/OS V5R4
  - Conversion requires program's creation data (observability)
    - Note that all programs created for V5R1 or later releases have had their creation data automatically saved during program creation
  - Tool available now to analyze program conversion for i5/OS V5R3 / V5R4
    - Identifies potential issues, if any, and estimates conversion time
  - Program conversion is performed during install/restore of applications, at first use or at scheduled time

ITSO Redpaper: i5/OS Program Conversion: Getting Ready for V6R1 <http://www.redbooks.ibm.com/redpieces/abstracts/redp4293.html?Open>

## i5/OS System Support

*Supported i5/OS releases span multiple System i generations*

System i Models	V5R3	V5R4	V6R1*
<b>POWER6</b> 570		✓	✓
<b>POWER5+</b> 515, 525		✓	✓
<b>POWER5/5+</b> 520, 550, 570, 595	✓	✓	✓
800, 810, 825, 870, 890	✓	✓	✓
270, 820, 830, 840	✓	✓	

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## Blades for System i and virtualization on Blades

## Opportunity for i5/OS® and IBM BladeCenter®

### Today's SMB Customer

- **System i**
  - 80% Clients have 1 or 2 systems
  - 85% of systems have 1 core
- **Windows**
  - Have an average of 12 servers
  - 2/3rds are not IBM servers
  - Running infrastructure applications
  - Servers are under utilized
- **Storage**
  - Not consolidated
  - No SAN for i5/OS

Consolidate with  
IBM BladeCenter



- ✓ *Capture greater % of server and storage spending*
- ✓ *Differentiate vs competition*
- ✓ *Positioned for future purchases*

## Introducing i5/OS Support for IBM BladeCenter

- **i5/OS V6R1 support for BladeCenter JS22**
  - Four core, 4.0 GHz POWER6 blade
  
- **Initially in the BladeCenter H Chassis**
  - Supports up to fourteen x86 and POWER blades
  
- **SOD to support BladeCenter S Chassis**
  - Supports up to six x86 and POWER blades plus 12 disks
  
- **i5/OS leverages PowerVM™ Standard Edition**
  - Virtual I/O Server partition owns resources and storage devices
  - IVM used to set up and manage partitions



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## BladeCenter Blades

Blades	JS22	JSxx*
# of Cores	4	2
GHz	4.0 GHz	3.8 GHz
Memory (Min/Max)	2/32 GB	
Local Disk (Min/Max)	0/1 73/146 GB	
Base Ethernet Ports	2	
Expansion Cards	0-2	
Virtualization	VIOS/IVM	VIOS/IVM
AIX V5.3 or V6.1	Yes	Yes
Linux- RHEL & SLES	Yes	Yes
<b>i5/OS V6R1</b>	<b>Yes</b>	<b>Yes</b>
<b>Software Tier</b>	<b>P20</b>	<b>P10</b>
<b>CPW</b>	<b>11,040</b>	

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## BladeCenter Chassis

Chassis	BCH	BCS
# of Blades	14	6
# of Disk Drives	0	0-12 (SAS)
Disk Capacity (Max)	0	3.6 TB
Power	220	110 or 220
Blades	x86 and POWER	x86 and POWER
Redundant Power and Cooling	Yes	Yes
Management Modules	1-2	1
<b>i5/OS Support</b>	<b>3/21/08</b>	<b>2008 Planned*</b>



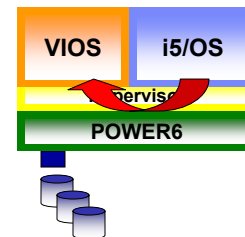
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## Virtualization with PowerVM



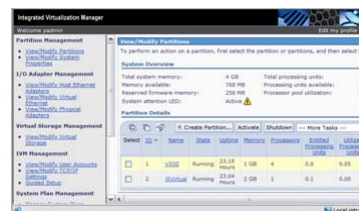
### ■ VIOS Based Virtualization

- i5/OS partition uses I/O resources from a VIOS partition
- VIOS also provides virtualization for AIX and Linux partitions
- Included with PowerVM Standard Edition
- Requires POWER6 processor-based systems with i5/OS V6R1
- Supports DS4700, DS4800, DS8100\* and DS8300\*



### ■ Integrated Virtualization Manager

- Tool that runs in VIOS partition for creating and managing partitions
- Provides an alternative to HMC for LPAR management\*\*
- Requires VIOS to own i5/OS I/O resources
- Included with PowerVM Standard Edition
- Requires POWER6 processor-based systems with i5/OS V6R1

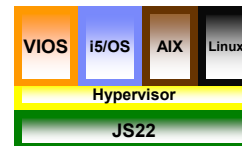
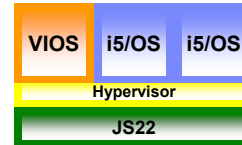
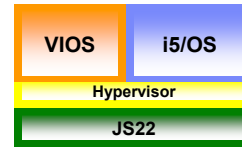


\* DS8000 supported only with Blade configurations  
 \*\* 570 and 595 systems require an HMC

## BladeCenter H Configuration with i5/OS

- **BladeCenter H Chassis**
  - Fibre, Ethernet, SAS switch(s)
  - DVD
- **JS22 Blade**
  - 4 Cores, up to 32 GB of memory
  - 1 Disk drive
  - Fibre, Ethernet, SAS Adapters
- **Storage**
  - DS4700, DS4800, DS8100, or DS8300
  - External SAS Tape drive
- **VIOS partition manages Blade resources**
  - IVM used to set up and manage partitions
  - i5/OS, AIX, and Linux are client partitions
- **i5/OS V6R1**
  - Processor and User entitlements
- **More Information**
  - <http://www.ibm.com/systems/i/os/i5os/v6r1/blades/>

### Partitioned Blade Examples



## Ordering



- **BladeCenter H**
  - Common Machine Type (7989-BCH), Features, Prices
  - Ordered via econfig or HVEC
- **BladeCenter JS22**
  - Common Machine Type (7998-61X), Features, Prices
  - Ordered via econfig
  - Default Configuration for i5/OS available in econfig
  - PowerVM Standard Edition available for no additional charge
- **BladeCenter HS21**
  - Intel processor-based blade
  - Ordered via HVEC
- **i5/OS**
  - Ordered with the JS22 or separately
  - Ordered via econfig

# Positioning

## System Positioning



515



Blade + Disk + i5/OS



525



Chassis + Blade + SAN + i5/OS



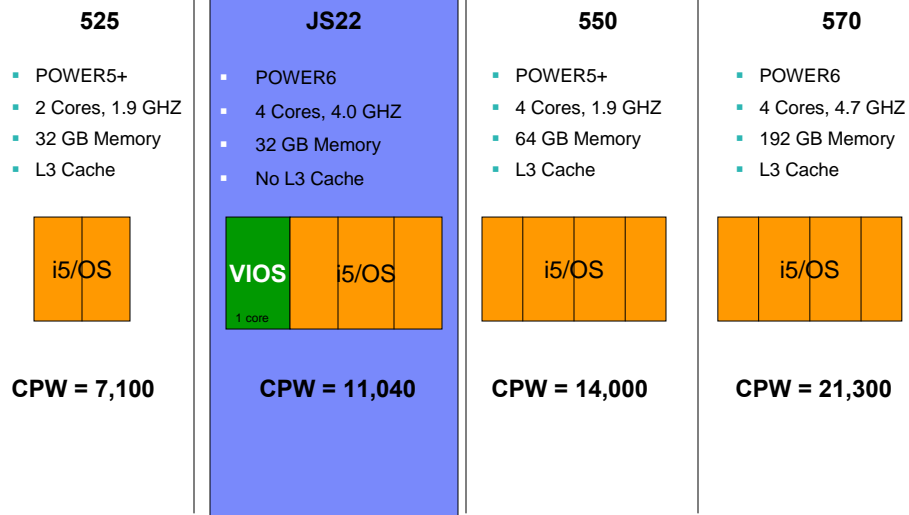
550 or 570

Price and Value

## System Configurations for i5/OS

Maximum	525 POWER5+	JS22 POWER6	550 POWER5+	570 POWER6
# of cores	2	4	4	16
Memory	32 GB	32 GB	64 GB	768 GB
Disk Storage (internal)	39 TB	146 GB	77 TB	387 TB
Disk arms (internal)	278	1	548	1374
SAN Attachment	Yes <small>(32 LUNs per adapter)</small>	Required <small>(16 LUNs)</small>	Yes <small>(32 LUNs per adapter)</small>	Yes <small>(64 LUNs per adapter)</small>
PCI Card Slots	90	2	172	692
LAN Ports	36	4	96	128
CD/DVD/Tape (internal)	14	1 <small>(DVD ROM in Chassis)</small>	24	48
Tape (external)	Yes	Yes	Yes	Yes
# of iSCSI adapters	21	NA	42	168

## Performance Comparison



## i5/OS V6R1 Configuration and Pricing

- **i5/OS is Licensed by processor and user entitlements**
  - 4 core blade, no CoD
  - 1 to 4 i5/OS processor entitlements
  - 10 to unlimited user entitlements
  - P20 Software Tier

	Description	Feature Description	Feature	Price*
<b>5761-SS1</b>	i5/OS Entitlements	Per Proc PWR6 Blades – 61X	1347	NA
<b>5761-SSA</b>	Processor Entitlements	Per Proc with 1 yr SWMA – 61X	1463	\$14,995
<b>5761-SSC</b>	User Entitlements	Per 10 Users – 61X	1478	\$2,500
		Unlimited Users – 61X	1479	\$50,000
		i5/OS External Access – 61X	1480	\$3,995
		Unlimit Colab Users – 61X	1481	\$5,995

1 Year (5733-SPP) and 3 Year (5733-SP3) SWMA options available

\* US List prices, subject to change without notice

## Pricing BladeCenter H with JS22 for i5/OS - Example

BladeCenter H	
BCH	\$4,234
Power Modules (2)	\$1,100
Brocade Fibre Switch	\$8,999
Cisco Ethernet Switch	\$4,999
SAS Connectivity Module	\$999
MSI Module	\$1,369
Power Cord, SAS Cable, SFP	\$875
<b>Total</b>	<b>\$22,575</b>

JS22	
7998-61X	\$220
JS22 4 Core 4.0 GHz	\$4,481
Processor Entitlement	\$200
Qlogic Ethernet / Fibre Card	\$999
4 GB Memory	\$898
73 GB SAS Drive	\$329
SAS Expansion Card	\$249
PowerVM Standard Edition	\$0
Software Preinstall	\$60
<b>Total</b>	<b>\$7,436</b>

DS4700	
Express Model 72 4Gb (no disk)	\$19,449
8 146GB 15K Drives	\$14,272
<b>Total</b>	<b>\$33,721</b>

SAS Tape 3850	
TS2230	\$3,395
<b>Total</b>	<b>\$3,395</b>

i5/OS	
Processor Entitlement - 1	\$14,995
User Entitlement - 10	\$2,500
<b>Total</b>	<b>\$17,495</b>

"under our control"

- **Total: \$84,622**
- **Just i5/OS, Blade, Disk, Tape: \$42,598**

## Sales Examples

	Customer Situation	Recommended Solution	Notes
1	<ul style="list-style-type: none"> <li>2 System i 270s</li> <li>14 old HP Servers</li> <li>No SAN</li> </ul>	<ul style="list-style-type: none"> <li>BladeCenter H</li> <li>JS22 blade for i5/OS</li> <li>5-10 HS21 blades with VMware</li> <li>DS4700</li> </ul>	Consolidate all servers and storage with BladeCenter and IBM System Storage
2	<ul style="list-style-type: none"> <li>2 System i 720s</li> <li>10 new HP Servers</li> <li>New SAN for Windows storage</li> </ul>	<ul style="list-style-type: none"> <li>System i 525</li> </ul>	525 offers more capacity, requires less energy, and runs i5/OS V6R1
3	<ul style="list-style-type: none"> <li>1 System i 820</li> <li>BladeCenter H</li> <li>8 HS21 blades</li> <li>DS4800</li> </ul>	<ul style="list-style-type: none"> <li>JS22 blade for i5/OS</li> </ul>	Consolidate i5/OS into the existing BladeCenter H
4	<ul style="list-style-type: none"> <li>1 System i 270</li> <li>3 old HP Servers</li> <li>No SAN</li> </ul>	<ul style="list-style-type: none"> <li>System i 515</li> <li>Integrated System x servers with iSCSI</li> </ul>	Consolidate all servers and storage with IBM System i and iSCSI

## Targets for i5/OS and BladeCenter – By the end of 2008



BCH



BCS\*

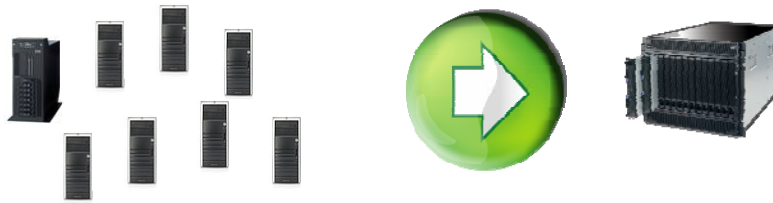
- Medium System i customer consolidating 8-20 Intel servers with BladeCenter
- Standardizing on SAN
- Add i5/OS on POWER6 Blade

- Small to Medium System i customer consolidating 1-2 System i servers and 3-10 Intel servers with BladeCenter
- OR
- New ISV Deployments with i5/OS and Windows applications

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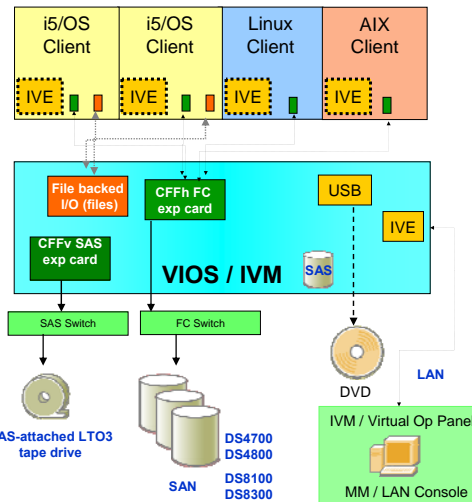
## IBM BladeCenter and i5/OS

- ✓ Run i5/OS Applications in a BladeCenter
- ✓ Consolidate servers with BladeCenter Value Proposition
- ✓ Enables you to capture additional customer spend



## Details on VIOS, IVM and Backups

## VIOS, IVM and i5/OS on POWER6 Blade



- VIOS = Virtual I/O Server = virtualization software in a partition
- Does not run other applications
- First LPAR installed on blade (on SAS drive)
- VIOS owns physical hardware (SAN, Ethernet, DVD, SAS tape)
- VIOS virtualizes disk, DVD, networking to i5/OS partitions
- IVM = Integrated Virtualization Manager = browser interface to manage partitions, virtualization
- IVM installed with VIOS
- i5/OS uses LAN console through virtual Ethernet bridge in VIOS

\* All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.

## Integrated Virtualization Manager (IVM) Introduction

The screenshot shows the Integrated Virtualization Manager (IVM) web interface. The interface is browser-based and supports Mozilla Firefox and Internet Explorer. The main content area displays the 'View/Modify Partitions' section, which includes a 'System Overview' and a 'Partition Details' table. A blue arrow points to the 'Partition Details' table.

Select	ID	Name	State	Uptime	Memory	Processors	Entitled Processing Units	Utilized Processing
<input type="checkbox"/>	1	i5-00000	Running	10.78 Days	1 GB	4	0.4	0.01
<input type="checkbox"/>	2	cfh3	Running	10.78 Days	30 GB	3	3.0	

- Browser-based interface, supports Mozilla Firefox and Internet Explorer
- Performs LPAR and virtualization management on POWER6 blade

## IVM Example: Create i5/OS Partition

**Create Partition: Name (Step 1 of 3)**

Name

To create a partition complete the following information.

System name: Server-7998-61X-0N100PDA

Partition ID: 2

Partition name: i5OSTest

Environment: i5/OS

**Create Partition: Memory (Step 2 of 3)**

Memory

Specify the amount of memory. Input should be in multiples of 16 MB.

Total system memory: 4 GB (4096 MB)

Current memory available for partition usage: 768 MB

Assigned memory: 512 MB

**Create Partition: Processors (Step 3 of 3)**

Processors

In shared mode, every assigned virtual processor uses 0.1 physical processors. In dedicated mode, every assigned processor uses 1 physical processor. Specify the desired number of processors and the processing mode.

Processors

Total system processors: 4

Assigned processors: 1

Processing Mode

Shared - 31 available virtual processors

Dedicated - 3 available dedicated processors

- Fewer steps than HMC
- IVM uses several defaults
- Virtual I/O resources only

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## IVM Example: i5/OS Partition Properties

**Partition Properties: ctfib5 (2)**

General

Partition name: ctfib5

Partition ID: 2

Environment: i5/OS

State: Running

Attention LED: Inactive

Settings

IPL source: B

Keylock position: Normal

Partition workload group participant:

Automatically start when system starts:

Load Source and Console Identification

Load source adapter: Virtual Storage / Optical

Alternate restart adapter: Virtual Storage / Optical

Console adapter: Virtual Ethernet 1

**Partition Properties: ctfib5 (2)**

Processing

Modify the settings by changing the pending values. The changes will be applied immediately; however, synchronizing the current and pending values might take some time.

Processors

Property	Current	Pending
Minimum processors	2	2
Assigned processors	3	3
Maximum processors	4	4

General

Share idle processors: When inactive

Processor compatibility mode: POWER6

**Partition Properties: ctfib5 (2)**

Storage

The selected rows in the Virtual Disks and Physical Volumes tables represent the storage currently assigned to the partition. All unselected rows represent storage that has not been assigned. You can change the storage assignments for the partition by deselecting existing items or selecting items that are not currently assigned. You can also create or modify storage in the Storage Management view.

Select	Name	Size	Storage Pool	Physical Location Code
<input checked="" type="checkbox"/>	hdisk1	50 GB		U78A5.001.W9H0084-P1-C7-T1-W500507630319CD3E
<input checked="" type="checkbox"/>	hdisk2	50 GB		U78A5.001.W9H0084-P1-C7-T1-W500507630319CD3E
<input checked="" type="checkbox"/>	hdisk3	50 GB		U78A5.001.W9H0084-P1-C7-T1-W500507630319CD3E
<input checked="" type="checkbox"/>	hdisk4	50 GB		U78A5.001.W9H0084-P1-C7-T1-W500507630319CD3E
<input checked="" type="checkbox"/>	hdisk5	50 GB		U78A5.001.W9H0084-P1-C7-T1-W500507630319CD3E
<input checked="" type="checkbox"/>	hdisk6	50 GB		U78A5.001.W9H0084-P1-C7-T1-W500507630319CD3E
<input checked="" type="checkbox"/>	hdisk7	50 GB		U78A5.001.W9H0084-P1-C7-T1-W500507630319CD3E
<input checked="" type="checkbox"/>	hdisk8	50 GB		U78A5.001.W9H0084-P1-C7-T1-W500507630319CD3E
<input checked="" type="checkbox"/>	hdisk9	50 GB		U78A5.001.W9H0084-P1-C7-T1-W500507630319CD3E

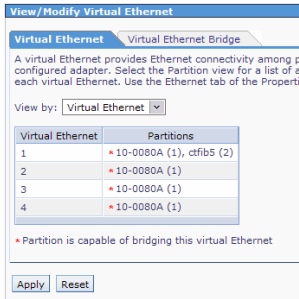
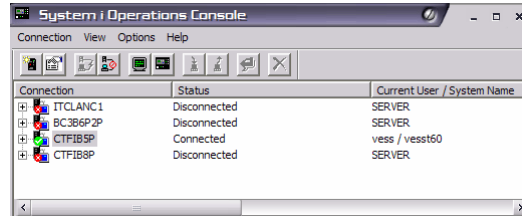
- Load source and alternate IPL devices default to virtual
- Changes are always DLPAR changes (when possible)
  - Virtual disk assigned to i5/OS by selecting available hdisk, then clicking OK (all available hdisks are assigned in this example)

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## LAN Console for i5/OS on POWER Blade

- Required for i5/OS on POWER blade
- Uses System i Access software on PC (can use same PC for IVM connection)



- i5/OS connects to VIOS via VLAN
- VIOS bridges VLAN to external network via virtual Ethernet bridge

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## Backup Options for i5/OS on POWER Blade

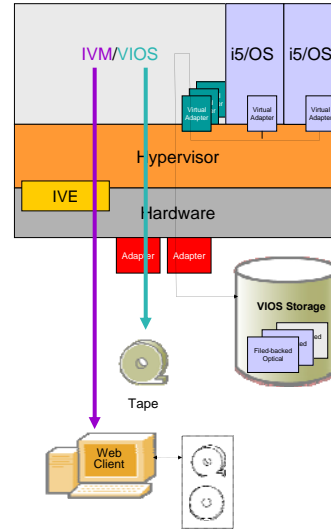
Solution	Partial backup	Full-system backup
i5/OS save to virtual optical in VIOS; VIOS command to tape	Yes	Yes
i5/OS save to virtual optical in VIOS; VIOS TSM client save over network	Yes	Yes
i5/OS save to virtual optical IMGCLG, FTP images to VIOS or another i5/OS	Yes	Yes
i5/OS save to virtual optical in VIOS; FlashCopy VIOS virtual media LUNs and attach to 2 <sup>nd</sup> VIOS	Not practical	Yes
i5/OS save to virtual tape IMGCLG; FTP IMGCLG files to another i5/OS partition	Yes	No
FlashCopy (full copy) VIOS LUNs assigned to i5/OS; bring up separate i5/OS partition from copy	Not practical	Yes
Replicate VIOS LUNs assigned to i5/OS; bring up separate i5/OS partition from copy	Not practical	Yes

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## i5/OS Save/Restore via VIOS File-backed Optical Images

- Use GO SAVE or BRMS in i5/OS
- Save is to writeable optical device in i5/OS
- Optical volume is backed by file in VIOS
- Two options to copy image files to tape:
  - Option 1 -- VIOS command to SAS tape
  - Option 2 -- Web Client Streaming
    - Use IVM GUI to stream optical media files between VIOS and web client, then move image files to media attached to web client.



## IVM Example: Virtual Media Library

**View/Modify Virtual Storage**

Virtual Disks | Storage Pools | Physical Volumes | **Optical Devices**

To perform an action on an optical device, first select the device or devices, and then select the task.

**Physical Optical Devices**

Physical optical devices allow you to assign a physical optical device on your system directly to a partition.

Modify partition assignment

Select	Name ^	Description	Assigned Partition	Physical Location Code
--------	--------	-------------	--------------------	------------------------

**Virtual Optical Media**

Virtual optical media files (such as an ISO image) may be assigned directly to a partition.

Media library size: 399.44 GB (29.44 GB Available) [Extend Library](#) [Delete Library](#)

\* Add Media... | Modify partition assignment | Download | Delete

Select	Name v	Assigned Partition	Mount Type	Size
<input type="checkbox"/>	ctf252	ctfib5 (2) - vtopt0	Read/Write	370 GB

- Virtual optical volume files organized into Virtual Media Library
- Similar to IMGCLG in i5/OS
- Once virtual optical volume is created, it is assigned to virtual optical device in i5/OS partition (vtoptX); it becomes available in i5/OS as OPTxx

## Virtualization on non-Blades portfolio

## Virtualization - processor

- **Minimum of processor number for partition - 0.1 of processor (536 CPW)**
- **Minimum step for increasing - 0.01**
- **Possibility to assign partitions to run in manually defined processor pool (max. 64 pools for shared mode)**

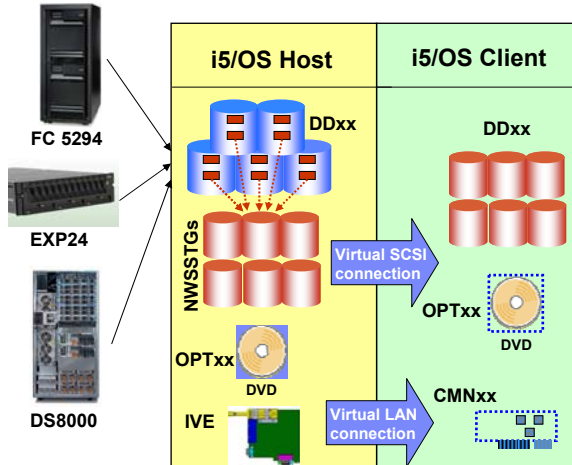
## Virtualization - memory

- **Minimum amount for i5/OS partition - 256MB**
- **Minimum step - 16MB**

## V6R1 I/O Virtualization Technologies

- **i5/OS virtual client LPARs**
  - V6R1 host LPAR provides disk, optical to V6R1 client LPAR
  - Client LPAR is assigned no physical hardware in HMC
  - Host LPAR virtualizes integrated or SAN disk to client
  - Rapid deployment of test/dev/Q&A LPARs
- **i5/OS virtual client LPARs + VIOS**
  - Virtual I/O Server (VIOS) provides disk, optical to V6R1 client LPAR
  - Client LPAR is assigned no physical hardware in HMC
  - VIOS virtualizes SAN disk to client
  - Leverage investment in DS4000 for i5/OS
- **Supporting V6R1 innovations:**
  - Storage space snapshots
  - Memory flush to disk (quiesce)

## V6R1 Virtual Client LPARs



- **DASD**
  - Hardware assigned to host LPAR in HMC
  - DASD can be integrated or SAN
  - DASD virtualized as NWSSTG objects
- **Optical**
  - DVD drive in host LPAR virtualized directly (OPTxx)
- **Networking**
  - Network adapter (such as IVE) and Virtual Ethernet adapter in host LPAR
  - Virtual Ethernet adapter in client LPAR

## Host LPAR Configuration – HMC

General Processors Memory I/O Tagged I/O OptiConnect **Virtual Adapters** Power Controlling Settings

Actions ▾

Virtual resources allow for the sharing of physical hardware between logical partitions. The adapter settings are listed below.

Maximum virtual adapters : \* 64

Number of virtual adapters : 10

Select	Type	Adapter ID	Connecting Partition	Connecting Adapter	Req
<input type="checkbox"/>	Ethernet	4	N/A	N/A	No
<input type="checkbox"/>	Ethernet	5	N/A	N/A	No
<input type="checkbox"/>	Ethernet	6	N/A	N/A	No
<input type="checkbox"/>	Server SCSI	10	za6bp15(15)	3	No
<input type="checkbox"/>	Server SCSI	11	za6bp10(10)	5	No
<input type="checkbox"/>	Server SCSI	12	za6bp10(10)	6	No
<input type="checkbox"/>	Server SCSI	13	Any Partition	Any Partition Slot	No
<input type="checkbox"/>	Server SCSI	9	za6bp7(7)	3	No
		Total: 10	Filtered: 10	Selected: 0	

**Virtual SCSI Adapter Properties: za6bp3**

Virtual SCSI adapter

Adapter ID : 10

Type of adapter : Server

Required : 3

Client partition : za6bp15(15)

Client adapter ID : 3

[Close] [Help]

OK Cancel Help

- Virtual SCSI server adapter
- At least 1 required per client LPAR, but more possible
- Configured to connect to specific adapter ID on client LPAR

## Client LPAR Configuration – HMC

Select	Type	Adapter ID	Connecting Partition	Connecting Adapter	Required
<input type="radio"/>	Ethernet	1021	N/A	N/A	No
<input type="radio"/>	Ethernet	1022	N/A	N/A	No
<input checked="" type="radio"/>	Client SCSI	3	za6bp3(3)	10	Yes
<input type="radio"/>	Client SCSI	4	za6bp3(10)	18	Yes
<input type="radio"/>	Server Serial	0	Any Partition	Any Partition Slot	Yes
<input type="radio"/>	Server Serial	1	Any Partition	Any Partition Slot	Yes

Total: 6 Filtered: 6 Selected: 0

- Virtual SCSI client adapter
- DASD and optical are accessible through the same VSCSI client adapter
- By using multiple adapters, a virtual client LPAR can use DASD from multiple hosts

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## Client LPAR Configuration – Load Source

Tagged I/O devices for this partition profile are detailed below.

**Load source**  
 Description: Virtual Adapter Slot 4 [Select...]  
 Location code: 4

**Alternate restart device**  
 Description: Virtual Adapter Slot 3 [Select...]  
 Location code: 3

**Console**  
 Use HMC console  
 Description: [Select...]  
 Location code:

**Alternate console**  
 Description: [Select...]  
 Location code: None

**Operations Console**  
 Description: [Select...]  
 Location code: None

- Both B- and D-mode IPL devices are set to virtual SCSI client adapters
- When installing virtual client LPAR, D-mode IPL is performed from DVD drive in host LPAR
- LIC and OS are installed on NWSSTG (Network server storage space) objects

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## Host LPAR Configuration – i5/OS View

```

Session A - [24 x 80]
File Edit View Communication Actions Window Help
Work with Communication Resources
System: ITCLSQ1
Type options, press Enter.
5=Work with configuration descriptions 7=Display resource detail

Opt Resource      Type      Status      Text
---
- CMB01           2844     Operational Combined function IOP
- LIN04           2793     Operational Comm Adapter
- CMN04           2793     Operational Comm Port
- CMN05           2793     Operational Comm Port
- CMB02           268C     Operational Combined function IOP
- LIN01           6B03     Operational Comm Adapter
- CMN01           6B03     Operational Comm Port
- LIN02           6B03     Operational Comm Adapter
- CMN02           6B03     Operational Comm Port
- CTL03           290B     Not detected Comm Adapter
- CTL01           290B     Operational Comm Adapter
- CTL04           290B     Operational Comm Adapter
- CMR03           670C     Operational Comm Processor
- LIN03           5706     Operational LAN Adapter
- CMN03           5706     Operational Ethernet Port

F3=Exit  F5=Refresh  F6=Print  F12=Cancel
More...

a 07/003
1902 - Session successfully started
  
```

- Virtual SCSI server adapter in i5/OS (290B device)

## Host LPAR Configuration – Storage Spaces

```

Work with Network Server Storage Spaces
System: ZA6BP3
Type options, press Enter.
1=Create 2=Change 3=Copy 4=Delete 5=Display 6=Print 10=Add link
11=Remove link

Opt Name      Server  Seq  Link Type Access Stg Path
---
- CP10LDSRC  CP10    1    *DYN *UPDATE
- CP10MIRROR CP102   1    *DYN *UPDATE
- CP12LDSRC  CP12    1    *DYN *UPDATE
- CP21LDSRC  CP21    1    *DYN *UPDATE
- CP7MIRROR  CP7     1    *DYN *UPDATE
- D1         CP21B   1    *DYN *UPDATE
- D10
- D11
- D12

More...
  
```

- Storage space objects in host LPAR
- Each NWSSTG is a DDxx in client LPAR

## Host LPAR Configuration – Storage Spaces

```

Create NWS Storage Space (CRTNWSSTG)

Type choices, press Enter.

Network server storage space . . CP1DISK1      Name
Size . . . . . 30000          *CALC, 1-1024000 megabytes
From storage space . . . . . *NONE      Name, *NONE
Format . . . . . *open       *NTFS, *FAT, *FAT32, *OPEN...
Data offset . . . . . *FORMAT     *FORMAT, *ALIGNLGLPTN...
Auxiliary storage pool ID . . . 2             1-255
ASP device . . . . .           Name

Bottom
F3=Exit  F4=Prompt  F5=Refresh  F12=Cancel  F13=How to use this display
F24=More keys

a 10/038
Connected to remote server/host.zd11hmc using port 2300
  
```

- Creating a storage space
- Identical to creating a storage space for AIX or Linux client today

## Host LPAR Configuration – NWSDs

```

Work with Configuration Status                                ZA6BP3
                                                           09/16/07 21:49:55
Position to . . . . . Starting characters

Type options, press Enter.
1=Vary on  2=Vary off  5=Work with job  8=Work with description
9=Display mode status 13=Work with APPN status..

Opt Description      Status      -----Job-----
-- CP10             ACTIVE
-- CP102            ACTIVE
-- CP12             ACTIVE
-- CP21             FAILED
-- CP21B           FAILED
-- CP7              ACTIVE
  
```

- WRKCFGSTS \*NWS provides list of NWSD (Network Server Description) objects
- Each client LPAR has at least 1 NWSD associated with it
- NWSD provides link between storage space object and VSCSI adapters

## Installing Client Partition from IMGCLG

```

Work with Image Catalog Entries
System: ZA6BP3
Catalog . . . : INSTALL2          Status . . . : Ready
Type . . . . : Optical           Device . . . : VOPT2
Directory . . : /home/install2

Type options, press Enter.
1=Add 2=Change 4=Remove 6=Mount 8=Load 9=Unload
10=Initialize volume 12=Work with volume

Opt  Index  Status  Image File Name
--  --
*AVAIL
--  1  Mounted  SLIC
--  2  Loaded  OS1
--  3  Loaded  OS2
--  4  Loaded  LPP
    
```

- An image catalog can be used to install multiple virtual client LPARs or PTFs

## Client LPAR Configuration – Load Source

```

Logical Hardware Resources on System Bus
System bus(es) to work with . . . . . *ALL *ALL, *SPD, *PCI, 1-9999
Subset by . . . . . *ALL *ALL, *STG, *WS, *CMN, *CRP

Type options, press Enter.
2=Change detail 5=Display detail 6=I/O debug
9=Resources associated with IOP

Opt Description                Type-Model  Status      Resource
--  --
Virtual Bus Exp Adapter        -           Operational BCC01
Virtual System Bus             -           Operational LB02
Virtual IOP                     < 268C-001 Operational CMB02
Virtual IOP                     6803-001   Operational CMB03
Virtual IOP                     6803-001   Operational CMB04
3 Virtual IOP                    290A-001   Operational CMB01
Virtual IOP                     268C-002   Operational CMB06

F3=Exit F5=Refresh F6=Include non-reporting resource
F9=Failed resources F10=Non-reporting resources
F11=Display serial/part numbers F12=Cancel F13=Display location
    
```

- Virtual client LPAR logical resources view following D-mode IPL

## Client LPAR Configuration – Load Source

```

Session A - GLANL001@zav1 - [24 x 80]
Logical Hardware Resources Associated with IOP

Type options, press Enter.
2=Change detail 5=Display detail

Opt Description          Type-Model  Status      Resource
Name
- Virtual Storage IOA    290R-001   Operational CHB01
- Disk Unit              6B22-050   Operational DC01
- Optical Storage Unit   %          Operational DPH001
                          %          Operational OP101

F3=Exit  F5=Refresh  F8=Include non-reporting resource
F9=Failed resources  F10=Non-reporting resources
F11=Display serial/part numbers  F12=Cancel  F13=Display location

09/003
  
```

- Virtual storage IOA is the VSCSI client adapter
- Disk unit is a storage space in host LPAR

## Client LPAR Configuration – Configured DASD

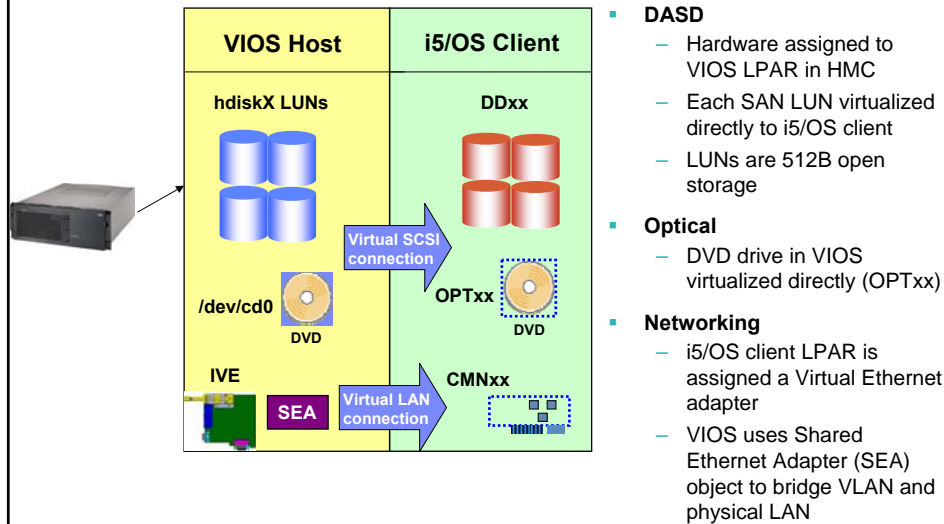
```

Work with Disk Status
Elapsed time: 00:00:00
B1000FDA
09/16/07 22:23:35
  
```

Unit	Type	Size (M)	% Used	I/O Rqs	Request Size (K)	Read Rqs	Write Rqs	Read (K)	Write (K)	% Busy
1	6B22	33405	14.7	.0	.0	.0	.0	.0	.0	0
2	6B22	33405	6.6	.0	.0	.0	.0	.0	.0	0
3	6B22	33405	6.6	.0	.0	.0	.0	.0	.0	0
4	6B22	33405	6.6	.0	.0	.0	.0	.0	.0	0

- Virtual client LPAR's System ASP with 4 virtual disks (storage spaces)

## V6R1 Virtual Client + VIOS Host



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## VIOS and V6R1 Client Configuration

- **HMC configuration is the same as with i5/OS host:**
  - Virtual SCSI server adapter(s) in VIOS LPAR
  - Virtual SCSI client adapter(s) in virtual client LPAR
  - VIOS is assigned 1 or more Fibre Channel adapters
- **SAN configuration:**
  - LUNs are standard “System p/AIX” 512B LUNs
  - LUNs do **not** have to be specific sizes supported by i5/OS (8.5, 17 35 GB, etc.)
- **Virtualization of LUNs, optical, Ethernet is configured using VIOS command line\* via Telnet**
- **Virtual client LPAR installation is the same as with i5/OS host**

\*VIOS section in IBM System Information Center:  
<http://publib.boulder.ibm.com/infocenter/eserver/v1r3s/index.jsp?topic=/iphb1/iphb1kickoff.htm>

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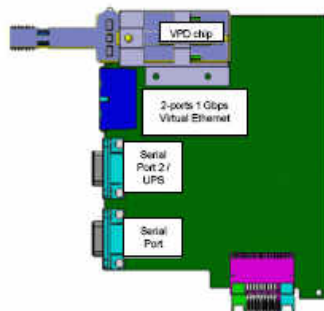
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## Virtualization - LAN

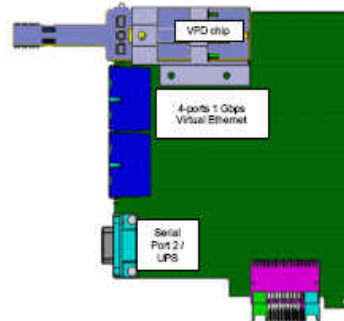
- The POWER6 processor-based servers extend the virtualization technologies introduced in POWER5™ by offering the Integrated Virtual Ethernet adapter (IVE).
- IVE, the name given to the collection of hardware (including the Host Ethernet Adapter(HEA)), software, and hypervisor provides integrated high-speed Ethernet adapter ports with hardware-assisted virtualization capabilities. It is a standard set of features offered on every IBM System i/p POWER6 processor-based server.
- The IVE developed to meet general market requirements for better performance and better virtualization for Ethernet. It offers:
  - Either four 1 Gbps ports or two 1 Gbps ports
- External network connectivity for LPARs using dedicated ports without the need of a host i5/OS partition or Virtual I/O Server

## Virtualization - LAN (continuing)

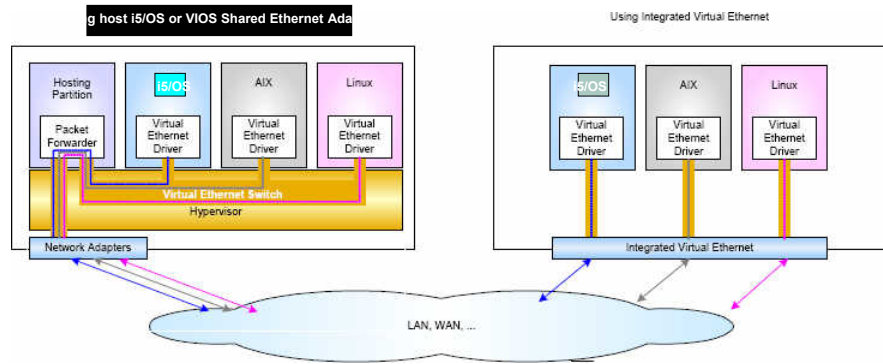
FC 5636 2-ports 1 Gbps assembly



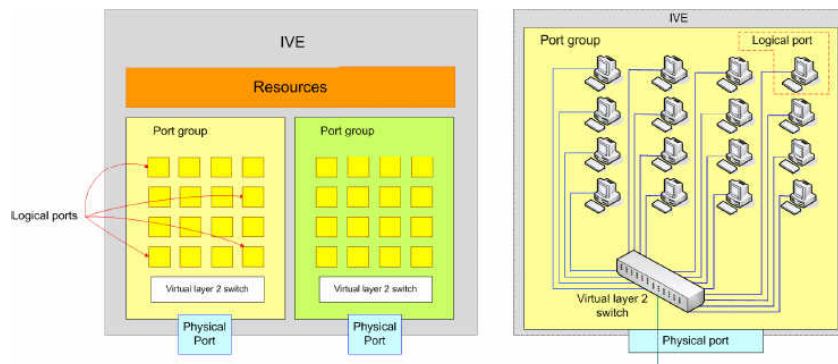
FC 5639 4-ports 1 Gbps assembly



## Virtualization - LAN (continuing)



## Virtualization - LAN (continuing)



## Virtualization - LAN (continuing)

IVE feature code	Physical ports	Physical port number	Port group	HMC logical port number	SMS logical port number
5636	2	2	2	1 to 16	1 to 16
		1			
5639	4	4	1	1 to 16	1 to 16
		3			
		2	2	1 to 16	17 to 32
		1			

## Virtualization - Backup

- **System level - backup all disks (NWSSTG's)**
- **File level - standard i5/OS backup strategy**

## Storage Space Snapshots

- New enhancement allows for save while active of NWSSTG objects
- Similar functionality to SAN Flash Copy with consistency groups
- Enables saving a client LPAR's storage spaces without shutting down the LPAR
- Works by establishing a checkpoint before saving the NWSSTG objects
- Changes to storage space during the save are kept in a side file
  - Side file is in the same IFS directory as NWSSTG files
  - Side file is committed to storage space once save is complete

## Storage Space Snapshots

```

Save Object (SAV)
Type choices, press Enter.
Save active option . . . . . > *NWSSTG      *NONE, *ALL, *ALWCKPVRT...
Output . . . . . *NONE
Save active message queue . . . *NONE
Synchronization ID . . . . . *NONE      Name, *NONE
  
```

- New save action option (\*NWSSTG) on SAV command signals a storage space snapshot (save while active)
- Storage space snapshots employ an admin service on AIX, Linux and Windows
- New i5/OS memory flush to disk (quiesce) function can be used to facilitate storage space snapshots for i5/OS virtual client LPARs

## i5/OS Quiesce – Memory Flush to Disk

- New V6R1 function that flushes memory to disk for a given ASP – System, User or IASP
- Facilitates copy or save operations that depend on data being committed to disk: SAN Flash Copy, storage space snapshots
- CHGASPACT \*SUSPEND or \*RESUME
- Flash Copy or storage space snapshot sequence becomes: CHGASPACT \*SUSPEND → Flash/Snapshot → CHGASPACT \*RESUME
- CHGASPACT \*SUSPEND performs the following actions:
  - Flushes memory to disk for selected ASP
  - Suspends as many transactions as possible
  - Suspends as many DB operations as possible
  - Flushes memory to disk again for in-flight transactions/operations

## i5/OS Quiesce – Memory Flush to Disk

```

Change ASP Activity (CHGASPACT)

Type choices, press Enter.

ASP device . . . . . > *SYSBAS      Name, *SYSBAS
Option . . . . . > *SUSPEND      *SUSPEND, *RESUME, *FRCWRT
Suspend timeout . . . . . 10      Number
Suspend timeout action . . . . . *CONT *CONT, *END
  
```

- “Suspend timeout” specifies the number of seconds for the suspend operation to complete
- “Suspend timeout action” determines whether the suspend should continue or end if the ASP was not quiesced within the given time period

## Virtualization - Backup - File level

- **i5/OS Host side:**
  - Create Image Catalog for OPT with appropriate number of volumes
  - Create and activate Virtual OPT
  - Load Virtual OPT to Image catalog
  
- **i5/OS Client side:**
  - Do backups to opt device with host Virtual OPT as a resource .
  
- **i5/OS Host side:**
  - Duptap optical volumes from image catalog to tape

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