

**Advanced
Technical
Support**



Virtual Storage for i5/OS Logical Partitions

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IBM Advanced Technical Support – Power Systems –
i5/OS

Agenda

- Virtualization enhancements for i5/OS
 - i5/OS virtual client partitions
 - PowerVM Virtualization
 - Virtualization scenarios
- i5/OS host & i5/OS client
 - Configuration and installation
 - Backups
- Further information

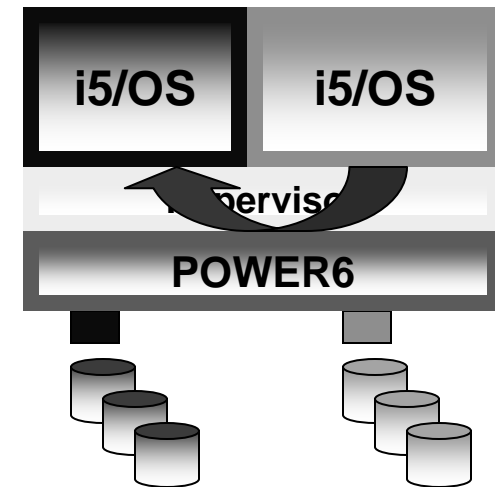
Virtualization Enhancements for i5/OS

i5/OS Virtual Client Partitions



■ i5/OS-based Virtualization

- i5/OS partition uses I/O resources from another i5/OS partition
- Eliminates requirement to buy adapters and disk drives for each i5/OS partition
- Supports simple creation of additional partitions e.g., for test and development
- Requires POWER6 systems with i5/OS V6R1
- PowerVM not required
- Can mix virtual and direct I/O in client partition



■ Platform support

- All POWER6 System i models* (non-blade)

■ Storage support

- Determined by host i5/OS partition (SAN, EXP24, integrated disk)

■ LPAR management

- HMC

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PowerVM Virtualization

■ VIOS-based Virtualization

- i5/OS partition uses I/O resources from Virtual I/O Server (VIOS)
- VIOS is included with PowerVM Standard and Enterprise Edition
- Requires POWER6 systems with i5/OS V6R1

■ Platform support

- All POWER6 System i models and POWER6 Blade

■ Storage support

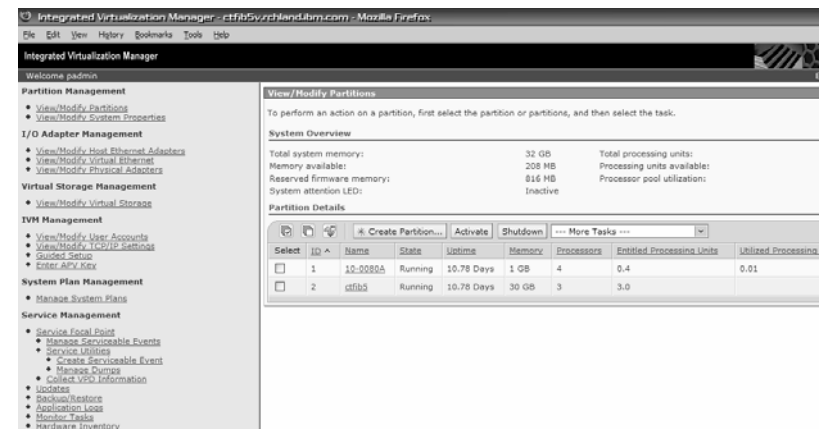
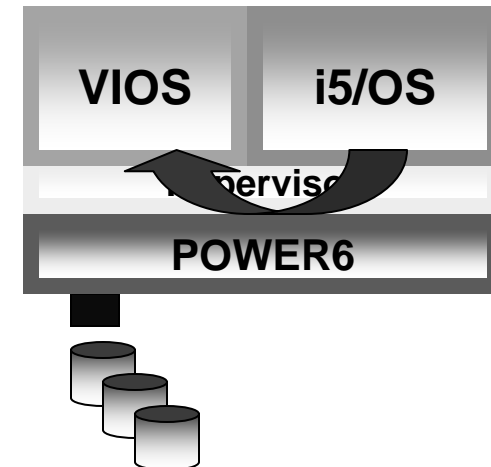
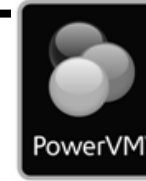
- Enables attachment to DS4000*

■ LPAR management

- HMC or IVM**

■ Integrated Virtualization Manager

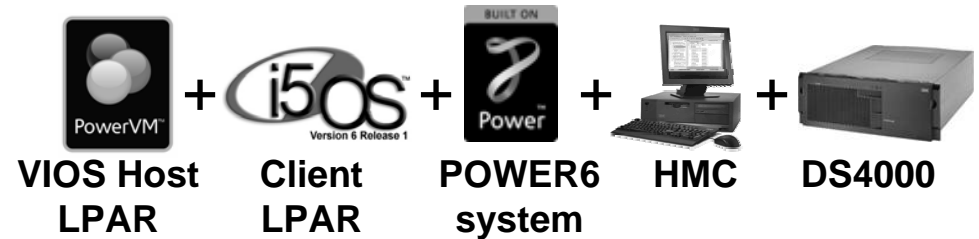
- Software for creating and managing partitions, part of VIOS
- Requires VIOS to own i5/OS I/O resources



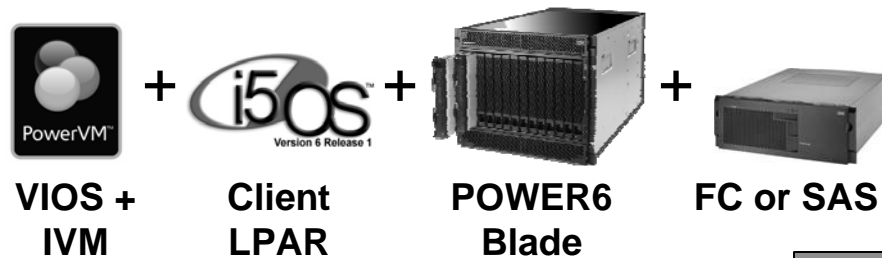
Virtualization Scenarios



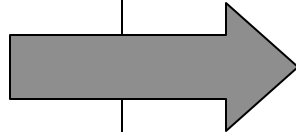
- **Hardware platform:** POWER6 System i (not POWER6 blade)
- **Host LPAR:** i5/OS
- **LPAR management:** HMC
- **Storage:** any supported by i5/OS host



- **Hardware platform:** POWER6 System i (e.g., 9406-MMA)
- **Host LPAR:** VIOS
- **LPAR management:** HMC
- **Storage:** DS4000 (not DS8000)



- **Hardware platform:** POWER6 blade
- **Host LPAR:** VIOS
- **LPAR management:** IVM (part of VIOS)
- **Storage:** Fibre Channel or SAS* (SOD)



- **This presentation does not discuss the i5/OS on POWER blade solution**
- **See Webcast *i5/OS V6R1 and IBM BladeCenter JS22*** (http://w3-1.ibm.com/sales/systems/portal/_s.155/254?navID=f340&geoID=All&prodID=System%20i&docID=siee020608me)

Part I: i5/OS Client with i5/OS Host

i5/OS V6R1 Host and Client Partitions: Overview

■ Requirements

- POWER6 hardware
- V6R1 on host and client
- PowerVM not required

■ DASD

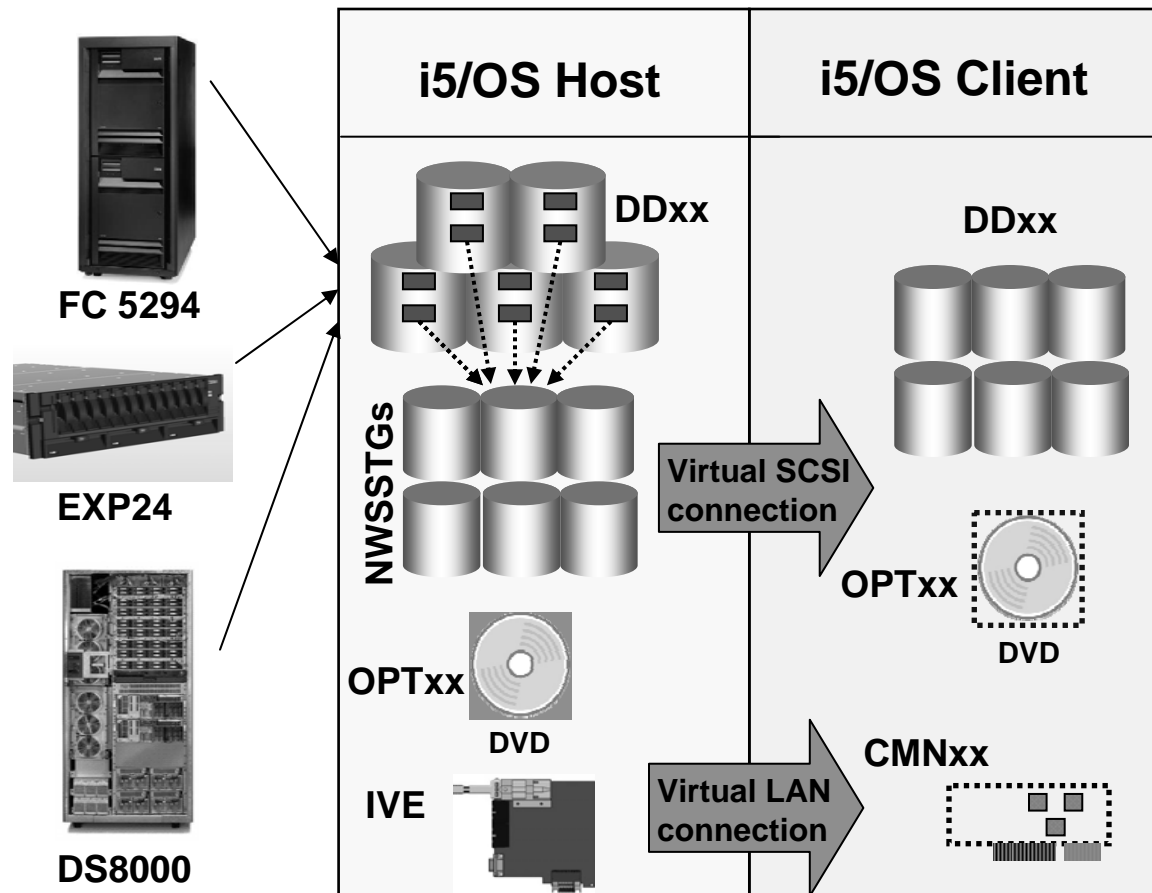
- Hardware assigned to host LPAR in HMC
- Can be integrated or SAN
- Virtualized as NWSSTG objects

■ Optical

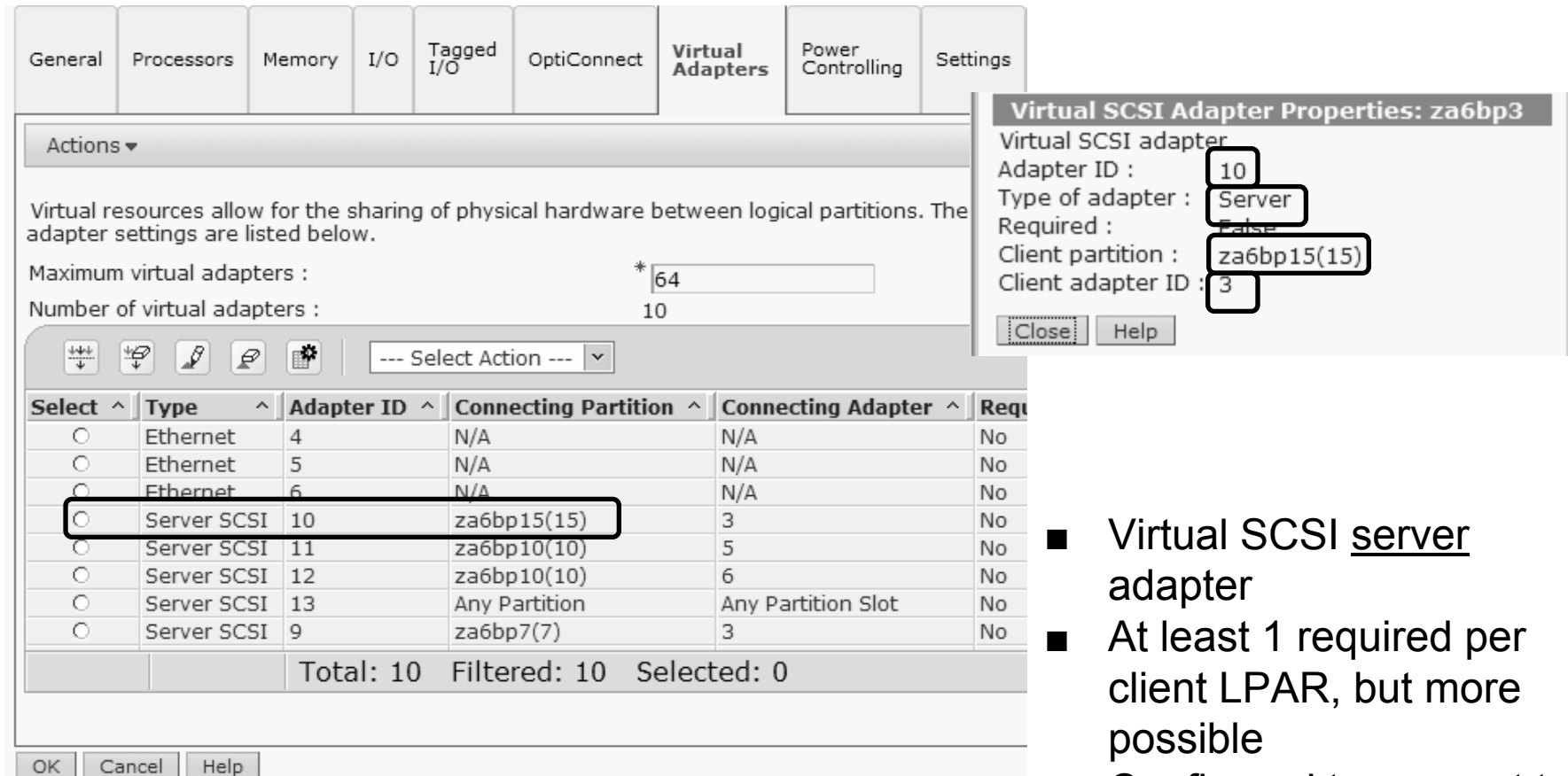
- DVD drive in host LPAR virtualized directly (OPTxx)

■ Networking

- Network adapter (such as IVE) and Virtual Ethernet adapter in host LPAR
- Virtual Ethernet adapter in client LPAR



Host LPAR Configuration – HMC



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="radio"/>	Ethernet	4	N/A	N/A	No
<input type="radio"/>	Ethernet	5	N/A	N/A	No
<input type="radio"/>	Ethernet	6	N/A	N/A	No
<input type="radio"/>	Server SCSI	10	za6bp15(15)	3	No
<input type="radio"/>	Server SCSI	11	za6bp10(10)	5	No
<input type="radio"/>	Server SCSI	12	za6bp10(10)	6	No
<input type="radio"/>	Server SCSI	13	Any Partition	Any Partition Slot	No
<input type="radio"/>	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 : False
Client partition : za6bp15(15)
Client adapter ID : 3

- 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

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

Maximum virtual adapters : *1024
Number of virtual adapters : 6

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	za6bp10s(16)	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 Adapter Properties: za6bp15
Virtual SCSI adapter : Adapter ID : 3
Type of adapter : Client
Required : true
Server partition : za6bp3(3)
Server adapter ID : 10

- 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

Client LPAR Configuration – Load Source

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

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

Load source
Description: Virtual Adapter Slot 4
Location code: 4

Alternate restart device
Description: Virtual Adapter Slot 3
Location code: 3

Console
 Use HMC console
Description:
Location code:

Alternate console
Description:
Location code: None

Operations Console
Description:
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

Host LPAR Configuration – i5/OS View

Work with Communication Resources

System: ITCLS01

Type options, press Enter.

5=Work with configuration descriptions

7=Display resource detail

Opt	Resource	Type	Status	Text
	LIN06	6B03	Operational	Comm Adapter
	CMN07	6B03	Not detected	Comm Port
	CMN18	6B03	Operational	Comm Port
	CMB12	6B03	Operational	Comm Processor
	LIN05	6B03	Operational	Comm Adapter
	CMN06	6B03	Not detected	Comm Port
	CMN17	6B03	Operational	Comm Port
	CMB13	268C	Operational	Comm Processor
	LIN07	268C	Operational	LAN Adapter
	CMN08	268C	Operational	Ethernet Port
	CMB14	290B	Operational	Comm Processor
	CTL02	290B	Operational	Comm Adapter
	CMB15	290B	Operational	Comm Processor
	CTL03	290B	Operational	Comm Adapter
	CMB16	290B	Operational	Comm Processor

More...

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

■ Virtual SCSI server adapters 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	CP10	2	*DYN	*UPDATE	
	D11	CP10	3	*DYN	*UPDATE	
	D12	CP10	4	*DYN	*UPDATE	

More...

Parameters or command

===>

F3=Exit F4=Prompt F5=Refresh F6=Print list F9=Retrieve
F11=Display disk status F12=Cancel F17=Position to

- 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

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

Host LPAR Configuration – NWSDs

```
Work with Configuration Status          ZA6DB2          02/18/08  23:00:28
```

```
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	

```
Parameters or command  
====>  
F3=Exit   F4=Prompt
```

- 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

```
Catalog . . . : INSTALLV61          Status . . . : Ready
Type . . . . : Optical             Device . . . : VOPT1
Directory . . : /installv61

System:  ZA6BP3
```

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	Loaded	SLIC_N
	2	Mounted	B2924_01
	3	Loaded	B2924_02
	4	Loaded	F2924_01
	5	Loaded	DP4_TS

Bottom

```
F3=Exit    F5=Refresh    F6=Load/Unload image catalog    F7=Verify image catalog
F8=Reorder by index    F12=Cancel    F24=More keys
```

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

Client LPAR Configuration – Load Source

```
Session A - ISLANCON5.ws - [24 x 80]
File Edit View Communication Actions Window Help
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                                   6B03-001   Operational CMB03
- Virtual IOP                                   6B03-001   Operational CMB04
  9 Virtual IOP                                   290A-001   Operational CMB01
- Virtual IOP                                   268C-002   Operational CMB06

Bottom

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

MA a 19/003
Connected to remote server/host 127.0.0.1 using port 1241
```

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

Client LPAR Configuration – Load Source

```
Logical Hardware Resources Associated with IOP

Type options, press Enter.
  2=Change detail    4=Remove    5=Display detail    6=I/O debug
  7=Verify           8=Associated packaging resource(s)

Opt Description      Type-Model  Status  Resource
- Virtual IOP        * 290A-001  Operational  CMB02
- Virtual Storage IOA 290A-001  Operational  DC02
- Disk Unit          6B22-050  Operational  DD002
- Disk Unit          * 6B22-050  Operational  DD001
- Optical Storage Unit % 632C-002  Operational  OPT01
```

- Virtual storage IOA is the VSCSI client adapter
- Disk units are storage spaces in host LPAR

Client LPAR Configuration – Configured DASD

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

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

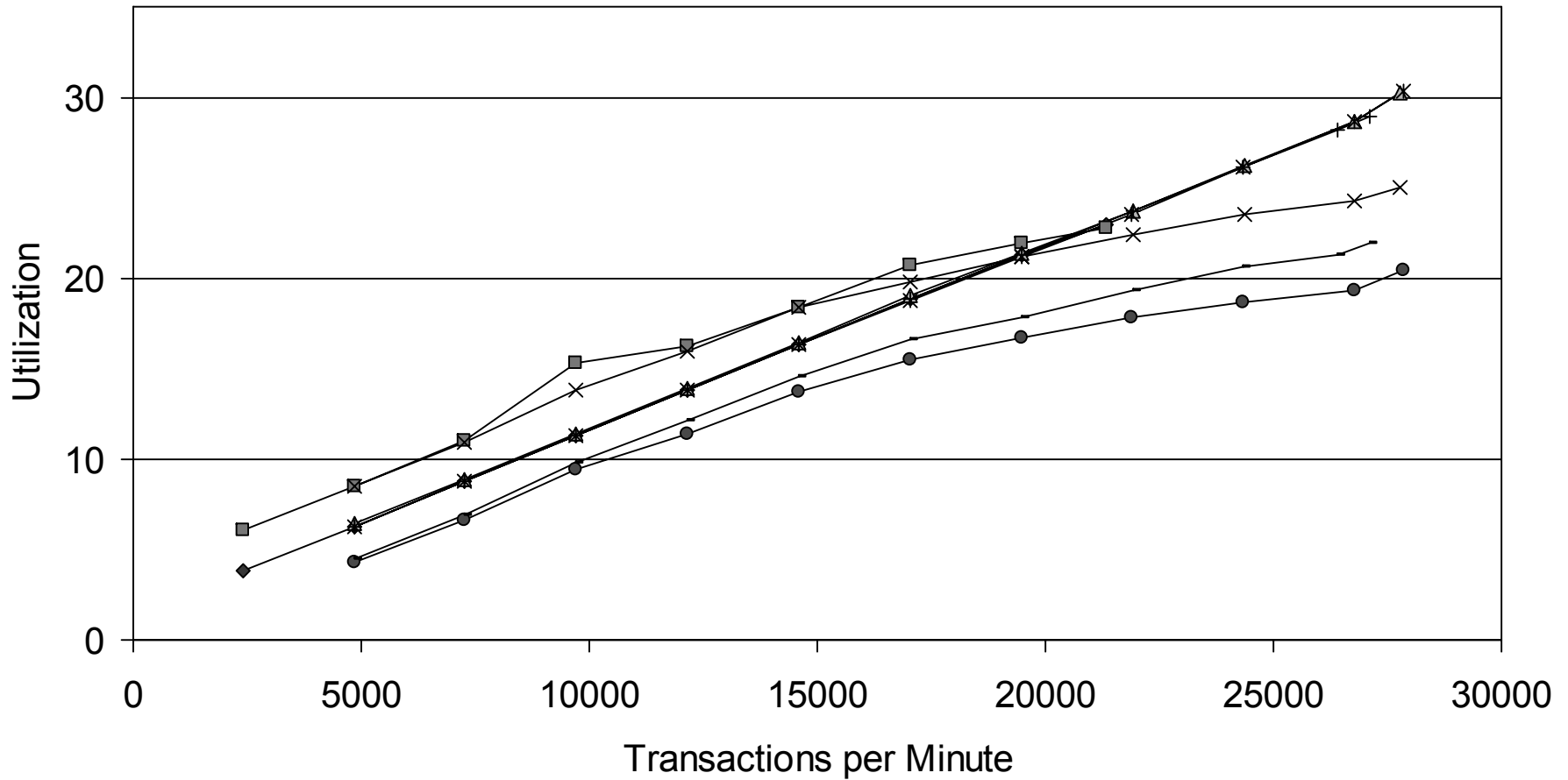
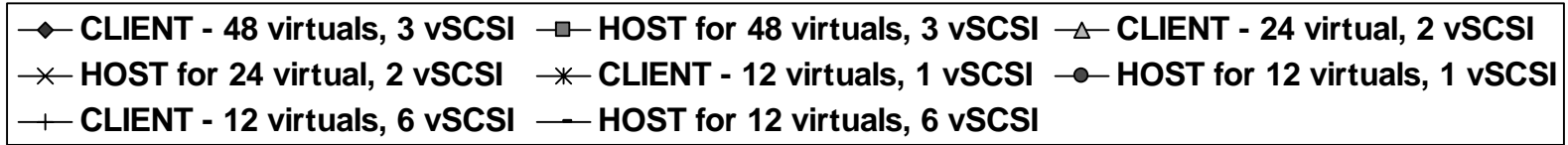
- Virtual client LPAR's System ASP with 4 virtual disks (storage spaces)

Backups for i5/OS V6R1 Client with i5/OS Host

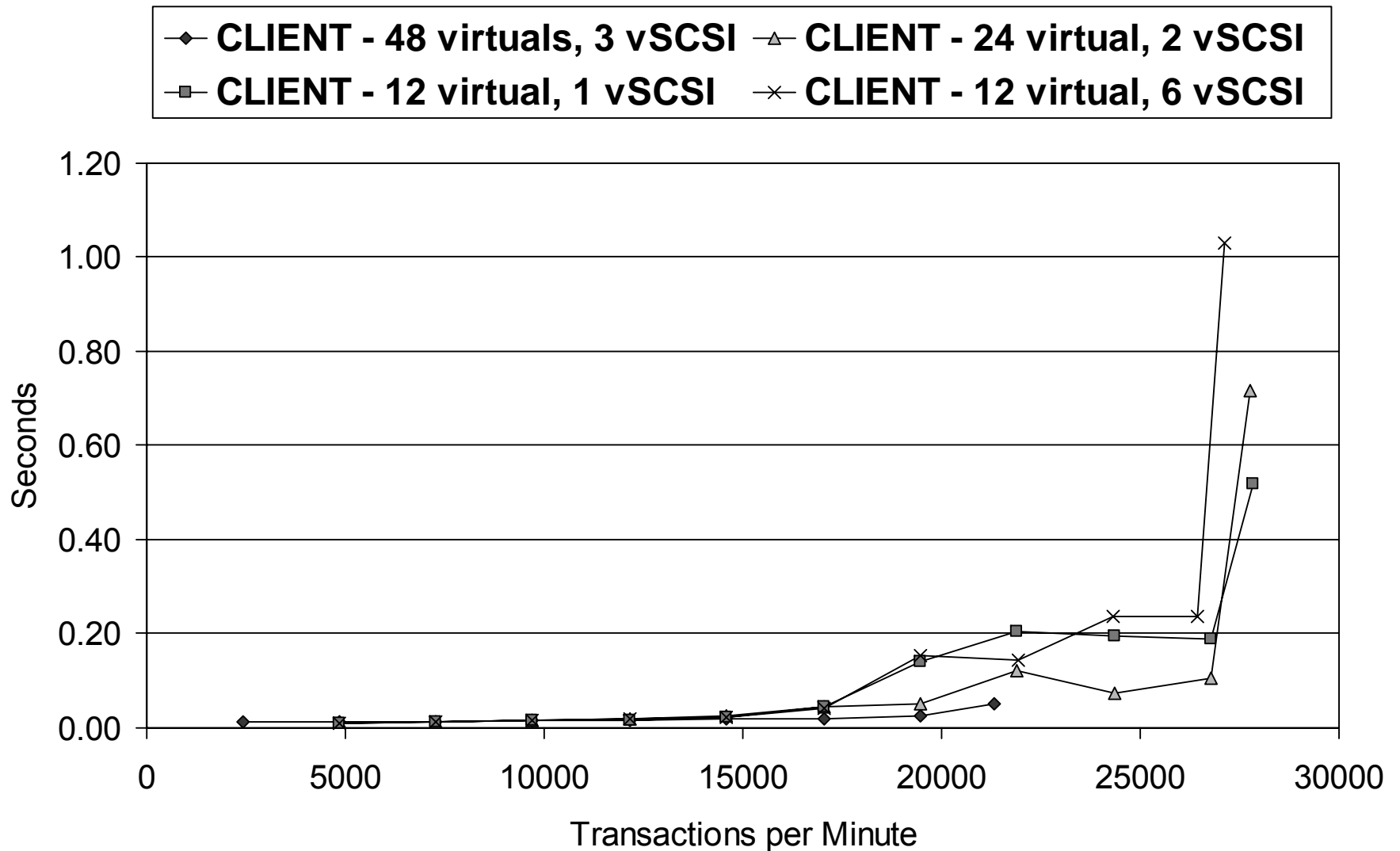
- Simplest approach is to use Dynamic LPAR (DLPAR) resource movement and switch physical tape adapter to client LPAR
 - Mixing of virtual and direct resources in client is supported
 - DLPAR movement of resources can be scheduled in the HMC
- For full-system backup, the client storage spaces can be saved on the host i5/OS partition
 - Similar to AIX and Linux client partitions
 - File-level backup is not supported
 - Storage spaces can be restored on another i5/OS V6R1 host
 - Storage spaces can be located in IASP, Flash Copy can be used on IASP

Preliminary Performance Information

CPU Utilization



Response time



Education

- ETEC203 - i5/OS Virtual Client Partitions and DS4000 Storage – 2 days
 - Workshop will be listed for sign-up by 3/21 on: <http://www-03.ibm.com/systems/i/support/itc/educ.html>
- LSI DS4000 course – March 4-7/08 in Wichita – 3.5 days
 - <https://www.regonline.com/builder/site/Default.aspx?eventid=183912>
- Getting Started with DS4000 (IBM) – 2 days
 - http://www-304.ibm.com/jct03001c/services/learning/ites.wss/us/en?pageType=course_description&courseCode=SS780

More Information



- APV Operations Guide (VIOS information)
 - <https://www.ibm.com/servers/resourceLink/lib03030.nsf/pages/AdvancedPowerVirtualizationOperationsGuide>
- i5/OS Virtual Client Partitions and DS4000 Storage Read-me First document
 - Scheduled for availability by 3/21, URL not available yet
- *Performance Capability Reference* manual (Chapter 14)
 - <http://publib.boulder.ibm.com/infocenter/systems/scope/i5os/index.jsp?topic=/books/sc410607.pdf>
- Redbook *IBM System Storage DS4000 and Storage Manager V10.10*
 - <http://www.redbooks.ibm.com/redpieces/abstracts/sg247010.html?Open>
- VIOS datasheet (VIOS support only, refer to this presentation for i5/OS + VIOS support)
 - <http://www14.software.ibm.com/webapp/set2/sas/f/vios/documentation/datasheet.html>

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