


imaginative invincible intuitive indestructible innovative innerpeace incontrol
incredible inventive immediate improving integral illuminating important
international industrious intriguing inspiring ingenious impressive integrated
illustrious intricate intelligent impassioned imaginative invincible intuitive
indestructible innovative innerpeace incontrol incredible inventive
immediate improving integral illuminating important international industrious
intriguing inspiring ingenious impressive integrated illustrious intricate
intelligent impassioned imaginative invincible intuitive indestructible
innovative innerpeace incontrol incredible inventive immediate improving
integral illuminating important international industrious intriguing inspiring
ingenious impressive integrated illustrious intricate intelligent impassioned
imaginative invincible intuitive indestructible innovative innerpeace incontrol
incredible inventive immediate improving integral illuminating important
international industrious intriguing inspiring ingenious impressive integrated
illustrious intricate intelligent impassioned imaginative invincible intuitive
indestructible innovative innerpeace incontrol incredible inventive
immediate improving integral illuminating important international industrious
intriguing inspiring ingenious impressive integrated illustrious intricate
intelligent impassioned imaginative invincible intuitive indestructible
innovative innerpeace incontrol incredible inventive immediate improving
integral illuminating important international industrious intriguing inspiring
ingenious impressive integrated illustrious intricate intelligent impassioned
imaginative invincible intuitive indestructible innovative innerpeace incontrol
incredible inventive immediate improving integral illuminating important
international industrious intriguing inspiring ingenious impressive integrated
illustrious intricate intelligent impassioned imaginative invincible intuitive

iSeries. mySeries.

iSeries. mySeries.



Common Europe Luxembourg
Introducing IBM eServer i5 & 

Version 5 Release 3 Announcements (May 4th, 2004)
by Eddy Pasteger, REAL Solutions S.A.

iSeries. mySeries.

Agenda

- V5R3 Hardware Overview
 - ➔ Power5 Technology
 - Technology Roadmap
 - Simultaneous Multi-Threading
 - Cache and Memory Affinity
 - ➔ New Servers IBM eServer i5
 - IBM eServer i5 model 520
 - IBM eServer i5 model 570
 - ➔ LPAR
 - Power Hypervisor (pHyp)
 - Hardware Management Console
 - Capped & Uncapped Partitions
 - ➔ I/Os
 - HSL-2/RIO-G & Towers
 - New Adapters
 - ➔ Capacity on Demand
 - ➔ SAN Multi-Path
 - ➔ Upgrades & Migration
 - Techniques & Planning

iSeries. mySeries.

Agenda

- V5R3 Software Overview
 - ➔ Cross Site Mirroring (XSM)
 - ➔ Save/Restore Enhancements
 - General Enhancements
 - Ragged Save While Active
 - BRMS Enhancements
 - ➔ Time Enhancements
 - ➔ Miscellaneous Enhancements
 - CL, yes you heard CL !
 - IFS Anti-Virus Scanning
 - Others
 - ➔ Upgrades & Migration
 - Techniques & Planning

iSeries. mySeries.

Warning !

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

iSeries. mySeries.

iSeries. mySeries.

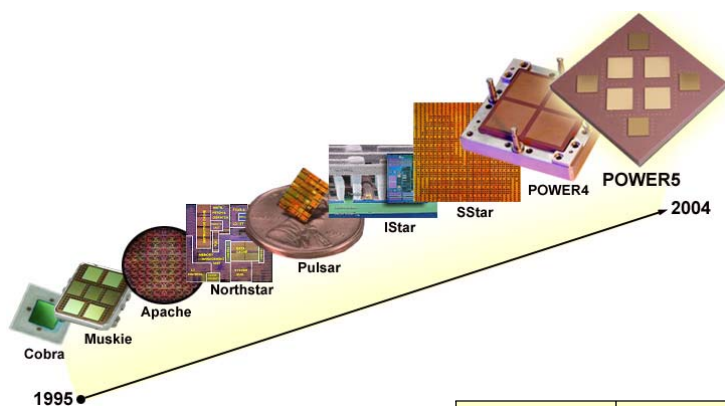


V5R3 Hardware Overview

Power5 Technology

iSeries. mySeries.

Power5 Technology

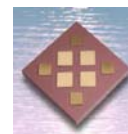


	1995 : Cobra	2004 : Power5
Transistor count	4.7 millions	276 millions
Frequency	50 MHz	>= 1.5 GHz
Logical Partitions	None	Up to 254

iSeries. mySeries.

Power5 Technology

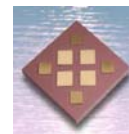
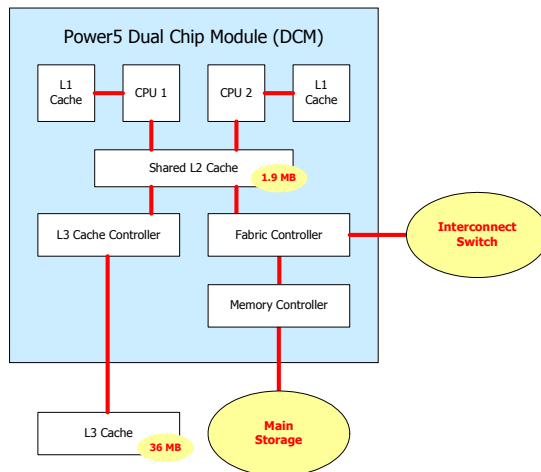
- Lithography : use 130 nanometer technology
 - ➔ 1 nanometer = 1/1000000000 meter
 - Think about a line of 8 atoms !
 - Think about 5 millions transistors on a ball-point pen tip !
 - ➔ 276 millions transistors
- Dual core chip
 - ➔ 2 processors per chip
 - ➔ Operates as 4 processors on a chip in SMT mode
- Enhanced thermal management
 - ➔ Low-power consuming circuitry
 - ➔ Automatic "switch-off" of unused circuits
- Self healing autonomic circuits
 - ➔ Advanced error corrections
 - ➔ Redundant components
 - ➔ "Guard-out" mechanism
- Support Power Hypervisor (pHyp)
 - ➔ i5/OS V5R3, AIX 5L* and Linux*
 - ➔ Existing applications run unchanged on i5/OS V5R3



(*) Release levels available 2H2004

iSeries. mySeries.

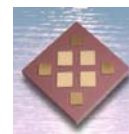
Power5 Technology



iSeries. mySeries.

Power5 Technology

	SStar	Power4	Power5
Lithography	?	180 nm	130 nm
Transistors	?	174 millions	276 millions
Cores / logical processors per chip	1 / 2	2 / 2	2 / 4
Area	?	415 mm ²	389 mm ²
Frequency	750 MHz	1.10 / 1.30 GHz	1.50 / 1.65 GHz
L2 / L3 cache	4 MB / None	1.4 / 32 MB	1.9 / 36 MB
Max memory	?	256 GB	1 TB*
Multi-threading	HMT	No	SMT



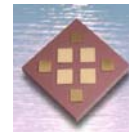
(*) This presentation contains information about IBM's plans and directions. Such plans are subject to change without notice.

iSeries. mySeries.

POWER Technology Roadmap

- 2004-2005 :
 - ➔ Power5
 - Lithography : 130nm
 - Frequency : ≥ 1.5 GHz
- 2005-2006 :
 - ➔ Power5+ (*)
 - Lithography : 90nm
 - Frequency : ≥ 2 GHz
- Future :
 - ➔ Power6 (*)
 - Lithography : 65nm (4 Atoms !)
 - Ultra High Frequency Cores : ≥ 5 GHz
 - ➔ Beyond pure processor performance :
 - Maintain capability to serve very fast data movements in/out processors !
 - Maintain capability to handle a wide variety of workloads !
 - ➔ Roadmap drawn to Power9 (*)
 - One generation planned every 18 months

i5os



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

iSeries. mySeries.

iSeries. mySeries.



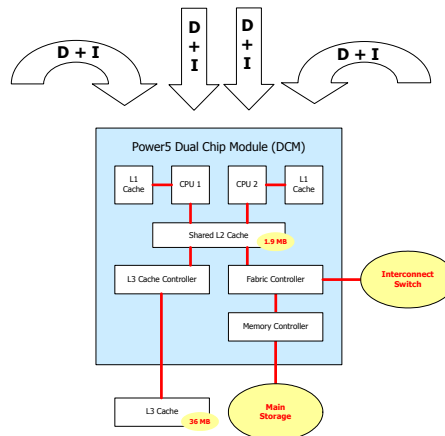
V5R3 Hardware Overview

Power5 Simultaneous Multi-Threading

iSeries. mySeries.

Multi-Threading

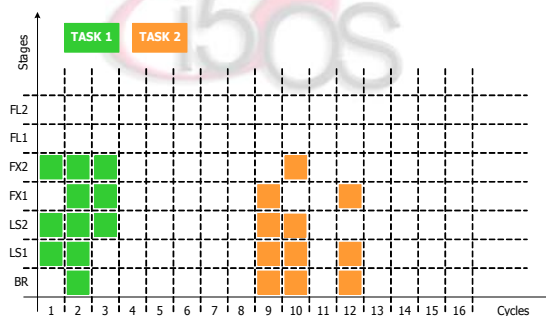
- One physical processor becomes two logical processors
 - ➔ A single processor becomes capable of executing multiple threads
 - ➔ Operating system can "see" four processors on a single chip



iSeries. mySeries.

No Multi-Threading

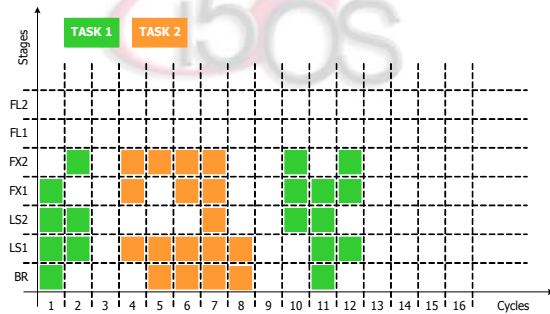
- Used on Power4 processor technology
- Notes
 - ➔ Long delays (aka. « wait states ») due to cache fills



iSeries. mySeries.

Hardware Multi-Threading

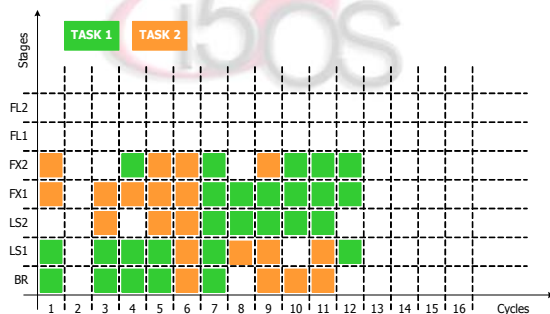
- Used on SStar processor technology
- Controlled at server level
- Notes
 - At a given time, only one task executes instructions
 - The processor can hold the state of multiple tasks or threads
 - Consecutive execution of portions of each thread instruction stream
 - Reduces « wait states », but processor stages can remain underutilized



iSeries. mySeries.

Simultaneous Multi-Threading

- Used on Power5 processor technology, controlled at partition level
- Notes
 - Concurrent execution of multiple instruction streams
 - Underutilized processor stage can be used by another thread
 - All 2 logical processors shares the L-1 cache
 - 64 KB for instructions, 32 KB for data
 - All 4 logical processors shares the L-2 cache
 - 1.9 MB for instructions and data



iSeries. mySeries.

Simultaneous Multi-Threading

- Configuration
 - Controlled per partition
 - System value QPRCMLTTSK
 - 0 = "Off" : Multi-Threading is deactivated
 - 1 = "On" : Multi-Threading is activated
 - 2 = "System Controlled" : Determined by the task dispatcher
 - Change takes effect after partition IPL
- Effects on performance
 - And for a single-threaded job ?
 - SMT does not speed up the execution of any given task !
 - SMT increases performance by allowing more tasks to execute at the same time !
 - Decreases amount L-1 and L-2 cache available per thread !
 - Measured results :
 - SMT achieves 45-65% more throughput than NMT

iSeries. mySeries.

Simultaneous Multi-Threading : Performance Metrics

- Computing precise CPU usage calculation
 - No longer straightforward with two logical processors for each physical processor
- New "Processor Utilization of Resource" register for each logical processor
 - Count the cycles used by "productive" instructions dispatched
 - Count the cycles assigned to the wait state task

$$\frac{Tc - (aWSTc\ 1 + aWSTc\ 2)}{Tc} \times 100 = \% \text{ CPU utilization}$$

- Performances functions and products adapted !
 - Management Central
 - Performance Tools

iSeries. mySeries.

iSeries. mySeries.



V5R3 Hardware Overview

Cache and Memory Affinity

iSeries. mySeries.

Caches and Main Storage

- Cache layout
 - ➔ L1 Cache
 - Instruction Cache = 64 KB, Data Cache = 32 KB
 - Private for each physical processor
 - Shared by both SMT logical processors
 - Located on chip, work at processor speed
 - ➔ L2 Cache
 - Size = 1.9 MB
 - Shared by both physical processors
 - Located on chip, work at processor speed
 - ➔ L3 Cache
 - Size = 36 MB
 - L3 Cache Controller located on chip
 - L3 Cache located off chip, work at 1/2 processor speed
 - Latency between L2 and L3 cache movements reduced by 20% on Power5
 - ➔ Memory Controller
 - Located on chip

iSeries. mySeries.

Caches and Main Storage

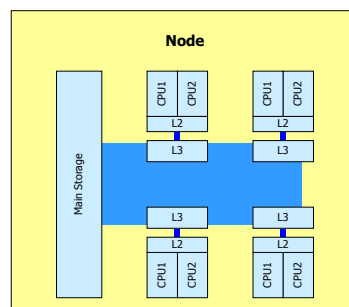
- When data in a cache is updated ...
 - ➔ Data must be eliminated out of all other caches, or
 - ➔ Data must be updated in all other caches
- Cache content integrity ...
 - ➔ All cache content must be known by all active processors
 - ➔ Requires fastest possible communication between processors



iSeries. mySeries.

Node & Home Node

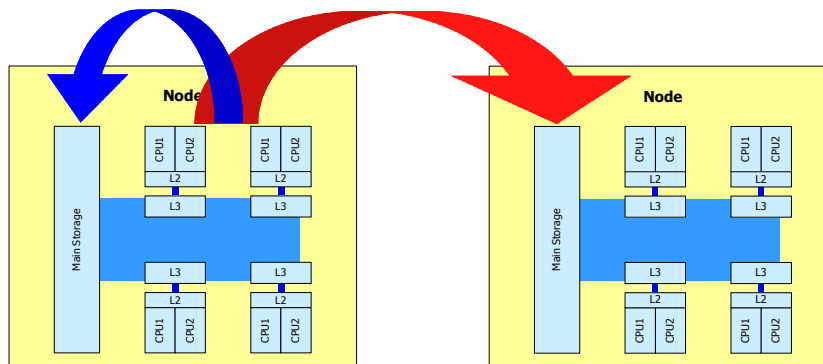
- What is a Node ?
 - ➔ Packaged set of processors, cache and memory on a module
 - ➔ Models i825, i870, i890 and i5 570
- What is a Home Node ?
 - ➔ Home node is selected during task creation
 - ➔ Task dispatcher will further prefer processors on this node



iSeries. mySeries.

Memory Accesses

- Local vs. Remote
 - ➔ Each node has memory card directly plugged on its processor board
 - ➔ Memory Accesses will be « local » or « Remote »
- Storage Manager
 - ➔ Allocates pages in home node « Local » main storage
 - ➔ Tends to limit « Remote » memory accesses



iSeries. mySeries.

Affinity Level, Job Grouping

- Operating System parameters can be used to influence Task Dispatching
 - ➔ Take defaults unless you are an expert !



iSeries. mySeries.

Affinity Level, Job Grouping

- System Value QTHDRSCAFN
 - ➔ Controls Threads Resource Affinity
 - Changes takes effect for new jobs
 - ➔ Level :
 - *NORMAL :
 - Task is dispatched to its home node, if available
 - Task is dispatched to a remote node, if home node not available
 - *HIGH :
 - Task is dispatched to its home node, if available
 - Task dispatcher will wait longer for task's home node availability
 - ➔ Default value is '*NORMAL'
- ➔ Group :
 - *GROUP :
 - Threads are grouped together with the initial thread
 - Threads affinity to the same node than the initial thread
 - *NOGROUP :
 - Threads are not grouped together with the initial thread
- ➔ Default value is '*NOGROUP'

iSeries. mySeries.

Affinity Level, Job Grouping

- Parameters in ADDRTGE / ADDPJE can Override QTHDRSCAFN
 - ➔ THDRSCAFN
 - *SYSVAL, or
 - Level : *NORMAL, *HIGH
 - Group : *GROUP, *NOGROUP
 - ➔ Default value is '*SYSVAL'
 - ➔ RSCAFNGRP
 - *YES, *NO
 - ➔ Default value is '*NO'

iSeries. mySeries.

Affinity Level, Job Grouping

- System Value QTHDRSCADJ
 - ➔ Controls Threads Resource Adjustments
 - Changes takes effect immediately
 - ➔ 0 : No Adjustment
 - ➔ 1 : Dynamic Adjustment
- ➔ Target Weight
 - Represents the ideal proportion of the total work to be handled by a node
 - Evaluated
- ➔ Current Weight
 - Proportion of the total work handled by a node
 - Computed
- ➔ Controls whether LIC is enabled to change the home node of existing jobs/tasks/threads to achieve a better nodal balance
- ➔ Default value is '1'

iSeries. mySeries.

iSeries. mySeries.



V5R3 Hardware Overview

New Servers IBM eServer i5 model 520 and 570

iSeries. mySeries.

IBM eServer i5 model 520 : Highlights

- One or two processors
 - ➔ Processing power range from 500 to 6000 CPW
 - ➔ Value, Express, Standard and Enterprise editions
- Hardware packaging
 - ➔ Standalone
 - ➔ Racked (4 EIA units)
- Up to 32 GB main storage
- HSL-2 / RIO-G ports
 - ➔ 2 GB/s speed
- Built in reliability features

i5os



iSeries. mySeries.

IBM eServer i5 model 520 : Details

eServer i5 model 520						
Processor feature	8950	8951	8952	8953	8954	8955
Server feature	0900	0901	0902	0903	0904	0905
CPW	500	1000	1000	2400	3300	6000
5250 OLTP CPW	30	60	0/1000	0/2400	0/3300	0/6000
Value Edition	7450	7451				
Standard / Enterprise Edition			7458 / 7459	7452 / 7453	7454 / 7455	7456 / 7457
Processor	1 / 1.5GHz	1 / 1.5GHz	1 / 1.5GHz	1 / 1.5GHz	1 / 1.65GHz	2 / 1.65GHz
Max. partitions	2	4	4	10	10	20
Main storage	0.5 / 32GB	1 / 32GB	1 / 32GB	1 / 32GB	1 / 32GB	1 / 32GB
Max. disk arms	278/277	278/277	278/277	278/277	278/277	278/277
Max. disk storage	19TB	19TB	19TB	19TB	19TB	19TB
Max. HSL Loops	1	1	1	1	1	1
Software tier	P05	P10	P10	P10	P20	P30

iSeries. mySeries.

IBM eServer i5 model 520 : CEC Details

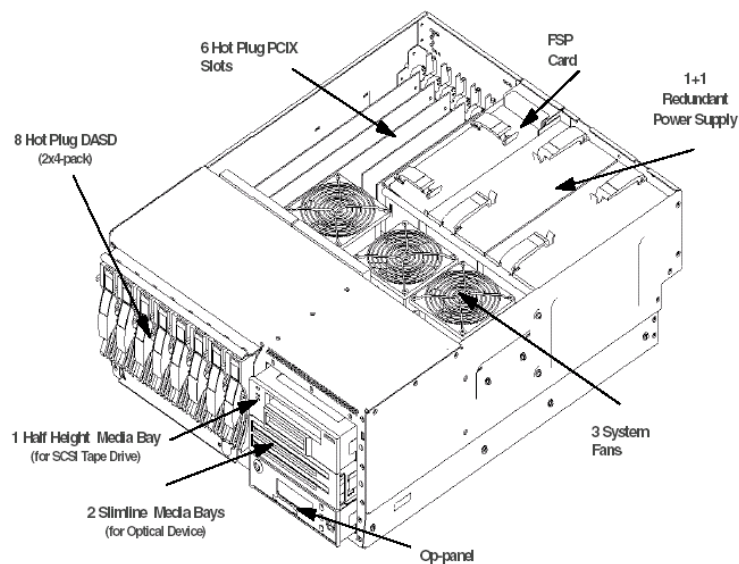
- Features
 - ➔ Memory slots (8) : plug in quads (*)
 - ➔ PCI-X slots (6)
 - ➔ 1000/100/10 Mbps Ethernet ports (2)
 - ➔ Imbedded disk controller (1)
 - ➔ Base IOP - uses PCI-X slot (1)
 - ➔ HMC ports (2)
 - ➔ HSL-2 ports (2) : one loop
- Reliability Features
 - ➔ Hot-plug disk slots (8)
 - ➔ Hot-plug PCI-X slots (6)
 - ➔ Hot-plug, redundant fans (3)
 - ➔ Hot-plug, redundant power supply (2)



(*) One exception for smallest 520 – allow one pair

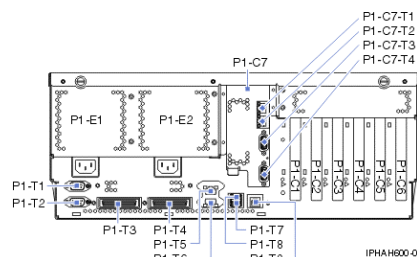
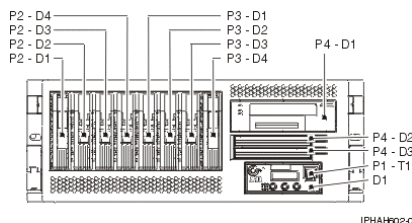
iSeries. mySeries.

IBM eServer i5 model 520 : CEC Physical Layout



iSeries. mySeries.

IBM eServer i5 model 520 : CEC Physical Layout



iSeries. mySeries.

Comparing i5 model 520 to iSeries model 800

	800	800	520	520
Processor	540 MHz SStar	540 MHz SStar	1.5GHz POWER5	1.5 GHz POWER5
L2 cache	0	2 MB	1.9 MB (*)	1.9 MB (*)
Processor CPW	300	950	500	1000
5250 OLTP CPW	25	50	30	60
Memory (Max)	8 GB	8GB	32 GB	32 GB
HSL Loops	1 HSL	1 HSL	1 HSL-2	1 HSL-2
I/O Towers (Max)	1	1	6	6
Disk (max in CEC)	6+12	6+12	4+4	4+4
Disk (Max)	4 TB	4 TB	19 TB	19 TB
IXS / IXA	4 / 3	4 / 3	18 / 8	18 / 8
Disk Drives (Max)	63	63	278	278
Rack Design	16 EIA	16 EIA	4 EIA	4 EIA
Software Tier	P05	P10	P05	P10
Upgrade Path	To 950/50	No	To 1000/60	No
LPAR (Max OS/400)	4	4	2	4
LPAR (Max OS/400 or i5/OS, AIX 5L, Linux)	10 (no AIX) max 4 OS/400	10 (no AIX) max 4 OS/400	2	4

(*) L-2 cache on chip

iSeries. mySeries.

Comparing i5 model 520 to iSeries model 810 (1-way)

	810 1-way	810 1-way	810 1-way	520 1-way	520 1-way	520 1-way
Processor	540 MHz SStar	540 MHz SStar	750 MHz SStar	1.5GHz POWER5	1.5GHz POWER5	1.65GHz POWER5
L2 + L3 cache	2 + 0	2 + 0	4 + 0	1.9* + 0	1.9* + 0	1.9* + 36 MB
Processor CPW	750	1020	1470	1000	2400	3300
Memory (Max)	16 GB	16 GB	16 GB	32 GB	32 GB	32 GB
HSL Loops	1 HSL	1 HSL	1 HSL	1 HSL-2	1 HSL-2	1 HSL-2
I/O Towers (Max)	4	4	4	6	6	6
Disk (max in CEC)	6+12	6+12	6+12	4+4	4+4	4+4
Disk Drives (Max)	198	198	198	278	278	278
Disk (Max)	14 TB	14 TB	14 TB	19 TB	19 TB	19 TB
IXS / IXA	13 / 7	13 / 7	13 / 7	18 / 8	18 / 8	18 / 8
Rack Design	16 EIA	16 EIA	16 EIA	4 EIA	4 EIA	4 EIA
Software Tier	P10	P10	P10	P10	P10	P20
Upgrade Path	To 810 or 520	To 810 or 520	To 810 or 520	To 520	To 520	To 520
LPAR (Max OS/400 or i5/OS, AIX 5L, Linux)	10 (no AIX) max 4 OS/400	10 (no AIX) max 4 OS/400	10 (no AIX) max 4 OS/400	4	10	10

(*) L-2 cache on chip

iSeries. mySeries.

Comparing i5 model 520 to iSeries model 810 (2-ways)

	810 2-way	520 1-way	520 2-way
Processor	750 MHz SStar	1.65GHz POWER5	1.65 GHz POWER5
L2 + L3 cache	2x4 + 0	1.9* + 36 MB	1.9* + 36 MB
Processor CPW	2700	3300	6000
Memory (Max)	16 GB	32 GB	32 GB
HSL Loops	1 HSL	1 HSL-2	1 HSL-2
I/O Towers (Max)	4	6	6
Disk (max in CEC)	6+12	4+4	4+4
Disk Drives (Max)	198	278	278
Disk (Max)	14 TB	19 TB	19 TB
IXS / IXA	4 / 3	18 / 8	18 / 8
Rack Design	16 EIA	4 EIA	4 EIA
Software Tier	P20	P20	P30
Upgrade Path	To POWER5	To 520	No
LPAR (Max OS/400 or i5/OS, AIX 5L, Linux)	20 (no AIX) max 8 OS/400	10	20

(*) L-2 cache on chip

iSeries. mySeries.

IBM eServer i5 model 570 : Highlights

- One to four processors
 - ➔ Processing power range from 3300 to 11700 CPW
 - ➔ Standard and enterprise editions
- Hardware packaging
 - ➔ Racked only (4 EIA units)
- Up to 64 GB main storage
- HSL-2 / RIO-G ports
 - ➔ 2 GB/s speed
- Built in reliability features

i5os



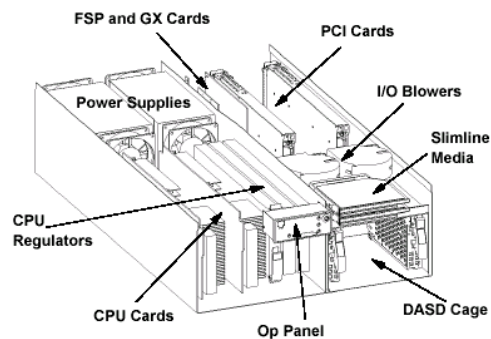
iSeries. mySeries.

IBM eServer i5 model 570 : Details

eServer i5 model 570					
Processor feature	8961	8961 (2x)			
Server feature	0919	0920			
CPW	3300 / 6000	6350 / 11700			
Interactive CPW	0 / Maximum	0 / Maximum			
Standard / Enterprise Edition	7488 / 7489	7469 / 7470			
Processor	1-2 / 1.65GHz	2-4 / 1.65GHz			
Max. partitions	20	40			
Main storage	2 / 64 GB	2 / 64 GB			
Max disk arms	276/275	546/545			
Max disk storage	38.5TB	38.5TB			
Max. HSL-2/RIO-G Loops	1	2			
Software tier	P30	P30			

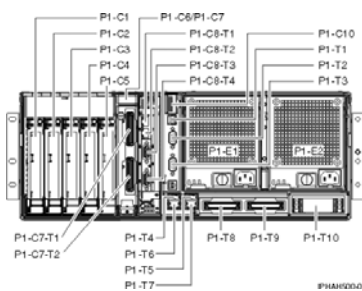
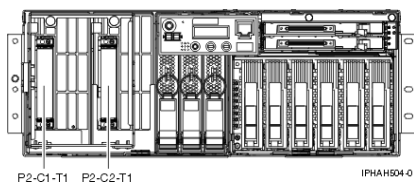
iSeries. mySeries.

IBM eServer i5 model 570 : CEC Physical Layout



iSeries. mySeries.

IBM eServer i5 model 570 : CEC Physical Layout



iSeries. mySeries.

Comparing i5 model 570 to iSeries model 825

	825 3/6-way	570 1/2-way	570 2/4-way
Processor	1.1 GHz POWER4	1.65GHz POWER5	1.65 GHz POWER5
L2+L3 cache	3*(1.4+32)	1.9+36	2*(1.9+36)
Processor CPW	3600-6600	3300-6000	6350-11700
Editions	Std/Ent	Std/Ent+	Std/Ent+
On demand	Yes	Expanded	Expanded
Memory (Max)	48 GB	32 GB	64 GB
HSL Loops	3 HSL-2	1 HSL-2	2 HSL-2
I/O Towers	18	6	12
Disk (max in CEC)	10+5	6	6
Disk Drives (Max)	825	278	546
Disk (Max)	58 TB	19 TB	39 TB
IXS / IXA	36 / 18	18 / 8	36 / 16
Rack Design	16 EIA	4 EIA	4 EIA
Software Tier	P30	P30	P30
Upgrade Path	Yes	Yes	future
LPAR (Max OS/400 or i5/OS, AIX 5L, Linux)	30/32 (no AIX)	10/20	20/40

iSeries. mySeries.

Comparing i5 model 570 to iSeries model 870

	870 5/8-way	570 2/4-way
Processor (1-Way)	1.30 GHz POWER4	1.65 GHz POWER5
L2+L3 cache	4*(1.4+32)	2*(1.9+36)
Processor CPW	7700-11500	6350-11700
Editions	Std/Ent	Std/Ent+
On demand	Yes	Expanded
Memory (Max)	64 GB	64 GB
HSL Loops	4 HSL-2	2 HSL-2
I/O Towers	23	12
Disk (max in CEC)	15+30	6
Disk Drives (Max)	1080	546
Disk (Max)	76 TB	39 TB
IXS / IXA	48 / 32	36 / 16
Rack Design	42 EIA	4 EIA
Software Tier	P40	P30
Upgrade Path	Yes	future
LPAR (Max OS/400 or i5/OS, AIX 5L, Linux)	32 (no AIX)	20/40

iSeries. mySeries.

iSeries. mySeries.

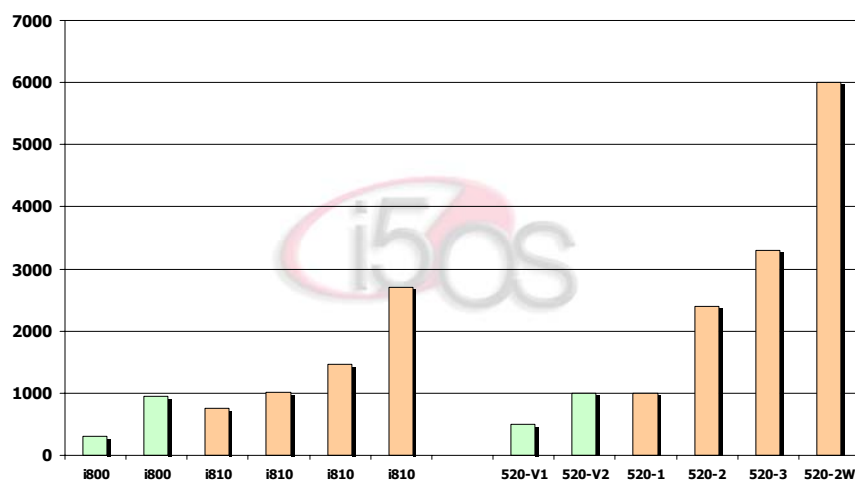


V5R3 Hardware Overview

Performance

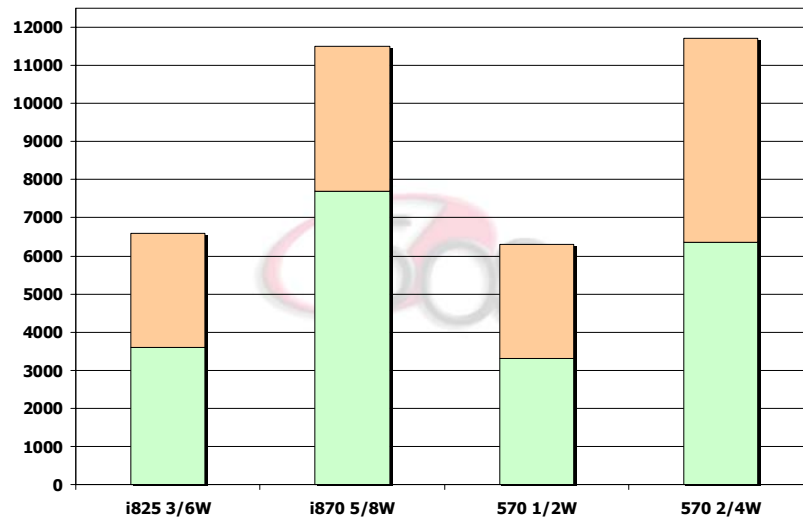
iSeries. mySeries.

Models Comparison : Entry



iSeries. mySeries.

Models Comparison Growth



iSeries. mySeries.

iSeries. mySeries.

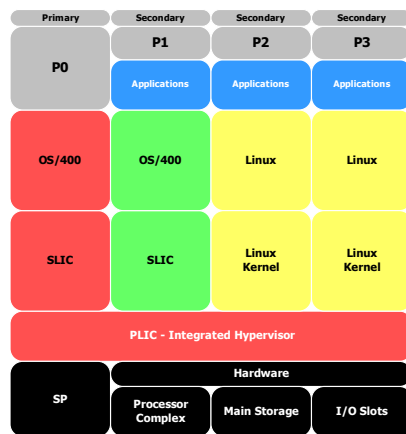


V5R3 Hardware Overview

LPAR : Power Hypervisor and Hardware Management Console

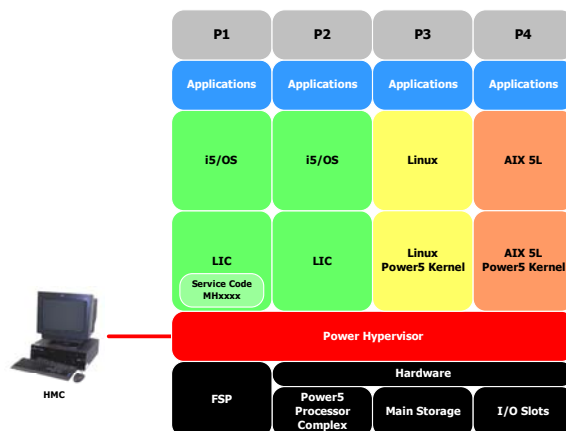
iSeries. mySeries.

Yesterday's LPAR



iSeries. mySeries.

Today's LPAR : Power Hypervisor



iSeries. mySeries.

Today's LPAR : Power Hypervisor

- How does it work ?
 - Code that controls Processor Complex (flash code) is present in the Flexible Service Processor (FSP)
 - At server startup :
 - FSP initializes the processor complex registers
 - FSP checks functional health of each component in the processor complex
 - FSP starts the processor complex
 - Power Hypervisor (pHyp) Program Load
 - Server is in an operational state : any existing partition can IPL

iSeries. mySeries.

Today's LPAR : Power Hypervisor

- Power Hypervisor Services
 - LPAR Configuration
 - Resources Allocation & Deallocation
 - Resources Switching
 - Virtual Processor
 - Virtual Memory
 - Virtual LAN
 - Virtual I/O
 - Virtual Console

iSeries. mySeries.

V5R3 LPAR on different servers

Function	V5R3 on eServer iSeries 8xx	V5R3 on eServer i5 5xx
Interface	DST, SST or iSeries Navigator	HMC
Authority	Service Tools User ID	HMC User Role
Max. Partitions	32	254
Partition type	Primary, Secondary	Partition profile, System profile
Creation	New Partition available after IPL	New Profile available immediately
Support i5/OS +	Linux	Linux and AIX
I/O	IOP level switching	Slot level switching
BUS	Bus ownership	No Bus ownership
Virtual I/O	Host and Guest Partitions	Virtual Server and Client Partitions
Virtual LAN	Up to 16 networks	Up to 4094 networks
Partition Console	LAN Console, Direct attach, Twinax	Same + HMC
Configuration	Load Source	FSP + HMC

iSeries. mySeries.

AIX 5L on the eServer i5

- AIX 5L Version 5.2-H
 - Planned 3Q2004
 - Power5 Kernel
 - Dedicated Processors
 - Direct I/Os
- AIX 5L Version 5.3
 - Planned 4Q2004
 - Power5 Kernel
 - Support for Shared Processors
 - Support for Virtual I/Os

i5os



iSeries. mySeries.

Hardware Management Console

- Hardware Dedicated to Console Functions
- Used to Create and Maintain a Multiple-Partitioned Environment :
 - ➔ Command capability to run scripted operations
 - Startup & shutdown partitions
 - Performing resource movements
 - ➔ Displaying a virtual console
 - ➔ Displaying a virtual operator panel
 - ➔ Detecting, reporting and storing changes in hardware conditions
 - ➔ Gathering and reporting system error events
 - ➔ Activating CoD resources
 - ➔ Supports i5/OS, Linux and AIX
- Mandatory ?
 - ➔ LPARed Systems
 - ➔ CoD Systems
 - ➔ Not required to operate the partitions



iSeries. mySeries.

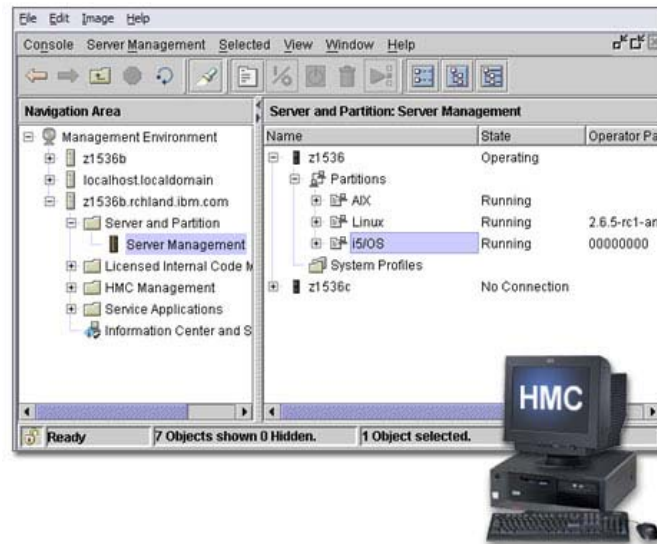
Hardware Management Console

- Appliance based on xSeries Server Technology
 - ➔ Minimum configuration includes :
 - RAM : 1 GB
 - HDD : 40 GB
 - LAN : 1000/100/10 Mbps Ethernet
 - DVD-RAM : 1
 - FDD : 1
 - ➔ « Cleaned » Linux with :
 - HMC Console Application (GUI)
- Connects to i5 Servers
 - ➔ Using dedicated Ethernet HMC ports
 - ➔ Up to 40 partitions on 2 eServer i5
- Packaging
 - ➔ Desktop version : 7310-C03
 - ➔ Rack version : 7310-CR2



iSeries. mySeries.

Hardware Management Console



iSeries. mySeries.

iSeries. mySeries.



V5R3 Hardware Overview

LPAR : Capped & Uncapped Partitions

iSeries. mySeries.

Yesterday's LPAR

- Processing Value
 - Minimum
 - Maximum
 - Assigned



iSeries. mySeries.

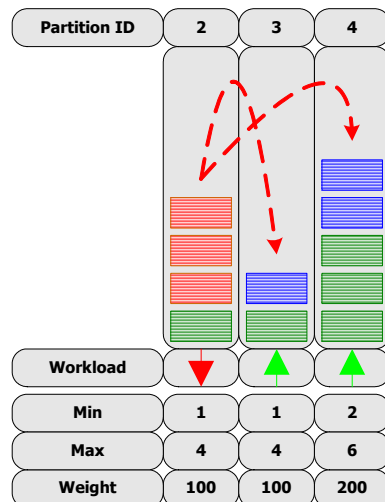
Today's LPAR

- Processing Value
 - Minimum
 - Desired
 - Maximum
 - Assigned
- Sharing Mode
 - Capped
 - LP CPU will never exceeds its assigned capacity
 - Uncapped
 - LP CPU assigned capacity may be exceeded
 - Up to maximum
 - When there is unused processing power
 - Processors that are unused become available for uncapped partitions
 - Uncapped Weight
 - A number from 0 to 255 set for each uncapped partition
 - Defaults to 128
 - Available unused CPU capacity is distributed in proportion to weight value

iSeries. mySeries.

Today's LPAR

- Example

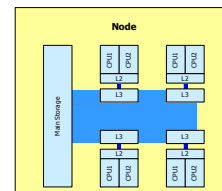


iSeries. mySeries.

Today's LPAR : Performance Aspects

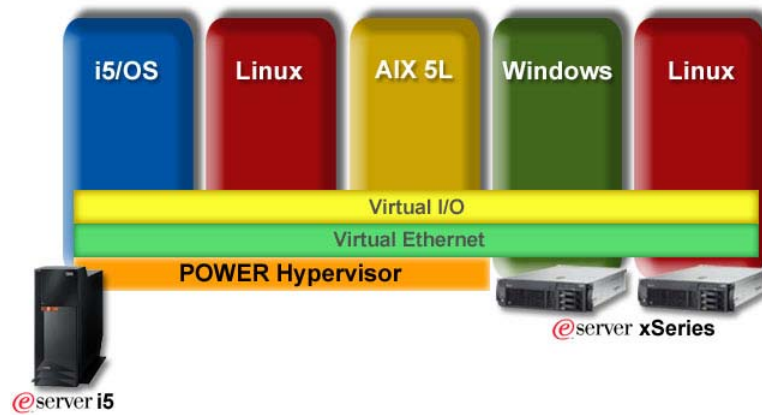
- At partition startup
 - Processor allocation in most efficient way
 - Dedicated processors favored over shared processors
- Partition Main Storage allocation
 - Power Hypervisor algorithm
- Memory Affinity and Partitioning
 - Partition type
- The Home Node concept and Partitioning
 - Automatic rebalancing for Partition configuration changes

i5/OS



iSeries. mySeries.

Power Hypervisor (pHyp)



iSeries. mySeries.

iSeries. mySeries.



V5R3 Hardware Overview

HSL-2/RIO-G Towers

iSeries. mySeries.

HSL-2/RIO-G Towers

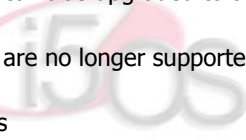
- HSL(-1)
 - HSL(-1) connectics
 - Speed = 1 GB/s
- HSL(-1)+
 - HSL(-1) connectics
 - Speed = 1 GB/s
 - Support for Clustering
- HSL-2
 - HSL-2 connectics
 - Speed = 1 GB/s
- HSL-2/RIO-G
 - HSL-2 connectics
 - Speed = 2 GB/s
- Optical HSL
 - Fiber
 - Speed = 512 MB/s



iSeries. mySeries.

HSL-2/RIO-G Towers

- Some existing HSL-2 towers can be upgraded to HSL-2/RIO-G
 - #5094, #5294, #5095, #0595
 - Speed = 2 GB/s
- Some existing HSL-2 towers can't be upgraded to the higher speed
 - #5088, #0588
 - Speed = 1GB/s
- Some existing HSL towers can't be upgraded to the higher speed
 - #5074, #5079, IXAs
- Some existing HSL towers are no longer supported !
 - #5075, #5078, #0578
- Loop design considerations
 - HSL, HSL-2 and HSL-2/RIO-G can coexist on a loop
 - Conversion cables
 - HSL to HSL, HSL-2 to HSL-2, HSL to HSL-2
 - Cable length restrictions
 - 10 meters



iSeries. mySeries.

HSL-2/RIO-G Towers

- All copper eServer i5 ports are HSL-2/RIO-G capable
 - ➔ Speed = 2 GB/s
- Optional Optical HSL adapter runs at reduced speed
 - ➔ Speed = 512 MB/s
- Third CPU regulator required for optional HSL-2/RIO-G adapter on 570
 - ➔ Optional HSL-2 / RIO-G adapter occupies PCI-X slot 6

i5 Model	Adapter Feature	Active Ports	Loop Type
520 (All)	N/A	2	Copper
570 #0919	N/A	2	Copper
570 #0920	#1800	4	2 Copper
570 #0920	#1801	4	1 Copper + 1 Optical

iSeries. mySeries.

HSL-2/RIO-G Towers

	820 830 840	810	825	870 890	520	570
Migration Tower 5065 / 5066	Y Y	N N	N N	N N	N N	N N
5074 / 5079 5078 / 0578 5075	Y Y Y(820)	Y Y N	Y Y N	Y Y N	Y N N	Y N N
5094 / 5294 5088 / 0588 5095 / 0595	Y Y Y	Y Y Y	Y Y Y	Y Y Y	Y* Y Y*	Y* Y Y*

(*) Upgrade to HSL-2/RIO-G

iSeries. mySeries.

HSL-2/RIO-G Cables

Length (m)	HSL to HSL	HSL to HSL-2	HSL-2 to HSL-2	Optical
1.20	-	-	1481	-
1.75	-	-	1307	-
2.50	-	-	1308	-
3.00	1460	-	-	-
3.50	-	-	1482	-
6.00	1461	1474	-	1470
10.00	-	1475	1483	-
15.00	1462	-	1485 (*)	-
30.00	-	-	-	1471
100.00	-	-	-	1472

(*) Reduced speed !

iSeries. mySeries.

iSeries. mySeries.



V5R3 Hardware Overview

New Adapters

iSeries. mySeries.

Other PCI-X Ultra-320 SCSI Controllers

- Disk / tape controllers for eServer with POWER5 processors
- Disk / tape controller #5715
 - Internal SCSI port
 - Up to six internal DASD
 - External SCSI port
 - Tape and CD/DVD
- Magnetic media controller #5712
 - Two external SCSI ports
 - Both support tape and CD/DVD
- External ports: 68-pin VHDCI physical interface.



iSeries. mySeries.

Imbedded DASD Controllers

- eServer model 520 and model 570 have imbedded DASD Controller
 - Support for up to 8 disk units on model 520
 - Support for up to 6 disk units on model 570
 - Mirroring or unprotected
 - No PCI-X slot used
 - Provides a slot for #5709
- RAID5 adapter #5709
 - Plugs in the imbedded DASD Controller
 - Can provide RAID5 protection
 - Optional on model 520
 - Required on model 570
 - 16 MB write cache



iSeries. mySeries.

PCI-X Ultra-320 SCSI Disk Controller

- #2780 Ultra-320 SCSI controller
 - ➔ 4 SCSI busses
 - ➔ 575 MB write cache
 - ➔ 256 MB read cache
 - ➔ Controls maximum of 20 disk units
- RAID-5 configuration options
 - ➔ Availability
 - ➔ Performance
 - ➔ Balance
 - ➔ Capacity



! PRODUCT PREVIEW !

iSeries. mySeries.

PCI-X (IOP-Less) Dual Port Ethernet Adapter

- Feature #5706 with UTP connections
- Feature #5707 with Optical connections
- First adapter for i5/OS that does not require an IOP
 - ➔ Some IOP functions included in adapter
 - ➔ Other IOP functions provided by the server
- Requires Power5 processors
- Two 1Gbps ports



iSeries. mySeries.

3592 Model J1A

- Tape Cartridge Capacity
 - 300GB native
 - Up to 900GB with compression
 - Rewritable or WORM (*)
 - 60GB short length cartridge
 - 30% of locate time
 - Rewritable or WORM (*)
- Attachment
 - Through fiber optical cable only
 - #2765 or #5704 adapters
- Transfer rate
 - Native 40MB/sec
- Throughput capability
 - Up to 20% more than LTO-2
 - Restore up to 390 GB/h from a single drive (**)



(*) WORM is not yet supported on iSeries. Support Planned 1H2005.
(**) Measured on an iSeries 825, 4-Ways, with #2844 IOPs, #2757 IOAs and 240 15 KRPM DASD Units !

iSeries. mySeries.

iSeries. mySeries.



V5R3 Hardware Overview

Capacity on Demand

iSeries. mySeries.

Capacity on Demand

- Unit is "processor day"
 - ➔ 1 processor day is 1 processor activated for 24 hours
- May 2004, GA 1 :
 - ➔ CUoD for IBM eServer i5
 - ➔ On/Off CoD for IBM eServer i5
- May 2004 Preview (*) :
 - ➔ CUoD for IBM eServer i5 processors and memory
 - ➔ On/Off CoD for IBM eServer i5 processors and memory
 - ➔ Reserve CoD for IBM eServer i5 processors
 - ➔ Trial CoD for IBM eServer i5 processors and memory

Processor Day Comparisons	iSeries	i5
Credit for 14 Processor Days with order of On/Off Enablement Feature	YES	NO
Orderable features for the prepay of 30 processor days to be used with On/Off CoD	YES	NO
30 <u>elapsed</u> days of no-charge capacity made available through Trial CoD	NO	YES
Orderable features for the prepay of 30 processor days to be used with Reserve CoD	NO	YES

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

iSeries. mySeries.

Capacity on Demand

- On/Off CoD
 - ➔ Requires to sign a contract
 - ➔ Requires to report activity on a monthly basis
 - ➔ Processors days are billed



iSeries. mySeries.

Capacity on Demand

- Reserve CoD
 - ➔ Does NOT requires to sign a contract
 - ➔ Does NOT requires to report activity on a monthly basis
 - ➔ Prepaid feature (30 processor days)
 - ➔ To be used with Uncapped Partitions
 - Reserve processors are placed into shared processor pool
 - Reserve processors are used when non-reserve processors are 100% utilized



iSeries. mySeries.

Capacity on Demand

- Trial CoD
 - ➔ Go to a website and make a trial request
 - For processor
 - For memory
 - For Both
 - ➔ Receive an activation key
 - ➔ Trial CoD activation is for 30 ELAPSED days



iSeries. mySeries.

iSeries. mySeries.



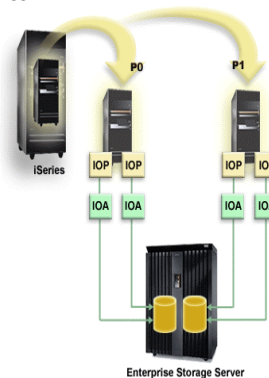
V5R3 Hardware Overview

SAN Multi-Path

iSeries. mySeries.

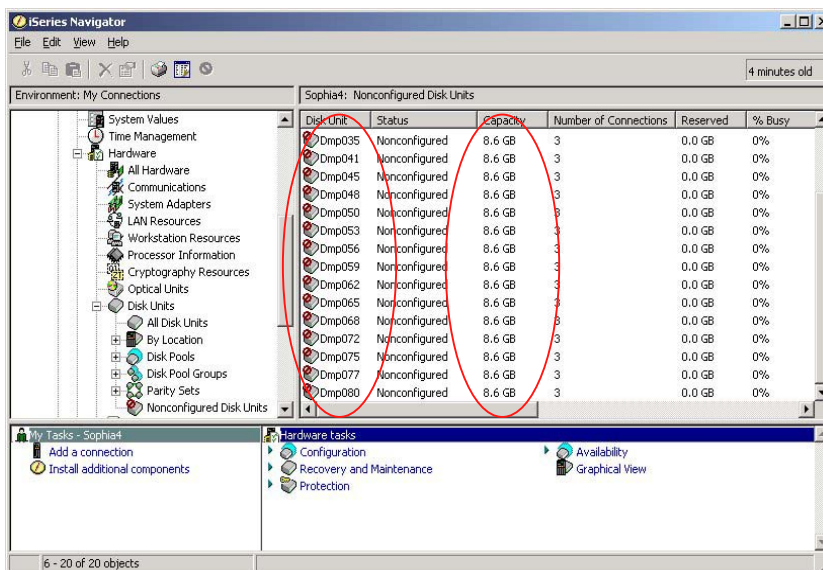
SAN Multi-Path for Enterprise Storage Server

- Multipath I/O provides IOP level redundancy
 - ➔ Improves fault tolerance
- Principle :
 - ➔ Disk units are named DmpXXX
 - ➔ The system is "aware" of the number of paths availables
 - Only one of them is active at a given time
- Rules :
 - ➔ Maximum 8 connections to the same LUN
 - ➔ Maximum 32 LUNs per IOA
 - Active or Pending



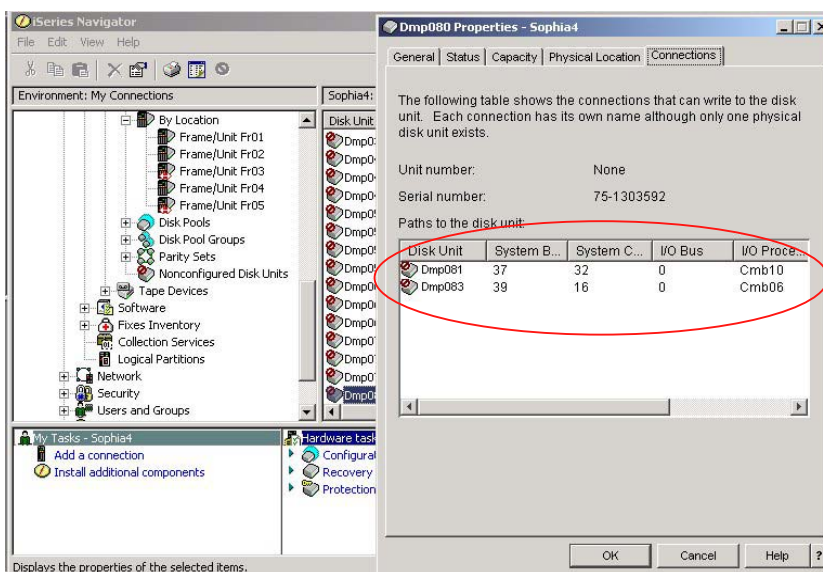
iSeries. mySeries.

SAN Multi-Path for Enterprise Storage Server



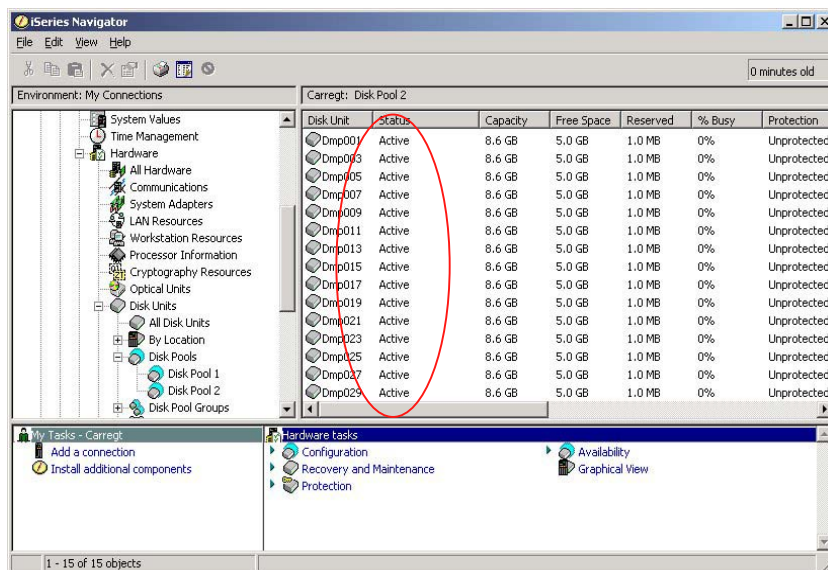
iSeries. mySeries.

SAN Multi-Path for Enterprise Storage Server



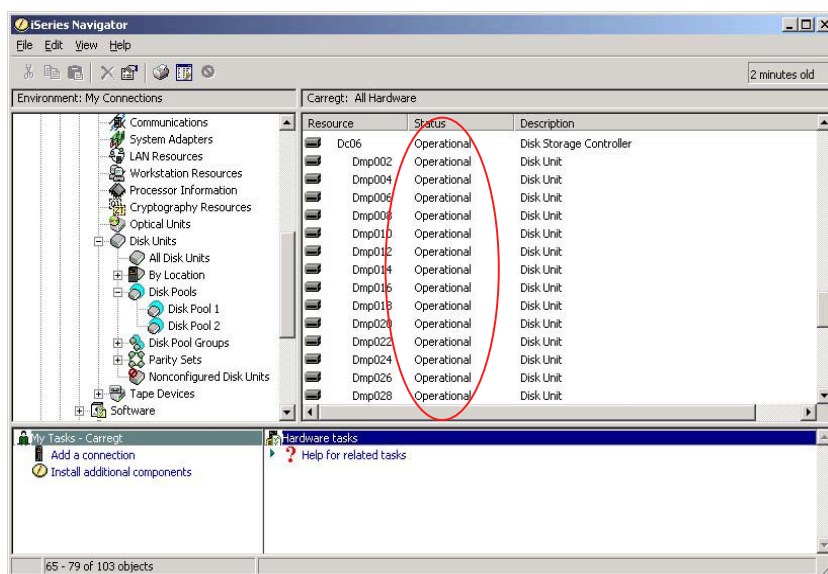
iSeries. mySeries.

SAN Multi-Path for Enterprise Storage Server



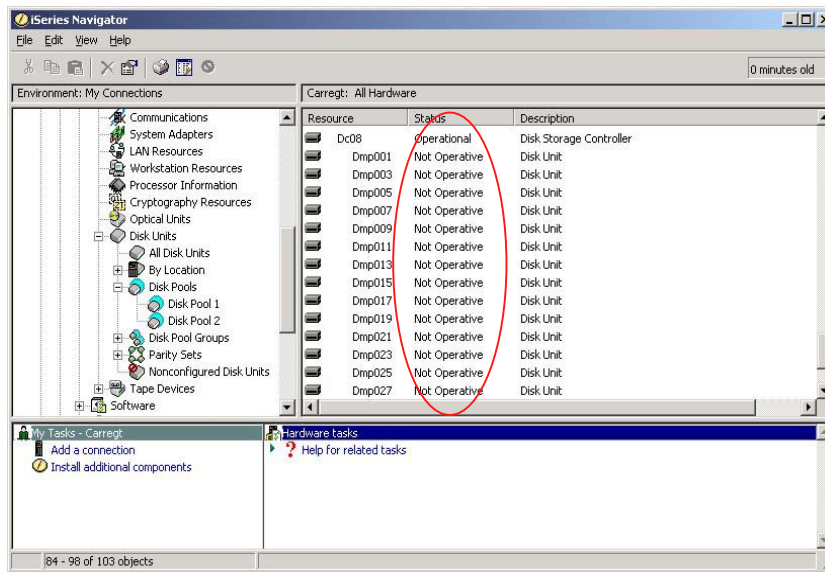
iSeries. mySeries.

SAN Multi-Path for Enterprise Storage Server



iSeries. mySeries.

SAN Multi-Path for Enterprise Storage Server



iSeries. mySeries.

iSeries. mySeries.

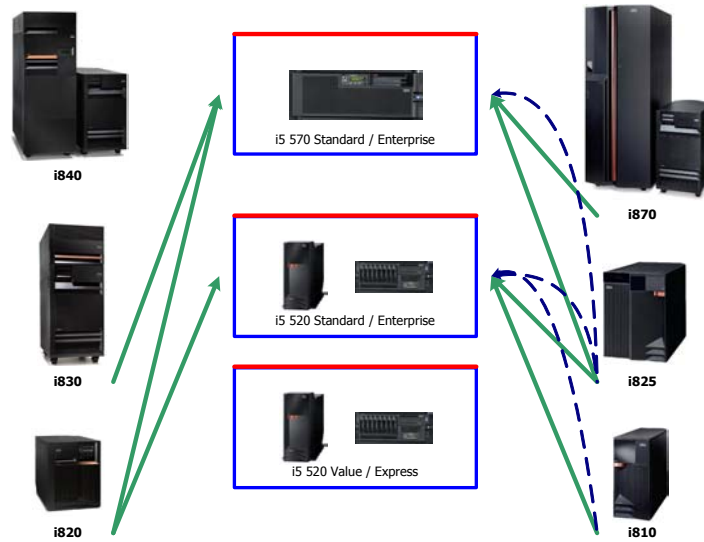


V5R3 Hardware Overview

Upgrades and Migrations

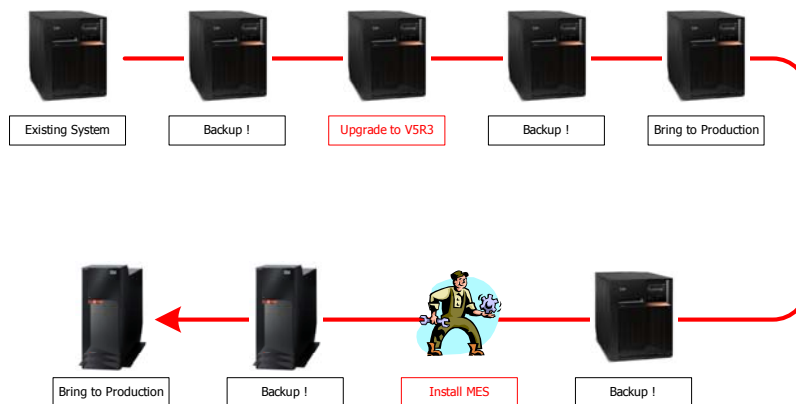
iSeries. mySeries.

Available Upgrade Paths



iSeries. mySeries.

Upgrade Process (Standalone)



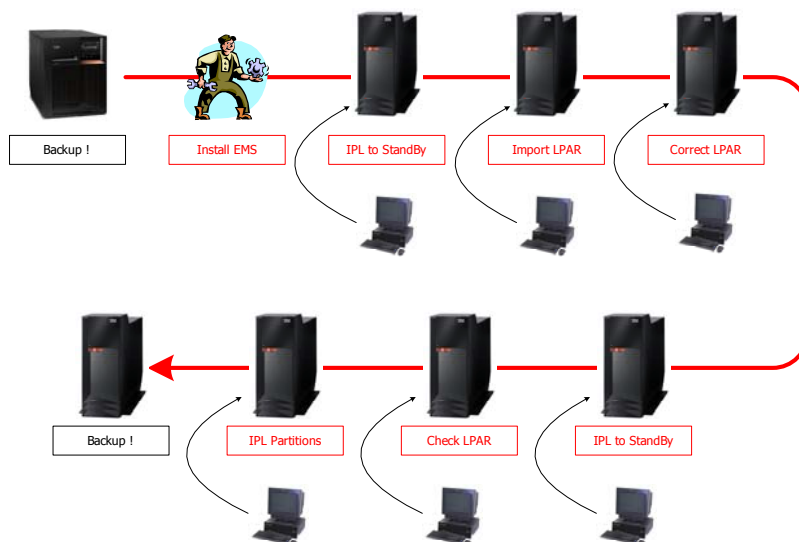
iSeries. mySeries.

Upgrade Planning (Standalone)

- **PLANNING IS MANDATORY !**
- Software Considerations
 - ➔ Upgrade to V5R3 : covered later into presentation
- Hardware Considerations
 - ➔ Disks
 - Quantities vs. Available Slots
 - Data Move vs. Unload/Reload
 - Load Source Migration ?
 - ➔ Number of HSL Loops
 - ➔ Number of Towers
 - ➔ Placement of Towers
 - ➔ Cables (HSL, SPCN, Power Cords, ...)
 - ➔ IXS
 - Not supported into CEC
 - ➔ IXA
 - Fully supported, but remains HSL(-1)
- **WRITE PROCEDURES !**

iSeries. mySeries.

Upgrade Process (LPARed)



iSeries. mySeries.

Upgrade Planning (LPARed)

- PLANNING IS MANDATORY
- Software Considerations
 - ➔ Upgrade to V5R3 : covered later into presentation
- Hardware Considerations
 - ➔ For EACH Logical Partition, Review all considerations for standalone systems !
 - ➔ HMC is required
 - ➔ Primary Partition will become next available LPID
 - Primary Partition can be dropped as part of the upgrade process
- WRITE PROCEDURES

iSeries. mySeries.

Other Upgrade Rules & Considerations

- CUoD
 - ➔ No permanent activations required for upgrades into model 570
- Editions
 - ➔ Existing edition upgrade rules remain the same
- Upgrades with LPAR
 - ➔ No primary partition
 - ➔ HMC required
 - ➔ LPAR partition information to partition profile information
- 9402 and 9404 type converted to 9406
 - ➔ Upgrades for these servers available third quarter of 2004
- DASD protection considerations when upgrading
 - ➔ Restricted number of DASD slots in eServer system unit
 - ➔ Extra services available

iSeries. mySeries.

Other Upgrade Rules & Considerations

- V5R3 is the last release to support the model 170, 250, 720, 730, 740
- V5R3 is the last release to support SPD hardware
 - Next release will no longer support
 - SPD I/Os
 - Migration Towers
 - SPD attached PCI towers (#5065 and #5066)
- V5R1 planned end of support September 2005



iSeries. mySeries.

iSeries. mySeries.

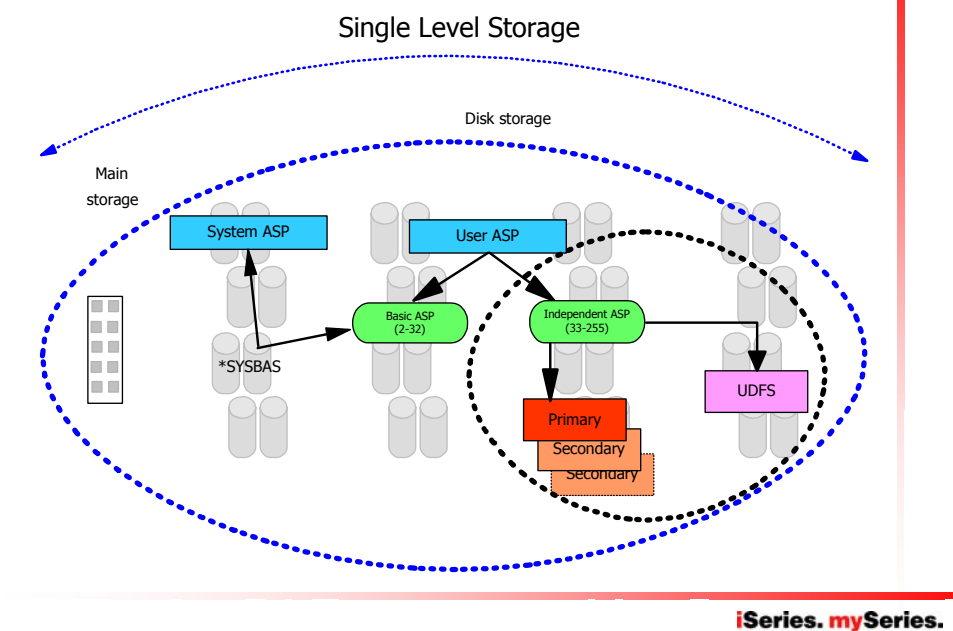


V5R3 Software Overview

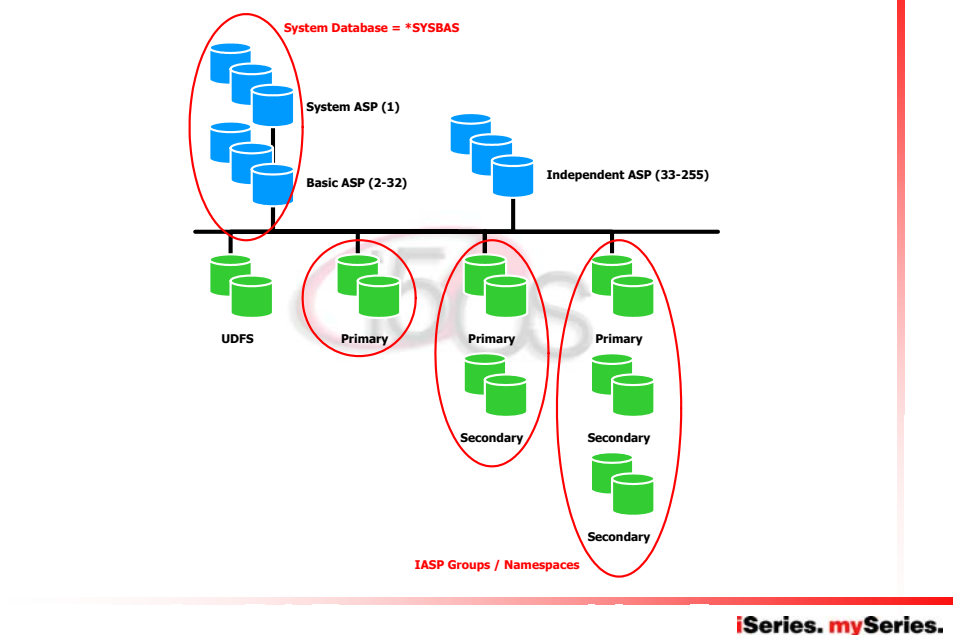
Cross-Site Mirroring (aka. XSM or GeoMirroring)

iSeries. mySeries.

Reminder : IASP, IASP Groups and Namespaces



Reminder : IASP, IASP Groups and Namespaces



What's new for IASPs int V5R3 ?

- New object support
 - ➔ *OUTQ and *SPLF
 - A library located into an IASP can now contain an output queue
 - Up to 10 million spool files in a single IASP
 - ➔ A writer can be started
 - The IASP must be in its namespace
 - ➔ Spool files will be decoupled from the job
 - System value QSPFLACN
 - Spool files can be found using JOBSYSNAME and CRTDATE
 - ➔ Commands and APIs adapted to use IASP specification
 - CHGSPLFA, DLTSPLF, HLDSPLF, RLSSPLF, WRKSPLF
 - Auditing outfiles QASYSFJ5 and QASYPOJ5 changes
 - ➔ Reclaim Spool Storage (RCLSPLSTG) restriction
 - RCLSPLSTG will not cleanup IASPs
 - Cleanup is performed at IASP's vary on time
- Performance enhancements
 - ➔ Fast spool file recovery
 - Compared to IPL recovery time
 - ➔ Faster DB cross reference synchronization

iSeries. mySeries.

Reminder : IASPs & IASP Object Support

Objects Supported into IASPs		
*ALRTBL	*IGCDCT	*QMFORM
*BLKSF	*JOBDB	*QMQR
*BNDDIR	*JRN	*QRYDFN
*CHTFMT	*JRNRCV	*SBS
*CHRSF	*LIB	*SCHIDX
*CLD	*LOCALE	*SPADCT
*CLS	*MEDDFN	*SPLF *** NEW ***
*CMD	*MENU	*SQLPKG
*CRQD	*MGTCOL	*SQLUDT
*CSI	*MODULE	*SRVPGM
*DIR	*MSGF	*STMF
*DTAARA	*MSGQ	*SVRSTG
*DTADCT	*NODGRP	*SYMLNK
*DTAQ	*NODL	*TBL
*FCT	*OUTQ *** NEW ***	*USRIDX
*FIFO	*OVL	*USRQ
*FILE	*PAGDFN	*USRSPC
*FNTRSC	*PAGSEG	*VLDL
*FNNTBL	*PDG	*WSCST
*FORMDF	*PGM	
*FTR	*PNLGRP	
*GSS	*PSFCFG	

iSeries. mySeries.

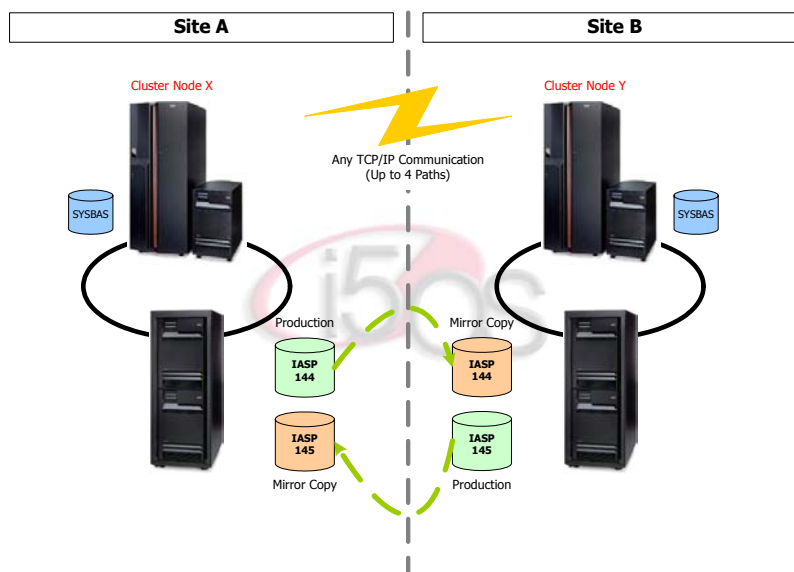
Reminder : IASPs & IASP Object Support

Objects NOT Supported into IASPs	
*AUTL	*IPXD
*CFGL	*JOBQ
*CNNL	*JOBSCD
*COSD	*LIND
*CRG	*MODD
*CSPMAP	*M36
*CSPTBL	*M36CFG
*CTLD	*NTBD
*DDIR	*NWID
*DEV	*NWS
*DOC	*PRDAVL
*DSTMF *** ALERT ***	*PRDDFN
*EDTD	*PRDL
*EXITRG	*RCT
*FLR	*SOCKET
*IGCSRT	*SSND
*IGCTBL	*S36
*IMGCLG	*USRPRF

(*) ALERT : SAV of QNTC previously mentioned as supported

iSeries. mySeries.

Cross-Site Mirroring (XSM)



iSeries. mySeries.

Cross-Site Mirroring (XSM) : How does it work ?

- Data replication from one IASP to another IASP
 - An i5/OS Storage Management page-level replication
 - Logical system controlled mirroring
 - Guarantees integrity and sequence
 - Communication :
 - Data transmitted by TCP/IP connections
 - Up to 4 TCP/IP interfaces
 - Any physical communication fabric
 - Use round-robin with load and bandwidth considerations
 - Modes of operations :
 - Synchronous mode
 - I/O acknowledgement when I/O is completed by both source and target
 - Safest mode, if performance is acceptable
 - Asynchronous mode
 - I/O acknowledgement when I/O is completed on source and received for processing by target
 - Target can have a number of pages pending
 - Mirror copy cannot become production until all pending changes are processed

iSeries. mySeries.

Cross-Site Mirroring (XSM) : How does it work ?

- Data replication from one IASP to another IASP
 - Timeout :
 - Time in seconds that source will wait for target and then suspend mirroring
 - When target is available again, mirroring is "resumed"
 - After a suspend, a complete synchronization is required !
 - Consider redundant communication paths
 - Priority
 - Determines the amount of system resources used to achieve XSM
 - High, Medium, Low
 - Impact on resume time
 - Impact on performance (from 15% to 20% CPU overhead)

iSeries. mySeries.

Cross-Site Mirroring (XSM) : How does it work ?

- Independent from DASD size and protection
 - No need for the exact same size
 - No need for the same protection
 - Unprotected, Mirroring and RAID-5 are possible
 - Start configuration from server owning smallest size IASP
 - Swap roles when still empty as required
 - Threshold value & threshold messages
- Good housekeeping required
 - Changes of user dependent objects in *SYSBAS
 - Subsystem descriptions, user profiles, ...
 - XSM in combination with :
 - Remote journaling
 - High Availability business partner software
- Planning required !

iSeries. mySeries.

Cross-Site Mirroring (XSM) : Operational Considerations

- Dependencies
 - IASP state is synchronized automatically
 - When production is made "Available", the mirrored copy is made "Varied on"
 - No concurrent operations or data access on mirrored copy when "Varied on"
- Recovery time out
 - Time before XSM will suspend
 - Consider redundant communication paths
- Performance
 - Input / Output intensive work
 - Read to write ratio
 - Asynchronous compared to synchronous
 - Main Storage
- Consequences of detaching and attaching a mirrored IASP copy
 - Resynchronization time depends on size and on communication bandwidth
 - Most environments not suitable for backup to tape operations
 - Create a different device description before using a detached mirrored copy

iSeries. mySeries.

Cross-Site Mirroring (XSM) : Operational Considerations

The image shows two screenshots of the IBM Disk Pools management console. The top screenshot shows the 'Disk Pools - Richsam' window with a table of disk pools. The bottom screenshot shows the 'Disk Pools - lun11a0d' window with a table of disk pools.

Disk Pool	Capacity	% Used	Type	Rule - Geog...	Mirror Co...	Mirror Co...	Mode - Geograp...	Threshold	Status	Balance S...	Protecte...	Disk Units
Disk Pool 1	77.3 GB	81%	System	production c...	active	usable	Synchronous	90%	Available	Balanced	0.0 GB	9
Disk Pool 144 (...)	17.2 GB	0%	Primary	production c...	active	usable	Synchronous	90%	Available	Never bal...	0.0 GB	2

Disk Pool	Capacity	% Used	Type	Rule - Geog...	Mirror Co...	Mirror Co...	Mode - Geograp...	Threshold	Status	Balance S...	Protecte...	Disk Units
Disk Pool 1	17.5 GB	56%	System	production c...	active	usable	Synchronous	90%	Available	Never bal...	0.0 GB	1
Disk Pool 144 (...)	17.5 GB	0%	Primary	production c...	active	usable	Synchronous	90%	Pending	Never bal...	0.0 GB	1

iSeries. mySeries.

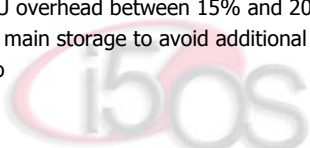
Cross-Site Mirroring (XSM) : Operational Considerations

- Detach Mirror Copy
 - ➔ When required to access to mirror copy
 - Data mining, Reports, Saves, Tests, ...
 - ➔ When detached, changes are no longer mirrored
- Reattach Mirror Copy
 - ➔ When reattaching, a complete synchronization is required !
 - ➔ Mirrored copy is unusable until synchronization is complete
- Suspend GeoMirroring
 - ➔ When suspended, changes are no longer mirrored
- Resume GeoMirroring
 - ➔ When resuming, a complete synchronization is required !
 - ➔ Mirrored copy is unusable until synchronization is complete

iSeries. mySeries.

Cross-Site Mirroring (XSM) : Operational Considerations

- About Synchronization
 - ➔ Copy is zeroed out and completely rewritten
 - ➔ Warning !
 - Bandwith, I/O, Time consuming
 - Consider blocking access to data during synchronization !
- About Performances
 - ➔ Tests showed a CPU overhead between 15% and 20% with XSM active
 - ➔ Consider additional main storage to avoid additional paging
 - ➔ Read vs. Write ratio



iSeries. mySeries.

iSeries. mySeries.



V5R3 Software Overview

Save/Restore Enhancements

iSeries. mySeries.

General Enhancements for Save

- New System Value QSAVACCPH
 - ➔ *SYSVAL default for several save commands
- SAVSYS
 - ➔ SAVSYS allowed in batch mode thru BRMS
 - Without BRMS console monitor !
 - Using subsystem Q1ACTLSBS
 - Using a 'restricted system time limit'
 - SRC A900:3C70 is displayed while the SAVSYS runs
- SAVLIB(*NONSYS) and SAVLIB(*ALLUSR)
 - ➔ Library order change
 - begins with QSYS2, QGPL & QUSRSYS
 - These libraries contains numerous object required before restoring any other object
 - ➔ Starting library : parameter STRLIB
- Data compression parameters
 - ➔ Save to savefile or to optical device
 - ➔ Select one of these algorithms
 - *LOW = SNA
 - *MEDIUM = TERSE
 - *HIGH = LZ1

iSeries. mySeries.

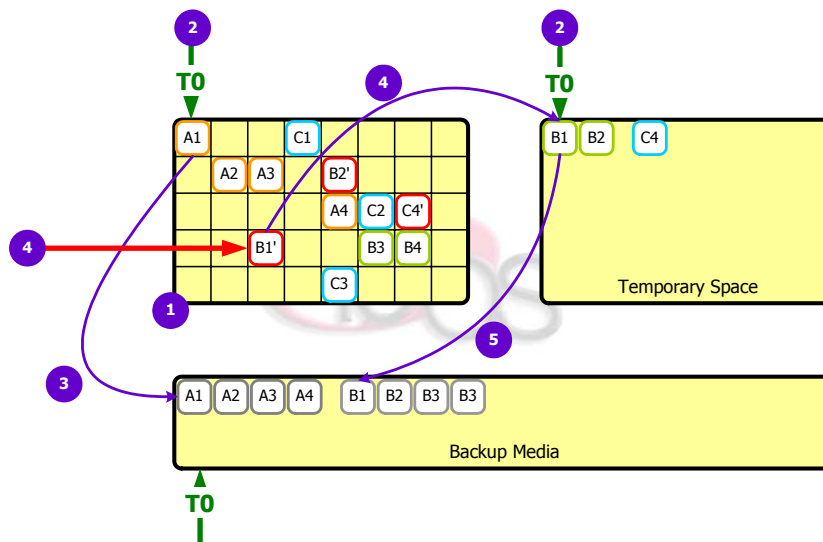
General Enhancements for Restore

- Parameter OMTOBJ for RSTLIB, RSTOBJ, RSTCFG
 - ➔ Up to 300 generic or specific names
- Parameter OMTLIB for RSTLIB
 - ➔ Now support generic values !



iSeries. mySeries.

Reminder : Save While Active



iSeries. mySeries.

« Ragged » Save While Active

- Save While Active with partial transactions
 - Purpose
 - Keep critical applications running
 - Classic 'Save While Active' means 'not too active'
 - Methodology
 - Pre-V5R3 SWA
 - Achieve consistency at save time
 - Wait until all in-flight transactions close
 - Pay the price every save
 - V5R3 SWA, with partial transactions
 - Achieve consistency post-restore
 - Don't wait until all in-flight transactions close
 - Worry about consistency if object ever restored
 - Pay the recovery price rarely

iSeries. mySeries.

« Ragged » Save While Active

- Save Command Changed
 - ➔ Target Release must be V5R3
 - ➔ Specify *NOCMTBDY

```

Session A - [24 x 80]
Save Library (SAVLIB)

Type choices, press Enter.

Additional Parameters
Target release . . . . . > *CURRENT      *CURRENT, *PRV, *V5R10...
Save active . . . . . > *SYNCLIB       *NO, *LIB, *SYNCLIB, *SYSDFN
Save active wait time:
Object locks . . . . . > 120           0-99999, *NOMAX
Pending record changes . . . . . > *NOCMTBDY  0-99999, *LOCKWAIT...
Other pending changes . . . . . > 120       0-99999, *LOCKWAIT, *NOMAX

F3=Exit  F4=Prompt  F5=Refresh  F10=Additional parameters  F12=Cancel
F13=How to use this display  F24=More keys

Bottom
08/037
    
```

iSeries. mySeries.

« Ragged » Save While Active

- Recovery after the Restore
 - ➔ Restore Journals, Receivers and Files
 - Restore with OUTPUT(*PRINT)
 - ➔ Objects contains partial transactions information
 - Partial transactions exist ?
 - Journal receiver information
 - ➔ Files with partial transactions cannot be opened

```

Session A - [24 x 80]
Display Spooled File

File . . . . . QPDSPFD      Page/Line  2/36
Control . . . . .          Columns  1 - 78
Find . . . . .

*.....1.....2.....3.....4.....5.....6.....7.....
Access path logical reads . . . . .
Access path physical reads . . . . .
Implicit access path sharing . . . . . No
Last change date/time . . . . . 15/05/04 10:04:40
Last save date/time . . . . . 14/05/04 00:19:47
Last restore date/time . . . . . 17/07/99 12:24:24
Last used date . . . . . 16/05/04
Days used count . . . . . 234
Reset date . . . . .
Object restored with partial transactions,
apply journal changes required . . . . . *NO
Partial transaction exists,
roll back ended . . . . . *NO
Starting journal receiver for apply . . . . .
Library . . . . .
RSP Device . . . . .

F3=Exit  F12=Cancel  F19=Left  F20=Right  F24=More keys

More...
03/022
    
```

iSeries. mySeries.

« Ragged » Save While Active

- Recovery, the final steps
 - ➔ Have recent receivers with the transaction complete ?
 - Forward Recovery = APYJRNCHG
 - ➔ Have no recent receiver, but receiver with the save operation included ?
 - Backward Recovery = RMVJRNCHG
 - Needs receivers that include the start of the transaction
 - ➔ No receiver at all ?
 - « Heroic » or « Suicidal » option = CHGJRNOBJ PTLTNS(*ALWUSE)
 - Make the object accessible « AS-IS » !
 - Most environments will NOT accept the consequences !

iSeries. mySeries.

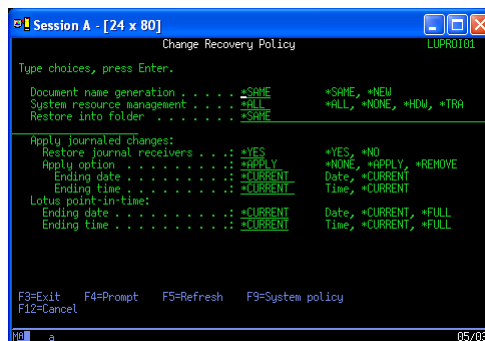
« Ragged » Save While Active

- Rules !
 - ➔ Change receivers on a regular basis
 - Reduces entries, Simplify searches
 - ➔ Save receivers on a regular basis
 - Hourly for example
 - ➔ Good housekeeping will made recovery possible !

iSeries. mySeries.

« Ragged » Save While Active

- BRMS and Recovery of Partial Transactions
 - New recovery policy options
 - BRMS will ensure all needed receivers will be available
 - STRRCYBRM ... OPTION(*APYJRNCHG)
 - BRMS will assist in selecting journals and applying changes to objects



iSeries. mySeries.

Other BRMS Enhancements

- Duplication of BRMS media
 - No longer required on the owning system
 - Allowed on any other system on the network
 - DUPMEDBRM ... FROMSYS(<system_name>)
 - Beware of optimum block size of involved tape drives
- On-line Lotus Domino backup
 - Automatically saves as full where incremental is not possible
- New "Reclaim Media" wizard
 - Help to moves data between volumes to free up tapes
 - Two tape drives required

iSeries. mySeries.

About Optimum Block Size

Tape Drive Model	Format/Density	Maximum Optimum Block Size
MLR3 - 25GB	*MLR3	256K
SLR100 - 50GB	*SLR100	256K
Model 3590	*FMT3590	256K
Model 3590E	*FMT3590E	256K
Model 3590H	*FMT3590H	256K
Model 3570-Bxx	*FMT3570	256K
Model 3570-Cxx	*FMT3570E	256K
Models 358x	*ULTRIUM1	256K
3490 Model F - 18 track	*FMT3480	64K
3490 Model F - 36 track	*FMT3490E	256K
7208 Model 342	*FMT20GB	240K
7208 Model 345	*FMT60GB	240K
VXA-2	*VXA2	240K

iSeries. mySeries.

iSeries. mySeries.



V5R3 Software Overview

Time Enhancements

iSeries. mySeries.

i5/OS Time Enhancements

- New Multiple Time Zone Support – Stage 1
 - ➔ Time is now maintained using UTC
 - ➔ New Time Zone Objects
 - ➔ New System Value QTIMZON
 - ➔ New Job Attributes (RO)
- New Time Adjustment
 - ➔ New Daylight Saving Time support
 - ➔ New SNTP/NTP capabilities
 - ➔ New time adjustment method



iSeries. mySeries.

i5/OS Time Zone Description Objects

- New *TIMZON Object Type
 - ➔ Offset from UTC
 - ➔ Zone Names
 - Standard Time
 - Daylight Saving Time
 - ➔ Start & End of DST
 - Month (*JAN, *FEB, ...)
 - Day (*MON, *TUE, ...)
 - Relative day of month
 - Time (02:00, 03:00, ...)

A screenshot of a terminal window titled "Session A - [24 x 80]". The window displays the "Time Zone Description Commands" menu. The menu lists several commands and related command menus. The commands are: 1. Change Time Zone Description (CHGTIMZON), 2. Create Time Zone Description (CRTTIMZON), 3. Delete Time Zone Description (DELTIMZON), and 4. Work with Time Zone Desc (WRKTIMZON). The related command menus are: 5. Network Time Protocol Commands (CHDNT). The menu is displayed in a green-on-black format. The bottom of the screen shows the prompt "Selection or command" and a cursor. The footer of the terminal window displays "P3=Exit P4=Prompt P9=Retrieve F12=Cancel F15=Major menu" and "IBM CORPORATION. 1988, 2003." The date "21/007" is also visible in the bottom right corner.

iSeries. mySeries.

i5/OS Time Zone Description Objects

- Many, many *TIMZON description provided with i5/OS

```

Session A - [24 x 80]
Work with Time Zone Descriptions
Type options, press Enter.
2=Change 4=Delete 5=Display details 6=Print 8=Update system value
-----Standard Time-----
Opt Offset Zone Abbr Full
- +03:00 QP0300UTC UTC+03:00 UTC+03:00 Standard Time
- +02:00 QP0200EET EET Eastern European Time
- +02:00 QP0200EET2 EET2 Eastern European Time
- +02:00 QP0200SAST SAST South African Standard Time
- +02:00 QP0200UTC UTC+02:00 UTC+02:00 Standard Time
- +01:00 QP0100CET CET Central European Time
- +01:00 QP0100CET2 CET2 Central European Time
- +01:00 QP0100CET3 CET3 Central European Time
- +01:00 QP0100UTC UTC+01:00 UTC+01:00 Standard Time
Parameters or command
F3=Exit F4=Prompt F5=Refresh F6=Create F9=Retrieve
F11=Display DST name F12=Cancel F17=Top F18=Bottom

```

iSeries. mySeries.

i5/OS Time Zone System Values

- New Time Zone support
 - QTIMZON system value
 - Specifies the time zone information used to calculate local system time
 - QUTCOffset system value
 - Cannot be changed if QTIMZON is used
 - Daylight Saving Time
 - Configured by specifying the corresponding value for QTIMZON

```

Session A - [24 x 80]
Change System Value
System value . . . . . QTIMZON
Description . . . . . Time zone
Type choice, press Enter.
Time zone . . . . . QP0100CET2 Name
Associated settings:
Offset . . . . . +02:00
Full name . . . . . Central European Daylight Saving Time
Abbreviated name : CEST
F3=Exit F4=Prompt F5=Refresh F12=Cancel

```

iSeries. mySeries.

i5/OS Time Zone System Values

- QDATETIME
 - ➔ System date and time system value
 - ➔ Composed of system values QDATE and QTIME
 - Format : YYYYMMDDHHMMSSmmmmpppp
 - ➔ Changes need *ALLOBJ special authority
- QTIMADJ
 - ➔ Time adjustment system value
 - ➔ Identify the software to use to adjust system clock
 - ➔ Keep system clock synchronized with external time source
 - QIBM_OS400_SNTP

iSeries. mySeries.

i5/OS Time Zone Job Attributes

- Job Attributes for:
 - ➔ Time Zone
 - ➔ Local Job Date and Time
 - ➔ Time Zone Abbreviated and Full Name
 - ➔ UTC Time Offset
- In V5R3 Job Attributes are Read Only
 - ➔ Set based on system value QTIMZON
 - ➔ Command and API Support to Retrieve Values
 - RTVJOBA, ...
- Future ?
 - ➔ Stage 2 ...

iSeries. mySeries.

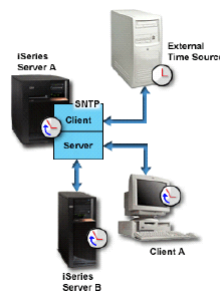
Simple Network Time Protocol (SNTP)

- Understand
 - NTP = Network Time Protocol
 - Most used protocol to synchronize time
 - Client query multiple servers
 - Servers answers NTP 64-bits packet
 - Time elapsed since 01/01/1900
 - Precision : 200 picoseconds
 - Client computes average time
 - SNTP = Simple Network Time Protocol
 - Simplified NTP
 - Client query only one server
- V5R1 / V5R2
 - OS/400 integrated its own SNTP client
 - SNTP client synchronize an internal software clock, not system time (QTIME)
 - APIs available to retrieve software clock to synchronize system time (QTIME)

iSeries. mySeries.

i5/OS SNTP/NTP Capabilities

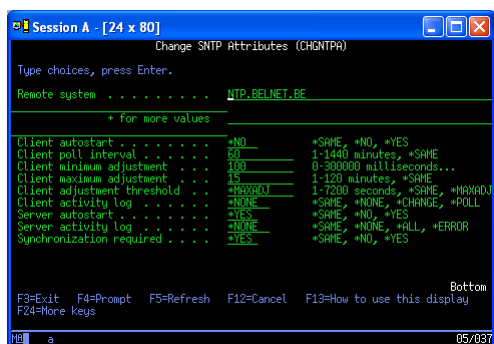
- V5R3 :
 - i5/OS updates directly system clock
 - Not supported on models 170, 250, 7xx
 - Want to continue with old method ?
 - CRTDTAARA DTAARA(QUSRSYS/QTOTSNTP) TYPE(*CHAR)
LEN(9) VALUE(*SOFTWARE) AUT(*USE)
 - i5/OS integrates its own NTP server
 - Use your iSeries as a time source !
 - Client and Server can be used concurrently
 - SNTP client obtains exact time from an outside source
 - NTP server send that time to clients within your network



iSeries. mySeries.

i5/OS SNTP/NTP Capabilities

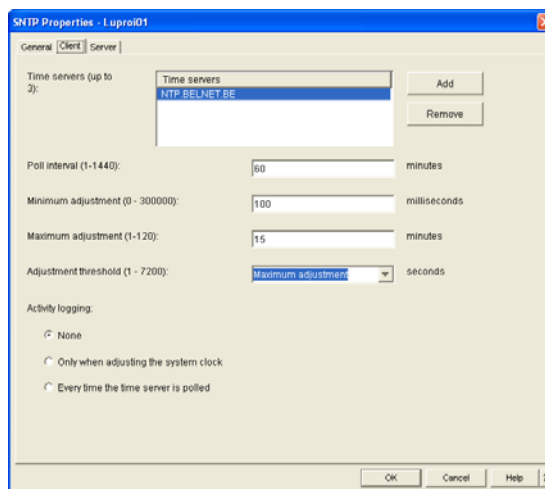
- Configuration via 'Green Screen' :



iSeries. mySeries.

i5/OS SNTP/NTP Capabilities

- Configuration via 'iSeries Navigator' :



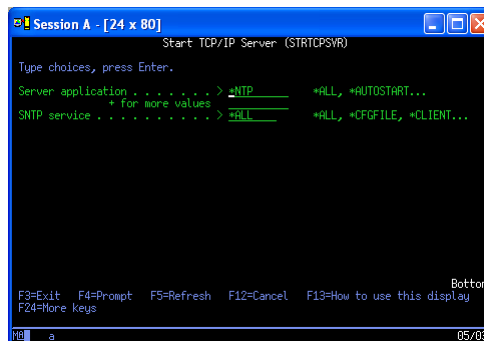
iSeries. mySeries.

i5/OS SNTP/NTP Capabilities

- Start/Stop via 'Green Screen' or 'iSeries Navigator' :

- STRTCPSVR *NTP

- Server application (SERVER) parameter
 - *NTP
- SNTP service (NTPSRV) parameter
 - *CLIENT
 - *SERVER
 - *ALL



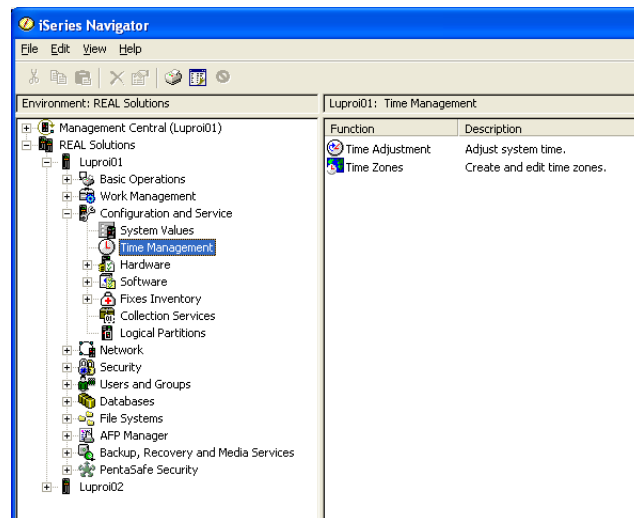
iSeries. mySeries.

i5/OS Time Adjustment Capabilities

- Time is now maintained using UTC
- UTC value is set during installation of V5R3
- UTC time can be Speed Up or Slowed Down
 - Supported models
 - YES for i5 5xx and iSeries 8xx
 - NO for 170, 250, 7xx
 - Thru API QWCADJTM
 - Provide adjustment amount (number of microseconds)
 - Provide adjustment direction (0 = SpeedUp, 1 = SlowDown)
 - Thru iSeries Navigator

iSeries. mySeries.

i5/OS Time Adjustment Capabilities



iSeries. mySeries.

i5/OS Time Adjustment Capabilities

- Recommendations
 - Get the Right QTIMZON Setting
 - QWCTIMZON *DTAARA
 - Attended IPL
 - Post Install – CHGSYSVAL or iSeries Navigator
 - Use Time Adjustment rather than CHGSYSVAL(QTIME)
 - Stop Using Scheduled Jobs to Change QTIME for Daylight Saving Time



iSeries. mySeries.

iSeries. mySeries.



V5R3 Software Overview

Control Language ... Yes, you heard CL !

iSeries. mySeries.

What's New with CL Programming Language ?

- Multiple display and/or database files per program
- New support for integer variables
- New flow control instructions



iSeries. mySeries.

CLP : Multiple Files in CL Program

- Up to 5 display or database files per procedure or OPM program
- Declaration :
 - DCLF FILE(<my_library>/<my_file>) OPNID(<my_open_id>)
 - OPNID value : identifies file and file fields within the program
- Fields and Indicators Usage :
 - &<my_open_id>_<my_field_name>
 - &<my_open_id>_INxx
- CL commands with OPNID parameter:
 - DCLF, SNDRCVF, SNDF, RCVF, WAIT
- Example

```
DCLF FILE(QGPL/GA1FILE) OPNID(GAID1)
:
RCVF OPNID(GAID1)
:
IF COND(&GAID1_QUANTITY *EQ 0) THEN( ..
:

```

iSeries. mySeries.

CLP : Support for Integer Variables

- New TYPE values on DCL statement
 - Values *INT (INTEger) and *UINT (Unsigned INTEger)
 - LEN(2) and LEN(4) supported

iSeries. mySeries.

CLP Loops : Control Flow Enhancements

- New CLP Commands
 - ➔ DOWHILE
 - ➔ DUNTIL
 - ➔ DOFOR
 - ➔ ITERATE and LEAVE
 - ➔ SELECT (with WHEN and OTHERWISE)
- ENDDO marks the end of a loop, regardless of which type loop
- Loops can be nested, up to 25 levels

iSeries. mySeries.

CLP Loop : DOWHILE

- Same Condition (COND) support as in the IF statement
- Evaluates the COND at the "top" of the loop
- Example:

```
DOWHILE (&I *LE 10)
:
:
:
ENDDO
```

iSeries. mySeries.

CLP Loop : DOUNTIL

- Same Condition (COND) support as in the IF statement
- Evaluates the COND at the "bottom" of the loop
- Example:

```
DOUNTIL (&I *GT 10)
:
:
:
ENDDO
```



iSeries. mySeries.

CLP Loop : DOFOR

- Syntax : DOFOR VAR() FROM() TO() BY()
 - VAR must be of variable type *INT or *UINT
 - FROM and TO can be integer constants, expressions or variables
 - BY must be an integer constant (can be negative)
 - It defaults to '1', all other parameters are required.
 - FROM / TO expressions are evaluated at the loop initiation
 - TO evaluated after increment
- Checks for loop exit at "top" of loop

- Example:

```
DOFOR VAR(&I) FROM(1) TO(10) BY(2)
:
:
:
ENDDO
```



iSeries. mySeries.

CLP Loops : ITERATE

- Allowed only within groups DOWHILE, DOUNTIL, DOFOR
- Support LABEL to allow jump out of multiple (nested) loops
- Defaults to *CURRENT loop
- Passes control to end of loop and test loop exit condition
- Example :

```
DOWHILE (&I *LE 10)
:
IF COND(<condition>) THEN(ITERATE)
:
:
ENDDO
```

iSeries. mySeries.

CLP Loops : LEAVE

- Allowed only within groups DOWHILE, DOUNTIL, DOFOR
- Support LABEL to allow jump out of multiple (nested) loops
- Defaults to *CURRENT loop
- Passes control to next CL statement following loop ENDDO
- Example :

```
DOWHILE (&I *LE 10)
:
IF COND(<condition>) THEN(LEAVE)
:
:
ENDDO
```

iSeries. mySeries.

CLP Loops : SELECT

- SELECT starts a group of commands
- ENDSELECT ends the group
- The group must have at least one WHEN statement
- OTHERWISE statement optional in a group
 - ➔ Can be used if no WHEN statement COND = True
 - ➔ Only parameter is CMD (like ELSE command)

- Example :

```
SELECT
WHEN COND(<condition_1>) THEN(<command_1>)
:
WHEN COND(<condition_n>) THEN(<command_n>)
OTHERWISE CMD(<command-x>)
ENDSELECT
```

iSeries. mySeries.

iSeries. mySeries.



V5R3 Software Overview

IFS Antivirus Scanning

iSeries. mySeries.

IFS Antivirus Scanning

- i5/OS cannot be infected by 'viruses'
 - i5/OS inherits OS/400 Object Orientation
 - A program (*PGM) is not a file (*FILE)
 - i5/OS do not 'execute' files
 - i5/OS do not allow to 'open' programs
- i5/OS is a file server
 - IFS capabilities
 - NetServer
 - Network File System (NFS)
 - ...
 - IFS can store files infected by viruses



iSeries. mySeries.

IFS Antivirus Scanning

- What's new for V5R3 ?
 - Enablement structure handle viruses stored into IFS
 - The enablement structure itself DO NOT scan, detect or clean viruses
 - The enablement structure provides enhancements for third-party solutions



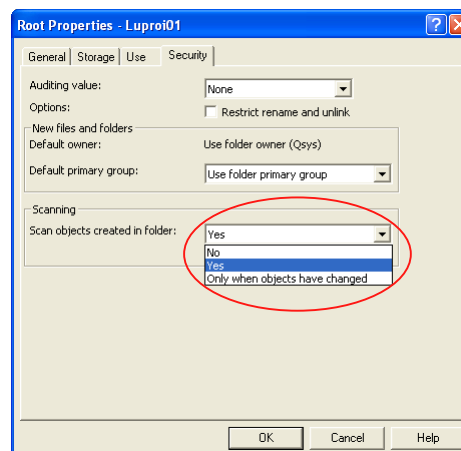
iSeries. mySeries.

IFS Antivirus Scanning

- How does it work ?
 - New Exit Points
 - QIBM_QP0L_SCAN_OPEN
 - QIBM_QP0L_SCAN_CLOSE
 - New System Values
 - QSCANFS
 - Activate or deactivate scanning
 - *NONE, *ROOTOPNUD
 - Default value is *ROOTOPNUD
 - QSCANFCTL
 - Define scanning conditions
 - *NONE, *ERRFAIL, *FSVRONLY, *NOFAILCLO, *NOPOSTRST, *NOWRTUPG, *USEOCOATR
 - Default value is *NONE

iSeries. mySeries.

IFS Antivirus Scanning



iSeries. mySeries.

iSeries. mySeries.



V5R3 Software Overview

Other Enhancements

iSeries. mySeries.

Other Enhancements ...

- Application Development
 - ➔ Compilers
 - ➔ WebFace
- Communications
 - ➔ EIM
 - ➔ HTTP
 - ➔ LDAP
 - ➔ PPP
 - ➔ QoS
 - ➔ VPN
- iSeries Access
 - ➔ For Windows
 - Itanium Support
 - ➔ For Web
 - ➔ For Wireless
 - ➔ iSeries Navigator
 - Lots of Enhancements !
- iSeries Operations Console
 - ➔ New interface
 - ➔ More robust, error recovery
 - ➔ Control panel
 - ➔ Console takeover
- Database
 - ➔ General SQL Enhancements
 - New functions, new types
 - ➔ Journalling
 - Capacities & performance
 - ➔ QAQQINI
 - New options
 - ➔ RGZPFM
 - On-line and/or parallel
 - ➔ SQL Query Engine (SQL)
 - Performance
- Integrated File System (IFS)
 - ➔ On-line Conversions to *TYPE2
 - ➔ Performance
 - ➔ Virus Scanning
- Output
 - ➔ InfoPrint Server

iSeries. mySeries.

Other Enhancements ...

- WebSphere Application Server Express
- Lotus Domino 6.5.1
- WebSphere Portal & WebSphere Portal Express
- iSeries Access
- WebSphere Development Studio
- ...



iSeries. mySeries.

iSeries. mySeries.



V5R3 Software Overview

Upgrades & Migrations

iSeries. mySeries.

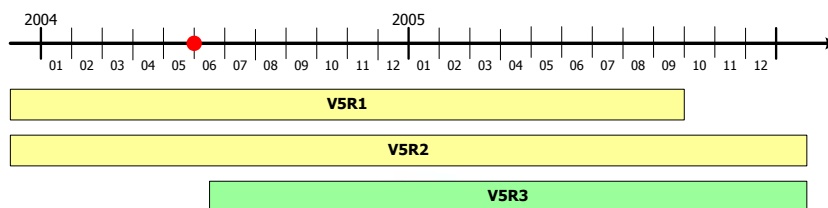
Why Upgrade ?

▪ ...



iSeries. mySeries.

Why Upgrade ?



Release	EoS	Upgrades to				
		V4R4	V4R5	V5R1	V5R2	V5R3
V4R4	31/05/2001	-	02/07/2002	21/11/2003	-	-
V4R5	31/12/2002	-	-	21/11/2003	To be annnouncec	-
V5R1	30/09/2005	-	-	-	To be announced	To be announced
V5R2	To be announced	-	-	-	-	To be announced
V5R3	To be announced	-	-	-	-	-

iSeries. mySeries.

Upgrade Paths

- Direct Upgrade
 - ➔ From V5R1M0 and V5R2M0
 - You can upgrade these versions to V5R2 following "Software Installation"
- Two-Step Upgrade
 - ➔ From V4R4M0, V4R5M0
 - You can upgrade these version directly to V5R1 following "Software Installation"
 - Then, you can upgrade V5R1 to V5R3 following "Software Installation"
- No Upgrade Support
 - ➔ From V1RxMy, V2RxMy, V3RxMy, V4R1M0, V4R2M0, V4R3M0
 - ➔ What does that mean ?
 - Because of important internal Operating System architecture changes, do **NOT** try to upgrade from these versions
 - Save & Restore operations from these versions are allowed

iSeries. mySeries.

Interoperability

- What is Interoperability ?
 - ➔ The ability of one system to exchange data or objects with another system
 - ➔ The exchange can be performed electronically or by physical media
 - ➔ Either system can initiate the exchange
 - ➔ If you have several iSeries in a network, they must be at compatible releases
- V5R3 can FULLY interoperate with
 - ➔ V5R2M0, V5R1M0

iSeries. mySeries.

Planning Information

- Previous AS/400 Models
 - ➔ V5R3 does NOT support for AS/400 models 4xx, 5xx, 4xS and 5xS
 - ➔ V5R3 does NOT support for AS/400 models 150, 6xx, Sxx
 - ➔ V5R3 is the last release to support AS/400 models 170, 250, 7xx



iSeries. mySeries.

Upgrade Tasks

- PLANNING IS MANDATORY !
 - ➔ Check with ISVs for applications compatibility with V5R3
 - Need a specific release and/or corrective service level ?
 - ➔ Review documentation
 - Software Installation
 - Memorandum to Users
 - Preventive Service Planning
 - PTF Shipping Information Letter
 - ➔ Verify contents of software package
 - Up to 15 CDs !
 - ➔ Order latest PTFs
 - Cumulative package is no longer delivered with the distribution media
 - Cumulative package is delivered with PTF groups for HIPER & DB2/UDB
 - PTFs required by upgrade process
- WRITE PROCEDURES !

iSeries. mySeries.

Upgrade Tasks

- PLANNING IS MANDATORY !

- ECS and iSeries Service Agent
 - PPP communications encryption is now mandatory
 - Requires 5722-AC3 (Cryptographic Access Provider 128-bits)

- WRITE PROCEDURES !



iSeries. mySeries.

Upgrade Tasks

- PLANNING IS MANDATORY !

- Licensed Programs now requires acceptance of Electronic Software Agreements
 - Upgrade will FAIL if you do not accept these software agreements
- Licensed Internal Code requires additional disk space
 - LIC now requires 0.42 GB more (will use 1.42 GB on LSU)
 - Upgrade will FAIL if you do not allocate the additional space
- Check the console mode value
 - Through DST
- Update eServer Firmware
 - Through HMC or Service Partition
 - IBM eServer i5 models 5xx only !
- Download Software Keys
 - Now available online from internet

- WRITE PROCEDURES !



iSeries. mySeries.

Upgrade Tasks

- PLANNING IS MANDATORY !
 - ➔ Install upgrade preparation PTFs
 - PTFs for Electronic Software Agreements
 - PTFs for Disk Configuration
 - PTFs for Virtual Media Install
 - PTFs for ...
 - ➔ Create and load your image catalogs
 - ➔ Prepare your upgrade (GO LICPGM, Option 5)
 - Cleanup !
 - Create a custom list of software to install
 - Accept Electronic Software Licence Agreements
 - Allocate additional space for LIC
 - Verify internal system objects
- WRITE PROCEDURES !

iSeries. mySeries.

Upgrade Tasks

- PLANNING IS MANDATORY !
 - ➔ Perform a dual complete backup
 - GO SAVE, Option 21
 - ➔ Upgrade
 - LIC
 - OS
 - LICPGMs
 - ➔ Install Required PTFs
 - Cumulative Package
 - Group PTFs
 - ➔ Perform a dual system backup
 - GO SAVE, Option 22
- WRITE PROCEDURES !

iSeries. mySeries.

Questions & Answers



iSeries. mySeries.

Thank You !

iSeries. mySeries.

Acknowledgements

Special Thanks

*Franz Bourlet
Louis Cuypers
Jean-René Huyberechts
Fabian Michel
and
Jos Vermaere*

iSeries. mySeries.

Contact Information

REAL Solutions S.A.
Rue d'Eich, 33
L-1461 Luxembourg



Eddy Pasteger
System Engineer Manager
iSeries Certified Solutions Expert

Voice : (+352) 43 65 22 1
Fax : (+352) 42 26 38
E-mail : eddy.pasteger@real.lu

iSeries. mySeries.

