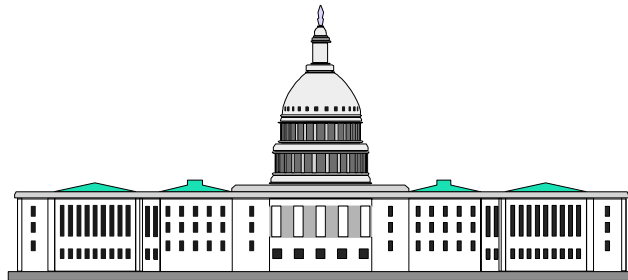


# Getting Started with zSeries Logical Partitioning

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# What is Logical Partitioning?

**Processor Resource/System Manager (PR/SM) -**  
A standard facility (hardware and LIC) on current IBM zSeries and ESA/390 processors that allows a single processor complex to support concurrent execution of multiple operating systems.

**Logical Partition (LP) -** A logical machine consisting of a subset of the resources of the physical processor complex, isolated from all other partitions by PR/SM

**Logical Partition Mode (LPAR Mode) -** An operational mode selected at activation (POR) of the processor to support logical partitions.



# Why Use Partitioning?

## Required to Exploit:

- Intelligent Resource Director (IRD) on zSeries
- z/OS.e on z800
- WLC Pricing at Sub-CEC Levels
- Special Processors - IFL for Linux, ICF for Parallel Sysplex CF

## Availability

- Parallel Sysplex
- Extended Recovery (XRF)
- Memory Upgrade on Demand

## Diverse Workload Separation

- "Service Bureau"
- Isolation for security reasons
- Mergers, Acquisitions (Easier than consolidation)
- z/OS, OS/390, z/VM, VM/ESA, LINUX, VSE/ESA, TPF/ESA

## Test, Development, Production

- Application Migration
- Operating System/Hardware Migration



# Basic vs LPAR Mode - z900

LPAR Mode	Basic Mode
<p><b>Images/CEC -</b> Variable up to 15 LPs Mix: S/390, zArch, CF, LINUX</p> <p><b>Operating System or CF -</b> One per active LP</p> <p><b>Processors: CPs, ICFs, IFLs</b> Dedicated or Shared CF LP Ded and Shared</p> <p><b>Channels, CF Links -</b> Dedicated, shared, reconfigurable</p> <p><b>Storage -</b> Central/Expanded, S/390 - Central - 2GB/LP + HSA zArch - Central - 64GB/LP - HSA Reconfigurable</p> <p><b>HSA -</b> From central not in any LP One HSA (larger)</p> <p><b>TOD -</b> Manual, ETR, Offset, or Datesource</p>	<p><b>Images/CEC -</b> Single</p> <p><b>Operating System -</b> One (No CF)</p> <p><b>Processors: CPs only -</b> Dedicated</p> <p><b>Channels, CF Links -</b> Dedicated</p> <p><b>Storage -</b> Central/Expanded S/390 - Central - 2GB - HSA zArch - Central - 64GB - HSA Reconfigurable</p> <p><b>HSA -</b> From Central of single image One HSA</p> <p><b>TOD -</b> Manual or ETR</p>



# What does an LP Need?

## Name and Resource Number

- Identification and Channel Subsystem use

## Logical processors (CPs, ICFs, Crypto) weight and capacity

## Storage - central, expanded

## Logical Channel Subsystem - devices, paths

## Logical time of day

- Sysplex Timer, Timer Offset, or Datesource

## Access to machine facilities

- ~~ICMF and ADMF~~ - Gone on zSeries
- I/O Configuration Control, Performance Data, Cross Partition Authority, Isolation of Resources



# Where does an LP get it?

## Name and Resource Number

- IODF/IOCDS at Activation (POR)

## Logical processors (CPs, ICFs, Crypto) weight and defined capacity

- LP Activation from Image Profile Processor and Options tabs
- IRD and Operator HMC Actions, CF Commands

## Storage - central, expanded

- LP Activation from Image Profile Storage tab
- Operator DSR Commands

## Logical Channel Subsystem - devices, paths

- LP Activation from IODF/IOCDS and "remembered" changes
- IRD and Operator Dynamic I/O Activate and CF/VARY Commands

## Logical time of day

- LP Activation from Image Profile General tab
- MVS Parameters, Operator Commands

## Access to machine facilities

- Image Profile Security tab



# How are LPs created?

## Define in I/O Configuration Data Set (IOCDs) by Hardware Configuration Definition (HCD) and IOCP

- LP Name
- LP "Resource Number"
- LP Channels and Devices (Initial)

## Processor Activation (POR)

- IOCDs with LP Definitions
- LPAR Mode selected for POR in Activation Profile

## Individual Partition Activation

- Resources and IPL according to Image Profile
- Automatic after processor activation or
- One at a time manual





# Channel Modes

## Shared (EMIF - Multiple Image Facility)

- A channel path that can be configured online to one or more LPs at the same time. One or more LPs can access I/O devices at the same time using this channel path.
- Note: Just because the channel is shared does NOT mean all the devices are too.
- Access List - Has, Candidate List - Allowed to have

## Reconfigurable

- An unshared channel path which can be configured offline from one LP, then online to another. Only one LP can access I/O devices on this channel path at a time.

## Dedicated

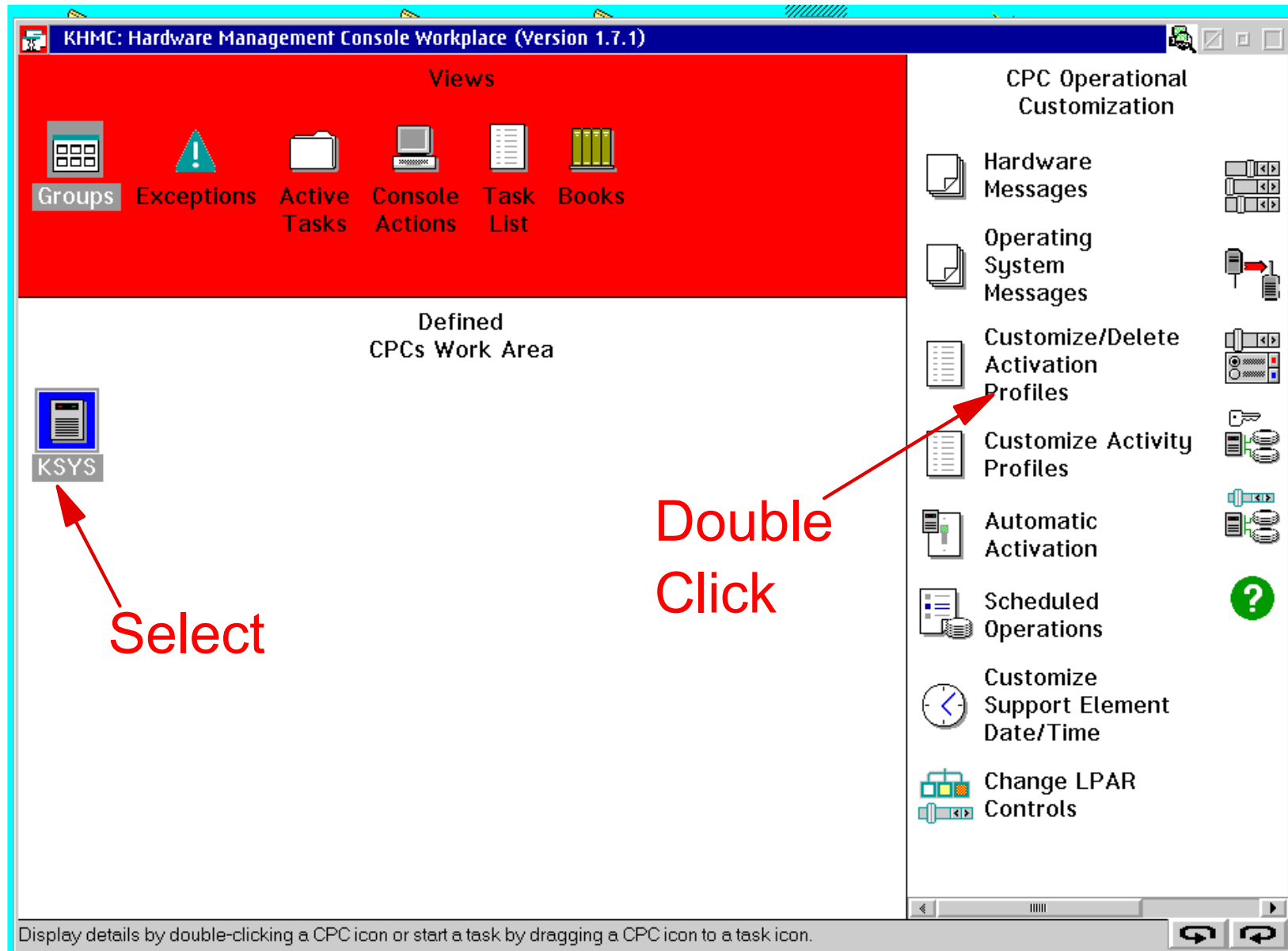
- An unshared and non-reconfigurable channel path. Only one LP can access I/O devices on this channel path.



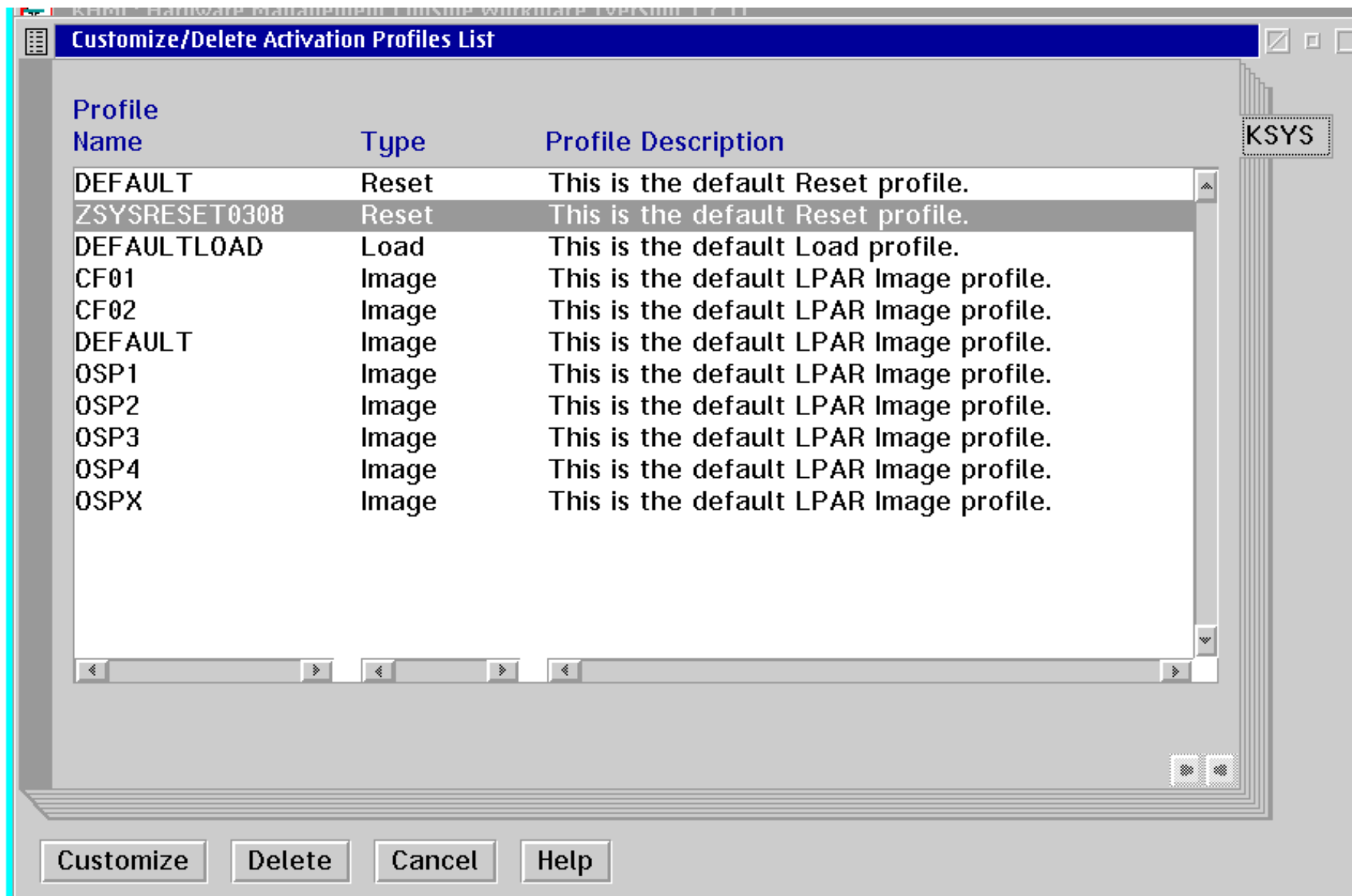
# zSeries Channel Types

TYPE	Description	Shared (EMIF)	Reconfig.
BL	Parallel Block (z900)	N	Y
BY	Parallel Byte (z900)	N	Y
CVC	ESCON Converter Channel	N	Y
CBY	ESCON Converter Byte Channel	N	Y
CNC	ESCON Channel	Y	Y
CTC	ESCON Channel to Channel	Y	Y
CFS	ISC-3 Coupling Facility Sender	Y	Y
CFR	ISC-3 Coupling Facility Receiver	N	Y
CFP	ISC-3 Coupling Facility Peer	Y	Y
CBS	ICB-2 Sender Channel (z900)	Y	Y
CBR	ICB-2 Receiver Channel (z900)	N	Y
CBP	ICB-3 Peer Channel	Y	Y
ICP	Internal Coupling Peer	Y	Y
OSA	Open Systems Adapter-2	Y	Y
OSD/E	OSA-Express	Y	Y
IQD	Hipersockets	Y	Y
FC	Native FICON and FCTC	Y	Y
FCP	Fibre Channel (SCSI) Protocol	Y	Y
FCV	FICON Bridge (ESCON Director)	Y	Y

# HMC Customize Profiles



# Reset Profile Selection



Customize/Delete Activation Profiles List

Profile Name	Type	Profile Description
DEFAULT	Reset	This is the default Reset profile.
ZSYSRESET0308	Reset	This is the default Reset profile.
DEFAULTLOAD	Load	This is the default Load profile.
CF01	Image	This is the default LPAR Image profile.
CF02	Image	This is the default LPAR Image profile.
DEFAULT	Image	This is the default LPAR Image profile.
OSP1	Image	This is the default LPAR Image profile.
OSP2	Image	This is the default LPAR Image profile.
OSP3	Image	This is the default LPAR Image profile.
OSP4	Image	This is the default LPAR Image profile.
OSPX	Image	This is the default LPAR Image profile.

KSYS

Customize Delete Cancel Help



# Reset Profile-General Tab

Customize Activation Profiles : KSYS

Profile name: ZSYSRESET0308 Assigned for activation

Description: This is the default Reset profile.

Input/Output Configuration: Allow Dynamic

Data Set	Type	I/O	Partitions
A0 03.27.01	Partition	Yes	OSP1 OSP2
A1 03.13.01	Partition	Yes	OSP1 OSP2
A2 03.26.01	Partition	Yes	OSP1 OSP2
A3 03.27.01	Partition	Yes	OSP1 OSP2
D0 DIAGNOSE	ESA/390	No	

Use Active IOCDS: Currently A0

Mode: Logically partitioned (ESA/390, ESA/390 TPF)

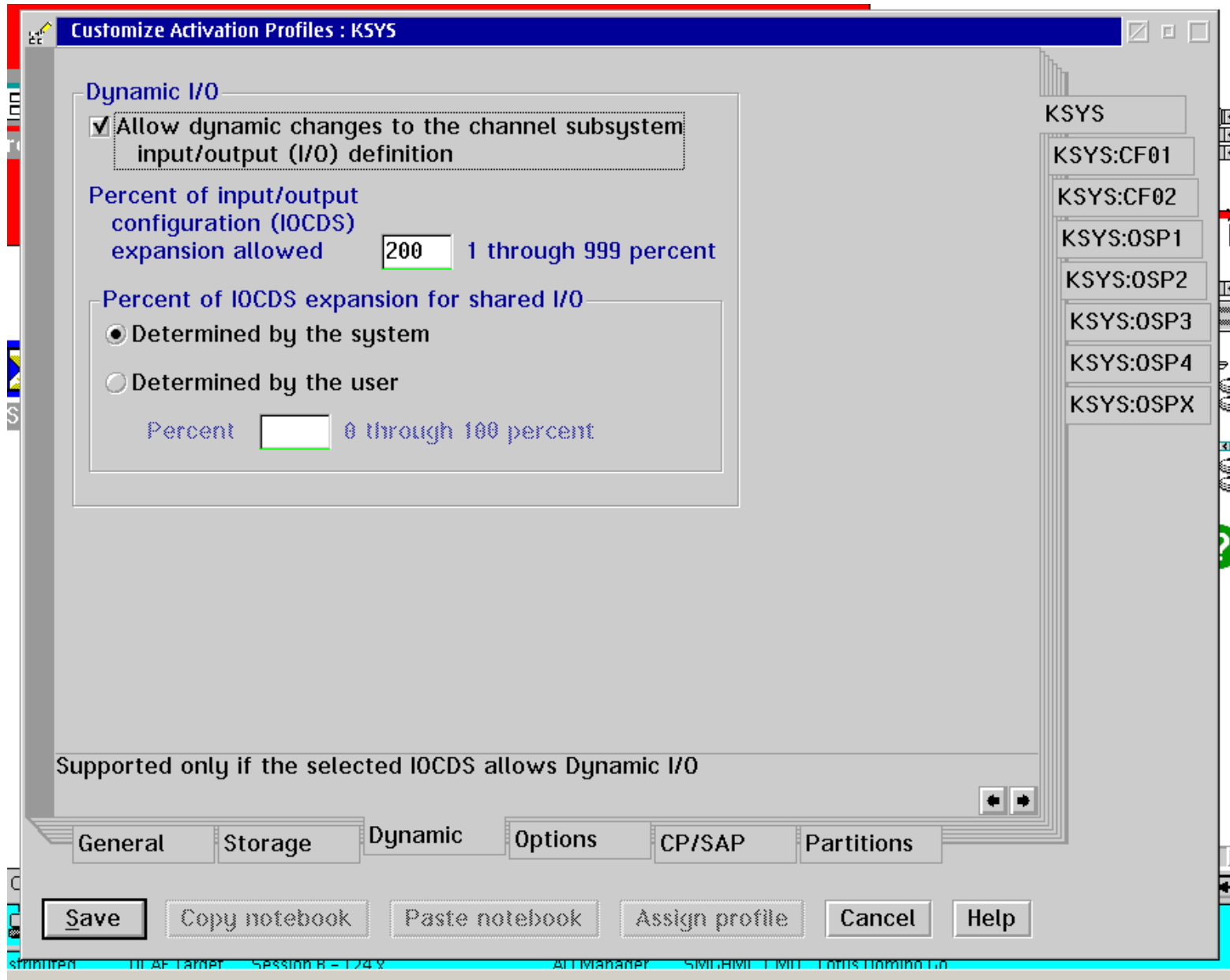
Load delay for power sequencing: 0 minutes 0 seconds

General | Storage | Dynamic | Options | CP/SAP | Partitions

Save Copy notebook Paste notebook Assign profile Cancel Help



# Reset Profile-Dynamic Tab





# Reset Profile-Partitions Tab

Customize Activation Profiles : KSYS

Specify the order in which the logical partitions will be activated. If no order is specified for a partition, it will not be activated.

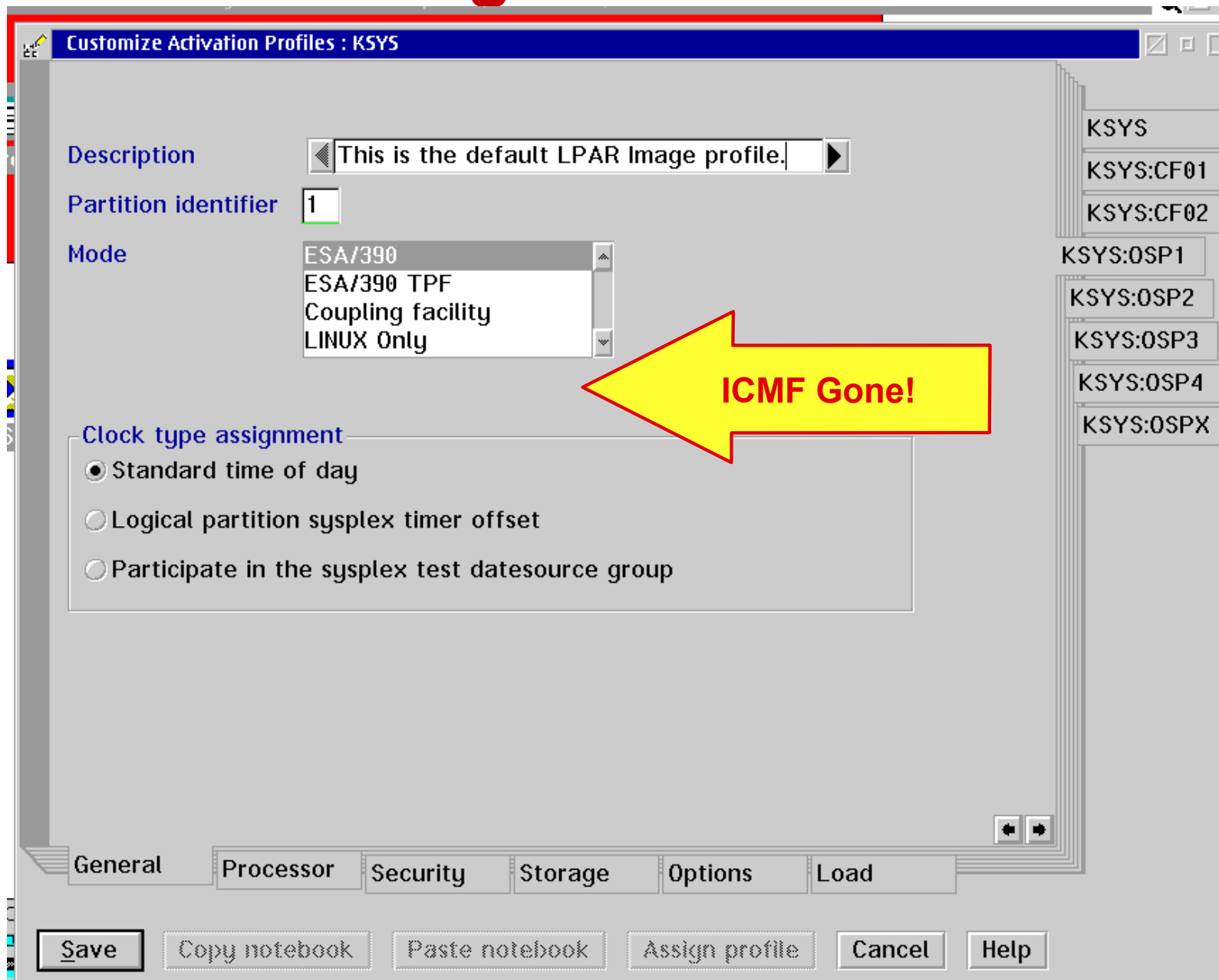
Partition	Order	Partition	Order
CF01	1		
CF02	2		
OSP1	3		
OSP2	4		
OSP3	5		
OSP4	6		
OSPX	7		

KSYS  
KSYS:CF01  
KSYS:CF02  
KSYS:OSP1  
KSYS:OSP2  
KSYS:OSP3  
KSYS:OSP4  
KSYS:OSPX

General Storage Dynamic Options CP/SAP Partitions

Save Copy notebook Paste notebook Assign profile Cancel Help

# Image Profile-General Tab



Customize Activation Profiles : KSYS

Description: This is the default LPAR Image profile.

Partition identifier: 1

Mode: ESA/390, ESA/390 TPF, Coupling facility, LINUX Only

Clock type assignment:  
 Standard time of day  
 Logical partition sysplex timer offset  
 Participate in the sysplex test datesource group

ICMF Gone!

Profiles: KSYS, KSYS:CF01, KSYS:CF02, KSYS:OSP1, KSYS:OSP2, KSYS:OSP3, KSYS:OSP4, KSYS:OSPX

General | Processor | Security | Storage | Options | Load

Save | Copy notebook | Paste notebook | Assign profile | Cancel | Help





# Logical Processor Assignment

## Dedicated Logical Processors

- Backed by assigned physical processors
- "Locked" to a partition

## Shared Logical Processors

- Backed by a "pool" of physical processors
- Share = Assigned partition weight divided by sum of all **ACTIVE** partition weights
- Can exceed share if other partitions fail to use their full share (Up to 100% logical processor busy)
- Hard Capping - Prevents exceeding share
- Soft Capping for WLC - Prevents exceeding defined MSU capacity



# Shared Pools

## Shared CP Pool - Shared CP weight!

- POR - All CPs added here
- CUoD - New CPs added here
- LP with dedicated CPs activated - CPs removed from the pool
- LP with dedicated CPs deactivated - CPs returned to the pool
- Dedicated CP Configured OFF - CP returned to the pool

## Shared ICF/IFL Pool - Shared ICF/IFL weight!

- POR - All IFL/ICFs added here
- CUoD - New IFL/ICFs added here
- LP with dedicated ICF/IFLs activated - ICF/IFLs removed
- LP with dedicated ICF/IFLs deactivated - ICF/IFLs returned
- Dedicated ICF/IFL Configured OFF - ICF/IFL returned

## "Width" Rules (Width = Number in the pool)

- Can't configure more shared ON than the width of the pool
- Can't reduce width to fewer than the greatest number ON to an active LP



# Shared LPs - Weights and Assignment

**Need to tell PR/SM how to manage the sharing of CP resources**

**Rules are only enforced when there is more demand than there are resources available**

- Except for hard or soft capping

**Only give to an LP the number of logical processors it needs**

- Overallocating will drastically increase the overhead caused by PR/SM dispatching CPs with no work to do - "Short Engine Effect"
- IRD logical management adjusts number of online logical CPs to the need

**An easy starting point for the weight is the MIPS value you want the LP to have. Total should add up to the MIPS rating of the *pool***

- MIPS = Meaningless Indicator of Processor Speed
- If MIP rating is small.....use a multiplier to get better granularity

**Possibly a moving target**

- Need to use experience as an input

**Fear not.....weights and capping can be changed on the fly**

- Choose number of CPs carefully.....to change an image profile requires a re-activation of the LP....and thus IPL
- Assign Reserved CPs for flexibility for IRD or manual control



# An example....share the wealth according to rank...

- System with:
  - 3 Partitions (LPs)
  - 6 Shared CPs in the pool
- Here we go.....

	Logical CPs	Weight
LPA	2	300
LPB	1	100
LPC	5	900
Totals	8	1,300

Question: Why the above values?

Answer: Cuz.....



# Do some math here.....

	Logical CPs/ Pool CPs	Weight/ Sum of Weights	% SHARE! (of entire pool)
LPA	2/6	300/1300	23.1%
LPB	1/6	100/1300	7.7%
LPC	5/6	900/1300	69.2%

## Results:




LPA will get 23.1% of 6 CPs using only 2 CPs

LPB will get 7.7% of 6 CPs using only 1 CP

LPC will get 69.2% of 6 CPs using only 5 CPs

# Weight Example

- Can't achieve share if LCP% of PCP > 100%
- Performance ROT - Sum of LCPs/Pool CP < 2

	Logical CPs/ Pool CPs	Weight/ Sum of Weights	% SHARE!	LCP % of PCP= %*Pool/Logical CPs	
LPA	2/6	300/1300	23.1%	69.3% of 2	
LPB	1/6	100/1300	7.7%	46.2% of 1	
LPC	5/6	900/1300	69.2%	83.04% of 5	

Ratio of Sum of LCPs to Pool CPs =  $8/6 = 1.33$





# Are we done?

## Don't know.....

- **What if one or more of the partitions is not very busy?**
  - **More CP resource is now available to the other LPs**
    - ▶ **potential to exceed the relative share we worked so hard to set up. But that is okay?**
- **What if you charge a user a flat fee for the amount of processing power available?**
  - **Hard capping a partition will limit the LP to only the defined share. (Hard Cap = "Initial Cap")**
- **What happens if one of the partitions is deactivated or CUoD happens?**
  - **A whole new ballgame.....**



# But what if LPC goes away?

Before-

	Logical CPs/ Pool CPs	Weight/ Sum of Weights	% SHARE!	LCP % of PCP= %*Pool/Logical CPs
LPA	2/6	300/1300	23.1%	69.3% of 2
LPB	1/6	100/1300	7.7%	46.2% of 1
LPC	5/6	900/1300	69.2%	83.04% of 5

After-

	Logical CPs/ Pool CPs	Weight/ Sum of Weights	% SHARE!	LCP % of PCP= %*Pool/Logical CPs
LPA	2/6	300/400	75% (33% max)	225% of 2 ??
LPB	1/6	100/400	25% (16.6% max)	150% of 1 ??
LPC	<del>X</del>	<del>X</del>	<del>X</del>	<del>X</del>

What is the effect on hard capping.....still there, but value has changed





# Image Profile-Processor Tab

Customize Activation Profiles : KSYS

Logical processor assignment

Dedicated central processors

Not dedicated central processors

Not dedicated central processor details

Initial processing weight  1 to 999  Initial capping

Enable WorkLoad Manager

Minimum processing weight

Maximum processing weight

Number of processors - Initial  Reserved

Cryptographic coprocessors

Cryptographic coprocessor 0  
Cryptographic coprocessor 1

General Processor Security Storage Options Load

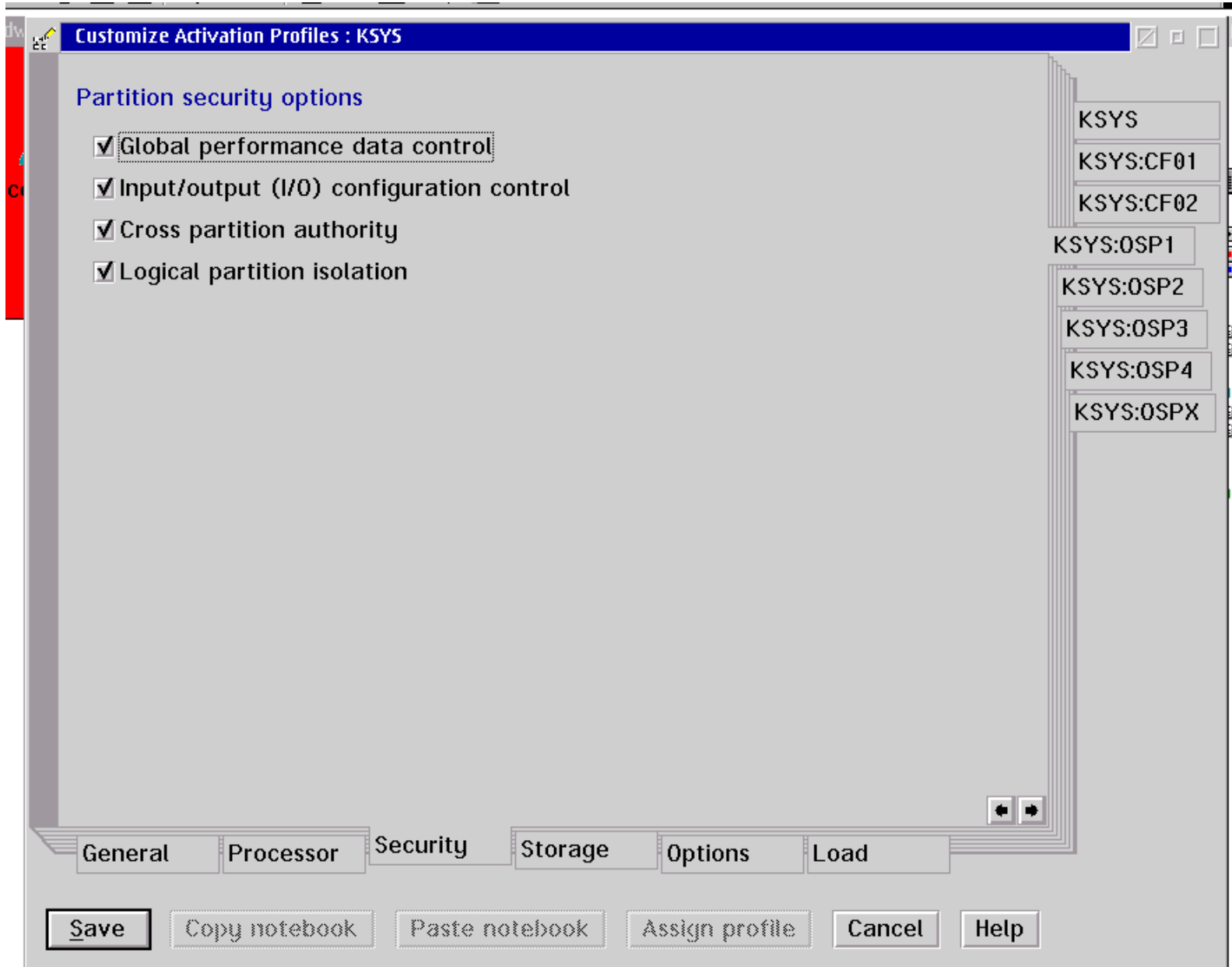
Save Copy notebook Paste notebook Assign profile Cancel Help

KSYS  
KSYS:CF01  
KSYS:CF02  
KSYS:OSP1  
KSYS:OSP2  
KSYS:OSP3  
KSYS:OSP4  
KSYS:OSPX





# Image Profile-Security Tab





# LPAR Memory Assignment

## CPC Activation in LPAR Mode

- CS/ES Split Occurs (G5 Dr 14x and earlier)
- CS Single Storage Pool (z900 and G5/6 - Dr 22e and later )
- CS/ES Addressability Established
- HSA Assignment and Addressability

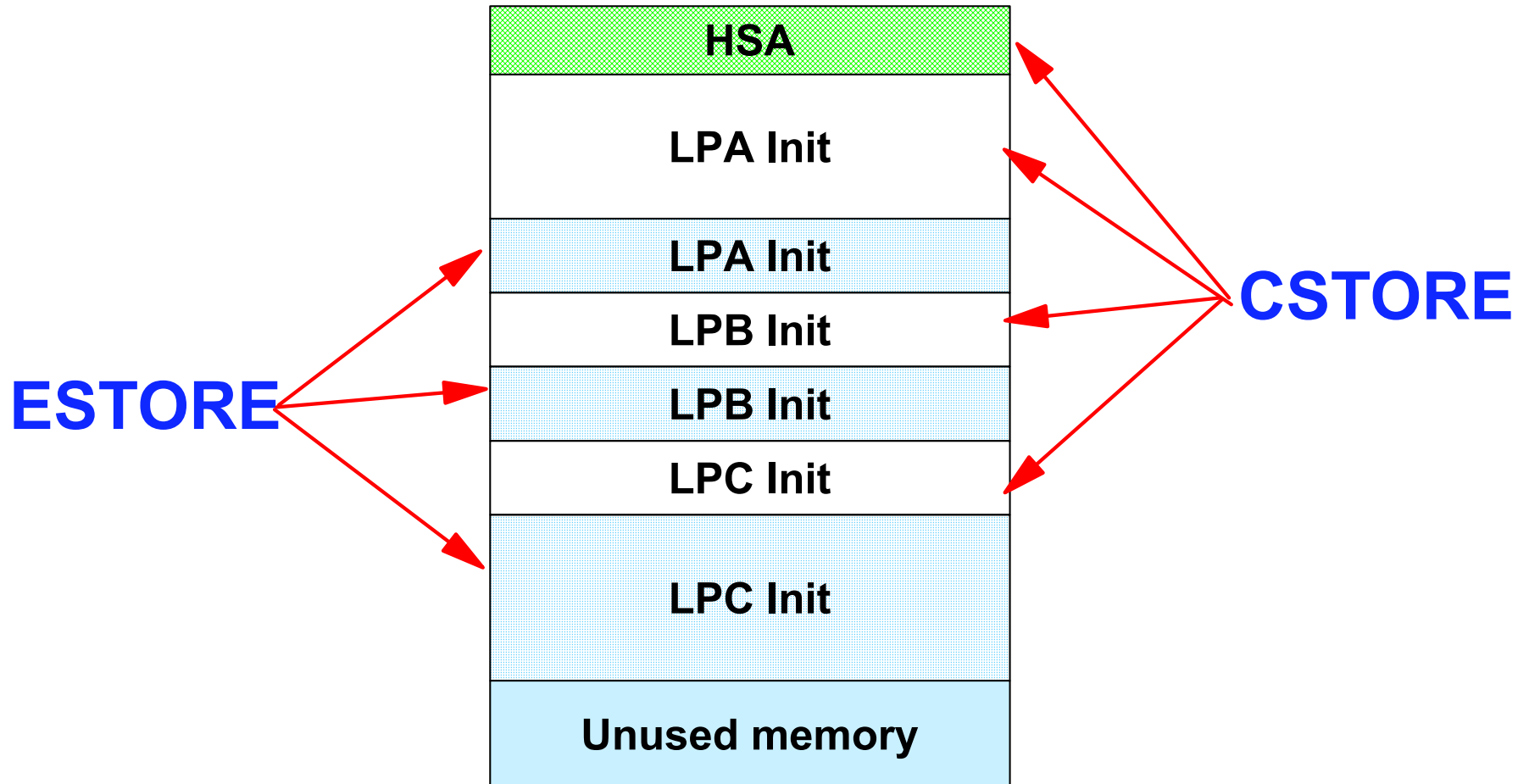
## LP activation

- LP CS/ES Initial and Reserved Addressability Assigned
- CS/ES Initial Memory Amounts Assigned
- Later: CS/ES Reserved Amounts Assigned by DSR (Optional)

## LP DSR-2

- Create ES from SSP as Needed (z900 and G5/6)
- Assign/Unassign CS or ES to LP

# Memory - Post Activation



**Note: With planning, memory can be dynamically reconfigured among LPs including reconfiguration from CSTORE to ESTORE or ESTORE to CSTORE.**



# zSeries and S/390 CS and ES

## z900 and G5/6 (Dr 22e and later)

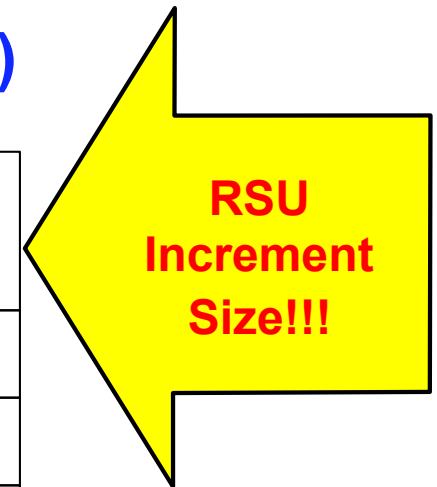
- Single Storage Pool CS
- ES configured as needed

## Earlier Machines

- CS/ES split occurs at CEC activate (POR)

**Granularity: (Was 1 MB prior to G3 Dr 88)**

Total Storage G5/6 or z900	Granularity CS & ES
1 GB	2 MB
1.5 or 2 GB	4 MB
2.5 - 4 GB	8 MB
5 - 8 GB	16 MB
10 - 16 GB	32 MB
18 - 32 GB	64 MB
40 - 64 GB	128 MB





# MVS RSU Parameter

In IEASYSxx. Specifies the number of central storage **increments** to be made available for central storage reconfiguration

- MVS attempts to keep this area free of long term fixed pages

$$RSU = \frac{\text{CS amount to be reconfigured}}{\text{storage increment size}}$$

Or: Storage to be kept free = RSU \* **increment**

- If memory is upgraded, **check the RSU parameter!**

## OS/390 V2.10 and z/OS - Better RSU Options

- All OFFLINE storage (Reserved Storage)
- An amount (% , MB or GB) - System calculates increments



# Image Profile-Storage Tab

**Customize Activation Profiles : KSYS**

**Central storage**  
Amount (in megabytes)

Initial   
Reserved

Storage origin

Determined by the system  
 Determined by the user

Origin

**Expanded storage**  
Amount (in megabytes)

Initial   
Reserved

Storage origin

Determined by the system  
 Determined by the user

Origin

128 MB Storage Granularity (allows up to 65536 MB total storage)

General Processor Security **Storage** Options Load

Save Copy notebook Paste notebook Assign profile Cancel Help

- KSYS
- KSYS:CF01
- KSYS:CF02
- KSYS:CF03
- KSYS:CF04
- KSYS:OSP1
- KSYS:OSP2
- KSYS:OSP3
- KSYS:OSP4
- KSYS:OSP7
- KSYS:OSP8
- KSYS:OSP9
- KSYS:OSPA
- KSYS:OSPB
- KSYS:OSPC
- KSYS:OSPD



# Image Profile Options Tab

Customize Activation Profiles : KSYS

Image options

Minimum input/output (I/O) priority

Maximum input/output (I/O) priority

Defined capacity

MSUs - WLC

KSYS  
KSYS:CF01  
KSYS:CF02  
KSYS:OSP1  
KSYS:OSP2  
KSYS:OSP3  
KSYS:OSP4  
KSYS:OSPX

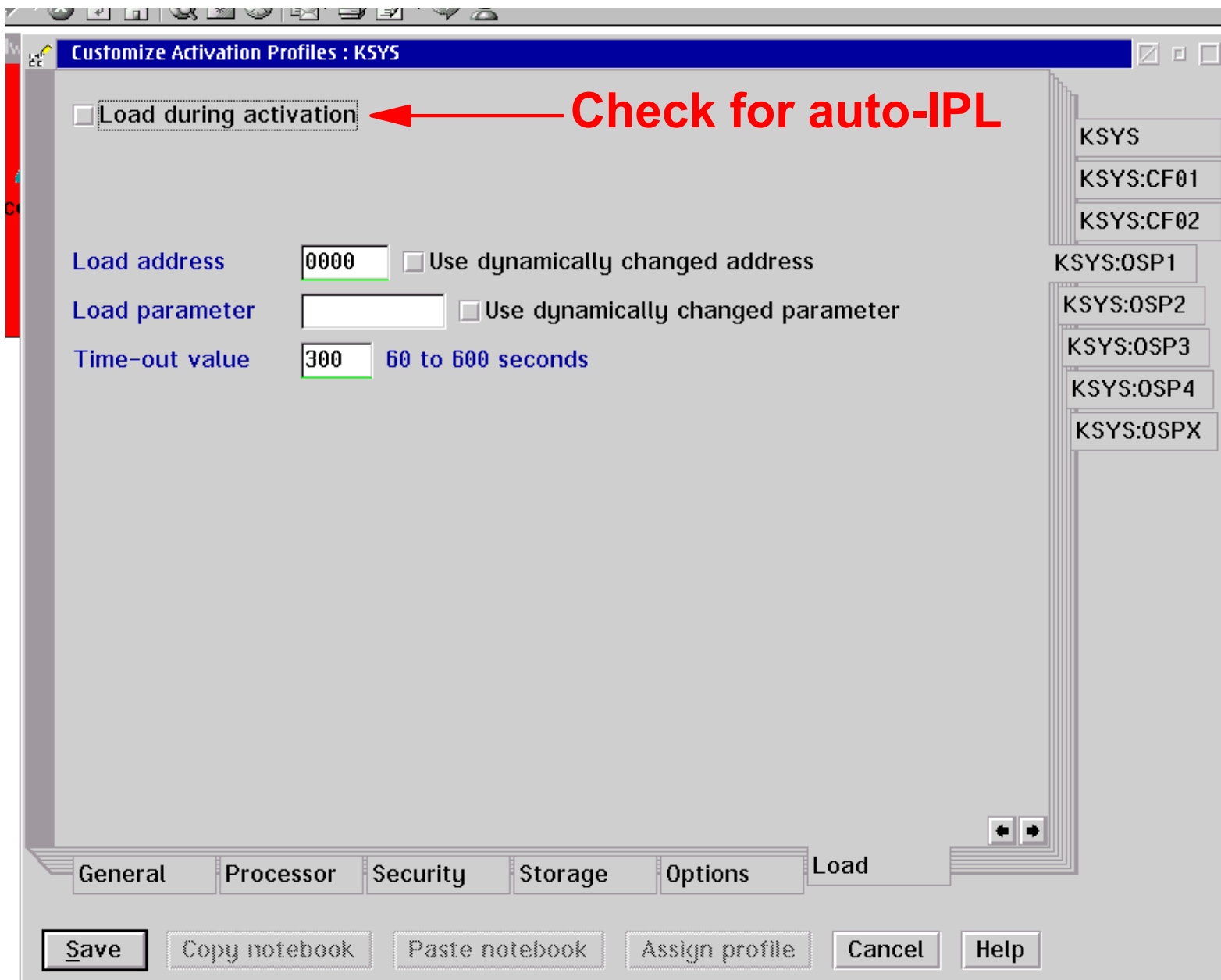
General Processor Security Storage Options Load

Save Copy notebook Paste notebook Assign profile Cancel Help





# Image Profile-Load Tab



# Once it is up and running.....





# HMC/SE Change Controls (Left)

**MSUs - WLC**

**Change Logical Partition Controls**

Last reset profile attempted: ZSYSRESET0308  
Input/output configuration data set (IOCDs): A0 03.27.01

Logical Partition	Active	Defined Capacity	Current Weight	WLM Managed	Initial Processing Weight	Minimum Processing Weight	Maximum Processing Weight	Initial Capping	Current Capping	Number of Processors
OSP1	Yes	0	333	<input type="checkbox"/>	333	1	666	<input type="checkbox"/>	No	0
OSP2	Yes	0	333	<input type="checkbox"/>	333	1	666	<input type="checkbox"/>	No	0
OSP3	No	0	0	<input checked="" type="checkbox"/>	333	10	400	<input type="checkbox"/>	No	0
OSP4	Yes	0	333	<input type="checkbox"/>	333	10	400	<input type="checkbox"/>	No	0
CF01	Yes	0	0	<input type="checkbox"/>	0	0	0	<input type="checkbox"/>	No	1
CF02	Yes	0	0	<input type="checkbox"/>	0	0	0	<input type="checkbox"/>	No	1
OSPX	Yes	0	333	<input checked="" type="checkbox"/>	333	10	500	<input type="checkbox"/>	No	0

**Processor running time**

Warning: It is recommended that you select 'Dynamically determined by the system.'  
Selecting 'Determined by the user' risks suboptimal use of processor resources.

Dynamically determined by the system  
 Determined by the user

Running time:  1 to 100 milliseconds  
 Do not end the timeslice if a partition enters a wait state

Save to profiles | Change running system | Save and change | Reset | Cancel | Help





# HMC/SE Change Controls (Right)

Change Logical Partition Controls

ZSYSRESET0308

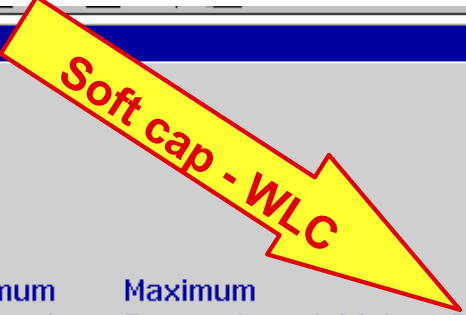
S): A0 03.27.01

ent	WLM	Initial	Minimum	Maximum	Initial	Current	Number of	Number of	
ght	Managed	Processing	Processing	Processing	Capping	Capping	Dedicated	Non-	Logical
		Weight	Weight	Weight			Central	dedicated	Partition
							Processors	Central	
								Processors	
<input type="checkbox"/>		333	1	666	<input type="checkbox"/>	No	0	4	OSP1
<input type="checkbox"/>		333	1	666	<input type="checkbox"/>	No	0	4	OSP2
<input checked="" type="checkbox"/>		333	10	400	<input type="checkbox"/>	No	0	4	OSP3
<input type="checkbox"/>		333	10	400	<input type="checkbox"/>	No	0	4	OSP4
<input type="checkbox"/>		0	0	0	<input type="checkbox"/>	No	1	0	CF01
<input type="checkbox"/>		0	0	0	<input type="checkbox"/>	No	1	0	CF02
<input checked="" type="checkbox"/>		333	10	500	<input type="checkbox"/>	No	0	6	OSPX

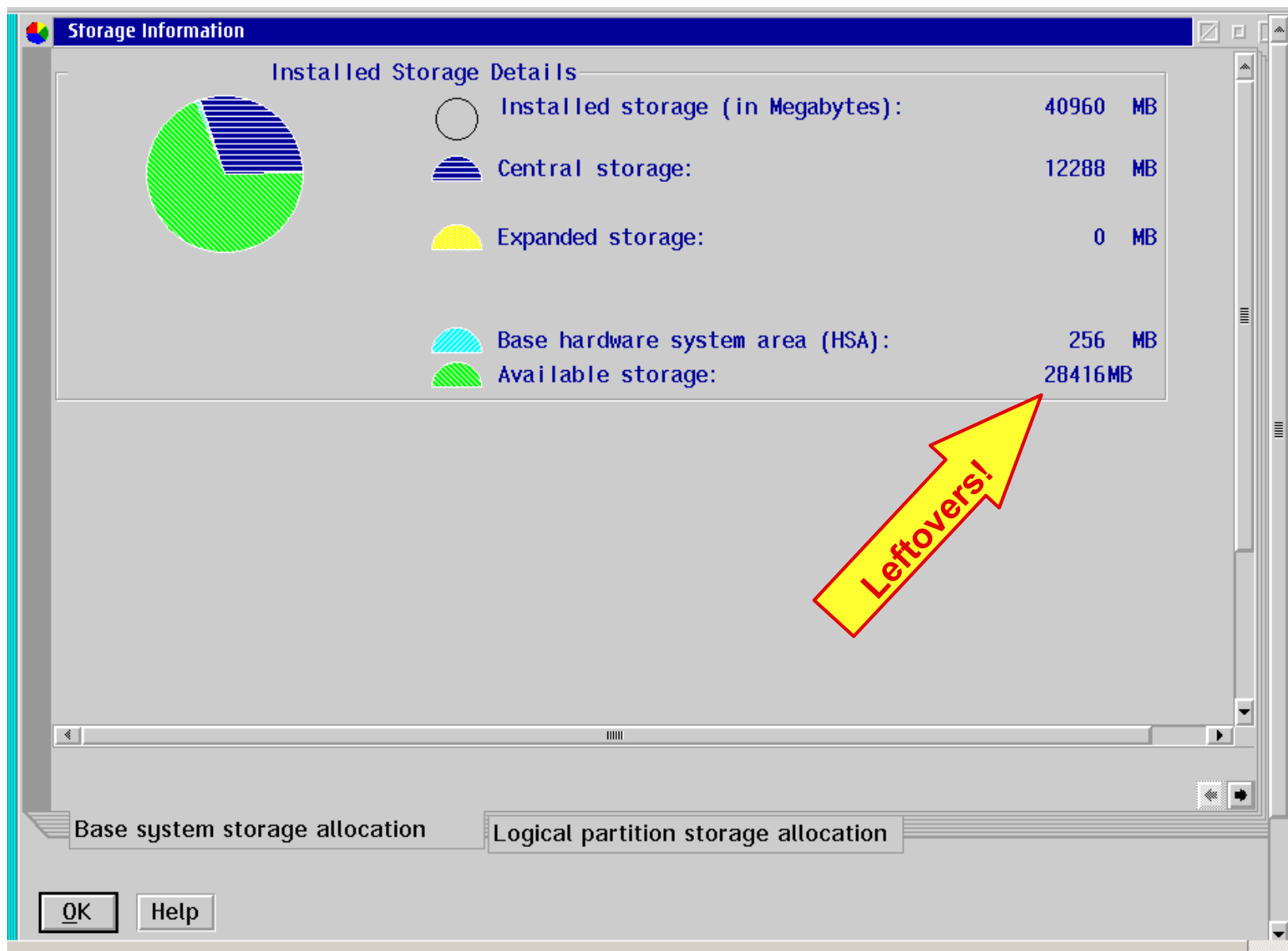
Select 'Dynamically determined by the system.'  
user' risks suboptimal use of processor resources.

00 milliseconds  
partition enters a wait state

to profiles Change running system Save and change Reset Cancel Help



# HMC/SE Checking Storage





# HMC/SE LPAR Storage

Storage Information

Input/output configuration data set (IOCDs): A0 03.27.01

Available storage: 28416

Central Storage Allocation

Name	Origin	Initial	Current	Maximum	Gap	Expandable Element
CF01	80512	1024	1024	1024	0	
CF02	79488	1024	1024	1024	0	
OSP1	77440	2048	2048	2048	0	
OSP2	75392	2048	2048	2048	0	
OSP3	73344	2048	2048	2048	0	

Base system storage allocation Logical partition storage allocation

OK Help



# RMF - Partition Data and Cluster Reports

## P A R T I T I O N   D A T A   R E P O R T

z/OS V1R1

SYSTEM ID 200B  
RPT VERSION 02.10.00

DATE 07/20/2001  
TIME 11.59.00

INTERVAL 14.59.628  
CYCLE 1.000 SECONDS

```

MVS PARTITION NAME      BSYS
IMAGE CAPACITY          355
NUMBER OF CONFIGURED PARTITIONS 10
NUMBER OF PHYSICAL PROCESSORS 11
                        CP      11
                        ICF     0
WAIT COMPLETION         NO
DISPATCH INTERVAL     DYNAMIC
  
```

----- PARTITION DATA -----							-- LOGICAL PARTITION PROCESSOR DATA --				-- AVERAGE PROCESSOR UTILIZATION PERCENTAGES						
-----MSU-----							PROCESSOR-				LOGICAL PROCESSORS		--- PHYSICAL PROCESSORS ---				
NAME	S	WGT	DEF	ACT	DEF	WLM%	NUM	TYPE	EFFECTIVE	TOTAL	EFFECTIVE	TOTAL	LPAR	MGMT	EFFECTIVE	TOTAL	
ASYS	A	212	0	92	NO	0.0	4.0	CP	00.42.50.385	00.42.55.267	71.43	71.57	0.05		25.97	26.02	
BSYS	A	187	0	83	NO	0.0	4.0	CP	00.38.19.453	00.38.26.958	63.90	64.11	0.08		23.24	23.31	
QSYS	A	83	0	36	NO	0.0	2.0	CP	00.16.28.049	00.16.31.803	54.91	55.12	0.04		9.98	10.02	
NSYS	A	50	0	12	NO	0.0	2	CP	00.05.27.693	00.05.34.038	18.21	18.57	0.06		3.31	3.38	
PSYS	A	40	0	4	NO	0.0	2	CP	00.01.41.819	00.01.48.759	5.66	6.04	0.07		1.03	1.10	
DSYS	A	170	0	60	NO	0.0	4.0	CP	00.27.30.899	00.27.53.982	45.88	46.52	0.23		16.68	16.92	
SSYS	A	50	0	11	NO	0.0	2	CP	00.04.59.750	00.05.06.010	16.66	17.01	0.06		3.03	3.09	
USYS	A	50	0	5	NO	0.0	2	CP	00.02.21.629	00.02.29.247	7.87	8.29	0.08		1.43	1.51	
ESYS	A	126	0	43	NO	0.0	2.0	CP	00.20.06.469	00.20.11.850	67.05	67.35	0.05		12.19	12.25	
LNXCO1	A	30	0	0	NO	0.0	1	CP	00.00.00.037	00.00.00.042	0.00	0.00	0.00		0.00	0.00	
*PHYSICAL*										00.02.43.917				1.66		1.66	
TOTAL										02.39.46.187	02.43.41.878			2.38		96.87	99.25

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## L P A R   C L U S T E R   R E P O R T

z/OS V1R1

SYSTEM ID 200B  
RPT VERSION 02.10.00

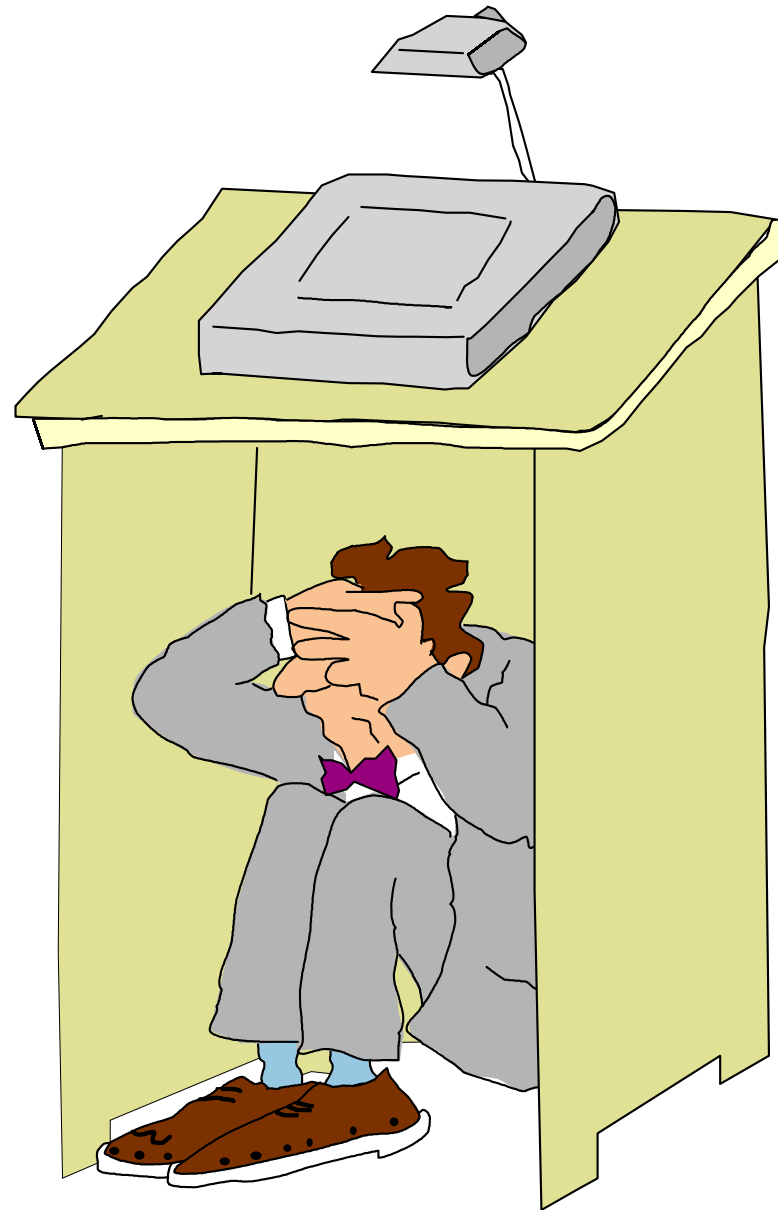
DATE 07/20/2001  
TIME 11.59.00

INTERVAL 14.59.628  
CYCLE 1.000 SECONDS

			----- WEIGHTING STATISTICS -----						----- PROCESSOR STATISTICS -----				----- STORAGE STATISTICS -----				
			--- DEFINED ---			--- ACTUAL ---			--- NUMBER ---		--- TOTAL% ---		--- CENTRAL ---		--- EXPANDED ---		
CLUSTER	PARTITION	SYSTEM	INIT	MIN	MAX	AVG	MIN %	MAX %	DEFINED	ACTUAL	LBUSY	PBUSY					
COSPLEX	ASYS	200A	210	210	300	212	100	0.0	16	4.0	71.56	26.02	3648	N/A			
	BSYS	200B	180	180	300	187	100	0.0	16	4.0	64.11	23.31	3648	N/A			
	DSYS	200D	160	50	300	170	0.0	0.0	16	4.0	46.52	16.92	3648	N/A			
	ESYS	200E	140	50	300	126	0.0	0.0	16	2.0	67.35	12.25	3648	N/A			
	QSYS	200Q	90	50	300	83	0.0	0.0	16	2.0	55.12	10.02	2304	N/A			
-----			TOTAL						780				80	304.7	88.52	16896	N/A



# Questions?



## Answers: zSeries PR/SM Planning, SB10-7033-03