LPAR Advanced Topics

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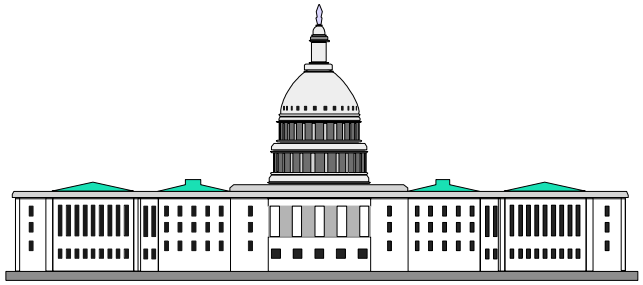

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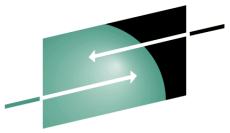

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LPAR Advanced Topics

Introduction to z800 and Running z/OS.e

zSeries PR/SM Workload Pricing Support

zSeries PR/SM IRD Support

- CPU Management
- CSS I/O Priority Queuing
- Dynamic Channel Path Management

HiperSockets (z/OS V1.2 & up)

zSeries Coupling Facility Support

Capacity Upgrade on Demand (G5/6 and zSeries)

- Concurrent Memory Upgrade (z900 Dr 3C)
- Nondisruptive CBU CP Downgrade (z900 Dr 3C and z800)

Memory Configuration and Reconfiguration

- Fast Synchronous Data Mover Facility (G5/6 and zSeries)
- MVS Storage Reconfiguration

Linux Support (G5/6 and zSeries)

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IBM zSeries 800

Complete z/Architecture (64 bit)

- OS/390 V2.8 & up, z/OS all, z/OS.e
- VM/ESA V2.4 & up, z/VM all
- VSE/ESA V2.4 & up, TPF 4.1
- Linux Kernel 2.2 & 2.4 (31 and 64 bit)

Flexible Model Structure

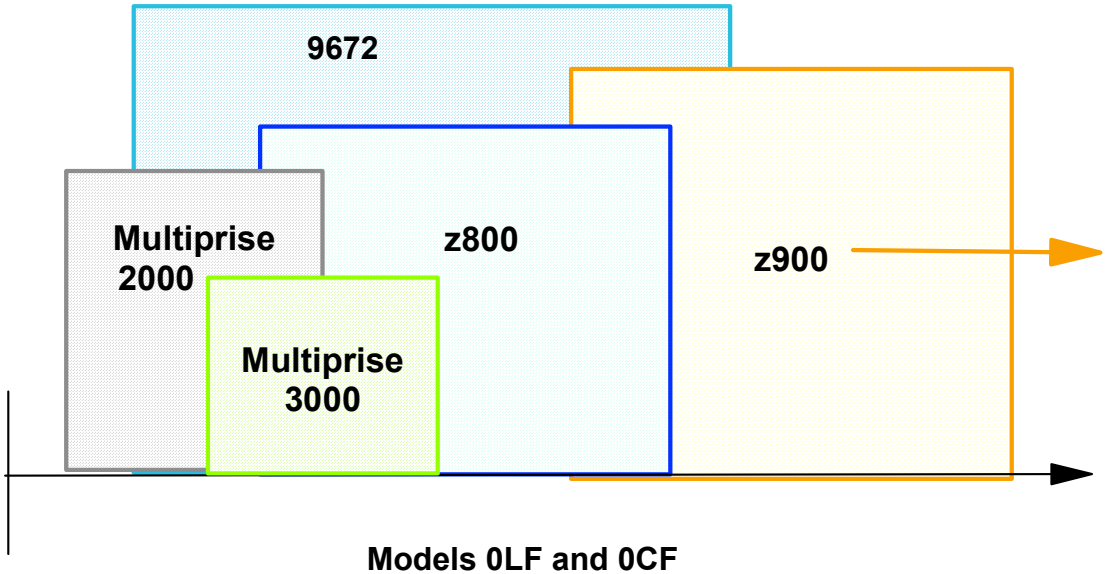
- 1 to 4-way
- z800-001 ITRR close to G6-X17
- 3 sub-uni, 1 sub-dyadic
- CUoD and CBU
- Linux Model 0LF, CF Model 0CF
- z800-004 upgrades to z900-104

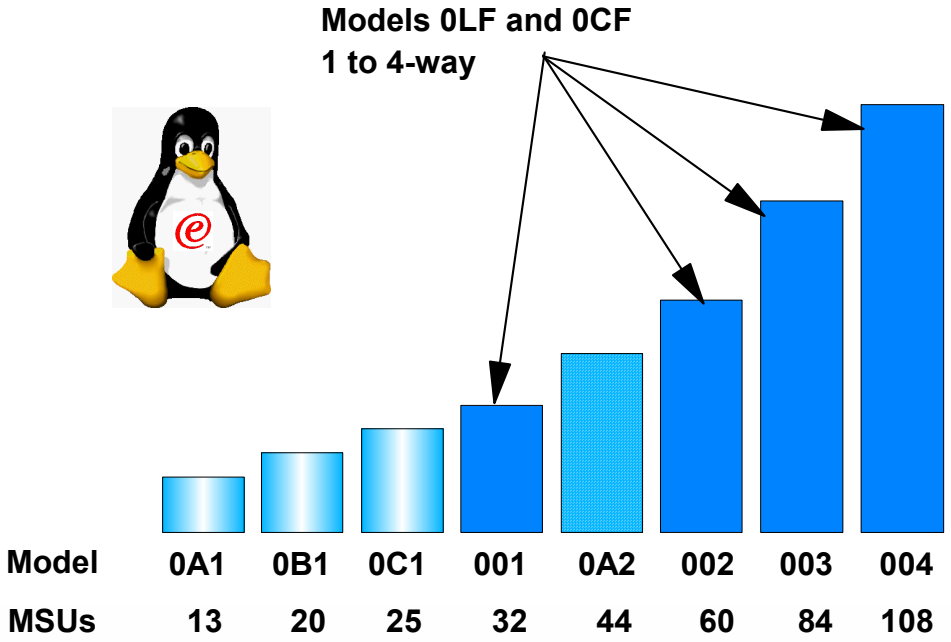
8, 16, 24 or 32 GB memory

- No concurrent upgrade

zSeries I/O Subsystem supports

- All zSeries I/O cards (16 max)
  - Up to 240 Escon
    - No Parallel, OSA-2 FDDI, or ICB-2
- SOD: Linux FCP support





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z800 LPAR Mode Exclusive: z/OS.e

z/OS.e Machine Support

- z/Architecture required - 64-bit only
- z800 - YES
- z900 - No! Will detect and fail.

z/OS.e Operating Mode

- LPAR Mode - YES
- Basic Mode - No! Will detect and fail.

z/OS.e LPAR Requirements

- Name in IOCDS must start with "ZOSE"
- "ZOSE" named LPAR on z800:
  - z/OS.e and z/OS.e under z/VM will run
  - z/OS and OS/390 will NOT run, even under z/VM
- "ZOSE" named LPAR on S/390 or z900:
  - Name has NO effect, z/OS or OS/390 will run
- Shared CP - OK, Requires WLM "Defined Capacity"
- Dedicated CP - OK

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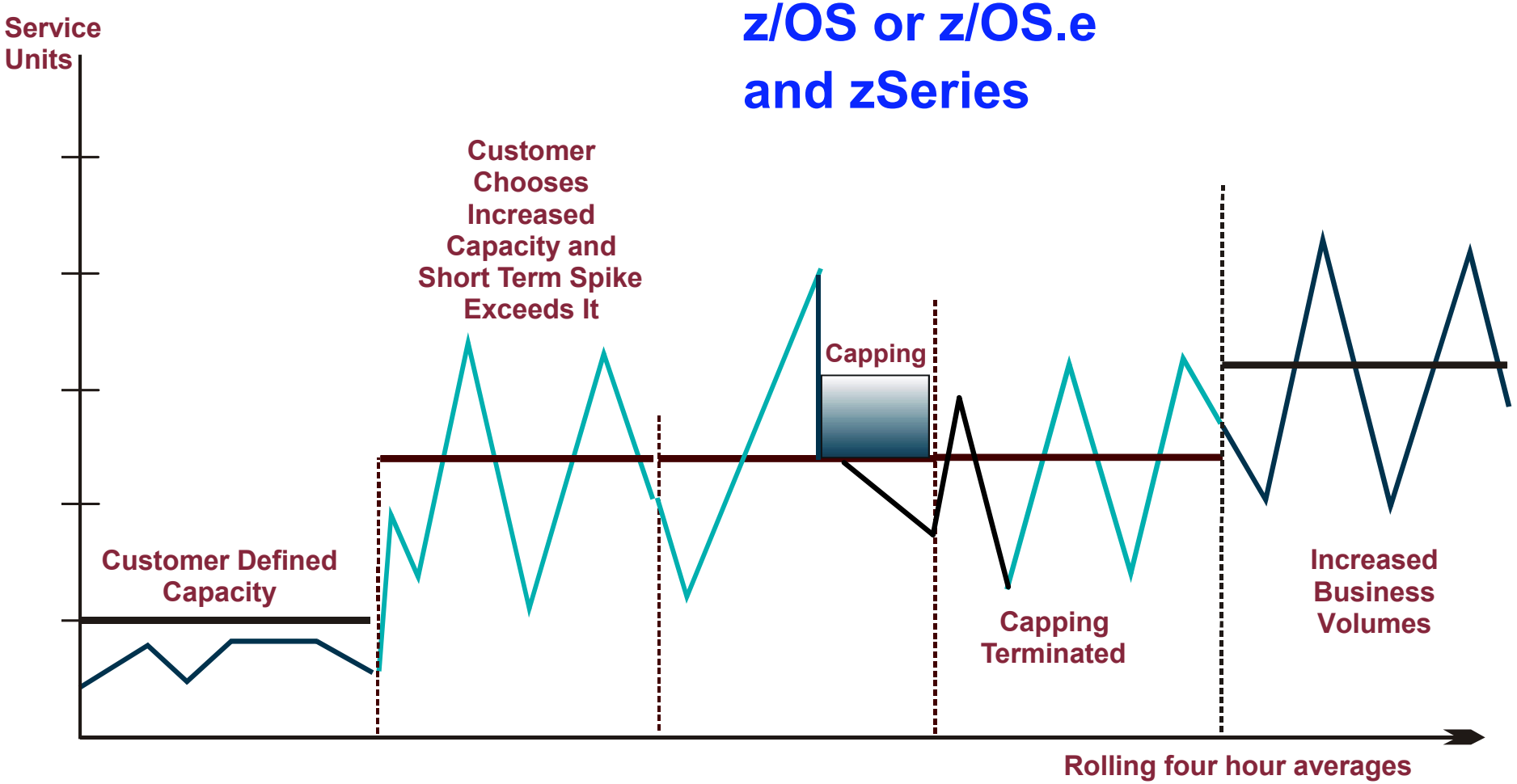
Variable Workload License Charge
PR/SM Managment to Defined Capacity

z/OS or z/OS.e
and zSeries



Pay for what you define!

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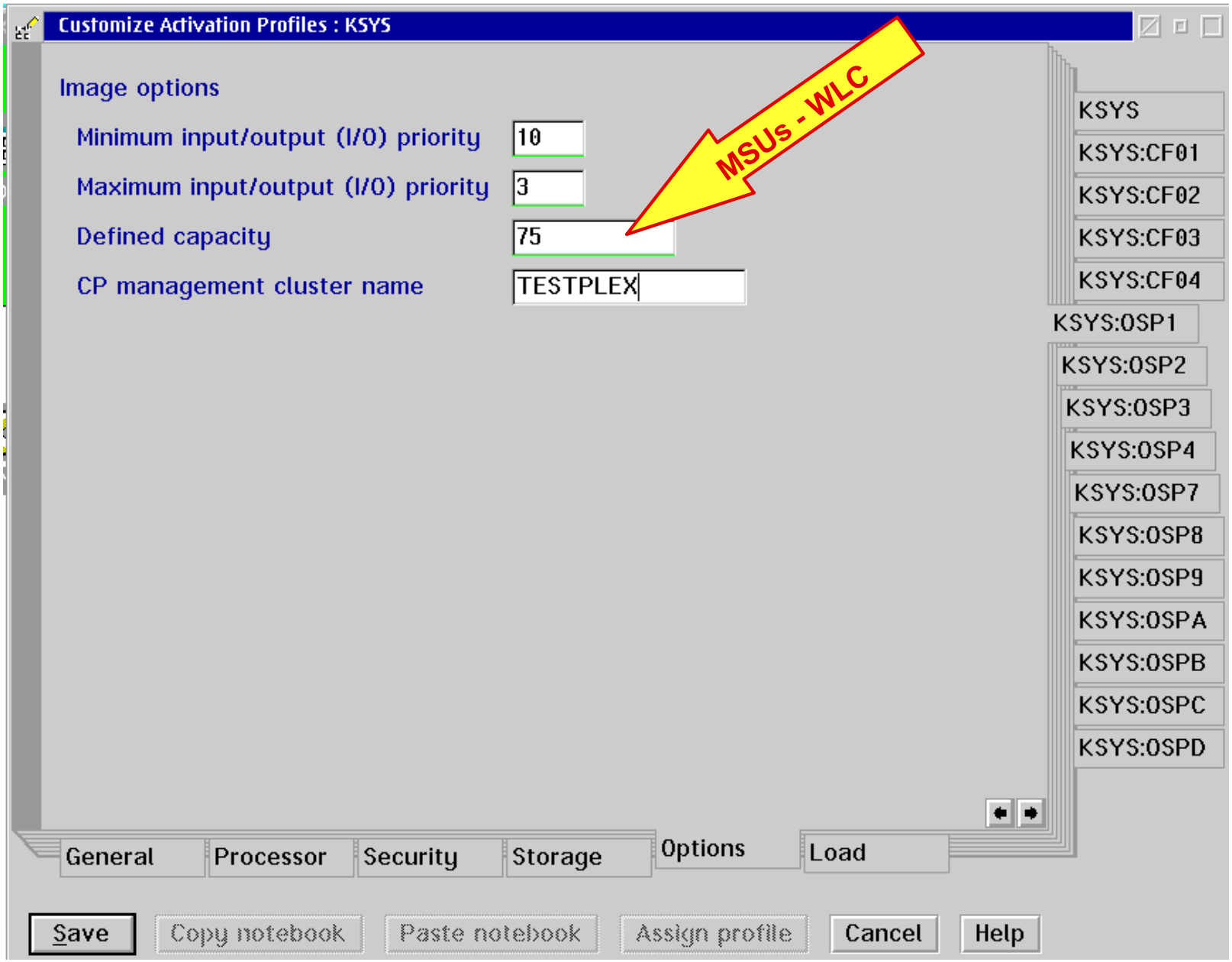
Image Profile Options Tab



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HMC/SE Change Controls (Left)

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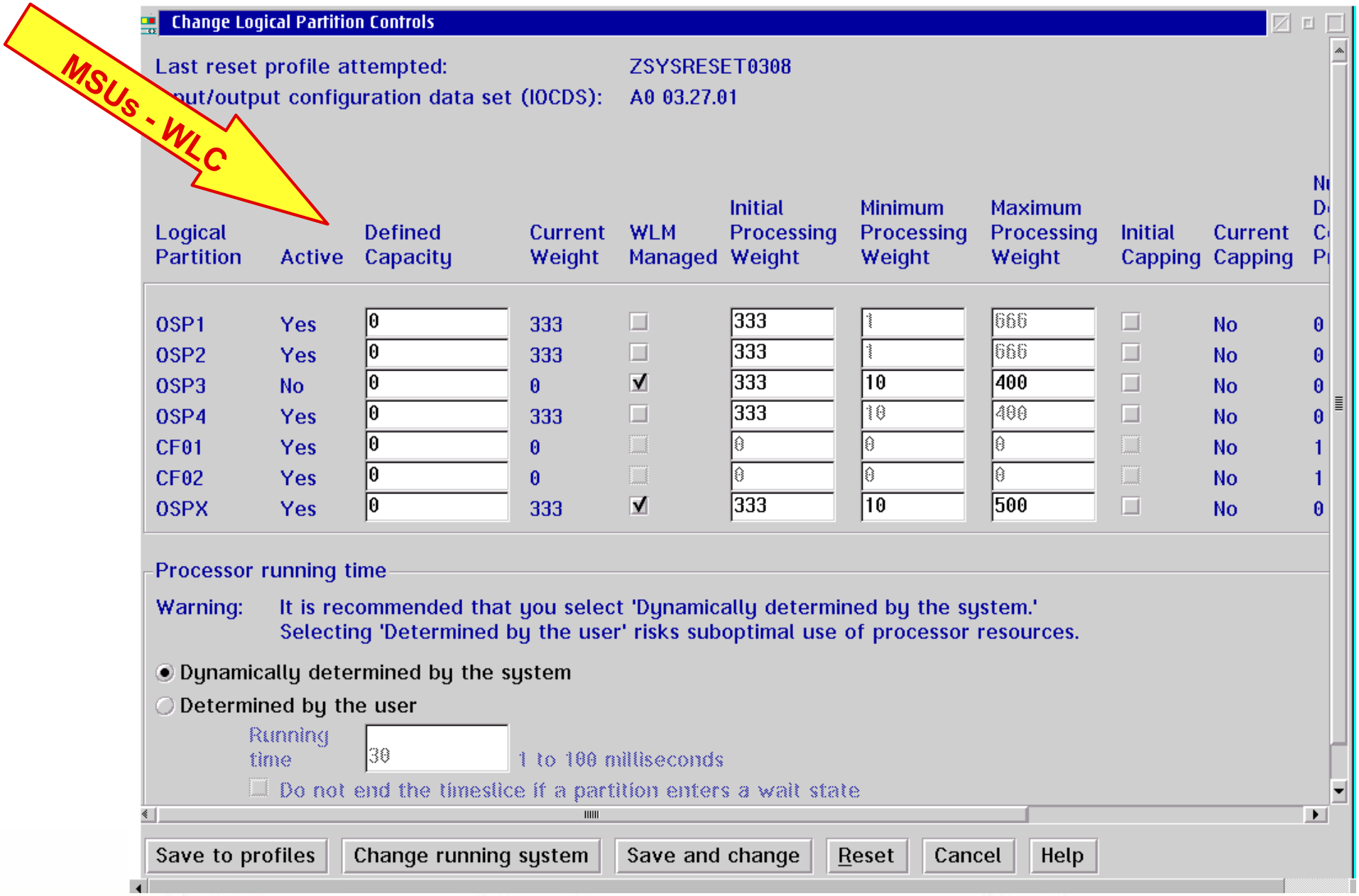

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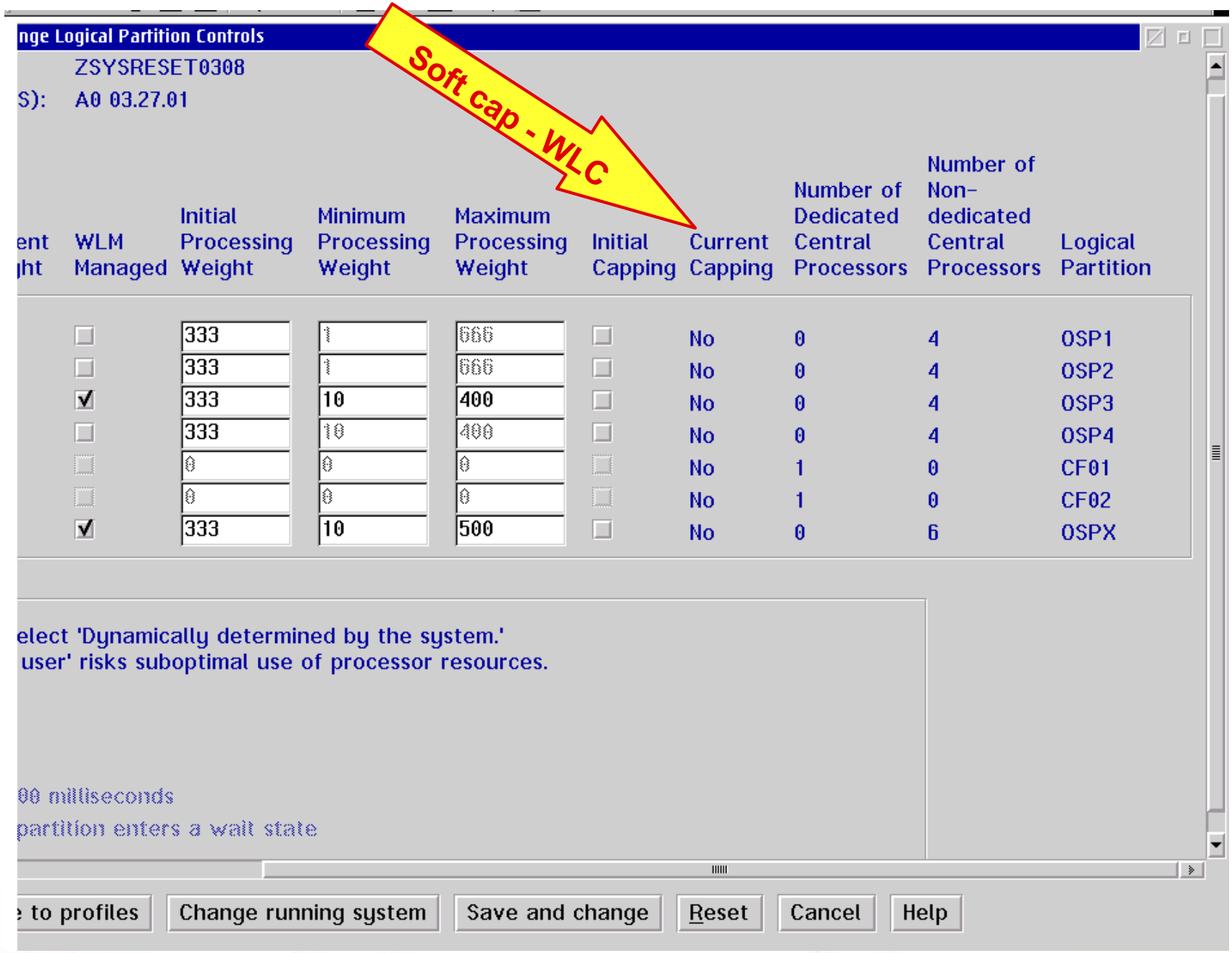
HMC/SE Change Controls (Right)



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Intelligent Resource Director

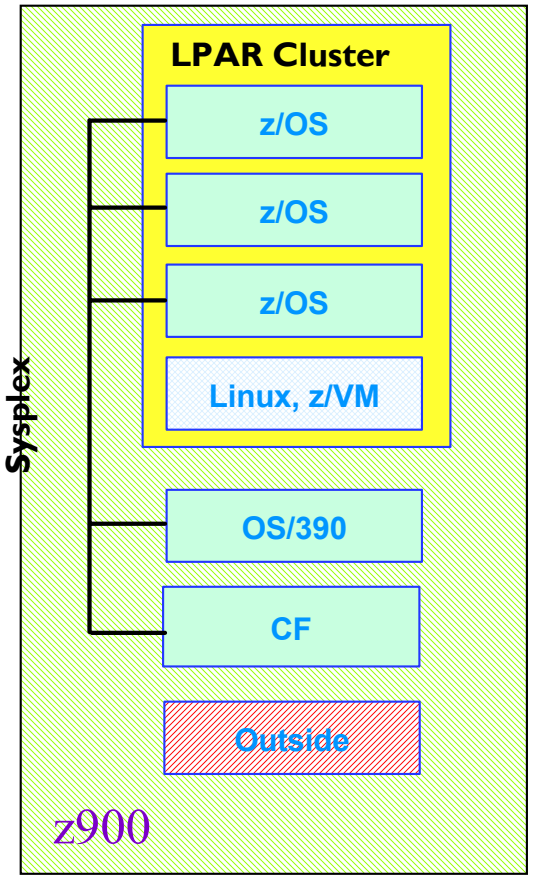
Leverage platform strengths through integration

- Workload Manager
- Parallel Sysplex
- PR/SM
- Channel Subsystem

View a cluster of LPs on a zSeries as single pool of computing resource

- Move physical resource to priority workloads in an LPAR cluster
- Extend goal oriented resource management across logical partitions transparently to application subsystems
- Initial resources managed: CPU and I/O
- Requires Parallel Sysplex, WLM Goal Mode, WLM Structure and Level 9 Coupling Facility
- z/OS V1.2 adds z/VM and Linux for zSeries support for LPAR weight management

zSeries IRD Scope



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Intelligent Resource Director

LPAR CPU Management

Description

- **LPAR Weight Management - z/OS, z/VM and Linux for zSeries**
  - Dynamically manages a partition's CPU access based on workload demands and goals (z/VM and Linux on shared CPs only)
- **Vary Logical CPU Management - z/OS Only**
  - Optimizes number of logical CPs based on partition's current weight and CPU consumption

Benefits

- **Provides flexibility in managing** CPU **resources across logical partitions in accordance with workload goals.**
  - Dynamic change of LPAR weights
  - Manage tradeoffs between meeting service goals for work and making efficient use of a system's resource
  - Prevent or mitigate possible problems
  - Provides the fastest Uniprocessor speed for single tasking workloads
  - Reduces LPAR overhead

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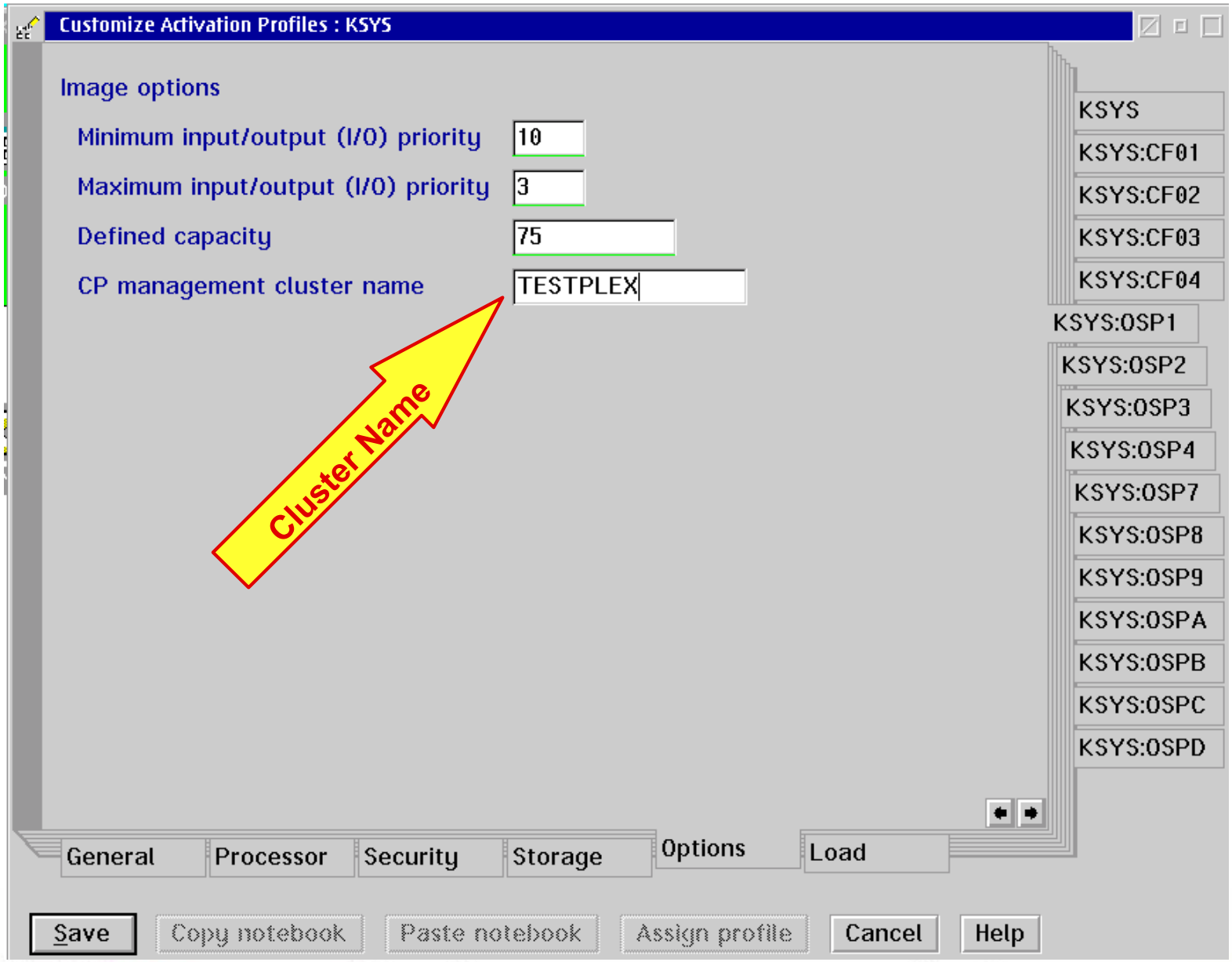
zSeries Image Profile Control CPU Management



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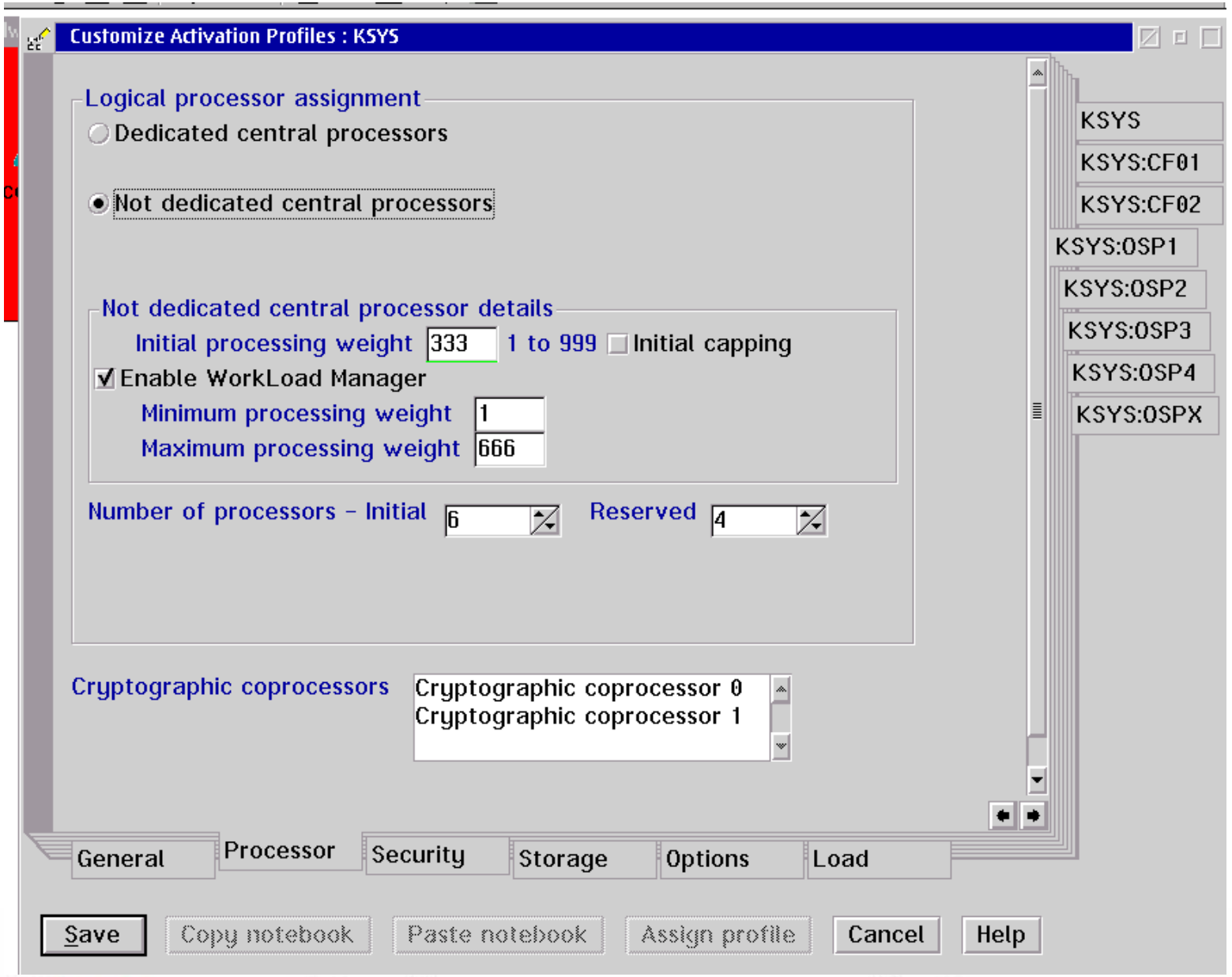
zSeries Image Profile Control CPU Management



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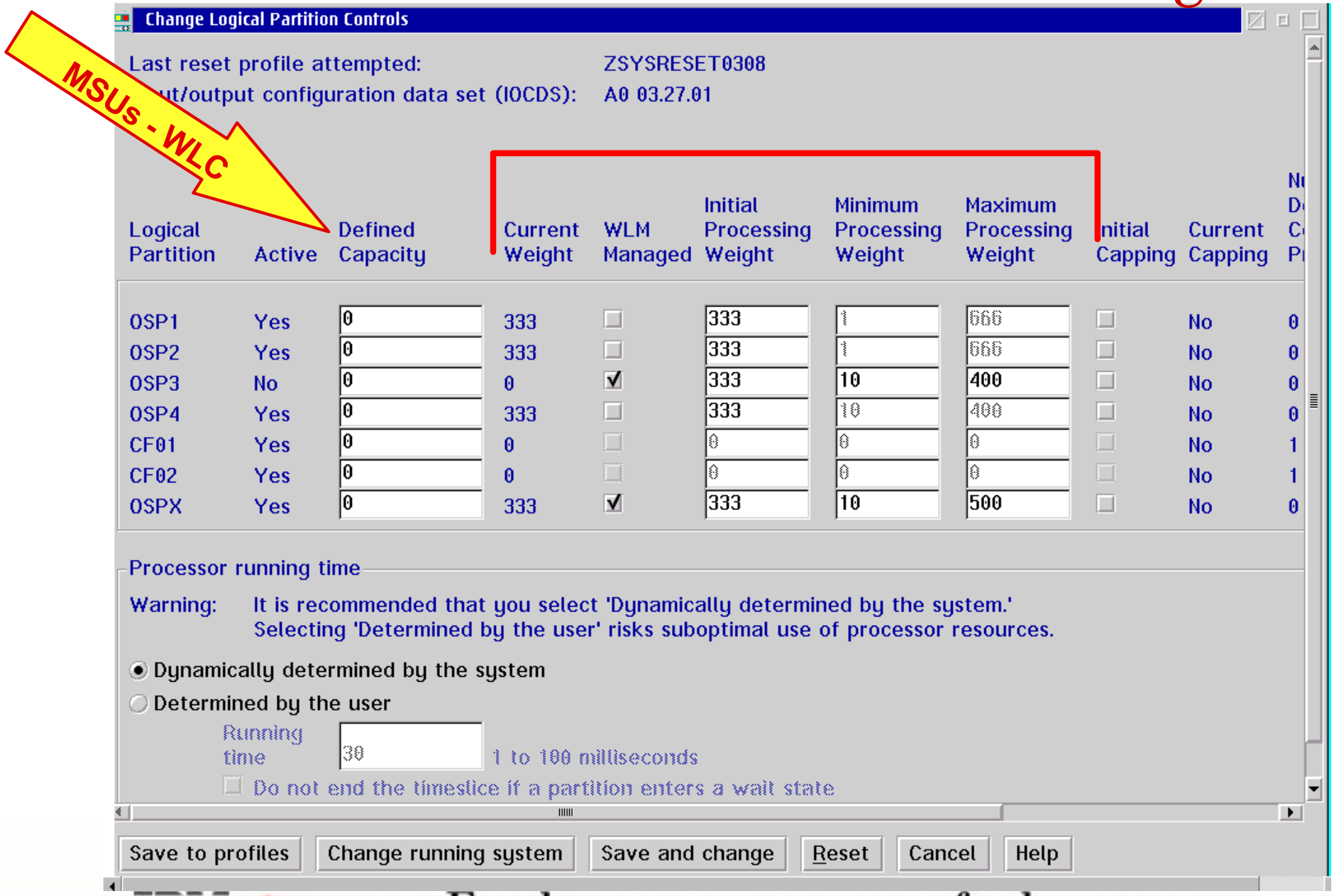
zSeries Change Logical Partition Controls CPU Management



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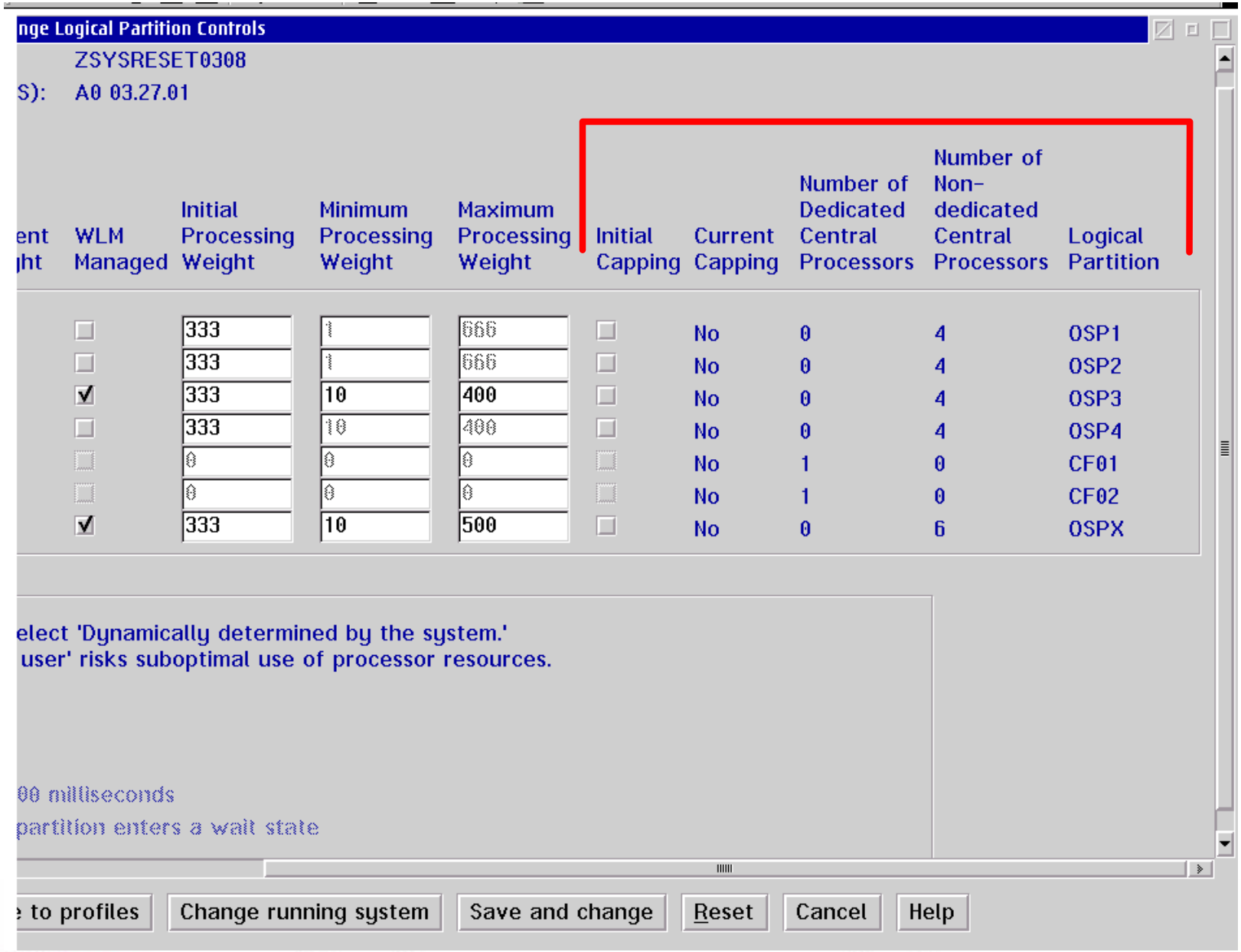
zSeries Change Logical Partition Controls CPU Management



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Intelligent Resource Director

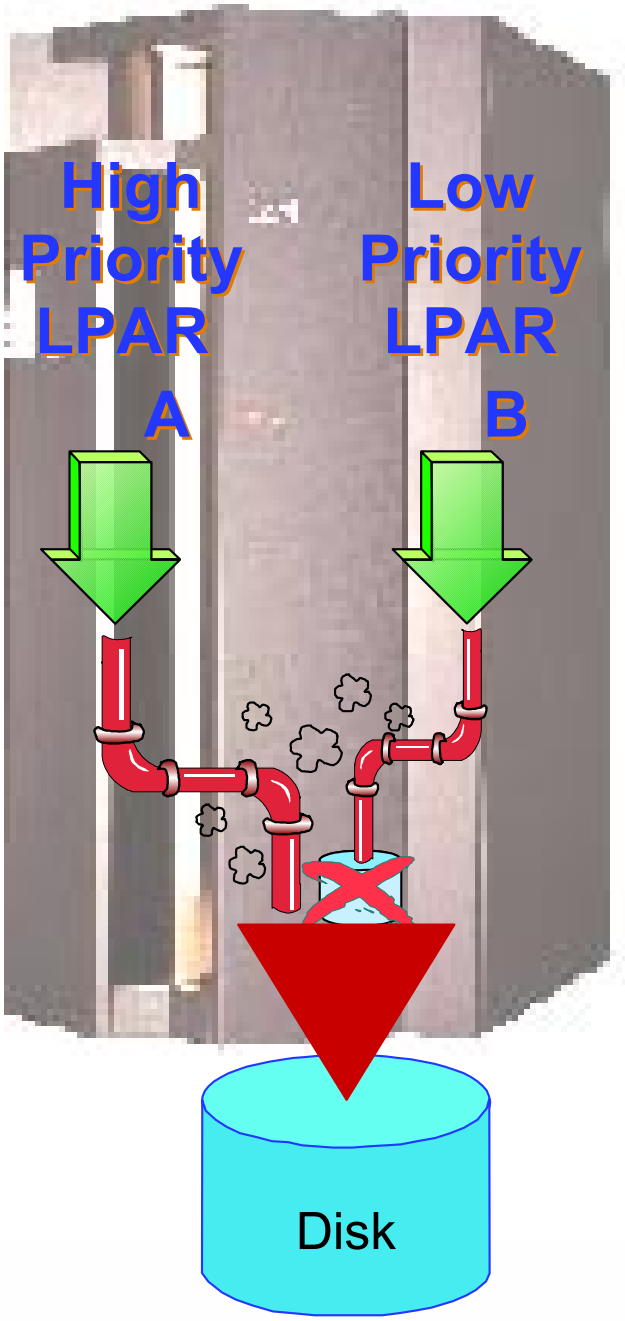
Channel Subsystem Priority Queuing

Description

- I/O Priority Queuing prioritizes I/O within an LPAR across workloads
  - Available since OS/390 V1.3
- Channel Subsystem Priority Queuing prioritizes I/O within an LPAR cluster
  - LPAR priorities based on workload goals
  - Exclusive to zSeries
- z/VM and Linux for zSeries - static only

Benefits

- Allows better channel resource management with EMIF
  - Low priority work will not preempt high priority work from other LPARs



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zSeries Reset Profile Control
CSS I/O Priority Queuing

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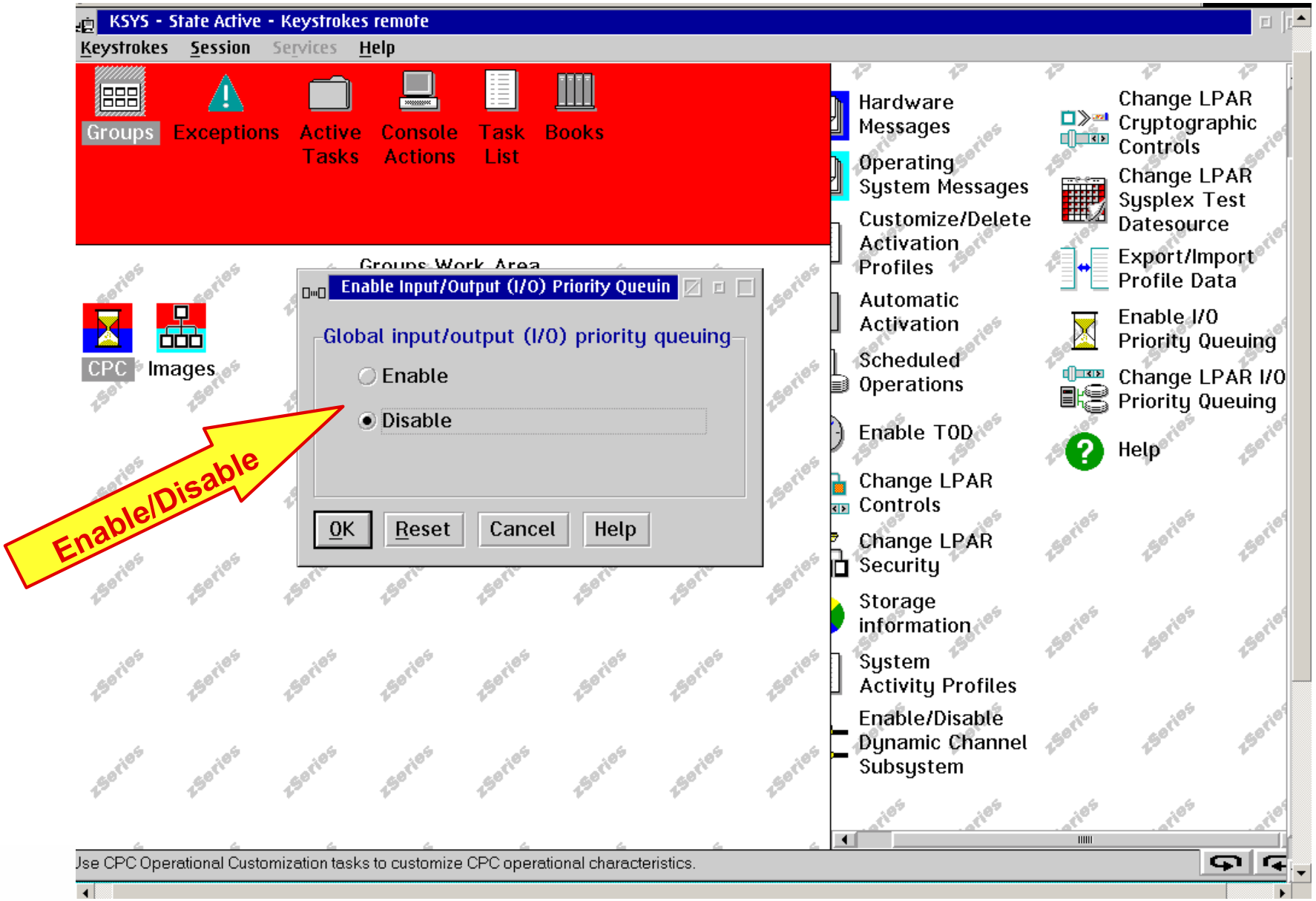
zSeries System-wide Control
CSS I/O Priority Queuing



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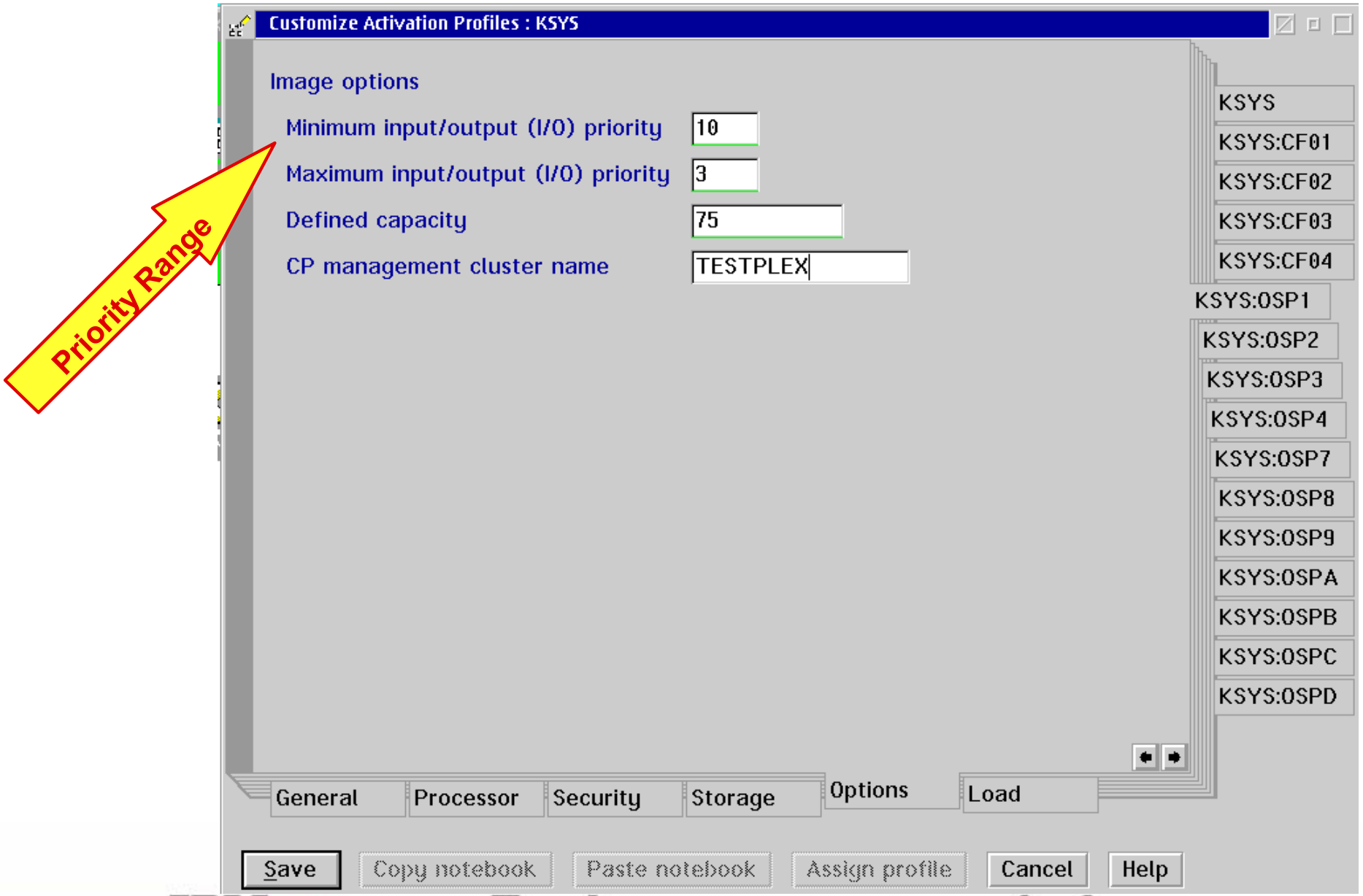
zSeries Image Profile Control
CSS I/O Priority Queuing



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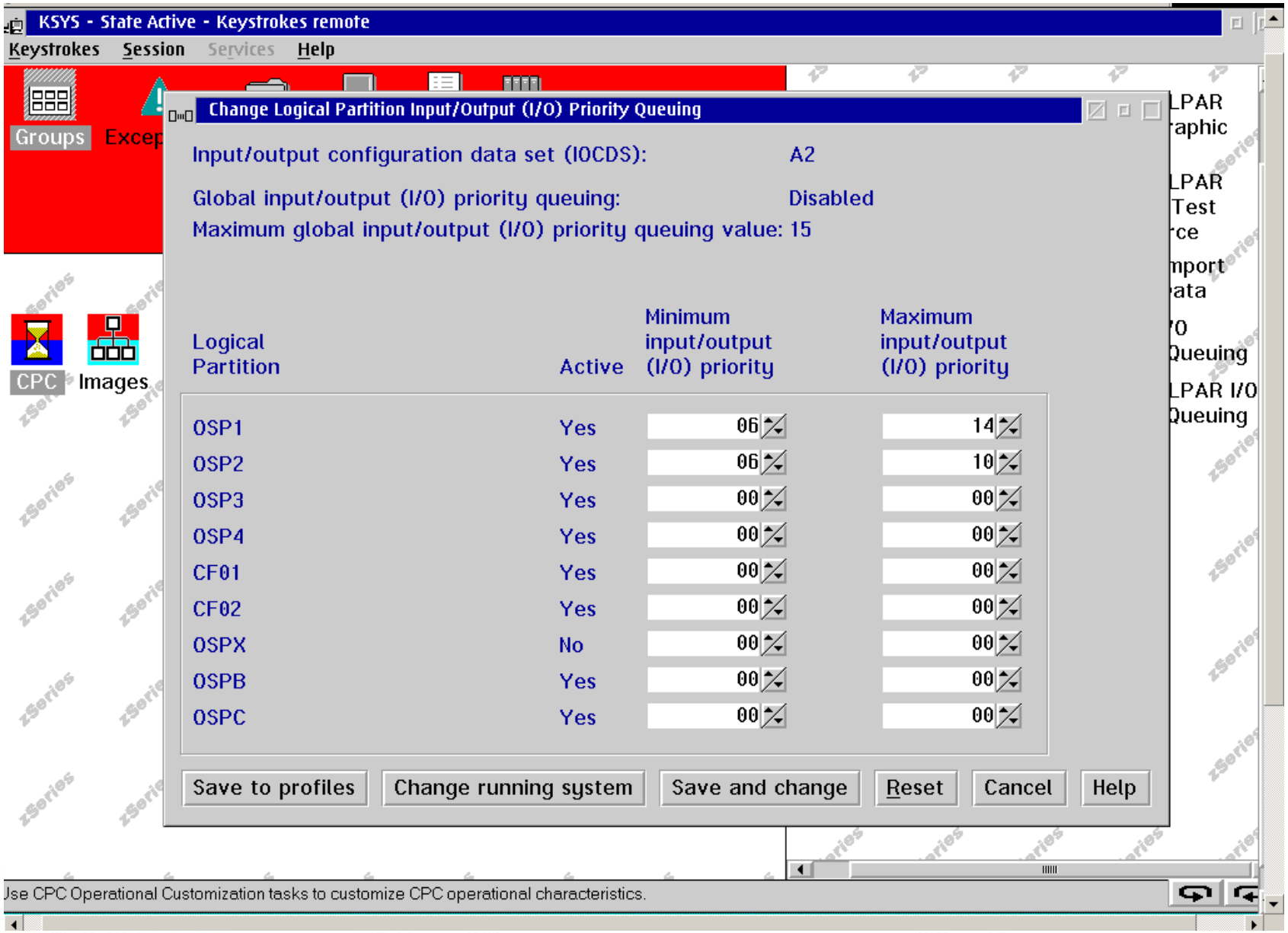
zSeries Change Logical Partition CSS I/O Priority Queuing



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Intelligent Resource Director

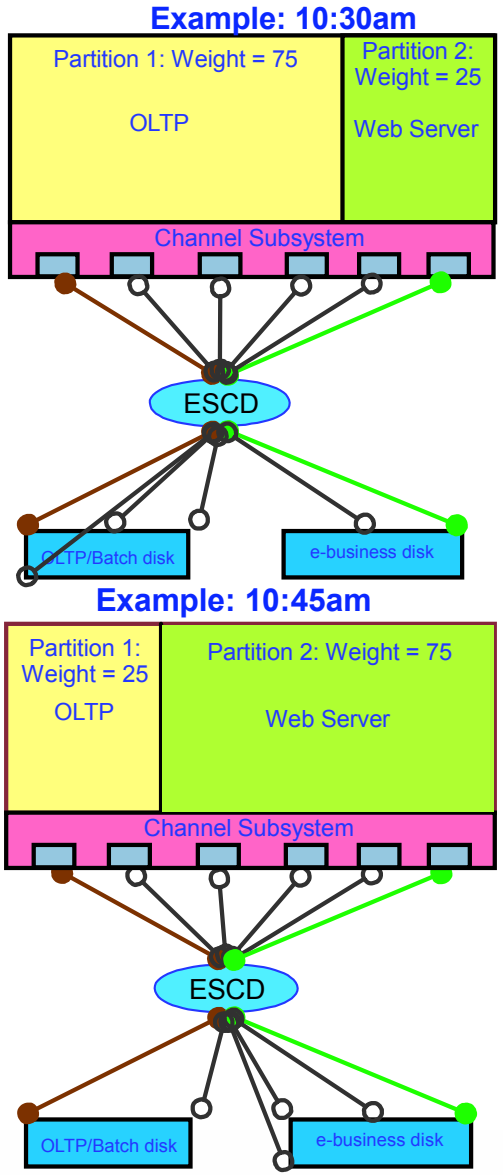
Dynamic Channel Path Management

Description

- Allows the system to dynamically manage channel paths in response to changing workload demands
- Moves channel capacity (bandwidth) to the disk subsystem(s) experiencing need based on workload requirements
- Optimized with Channel Subsystem Priority Queuing
- Exclusive to zSeries and z/OS

Benefits

- More efficient use of hardware resource
- Reduces channel requirements
- Simplifies I/O configuration planning and definition
- Dynamically balances I/O connectivity based on workload demand



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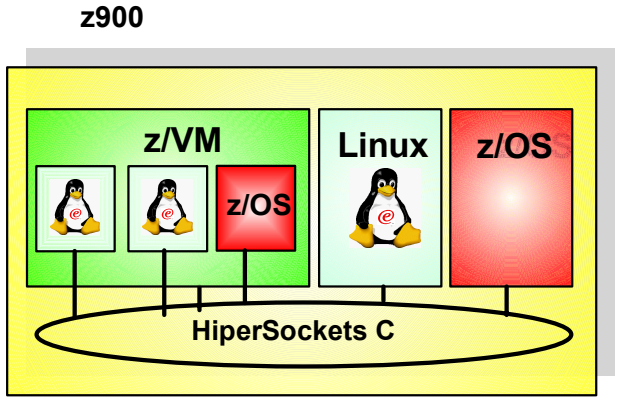
HiperSockets - The Network in the Box

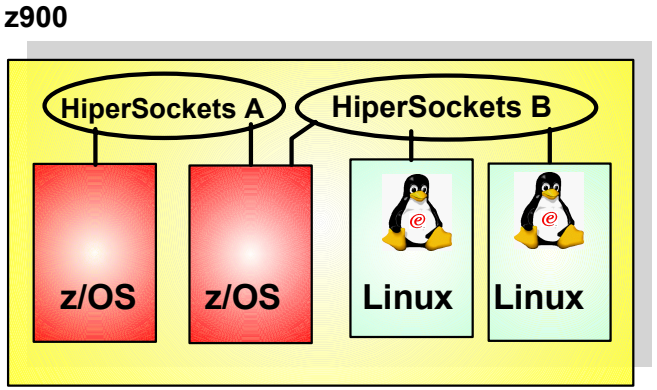
IP networking among virtual servers in a zSeries

- Improved response time due to low latency
  - High Speed connectivity via memory bus
- Highly Secure
  - Data never flows outside the server
- Highly available
  - Integrated zSeries hardware, no external parts
- Cost savings
  - No external network, attachment, or cables
- Flexible
  - Combinations of z/OS, Linux, and z/VM
- Simple to install, operate, maintain
  - Transparent to applications



Pre-requisites

- z/OS 1.2 & up or z/OS.e (z800 only)
- z/VM 4.2
- Linux kernel 2.4 (64- and 31-bit)
- z900 (Driver 3C) or z800



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HiperSockets Configuration

Fast data movement between LPARs

- Provides up to four "internal LANs" HiperSockets accessible by all LPARs
- Up to 1,024 TCP/IP stacks across all four HiperSockets
- Up to 4,000 IP addresses
- Similar to cross-address-space memory move using memory bus
- Does not use CPU cache, thus no effect on other activity

I/O configuration with new CHPID type = IQD

- Controlled like regular CHPID
- Each OS image configures its own usage of available HiperSockets CHPIDs
- Uses iQDIO similar to OSA/Express

Works with both standard and IFL CPs

No physical media constraint, no physical cabling

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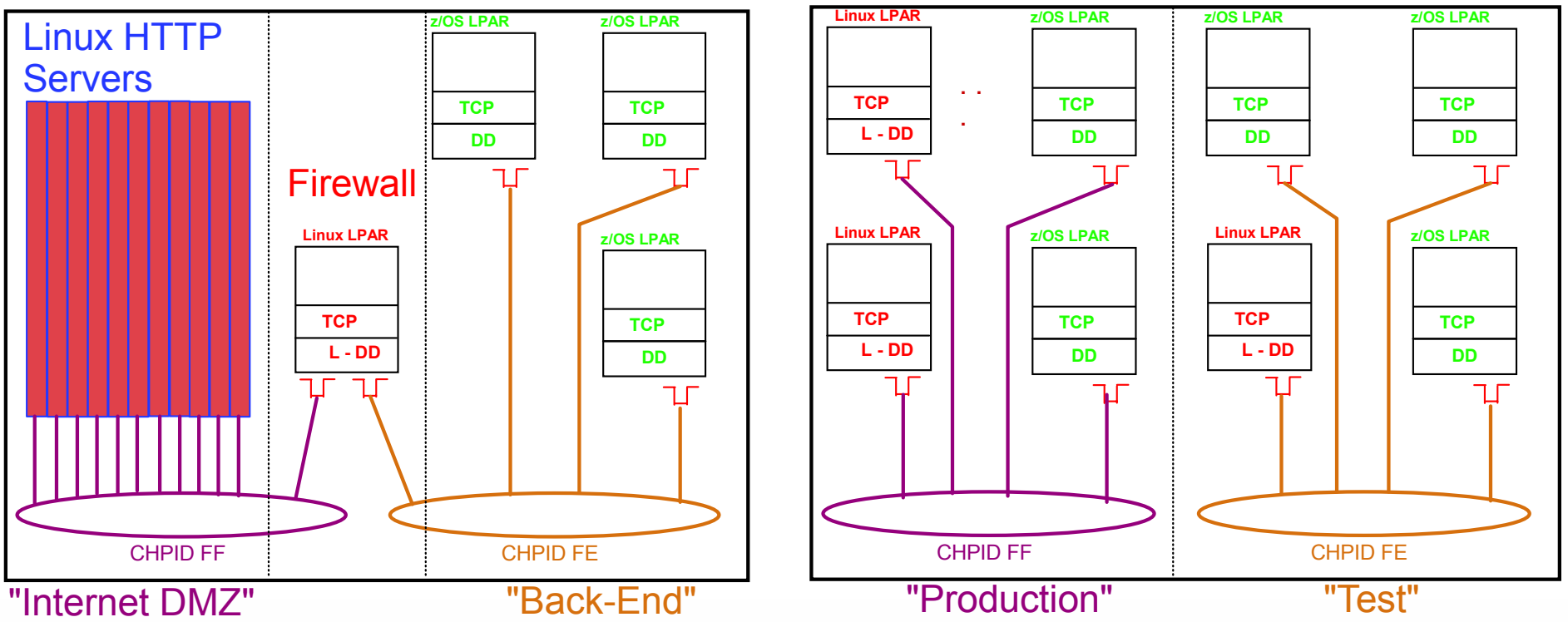
HiperSockets: Multiple "LANs"

Up to 4 "simulated virtual LANs" per CEC

- Each LAN has its own CHPID. New type (IQD) controlled like regular CHPID
  - Can be shared by all defined LPARs
- Each OS image configures its own usage of available HiperSockets CHPIDs
- Each CHPID has configurable IQD frame size (16K, 24K, 40K, 64K)
  - Allows optimization per HiperSocket for small packets versus large streams by setting Maximum Transmission Unit (MTU) size to 8K, 16K, 32K, 56K



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IBM Coupling Facility Control Code

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World's Leading and Unrivaled Coupling Technology

Dynamic ICF Expansion into shared ICFs
Structure rebuild

Level 8 (6/99)
G3/4 Last Level

Shared ICF
IBM Concurrent Conditioning for S/390

Level 7 (3/99)

CF Resource Mgmt
- IC Channel
- ICB
- TPF support

Level 6

- DB2 CACHE Duplexing
- Dynamic ICF Expansion

DB2 Availability

Level 5 - G2 Last Level

MQSeries V2.2
Multi-system Enclaves
IRD Support

Level 9 (6/00)

z900 GA
G5/6 Dr 26

Continuous Operations

Initial CF HW and Functions

Level 1

Level 0

- Dynamic Alter
- CICS TSQ
- System Logger

- Dynamic CF Dispatch
- ICF Support

Level 4 - G1 Last Level

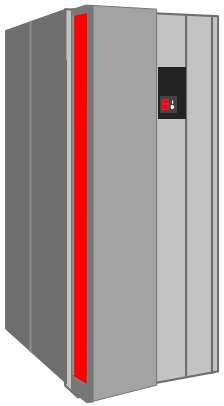
Dynamic I/O Peer and Receiver Structure Changes Sender in CF

Level 10 (10/01)

z900 Dr 3C

List KEY and List cursor Enhancements

Level 1



IMS Shared Message Queue Base

Level 3

Level 2

64-bit

Level 12

z800 GA

Register Name List and Batch Unlock

Level 2

DB2 Performance

Cache Vector index Comparison Enhancement

VSAM RLS

Level 2

Structure Enhancements (255/Structure & 1023 Structure/CF

Systems Management

Note: *Level 11 - Reserved for G5/6*

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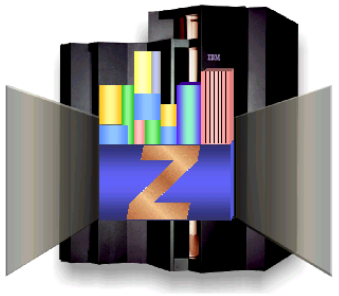
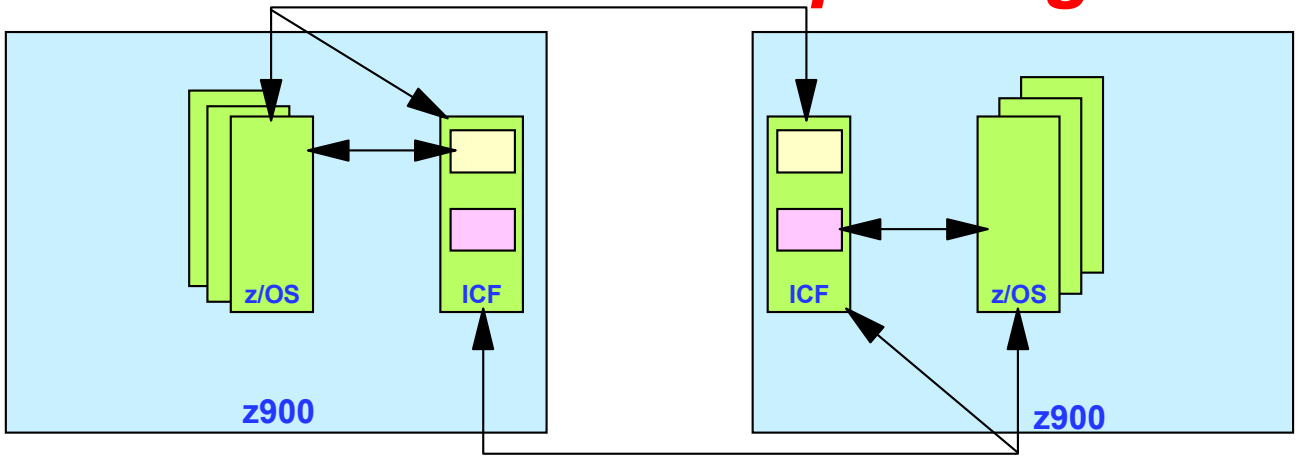
Parallel Sysplex Enhancement



System Managed CF Structure Duplexing



A robust failure recovery capability

BENEFITS:

- Ease of middleware and ISVs to use CF for high availability
- May eliminate the need for standalone CF in some situations

Requirements:

- z/OS v1.2 + PTFs
- zSeries
  - CFCC Level TBD
  - CF: ICF or Model 100
- S/390 G5/6
  - CFCC Level TBD
  - CF: ICF or Model R06

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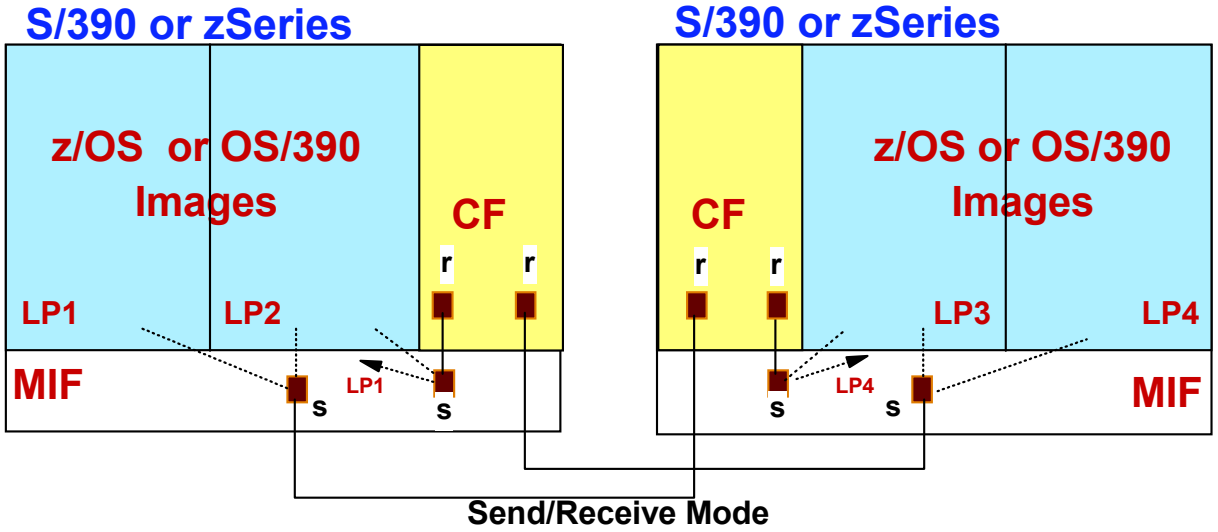
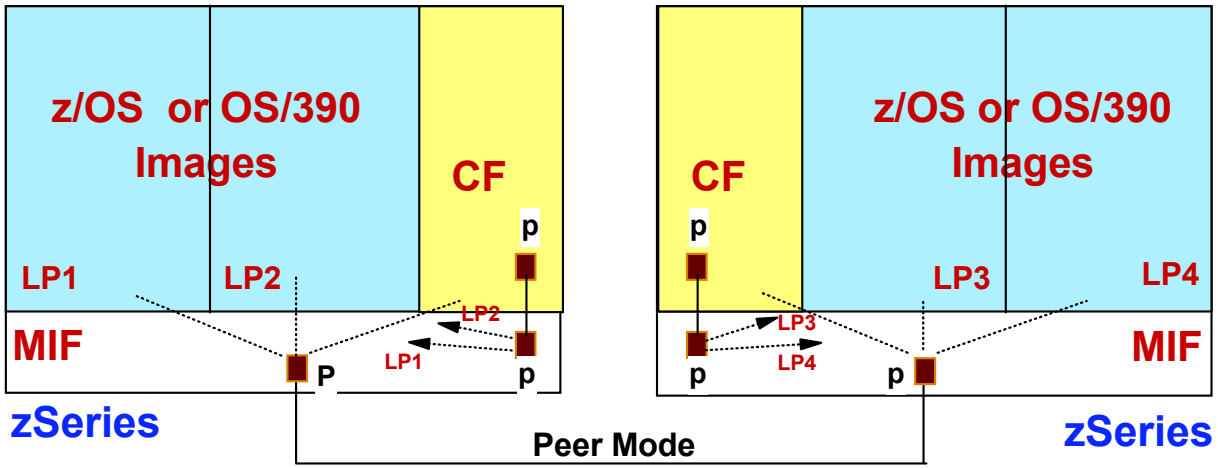
zSeries Peer Link Sharing CHPID Saving



Send/Receive Links

- zSeries to 9672 (or zSeries)
- ISC-3 and ICB-2 (z900)
- Sender to Receiver
- Sender - MIF shared
- Receiver - No sharing
- 8 CHPIDs



Peer Mode Links

- zSeries to zSeries only
- ISC-3, ICB-3, and ICP
- Peer to Peer
- Peer - One CF; multiple z/OS, OS/390 MIF shared
- 6 CHPIDs - Saves 2 with internal Coupling Facility

Note: Minimum connectivity illustrated, duplicate links are recommended for availability.

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Capacity Upgrade on Demand

Driver 22 (6/1999) provides CUoD

- "Plan Ahead" and order of upgrade MES required
- Engines added to shared pools (CP and ICF) without disruption
- Permanent addition, no removal
- Changing maximum number(s) of engines in an LP requires deactivate and profile change

Driver 26 (6/2000) adds *initial* and *reserved* engine support for LPAR mode

- Define initial and reserved engines in profile
- Configure ON reserved engines after CUoD occurs without deactivation

zSeries

- z900 GA: Same support as G5/6 at Driver 26
- z900 - Memory Upgrade on Demand - Driver 3C (10/31/2001)
- z800 - Concurrent sub-uni upgrade - (Available - 9/30/2002)

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LPAR Support for CUoD and CBU zSeries and G5/6

Nondisruptive CUoD/ CBU Upgrade

- Add physical CPs to shared CP Pool
- Add physical ICFs to shared ICF Pool (CUoD only)
- Added physical engines become available and visible (STSI and event)

LP Profile: Initial and Reserved Processors (G5/6 Dr 26 6/2000)

- Support for S/390 and CF LPs - CP and ICF
- Initial - On at Activation
- Reserved - Can be configured on if resource is available
- Initial + Reserved can equal CUoD maximum

Nondisruptive CBU CP Downgrade (z900 Dr 3C and z800)

LP Activation and Processor Config Rules

- Can't activate LP with more initial shared logicals than shared pool contains.
- Can't activate LP with initial dedicated logicals if physicals taken from shared pool would "starve" an active LP with shared logicals.
- z900 nondisruptive CBU CP downgrade takes CPs ONLY from the shared CP pool, will not take the last CP.

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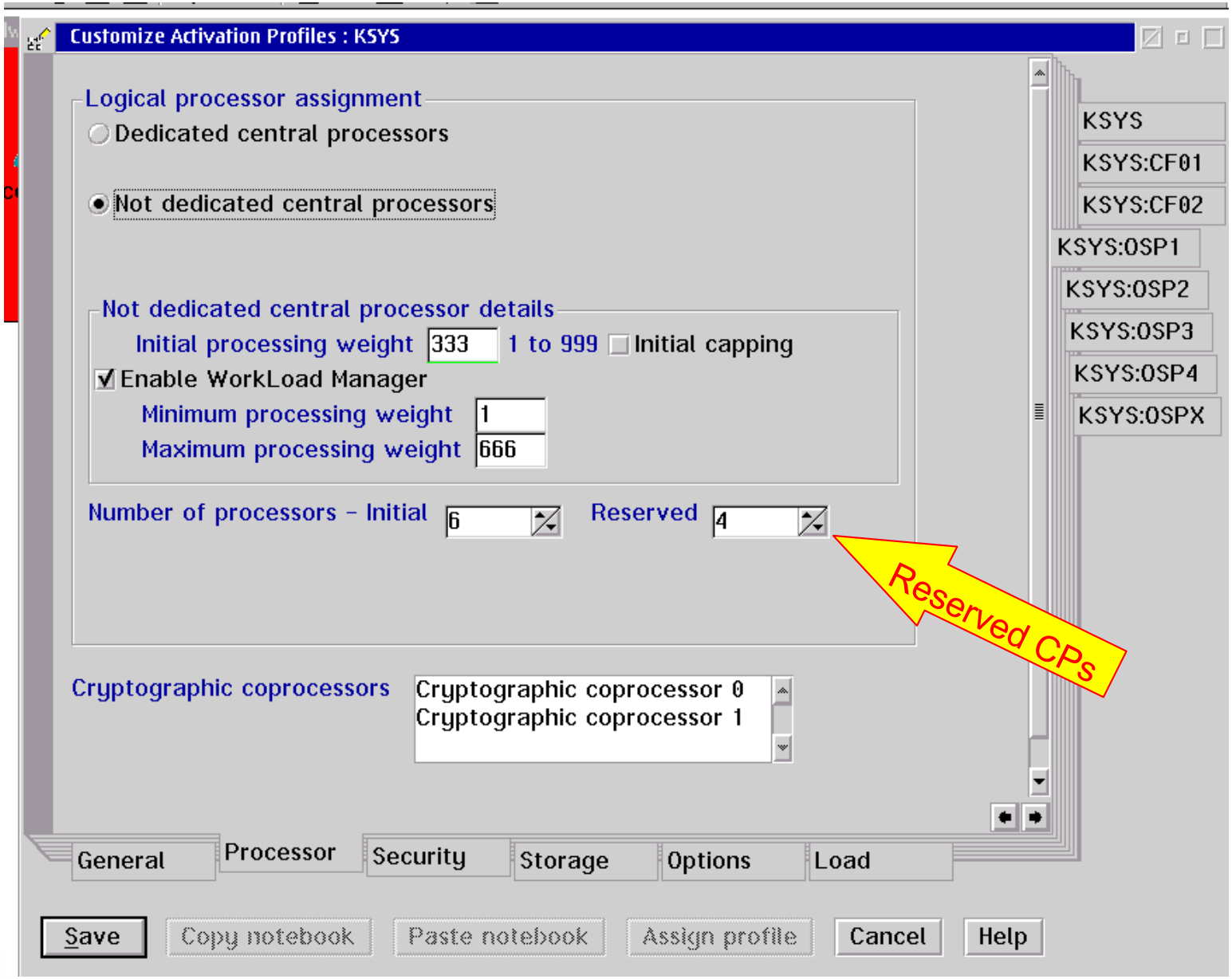
Initial and Reserved Support

zSeries at GA
S/390 G5 or G6 (Dr 26w)



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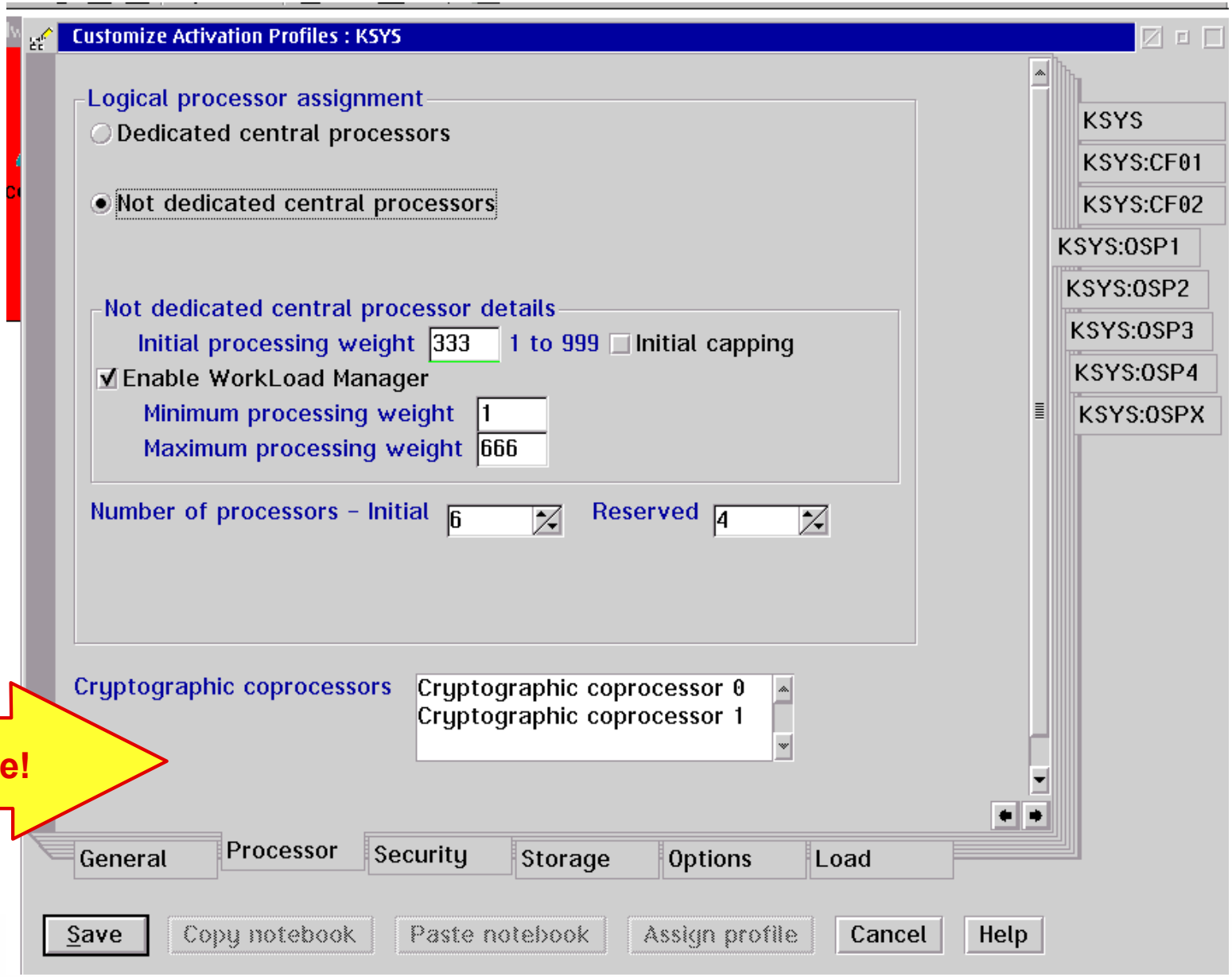
Fast Synchronous Data Mover Facility Replacment for ADMF

DB2 FSDMF APAR - PQ38174

- zSeries - Required
- G5/6 - Desirable



ADMF Gone!

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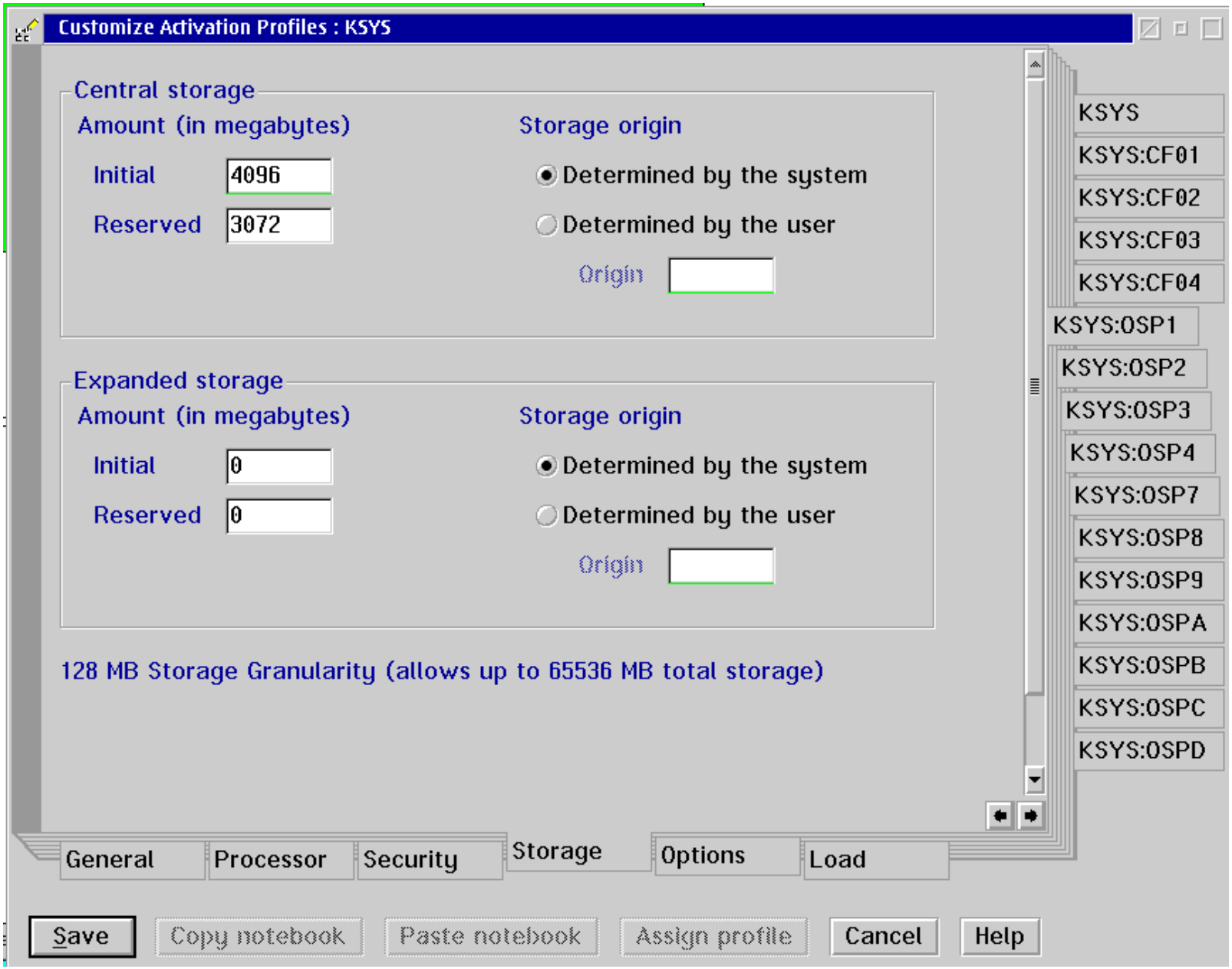
Image Profile, Storage

Expanded Storage

- Supported by z/Architecture
- Not used - zSeries CFCC, 64-bit OS/390 R10, z/OS, and z/OS.e



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z900 Concurrent Memory Upgrade

Concurrent Memory Upgrade

- LIC CC memory activation
- From current size to any size supported by cards installed (card change is disruptive)
- Add to partition using DSR/2 (MVS only) - Central or Expanded

Pre-Requisites

- z900 Server, LPAR Mode
- Predefine additional storage to partitions - Reserved Storage
- Predefine storage granularity if it would change

Note: No CBU for memory

Memory Card Size and Number

Storage	Models 100-109	Models 110-116	Models 1C1-1C9
5 6 7 8	**4 GB x 2**	**Not Offered**	**Not Offered**
10 12 14 16	**8 GB x 2**	**4 GB x 4**	**4 GB x 4**
18 20 24 28 32	**16 GB x 2**	**8 GB x 4**	**8 GB x 4**
40 48 56 64	**Not Offered**	**16 GB x 4**	**16 GB x 4**

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zSeries Storage Granularity

zSeries and G5/6 (Dr 22e and later)

- Single Storage Pool - All central storage
- ES configured as needed from central

Earlier Machines

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

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

Total Storage G5/6 or zSeries	Granularity CS & ES
5 - 8 GB	16 MB
10 - 16 GB	32 MB
18 - 32 GB	64 MB
40 - 64 GB	128 MB

RSU Increment Size!!!

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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

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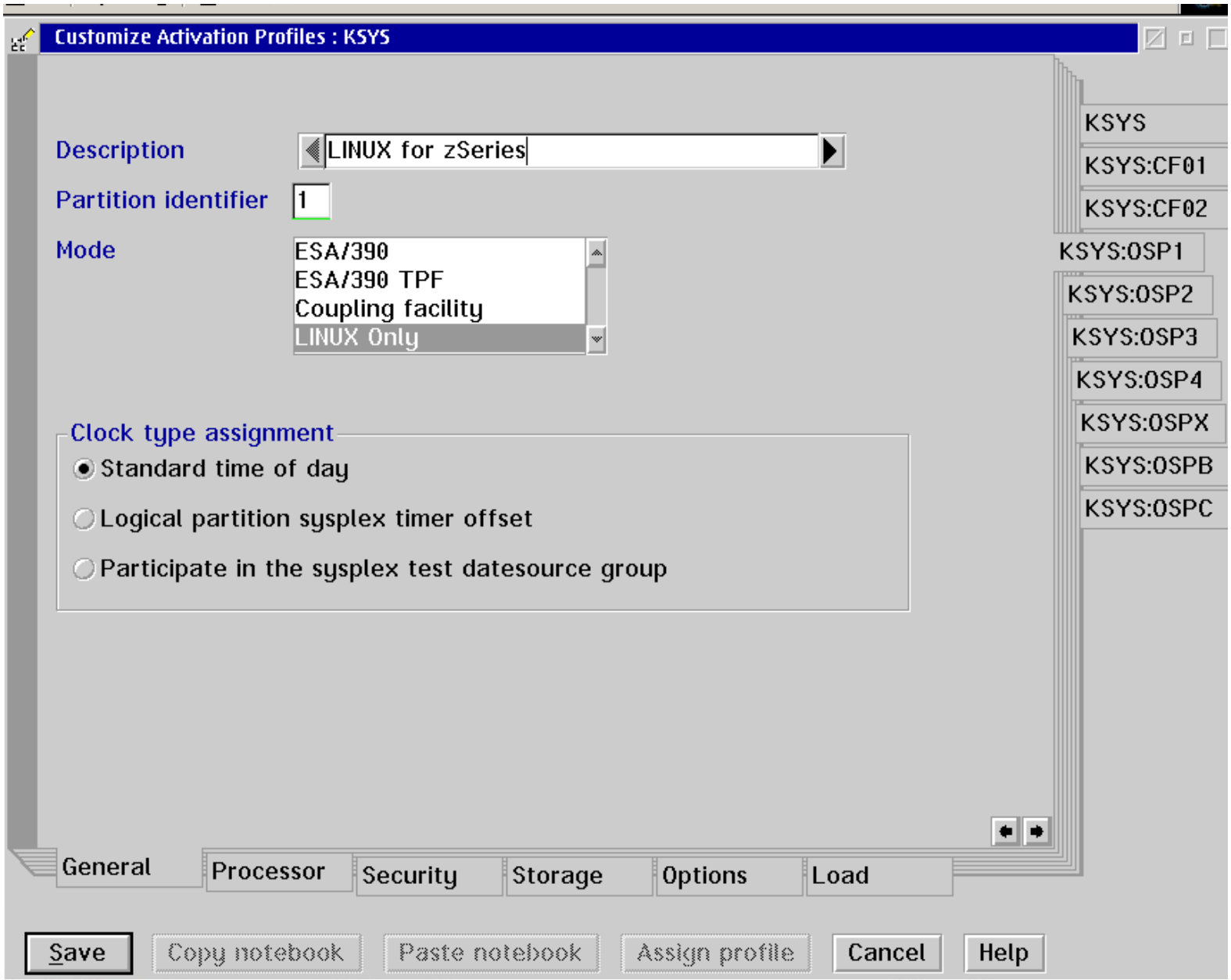
Linux Mode Partition Selection



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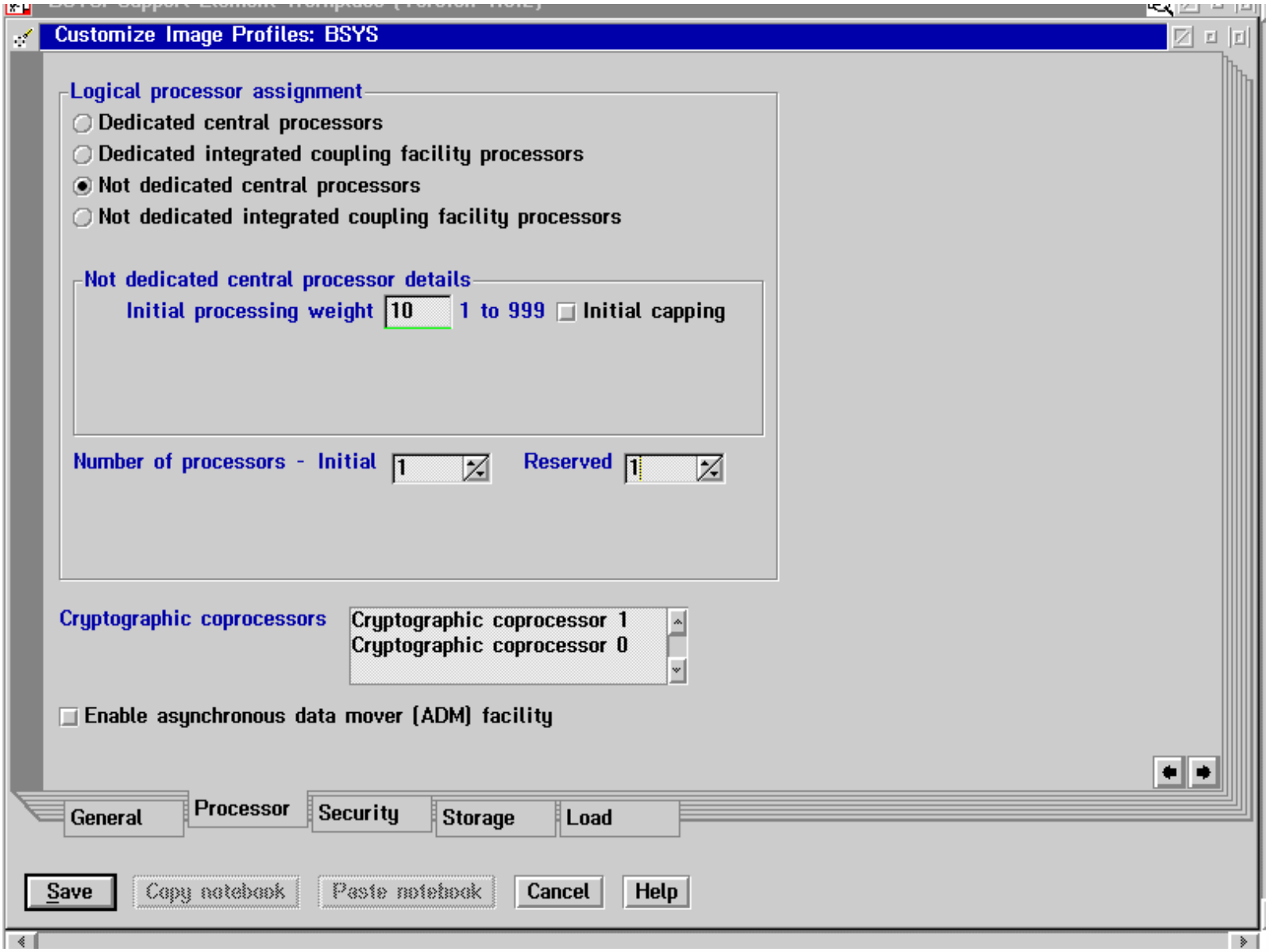
Linux Mode Processor Assignment

Note: To PR/SM IFL = ICF



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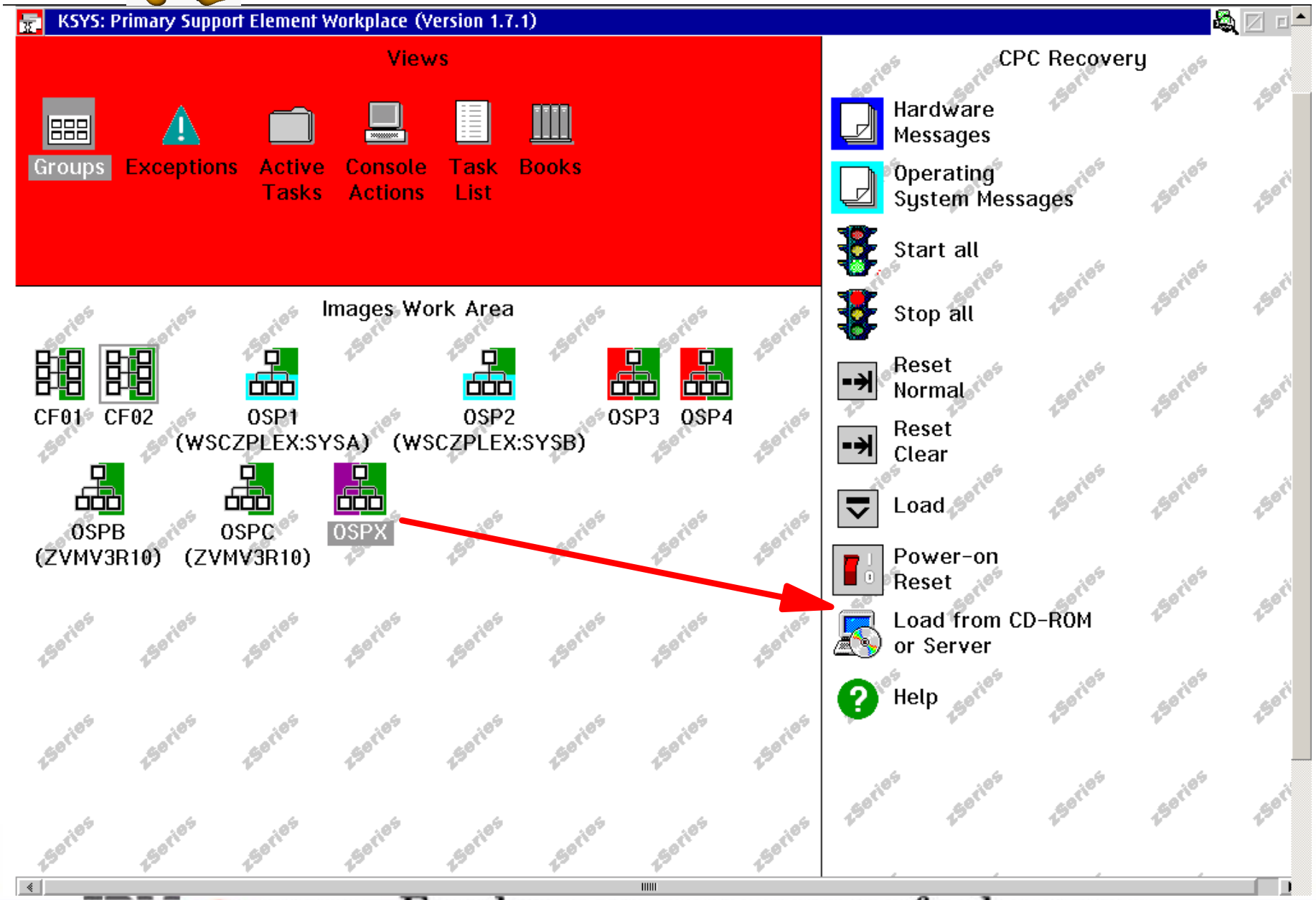
Load from CD-ROM or Server



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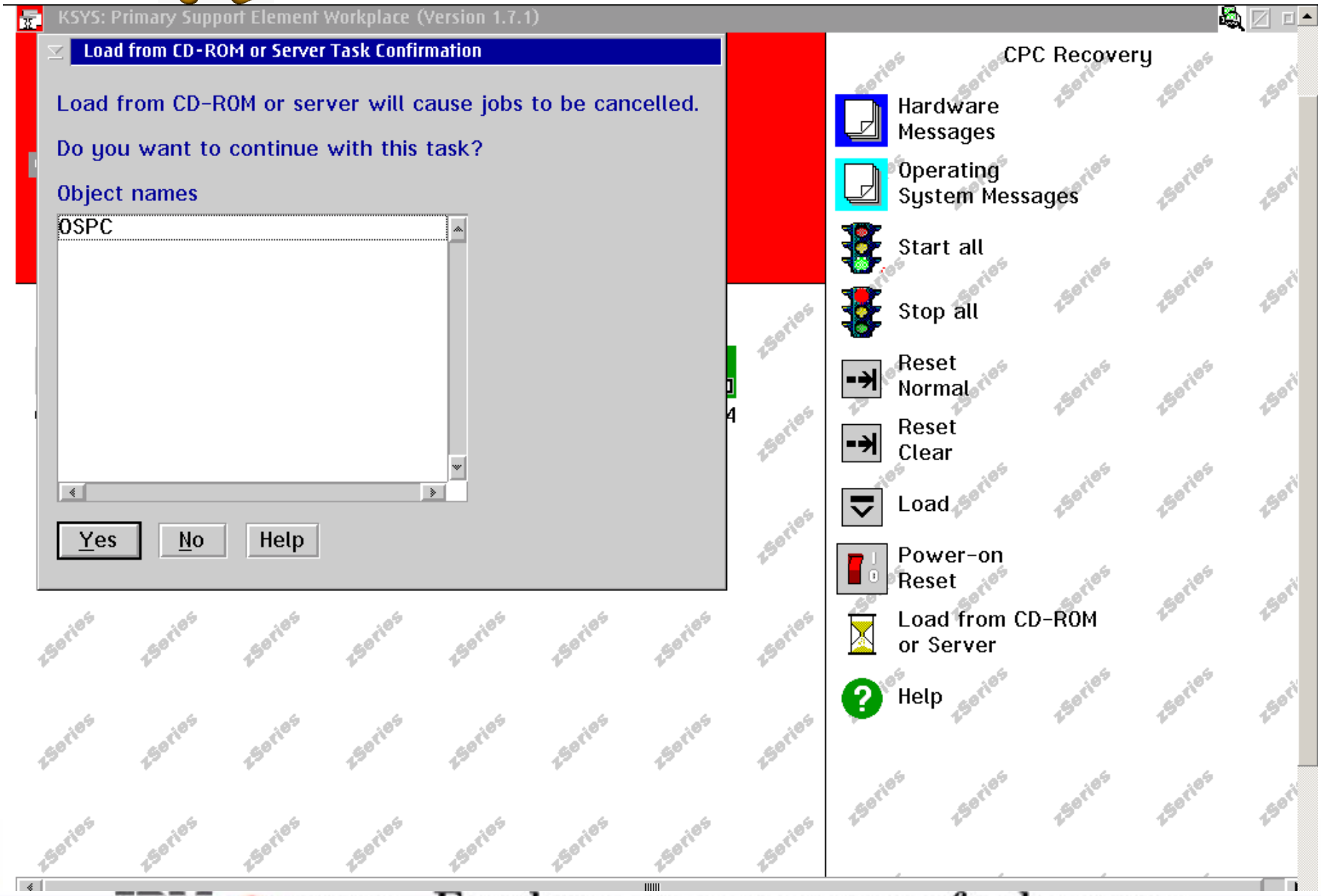

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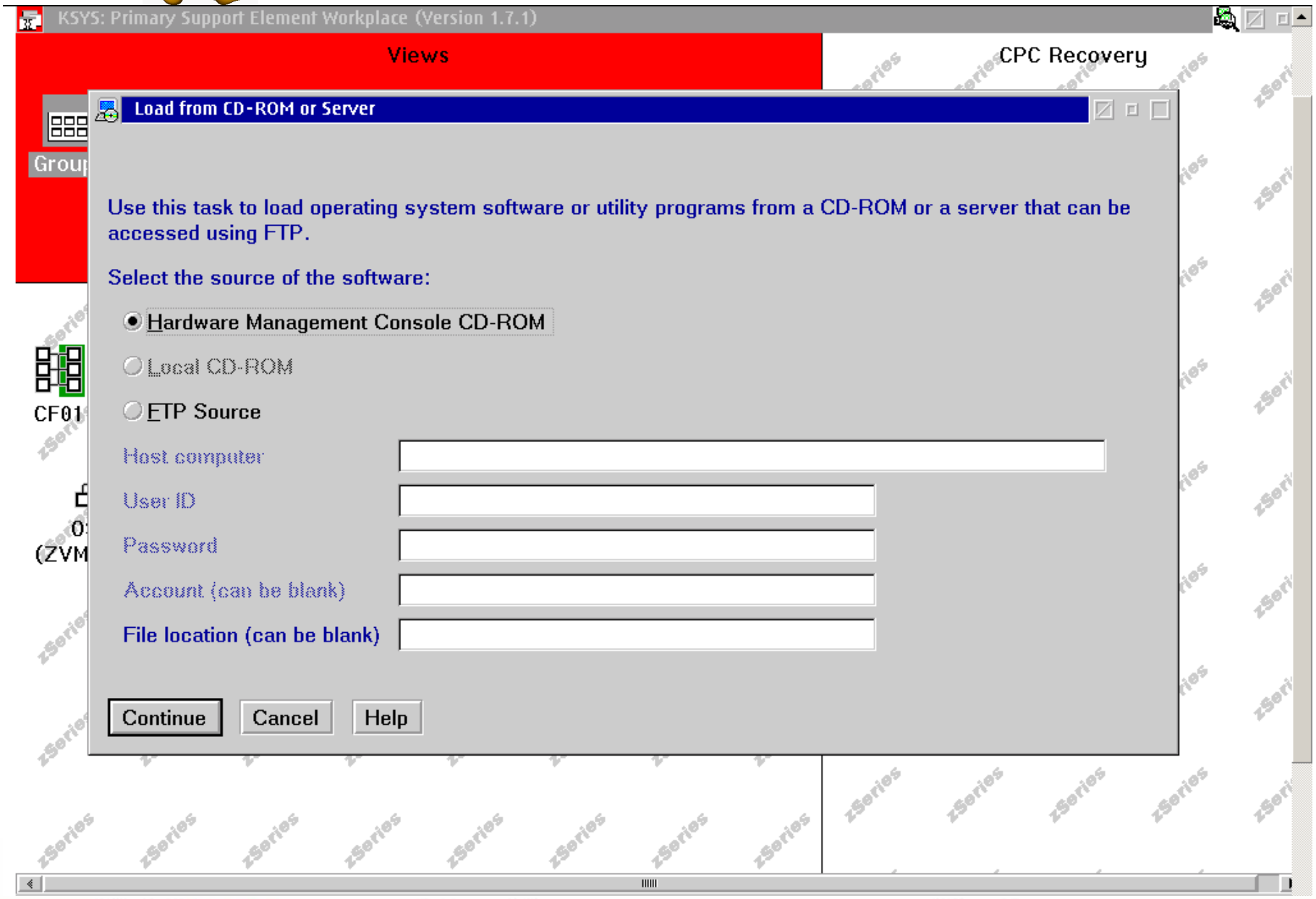

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