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Parallel Sysplex Update
2003
Frank Kyne - ITSO Poughkeepsie
kyne@us.ibm.com

Redbooks

International Technical Support Organization

General

Agenda:

- Start 09:00
- Lunch about 12:30 for 1 hour
- Finish about 17:00.

- Breaks every 90 minutes or so, for 15 minutes

General

Questions?? <u>Please</u> ask as I go along. Also, if you can't understand my strange accent, please let me know!

PLEASE complete the evaluation forms.

My background.....

Agenda

Topics:

- Sysplex availability-related functions and features checklist
- System Logger 101
- msys for Operations and z/OS HealthChecker status and directions
- Bits and bytes
- Merging systems into a sysplex
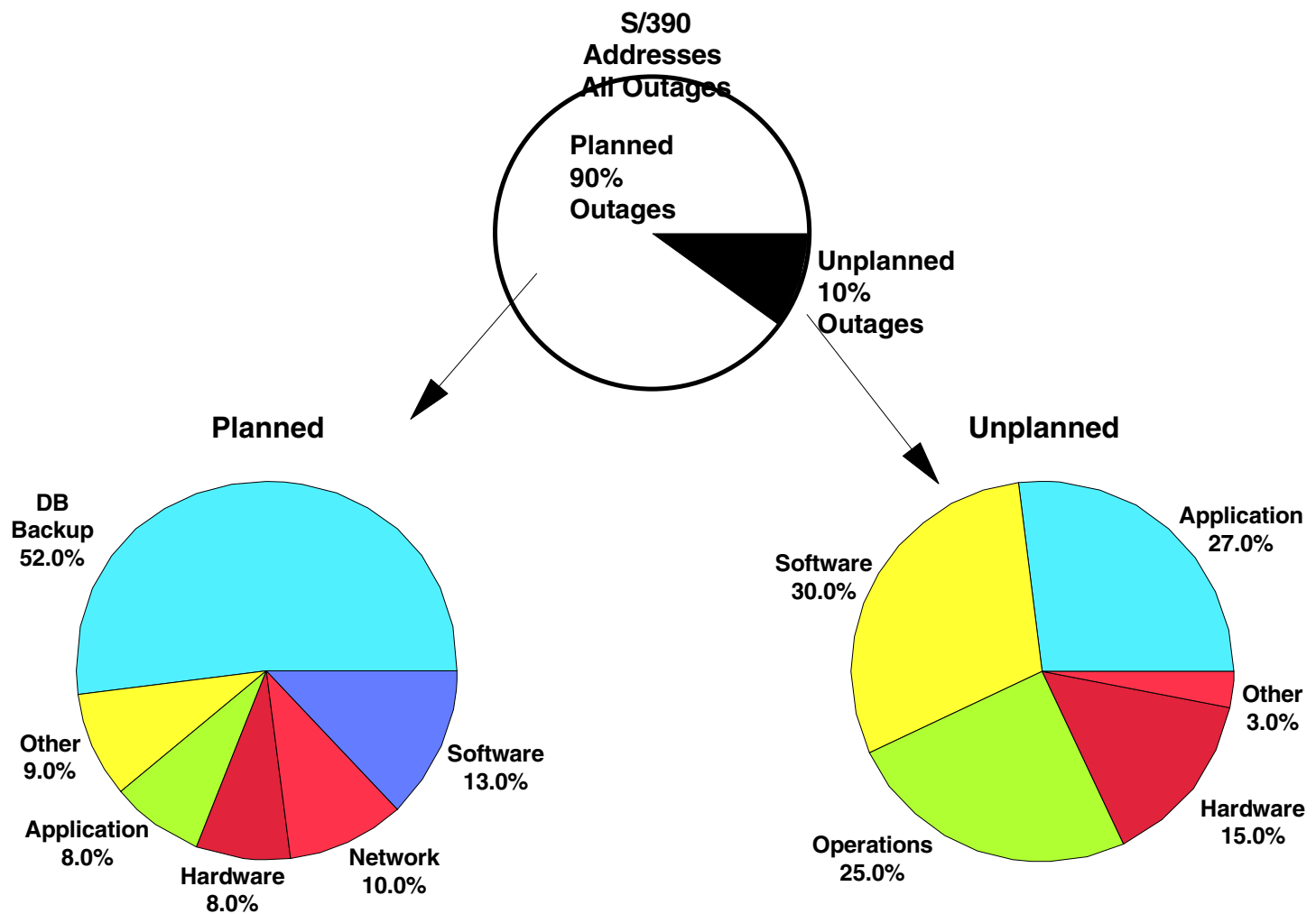
Sysplex availability checklist

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Parallel Sysplex availability

Some general points:

- High availability - Keeping applications running with no *unplanned* outages.

- Continuous operations - Keeping the system up and running with no *planned* outages (for a customer trying to use your system via the Web, there is no such thing as a *planned* outage....)

- It is unlikely that any vendor will ever deliver a *system* that will *never* require a planned outage. Therefore the best you can do is provide *applications* that will never have an outage:
  - Spread each critical application across more than one system.
  - Exploit all applicable functions that help avoid planned and unplanned outages.

- In this presentation we will focus on the latter

- For application considerations, refer to upcoming Redbook *Parallel Sysplex Application Considerations*, SG24-6523-01

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Continuous Application Availability

S/390
Addresses
All Outages

Planned
90%
Outages

Unplanned
10%
Outages

Planned

- DB Backup 52.0%
- Other 9.0%
- Application 8.0%
- Hardware 8.0%
- Network 10.0%
- Software 13.0%

Unplanned

- Application 27.0%
- Software 30.0%
- Other 3.0%
- Hardware 15.0%
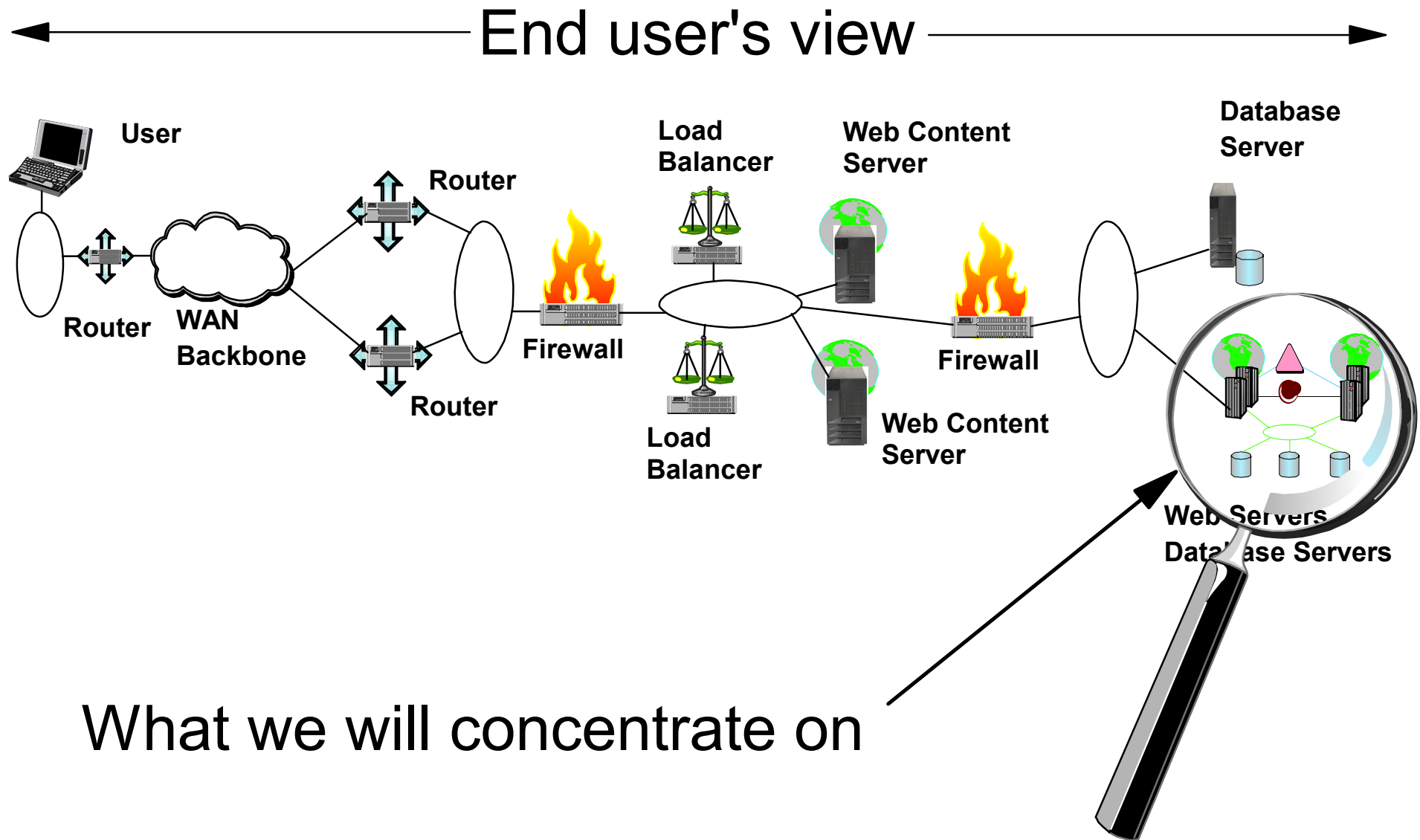- Operations 25.0%

Parallel Sysplex Availability

To get the availability benefits enabled by a Parallel Sysplex, you *must* make the effort to exploit the capabilities it provides

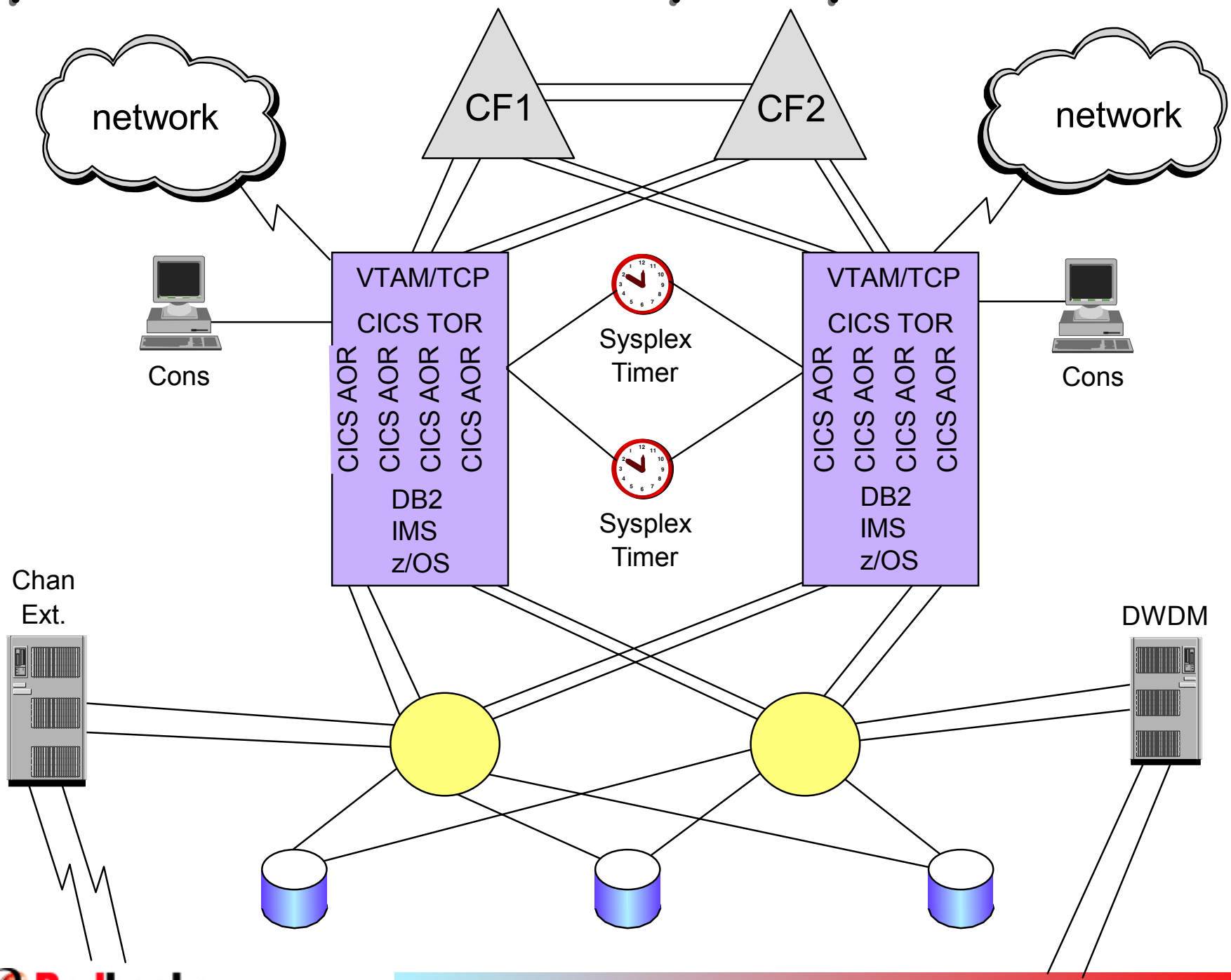Installing a Coupling Facility does not automagically eliminate all outages

There is NO magic silver bullet to provide continuous availability

BUT... there are many small changes you can make - when added together, these can make a significant improvement to availability

Parallel Sysplex Availability

End user's view

User

Router

WAN Backbone

Router

Router

Firewall

Load Balancer

Load Balancer

Web Content Server

Web Content Server

Firewall

Database Server

Web Servers Database Servers

What we will concentrate on

Application service delivery components

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CPU considerations

Feature	Exploiting?
Use latest technology you can afford - each new generation has availability/reliability and dynamic upgrade/downgrade improvements over previous generations	
Exploit concurrent upgrade capabilities like CBU, CUoD, MUoD, Daily On/Off, I/O upgrade plan ahead	
Ensure every critical device is configured with at least two channels, through different switches/directors	
Do a Component Failure Impact Analysis (CFIA) every time you make a significant configuration change	
Ensure Driver levels are kept up to date, and install Hiper MCLs in a timely manner (nearly all patches are non-disruptive)	
Ensure environmentals (Air conditioning, UPS, generators, physical security, telecoms connections) are designed for required levels of availability	
Implement automation that will notify the relevant parties in case of the failure of any component	
Consider placing two LPARs from each sysplex on each CPC - ensures that MIPS on that CPC will still be available to the sysplex even if one LPAR is shut down. If possible, mix LPARs that do NOT have identical LPARs and use IRD to manage weights	
If running on zSeries, exploit Channel Subsystem I/O Priority Queuing	
Ensure CPC has sufficient capacity - running at 100% for prolonged periods is not recommended	
Enable Automatic I/O Reset Facility if not using Automatic Reconfiguration Facility	
Configure sufficient HSA to allow for Dynamic I/O Reconfigurations	
Don't configure an LPAR with extremely low weights (<5%) in a sysplex	

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CF considerations

Feature	Exploiting?
CFLevels 11 and 12 now available. Start planning now to upgrade to these levels (remember that CFLevel change is currently disruptive)	
SoD for z990 GA3 to support upgrade of CFLevels and service level without a POR	
CFLevel 12 can significantly impact the storage required for List and Cache structures. Review the ITSO Hint and Tip about structure sizes for a procedure to determine new sizes.	
MUST have at least 2 CFs, even for Resource Sharing	
If doing data sharing (prior to SM Duplexing), at least one CF must be failure-isolated and 'category 3' structures should be in that CF. See WSC FLASH 98029	
Regularly make sure that all structures are in the CF that you expect them to be in, *especially* if one CF is an ICF.	
Each CF should have enough storage to hold *all* structures. Remember Control Storage if CF still in 31-bit mode.	
Monitor CF storage utilization as you add structures and upgrade CF Levels	
Check available control space before attempting to empty one CF into the other	
Each CF with 1 CP should not run at >50% CPU utilization. If there is more than 1 CP, higher utilization is possible without impacting performance	
Must consider impact of high CF CPU utilization on CF response times, especially during CF or system recovery	
If possible, production CFs should have 2 (or more) CPs	
Should be *at least* 2 sender or peer links from every CPC to every connected CF	
Use battery backup *and* UPS when doing data sharing	
Never enable Dynamic CF Dispatching for a production CF - See ITSO Hint and Tip entitled "Use of Shared Engines for Coupling Facilities"	
Use highest speed links possible, especially for structures with large data transfers	
Consider exploiting System Managed CF Duplexing, even with stand alone CFs	

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DASD considerations

Feature	Exploiting?
Ensure that each ESS Cluster has a unique IP Address	
Place your ESSs on the same protected machine room LAN as the HMCs	
Make sure that all paths from each host are spread across multiple ESS host bays	
Protect DSF with RACF or similar	
Use DSF R17 or DSF R16 + APAR PQ44667 to improve checking of paths to disks	
When initializing a volume, check that the hardware serial number listed in message ICK091I is the correct serial number: ICK091I EC00 NED= 3390.B3C.IBM.91.**000001324524**	
Exploit FlashCopy and SnapShot (and similar) to minimize impact of backups and to easily create test copies of volumes. FlashCopy V2 supports flash across different LSSs in the same ESS.	
Create real time offsite copies of production volumes - PPRC performance on ESS significantly improved over earlier devices	
If using GDPS/PPRC, exploit HyperSwap to let you non-disruptively swap primary and secondary volumes for planned or unplanned outages	
Configure and exploit Parallel Access Volumes. If possible, manage them with WLM.	

Switches, directors, and timer considerations

Feature	Exploiting?
Always spread paths to critical devices across more than one director	
Define switch Control Unit Port in HCD, to ensure errors can be reported back to the operating system	
If appropriate, order High Availability configuration when purchasing FICON switch	
Use Model 2 Sysplex Timers - support on Model 1s runs out at the end of 2003. See Redpaper on migration options at: http://www.redbooks.ibm.com/redpapers/pdfs/redp3666.pdf	
Implement the Expanded Availability Configuration with Model 2s	
Ensure APAR OW44231 for loss of timer signal is installed and understood	
Especially when using recent technology, ensure that microcode levels are kept up to date.	

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OS/390 and z/OS-supplied exploiters

Feature	Exploiting?
Exploit IBM-provided automation in SA/390 and msys for Ops	
Use z/OS HealthChecker either in SA/390, msys for Ops, or standalone	
Enable GRS SYNCHRES option in GRSCNF member (or dynamically via SETGRS command)	
EXITs - eliminate where possible (is it still needed?), for those that remain, use Dynamic Exit support where possible.	
OPERLOG - used for sysplex-wide problem determination - can be used together with syslog	
LOGREC - sysplex-wide problem recording medium that never fills	
Sysplex tape sharing - free cross-system tape unit sharing, if you can live with lack of cross-sysplex support	
GRS Star - higher performance, superior availability and recoverability compared to GRS Ring. Considered a pre-req for large sysplexes	
RACF sysplex data sharing - improved performance, easier multi-system administration	
JES2 Checkpoint in CF - equivalent-to-better performance, especially with mixed CPC sizes, and elimination of Reserves	
Enhanced Catalog Sharing - performance equivalent to non-shared DASD environment	
Sysplex HFS sharing - improved flexibility and availability for end-users and system programmers	
Symbolic Alias Facility - swap between subsystem software releases with no JCL changes, renaming, or library copying	
Use of system symbols in Parmlib, Proclib, VTAM, TCP, NetView, OPC, AOC, Clists to minimize multi-system maintenance overhead - with z/OS 1.4, you can have up to 800 symbols	

DFSMS-supplied exploiters

Feature	Exploiting?
Enable DFSMShsm Secondary Host Promotion	
If you have >1 HSMplexes in the same sysplex, implement DFSMShsm Single GRSplex to remove false contention on the CDSs	
If there are a very large number of HSM-managed data sets or volumes, implement DFSMShsm RLS for CDSs to provide improved performance for CDS-intensive activities	
Use DFSMShsm Multiple Address Space HSM - lets you break HSM tasks across multiple address spaces, running higher priority tasks (like recall) in one address space, and lower priority tasks in another	
Specify RESTART='(a,b)' on HSM startup JCL to automatically restart HSM following a failure	
Use DFSMShsm Single Recall Queue - balances HSM recall processing across hosts in a sysplex and provides persistency of recall requests should the HSM address space fail or be stopped	
OAM sysplex support - ability to access OAM data from any system in the sysplex, and remove OAM affinity to just one system	

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XCF considerations

Feature	Exploiting?
There should be 1 XCF structure per Transport Class **per CF**. Every structure should be defined as both PATHIN and PATHOUT This is <u>SO</u> much easier than using CTCs	
CDSs should be on high performance volumes	
Place the primary sysplex, CFRM, and LOGR CDSs on different volumes	
Place primary, alternate, and spare CDSs on separate physical controllers	
CDSs should <u>not</u> be larger than necessary - impacts IPL and recovery times	
Use a backup method that does not cause RESERVE problems - consider Disaster Recovery requirements	
Place CDSs on dedicated volumes with no RESERVEs	
Ensure there is automation in place to add a spare CDS if primary or alternate is lost	
Allocate spare CDS' at the same time as primary and alternate, to ensure they are all at the same functionality level and formatted with the same values	
Have separate RACF profile to protect CDSs	
Use XISOLATE (WSC FLASH 10080) program to monitor for single points of failure - Available from ftp://ftp.software.ibm.com/s390/mvs/tools	

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XCF considerations (cont)

Feature	Exploiting?
Always use the POPULATECF flavour of the SETXCF command to repopulate a CF	
Implement automation to act on potential hang situations (messages IXL040E and IXL041E).	
Monitor for, and apply HIPERs for XCF (5752SCXCF) and XES (5752SCIXL)	
Check for NEW FUNCTION APARs for XCF and XES	
If XCF message rates above 1000/sec, see Setting Up a Sysplex for tuning recommendations	
Use enhanced D XCF,PI,STRNM=nnnn command to get response time information for XCF paths	
Implement automation to check that each structure is in the first CF in its preference list - first check that all CFs are available! **z/OS HealthChecker will do this**	

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CFRM considerations

Feature	Exploiting?
Ensure that System-Managed Rebuild is enabled (reqs OS/390 2.8 and CFLEVEL 8) - this is a pre-req for new CF exploiters such as JES2, WLM, MQ, CICS TS 2.2, others	
Structure Full Monitoring should be enabled and automated (to alert appropriate tech support staff)	
Auto Alter enabled for *recommended* structures. *Plus monitor for messages so that CFRM policy can be adjusted accordingly*	
Always update the CFRM policy any time a structure size is changed using SETXCF ALTER or Auto Alter	
All structures should have at least 2 CFs in preference list	
Ensure a CFRM policy naming convention is used so that policy changes can be easily backed out	
Use appropriate structure sizes - validate with CFSizer (for rough figure) or check RMF reports (for more accurate indication if existing structure is large enough)	
Suggest specifying SIZE = no more than 2 * INITSIZE. It should *no*t be much larger than this.	
Never use REBUILDPERCENT > 1 - recommend to allow REBUILDPECENT to default	
Check regularly that there are no structures in POLICY CHANGE PENDING status - if you find any, rebuild those structures at a convenient time. If the new policy is started through msys for Ops, it will automatically rebuild any structure that goes into this state.	

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Logger considerations

Feature	Exploiting?
Try to ensure staging data sets are not used (except for GDPS customers) - this infers that the CFs are failure isolated and LOGR policy is set up correctly	
Ensure LOGR CDS is *at least* at HBB6603 level. If all systems running z/OS 1.2 or later, CDS should be at HBB7705 (D XCF,C,TYPE=LOGR)	
If all systems > z/OS 1.2, and at least one system is at z/OS 1.3, most log stream attributes can now be changed while the log stream is connected (if HBB7705 CDS)	
Set up automation to monitor for IXG310I/IXG311I/IXG312E messages - all relate to offload problems	
Set up automation to monitor for IXG267I message - issued at data set allocation time and indicates that offload or staging data sets do not have share options (3 3)	
Never delete offload or staging data sets manually without first checking to ensure Logger has no knowledge of those data sets - always do a DELETE LOGSTREAM to remove log stream definitions and all associated data sets.	

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Logger considerations

Feature	Exploiting?
Put log streams with similar average buffer size and request rates in the same structure. Do *not* mix idle and busy log streams in same structure	
Try to aim for offloads happening around once a minute	
Even if you don't intend to use staging data sets, specify STG_DUPLEX(YES), DUPLEXMODE(COND) (or apply the PTF for OA03001) and at least STG_SIZE and STG_DATACLAS for every log stream	
Use data class with 24K CI Size for all offload data sets - staging data sets must still have 4K CI Sizes	
When using CF Log streams and duplexing to DASD, ensure that staging data sets are sufficiently large that they are not hitting the High Threshold before the log streams in the CF	
Have at least 2 different systems connected to each LOGR structure - allows peer recovery in case of a system failure	
For CICS DFHLOG, IGWLOG, and RRS Active log streams, monitor offload data sets - if sequence number is large, adjust HIGHOFFLOAD and LOWOFFLOAD or structure size	
Also for DFHLOG, monitor frequency of LOG TAIL DELETION (shows up in CICS syslog) - should not be more frequent than 1/minute	
Get your kids to analyze the SMF 88 reports using the IXGRPT1 program - to see how tough life your job is!	

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SFM considerations

Feature	Exploiting?
USE SFM. Single change that would have eliminated the largest number of multi-system outages	
If the policy is defined and started, SFM can: 🖉 Partition a system out of the plex if status update is missing 🖉 Partition a system out of the plex if XCF signaling to the system is lost 🖉 Assist with V XCF,xxx,OFFLINE processing 🖉 Control structure rebuild processing based on REBUILDPERCENT	
Do *not* specify PROMPT in the SFM - use ISOLATETIME(0) instead to get sick system immediately removed from sysplex	
Don't set INTERVAL in COUPLExx - let system determine it dynamically	
Don't specify OPNOTIFY- let it default to the calculated INTERVAL plus 3 seconds	
Set CLEANUP interval to 15 seconds - should be sufficient for planned shutdowns	

Automatic Restart Manager considerations

Feature	Exploiting?
When you move to z/OS 1.4, the ARM CDS MUST be formatted using a z/OS 1.4 version of IXCL1DSU.	
ARM talks to WLM to identify most appropriate LPAR when restarting workloads from a failed image - CPU % and common storage usage	
Use ARM to quickly restart DB2 (using RESTART LIGHT option if DB2 V7) to release retained locks	
Use ARM to restart CICS and CPSM regions on the same image as the associated DB2 following a system failure	
Use ARM to restart a CICS Server region (Temp Storage, CF Data Table, or Named Counter Server) after a failure (reqs CICS 2.1)	
Use ARM to automatically restart NetView, especially if NetView is used to drive automation	
Use ARM to restart VTAM and TCP/IP following a failure	
Use ARM to restart IMS regions (Control region, Common Queue Server, FDBR) following a failure	
Use ARM to restart IRLM following a failure	
Use ARM to restart MQ Series following a failure	
Use ARM to restart RRS	
Use ARM to restart SDSF Server address space	
Use ARMWRAP program to add ARM support to other jobs/tasks	

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z/OS Health Checker

Feature	Exploiting?
Do you have documentation explaining every override to IBM defaults?	
Do you have a mechanism for finding out about changes to IBM recommendations?	
How do you know if someone has changed your perfect configuration?	
Download the Health Checker from: **http://www14.software.ibm.com/webapp/download/search.jsp?go=y&rs=hchk**	
Run the HealthChecker regularly - at least once a week - just because you get a clean run does NOT mean you don't have to run it again!	
Register on ResourceLink so that you are notified every time a new level of code comes available.	

Network/sysplex considerations

Feature	Exploiting?
Use VTAM over XCF for greatly simplified definitions	

VTAM Generic Resources for:
    CICS
    DB2
    IMS
    TSO
    NetView Access Services	

VTAM Multi Node Persistent Sessions for:
    CICS (CICS TS 2.2 supports signon persistence)
    IMS Rapid Network Recovery	

TCP/IP can use XCF for intra-sysplex communication	
TCP/IP Dynamic XCF provides auto notification when a new stack joins the sysplex	
TCP/IP Virtual IP Addressing	
TCP/IP VIPA Dynamic Takeover	
TCP/IP VIPA Dynamic Takeback	
TCP/IP Sysplex Distributor (See SG24-5235-02)	
TCP/IP WLM/DNS support - start replacing with Sysplex Distributor if you are using this feature	

CICS considerations

Feature	Exploiting?
Use CICS Shared Temporary Storage in CF to eliminate non-recoverable temporary storage as an affinity - also, CICS TS 2.2 supports System Managed Rebuild and Duplexing for this structure	
Use CICS Named Counter Server in CF to provide unique counter values across multiple CICS regions - also, CICS TS 2.2 supports System Managed Rebuild and Duplexing for this structure	
Use CICS Global ENQ/DEQ to allow a program in one CICS region to DEQ a resource that was ENQed in another	
Use CICS Data Tables in CF to share information currently held in a CICS data table across multiple CICS regions - also, CICS TS 2.2 supports System Managed Rebuild and Duplexing for this structure	
Use CICS VSAM Record Level Sharing to remove CICS FORs as a single point of failure	
Use CICSPlex System Manager (part of CICS TS since CICS TS 1.1) for CICSPlex management and dynamic transaction routing	
Use CICS Transaction Affinities Utility or CICS Interdependency Analyzer to identify, remove, or manage transaction affinities	

CICS considerations

Feature	Exploiting?
Define CICS TORs as VTAM Generic Resources	
Define two cloned TORs on each MVS image	
Use a separate Sockets Owning Region (SOR) on each image	
If using CICS Java support, define a separate Java Owning Region (JOR)	
CICS supports DB2 group attach in CICS TS 2.2	
Make sure all application programs (COBOL, PL/I) are running above the line	
Enable CICS storage protection to protect CICS code and control blocks from errant user programs	
Make sure CICS transaction isolation is used to protect CICS transactions from each other	
If possible, use the TCP/IP sockets support provided with CICS rather than the CICS sockets support provided with Communications Server	

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Other MVS-related exploiters

Feature	Exploiting?
Utilize WLM-Managed Batch Initiators where appropriate	
Use WLM Resource Affinity Scheduling together with automation to control where jobs can run	
Set up an OPC Hot Standby Controller to take over in case of planned or unplanned outage of the OPC Controller	
Exploit the OPC Interface to WLM to alter WLM Service Class for selected jobs/applications	
Sysplex enhancements in System Automation for OS/390 (also available to non-SA/390 customers as "msys for Operations")	
GRS Enhanced Contention Analysis (enhanced D GRS command)	
SNA Console support - full function MVS console (except NIP support) from any SNA or IP screen	
Use DFSMS Data Set Separation feature to keep duplex data sets on separate control units	

Planned Outage avoidance

Task	Command
Update APPC configuration and transaction scheduler definitions in APPCPMxx	SET APPC=xx
Update APF List	SET PROG=xx SETPROG
Change Common Storage tracking status	SET DIAG=xx
Want to change SYSABEND, SYSMDUMP, SYSUDUMP options	CHNGDUMP
Update Dump Analysis and Elimination options	SET DAE=xx
Want to make changes to MPFLST, PFKTAB, MMSLST, CNGRP	CONTROL, VARY CN, VARY CNGRP, and SET MPF=xx
Want to update exits that support dynamic refresh ability	SET PROG=xx
Update GRS RNLs	SET GRSRNL=xx
Update GRS config (SYNCHRES, RESMIL, TOLINT, MODE)	SETGRS

Planned Outage avoidance

Task	Command
Modify I/O Config or OS Config	ACTIVATE
Bring recently installed engines online without an IPL	CF CP(x),ONLINE
Modify MIH or Hot I/O Settings	SET IOS=xx
Update list of LNKLST libraries	SET PROG=xx SETPROG
Switch LOGREC recording medium	SETLOGRC
Need to add or update an LPA module	SET PROG=xx SETPROG
Add or remove Page data sets	PAGEADD PAGEDEL
Update Parmlib concatenation	SETLOAD
Update Program Properties Table	SET SCHED=xx
Have to update SLIP settings to get a dump	Update IEASLPxx, SET SLIP=xx

Planned Outage avoidance

Task	Command
Pick up modified SMFPRM statements	SET SMF=xx
Change SMF parms without changing SMFPRMxx	SETSMF
Pick up modified IGDSMS statements	SET SMS=xx
Change SMS parms without changing IGDSMSxx	SETSMS
Pick up modified BPXPRM statements	SET OMVS=xx
Change OMVS parms without changing BPXPRMxx	SETOMVS
Update SRM parameters specifyable in IEAOPTxx	SET OPT=xx
Activate changes in IKJTSOxx member	SET IKJTSO=xx
Change XCF configuration	SETXCF
Add authorization for a new product (defined in IGDPKGxx)	SET PROD=xx
Activate changes to LLA definitions	F LLA,UPDATE=xx
Activate changes to VLF definitions	Stop & Restart VLF

Testing (that horrible word)

Feature	Exploiting?
Do you have a test environment? Is it used for destructive testing or just to test things that you know will work?	
How closely does the test environment reflect the production one?	
What percentage of bugs (software or hardware) are found in the test system? What percentage in production?	
When you hit a bug in production, do you analyze why it wasn't found in the test environment? Do you adjust the test environment to rectify this?	
Do you have a Training environment for operators and systems programmers or do they try out their procedures on the production system?	
Do the operators *understand* their procedures? Do you provide training so they understand what is happening (IBM has an offering called Parallel Sysplex Training Environment that provides this capability)	
Do you test all changes you will make to the production system? Do you test the backout procedures?	

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Some things to think about....

Feature	Exploiting?
Does your catalog recovery procedure work? How about for the catalog that contains all the archived SMF data?	
How would you recover your tape management database?	
How would you recover from a failure that impacted both your primary and alternate sysres?	
How would you recover if all your SPECIAL and OPERATIONS userids got revoked?	
How often do you test your Single Pack System? Are the userids on that system set up with never-expire passwords?	

Parallel Sysplex Availability

Other sources of information:

- SG24-xxxx Sysplex Availability Guide (currently in development)
- SG24-2086 Continuous Availabillity S/390 Technology Guide
- SG24-4502 Parallel Sysplex Continuous Availability Presentation Guide
- SG24-4503 Parallel Sysplex Continuous Availability SE Guide
- SG24-4593 Planning for CICS Continuous Availability in an MVS/ESA Environment
- SG24-5680 Implementing ESS Copy Services on S/390
- Parallel Sysplex Training Environment, available from IBM Learning Services
- Parallel Sysplex Availability Checklist, available at:
  - http://www.ibm.com/servers/eserver/zseries/library/whitepapers/pdf/availchk_parsys.pdf
- Other Parallel Sysplex availability documents available at:
  - http://www.ibm.com/servers/eserver/zseries/pso/

System Logger
If it ain't broken....
it can still be fixed

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Topics

Why should you care?

Logger exploiters

Brief overview of Logger function

Logger performance tips

Logger disaster recovery considerations

Supporting documentation

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Why bother?

Tuning use of System Logger *can* make a difference to performance.   Would you rather run 2 or 60 CICS transactions per second?

Benefits of Log Tuning

Legend: —— LGDFINT=30   —— LGDFINT=0

Y-axis: Txns/sec (0, 10, 20, 30, 40, 50, 60)
X-axis: 1, 2, 3, 4, 5, 6
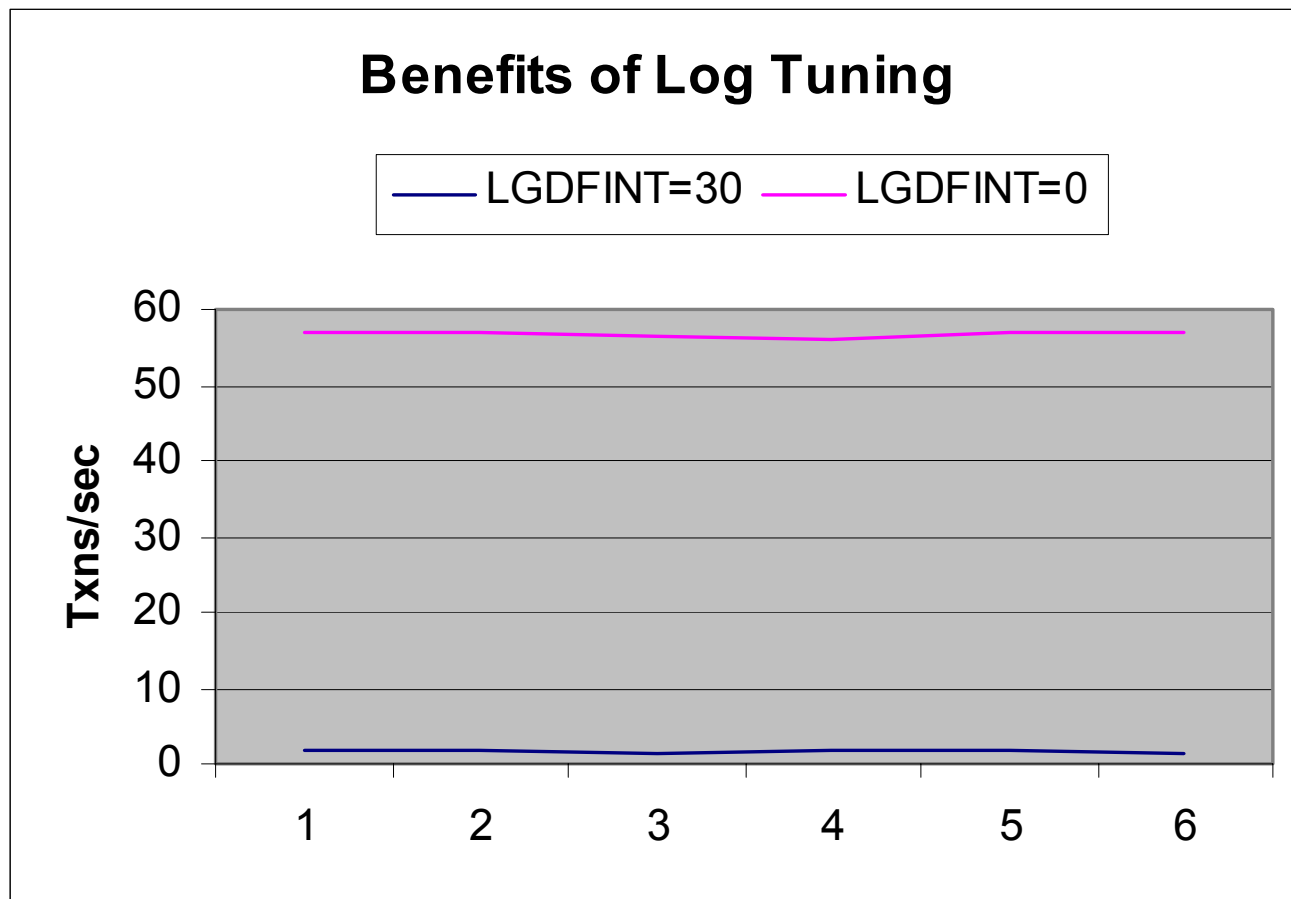
Why bother?

Any other reasons?

- Because of the function it provides (logging), some exploiters cannot execute if Logger services are not available. For example, if CICS cannot log transactions, CICS address space will terminate.

- The data that Logger is responsible for may be critical from a business perspective, so it is vital that Logger does not suffer problems that could result in lost data.

Who uses System Logger?

Logger exploiters:

- CICS
  - DFHLOG (unique)
  - DFHSHUNT (unique)
  - Log of logs (shared)
  - User journals, e.g. CICS Forward Recovery (either)
- DFSMStvs
  - IGWLOG (1 per TVS subsystem)
  - IGWSHUNT (1 per TVS subsystem)
- IMS
  - Shared Message Queue (shared)
- APPC Protected Conversions (shared)
- OPERLOG (shared)
- LOGREC (shared)

Who uses System Logger?

Logger exploiters:

- ## WebSphere
  - Error log stream (shared)

- ## System Automation for OS/390 V2
  - HSA.MESSAGE.LOG (shared)
  - HSA.WORKITEM.HISTORY (shared)
  - ING.HEALTH.CHECKER.HISTORY (shared)

- ## Resource Recovery Services (RRS)
  - ARCHIVE (shared)
  - MAIN.UR (shared)
  - RM.DATA (shared)
  - DELAYED.UR (shared)
  - RESTART (shared)

Logger introduction
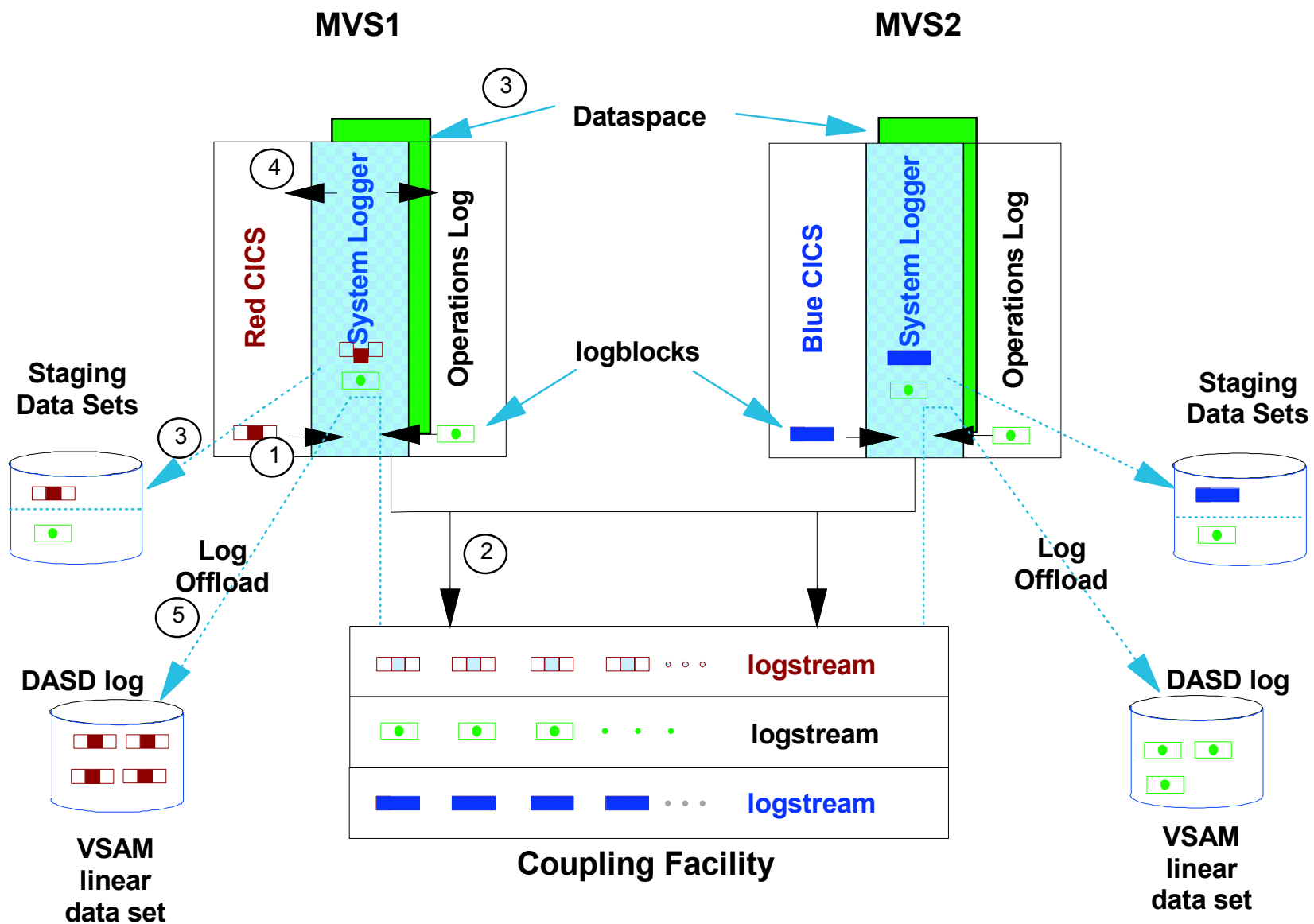
Logger responsibilities:

- Provide a common service for tasks that want to save and optionally reuse log-type data
  - Write log records (IXGWRITE)
  - Read log records (IXGBRWSE)
  - Delete log records (IXGDELET)
- Provide the ability to merge log data from multiple address spaces on multiple systems
- Move log data through the storage hierarchy, transparently to the data owner
- Optionally delete old log data based on installation policies
- Provide the requested level of availability for log data

Logger components

Logger components

- Interim storage - where log records are written immediately you give them to Logger. Could be:
  - Coupling Facility structure
  - Staging data set
  - Dataspace associated with Logger address space
- Longer term storage - "offload" data sets on DASD
- Logger CDS
  - Contains Logger policy (log stream and Logger structure defns)
  - Status information (which log streams are in use, and who is connected to them)
  - Inventory information (names of offload data sets associated with each log stream and range of log records in each data set)

Function overview

MVS1   **MVS2**

Dataspace

Red CICS — System Logger — Operations Log

Blue CICS — System Logger — Operations Log

logblocks

Staging Data Sets

Staging Data Sets

Log Offload

Log Offload

DASD log

DASD log

VSAM linear data set

VSAM linear data set

logstream

logstream

logstream

Coupling Facility

*** NOTE - CICS System Logs can *NOT* be merged

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Logger characteristics

A few important points to remember:

- From an application point of view, there is no difference between a CF and a DASD-only log stream <u>except</u> that DASD-only log streams can only be shared by connectors on one system. Multi-system log streams MUST be CF.

- The <u>elements</u> in a Logger CF structure are divided equally between all currently-connected log streams, regardless of level of activity.

- The <u>entries</u> in a Logger structure are shared between all connected log streams.

Logger CDS

Logger CDS (Type LOGR) contains:

- List of all the CF structures that will be used to contain log streams
- List of all the log streams, the attributes of each, and whether they will reside in the CF or staging data sets
- Model log stream definitions (only used by CICS)
- Information about all allocated staging and offload data sets, including information about the time range of data held in each one (similar to a catalog)

Every time you update *a* CFRM policy, you <u>replace</u> its entire contents. When you update *the* Logger policy, each change is incremental.

There is no facility to offload this information out of the CDS, nor any way to merge one LOGR CDS with another

Log data protection

In an attempt to protect your log data, Logger always keeps two copies of log records:

- For DASD-only log streams, one copy is in Staging data sets, 2nd copy is in Logger-owned data space

- For CF log streams, one copy is in CF structure. Location of 2nd copy depends on parameters and configuration
  - If you say LOGGERDUPLEX(UNCOND), 2nd copy always in Staging data set
  - If you say LOGGERDUPLEX(COND) AND CF is in same failure domain as Logger address space, 2nd copy is in staging data set
  - If you say LOGGERDUPLEX(COND) and CF is failure-isolated from Logger address space, 2nd copy is in dataspace

- Gets even more complicated if you use System Managed Duplexing with the Logger structure! See upcoming Logger Redbook (SG24-6898)

Log data protection

Peer recovery:

- If the last system using a CF log stream (and no staging data set) dies, there is only one copy of the log stream data left - in the CF
  - If the CF were to fail, that data would be lost

- To protect you from lost data, System Logger performs peer recovery
  - If another system is connected to a log stream in the same structure as the log stream that was being used by the failed system, that system will offload all data from the log stream to offload data sets on DASD.
    - ► Does NOT have to be connected to the same log stream
    - ► DOES have to be connected to the same structure
    - ► Make sure that each Logger structure is connected to by at least 2 systems, preferably on different CPCs

Logger offload processing

What is offload processing?

Multi-phase process:

- Initiated when structure *or* staging data hit HIGHOFFLOAD threshold
- First phase is to physically delete all data that has already been deleted by IXGDELET
- If interim storage not below LOWOFFLOAD threshold, move oldest data to offload data sets until LOWOFFLOAD is reached
- Do not confuse offload processing with use of offload data sets. Frequent offload processing is good. For some log streams, use of offload data sets is NOT good.

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DASDONLY and CF log streams

Differences between DASDONLY and CF log streams:

- There is one allocation task *per structure*, but only one allocation task for ALL DASDONLY log streams.

- When running an offload process, space in a CF log stream is freed up in increments as the data is processed. Space in a DASDONLY log stream is not freed up until the offload completes.

- Maximum rate at which you can write data to a DASDONLY log stream is determined by how fast you can write it to the staging data sets. Maximum rate for CF log stream is controlled by how fast you can write to CF (except if you duplex to staging data sets).

- Data for DASDONLY log stream offloads come from System Logger data spaces. If staging data sets are too large, some of this information may get paged out, requiring page-ins to do the offload. Data for CF log stream offloads is taken from the CF.

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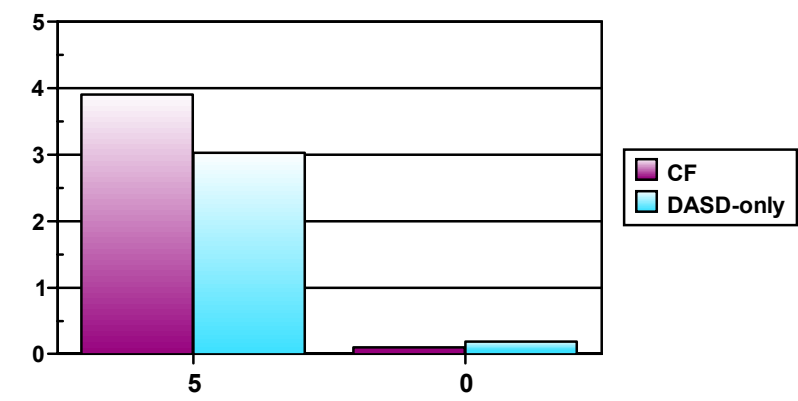# DASDONLY and CF log streams

Logger throughput capabilities:

- Speed at which log data can be handled by System Logger depends on the media used for interim storage

- For DASD, maximum IXGWRITE rate is 80-90% of 1000/DASD response times. So, at 1ms response time, you could do 800-900 IXGWRITEs per second. The amount of data in each write depends on the application and the setting of LGDFINT (for CICS).

- For CF, maximum is about 80% of 1000000/CF response times for Logger structure. So, if response times are 50 mics, maximum rate would be about 16,000 IXGWRITEs per second. However, log streams that duplex to DASD staging data sets are limited to DASDONLY throughput rates.
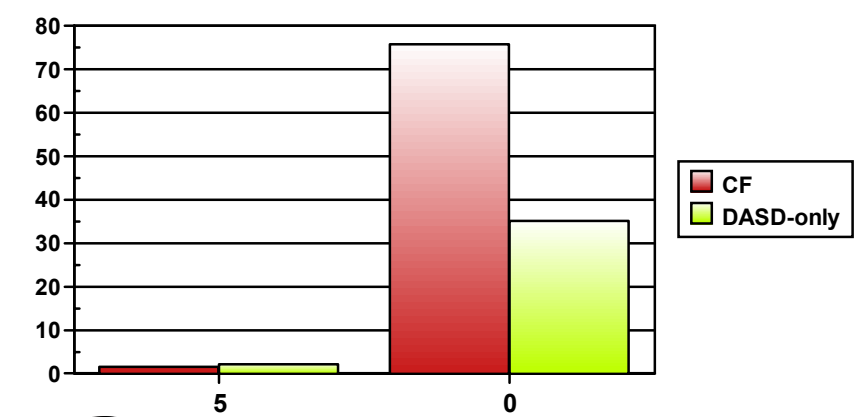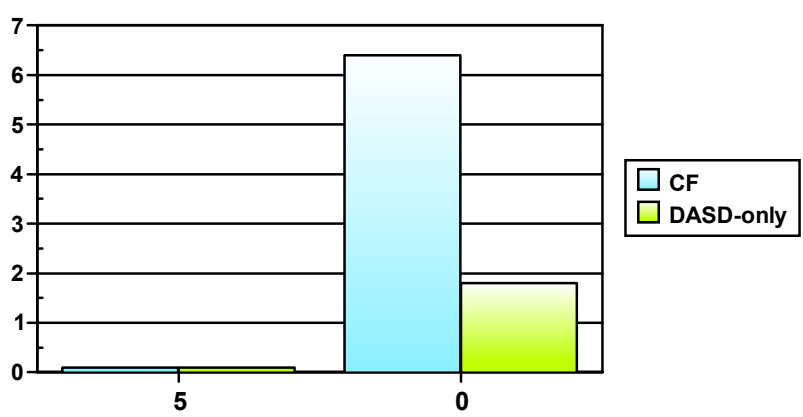
Effect of DASDONLY vs. CF
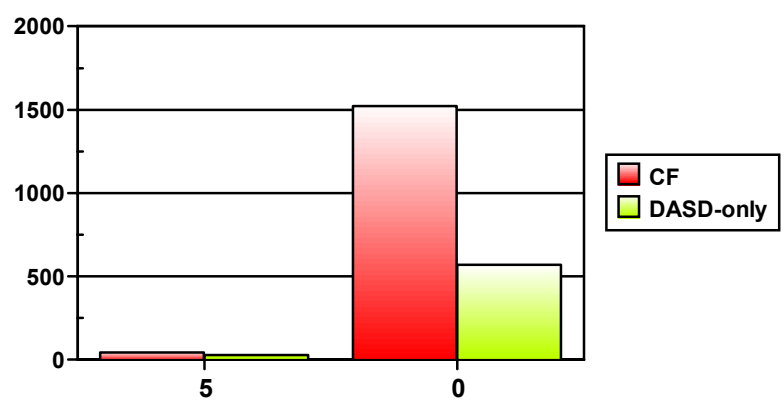

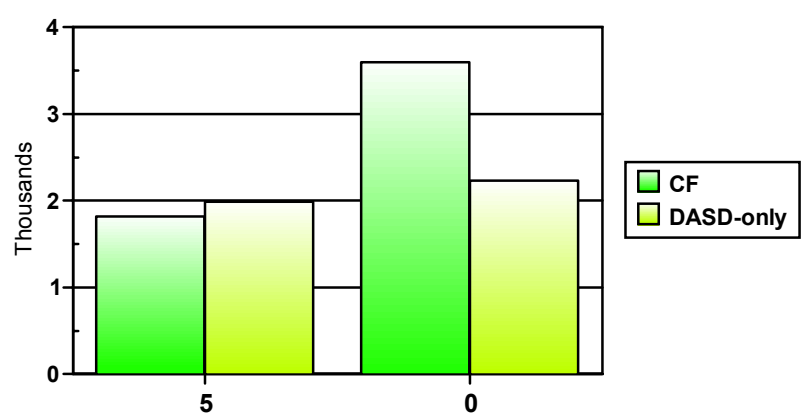Txns per sec.
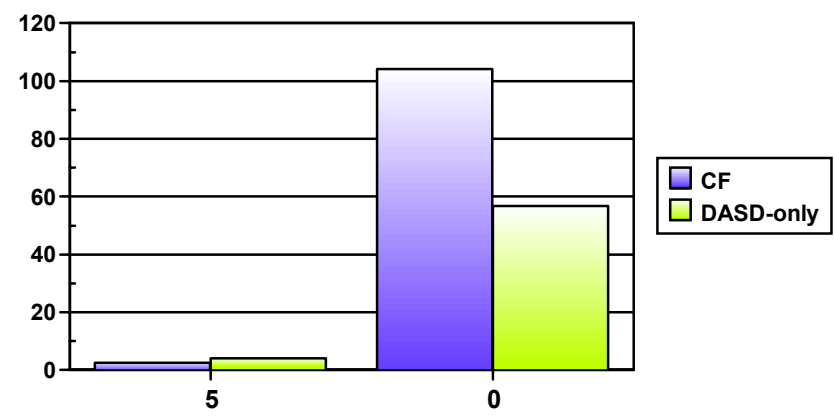
CICS Resp Times

CICS CPU %

System Logger CPU

IXGWRITE Rates

System Logger Storage

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Logger performance

Logger performance:

- A number of components contribute to Logger performance:
  - Speed of CF and CF links (if using CF log streams)
  - Speed of DASD (for staging and offload data sets)
  - Available storage on z/OS system (for backing data space)
  - Available CPU cycles on z/OS, to provide timely Logger response
  - Lack of delays in allocating offload data sets

- If you have enough of each of these available, how you tune a log stream depends on how it will be used:
  - "Funnel" log streams. Want to move data to offload data sets as quickly as possible.
  - "Active" log streams. Want to write, use, and delete the data all in interim storage.

Logger performance

Performance considerations for "funnel" log streams:

- A "funnel" type log stream is one where the application issues writes to Logger, rarely if ever reads the data back again, and may or may not delete the data at some later time.

- Need to ensure that interim storage locations can keep up with rate that application is writing the log data.

- Want to make sure that offload can complete in less time than it would take application to fill interim storage.

Logger performance

Recommendations for "funnel" log streams:

- Specify HIGHOFFLOAD threshold of 70%. Make sure that the interim storage can be offloaded from HIGHOFFLOAD to LOWOFFLOAD in less time than the application can write enough data to fill from HIGHOFFLOAD to 100%.

- Specify LOWOFFLOAD threshold of 0%. No benefit in specifying any threshold higher than this.

- Do NOT oversize the interim storage for these log streams. Size interim storage (& threshold values) to cope with peak write rates from connected applications.

- Aim for not more than 1 DASD Shift per SMF interval, but *at least* 1 per day.

- For CICS journal log streams, specify a small MAXBUFSIZE to force data from the buffers sooner

Logger performance

Performance considerations for "active" log streams:

- An "active" type log stream is one where the application sends data to Logger, possibly reuses it again, and deletes the data, all within a relatively short period of time.

- The objective with these log streams is that all this happens while the data is still in interim storage, completely avoiding any interaction with DASD for this data.

- Need to tune both the Application and Logger to ensure optimum performance, availability, and efficiency.
  - CICS/TVS need to get confirmation that log data has been successfully written as quickly as possible.
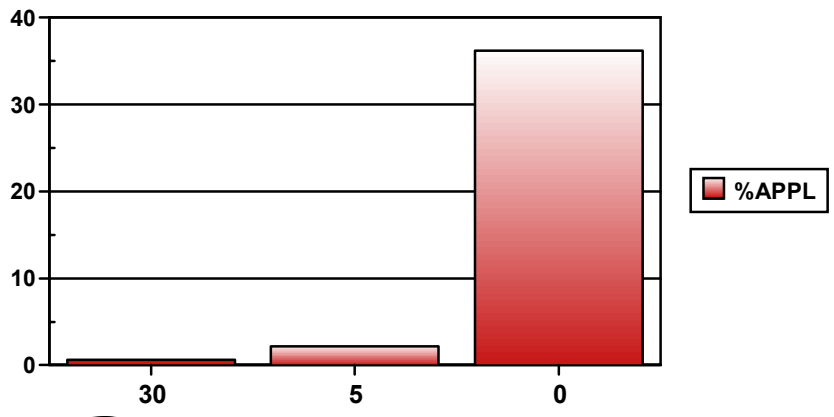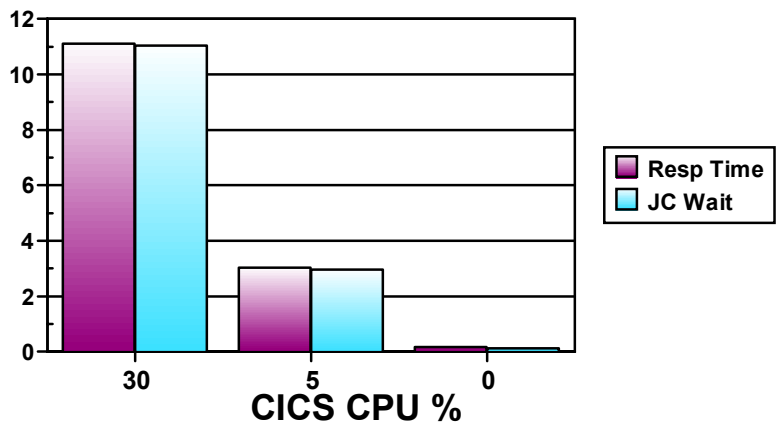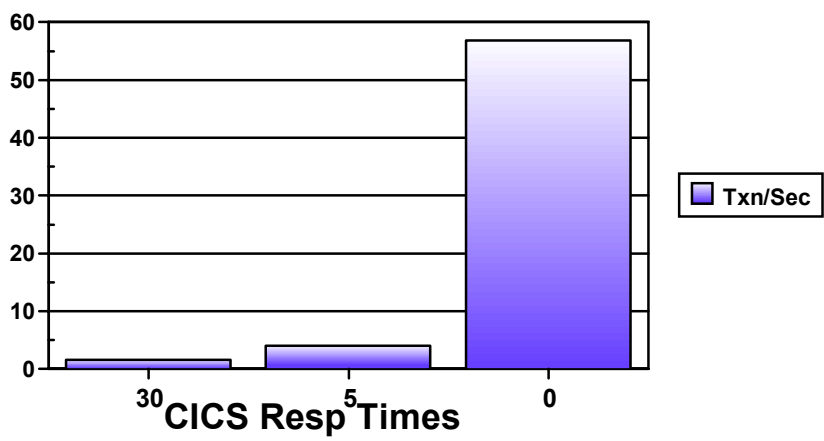 - Logger needs to be configured so that it does not become a bottleneck

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Logger performance

Recommendations for "active" log streams:

- Mainly applies to CICS DFHLOG/DFHSUNT and TVS IGWLOG/IGWSHUNT log streams. Most RRS log streams are also "active", but do not see high request rates.

- Aim for no data being offloaded to offload data sets. You should never see more than 2 offload data sets allocated for any of these log streams.

- Offload data sets with high "generation" numbers are a possible indicator that log stream is moving more data to offload data sets than you would like.

- Specify OFFLOADRECALL(NO) to avoid offload being delayed to recall migrated data sets.

- Specify HIGHOFFLOAD threshold of 80%, LOWOFFLOAD threshold of 60%.

- For CICS running on current CPCs and current CFs (z900 or faster), set LGDFINT to no more than 5, and maybe as low as 0

Effect of changing LGDFINT

Txns per sec.

System Logger CPU

CICS Resp Times

CICS CPU %

System Logger Storage

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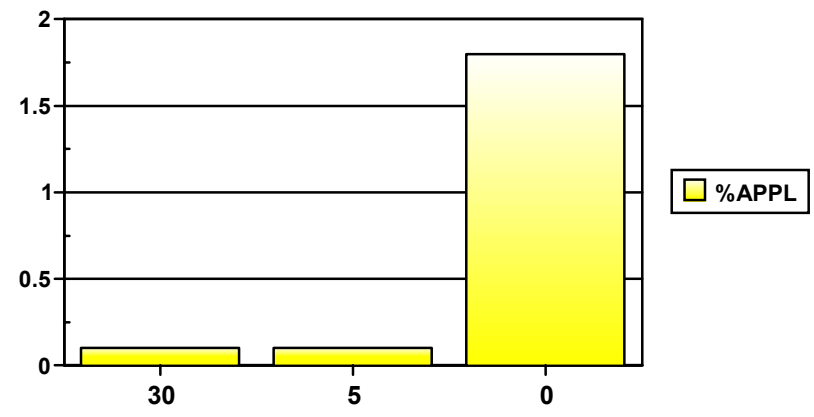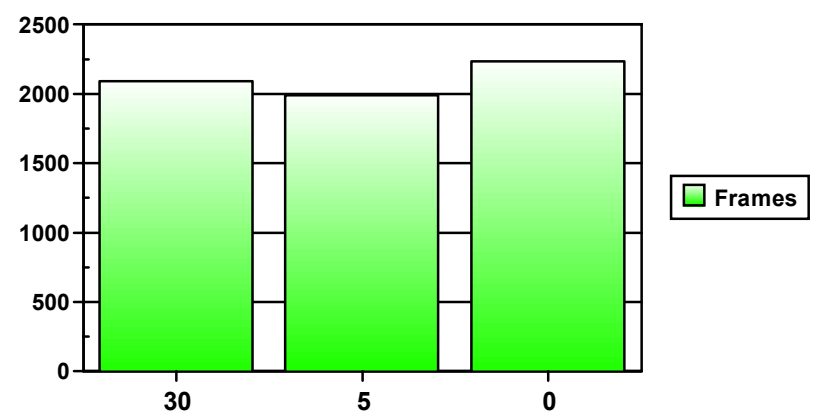
Effect of changing AKPFREQ

Txns per sec.

System Logger CPU

CICS Resp Times

CICS CPU %

System Logger Storage

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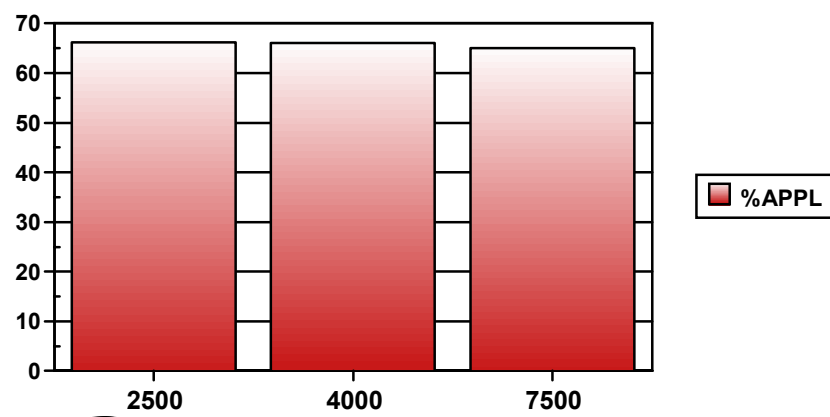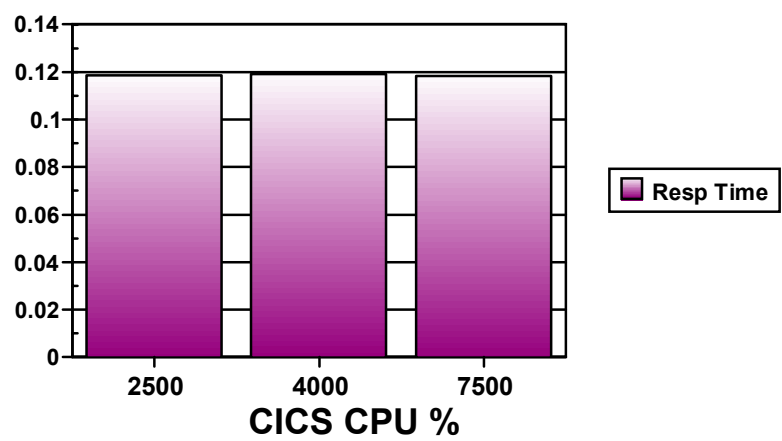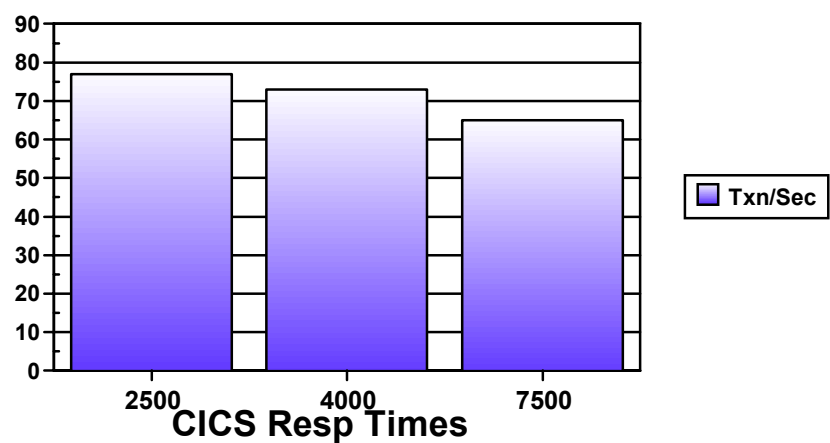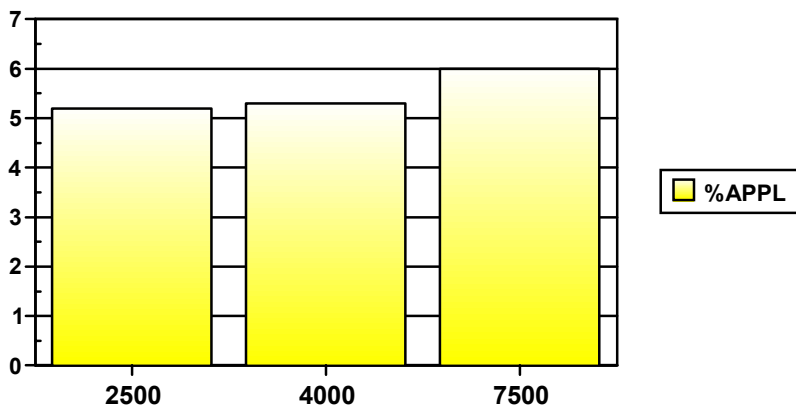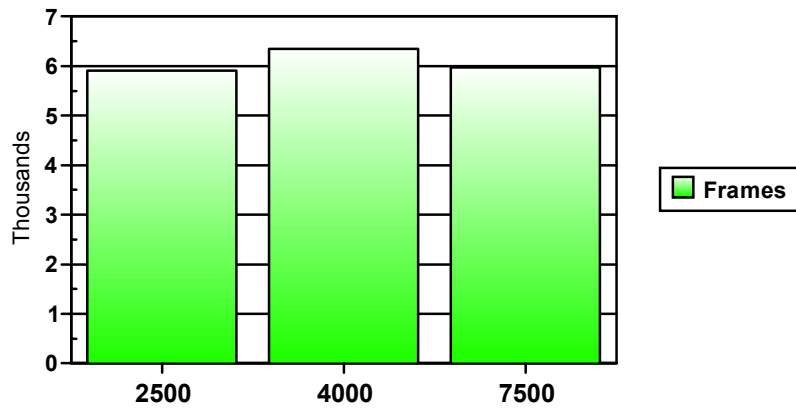
Logger general recommendations

Plus, some general recommendations, applying to all types of log streams:

- Make sure all LOGR CDSs are allocated at the HBB7705 level - format with SMDUPLEX keyword, even if you don't plan to use CF Duplexing. This allows you to schedule log stream attribute updates while it is still connected and benefit from other new features..

- Make sure you don't run out of DSEXTENTs - monitor for IXG261E and IXG262A messages.
  - Remember, each DSEXTENT provides for up to 168 more extents, but only for one log stream

- Make sure data class used for staging and offload data sets has SHAREOPTIONS(3 3). Apply OW54863 and monitor for IXG267I warning of incorrect share options.

Logger general recommendations

And some more.....

- For CF log streams:
  - Monitor for Entry Full conditions - affects ALL log streams in that structure
  - Ensure that offloads are not being initiated because staging data sets are filling before structure
- Aim for 0 "type 3" writes. A type 3 write is a write that is issued after log stream interim storage is 90% full - indicates too small interim storage or delays in offloads

Logger general recommendations

Log stream tuning continued:

- 1 offload per minute during peak times is fine, possibly even more frequently

- It is generally not necessary to have very large interim storage for most log streams - just drives up central storage usage for no benefit

- Use CI Size of 4K for staging data sets, 24K for offload data sets

- Specify STG_SIZE in log stream definitions to get appropriate data set size for that log stream - for CF log streams, it is safer to make these data sets too large rather than too small

- Element size in staging data sets is 4K, but only 256 or 512 bytes in CF - recommend MAXBUFSIZE of 64000 for CICS DFHLOG & DFHSHUNT log streams and check "EFFECTIVE AVERAGE BUFFER SIZE" in IXCMIAPU report.

Logger general recommendations

Log stream tuning continued:

- If a log stream does not have any offloads for a long time (at least one per SMF interval), its interim storage is too large.

- Storage in a CF structure is divided evenly between all currently connected log streams in that structure, regardless of level of activity of different log streams.
  - Try to place log streams with similar write rates in the same structure
  - Try to place log streams with similar average buffer sizes in the same structure

Logger general recommendations

And some more......

- Specify STG_DUPLEX(YES) and DUPLEXMODE(COND) OR apply APAR OA03001. This will let you specify the STG_nnn parms even if you don't normally intend to use staging data sets for that log stream .

- Ensure PTF for APAR OW51854 is applied to all systems and monitor for/automate IXG310/311/312 messages.

- Apply ALL Logger HIPER APARs.

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Monitoring Logger activity

SYSTEM LOGGER ACTIVITY REPORT (IXGRPTRA)

```
                                          BYT WRITTN  BYT WRITTN  BYT WRITTN                                              AVERAGE
                                          BY USERS    TO INTERIM  TO DASD     #WRITES    ---# WRITES COMPLETED------      BUFFER
--LOGSTREAM NAME------- STRUCTURE NAME--   IXGWRITES   STORAGE     (INVOKED)   INVOKED    TYPE1      TYPE2      TYPE3      SIZE

                                          BYT DELETD  # DELETES   BYT DELETD  # DELETS   --------------EVENT--------------
                                          INTERIM ST  W/O DASD    INTERIM ST    W/       OFF-  DASD STRC NTRY STG   ST   RE-
                                          W/O DASD    WRITE       W/DASD      WRITE      LOAD  SHFT FULL FULL THLD FULL  BLD

01/30/98  0:46:00 AM  (SMF INTERVAL TIMESTAMP 'AFEFC71BAFCC75Ø9'X)
   REESMK.IYK95.DFHJØ1   LOG_SYSTEST_ØØ6     416 LWB     512 SWB     456 LDB     1 LWI     1 SC1    Ø SC2    Ø SC3    416 C*
                                              Ø SIB       Ø SII     416 SAB     1 SAI     1EO  1EDS ØESF ØEFS ØETT ØETF ØERI
01/30/98  0:50:46 AM  (SMF INTERVAL TIMESTAMP 'AFEFC82CDD3FC4ØØ'X)
   REESMK.IYK95.DFHSHUNT LOG_GENERAL_ØØ8        Ø         Ø           Ø         Ø         Ø        Ø          Ø        Ø
                                                Ø         Ø           Ø         Ø         1    Ø    Ø    Ø    Ø    Ø    Ø
01/30/98  0:50:54 AM  (SMF INTERVAL TIMESTAMP 'AFEFC833F7ØØ6CØ7'X)
   REESMK.IYK95.DFHLOG   LOG_GENERAL_ØØ5    1112820   1135616     467910      233       230       3          Ø        4776
                                            631323       172       470196     57         2    1    Ø    Ø    Ø    Ø    Ø
01/30/98  0:56:51 AM  (SMF INTERVAL TIMESTAMP 'AFEFC98841ØADEØ8'X)
   REESMK.IYK95.DFHJØ1   LOG_SYSTEST_ØØ6     416       512         456        1         1        Ø          Ø        416
                                              Ø         Ø           416       1         1    Ø    Ø    Ø    Ø    Ø    Ø
01/30/98  1:13:54 AM  (SMF INTERVAL TIMESTAMP 'AFEFCD58369C4AØ9'X)
   REESMK.IYK95.DFHSHUNT LOG_GENERAL_ØØ8        Ø         Ø           Ø         Ø         Ø        Ø          Ø        Ø
                                                Ø         Ø           Ø         Ø         1    Ø    Ø    Ø    Ø    Ø    Ø
01/30/98  1:14:00 AM  (SMF INTERVAL TIMESTAMP 'AFEFCD5DDEØ2CDØ7'X)
   REESMK.IYK95.DFHLOG   LOG_GENERAL_ØØ5    3100472   3123200     1182400     207       193       13         1        14978
                                            1875985     145         1145356   60         3    3    Ø    Ø    Ø    Ø    Ø
05/11/98  2:21:00 PM  (SMF INTERVAL TIMESTAMP 'BØ6F79A6457A63Ø3'X)
   IYCUZCØ7.DFHLOG       *DASDONLY*        19444326  28229632    16380778     3894      Ø        Ø          Ø        4993
                                            4694016     635         23736320  3318       90   3    Ø    Ø    391  1    Ø
   IYCUZCØ7.DFHSHUNT     *DASDONLY*          350683   1486848         Ø       363       Ø        Ø          Ø        966
                                                Ø         Ø           Ø         Ø         Ø    Ø    Ø    Ø    Ø    Ø    Ø
```

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Monitoring Logger activity

Explanation of Logger SMF Fields:

- LWB   Bytes written by IXGWRITE commands.
- SWB   Bytes written to interim storage - includes control info.
- LDB   Bytes written to offload data sets - includes control info.
- LWI   Number of IXGWRITE commands.
- SC1/2/3 Number of IXGWRITEs of each category.
- C*   Calculated field, not included in SMF record.
- SIB   Bytes deleted by IXGDELET where record was still in interim storage.
- SII   Number of bytes deleted by IXGDELET.
- SAB   Number of bytes deleted because data was offloaded to DASD.
- SAI   Number of bytes deleted from interim storage because it was offloaded to DASD.
- EO   Number of offloads.
- EDS   Number of DASD shifts.
- ESF   Number of times IXGWRITE got "structure full".
- EFS   Number of times offload was done because 90% of total structure's list entries were in use.
- ETT   Number of times staging data set hit threshold.
- ETF   Number of times staging data set filled up.
- ERI   Number of structure rebuild events initiated.

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Monitoring Logger activity

Monitoring:

- There are a number of tools to monitor System Logger use:
  - IXGRPT1 - provided in SYS1.SAMPLIB
    - ► Not the most user friendly report, but provides all the information you need
  - Sample DFSORT jobs available with the upcoming System Logger Redbook
    - ► Provide similar information to IXGRPT1 but in a more readable format
  - Sample Excel spreadsheet that will be available with upcoming System Logger Redbook
    - ► Applies some simple rules against T88 data to help you identify log streams in need of attention.

Logger and disaster recovery

Disaster recovery considerations:

- LOGR CDS, log streams, and application files must all be in synch.

- Therefore, there is no point trying to restart Logger using a CDS recovered from a full volume dump. To restart after a disaster using dump/restore method, should delete and redefine all log streams and cold or initial start all Logger exploiters

  − Keep all log stream define jobs, or have exec to recreate them...

- If using DASD remote copy, log streams must be on DASD, either DASD-only, or DUPLEXMODE(UNCOND), and log streams, CDS, and user files must all be remote copied. Note that PPRC does *not* guarantee time consistency

- Special considerations for GDPS users because of GDPS Freeze function and way GDPS places the CDSs.

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Logger summary

Summary

- Logger can impact both availability and performance, so monitor for important Logger messages and review SMF 88 records.

- If you want to know more about System Logger, refer to upcoming IBM Redbook:
  - Systems Programmers Guide to: System Logger, SG24-6898

- Follow the recommendations in this document, and you should have a highly available, well-performing Logger subsystem

msys for Operations and z/OS HealthChecker Implementation

Redbooks

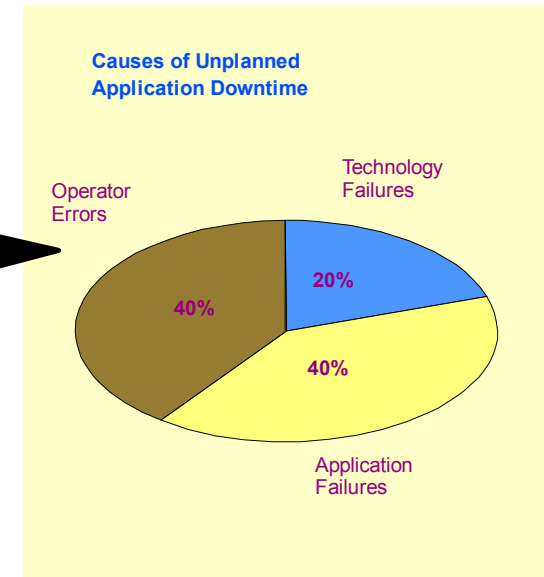**International Technical Support Organization**

msys for Operations

Topics:

- What IS msys for Operations?

- What does msys/Ops do for me?

- How painful is the installation and implementation?

- What is the z/OS HealthChecker

- How do I install and implement it?

- Getting Started

- Summary

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Sysplex automation

The *what*:

- Prepackaged *sysplex* automation

Causes of Unplanned Application Downtime

Operator Errors

Technology Failures

20%

40%

40%

Application Failures

The *why*:

- To avoid or deduce impact of outages
- To reduce the complexity of effectively managing a Parallel Sysplex
- To deliver a means of automating sysplex operations, based on broad range of customer experiences and IBM knowledge of product internals
- To let customers exploit this capability with minimum effort

Sysplex automation

The *how*:

- IBM's sysplex automation function is delivered in two ways:
- As a standard part of the System Automation for OS/390 V2 (SA/390) product, for customers that have that product
- For customers that do *not* have SA/390 V2, the **same sysplex automation functions** are available at <u>no additional cost</u> via a z/OS component known as "msys for Operations"

This presentation describes how to install the msys for Operations flavour - if you have SA/390, *the function is already installed* and simply needs to be tailored and enabled

Sysplex automation

So, what is msys for Operations:

- Base element of z/OS, now available back to OS/390 2.10
- Subset of NetView 1.4 (HPZ8500)
- Subset of SA z/OS 2.1 (HKYS100)
- Shipped *automatically* on z/OS ServerPacs
  - Also available as a download from the Web in GIMZIP format

Enterprise NetView (licensed)

Procedural NetView (licensed)

Unattended NetView (licensed)

SA/390 V2 (licensed)

MSAS - Exploitation

MSAS - Infrastructure

Managed Systems Infrastructure for Operations

NetView System Services (NVSS)
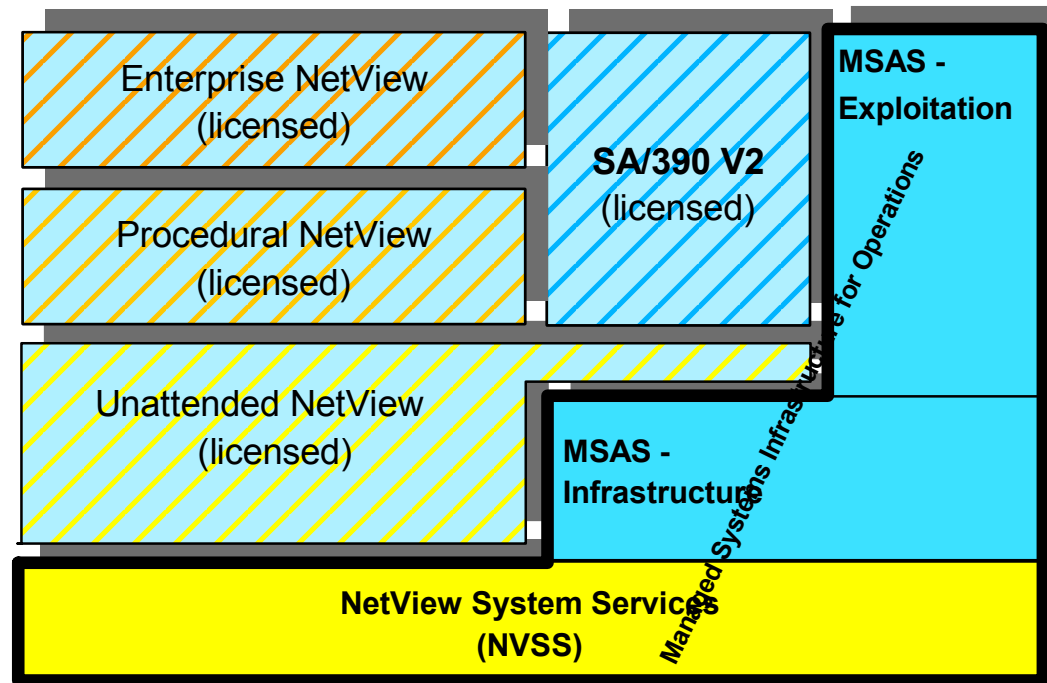
msys for Operations - What is it?

Clearing up some misconceptions:

- This has **nothing to do with** msys for Setup
  - You do *not* need DB2 or LDAP or Java or any other pre-reqs

- It is FREE to z/OS and OS/390 customers

- It is EASY TO INSTALL (honestly!!)

- It is a subset of SA/390 V2 - **if you have SA/390 V2, you already have the functions installed**, they might just not be turned on
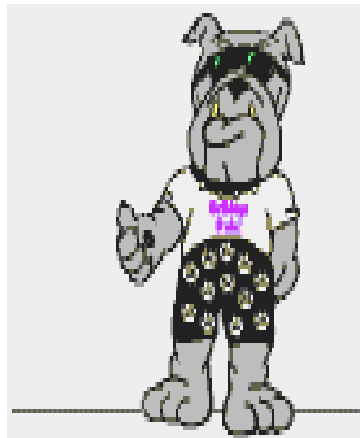
msys for Operations - What is it?

A little more detail....

- msys for Ops is a subset of SA/390 and NetView
- If you don't have NetView or SA/390, its services are only available to z/OS elements
  - Message trapping
  - Alert capabilities
  - Interfaces available for monitoring
  - Program communication with H/W - HMC/SE
- Not intended to be used as a base for customer-written automation
  - For automation beyond that provided as part of msys for Ops, you need full SA/390 product, or similar automation product
- The benefit of this is that the installation is GREATLY simplified compared to a full NetView and full SA/390

Sysplex automation

What does it give me?

- **Pre-configured automation**
  - Automation routines are provided, <u>based on analysis of actual customer outages</u>
  - Routines will be maintained by IBM, addressing new functions, and changed message layouts
  - <u>**Can coexist with your existing automation**</u>
- **Easier to use Operator interface**
  - NetView-based panels to help Operators manage a sysplex environment without having to be experts with XCF and related MVS commands
- **Transfer cost/headache of maintaining automation routines to IBM**
  - Today, there is no way to identify msgs changed when you move to a new release - let IBM take on that task

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Sysplex automation

Automation functions:

- Alternate Couple Data Set allocation
- WTO/WTOR buffer shortage recovery
- Log stream data set directory shortage recovery
- Check Logger offload data set SHAREOPTIONS
- System log recovery
- Active ECA - elimination of long ENQs
- Add local page data sets - ASM recovery
- Automation of IXC102A, IXC402D - isolate failed system
- Enable, override, or bypass selected HealthChecker checks

Sysplex automation

Operator panel functions:

- Display system information
- Display console information
- Display and manage Coupling Facilities
- Display and manage Couple Data Sets
- Display and compare information about IPLs, and contents of SYS1.PARMLIB that were used for the IPL
- Display and control Dump and SLIP trap information and take dumps
- Display information about "best practices" policies
- View results of HealthChecker checks

Redbooks

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msys for Operations - Getting Started

Official publication: SC33-7968-<u>04</u>
- Managed System Infrastructure for Operations: Setting Up and Using
  - www.ibm.com/servers/eserver/zseries/msys/msysops/library.html

msys/Ops Customization Checklist
- 13 steps - showing exactly what needs to be done
  - www.ibm.com/servers/eserver/zseries/pso/pdf/msys_check.pdf

ServerPac support - new dialog to set up msys for ops, does everything except customize AOFCUST & SAF definitions

Check Retain PSP buckets
- Upgrade: ZOSV1R2/ZOSV1R3/ZOSV1R4 Subset: MSYSOPS

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Installing msys for Operations

OK, so where do we start.....?

- If you have SA/390 V2, code is already installed, refer to SA/390 manuals for customization info

- If you are installing a new z/OS ServerPac and don't have SA/390, the msys for Ops libraries will come with the ServerPac

- If you are not ordering a ServerPac, or you are on OS/390 2.10 or z/OS 1.1, download the code from:
  - www.ibm.com/servers/eserver/zseries/zos/downloads/
  - Downloaded code is at base level, so you need to apply service to bring it up to date (search for APARs for FMID HKYS100 and keyword MSYS).

Installing msys for Operations

Data set names are NETVIEW.V?R?M?.llq and ING.llq regardless of whether or not a license is held:

- Unlicensed for either NetView or SA - data sets include only the msys/Ops infrastructure & functions
  - Specialized msys/Ops customization
  - New msys/Ops address space

- Licensed for NetView 1.4 or 5.1 & SA 2.1 or SA 2.2 - msys/Ops functions are included in the full product data sets
  - Customize msys/Ops functions using SA 2.x policy dialogs
  - No new address space necessary - use existing SA/390 AS

- Licensed only for NetView 1.4 or 5.1 - use full product NetView data sets and partially populated ING.llq data sets
  - Specialized msys/Ops customization
  - Start new msys/Ops address space

Installing msys for Operations

1. Allocate shared / system-unique data sets
2. Change & copy STC JCL into Proclib data set
3. Authorize & concatenate data sets to LNKLST & LPA
4. Update the Program Properties Table
5. Update Message Processing Facility list
6. Define Application Major Nodes to VTAM
7. Setup the VTAM Logmode Table
8. Setup adequate REXX environment table entries
9. Setup security definitions & Logon IDs
10. Update initialization parameters
11. Support Element customization
12. Define log streams
13. Setup the policy member - AOFCUST

Installing msys for Operations

Allocating data sets

- msys for Ops requires 7 data sets per system plus 2 data sets shared between all sysplex members. Sample job provided to allocate these:
  - DSILIST (1/system),   standard NetView file
  - DSILOGP (1/system),   standard NetView file
  - DSILOGS (1/system),   standard NetView file
  - DSITRCP (1/system),   standard NetView file
  - DSITRCS (1/system),   standard NetView file
  - DSISVRT (1/system),   standard NetView file
  - STATS (1/system),   standard NetView file
  - DSIPARM (1/sysplex), contains customized members
  - IPLDATA (1/sysplex), VSAM file that contains IPL records

Redbooks

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Installing msys for Operations

Setting up started tasks

- Need to copy 5 started tasks from ING.SINGSAMP and 1 started task from NetView CNMSAMP to a PROCLIB

- 2 of these need to be customized (minimal)

- 1 should be started in COMMNDxx

- 1 more (the one that runs NetView) should be started during the IPL process

Setting up component trace definitions for msops

- Copy CTIHSAZZ from SINGSAMP to SYS1.PARMLIB (requires OA03590)

- Allocate trace data set using HSAJCTWR job in SINGSAMP

Installing msys for Operations

APF, LNKLST, LPALST changes

- 4 data sets need to be added to APF (can be done dynamically)
- 1 data set must be added to LNKLST (can be added dynamically)
- 1 data set must be added to LPALST (modules can be added to LPA dynamically - sample statements provided)

SCHEDxx change

- 1 entry required for DSIMNT (can be activated dynamically by updating SCHEDxx and then issuing T SCH=xx command)

MPFLST changes

- MPF must be updated to ensure required messages are passed to automation. List of messages provided in member INGEMPF in SINGSAMP. Can be activated dynamically with SET MPF=xx

Installing msys for Operations

VTAM Changes

- msys for Ops uses VTAM to communicate between systems. VTAM must be configured to use XCF for cross-system communication (that is, XCFINIT=NO must <u>NOT</u> be specified)
- msys for Ops NetView must be defined to VTAM. Sample VTAMLST member provided. Can be activated dynamically

Security setup

- msys for Ops provides 6 levels of authority
- Sample SAF and NetView statements provided. Need to be customized for your environment.

Installing msys for Operations

NetView customization...

- Minimum of 1 member, max of 4 members require customization

- Copy CNMSTYLE into shared DSIPARM, add TWO lines and comment out THREE (always)

- If using NetView security, copy DSIDMNK into shared DSIPARM and make TWO changes

- If using NetView security, copy DSIOPFU into shared DSIPARM and defined your userids and passwords

- If you are using the full NetView product, slightly more changes required, but all are listed in checklist

Installing msys for Operations

VTAM logmode table

- If you already use NetView, this should already be done
- If not, you must add an entry to AMODETAB. Sample job provided.

REXX environment table

- If you already use NetView, this should already be done
- If not, a sample SMP/E usermod is provided to increase the number of entries in IRXANCHR.

Hardware interface

- Customization must be carried out on HMC and SE. Step by step instructions provided

Installing msys for Operations

Define CF Structure(s) and log streams

- msys for Ops (and SA/390) uses log streams to store information that can be accessed by all the systems in the sysplex
- Both DASDONLY and CF log streams are supported, although DASDONLY log streams cannot be shared across systems
- Volume of traffic to log streams is not high, so a single structure can be used (although 3 are recommended)
- Sample jobs provided to update CFRM and LOGR policies

Installing msys for Operations

Customize AOFCUST

- All automation functions are controlled and customized in one member - AOFCUST

- As delivered, all automation is turned <u>OFF</u>

- To enable automation, the AOFCUST member must be customized

- Sample is provided. Sample contains comments explaining how to customize it

- You can turn individual automation functions on/off as required and as may fit in with your existing automation

msys for Operations - AOFCUST Member

The heart of msys for Ops....

```
AUTO(
*   CDS
*   ENQ
*   LOG
*   LOGGER
*   PAGE
*   WTO
*   XCF
*   HEALTHCHK
)

COMMON(
   TEMPHLQ (MSOPS.TEMP)
)

WTOBUF(
*CICS      WTOR  CANCEL
*DB2       WTO   CANCEL
*IMS       *     CANCEL
 *         WTOR  CANCEL
 *         WTO   CANCEL
)

CDS(
   HLQ   SYS1.MSOPS.CDS,
   VOL   (CFRM,TOTDS3,TOTDS2),
   VOL   (ARM,TOTST5),
   VOL   (LOGR,TOTDS1,TOTDS4),
   VOL   (SFM,TOTST1,TOTST2),
   VOL   (SYSPLEX,TOTDS0,TOTDS1)
)
```

```
ENQ(
   RES     (MSOPS*,*,45)
   RES     (MSOPSECA,*,30)
   DUMP    (CSA,GRSQ,RGN,SQA,NOSUM,TRT)
   JOB     (MSOPS*,DUMP)
   JOB     (*,NODUMP)
   TITLE   (MSOPS Initiated - Long ENQ Detection)
)

PAGE(
   HLQ (SYS1.MSOPS.PAGE)
   CYL (400)
   VOL (TOTTS2,TOTTS3)
   JOB (MSOPS*,CANCEL)
   JOB (*,KEEP)
   DSN (SYS1.MSOPS.LPAGE.VTOTTS1)
)

IXC102A(
   CMD     (SC47,'LOAD CLEAR')
   DISABLE (SC48,SC50)
   DISABLE (SC61,SC62)
   ENABLE  (SC47,SC54,SC55)
   ENABLE  (sysnamex)
)
```

msys for Operations - AOFCUST Member

```
HW(
    CPC    (P701,USIBMSC.SCZP701,AIBSNMP)
    CPC    (P801,USIBMSC.SCZP801,AIBSNMP)
    IMAGE (SC54,A1 ,P701,WTSCPLX1,MVS)
    IMAGE (SC55,A2 ,P701,WTSCPLX1,MVS)
    IMAGE (SC49,A3 ,P701,WTSCPLX1,MVS)
*   IMAGE (SC59,A4 ,P701,OPPLEX   ,MVS)
    IMAGE (SC04,A5 ,P701,WTSCPLX1,MVS)
*   IMAGE (SC58,A6 ,P701,PLEX58   ,MVS)
    IMAGE (SC61,A7 ,P701,WTSCPLX1,MVS)
    IMAGE (SC62,A8 ,P701,WTSCPLX1,MVS)
    IMAGE (SC67,A9 ,P701,WTSCPLX1,MVS)
*   IMAGE (SC57,I1 ,P701,PLEX57   ,MVS)
    IMAGE (SC69,A11,P701,WTSCPLX1,MVS)
    IMAGE (SC47,A12,P701,WTSCPLX1,MVS)
*   IMAGE (    ,A13,P701,         ,OTHER)
*   IMAGE (CF07,C1 ,P701,         ,CF)
    IMAGE (CF05,C2 ,P701,WTSCPLX1,CF)
*   IMAGE (SC52,A1 ,P801,WTSCPLX1,MVS)
    IMAGE (SC53,A2 ,P801,WTSCPLX1,MVS)
    IMAGE (SC50,A3 ,P801,WTSCPLX1,MVS)
*   IMAGE (    ,A4 ,P801,         ,OTHER)
    IMAGE (SC42,A5 ,P801,WTSCPLX1,MVS)
    IMAGE (SC43,A6 ,P801,WTSCPLX1,MVS)
    IMAGE (SC66,A7 ,P801,WTSCPLX1,MVS)
*   IMAGE (SC63,A8 ,P801,SANDBOX ,MVS)
*   IMAGE (SC64,A9 ,P801,SANDBOX ,MVS)
*   IMAGE (SC65,A10,P801,SANDBOX ,MVS)
    IMAGE (SC48,A11,P801,WTSCPLX1,MVS)
*   IMAGE (    ,A12,P801,         ,OTHER)
*   IMAGE (CF04,C1 ,P801,SANDBOX ,CF)
*   IMAGE (CF03,C2 ,P801,SANDBOX ,CF)
    IMAGE (CF06,C3 ,P801,WTSCPLX1,CF)
)
```

```
HEALTHCHK(
 CHECK(XCF_SYSPLEX_Failure_Management)
        DATE(20030201)
        NOCALL
        REASON('SFM Not Used Here);
 CHECK(CHECK(XCF_Failure_Detection_Interval)
        DATE(20030201)
        PARMS(4,20)
        REASON('Give XCF Longer To Recover Before
Isolating Systems);
 CHECK(Number_EMCS_consoles)
        DATE(20030201)
        PARMS(10,20)
        REASON('Number Of Installation Required EMCS
Consoles');
 CHECK(SDUMP_Availability)
        DATE(20030201)
        NOCALL
        REASON('Installation Uses Preallocated Dump
Data Sets');
 CHECK(SYSCONS_PD_MODE)
        DATE(20030301)
        REASON('SYSCONS in Problem Determination Mode
Allowed Here');
 CHECK(Available_Frame_Queue_Thresholds)
        DATE(20030301)
        PARMS(600,800,400,600)
        REASON('Installation Requires Higher AFQ
Thresholds');
)
```

Installing msys for Operations

msys for Ops installation summary:

- You do NOT need to know anything about NetView or SA/390 to install or use msys for Ops

- Installation takes less than two hours

- No IPLs or system interruptions are required to activate msys for Ops

- This is a *very* strategic function, so please take a half day to install and try it out

- msys for Ops is free - how many things do you get from IBM for free??!! So, try it out

z/OS HealthChecker

International Technical Support Organization

z/OS HealthChecker

In order to ensure high availability and optimum performance, it is vital that "best practices" are adhered to. However:

- ► Where do you find them
  - – Product manuals
  - – Redbooks
  - – WSC Flashes
  - – Elsewhere on the Web
  - – Ask your dog??
- – If you find different answers, which one is correct?
- – And, how do you know when they change??
- – Even if you set your sysplex up "correctly", how do you know if deviations creep in over time?

Answer: the z/OS HealthChecker

z/OS HealthChecker

So, what is the HealthChecker?

- Code that checks about 30 aspects of system operation - based on actual outage analysis data

- Highly parameterized, allows easy updates of "best practices" values

- Users can override best practices values, but must provide a reason and timestamp - if corresponding IBM best practice is updated, user must revalidate his override

- Runs on OS/390 2.10 and later

- Specifically designed to allow easy addition of new checks

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z/OS HealthChecker

Sounds interesting, how do I get a copy?

- There are two ways of running it:
  - As a task under msys for Ops (or SA/390 V2), with msys for Ops providing the user interface (in which case it comes with APAR OW56107).
  - It can also run as a stand-alone batch job (in which case you download the code from a Web site)
- The batch method will be updated more frequently (when you download it, you are asked to register so you can be informed when updates become available).
- Running it under msys for Ops provides a nicer interface and is automated.

z/OS HealthChecker

HFS Automove settings

Check if Available Frame Count threshold too low

CF Structure location

XCF Signaling

- ► minimum MAXMSG value for transport classes
- ► minimum XCF messages that an inbound XCF signal path should support to avoid message backup
- ► minimum pathout/pathin pair count
- ► Transport classes defined along IBM guidelines
- ► All Transport classes assigned to a Pathout

XCF signaling structures not all in the same CF

z/OS HealthChecker

Consoles

- ► Have NAME specified
- ► Have ALTGRP specified

- ► Each system has a console with command association and Master authority
- ► Has appropriate mix of MSCOPE and ROUTCODEs
- ► If AMRF is on, eventual action messages are suppressed
- ► No console is receiving ROUTCODE 11 messages
- ► Master console is active

EMCS Console

- ► Has appropriate mix of MSCOPE and ROUTCODEs
- ► Does not have HARDCOPY FLAG on, if MSCOPE > 1
- ► Not an excessive number of EMCS consoles

SYSCONS

- ► Have local MSCOPE and advisable ROUTCODEs
- ► Not in PD mode
- ► Have MASTER authority

z/OS HealthChecker

Use of V=R

Use of Reconfigurable Storage (RSU)

Storage checks - track changes in system areas (CSA, SQA, LPA, Nucleus) from IPL to IPL

XCF Cleanup is set to a recommended value

XCF Failure Detection Interval matches recommendation

Status of Sysplex Failure Management (SFM) Policy is ACTIVE

Use of dynamically allocated SDUMP data sets

 Use Of GRS Star

z/OS HealthChecker

Check for duplicate members in lnklst and LPA libraries

Check if a new secondary extent has been added for any lnklst library

Check that data sets defined in APF list actually exist

Check if lnklst data sets have secondary extents defined or in use

Check that SYNCHRES is being used for GRS

z/OS HealthChecker

Check that USS Root is HFS (not zFS)

Check that the Sysplex root is R/W and AUTOMOVE

Check that the Version root is R/O and AUTOMOVE

System-specific root should be R/W and NOAUTOMOVE

z/OS HealthChecker

Installation files on download Web site:

- ► User's Guide in PDF format
- ► Readme file
- ► Load library in TSO XMIT format
- ► Sample data set in TSO XMIT format
  - ► Execution JCL
  - ► USERPARM member to override IBM recommendations (when running the HealthChecker under msys for Ops, overrides are specified in the AOFCUST member).
- ► Library containing HealthChecker modules must be APF authorized
- ► You must allocate a data set to contain the storage allocation information from one IPL to the next (sample job provided)

z/OS HealthChecker

Summary

- z/OS HealthChecker provides a very easy-to-install and easy-to-use method to identify if your system does not meet recommended configuration guidelines

- You can tailor it to your installation and disable a subset of the checks that do not apply to you

- Provides most value if you run it frequently - please don't just run it once

- There are a number of Forums relating to the HealthChecker on ResourceLink that you can subscribe to (described in the HealthChecker User's Guide)

msys for Operations & HealthChecker- Summary

1. **Both msys for Ops and the HealthChecker are available at no charge to all z/OS and OS/390 2.10 customers**

2. **Both are available for download from:**

   http://www.ibm.com/servers/eserver/zseries/zos/downloads/

3. **Both are extremely easy to install**

4. **Both are central and strategic to IBM's efforts to further improve z/OS availability**

5. **Both make your life easier**

   a. Saves you having to design and constantly update your own sysplex automation routines

   b. Saves you having to spend time trying to keep track of IBM's latest sysplex-related configuration recommendations

   c. Equips operators to react faster and more precisely in day-to-day and emergency situations

msys for Operations and z/OS HealthChecker

Future

- New functions in msys for Ops
- New functions and interfaces in z/OS HealthChecker

Bits and bytes

International Technical Support Organization

GDPS Update

International Technical Support Organization

GDPS - Planned HyperSwap

Planned Site Shutdown

SITE 1   SITE 2

| CF1 | K1 | | P3 | P1 | → | P2 | P4 | | K2 | CF2 |

dupl   CDS_p   *d u p l e x*   *d u p l e x*   CDS_a   *dupl*

P   L   P   P   P   S   S   S   L   S

susp   *s u s p e n d e d*   *s u s p e n d e d*   CDS_p/a   *susp*

S   L   S   S   S   P   P   P   L   P
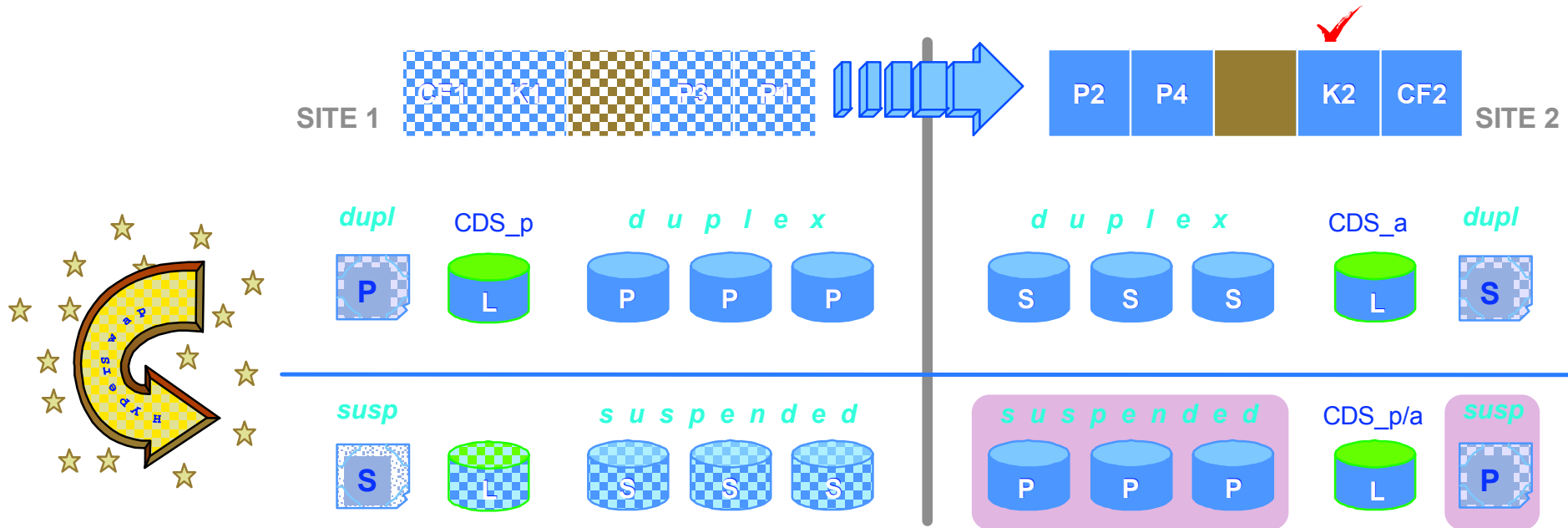
- ✓ ► Switch CFRM policy (change preference list (CF2), rebuild pending state structures)
- ► Switch CDS (primary and alternate CDS in site-2)
- ► Shutdown site-1 systems
- ► HyperSwap disk configuration (swap prim/sec PPRC volume UCBs, and suspend)
- ► Select secondary IPL volumes (SYSRES, IODF)
- ► Switch Tape and suspend duplexing

P2 and P4 remain active throughout the procedure

GDPS - Planned HyperSwap

Planned Site Shutdown - Return
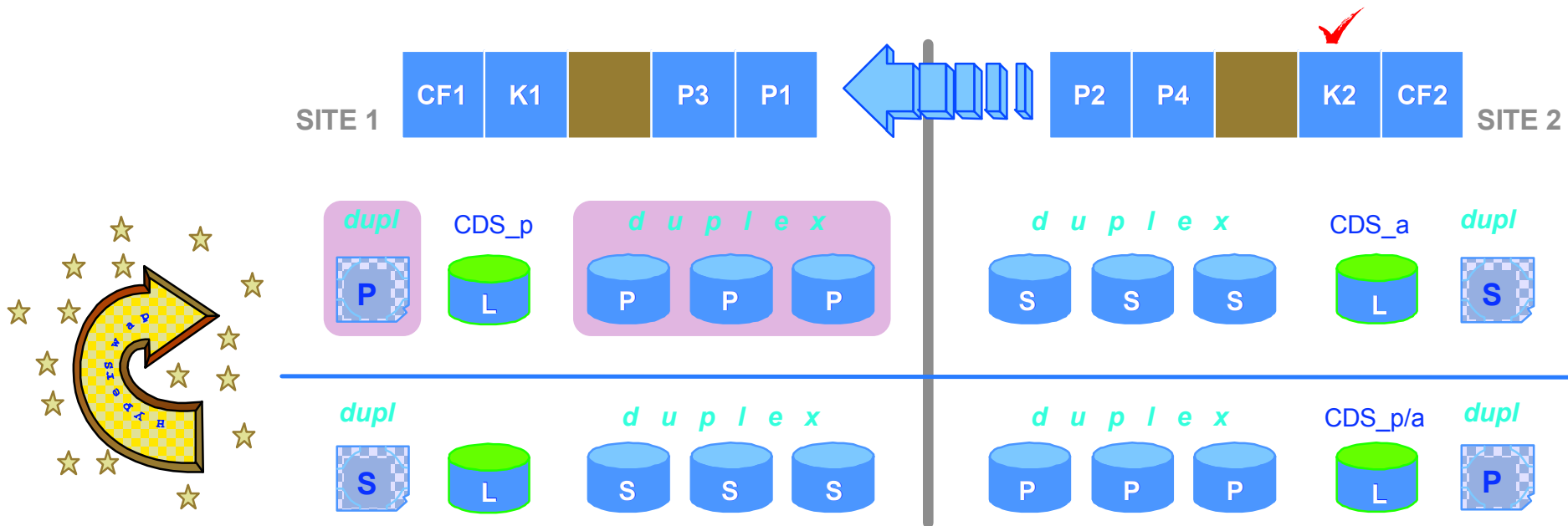
✓ ► ** Alternate controlling system K1 to be IPLed via standard action
► ** Re-synchronize primary / secondary disks and tape, verify resynch completion
► HyperSwap disk configuration (swap prim/sec PPRC volume UCBs, and resynch)
► Select primary IPL volumes (SYSRES, IODF)
► Switch CDS (restore original CDS configuration)
► Switch Tape (make the site-1 VTS(s) the primary)
► Switch CFRM policy (change preference list (CF1/2), rebuild pending state structures)
► Re-IPL site-1 production systems and restart applications

P2 and P4 remain active throughout the procedure

GDPS - Planned HyperSwap

Planned HyperSwap impact:

- HyperSwap swaps multiple SSIDs in parallel, but devices within each SSID are swapped serially

- Duration of HyperSwap impact related to size of largest SSID, but largely independent of number of SSIDs

- IBM tests with SSIDs containing 150-175 devices indicate user impact time of about 60 seconds

Unplanned HyperSwap impact:

- Don't have to do the same amount of work as for planned, but duration is again linked to the number of devices in the largest SSID.

- Duration expected to be roughly half the elapsed time of an equivalent Planned HyperSwap

GDPS - HyperSwap

Planned and Unplanned HyperSwap

- APARs on OS/390 V2R10 or z/OS 1.2 and up

Parallel Sysplex with GRS Star

- Convert all reserves to global enqueues (using RNL masking)

Disk subsystems that support PPRC level 3 (extended query)

All disk volumes must be PPRCed and in duplex mode

- Except Couple Data Set volumes

The PPRC configuration must have one-to-one correspondence between each primary PPRC SSID and secondary PPRC SSID

HyperSwap devices cannot attach to systems outside sysplex

Production systems must have sufficient channel bandwidth to primary and secondary PPRC disk subsystems

GDPS - Unplanned HyperSwap

GDPS/PPRC HyperSwap for Unplanned Disk Failover

SITE 1

| CF1 | K1 | | P3 | P1 |

SITE 2

| P2 | P4 | | K2 | CF2 |

dupl   CDS_p   *d u p l e x*   *d u p l e x*   CDS_a   *dupl*

P   L   ✕   P   P   S   S   S   L   S

dupl   *s i m p l e x*   CDS_p/a   *dupl*

P   ✕   P   P   P   L   S
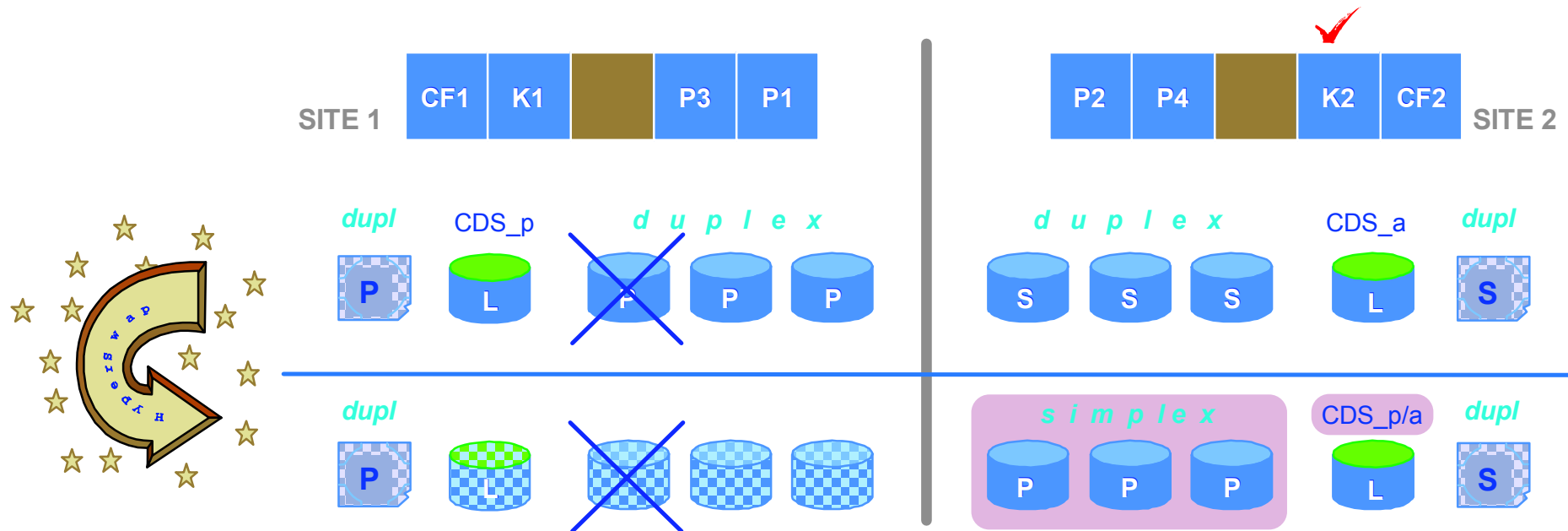
- ✓ HyperSwap disk configuration (swap prim/sec PPRC volume UCBs)
  - ◆ No application level error awareness
- Post swap procedure
  - ◆ Switch CDS (primary and alternate CDS in site-2)
  - ◆ Select site-2 IPL volumes (SYSRES, IODF)
- Chart shows Multiple Site Workload example; would apply to Single Site Workload also
- Return to site 1- same as Disk Config. Maint Return chart except
  - ◆ Full copy of primary disks required instead of re-synchronization

All coupling facilities and production images remain active throughout the procedure

GDPS/PPRC Storage Management

Also known as GDPS Lite

Entry level GDPS/PPRC offering

Provides remote copy management and Freeze capability for PPRC configurations

Supports GDPS-initiated and user-initiated FlashCopy

Requires a Control system, similar to full GDPS/PPRC offering

Does not support:

- GDPS Scripts (Automation)
- HyperSwap
- Peer-to-peer VTS

GDPS - Open LUN support

GDPS/PPRC Management for Open Systems LUNs

Primary Disk Subsystem

Secondary Disk Subsystem
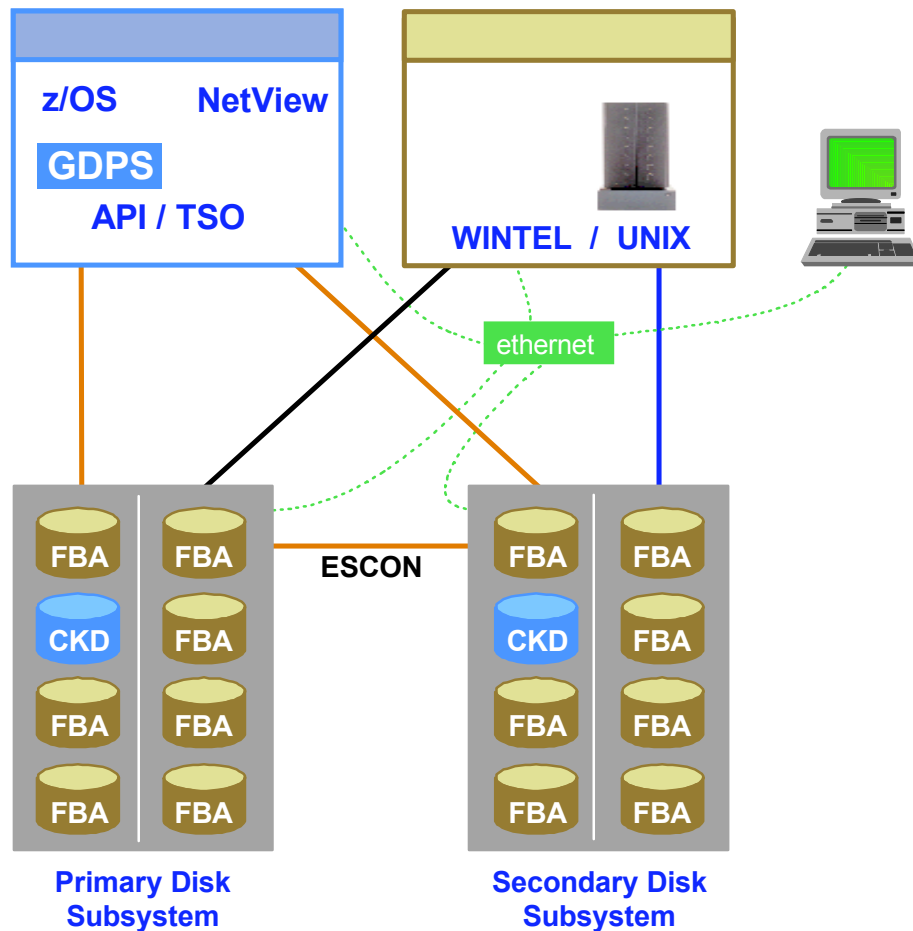
- ◆ Support implemented through new
  - ◆ Configuration definition options
  - ◆ Panels
  - ◆ Script verbs
- ◆ Requires
  - ◆ Some CKD capacity in disk subsystem
  - ◆ PPRC level 4
  - ◆ Development APAR
- ◆ Support details
  - ◆ Supports x-platform or platform level Freeze
  - ◆ FlashCopy not supported for Open
  - ◆ No GDPS Code running on Open Systems host - suspend reported through SNMP alert

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GDPS Cascaded PPRC

GDPS/Asynch Cascading PPRC
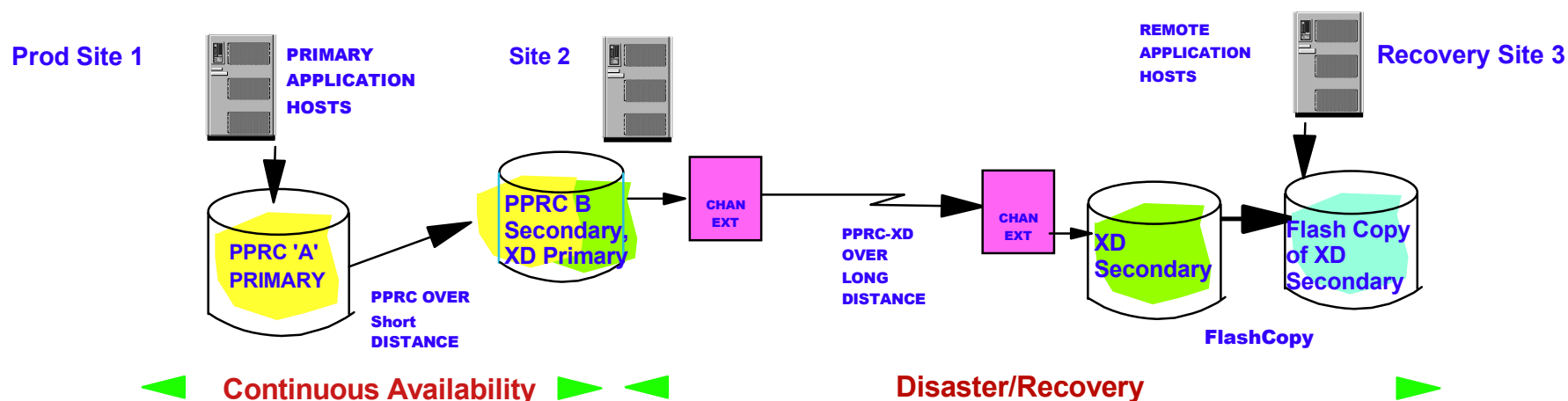
- Designed to provide continuous availability and no data loss between sites 1 and 2
- Sites 1 and 2 can be same building or campus distance to minimize performance impact

- Production site 1 failure
  - Site 3 can recover with no data loss
- Site 2 failure
  - Production can continue with site 1 data (A)
- Site 1 and 2 failure
  - Site 3 can recover with minimal loss of data

GDPS Managed coordinated solution for zSeries and Open Systems Continuous Availability and Disaster Recovery at unlimited distance

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GDPS - Customers

GDPS Customer base

- GDPS base has grown consistently, especially in light of increased regulatory requirements and terrorist threat

Industry		Count
Communications		12
Distribution		8
Finance		119
Industrial		14
Public		12
Total		165

* As at early September 2003

Mainframe Charter

International Technical Support Organization

Mainframe Charter

IBM's *Mainframe Charter*

IBM is committed to delivering innovative solutions to meet our customers' on demand business requirements.

It is our intention to continue to:

Innovation

- ✓ Provide leadership in innovation to enhance the use of zSeries to support increasingly integrated and flexible business processes for the on demand business.
- ✓ Maintain zSeries' position as a benchmark for flexible, efficient, and responsive platforms for highly complex, integrated environments running a wide range of mission-critical workloads.
- ✓ Improve the autonomic and self-managing capabilities of the zSeries while working to simplify user processes and system administration tasks.

Value

- ✓ Enhance the value proposition and lower the cost of computing of zSeries solutions in a way that is compelling, clear, and consistent.
- ✓ Extend the on demand characteristics of zSeries servers, highlighting its strengths as an environment for usage-based computing.
- ✓ Increase the ability to account for allocation and use of zSeries resources in an on-demand environment.

Community

- ✓ Support programs designed to foster vitality in the zSeries community, helping to promote a strong application portfolio and world-class support services.
- ✓ Provide the skills and expertise to assist customers in designing, developing, and deploying on demand solutions built on a foundation whose cornerstone is zSeries.
- ✓ Leverage key open standards and common structures to enhance the use of zSeries in large, heterogeneous environments.

These principles help guide IBM's investment priorities in zSeries systems and demonstrate IBM's commitment to providing ongoing value to its zSeries customers.

Mainframe Charter

Proof Points to Consider...

Innovation
- zSeries is a leader in delivering on demand world technologies *today.*
  - ▶ Integration, Virtualization, Autonomic
- Workload management and efficiency levels other platforms strive to achieve. zSeries is there *today.*
- zSeries has reestablished its relevance among IT professionals *today* running traditional and new applications side-by-side.

Value
- Today's Pricing Initiatives will help accelerate price/performance across our customer set.
- Extend what has worked well with IBM @server zSeries 800 (z800) pricing and apply across zSeries.
- Deliver premium hardware and software price/performance benefits to z990 customers.

Community
- IBM participation in open source community activities *today.*
- Planned and focused deployment of skills in the marketplace to assist our customer community in developing zSeries solutions.
- Facilitate well-established and highly disciplined levels of testing that foster "Day 1" support among application and systems management software vendors when new zSeries hardware and software is released.

Redbooks

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Mainframe charter - value

	Announced	Planned Implementation
Mainframe Charter	**Now**	**8/22**
Pricing Initiatives		
▪ Memory Pricing	**Now**	8/22
▪ IFL Pricing	**Now**	8/22
▪ Base Configuration Changes	**Now**	9/8
▪ Daily On/Off CoD Software Charges	**Now**	9/15
▪ Software Price/Performance Improvements for z990	**Now**	10/1
▪ WLC Pricing Enhancements	**Now**	10/1
▪ NALC Price Reduction	**Now**	10/1
▪ On/Off CoD for Linux	**Now**	10/31
▪ WebSphere® Sub-Capacity SOD	**Now**	Planned By Year-End 2003
z990 On Demand Business Investment Promotion	**Now**	Planned for 8/26

Mainframe charter - Community

IBM in the US, Canada, Australia, and Europe is working with universities and corporate sponsors to get more young people interested and skilled in zSeries

IBM Poughkeepsie has a co-op program to provide 6 months intensive zSeries training to college graduates who are then released into the marketplace.

Worldwide, IBM are deploying 500 new people into zSeries, to meet the demand for zSeries skills and help from customers.

For more information on the mainframe charter, refer to:

- http://www.ibm.com/zseries/announce/charter

And now, a word about On Demand on zSeries.........

International Technical Support Organization

On Demand on z....

And the word is....

RELAX

If you are doing data sharing and dynamic workload balancing on zSeries, you are already where all the other platforms want to be.....

Software and hardware service and support and upgrade planning

International Technical Support Organization

Hardware vs Software support dates

OS/390 R8

GA
9/99

EOS
9/02

OS/390 R9

GA
3/00

EOS
3/03

OS/390 R10

GA
9/00

EOS
9/04

z/OS R1

Not supported

9672 G2

GA
7/95

Withdrawn
From
Marketing
4/99

HW supported, SW
<u>not</u> supported

Withdrawn
From
Maintenance
Agreements
12/04

ibm.com/redbooks
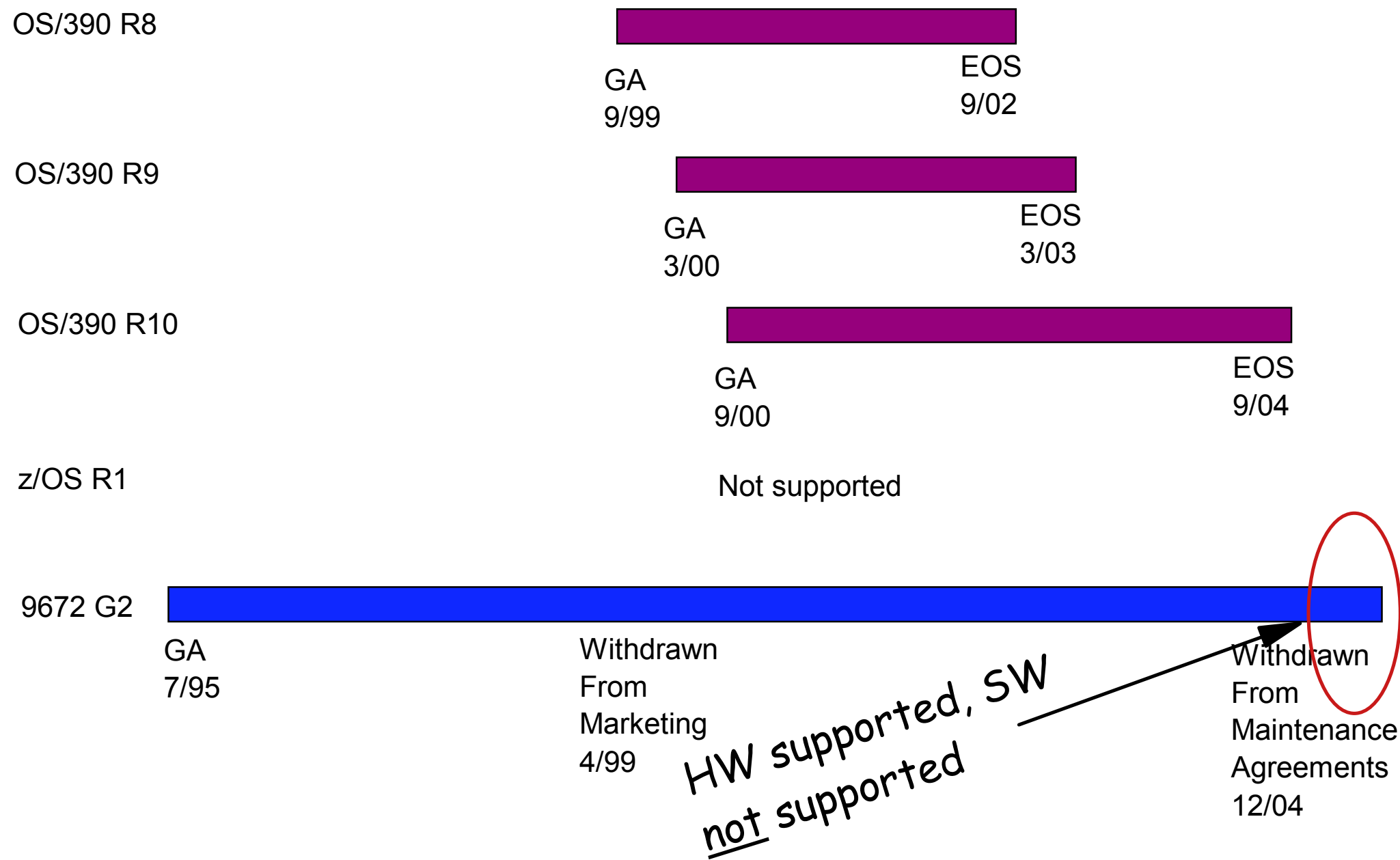
Hardware and Software support dates

Software and hardware GA, end of marketing, and end of support dates vary from country to country

- Ask local IBM for dates for your configuration

Important point is that hardware is usually supported beyond the time the software than runs on that hardware is supported

- Don't let hardware support dates drive your technology plan

If you keep a CPC or OS level until it runs out of support, it may not be possible to order the release that you can migrate to within the n, n+2 support window

- Even if you can't upgrade now, at least order a ServerPac containing the n+2 release so you have an upgrade path when you are able to upgrade

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Software support dates

OS/390 V2R10
GA 9/15/2000

z/OS V1R1
GA 3/15/2001
EOS 3/2004

z/OS V1R2
GA 10/26/2001
EOS 10/2004

z/OS.e V1R3
z/OS V1R3
GA 3/29/2002
EOS 3/2005

z/OS.e V1R4
z/OS V1R4
Ordering started 9/13/2002
GA 9/27/2002
EOS 3/2007

z/OS.e V1R5
z/OS V1R5
GA 1Q2004
EOS 1Q2007

Will remain orderable until 12/17/2003,
Supported until 9/2004

Migrate now - don't get caught up in the last minute rush
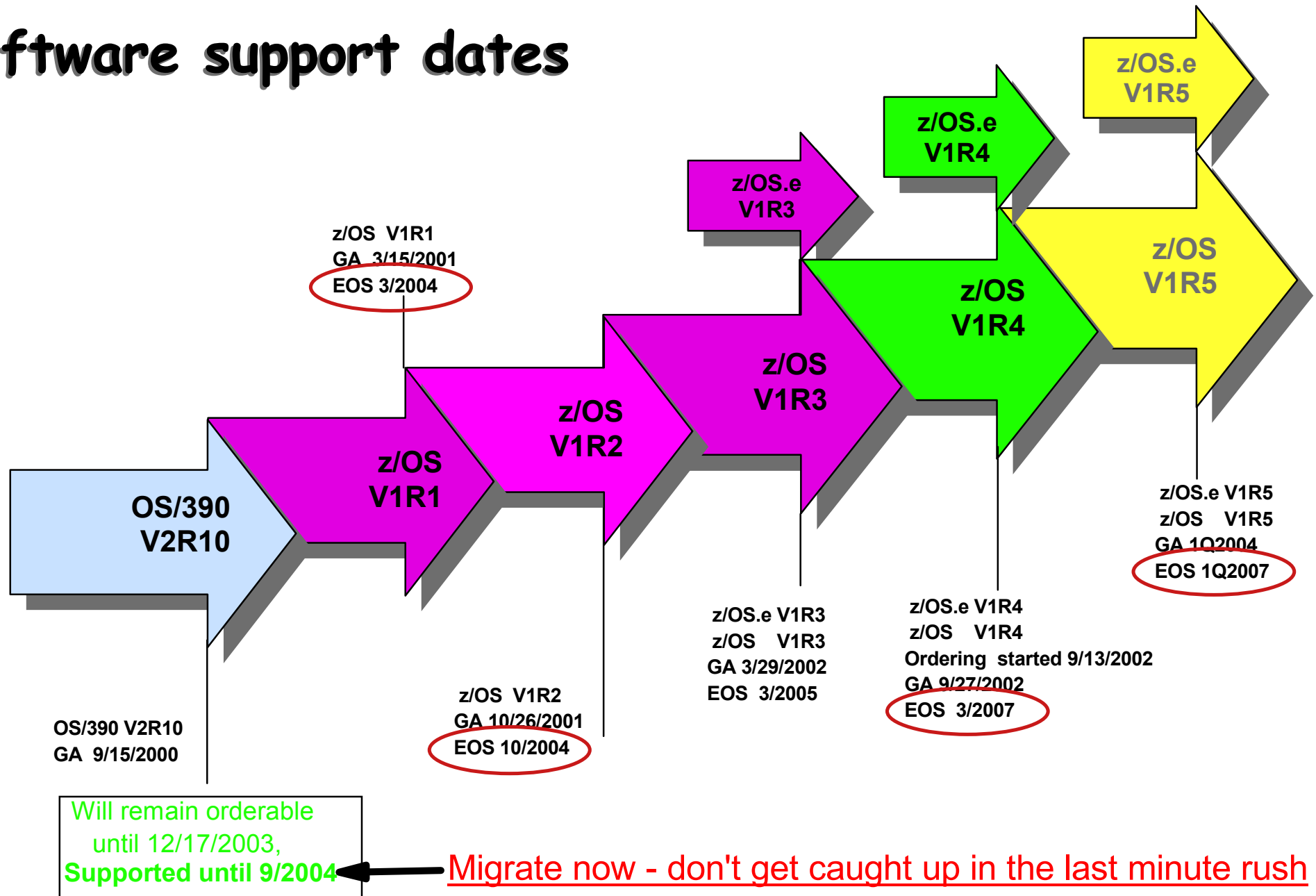
End-of-support information accessible at:

http://www.ibm.com/services/sl/products/java.html or
http://www.ibm.com/servers/eserver/zseries/zos/support/zos_eos_dates.html

Software support dates

z/OS V1R4 runs on the following IBM Servers

- IBM zSeries z990, z900, and z800
- S/390 9672 G5 and G6 with driver 26
- All models of Multiprise® 3000

z/OS V1R4 GAed last September (2002)

z/OS.e V1R4 runs ONLY on IBM z800 2066

- Same GA as z/OS V1R4

z/OS 1.4 Migration Guide (very popular) available at:
  - http://publibz.boulder.ibm.com/epubs/pdf/e0z2m100.pdf

Software support dates

z/OS 1.5 is planned to ship in 3/04

- z/OS 1.6 is planned to ship in 9/04
- Subsequent releases will ship every 12 months after that, that is, every September

Starting with z/OS 1.5, coexistence policy will be for n, n+2 releases, and each release will be supported for 3 years from its GA date

- This means that you *must* install (at least) every other release to stay within the coexistence window
- See WSC Flash 10186 for more information

For releases up to and including z/OS 1.4, coexistence policy is N, N+3

See z/OS 1.4 Planning for Installation for details

http://publibz.boulder.ibm.com/cgi-bin/bookmgr_OS390/BOOKS/E0Z2B131/5.3?DT=20021003160915

Distribution of releases

At the middle of 2003:

- For z900 customers, 30% were using some release of OS/390, remainder (70%) on z/OS (bulk on z/OS 1.4)

- Across all zSeries and S/390 CPCs, about 44% were still on OS/390, remainder on some release of z/OS.

- Rate of migration to z/OS continuing to accelerate
  - Remember, z/OS 1.4 is the last release that can coexist with OS/390 R10, so if you are still on OS/390, you must at least order z/OS 1.4 before z/OS 1.5 comes out.

Software support dates

Release / Year	2001	2002	2003	2004	2005	2006	2007	2008	2009
z/OS 1.1									
z/OS 1.2									
z/OS 1.3									
z/OS 1.4									
z/OS 1.5									
z/OS 1.6								?	
z/OS 1.7								?	
z/OS 1.8									?
z/OS 1.9									?
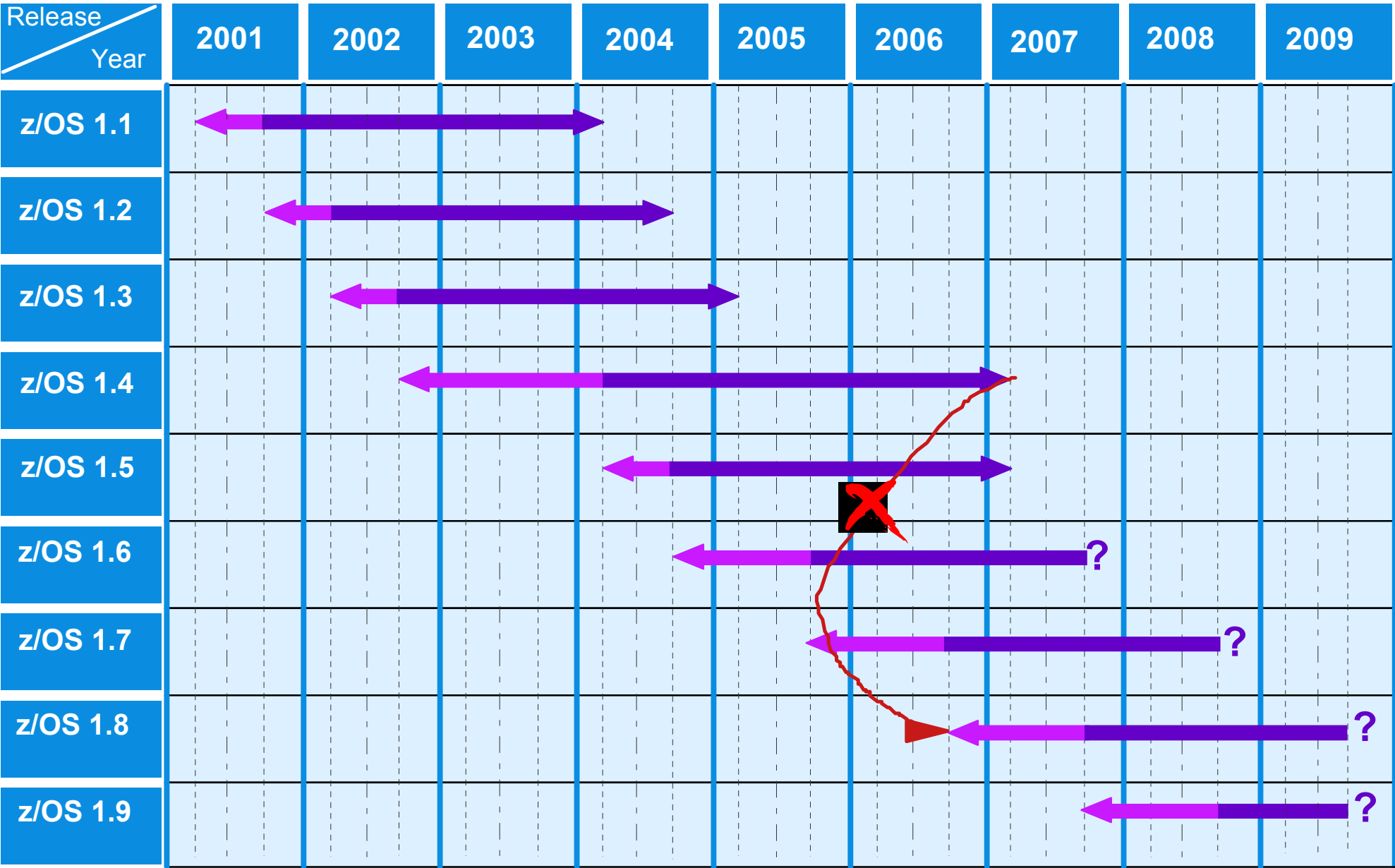
Hardware support

Note: z/OS 1.6 and later will *not* run on 9672 or MP3000

IBM z990

IBM z900

IBM z800

G5/G6
MP3000

Multiprise
& 9672

R2,R3,G4

OS/390
R8,
R9,R10

z/OS 1.1, 1.2,
1.3, 1.4, 1.5

z/OS.e 1.3,
1.4, 1.5

z/OS 1.6

z990 Sysplex considerations

International Technical Support Organization
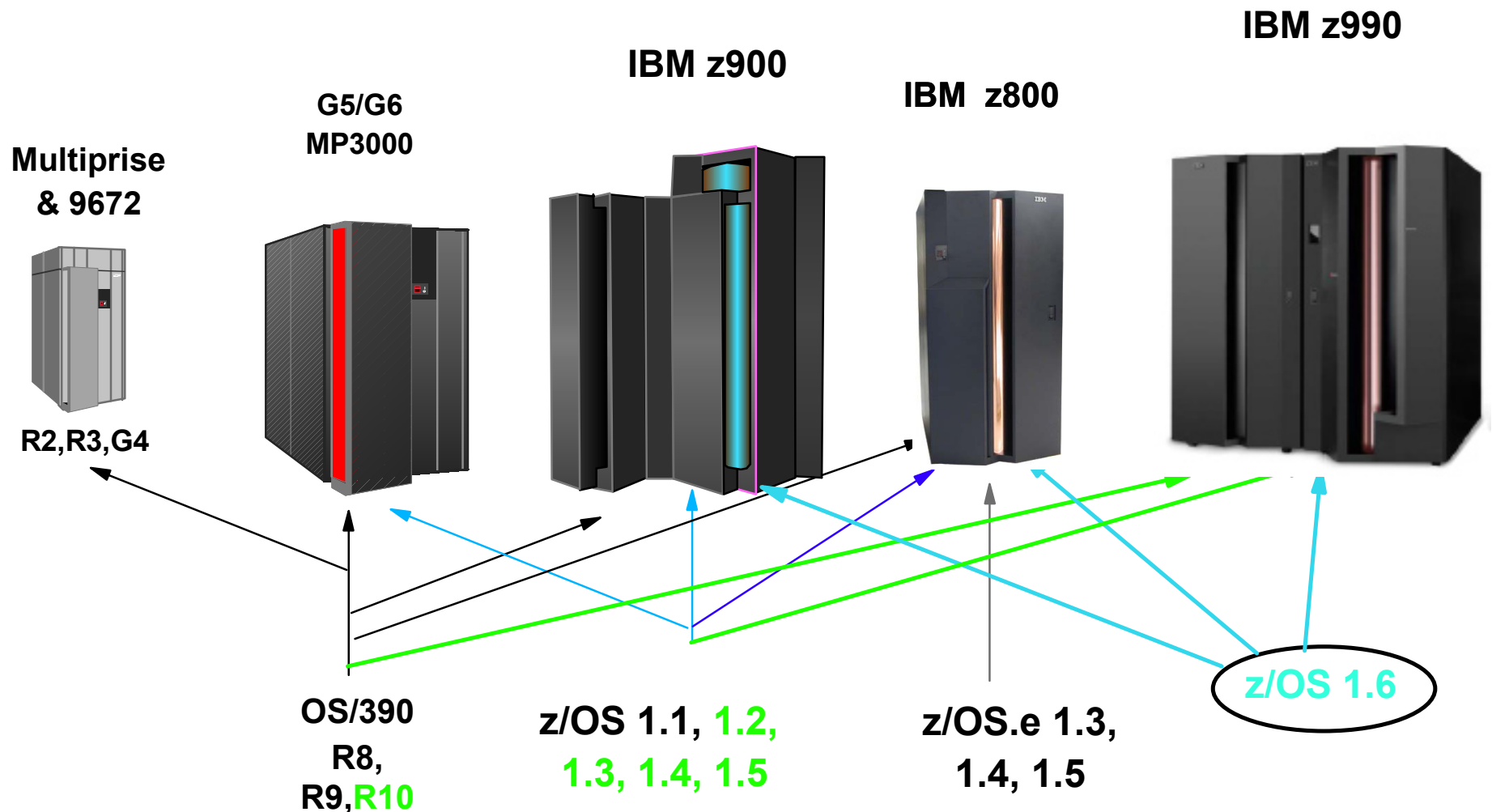
z990 migration - sysplex considerations

The following are the ONLY releases that can coexist in a sysplex with a z990:
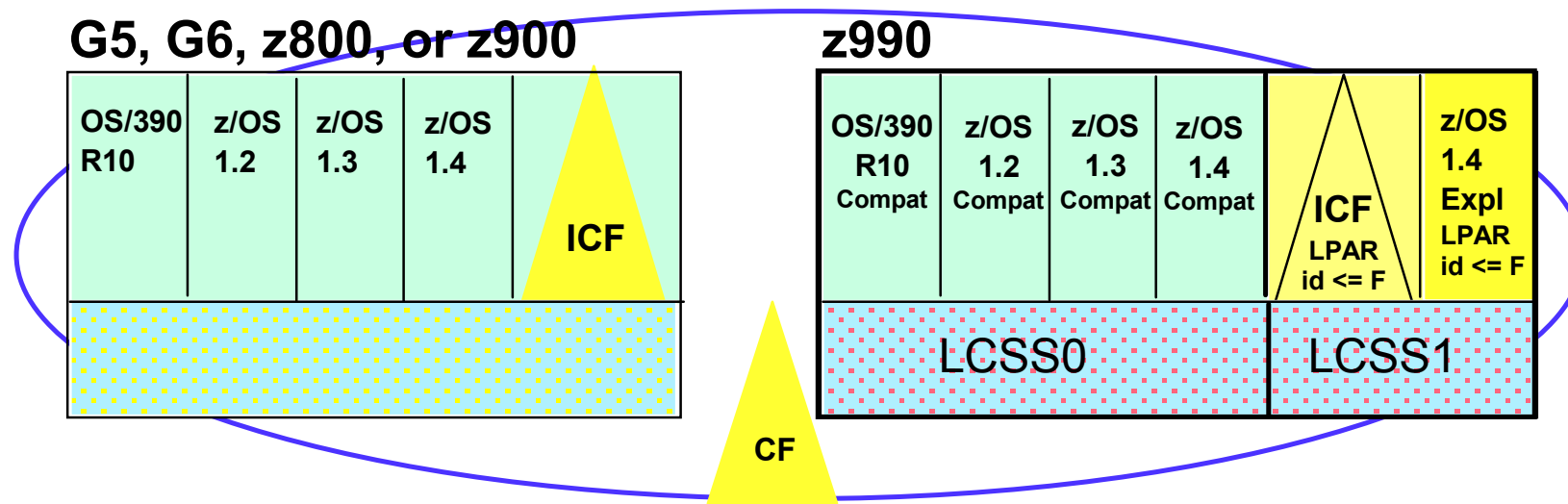
- OS/390 R10 (only if running on 9672 G5 or later)
- z/OS 1.2
- z/OS 1.3 and z/OS.e 1.3
- z/OS 1.4 and z/OS.e 1.4
- z/OS 1.1 is NOT supported ANYWHERE in the sysplex if the sysplex contains any image on a z990.

z990 migration - sysplex considerations

Compatibility <u>NOT</u> required

Compatibility (or Exploitation) required on all z990 images

G5, G6, z800, or z900

OS/390 R10	z/OS 1.2	z/OS 1.3	z/OS 1.4	ICF

z990

OS/390 R10 Compat	z/OS 1.2 Compat	z/OS 1.3 Compat	z/OS 1.4 Compat	ICF LPAR id <= F	z/OS 1.4 Expl LPAR id <= F
LCSS0				LCSS1	

CF
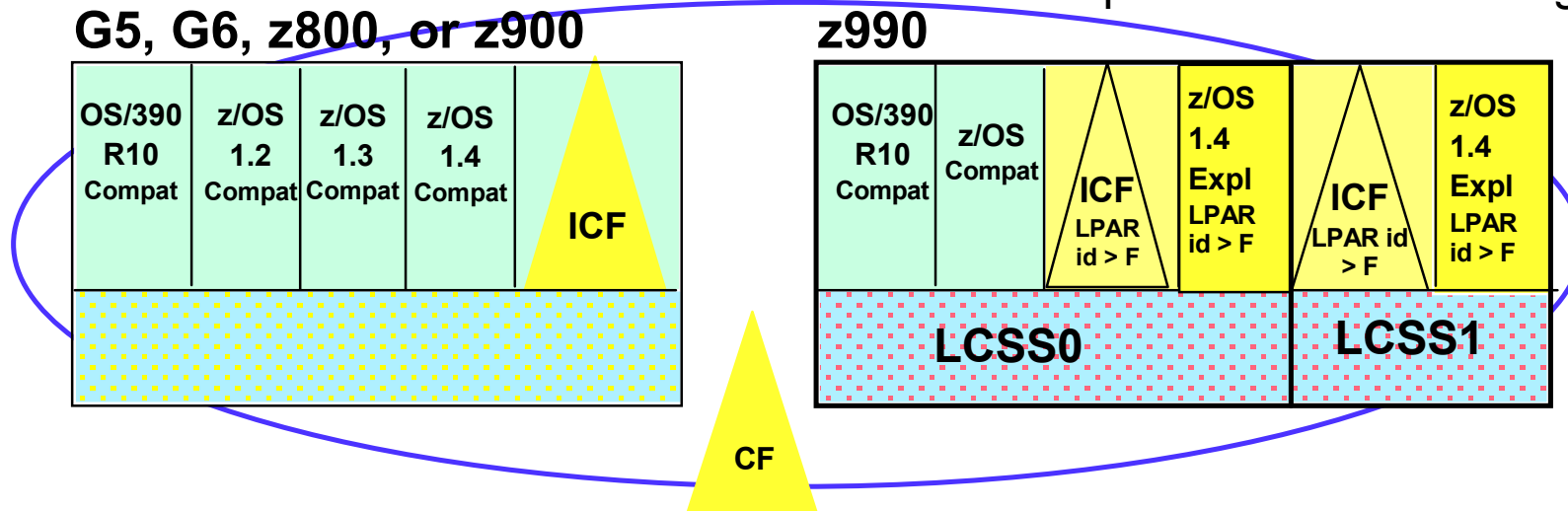
- Compatibility <u>*not*</u> required on non-z990 images in Parallel Sysplex when:
  - ► Coexisting z990 Compatibility (or Exploitation) operating system images have LPAR ID <=15 (x'F')
  - ► z990 CF LPAR ID <= 15 (x'F')
    - – LCSS of CF LPAR irrelevant

Recommendation: Rollout Compatibility level software to all images in the Sysplex as soon as possible

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z990 migration - sysplex considerations

Compatibility <u>IS</u> required

Compatibility (or Exploitation) required on all z990 images

G5, G6, z800, or z900

OS/390 R10 Compat	z/OS 1.2 Compat	z/OS 1.3 Compat	z/OS 1.4 Compat	ICF

z990

OS/390 R10 Compat	z/OS Compat	ICF LPAR id > F	z/OS 1.4 Expl LPAR id > F	ICF LPAR id > F	z/OS 1.4 Expl LPAR id > F

LCSS0   LCSS1
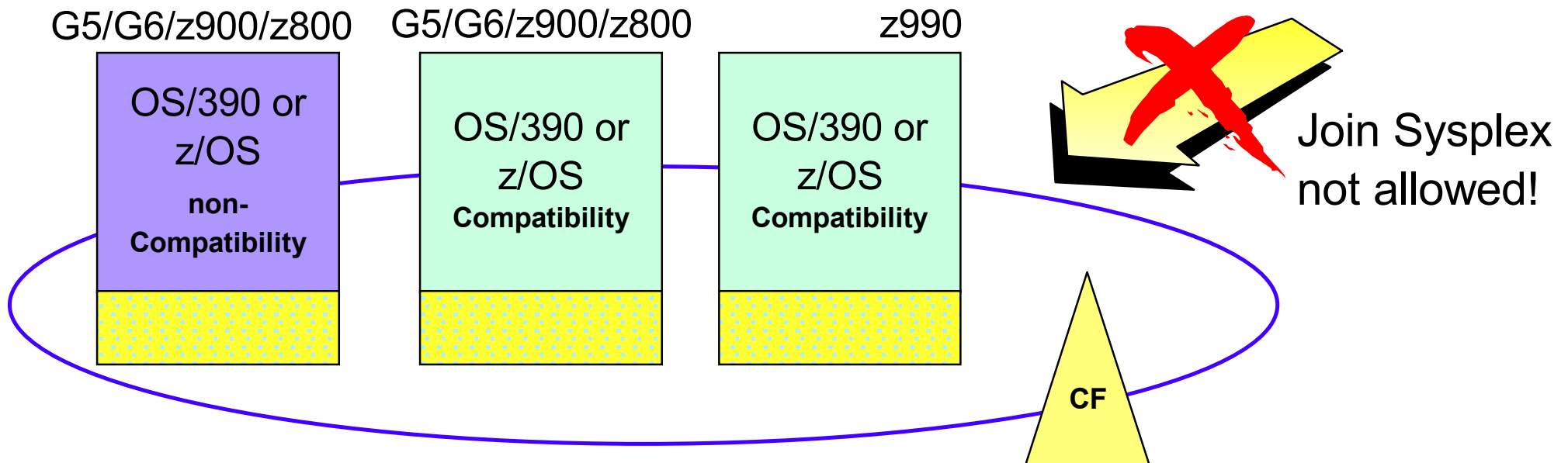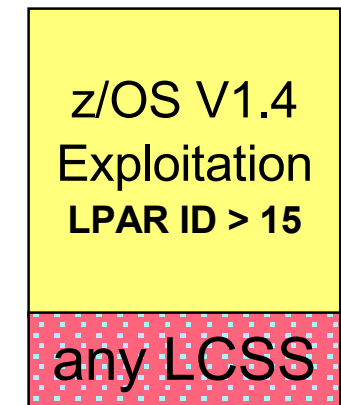
CF

- Compatibility *is* required on non-z990 images in Parallel Sysplex when:
  - ▶ z990 CF LPAR ID > 15
    - − LCSS of CF LPAR irrelevant
  - ▶ z990 z/OS 1.4 with Exploitation feature LPAR ID > 15
    - − LCSS of z/OS 1.4 Exploitation image is irrelevant

Restriction: Can not assign LPAR ID > 15 to CF LPARs until Compatibility software rolled out across all images in the Sysplex

z990 migration - sysplex considerations

- OS/390 and z/OS Compatibility, and z/OS Exploitation, code provide the following protection
  - ▶ z/OS with LPAR ID > 15 will not join sysplex unless all images in the sysplex are running on at least Compatibility code

z990

z/OS V1.4 Exploitation
LPAR ID > 15

any LCSS

G5/G6/z900/z800

OS/390 or z/OS
non-Compatibility

G5/G6/z900/z800

OS/390 or z/OS
Compatibility

z990

OS/390 or z/OS
Compatibility

Join Sysplex not allowed!

CF

z990 migration - sysplex considerations

- OS/390 and z/OS Compatibility, and z/OS 1.4 Exploitation, code provide the following protection
  - A system not running on at least Compatibility code will not be able to join a sysplex that already has a member with LPAR ID > 15
    - The system will actually join but will immediately be removed (wait state code of 0A2/154)

G5/G6/z900/z800

OS/390 or z/OS non-Toleration

z990

OS/390 or z/OS

Exploitation LPAR ID > 15

any LCSS

G5/G6/z900/z800

OS/390 or z/OS Compatibility

z990

OS/390 or z/OS Compatibility

Join Sysplex not allowed!

CF

z990 migration - sysplex considerations

G5, G6, z800, or z900

z/OS 1.2 Compat	z/OS 1.3 Compat	ICF	OS/390 R10 Compat	z/VM

CF

z990

LCSS0   LCSS1

CFCC level 11 or 12 with current maintenance

>15 LPARs <u>defined</u>
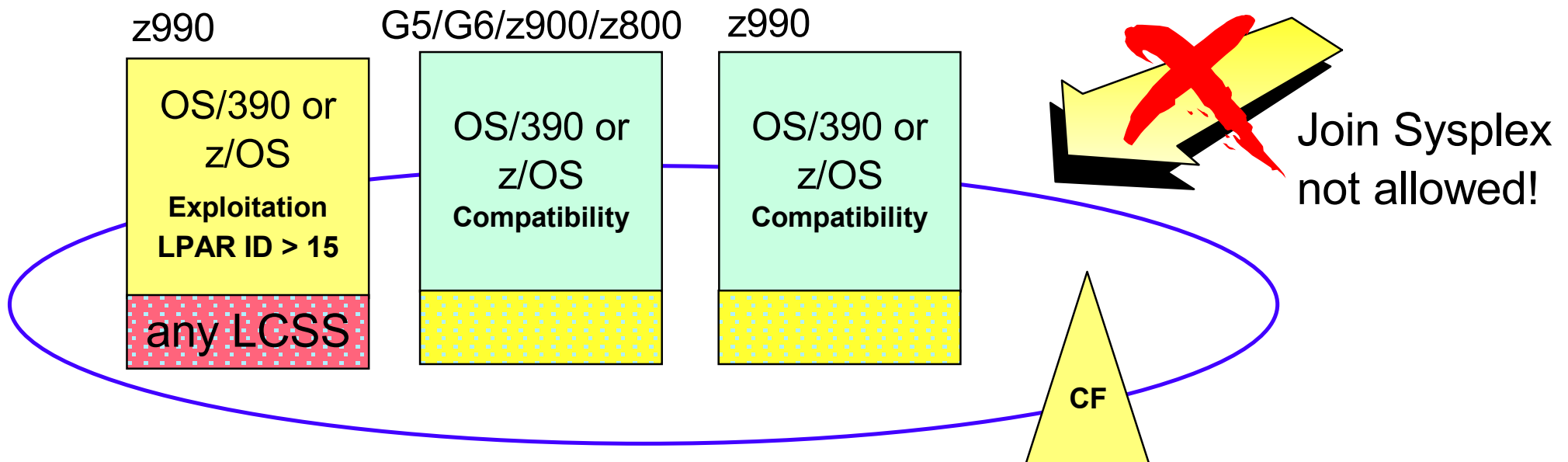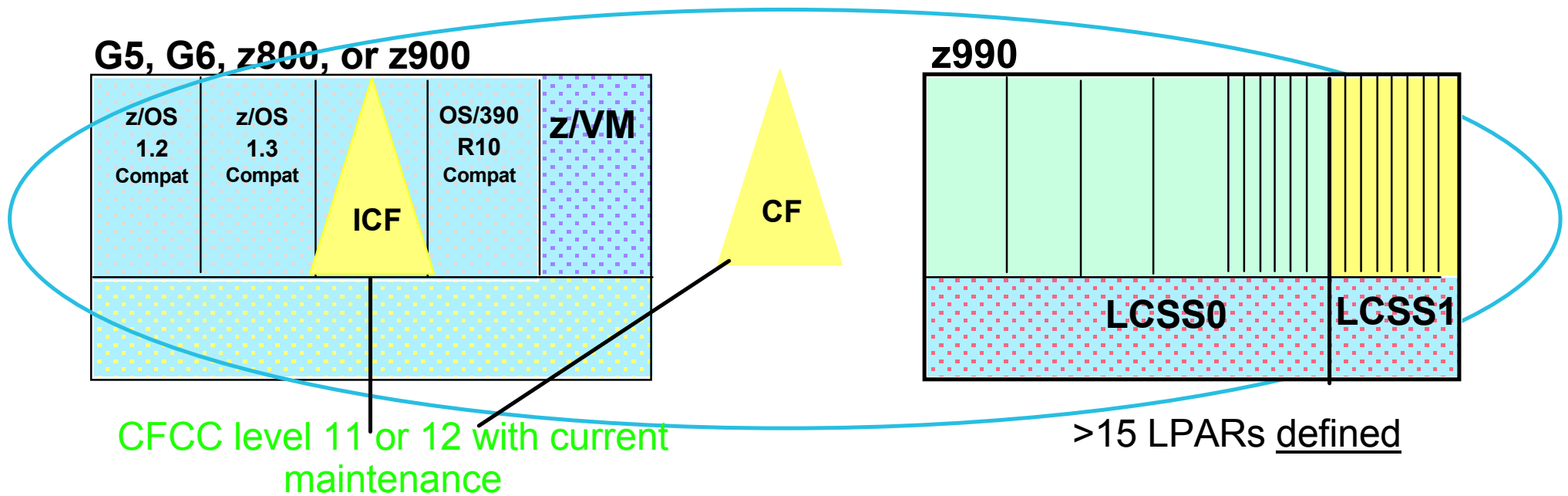
- ► Required non-z990 CFCC Levels
  - ➢ G5, G6 CFs must be CFCC 11 Service Level 5.04
  - ➢ z800, z900 must be CFCC 12 Service Level 10.05
- ► For some workloads, using G5 CFs in a Parallel Sysplex with z990 is not recommended
  - ➢ Use only as a temporary migration step

Recommendation: **Roll out non-z990 CFCC code to support z990 as soon as possible.**

z990 migration - sysplex considerations

Removing either z990 compatibility code or Exploitation code from a system that will run on a G5, G6, z800 or z900 server will reintroduce the sysplex coexistence considerations.

- It will prohibit that system from participating in a sysplex with either a operating system image or CF image on a z990 LPAR whose LPAR ID is >15

Removing (restoring) the CFCC Compatibility code from G5, G6, z800 or z900 server will reintroduce the sysplex coexistence considerations.

- Removing the CFCC Compatibility support from a CF image elsewhere in the sysplex, will prohibit that CF from participating in a sysplex with operating system or CF images on a z990 with more than 15 LPARs defined on it (regardless of the number of LPARs that are activated).

z990 sysplex considerations

When defining a CF in the CFRM policy:

- If the Coupling Facility resides on a non-z990 processor, then the partition number specified in the CFRM policy is the same as the partition number defined in HCD.

- If the Coupling Facility resides on a z990 processor, then the partition number specified in the CFRM policy should be the logical partition number specified in the PR/SM image profile.

- When moving a Coupling Facility to a z990 processor, remember to update the CFRM policy.

```
DATA TYPE(CFRM) REPORT(YES)

DEFINE POLICY NAME(POLICY1)
REPLACE(YES)

   CF  NAME(CF01)
       TYPE(123456)
       MFG(IBM)
       PLANT(02)
       SEQUENCE(123456789012)
       PARTITION(01)
       DUMPSPACE(2000)

   CF  NAME(CF02)
       TYPE(123456)
       MFG(IBM)
       PLANT(02)
       SEQUENCE(123456789012)
       PARTITION(11)
       DUMPSPACE(2000)
```

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z990 migration - sysplex considerations

Impact of CF speed on data sharing overhead

Host CF	G3	G4	G5	G6	z800	z900 1xx	z900 2xx	z990
C04-SM	10%	11%	16%	19%	21%	22%	25%	---
C05-HL	9%	10%	14%	16%	18%	19%	22%	---
R06-HL	9%	9%	12%	14%	16%	17%	19%	26%
R06-ICB	---	---	9%	10%	---	13%	14%	20%
G5/6-IC	---	---	8%	8%	---	---	---	---
z800 ISC	9%	9%	11%	12%	11%	12%	13%	18%
z800 ICB/IC	---	---	---	---	9%	10%	11%	14%
z900 ISC	8%	9%	11%	12%	10%	11%	12%	16%
z900 ICB/IC			8%	9%	8%	9%	10%	12%
z990 ISC	7%	8%	8%	9%	9%	10%	11%	14%
z990 ICB/IC			8%	8%	7%	8%	8%	9%

Chart is based on 9 CF ops/sec/MIPS - may be scaled linearly for other rates

z990 Sysplex support

Relative CF Speeds

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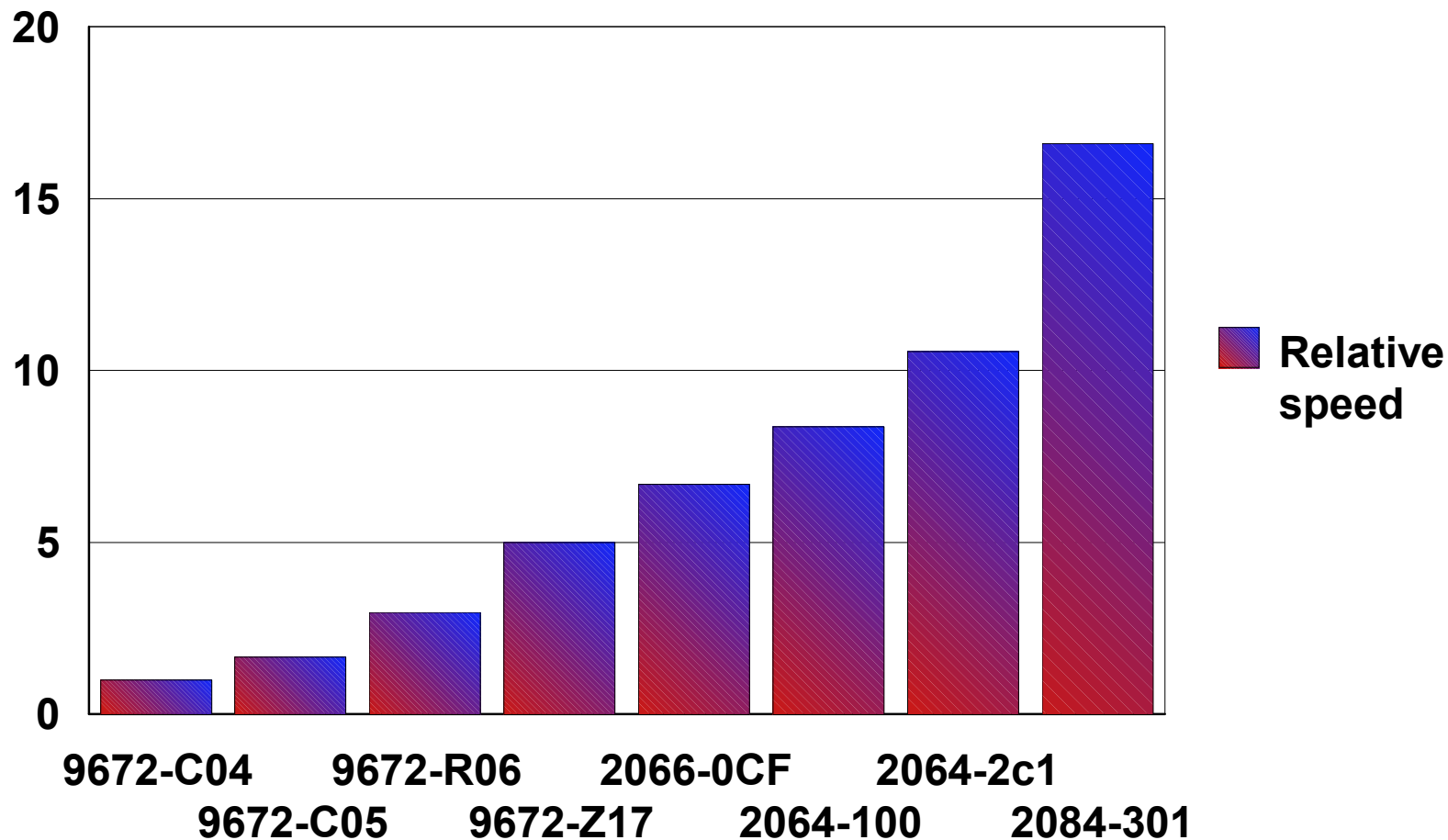
z990 Sysplex support

- No separate stand/alone, external Coupling Facility model for z990
- *Alternatives* to stand/alone CF (workload dependent):
  - ► Install standard z990 model with ICF(s) and CF Links only
    - – Physical characteristics different than z900 or G5/G6 CFs
    - – 2 Frames regardless of number of ICFs or links
    - – Requires careful planning for ICB link distances
  - ► Implement z990 ICFs on servers with Coupling Facility Duplexing
  - ► Continue using existing z900 CFs (2064-100)
  - ► Upgrade G5 CF (9672-R06) to z900 CF
  - ► Using G5 CFs in a Parallel Sysplex with z990 not recommended
    - – Use only as a temporary migration step

- Coupling Facility Configuration Options technical paper:
  - ► **ibm.com**/servers/eserver/zseries/library/techpapers/gf225042.html
- System Managed CF Structure Duplexing technical paper:
  - ► **ibm.com**/servers/eserver/zseries/library/techpapers/gm130103.html

z990 Sysplex support

- z990 Coupling Links:
  - ISC-3
    - Connect to z990, z900, z800, G5/G6
    - Requires new connector if migrating from G5/G6
    - Connection to G3/G4 *not supported*
    - Up to 20 km with Extended distance RPQ, longer distance with RPQ and DWDM
  - ICB-2
    - New STI-2 card with two ICB-2 ports (requires I/O slot)
    - Connects to G5/G6 *only*
    - SOD: z990 last CPU to support ICB-2
  - ICB-3
    - Connects to ICB3 on z990, z900, z800
    - 1GB/sec
    - New STI-3 card with two ICB-3 ports (requires I/O slot)
  - New! ICB-4
    - Connect to another z990 only
    - 2GB/sec
    - 7 meter distance between connected boxes
    - *Recommended connection for z990 to z990 at short distance and for System Managed CF Structure Duplexing*
  - IC
    - Memory to memory within z990 - 3.5GB/sec!
    - Supports Spanning (GA2)

CF Link connectivity between z990 and G3/G4 *not supported!*

SOD: z990 last zSeries server to support ICB-2!

ICB-3, ICB-4 and IC are *Peer Mode only!*

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z990 Sysplex support

z990 CF Link Connectivity to G5/G6 and z900/z800

Connectivity Options	z990 ISC-3	z990 ICB-2	z990 ICB-3	z990 ICB-4
Pre G5 9672	Not Supported	Not Supported	Not Supported	Not Supported
G5/G6 ISC	1 Gbps Compat Mode	n/a	n/a	n/a
z800/z900 ISC-3	2 Gbps* Peer Mode	n/a	n/a	n/a
z990 ISC-3	2 Gbps Peer Mode	n/a	n/a	n/a
G5/G6 ICB	n/a	333 MBps Compat Mode	n/a	n/a
z900 ICB-2	n/a	Not supported	n/a	n/a
z990 ICB-2	n/a	Not Supported	n/a	n/a
z800/z900 ICB-3	n/a	n/a	1 GBps Peer Mode	n/a
z990 ICB-3	n/a	n/a	1 GBps Peer Mode	n/a
z990 ICB-4	n/a	n/a	n/a	2.0 GBps Peer Mode

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z990 Sysplex support

CF Link support:

- Max number of ISC/ISC3 links   32
- Max number of ICB2 links   8
- Max number of ICB3 links   16
- Max number of ICB4 links   16
- Max number of IC links   32
- Max total number of links   64 (32 External/32 Internal)

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General CF links planning

General CF Link considerations

- CAN mix different link types (IC, ISC, ICB) between a z/OS image and a CF.

- CANNOT mix peer and non-peer between a CF and a z/OS.

- CANNOT mix shared and dedicated links between a CF and a z/OS.

- HCD is the best way to check if a proposed configuration is valid - if HCD says it is valid, you can be 99% sure it is valid.

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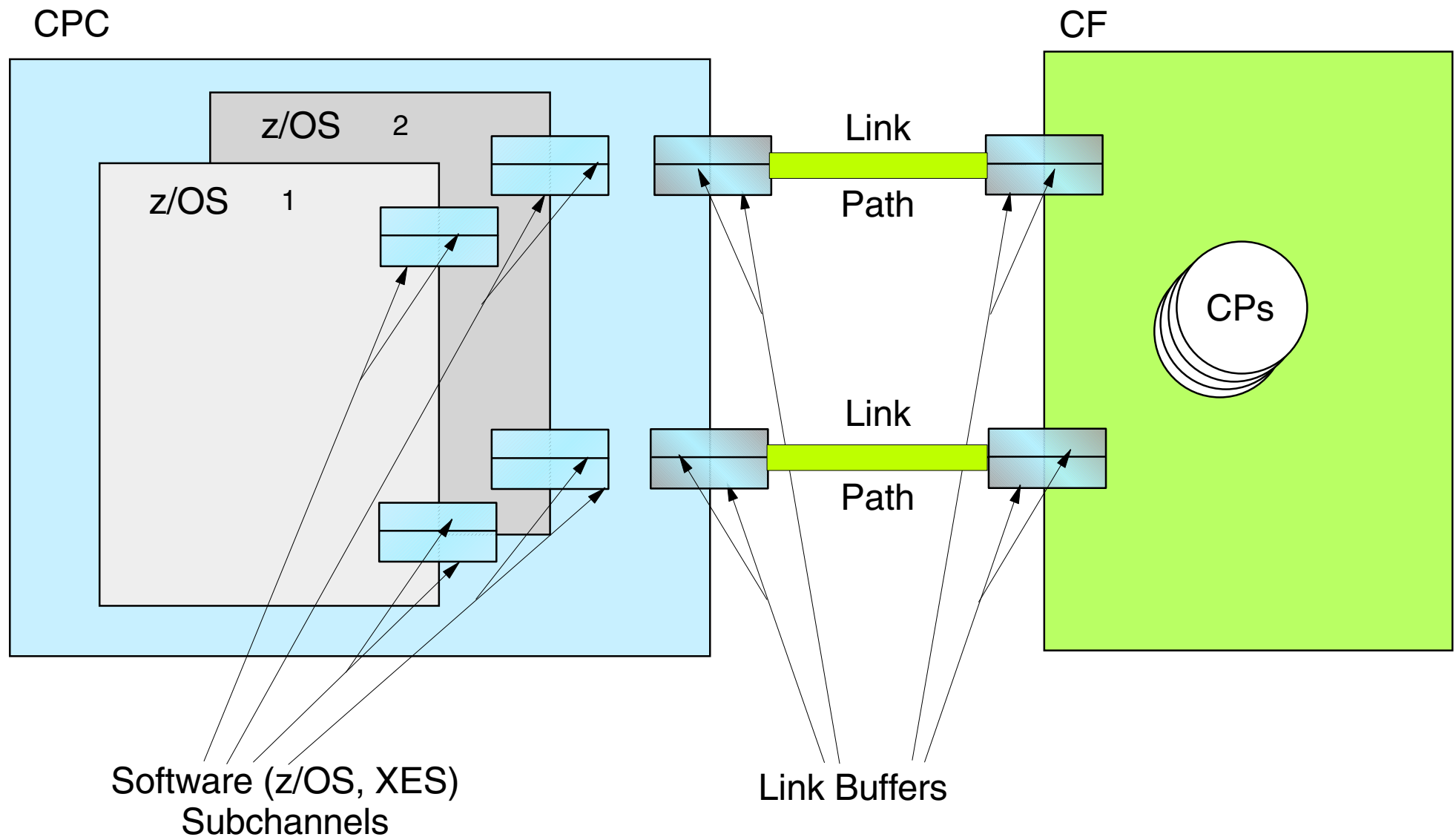
Statement of direction

At announce of z990, IBM made the following statement of direction:

- IBM intends to deliver new function that will reduce the duration of an outage associated with certain Coupling Facility Control Code (CFCC) LIC upgrades or changes. In the future, CFCC LIC changes will be designed to never require that the entire server be down to apply a patch or upgrade. Only the LPAR running the CFCC LIC being upgraded will need to be restarted, and then only if the patch is "disruptive."

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XES CF Subchannel Tuning

International Technical Support Organization

XES Subchannel tuning - background

CPC

CF

z/OS 2

z/OS 1

Link

Path

Link

Path

CPs

Software (z/OS, XES)
Subchannels

Link Buffers

* Note: Peer mode links have 7 subchannels per link per LP and 7 link buffers per link.

Compat mode links (shown here for simplicity) have 2 subchannels per link per LP and 2 link buffers per link.

XES Subchannel tuning

There are 3 possible results to an attempt to start a CF request:

- Subchannel and link buffer are free, request is sent to CF
- Subchannel is free but link buffer is busy
  - CP will spin, retrying until the link buffer comes free
- Subchannel is busy
  - For SYNC IMMEDIATE requests (normally lock requests) that have not been converted to asynch by the z/OS heuristic algorithm, XES will spin waiting for the subchannel to come free
  - For all other requests, the request is converted to an asynch request and queued waiting for an available subchannel. The CP is free to process other work now.

In a high utilization environment, result 2 can consume a lot of capacity, increasing overhead
  - It is preferable to requeue for the subchannel

XES Subchannel tuning

To address this, APAR OW54796 was developed.

In cases of high PATH BUSY (link buffer contention), XES will start to vary CF subchannels offline dynamically, in an attempt to convert PATH BUSY into SUBCHANNEL BUSY and thereby avoid overhead of spinning.

XES will always keep at least 2 subchannels to each CF online.

This shows up in RMF reports and in the D CF output.

XES Subchannel tuning

```
              C O U P L I N G   F A C I L I T Y   A C T I V I T Y

   z/OS V1R2           SYSPLEX DDBPLEXE          DATE 05/01/2003        INTERVAL 030.00.000
                       RPT VERSION V1R2 RMF      TIME 02.30.00          CYCLE 01.000 SECONDS
------------------------------------------------------------------------------------------------

COUPLING FACILITY NAME = CF01E
------------------------------------------------------------------------------------------------

                                        SUBCHANNEL  ACTIVITY
------------------------------------------------------------------------------------------------

        # REQ                              ----------- REQUESTS -----------   ----------------- DELAYED REQ
SYSTEM  TOTAL    -- CF LINKS --  PTH             #    -SERVICE TIME(MIC)-            Æ     % OF  ------
NAME    AVG/SEC  TYPE  GEN  USE  BUSY          REQ       AVG      STD_DEV          REQ     REQ   /DEL
MVSA    16704K   CFS    3    3  5667K  SYNC    9175K    74.3      109.1   LIST/CACHE 1733K  21.1  516.7
        9280.3   SUBCH  6    4         ASYNC   7453K   185.9      484.6   LOCK       1416K  16.8   91.9
                                       CHANGED 1374K  INCLUDED  IN ASYNC  TOTAL      3149K  18.9
                                       UNSUCC     0     0.0        0.0

MVSB    733599   CFS    3    3   522K  SYNC   481346    84.2      133.1   LIST/CACHE   12K   9.3   1149
        407.6    SUBCH  6    2         ASYNC  242995   498.0      4576    LOCK        4362   0.7  204.3
                                       CHANGED   578  INCLUDED  IN ASYNC  TOTAL        17K   2.3
                                       UNSUCC     0     0.0        0.0

MVSC     6736K   CFS    3    3   194K  SYNC    3199K    87.5      125.4   LIST/CACHE   27K   0.8  830.1
        3742.4   SUBCH  6    6         ASYNC   3538K   228.3      1450    LOCK         54K   1.7   56.6
                                       CHANGED 18167  INCLUDED  IN ASYNC  TOTAL        81K   1.2
                                       UNSUCC     0     0.0        0.0

MVSD    224008   CFS    3    3    46K  SYNC    41376    87.6      134.0   LIST/CACHE  2518   1.5   1643
        124.4    SUBCH  6    3         ASYNC  179041   623.7      2844    LOCK          57   0.1  157.4
                                       CHANGED    88  INCLUDED  IN ASYNC  TOTAL       2575   1.2
                                       UNSUCC     0     0.0        0.0

MVSK    17224K   CFS    3    3  2972K  SYNC    8340K    80.3      113.5   LIST/CACHE  810K   8.1  310.7
        9569.0   SUBCH  6    6         ASYNC   8940K   218.3      753.1   LOCK        478K   6.6   64.9
                                       CHANGED 725076 INCLUDED  IN ASYNC  TOTAL      1288K   7.5
                                       UNSUCC     0     0.0        0.0

MVSW    90626    CFS    3    3   354K  SYNC     6567    98.0      153.7   LIST/CACHE  9863  12.3  915.6
        50.3     SUBCH  6    2         ASYNC   80734   585.2      3260    LOCK          91   1.3  136.9
                                       CHANGED   312  INCLUDED  IN ASYNC  TOTAL       9954  11.4
                                       UNSUCC     0     0.0        0.0
```

XES Subchannel tuning

For more information:

- Refer to enabling APAR OW54796
- See Hint and Tip 0176 on www.redbooks.ibm.com

Sharing CF Engines

Redbooks

International Technical Support Organization

Sharing CF engines

The issues:

- z900 and z990 engines are so big, I don't want to dedicate a whole one to my CF.
- I don't want to dedicate a whole engine to my test CF.
- I only need more than one engine in my CF during recovery or high stress times

The answer:

- Shared engines for CFs
  - Well, maybe not....

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Sharing CF engines

So, what are the options:

1) Using shared CPs

2) Using shared ICFs on a server

3) Using dedicated ICF and shared CPs on a server

4) Using dedicated ICF and shared ICFs on a server

5) Using shared ICFs on a standalone CF

6) Using dedicated and shared ICFs on a standalone CF

Sharing CF engines

What is Dynamic CF Dispatching?

- By default, CFCC runs in a polling loop, either processing requests, or looping looking for new requests. This ensures very good response times (no interrupt code to go through). However, it will consume all the cycles available to that LP.

- Dynamic CF Dispatching (DCFD) lets you tell CFCC that it should go to sleep and release the processor if it has no work to do. As the workload increases, the sleep time is reduced (to a minimum of 5 MILLIseconds), eventually reverting to looping mode if workload continues to increase. This reduces CPU consumption but dramatically impacts CF response times. It should NEVER be enabled for a production CF.

- Dynamic ICF Expansion always enables DCFD for the shared engine(s). So, the shared engine will not use much CPU resource unless it gets busy.

Sharing CF engines

What are the other considerations:

- LPAR Capping - CF LPARs should NEVER be capped.

- Weights. The LPAR weight determines how likely that LP is to get access to a shared engine. If an LPAR is ahead of its fair share (as a production CF normally is), it is less likely to get a engine than one that is behind its share (as a CF with DCFD enabled normally would be).

  To ensure the production CF gets access to a engine, it should have a very high weight relative to the other LPARs sharing that engine.

- Impact of slower CF response times on attached z/OS LPARs. The use of shared engines will result in longer response times, driving up the cost of each synchronous request to that CF. Depending on the request rate to the CF, the cost on the attached CPCs could be larger than the cost of a dedicated engine for the CF....

Sharing CF engines

Specific recommendations:

- If possible, always used dedicated engines for any CF where response times are critical.

- ALWAYS turn DCFD off for a production CF. Response times for a CF with DCFD ON are 20-100 times longer than for a CF with a dedicated engine.

- If the CF does not contain System Managed Duplexed structures, it should be weighted to get a least 50% of an engine

- If the CF contains System Managed Duplexed structures, it should be weighted to get a least 95% of an engine

- If the CF consists of dedicated CF CPs and CF CPs which are shared with z/OS CPs, the shared CF must be weighted much higher (20 times) than the highest z/OS LPARs

- See Hint and Tip 0237 on www.redbooks.ibm.com for more info

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Sharing CF engines

Specific recommendations:

- Be careful when using Dynamic ICF Expansion. If the CF LPAR does not have sufficiently high weight, the shared engine might be stolen from the LPAR while it is holding a resource that another CF task requires. The delayed task must wait until the shared engine is eventually dispatched again.

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Expected CF Response Times

The following table shows expected response times for a lock structure from different combinations of CPCs and CFs with <u>dedicated</u> CF engines.

Host / Link / CF	Host SW	Total HW	Equiv Ins	Relative Cost
G3 / ISC / G3	71	100	5608	1.00
G3 / HL / G3	71	90	5281	.94
G4 / HL / G3	53	80	5932	1.06
G4 / HL / G4	53	65	5263	.94
G5 / HL / G4	22	55	8231	1.47
G5 / HL / G5	22	45	7162	1.28
G5 / ICB / G5	22	22	4704	.84
G6 / ICB / G5	18	20	5084	.91
z900/ HL /G5	14	40	9072	1.62
z900/ ICB /G5	14	18	5376	.96
z900/ISC3/z900	14	25	6552	1.17
z900/ICB3/z900	14	12	4368	.78

Expected CF Response Times

The following table shows expected response times for a cache structure from different combinations of CPCs and CFs with <u>dedicated</u> CF engines.

Host / Link / CF	Host SW	Total HW	Equiv Ins	Relative Cost
G3 / ISC / G3	121	160	9217	1.00
G3 / HL / G3	121	140	8561	.93
G4 / HL I G3	89	130	9767	1.06
G4 / HL / G4	89	115	9098	.99
G5 / HL / G4	37	105	14645	1.59
G5 / HL / G5	37	90	13576	1.47
G5 / ICB / G5	37	45	8766	.95
G6 / ICB / G5	30	42	9634	1.05
z900/ HL /G5	24	80	17472	1.89
z900/ ICB /G5	24	40	10752	1.17
z900/ISC3/z900	24	45	11592	1.26
z900/ICB3/z900	24	25	8232	.89

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Changing CF Levels

International Technical Support Organization

Effect of CF Level on CF structures

Starting point - CFLevel 10.....

If you use the same structure size in CFLevel 12.....

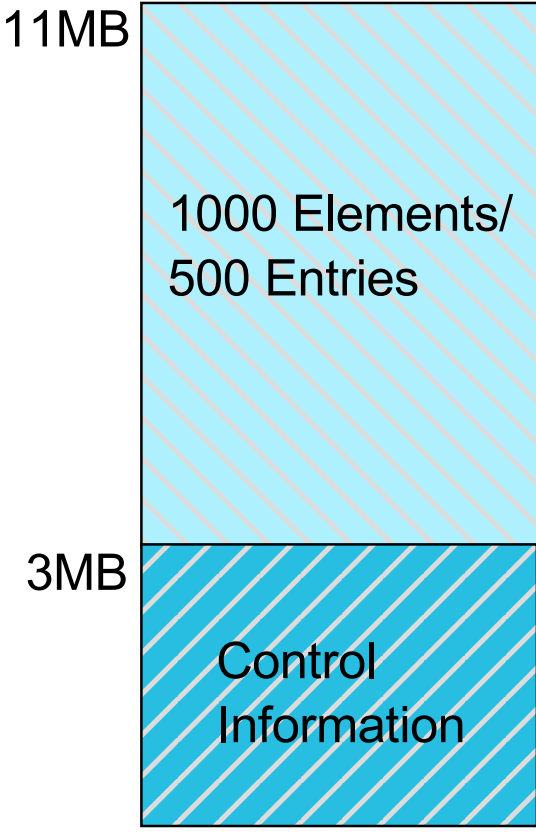To maintain the same number of entries and elements....

10MB

1000 Elements/
500 Entries

2MB

Control
Information

CFLevel 10

10MB

850 Elements/
420 Entries

3MB

Control
Information

CFLevel 12

11MB

1000 Elements/
500 Entries

3MB

Control
Information

CFLevel 12

ibm.com/redbooks
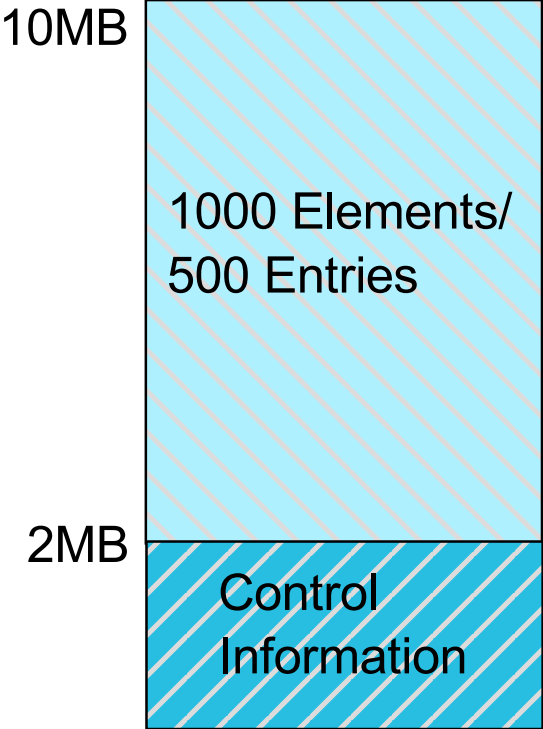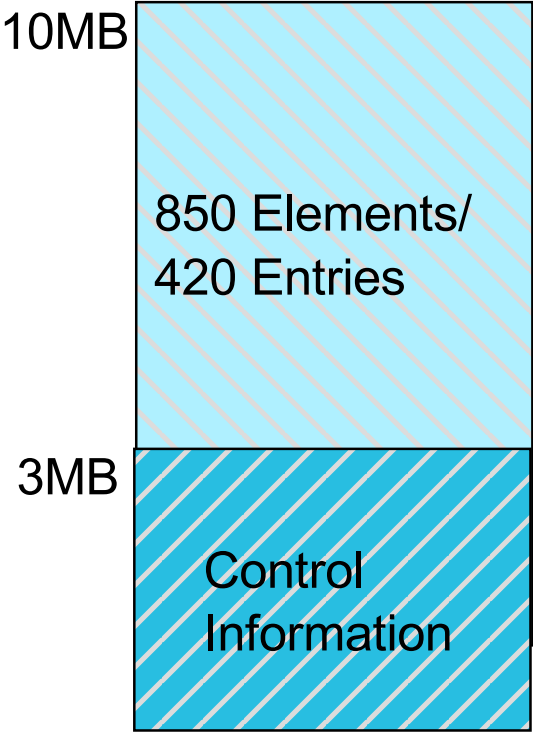
Effect of CF Level on CF structures

The factors that affect the amount of control information:

- % of storage reserved for Event Monitor Controls
- Entry to element ratio requested by the connector
- Maximum size of structure (as specified on SIZE parameter in CFRM policy)
- The use of adjunct areas within the structure

Effect of CF Level on CF structures

Tools that can help you calculate structure size:

- CFSizer
  - Relatively easy to use (+)
  - Does not require the new CFLevel to be installed when you run it (+)
  - Makes many assumptions, so answers might not be right for you(-)

- CFSIZE Batch job on CFSizer Web site
  - Easy to use (+)
  - Provides exact numbers, based on your current structure sizes (+)
  - Requires connectivity to at least one CF with the target CFLevel

- SETXCF START,REBUILD command
  - Adjusts structure size based on CFLevel (+)
  - Requires the target CFLevel to be installed
  - In some cases, does NOT resize the structure when moving between levels (see OW43778 APAR text for restrictions).

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Effect of CF Level on CF structures

Recommended procedure:

- Make sure existing structure sizes are appropriate
- Run an RMF report to show the size and number of entries/elements in each structure BEFORE the upgrade.
- Move all structures out of the CF to be upgraded (don't stop the workloads first, or the structures will be deleted) - use SETXCF START,RB,CFNM=whatever,LOC=OTHER
- Upgrade CF to new CFLevel
- Move structures back into upgraded CF one at a time using SETXCF START,RB,STRNM=structname,LOC=OTHER
- After all structures back in their "NORMAL" CF, check the new size of each structure and update the INITSIZE in the CFRM policy accordingly.
- When you are ready to upgrade the other CF, go through the same procedure for that CF

Effect of CF Level on CF structures

At the time of writing (9/03), there are currently two bugs in XCF/XES:

- If a structure has POLICY CHANGE PENDING for ANY reason, the structure will *not* get resized. GDPS customers must consider this if using the standard GDPS method of emptying and re-populating a CF
- The *first* time you rebuild a List structure, the current structure size will be increased by one segment (256KB) even if rebuilding in the same CFLevel

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Effect of CF Level on CF structures

General CFLevel recommendations:

- Upgrade one CF at a time
- Do not run with different CFLevels for an extended period
- There are no formal coexistence statements for CFLevels as there are for OS levels (n, n+2)
- Do not use any new capabilities until all CFs are stable on the new CFLevel

For more information on handling changes of CFLevels, refer to:

- Setting Up a Sysplex manual
- Hint and Tip entitled "Determining Structure Size Impact of CF Level Changes" on Redbooks Web site
- WSC Flash at
  http://www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/FLASH10181

System Managed CF Duplexing status

System-Managed Duplexing is available NOW, and in production in 7 customers (at early Sept 03)

Readiness review process still in place

- Intended to ensure that you have all the pre-reqs in place and understand the performance expectations for Duplexing
- Enroll on ResourceLink
- Code is available to any customer that participates in readiness review

Remember that SM Duplexing requires CFLevel 11 (9672) or CFLevel 12 (zSeries)

- These are the ONLY currently supported CF Levels....
- Remember that CFLevel upgrades are disruptive

Intelligent Resource Director status

As at middle 2003:

- Roughly 140 customers have enabled IRD
- In about 1/3 of these, CPU Management regularly adjusting LP weights
- Do not currently have data on usage of DCM or CSS IOPQ

Growth of z990 installed base (and accompanying consolidation of footprints) is expected to drive increased takeup of this function

Customer comment:

- "... very happy. Responds in enough time and pleased with how it works. We have it on 14 CPCs, in Development and Production. Phone calls from the developers stopped when we implemented it."

Intelligent Resource Director

Is IRD right for you:

- Get best benefits when you have complimentary workloads on same CPC (for example batch and online)
- Most effective when CPCs run at very high utilization
- If the MIPS requirement for an LPAR varies significantly by time of day, make sure you specify high INITIAL CPs and enable VARY CPU Management
- Cannot be effective if all work is classified as Importance 1 - WLM must have someone (lower importance) to take resource from.

WLM CPU Management and Channel Subsystem I/O Priority Queueing are easier to implement, suggest starting with those before moving on to DCM

Intelligent Resource Director

Implementing WLM CPU Management:

Prereqs:
- Install required hardware (zSeries CPC)
- Install required software (z/OS, in 64-bit mode)
- Install Supporting APARs on RMF
- WLM must be in goal mode
- Define WLM structure in CFRM policy - requires CFLevel 9
- Must have at least 2 LPARs from the sysplex on the CPC

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Intelligent Resource Director

Implementing WLM CPU Management (non-disruptively)

- Define Initial and Reserved CPs. For maximum flexibility, start with a high Initial and let WLM manage you down
- Define (3-digit) Initial, Minimum, and Maximum weights in Image and/or Reset profiles in HMC. Make sure "Initial Capping" is NOT selected for those LPs. Also, specify Minimum values to make sure that every LP that is in a sysplex gets at least 5% of the CPU - using a smaller number can lead to sysplex disruptions
- Select "WLM Managed" for the LPs that you wish to manage
- Activate the change dynamically on the HMC
- Use RMF to monitor:
  - That weights are bring changed and CPs are being varied on and off
  - That PIs for important workloads are meeting goals more consistently

Intelligent Resource Director

New function on zSeries

Allows OS to specify priority value to channel subsystem for I/O requests based on goals defined in WLM

Complementary to current priority mgmt:
- IOS UCB queues
- ESS control unit

Complementary to DCM:
- Ensures "right" user gets additional capacity

No visible effect on **overall** response times - high importance I/Os will be faster, low importance slower (assuming queuing for a channel) - average should be unchanged

Works for ALL device types (even 3420!) and all channel types (even parallel)

High Priority LPAR A

Low Priority LPAR B
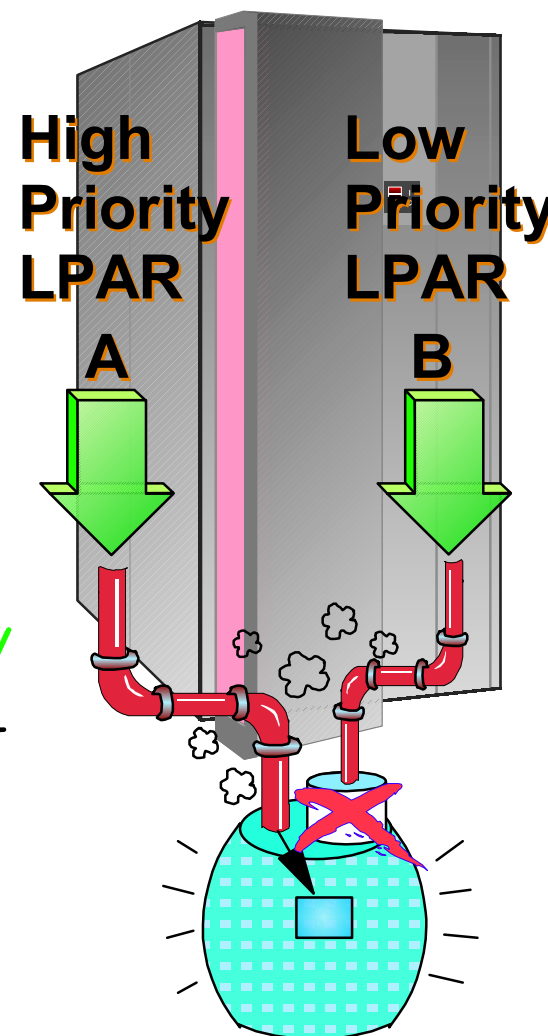
Intelligent Resource Director

Implementing CSS IOPQ:

- Must be z/OS, 64-bit mode, and WLM Goal mode on zSeries CPC
- Ensure I/O Priority Management is enabled in WLM policy
- Set priority ranges in Image profile in HMC
- Enable in the CPC Reset profile in HMC (remember, it is enabled or disabled at the CPC, not the LPAR, level)
- Enable dynamically using the "Enable I/O Priority Queueing" icon on the HMC
- Monitor effect in RMF Workload Reports

Enable I/O Priority Queuing
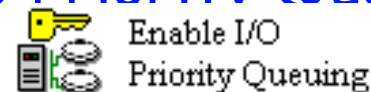
Intelligent Resource Director

z/OS MVS Planning: Workload Management, SA22-7602

Redbook z/OS Intelligent Resource Director, SG24-5952

WLM Web site:

- http://www.ibm.com/servers/eserver/zseries/zos/wlm/documents/ird/ird.html

IRD Bucket - 2064DEVICE subset IRD

Web-based wizard to help set up IRD:

- http://www.ibm.com/servers/eserver/zseries/zos/wizards/ird/irdv1r1/

**Miscellaneous**

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Sysplex trivia

Interesting sysplex facts:

- Largest sysplex is 15 2064-116s and 216s
- Largest number of images in a sysplex is 30
- Largest number of MIPS in a single image is 2190
- Largest number of volumes managed by HSM : 7000
- Largest CF - 7 way 2064-100
- Largest number of DB2 lock requests - 40,000 /sec to a CF 5 kms from the CPCs - and the response time never changed!
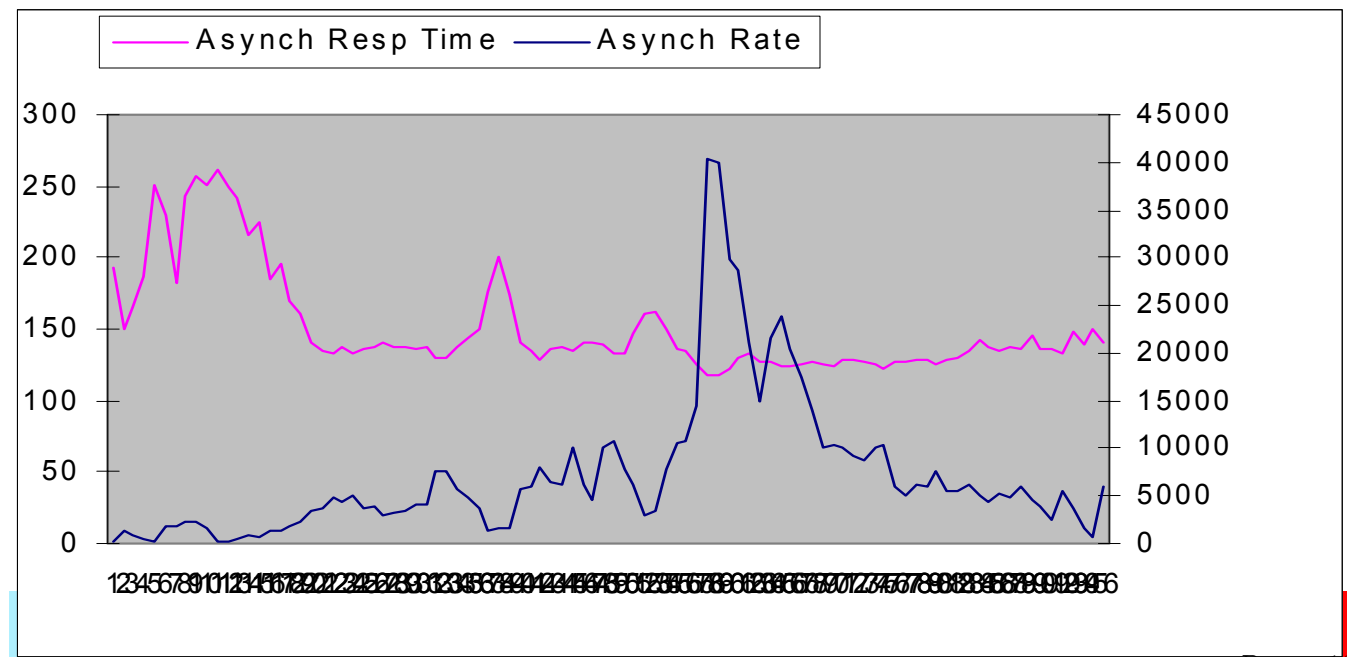
End-of-service for Sysplex Timer Model 1

Support for 9037-001 Timers will end on December 31, 2003

Replacement is 9037-002, however 001 is not upgradeable - you must remove the 001 and replace it with a 002

<u>Replacing 9037-001 with 9037-002 requires a nearly sysplex-wide outage</u>

See the ITSO Redpaper entitled "Migration Planning for the 9037 Model 2 Sysplex Timer" for a suggested migration procedure

Message Time Ordering

If CF is on z900 Turbo or faster, *and* connected systems are on z900 Turbo or faster:

- The CF must be connected to the same Sysplex Timer as all connected systems
- APAR OW53831 MUST be applied to all connected systems running on z900 Turbo or faster

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IBF

IBFs <u>cannot</u> be added to 2064-100 as an MES or RPQ - ordered on new machine as FC2210. It IS orderable on a 2084 as an MES, or on new builds as FC3210. Not available at all on z800.

IBFs don't help if you only lose one CF, because everything will rebuild to other CF before the failed one comes back

However, if both CFs lost, IBF helps you avoid things like DB2 reading all his logs to restart

IBF times are discussed in Installation Manual - Physical Planning for respective CPCs - available on Resourcelink. Hold up time depends on configuration, temperature, and battery age. Times are generally in range of 6-19 minutes.

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BTAM

Many customers still use BTAM even though it is no longer supported. Support ended march 31, 2002.

BTAM ERP uses format 0 channel programs, but z/OS 1.2 removed support for format 0.

A BTAM APAR/PTF was made available last year to address this, but, as BTAM is no longer supported, there are few or no references to the problem or PTF in the z/OS migration documentation.

Please check out APAR OW54440 if you are still using BTAM, and plan to upgrade to z/OS 1.2 or higher.
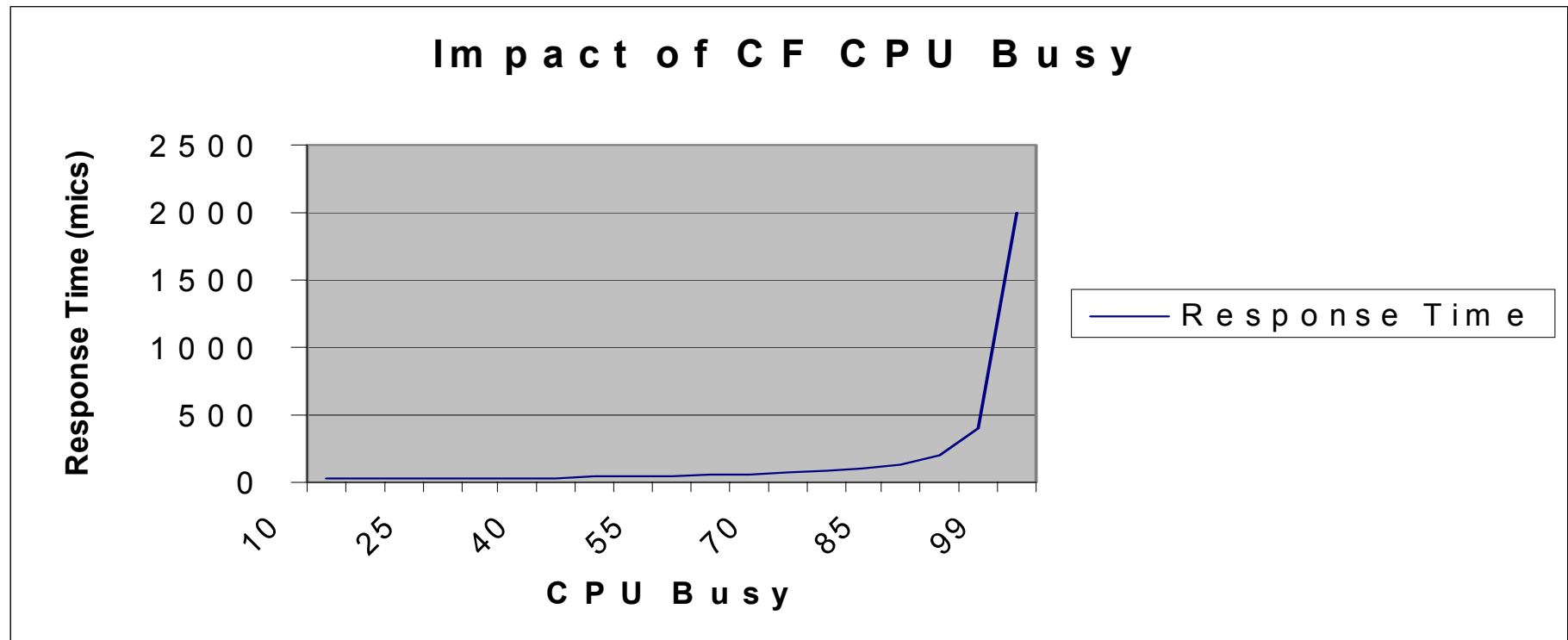
Coupling Facility Monitoring/Capacity Planning

Just as with z/OS, it is important to monitor the performance of your CFs, to ensure you maintain a balanced configuration.

Primary

Secondary

z/OS

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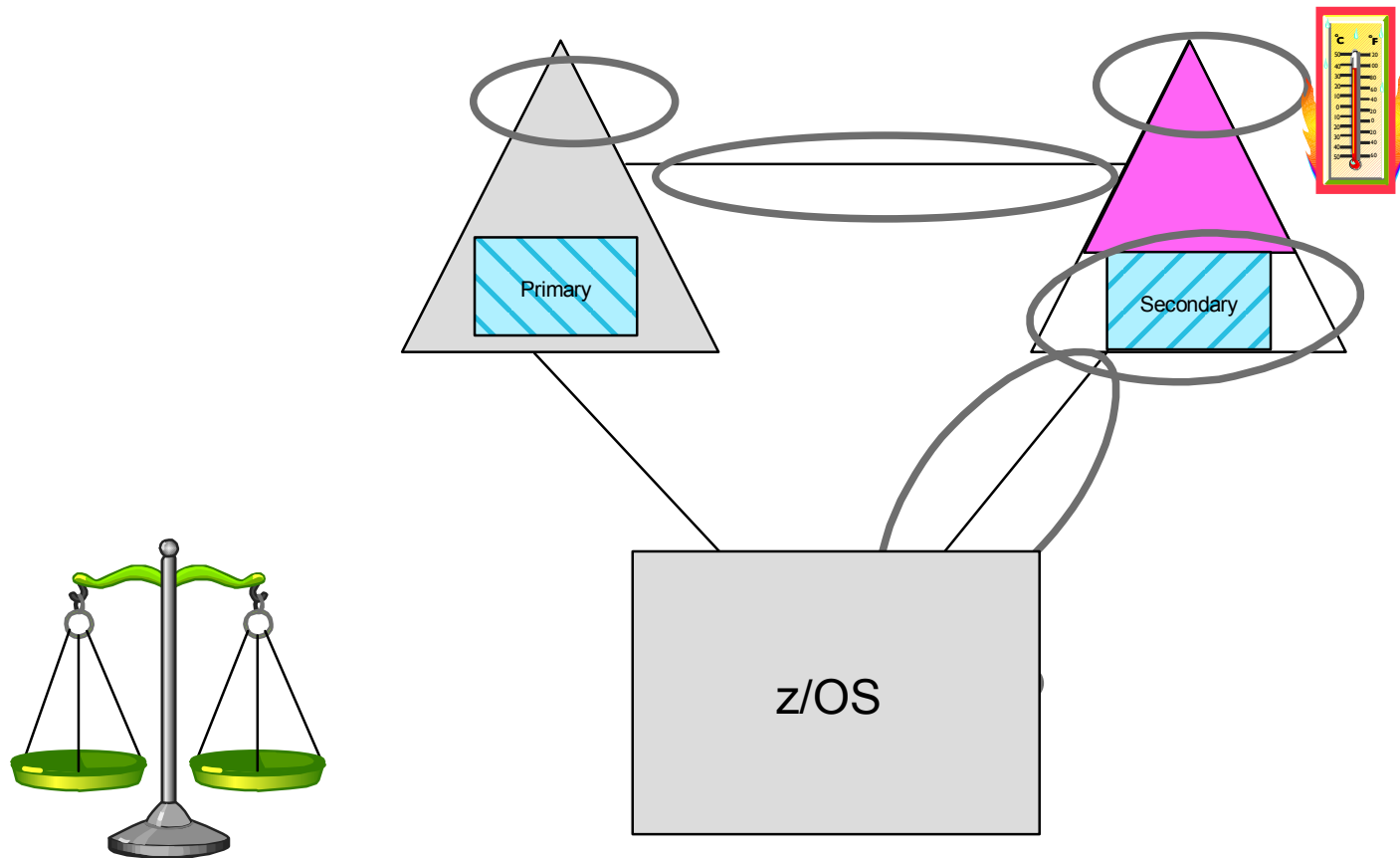
Coupling Facility Monitoring/Capacity Planning

In order to have timely recovery from failures, it is important sufficient capacity is available to take over other CFs workload PLUS the additional recovery processing

Impact of C F C P U B u s y

Response Time (mics) / CPU Busy chart with y-axis values 0, 500, 1000, 1500, 2000, 2500 and x-axis values 10, 25, 40, 55, 70, 85, 99

Legend: Response Time

CFs (even with dedicated engines) behave slightly worse than standard queueing model depicted above would predict.

Coupling Facility Monitoring/Capacity Planning

It is important to monitor a few key indicators of CF performance:

- To help you do capacity planning
- To assist in problem identification - what do things *normally* look like?

The important things to monitor for are:

- The top 10 structures in each sysplex
  - Number of requests by time of day (for sync and async)
  - Associated response times
  - % of total CF requests for each structure
  - For cache structures, dir reclaim rate
  - For lock structures, total and false contention % and rates
- Same info for selected important or growing structures (GRS, XCF, CICS Temp Storage, MQ...)

Coupling Facility Monitoring/Capacity Planning

More things to monitor:

- **XCF signalling**
  - Rec Out, REQ REJECT and ALL PATHS UNAVAILABLE for each transport class
  - Counts for the top 10 XCF groups for the whole sysplex and for each system
  - Counts for selected XCF groups (DFHIR000, SYSBPX, ISTXCF, for example)
  - For each structure/CTC, REQ OUT, AVAIL, BUSY, RETRY, and BUFFERS UNAVIL

- **CF Storage utilization**
  - Available storage (installed)
  - Allocated storage (total for whole CF)
  - (If possible) storage utilization by non-duplexed and primary structures (to ensure you can accomodate all structures from the "other" CF) in MB and % of installed storage

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Coupling Facility Monitoring/Capacity Planning

Coupling overhead

- Should be re-calculated af each z/OS CPC upgrade and/or significant change in CF workload

VSAM Index CI Size changes in z/OS 1.3

The alogrithm to calculate the CISZ of the index component of a VSAM data set has changed in z/OS 1.3.

As a result, a VSAM data set defined under 1.3 could have a different index CISZ than if it was defined under a previous release.

For products that use LSR (CICS, IMS, NetView, etc), the data might not open if there is no LSR pool defined to match the new CISZ.

IBM have a tool - INDXCISZ - that will tell you which data sets will have the CISZ changed, AND what the old and new CISZs will be.
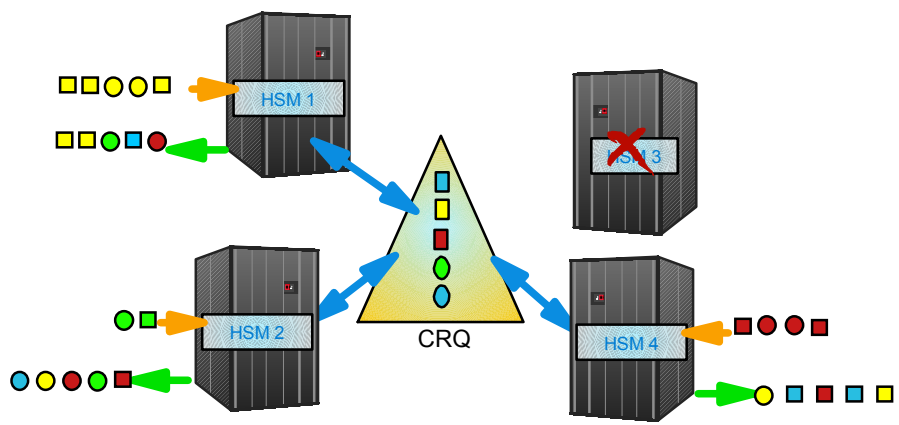
See WSC Flashes 10180 (IMS) and 10206 (general) and Info APAR II13288 for all the information you need.

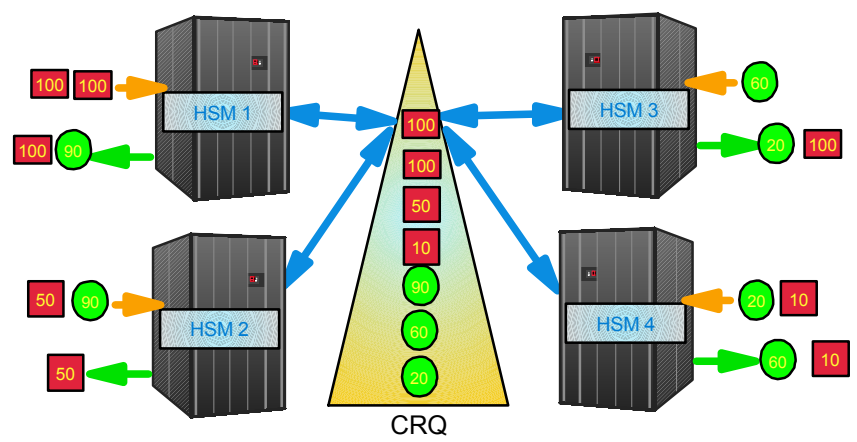# HSM Common Recall Queue (z/OS 1.3 feature)
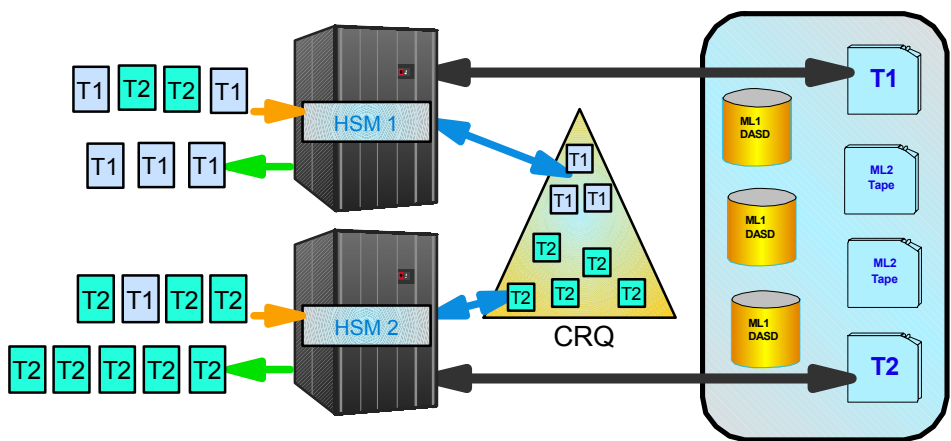

Workload balancing
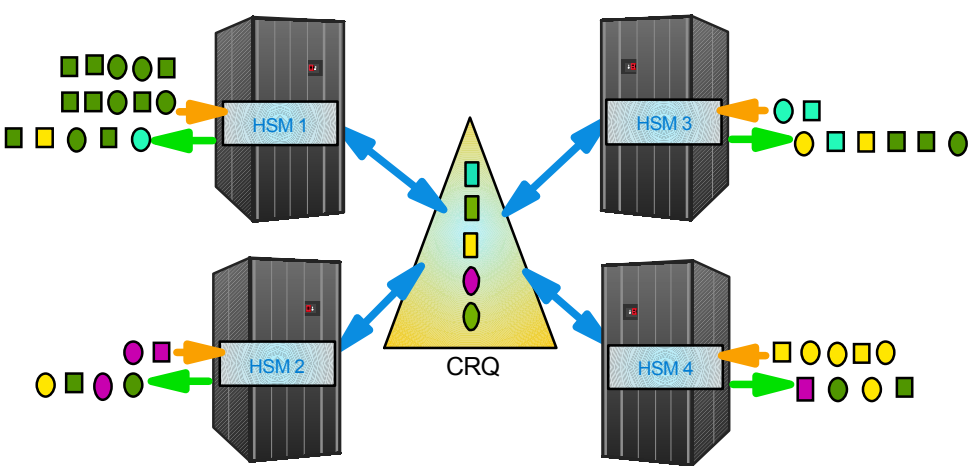
Recall Request Persistence

Sysplex-wide priorities

Tape Mount Optimization

= Wait   = Nowait   100 = Highest 0 = Lowest

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HSM Common Recall Queue

Implementation.....

- ## Add CRQ structure to CFRM Policy

  - ► Must be updated before attempting to connect:

    ```
    STRUCTURE NAME(SYSARC_PLEX1_RCL)
            INITSIZE(5120)          <- Initial structure size (about 4000 requests)
            SIZE(10240)          <- Max structure size (about 8400 requests)
            ALLOWAUTOALT(YES)  <- Automatically increase structure size if threshold hit
            FULLTHRESHOLD(90)   <- Set threshold to 90%
            PREFLIST(FACIL01, FACIL02)
    ```

- ## Update HSM Parmlib Member

    SETSYS COMMONQUEUE(RECALL(CONNECT(*basename*)))

  - ► Connect to CRQ during startup

  - ► *basename* must be exactly five characters

  - ► Can be implemented one host at a time

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VSAM/RLS Cache enhancements (reminder)

Prior to z/OS 1.3, you had no control over which CIs got cached in the CF - if CISZ=<4KB everything cached, if CISZ>4KB, nothing cached

In z/OS 1.3, you control via data class (RLS CF CACHE VALUE) whether any CI is cached for all access, updates only, or no caching at all

New keyword in IGDSMSxx member of Parmlib

- RLS_MAXCfFeatureLevel
- Must be set to 'A' to enable this new support. However, if set to 'A', pre-z/OS 1.3 systems will not be able to connect to RLS cache structure
- Default is 'Z', meaning to behave as in pre-z/OS 1.3

New keyword on SETSMS command:

- SETSMS RLS_MAXCFFEATURELEVEL(A|Z)

Setting is sysplex-wide, based on first system to be IPLed

ECS automatic AUTOADD in z/OS 1.5

Currently an operator command must be issued after the first system in a parallel sysplex is IPLed to enable the ECS AUTOADD function

This support allows ECS AUTOADD enablement without an operator command

- SYS1.NUCLEUS(SYSCATxx) column 63 specify 'Y'
- SYSCAT statement in LOADxx column 72 specify 'Y'

The ability to set the AUTOADD state by the MODIFY CATALOG command is still supported

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JOBCAT/STEPCAT Support

Previously, IBM announced a statement of intent to remove JOBCAT/STEPCAT support in a future release of z/OS.

IBM announced that we would provide an APAR that will write a message every time a STEPCAT or JOBCAT statement is used, to help identify users of this facility in advance of the removal of support. This APAR was never delivered - WSC FLASH 10102 is incorrect..

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JOBCAT/STEPCAT

Starting with z/OS 1.5:

- Use of JOBCAT/STEPCAT now optional at the installation level
  - Default is to no longer honor JOBCAT/STEPCAT
- New parameter to MODIFY CATALOG command:
  - F CATALOG,ENABLE(JOBSTEPCAT)
  - F CATALOG,DISABLE(JOBSTEPCAT)
  - Current setting retained across CAS restart
- If support is disabled and a catalog request is issued with JOBCAT/STEPCAT message IDC3009I will be issued with a return code 54 reason code 6 and the request will not be processed

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Catalog space monitoring

Prior to z/OS 1.5, there was no warning when a catalog is about to run out of space

New enhancement issue message when a specified percentage of maximum extents is reached

- IEC361I CATALOG catalogname (comptype) HAS REACHED xxx% OF THE MAXIMUM
- Issued once per catalog per extent and reissued for each subsequent catalog extent
- "comptype" is either DATA or INDEX

Invoked by issuing F CATALOG,NOTIFYEXTENT(xxx) where xxx is a value from 0-100. Default is 80. A setting of 0 or 100 will disable the function

F CATALOG,ALLOCATED will display the percentage of allocated extents for each catalog in the list in message IEC348I

Recreating lost SMS SCDS

New function in z/OS 1.5:

- SETSMS SAVESCDS(scds_dsname) command

Relieves the tedious work of recreating the SCDS if the source SCDS and all of its backups are lost

SMS will verify that the 'scds_dsname' is not the currently active ACDS or COMMDS

Minimizing dump impacts

Dump tuning suggestions:

- Set up IRLM with PC=YES. This places IRLM lock information in its own address space, removing need to specify QUIESCE=YES to get consistency in DB2 dumps.

- Specifying QUIESCE=YES results in the system going non-dispatchable while common storage is dumped. If you need consistency, can use A=SYNCSVCD on a SLIP.

- Work with IBM Level 2 to review/tune dump options to optimize chance of getting the info you need on first failure while minimizing the size of the dump.

- See II06335 for info about DB2 dumps.

- Make sure DAE is enabled and all systems in the sysplex are sharing the same SYS1.DAE data set.

- Use compression to get more dumps in the same amount of DASD space

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Minimizing dump impacts

Largest performance improvement is through use of faster DASD

Next largest improvement is via use of striping for dump data sets

Above 2 stripes, benefit tails off. Not worth going to more than 4 stripes.

Use of FICON vs ESCON improved performance by about 20%

SVC Dump Performance

Chart showing Dump time vs Number of stripes, with y-axis values 0, 100, 200, 300, 400, 500, 600, 700, 800, 900 and x-axis values 1, 2, 3, 4. Legend: ESS, 3390-3.
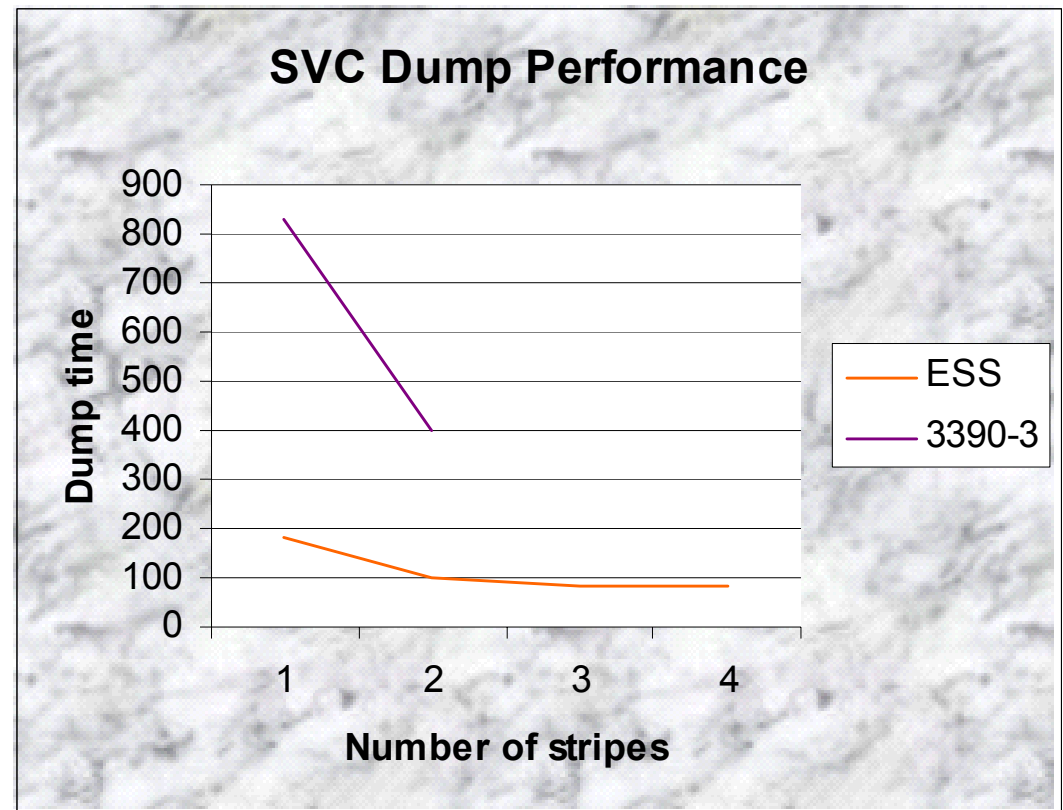
Paging volumes and PAV

It is likely that the highest use of the paging subsystem will be when the system is taking an SVC dump:

- In order to be able to free up storage quickly enough to take the dump without adversely impacting system performance, you must have a robustly configured paging subsystem - capacity is not enough, you must also provide acceptable performance

- If you use Dynamic PAV, you can place multiple page data sets on the same volume and still have the benefits of suspend/resume.

- Must use *Dynamic* PAV - ASM will *not* use static PAV. With Dynamic PAV, ASM/WLM will allocate two UCBs per page data set on the volume. WLM may actually add more aliases, but ASM will never drive more than two concurrent I/Os per page data set

- Remember to set PAGTOTL to allow you to dynamically add more page data sets

Stand Alone Dump

Problem: Stand Alone dumps can take a significant length of time. You need to get the system back as quickly as possible, but if you don't capture the dump, you may not be able to diagnose the problem.... This means having to take another hit before problem determination can start

Stand Alone Dump

There is not a huge amount you can do to affect stand alone dump performance

One of the things you *can* do is place the dump data sets on fast DASD and stripe them.

Real Storage Dump Data

Elapsed Seconds vs **Spanned Volumes**

Legend:
- nonESS 4.5GB
- nonESS 2.5GB
- ESS 3.0GB
- ESS 2.5GB
- nonESS 3.0GB
- ESS 4.5GB

ibm.com/redbooks
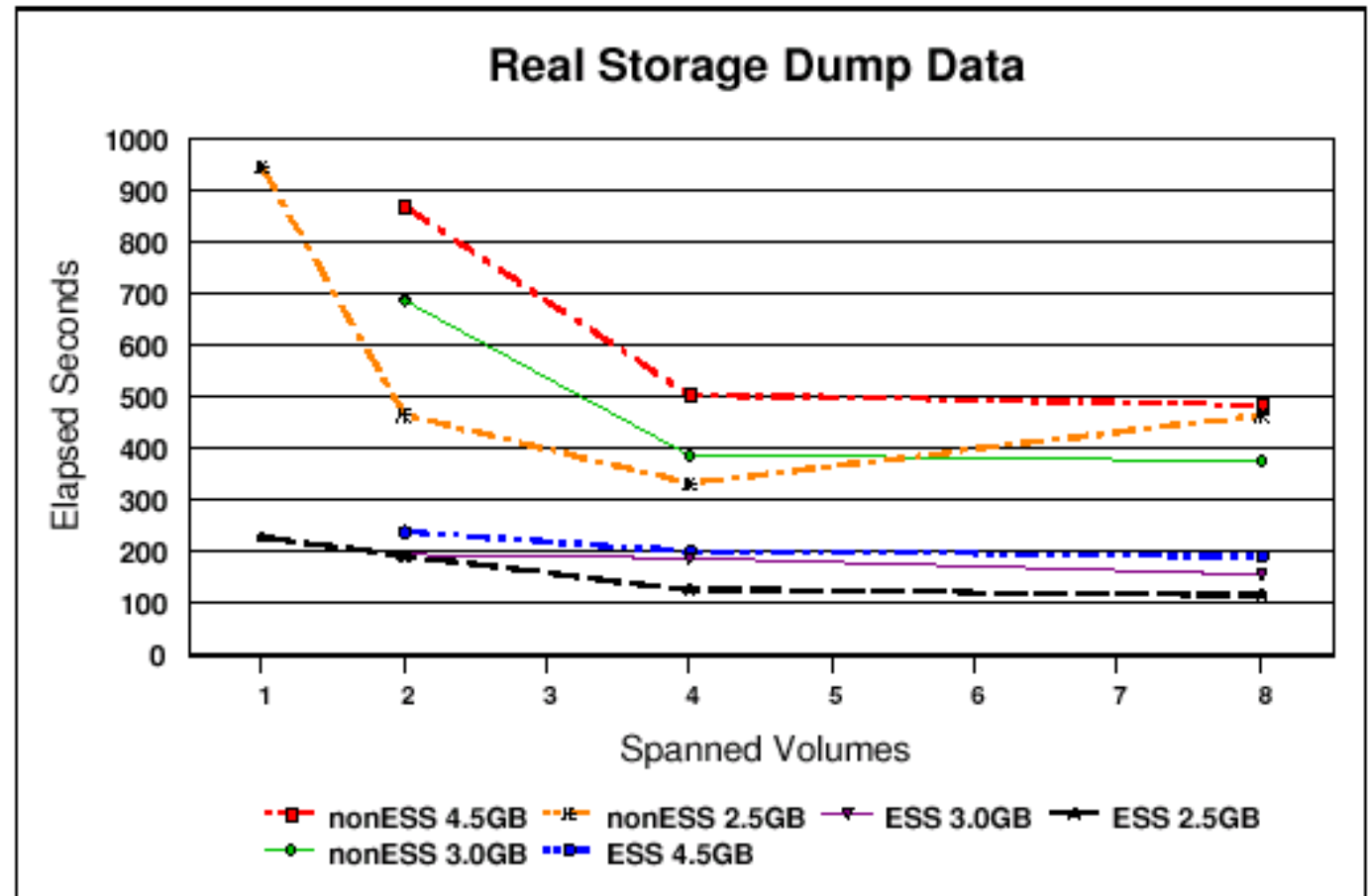
Stand Alone Dump

Some customers take a risk and only capture real storage when they take an SAD - this is a risk assessment that must be made by each customer

In tests of SAD performance, the use of FICON channels and striped dump data sets resulted in data rates of between 66 and 84 MB/sec for real storage, and between 1.3 and 2.0 MB/sec for virtual storage

CFLevel 12

With CFLevel 12, it is possible to have up to 48 concurrent tasks in the CF (increased from 16 previously)

CFLevel 12 provides support for Message Time Ordering

CFLevel 12 provides 64-bit support, alleviating constraints for customers with large number of structures or very large lock structures.

- Whether a CF runs in 31-bit or 64-bit mode is COMPLETELY transparent to the connected operating systems

CFLevel 12 also provides support for System-Managed CF Structure Duplexing

CFLevel 12

For workloads that are very update-intensive (like large DB2 batch jobs), sending requests to a CF one at a time is not very efficient

To address this, CFLevel 12, together with z/OS 1.4 introduces three new options on the IXLCACHE command that allows write, castout, and cross-invalidate requests to be batched

This support is exploited by DB2 V8

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Asynchronous CF Requests

Tip:

- Traditionally, asynchronous CF requests have response times of at least 150 microseconds.

- Recently, we have seen some examples of asynchronous response times as low as 60 mics.

- Possible explanation is that at very high request rates, responses are arriving so quickly from the CF, that when XES completes processing one request, another one is immediately ready for processing, eliminating the delay imposed by other work getting the CP and then having to wait for the dispatcher to check again if there is a request ready to process.

Interesting sources of information

Hot Topics Newsletter

- Published twice a year (Feb and August)
- Available from:
  - http://www.ibm.com/servers/s390/os390/bkserv/hot_topics.html

The Z Quarterly

- Published (surprisingly!) every quarter
- Brief - about 2 pages
- The purpose of the newsletter is to keep the intended audience informed about zSeries announcements, updates, events, and what is happening in the land of "z"
- Subscribe by sending me an email

Interesting sources of information

WSC Flashes

- Parallel Sysplex Couple Data Sets and Disaster Recovery

Read "Console Performance Hints and Tips" available at:

- http://www.ibm.com/servers/eserver/zseries/library/techpapers/gm130166.html

"Hints & Tips", RedPapers, RedPieces on Redbooks Web site

- http://www.redbooks.ibm.com

The "MainStream" IBM mainframe software newsletter:

- http://www-3.ibm.com/software/os/zseries/newsletter/mainstreamed3.html

eServer Magazine,mainframe edition CF:

- http://www.eservercomputing.com/mainframe/

z/journal (independent zSeries publication)

- http://www.zjournal.com/

Interesting sources of information

SEARCH390.COM

- http://www.search390.com

RMF Newsletters

- http://www.ibm.com/servers/eserver/zseries/zos/rmf/rmfhtmls/rmflett.htm

PUTDOC tool to FTP dumps to IBM

- http://techsupport.services.ibm.com/server/nav/zSeries/putdoc/putdoc.html

Interesting sources of information

It is now (finally!) possible to subscribe to WSC Flashes!

To subscribe, go to http://www.ibm.com/support/mysupport then:

1) Select "Edit Profile" in the left hand navigation bar. This is where you decide on which products you would like see a FLASH notice on.

2) Select product family from the "Select a product family" pull down in the center of the page

3) Next, select one or all (but at least one), of the topics found under the product family you selected (make the selection by putting a check in the box beside it).

4) Scroll to the bottom of the page and click on "Save & return"

5) Go to the bottom of the page that you returned to, under the blue bar header of "Select mail preferences", and under the text "Yes, you may send me this information by e-mail", select Flashes and (if you wish) Downloadable files

6) Click on "Submit"

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Tools available from ITSO

OPERLOG Viewer

- Lets you view OPERLOG without using SDSF. Can filter by system and time/date

LOGREC Viewer

- Lets you interactively view information in LOGREC logstream, formatted with EREP program

SMF Type 88 (Logger) reports

- Job to provide similar information to IXGRPT1 but in more readable format. Uses DFSORT

SMF Type 88 Spreadsheet analyzer

- Simple spreadsheet and DFSORT job to load SMF 88 data into Excel spreadsheet and highlight any log streams that exceed recommended thresholds

Tools available from ITSO

SYMUPDTE

- Program to dynamically change value of system symbols

System-Managed Duplexing Cost Estimator

- Excel Spreadsheet to estimate impact of System-Managed Duplexing on CF Response Times, subchannel utilization, and host and CF CPU utilization. Takes into account synch/asynch heuristic algorithm and extended distance between CFs.

Message Flooding Suppression MPF exits (chargeable offering)

- Powerful MPF exit that intelligently detects and suppresses message flooding situations, such as a looping job.
- Exit developed and supported (on a best-efforts basis) by IBM Development with distribution, installation support, and first level support provided by ITSO

Tools available from ITSO

Parallel Sysplex Training Environment (chargeable)

- Complete, 3-way Parallel Sysplex containing CICS, DB2, IMS, MQ, DFSMStvs, workloads for all CF structures, and working examples of most sysplex exploiters. Developed by ITSO and used for day-to-day ITSO operations. Runs under VM or native. Marketed by ITES (IBM Education), supported by ITSO.
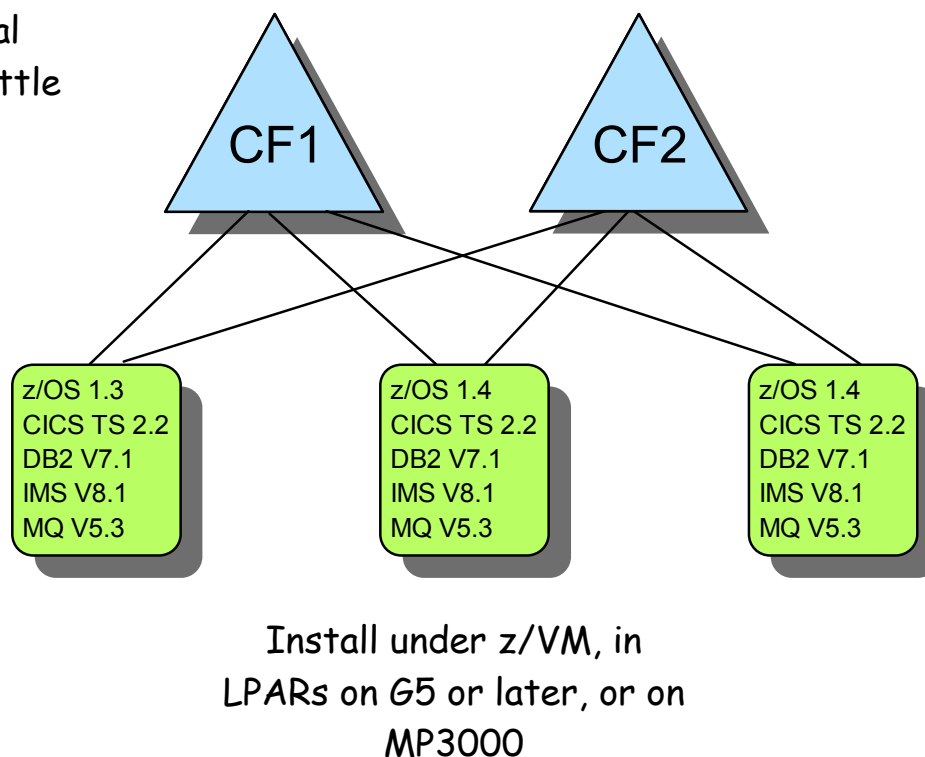
Parallel Sysplex Training Environment

Install a fully functional Parallel Sysplex in as little as 3 hours

Provides safe, realistic training environment for Operators

Gives sysprogs fast access to new features and functions, without the pain of having to install and customize them

Available from IBM Technology Education Services
For more info, contact:
Frank Kyne
(kyne@us.ibm.com)

CF1   CF2

z/OS 1.3	z/OS 1.4	z/OS 1.4
CICS TS 2.2	CICS TS 2.2	CICS TS 2.2
DB2 V7.1	DB2 V7.1	DB2 V7.1
IMS V8.1	IMS V8.1	IMS V8.1
MQ V5.3	MQ V5.3	MQ V5.3

Install under z/VM, in LPARs on G5 or later, or on MP3000

Offering includes:
- 3-way Parallel Sysplex in full volume dump format
- Onsite education from IBM to get up and running
- Exercise Guide and Installation Guide
- Batch-driven workloads for all CF exploiters
- Refreshed for new OS releases

Provides pre-configured, working versions of:
- VTAM GR use by CICS, TSO, SNA Consoles, IMS
- TCP/IP Dynamic VIPA takeover and Sysplex Distributor
- SNA Consoles support
- msys for Operations
- SDSF use of MQSeries
- CICS/RLS, DFSMStvs, DB2 data sharing, IMS data sharing, IMS Shared Messages Queues, MQSeries queues in CF, CICS TS in CF
- Extensive use of system symbols
- Use of Symbolic Alias Facility to control subsystem libraries
- Nearly every CF exploiter
- GRS Star, JES2 Checkpoint in CF, XCF structures, Tape Sharing, RACF sysplex data sharing, ECS, RRS, OPERLOG, WLM IRD

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Parallel Sysplex Training Environment

Some of the things it delivers working examples of:

- VTAM GR use by CICS, TSO, SNA Consoles, IMS
- TCP/IP Dynamic VIPA takeover and Sysplex Distributor
- SNA Consoles support
- msys for Operations
- SDSF use of MQSeries
- CICS/RLS, DFSMStvs, DB2 data sharing, IMS data sharing, IMS Shared Messages Queues, MQSeries queues in CF, CICS TS in CF
- Extensive use of system symbols
- System Managed Duplexing
- Use of Symbolic Alias Facility to control subsystem libraries
- Every possible CF exploiter except SmartBatch, NetView Access Services, and VTAM MNPS
- GRS Star, JES2 Checkpoint in CF, XCF structures, Tape Sharing, RACF sysplex data sharing, ECS, RRS, OPERLOG, WLM IRD

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Statements of direction

Effective in z/OS 1.6:

- IBM intends to support >16 engines
- IBM intends to support up to 60 LPARs on a z990
- The default currency symbol in Euro countries is being changed to be the Euro
- ISPF C/C++ Panels are being removed. Various other changes related to C/C++
- Language Environment RTLS is being withdrawn
- DCE Application Services is being removed
- Encina Toolkit Executive is being removed
- Text Search element of z/OS is being removed

Statements of direction

In future releases:

- 1.6 is last release that will support ISAM. The ISAM Compatability Interface that lets you use ISAM programs with VSAM files will continue to be supported

- 1.6 is last release that will support BIND DNS 4.9.3. - this means that DNS/WLM support will disappear. Sysplex Distributor should be used to replace DNS/WLM

- 1.6 is last release that will support OROUTED. Should be replaced with OMPROUTE

- In a future release, AnyNet will be removed. Enterprise Extender should be used to replace AnyNet

- In a future release of z/OS, IBM intends to certify z/OS to the Common Criteria Controlled Access Protection Profile (CAPP) at EAL2 and Labeled Security Protection Profile (LSPP) at EAL3+.

Supported Subsystem Releases

CICS TS

- CICS/ESA V4.1 is now out of support.
- Only supported CICS releases are 1.3 and CICS TS V2

MQ

- MQSeries V1.2 runs out of support April 12, 2004
- MQSeries V2.1 runs out of support April 30, 2004
- MQ V5.2 runs out of support April 30, 2004

DB2

- DB2 V6.1 no end date announced
- DB2 V7.1 runs out of support on March 31, 2005

IMS

- IMS V6.1 runs out of support Sept 30, 2003
- No date for IMS V7.1 or V8.1

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APARs of interest

OW56656   RMF support for z990

OA01504   Support to allow a CFRM CDS to be formatted for up to 32 CFRM policies (OS/390 2.10 – z/OS 1.4)

OA02187   Allows you to disable FICON Switch stats gathering on a system by system basis

OA03250   RMF Java Webstart for RMF PM

PQ30652   Provides support for Identity columns, which provide a way to have DB2 automatically generate unique, sequential, and recoverable values for specific columns in a table. A column that is defined with the AS IDENTITY attribute is referred to as an identity column.

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APARs of interest

OA04335   Propogate failed persistent connections when duplexing a structure

OA02703   Address delays in XCF message processing

Merging systems into a sysplex

International Technical Support Organization

Topics

This presentation discusses the considerations for moving an existing system (or systems), as an entity, into an existing sysplex

- It does NOT cover moving individual applications

Discuss sysplex design intent and reasons for moving (or *not* moving) a system into a sysplex

Describe the types of sysplex we will be discussing

List the items/components to be considered

Discuss the "gotchas" - considerations that can impact the feasibility of doing the merge

List the specific considerations for *a few* of the more complex merges (Merge redbook is over 400 pages!)

List supporting documentation

Sysplex benefits

How does sysplex help me?

- Improved availability by *removing single points of failure*:
  - Data sharing lets you run multiple copies of applications (cloning), spread across multiple systems on multiple CPCs
  - Workload balancing hides planned outages and minimizes impact of unplanned ones. Workload balancing also enhances service levels by dynamically routing work to where it will achieve the required response times.

- Easier management through *single system interface*
  - For Ops, users, sysprogs, security, storage admin, etc.

- Improved resource utilization
  - Cloning and workload balancing lets you move work dynamically to wherever the spare capacity currently exists

- Last and least (from a technical perspective) - It can result in reduced software costs

Sysplex concepts

Design point for sysplex:

- "A group of systems with similar characteristics, similar service levels, and similar workloads, sharing data between the systems and doing dynamic workload balancing across all systems"

Sysplex was *not* designed to consist of groups of subplexes

- There is a much closer relationship between systems in a sysplex than between two systems simply sharing DASD using RESERVE/RELEASE
- It is *possible* for a problem on one system in the sysplex to spread to other systems, potentially ending in a sysplex outage
- The chances of this happening are greatly enhanced if the systems are very different from each other

Sysplex benefits

Which systems *should* be in the same sysplex:

- Those containing applications that will share data with each other

- Those that share resources that should not be shared outside the sysplex
  - Security database
  - Storage pool
  - HSM resources

- Systems with similar, or at least compatible, standards - data set, esoterics, and volume names, device numbers, for example

- Systems with similar profiles - system programmer test and production systems should *not* be in the same sysplex

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Financial considerations

All systems do NOT necessarily have to be in the same sysplex in order to get the benefits of PSLC or WLC

For a CPC to qualify for aggregate software charging:

➤ The utilization of all MVS-based systems on the CPC that are in the sysplex must add up to more than 51% of the total <u>MVS-based</u> workload on that CPC for <u>every</u> interval in the prime shift
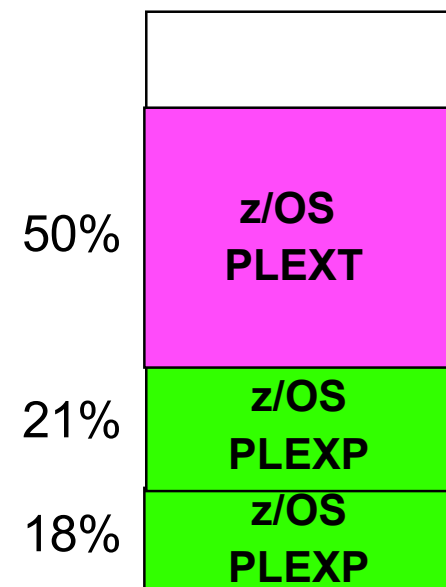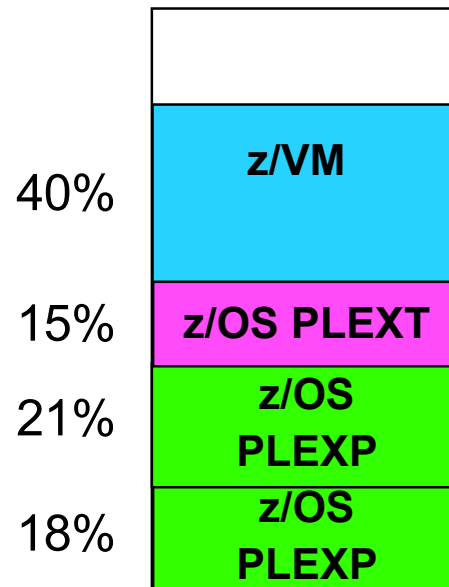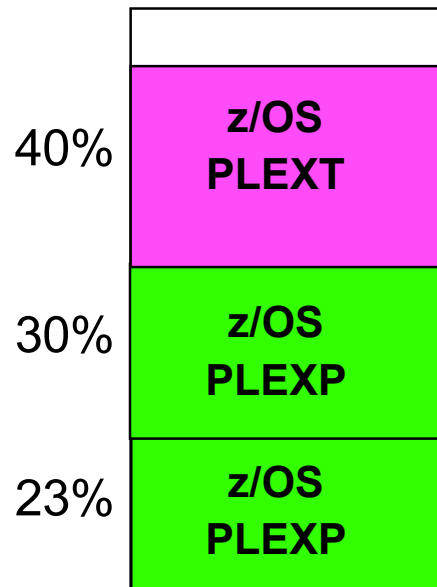
Financial alternatives

If you are considering the merge purely for financial reasons, as an alternative, consider:

- Rebalancing non-production workloads so production systems add up to more than 51% of MVS workload on each CPC

- Move some workload into the production LPARs - network ownership, spooling products, SMF postprocessing, etc

- Consider having at least two LPARs from production system on each CPC
  - Pushes up production sysplex utilization on each CPC
  - Ensures that all the MIPS of that CPC will still be available to production sysplex even if one system is down

Placing two disparate systems in the same sysplex, but not sharing anything does NOT provide any benefits in terms of easier management - savings come from sharing and cloning

Financial considerations

Need to consider impact on where products are licenced:

- Will the merge involve moving an LPAR from one CPC to another?
- If yes, are all products currently used by that LPAR already licenced on the target CPC?
- If no, do those products support VWLC (Variable Workload Charging)?
- If no, will the additional cost for those products offset the savings from PSLC or WLC?

Sysplex benefits

Basic question - will all systems be sharing all DASD?

- Do all users belong to the same company?
- Will the applications take part in data sharing or workload balancing now, or in the foreseeable future?
- Are you sure that there are no duplicate HLQs or duplicate data set or other resource names?
- If you plan on sharing all DASD, are you also going to share RACF, have a single JESplex, single HSM, single SMS, single tape management system, etc?

The answer to these question determines the type of sysplex you are targeting......

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The Platinumplex

z/OS 1.4
CICS
DB2
IMS
VTAM GR
Sys Distr
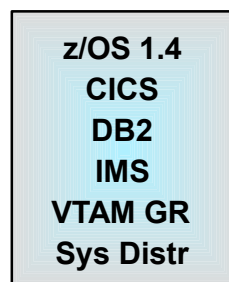
Shared everything
Workload balancing
Single logical control point

Logical view

Physical view

z/OS 1.4
CICS
DB2
IMS
VTAM GR
Sys Distr

z/OS 1.4
CICS
DB2
IMS
VTAM GR
Sys Distr

z/OS 1.4
CICS
DB2
IMS
VTAM GR
Sys Distr
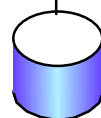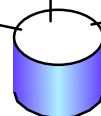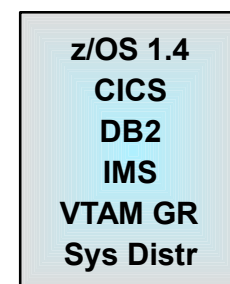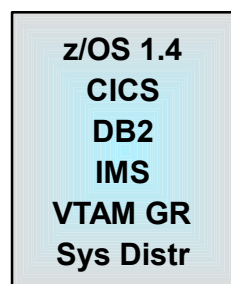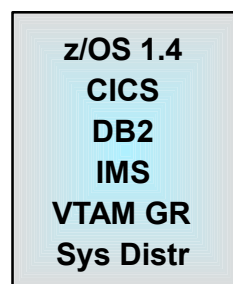
The Goldplex

Shared infrastructure
No workload balancing
Multiple logical
   control points

z/OS 1.4	z/OS 1.1	OS/390
CICS	IMS	CICS
DB2	VTAM GR	IMS
VTAM GR		VTAM

Logical view

Physical view

z/OS 1.4	z/OS 1.1	OS/390
CICS	IMS	CICS
DB2	VTAM GR	IMS
VTAM GR		VTAM
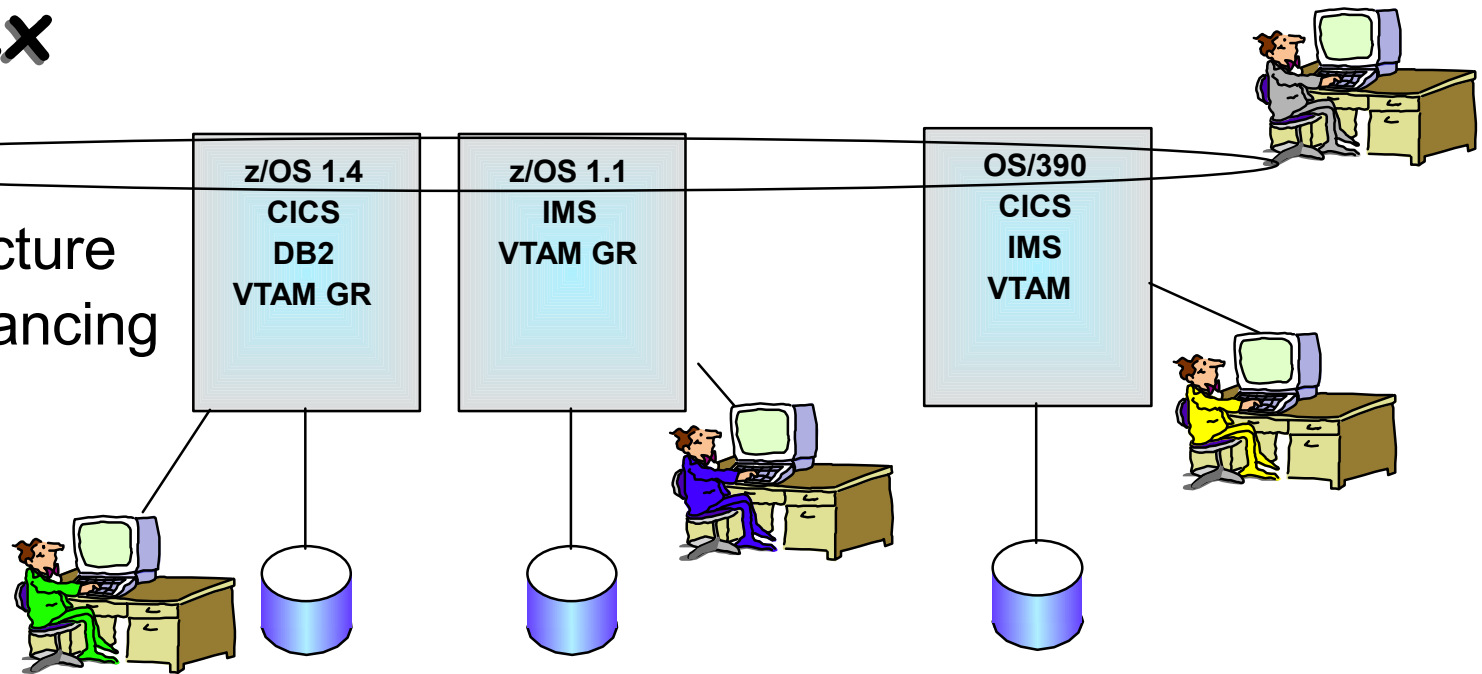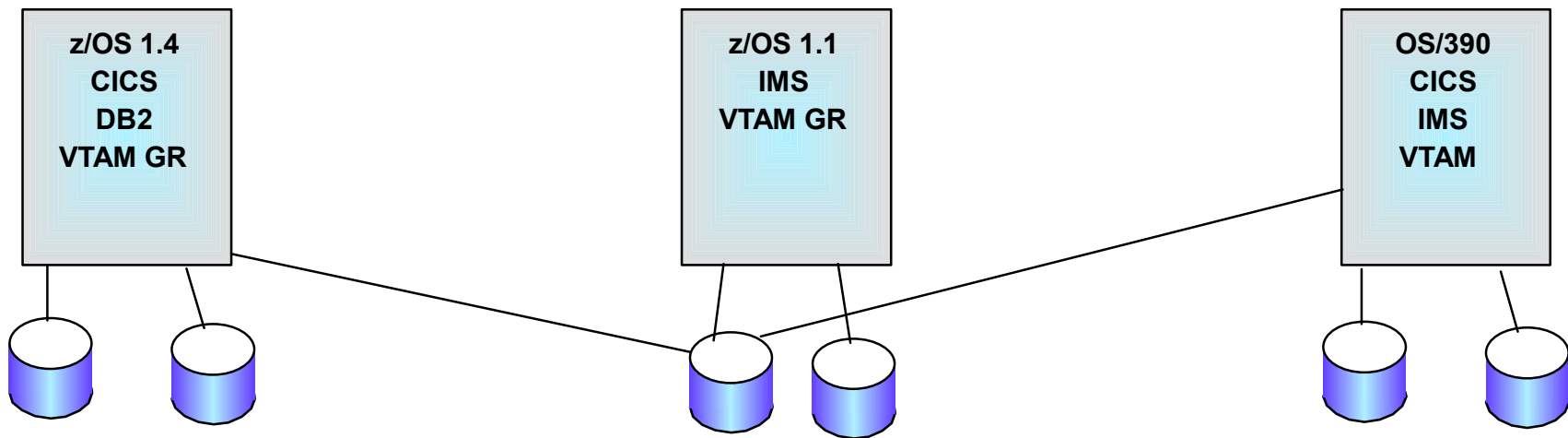
The Bronzeplex

Nearly nothing shared
No workload balancing
Many logical
    control points

z/OS 1.4	z/OS 1.1	OS/390
CICS	IMS	CICS
DB2	VTAM	IMS
VTAM		VTAM

Logical view

Physical view

z/OS 1.4	z/OS 1.1	OS/390
CICS	IMS	CICS
DB2	VTAM	IMS
VTAM		VTAM

Couple Data Sets
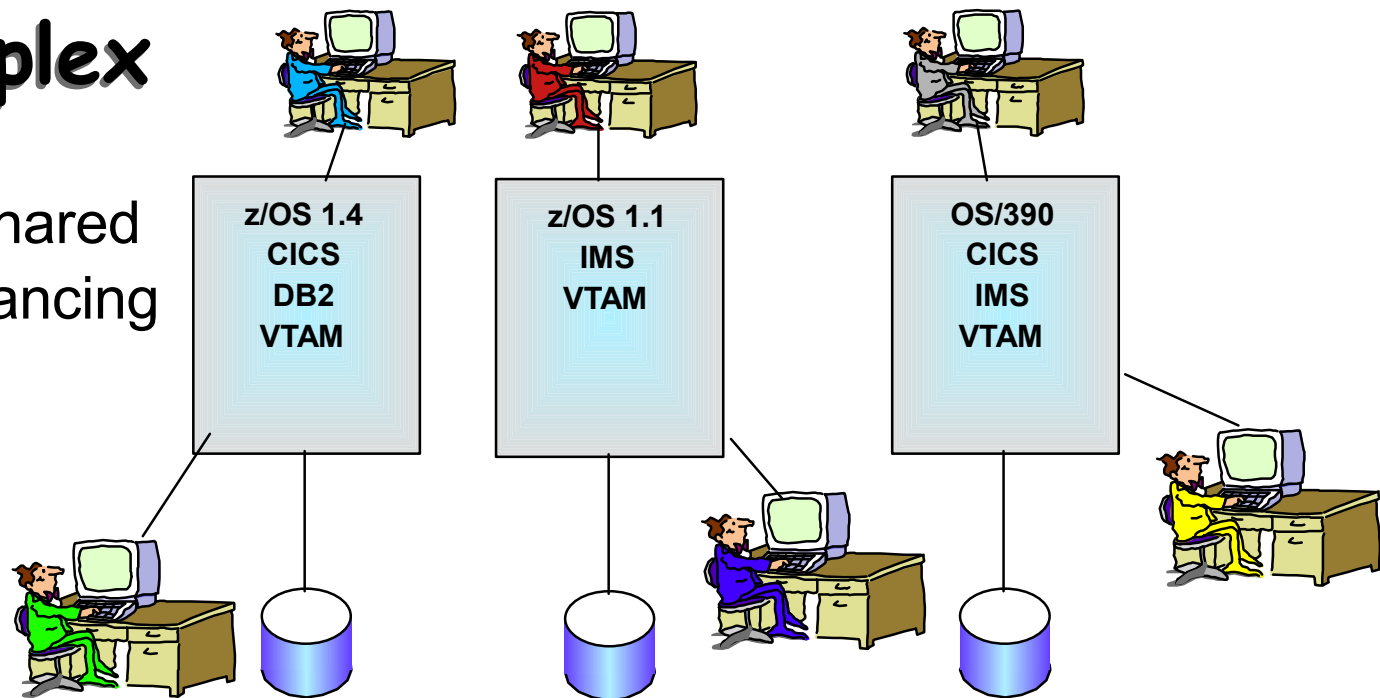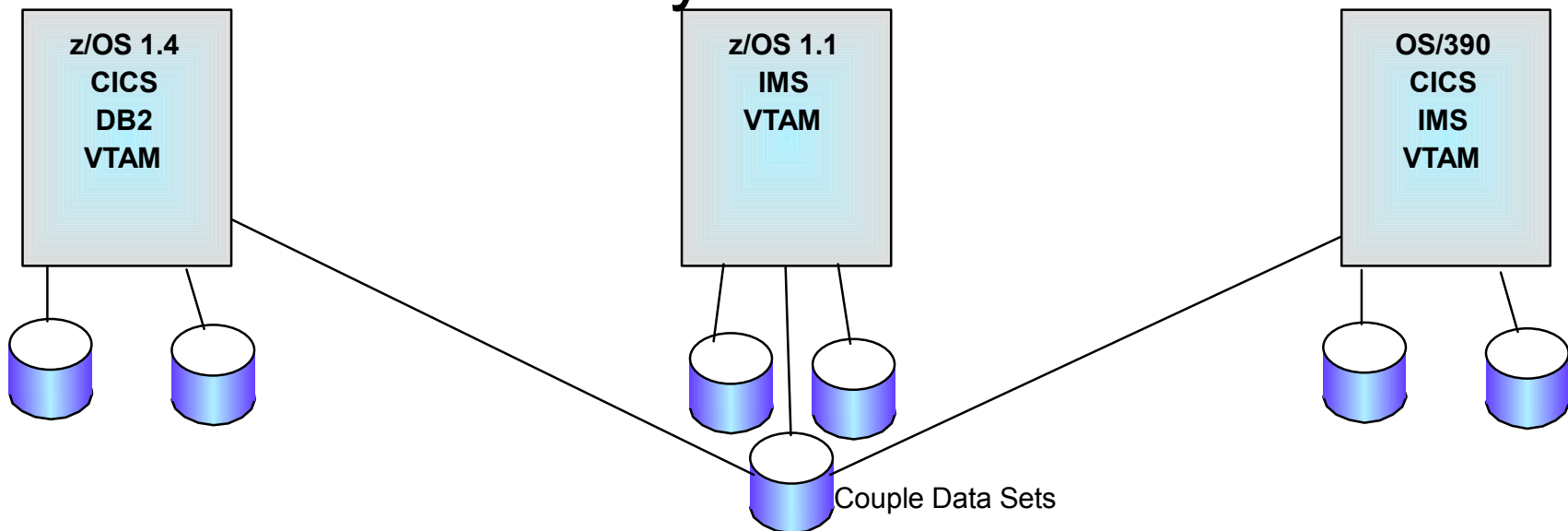
What aspects must be considered?

Sysplex infrastructure and CDS considerations	Maintenance philospohy and methodology
System Logger	OPC / Batch scheduler
WLM	System Automation
GRS	Operations considerations
SMF	Hardware config
JES2	RMM
Shared HFS	Language Environment
Sysres/system data sets	User exits and sysmods
VTAM	Non-IBM products
TCP/IP	Financial/licencing considerations
RACF	Others
SMS	
HSM	

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How many per sysplex

Plex type	1 per plex	>1 per plex
AUTOMATIONplex	X	X
CATALOGplex	X	X
DASDplex	X	X
ECSplex	X	
GRSplex	X	
JESplex	X	X
HFSplex	X	
HSMplex	X	X
OAMplex	X	X
OPCplex	X	X
RACFplex	X	X*
RMFplex	X	
RMMplex	X	X
SMSplex	X	X
SYSRESplex	X	X
TCPplex	X	
VTAMplex	X	
WLMplex	X	

Merging systems

In a sysplex, what MUST be shared?

- Couple Data Sets (so you must have AT LEAST 3 shared DASD devices, preferably on different physical CUs)
- XCF - every system in the sysplex is connected to the same XCF signalling media
- Console interface - any to any interface within the sysplex
- WLM policy - Can only have one policy per sysplex
- GRS - potential for false contention
- Many XCF groups have fixed names
  - If you want to use Dynamic XCF with TCP/IP, all stacks will connect to the same group
  - If you want to use Sysplex HFS sharing, there can be only one sharing group per sysplex
- System Logger - *any* system connected to a given Logger structure can potentially offload any log stream in that structure

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Gotchas for Bronze/GoldPlexes

Duplicate data set names - because there is only one GRS per sysplex, you could get many false contentions

Duplicate volsers - more likely to cause a problem when in the same sysplex. Also, PDSE uses volser and TTR to serialize data sets - *not* the data set name.....

TCP/IP - If you enable Dynamic XCF on a system, *all* other stacks in the sysplex using this feature will automatically know about that system

Likewise for VTAM XCF - can logon from anywhere

Can only have 1 VTAM GR and 1 VTAM MNPS group per sysplex - default VTAM action is to connect to GR and MNPS structures

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Gotchas for Bronze/GoldPlexes

Shared Logger structures - People typically place many, similar, log streams in the same structure - you really can't do this unless you are in a PlatinumPlex

Legal aspects - legal restrictions may require that NOTHING is shared between different companies

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Merging systems

Couple Data Sets

- CDSs to be considered are:
  - ARM, BPX, Sysplex, CFRM, LOGR, WLM
- You can only have one set of CDSs per sysplex
- There is no utility to merge CDSs
- Data in most CDSs is not persistent
  - Except LOGR CDSs
- However, you need to manually carry over *and reconcile* definitions from old CDSs to new ones
- Take the opportunity to review parameters used to set up each CDS
  - Remember that you can't *decrease* any value without a sysplex IPL
  - Do not over-specify MAXSYSTEM values (XCF, RLS)
- Should have primary, alternate, and spare for each CDS, ideally on volumes with no non-CDS data sets

Merging systems

System Logger

- Cannot "merge" two LOGR CDSs
  - Inventory information from *one* CDS must be discarded
    - ► This means INITIAL starts for affected CICS regions
    - ► Cold start for others such as RRS, CQS, etc.
  - Log structure and log stream definitions can be added, but definition jobs are typically not kept in one place
- How to handle the "old" offload and staging data sets?
  - You could manually delete them after the merge (duplicate DSNs)
  - You could delete the log stream definitions from the old CDS before the merge by DELETE LOGSTREAM (no fallback capability)
- Make sure SMS classes used by Logger are all available
- If *not* using shared DASD
  - Each log *structure* can only be connected to by systems in one DASDplex - limits use of OPERLOG, Merged Logrec
  - Have to consider HLQ used for each log stream - connected to catalog aliases, RACF, SMS routines

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Merging systems

Shared DASD

- All data sets on a shared volume must be cataloged in a catalog that is also shared

- If a volume is accessible from multiple systems, all those systems should be using the same security database
  - Having more than 1 security database "protecting" a given data set is a security exposure

- If a data set is going to be "managed", there should only be one SMS environment, to ensure the same classes gets assigned

- If a data set is accessible from multiple systems, all those systems must have access to the same HSM, in case the data set gets migrated

- If there is a single logical HSM, there must also be a single RMM, so every HSM can get information about ML2 tapes

Merging systems

Sysplex HFS Sharing

- One of the benefits of being in a sysplex, provides great flexibility

- Must define the OMVS CDS and specify SYSPLEX(YES) in the BPXPRMxx member

- However, there is only one HFS sharing group per sysplex
  - You can't have Systems SYSA and SYSB sharing one set of HFSs, and SYSC and SYSD sharing a different set

- Once a system joins the group, it potentially has access to every HFS mounted on any system in the sharing group
  - A volume does *not* have to be online to a system in order for that system to be able to read, or even write, to a HFS on that volume

- Should only be an issue if you are merging two sysplexes into a Bronzeplex or Goldplex, and *both* sysplexes are currently using sysplex HFS sharing

Merging systems

Merging RACF

- <u>NOT</u> a trivial undertaking
- First step should be to synchronize standards
- Most security databases contain huge amounts of redundant and obsolete information
- Have to cater for duplicate profiles and duplicate *named* profiles
- Many things to consider in addition to database contents - exits, RACF options, router table, class descriptor table, etc.
- There are a number of tools to help with the merge, however the process is largely a manual one
- Methodology is to start merging process well in advance of the actual merge
- *Strongly* recommend working with someone that has done one of these before

Redbooks

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Pages 245
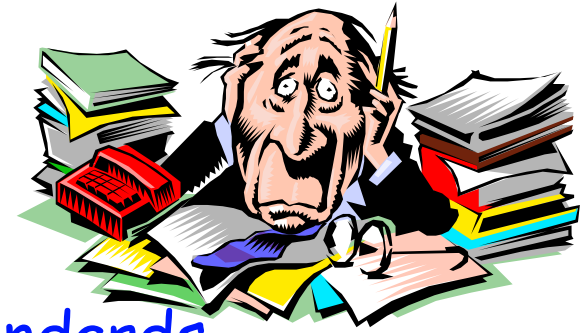
Merging systems

Merging WLM

- If possible, do the merge BEFORE you move all systems to goal mode!

- Remember that WLM has two levels of goals - meeting objectives at the SYSTEM level and meeting them at the SYSPLEX level - this is very important

- Setup is much more complex in a BronzePlex/GoldPlex
  - To keep WLM responsive, you need to keep the number of Service Class Periods to a minimum - difficult in a BronzePlex/GoldPlex

- Check for Service Classes with duplicate names - are objectives and periods the same?

- Check classification rules - you might have the same Service Class names but different classification rules!

- Beware Resource Groups - resource consumption allowed is across *whole sysplex*

Merging systems

Reference information:

- Merging Systems into a Sysplex Redbook, SG24-6818
  - There are a number of older documents floating around, especially for HSM and SMS - *all* are functionally replaced by the Redbook
  - There are some tools associated with the book available for download from:
    - ► ftp://www.redbooks.ibm.com/redbooks/SG246818/
- For RACF, tools are available at:
  - www.ibm.com/servers/eserver/zseries/zos/racf/goodies.html
- There are potentially many non-IBM products affected as well - speak to your vendors to see if they have supporting documentation

Questions?

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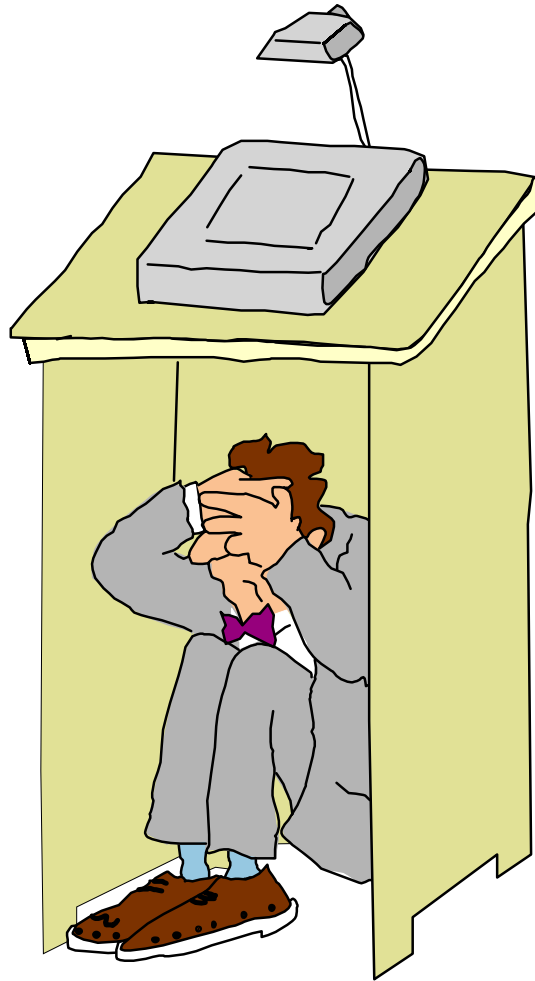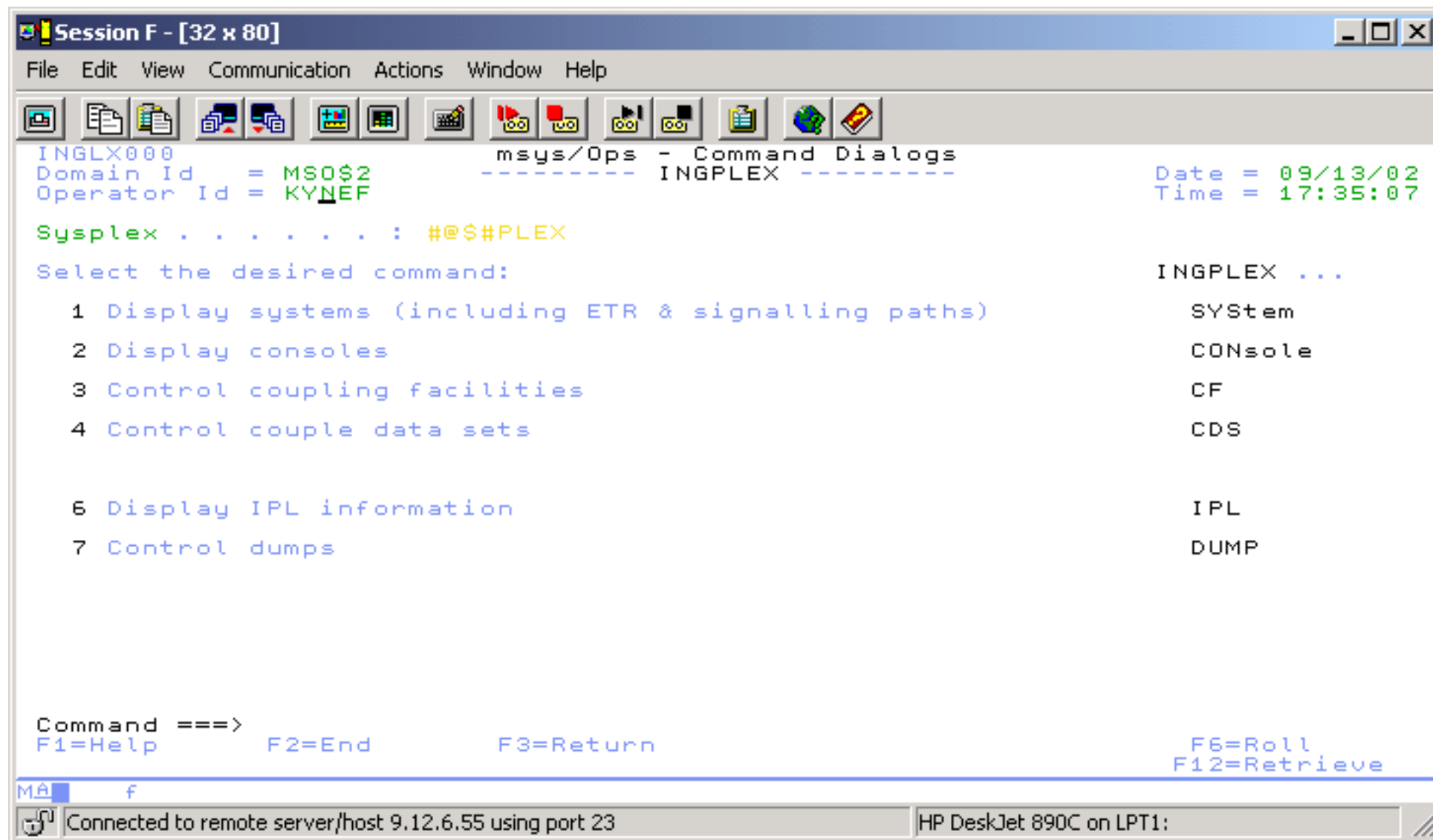
Thanks!!

Hope I see you again next year

Appendix

International Technical Support Organization

msys for Operations - INGPLEX Primary Panel

msys for Operations - INGPLEX Primary Panel

Primary panel with OW56107
applied....

```
INGLX000                  msys/Ops - Command Dialogs
Domain Id    = MS028      --------- INGPLEX ---------      Date = 03/05/03
Operator Id = RONN                                         Time = 18:04:42

Sysplex . . . . . . . :  RALPLEX1

Select the desired command:                               INGPLEX ...

   1  Display systems (including ETR & signalling paths)     SYStem

   2  Display consoles                                       CONsole

   3  Control coupling facilities                            CF

   4  Control couple data sets                               CDS


   6  Display IPL information                                IPL

   7  Control dumps                                          DUMP

   8  Health Checker best practices                          BESTpractices

   9  Health Checker results


Command ===>
F1=Help        F2=End         F3=Return                     F6=Roll
                                                            F12=Retrieve
```
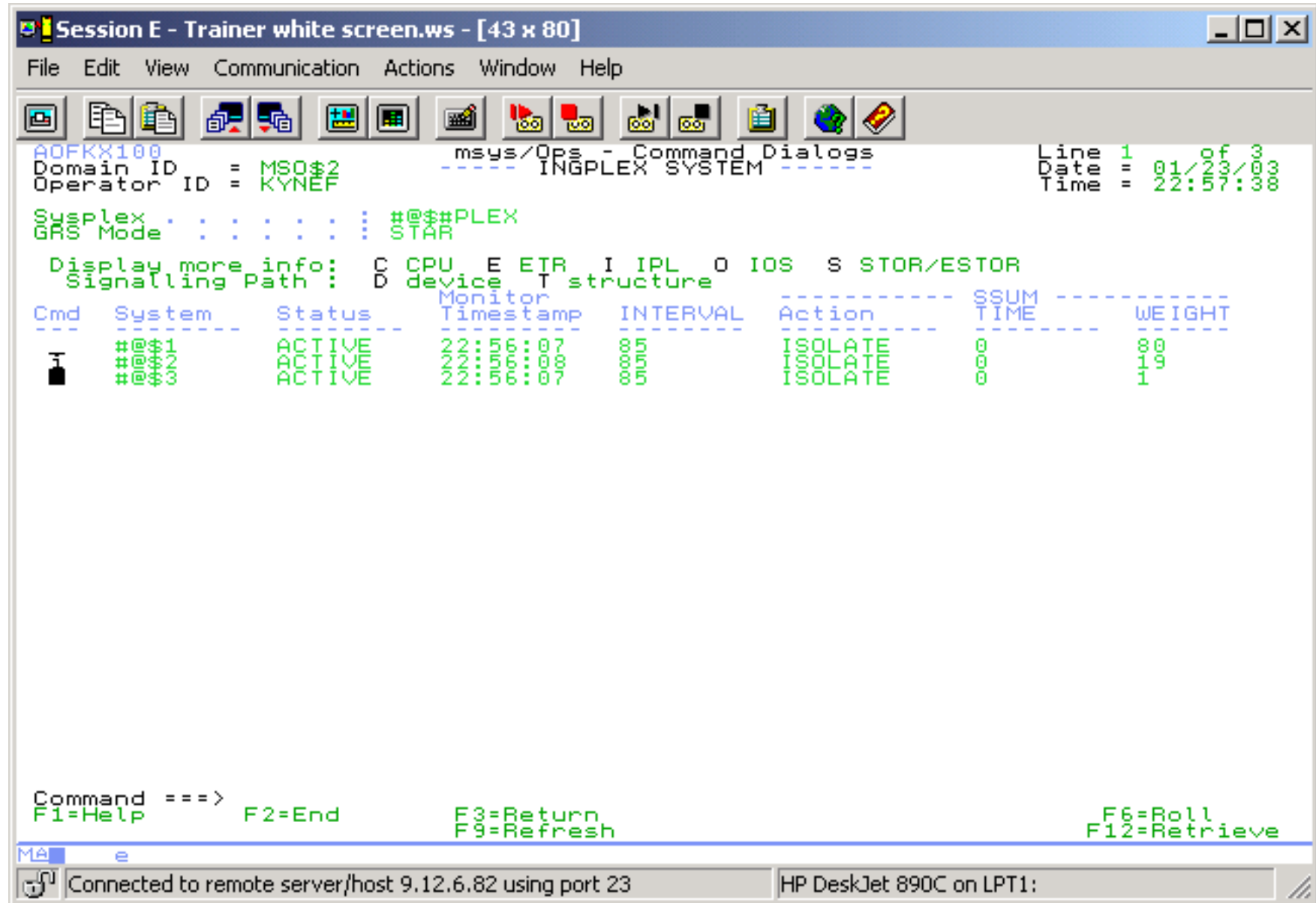
msys for Operations - Displaying Systems

msys for Operations - Displaying Systems

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msys for Operations - Displaying Consoles

msys for Operations - Displaying Consoles

msys for Operations - CDS Management (1/3)


```
Session E - Trainer white screen.ws - [43 x 80]

File  Edit  View  Communication  Actions  Window  Help

INGKX300                       msys/Ops - Command Dialogs      Line   1    of 21
Domain ID  = MSO$2        ------- INGPLEX CDS -------          Date = 01/23/03
Operator ID = KYNEF            Sysplex = #@$#PLEX              Time = 23:05:14

System..: #@$2                    Interval...: 85              OPNotify: 88
Maxmsg..: 750                     Cleanup....: 15             Retry..: 10
Classlen: 956                     Max CFlevel: 12             COUPLExx: COUPLE00
SMREBLD.: 1                       Max SMlevel: 12

Cmds:  A allocate alternate CDS  / C display CHPIDs
       D display CDS information / P switch alternate CDS to primary CDS

       Type        MS    Volume    Dev    Couple Dataset Name
                   --                      -------------------------------------
  _    SYSPLEX
       PRIMARY..:   4    #@$#X1    3811   SYS1.XCF.CDS01
       ALTERNATE:   4    #@$#X2    3F09   SYS1.XCF.CDS02
  _    ARM
       PRIMARY..:   4    #@$#X1    3811   SYS1.XCF.ARM01
       ALTERNATE:   4    #@$#X2    3F09   SYS1.XCF.ARM02
  _    BPXMCDS
       PRIMARY..:   4    #@$#X1    3811   SYS1.XCF.OMVS01
       ALTERNATE:   4    #@$#X2    3F09   SYS1.XCF.OMVS02
  _    CFRM
       PRIMARY..:   4    #@$#X2    3F09   SYS1.XCF.CFRM01
       ALTERNATE:   4    #@$#X1    3811   SYS1.XCF.CFRM02
  _    LOGR
       PRIMARY..:   4    #@$#X1    3811   SYS1.XCF.LOGR01
       ALTERNATE:   4    #@$#X2    3F09   SYS1.XCF.LOGR02
  _    SFM
       PRIMARY..:   4    #@$#X1    3811   SYS1.XCF.SFM01
       ALTERNATE:   4    #@$#X2    3F09   SYS1.XCF.SFM02
  _    WLM
       PRIMARY..:  16    #@$#X1    3811   SYS1.XCF.WLM01
       ALTERNATE:  16    #@$#X2    3F09   SYS1.XCF.WLM02

         List of primary and alternate CDSs.....

Command ===> ▇
F1=Help       F2=End           F3=Return                     F6=Roll
                               F9=Refresh                    F12=Retrieve
MA     e
Connected to remote server/host 9.12.6.82 using port 23       HP DeskJet 890C on LPT1:
```

Redbooks

ibm.com/redbooks

msys for Operations - CDS Management (2/3)

List of policies defined in CFRM CDS

Select 'D' to display contents of policy.....

msys for Operations - CDS Management (3/3)


```
INGKX319                    msys/Ops - Command Dialogs        Line  1    of 238
Domain ID   = MSO$2         ------- INGPLEX CDS -------       Date = 09/14/02
Operator ID = KYNEF                Sysplex = #@$#PLEX         Time = 12:57:34
                                  Policy Information

Type: CFRM       Name: CFRM02                  Contents of CFRM policy CFRM02.....
<---+----1----+----2----+----3----+----4----+----5----+----6----+----7----+----
      /* Defined: 09/13/2002 18:13:58.717703 User: KYNEF  */
      /* 46 Structures defined in this policy */
      /* 6 Coupling Facilities defined in this policy */

CF NAME(FACIL01) DUMPSPACE(2000) PARTITION(0) CPCID(00)
   TYPE(SIMDEV) MFG(IBM) PLANT(EN) SEQUENCE(0000000CFCC1)

CF NAME(FACIL02) DUMPSPACE(2000) PARTITION(0) CPCID(00)
   TYPE(SIMDEV) MFG(IBM) PLANT(EN) SEQUENCE(0000000CFCC2)

CF NAME(FACIL03) DUMPSPACE(2000) PARTITION(6) CPCID(00)
   TYPE(009672) MFG(IBM) PLANT(02) SEQUENCE(000000057332)

CF NAME(FACIL04) DUMPSPACE(2000) PARTITION(7) CPCID(00)
   TYPE(009672) MFG(IBM) PLANT(02) SEQUENCE(000000057332)

CF NAME(FACIL05) DUMPSPACE(2000) PARTITION(4) CPCID(00)
   TYPE(002066) MFG(IBM) PLANT(02) SEQUENCE(000000011CE3)

CF NAME(FACIL06) DUMPSPACE(2000) PARTITION(5) CPCID(00)
   TYPE(002066) MFG(IBM) PLANT(02) SEQUENCE(000000011CE3)

STRUCTURE NAME(CIC_DFHLOG_001) SIZE(8192)
   INITSIZE(4096)
   PREFLIST(FACIL02, FACIL01, FACIL04, FACIL03, FACIL06, FACIL05)

STRUCTURE NAME(CIC_DFHSHUNT_001) SIZE(8192)
   INITSIZE(4096)
   PREFLIST(FACIL01, FACIL02, FACIL03, FACIL04, FACIL05, FACIL06)

STRUCTURE NAME(CIC_GENERAL_001) SIZE(8192)
   INITSIZE(4096)

Command ===>
F1=Help      F2=End       F3=Return                          F6=Roll
             F8=Forward   F9=Refresh                         F12=Retrieve
```

Connected to remote server/host 9.12.6.55 using port 23   HP DeskJet 890C on LPT1:

msys for Operations - CDS Allocation (1/8)

```
Session C - Trainer white screen.ws - [43 x 80]                    _ □ X

File   Edit   View   Communication   Actions   Window   Help

INGKX300                    msys/Ops - Command Dialogs      Line  1    of 21
Domain ID    = MSO$1     -------- INGPLEX CDS --------     Date = 12/19/02
Operator ID = KYNEF            Sysplex = #@$#PLEX          Time = 12:35:59

System..: #@$1              Interval...: 85              OPNotify: 88
Maxmsg..: 750              Cleanup....: 15              Retry...: 10
Classlen: 956              Max CFlevel: 11              COUPLExx: COUPLE00
SMREBLD.: 1               Max SMlevel: 11

Cmds: A allocate alternate CDS  / C display CHPIDs
      D display CDS information / P switch alternate CDS to primary CDS

      Type       MS   Volume   Dev   Couple Dataset Name
      --------   --   ------   ----  ---------------------------------
  _   SYSPLEX
      PRIMARY..:  4   #@$#X1   37AC  SYS1.XCF.CDS01
      ALTERNATE:  4   #@$#X2   37AD  SYS1.XCF.CDS02
  _   ARM
      PRIMARY..:  4   #@$#X1   37AC  SYS1.XCF.ARM01
      ALTERNATE:  4   #@$#X2   37AD  SYS1.XCF.ARM02
  _   BPXMCDS
      PRIMARY..:  4   #@$#X1   37AC  SYS1.XCF.OMVS01
      ALTERNATE:  4   #@$#X2   37AD  SYS1.XCF.OMVS02
  a   CFRM
      PRIMARY..:  4   #@$#X2   37AD  SYS1.XCF.CFRM01
      ALTERNATE:  4   #@$#X1   37AC  SYS1.XCF.CFRM02
  ■   LOGR
      PRIMARY..:  4   #@$#X1   37AC  SYS1.XCF.LOGR01
      ALTERNATE:  4   #@$#X2   37AD  SYS1.XCF.LOGR02
  _   SFM
      PRIMARY..:  4   #@$#X1   37AC  SYS1.XCF.SFM01
      ALTERNATE:  4   #@$#X2   37AD  SYS1.XCF.SFM02
  _   WLM
      PRIMARY..: 16   #@$#X1   37AC  SYS1.XCF.WLM01
      ALTERNATE: 16   #@$#X2   37AD  SYS1.XCF.WLM02




Command ===>
F1=Help      F2=End       F3=Return                      F6=Roll
                          F9=Refresh                     F12=Retrieve

MA         c

Connected to remote server/host 9.12.6.55 using port 23   HP DeskJet 890C on LPT1:
```

msys for Operations - CDS Allocation (2/8)

```
Session C - Trainer white screen.ws - [43 x 80]                    _ □ X
File  Edit  View  Communication  Actions  Window  Help

[toolbar icons]

INGKX30B                      msys/Ops - Command Dialogs
Domain ID    = MSO$1      -------- INGPLEX CDS -------       Date = 12/19/02
Operator Id  = KYNEF            Sysplex = #@$#PLEX           Time = 12:37:24


                       SETXCF ACOUPLE Confirmation

You are going to allocate a new CFRM    alternate couple data set.

Automation will allocate the new alternate CDS based on the current

specifications in effect. If you want to specify your own alternate CDS

then please complete the necessary details below. Your own alternate CDS

must already have been formatted by the IXCL1DSU utility.

Your alternate couple dataset...

     Name    ==> ■_____

     Volume  ==> _____

The current alternate couple data set

   SYS1.XCF.CFRM02

will be removed as soon as you proceed with the GO function key.




Command ===>
           F2=End          F3=Return                              F6=Roll
                                      F10=Go         F11=Cancel   F12=Retrieve
MA              c
Connected to remote server/host 9.12.6.55 using port 23     HP DeskJet 890C on LPT1:
```

msys for Operations - CDS Allocation (3/8)

```
Session C - Trainer white screen.ws - [43 x 80]                    _ □ X

File   Edit   View   Communication   Actions   Window   Help

INGKX300                        msys/Ops - Command Dialogs        Line    1    of 21
Domain ID   = MSO$1         ------- INGPLEX CDS -------           Date = 12/19/02
Operator ID = KYNEF             Sysplex = #@$#PLEX                Time = 12:39:23

System..:  #@$1               Interval...:  85                   OPNotify:  88
Maxmsg..:  750                Cleanup....:  15                    Retry...:  10
Classlen:  956                Max CFlevel:  11                    COUPLExx:  COUPLE00
SMREBLD.:  1                  Max SMlevel:  11

Cmds: A allocate alternate CDS   / C display CHPIDs
      D display CDS information / P switch alternate CDS to primary CDS

      Type        MS   Volume   Dev    Couple Dataset Name
      --------    --   -------   ----   -------------------------------------------
  _   SYSPLEX
        PRIMARY..:  4   #@$#X1   37AC   SYS1.XCF.CDS01
        ALTERNATE:  4   #@$#X2   37AD   SYS1.XCF.CDS02
  _   ARM
        PRIMARY..:  4   #@$#X1   37AC   SYS1.XCF.ARM01
        ALTERNATE:  4   #@$#X2   37AD   SYS1.XCF.ARM02
  _   BPXMCDS
        PRIMARY..:  4   #@$#X1   37AC   SYS1.XCF.OMVS01
        ALTERNATE:  4   #@$#X2   37AD   SYS1.XCF.OMVS02
  _   CFRM
        PRIMARY..:  4   #@$#X2   37AD   SYS1.XCF.CFRM01
        ALTERNATE:  4   #@$#X1   37AC   SYS1.MSOPS.CDS.CFRM.CDS02
  _   LOGR
        PRIMARY..:  4   #@$#X1   37AC   SYS1.XCF.LOGR01
        ALTERNATE:  4   #@$#X2   37AD   SYS1.XCF.LOGR02
  _   SFM
        PRIMARY..:  4   #@$#X1   37AC   SYS1.XCF.SFM01
        ALTERNATE:  4   #@$#X2   37AD   SYS1.XCF.SFM02
  _   WLM
        PRIMARY..: 16   #@$#X1   37AC   SYS1.XCF.WLM01
        ALTERNATE: 16   #@$#X2   37AD   SYS1.XCF.WLM02




Command ===> █
F1=Help       F2=End          F3=Return                       F6=Roll
                              F9=Refresh                      F12=Retrieve

MA    c
```

Connected to remote server/host 9.12.6.55 using port 23   HP DeskJet 890C on LPT1:

msys for Operations - CDS Allocation (4/8)

```
SETXCF COUPLE,PSWITCH,TYPE=CFRM
IXC309I SETXCF COUPLE,PSWITCH REQUEST FOR CFRM WAS ACCEPTED
IXC257I PRIMARY COUPLE DATA SET 201
SYS1.XCF.CFRM01 FOR CFRM
IS BEING REPLACED BY
SYS1.MSOPS.CDS.CFRM.CDS02 DUE TO OPERATOR REQUEST
IEF196I IEF285I    SYS1.XCF.CFRM01                              KEPT
IXC253I PRIMARY COUPLE DATA SET 304
SYS1.XCF.CFRM01 FOR CFRM
IS BEING REMOVED BECAUSE OF A SETXCF COUPLE,PSWITCH OPERATOR COMMAND
DETECTED BY SYSTEM #@$1
....
S INGPIXCU,SUB=MSTR,U=AUTXCF2,P=IXCMIAPU,D=MSYS.TEMP.MSO$1.HSA02353,
T=124051,JOBNAME=INGPIXCU
....
SETXCF COUPLE,TYPE=CFRM,ACOUPLE=(SYS1.MSOPS.CDS.CFRM.CDS01,#@$#X2)
IXC309I SETXCF COUPLE,ACOUPLE REQUEST FOR CFRM WAS ACCEPTED
IXC260I ALTERNATE COUPLE DATA SET REQUEST FROM SYSTEM 324
#@$1 FOR CFRM IS NOW BEING PROCESSED.
DATA SET:  SYS1.MSOPS.CDS.CFRM.CDS01
```

msys for Operations - CDS Allocation (5/8)

```
Session C - Trainer white screen.ws - [43 x 80]                          _ □ X

File   Edit   View   Communication   Actions   Window   Help

INGKX300                    msys/Ops - Command Dialogs     Line   1    of 21
Domain ID   = MSO$1          -------- INGPLEX CDS --------  Date = 12/19/02
Operator ID = KYNEF              Sysplex = #@$#PLEX         Time = 12:47:00

System..: #@$1                   Interval...: 85            OPNotify: 88
Maxmsg..: 750                    Cleanup....: 15            Retry...: 10
Classlen: 956                    Max CFlevel: 11            COUPLExx: COUPLE00
SMREBLD.: 1                      Max SMlevel: 11

Cmds: A allocate alternate CDS   / C display CHPIDs
      D display CDS information   / P switch alternate CDS to primary CDS

       Type        MS   Volume   Dev   Couple Dataset Name
       --------    --   ------   ----  -----------------------------------------
  _    SYSPLEX
         PRIMARY..:  4   #@$#X1   37AC  SYS1.XCF.CDS01
         ALTERNATE:  4   #@$#X2   37AD  SYS1.XCF.CDS02
  _    ARM
         PRIMARY..:  4   #@$#X1   37AC  SYS1.XCF.ARM01
         ALTERNATE:  4   #@$#X2   37AD  SYS1.XCF.ARM02
  _    BPXMCDS
         PRIMARY..:  4   #@$#X1   37AC  SYS1.XCF.OMVS01
         ALTERNATE:  4   #@$#X2   37AD  SYS1.XCF.OMVS02
  _    CFRM
         PRIMARY..:  4   #@$#X1   37AC  SYS1.MSOPS.CDS.CFRM.CDS02
         ALTERNATE:  4   #@$#X2   37AD  SYS1.MSOPS.CDS.CFRM.CDS01
  _    LOGR
         PRIMARY..:  4   #@$#X1   37AC  SYS1.XCF.LOGR01
         ALTERNATE:  4   #@$#X2   37AD  SYS1.XCF.LOGR02
  _    SFM
         PRIMARY..:  4   #@$#X1   37AC  SYS1.XCF.SFM01
         ALTERNATE:  4   #@$#X2   37AD  SYS1.XCF.SFM02
  _    WLM
         PRIMARY..: 16   #@$#X1   37AC  SYS1.XCF.WLM01
         ALTERNATE: 16   #@$#X2   37AD  SYS1.XCF.WLM02




Command ===> ■
F1=Help        F2=End          F3=Return                      F6=Roll
                               F9=Refresh                     F12=Retrieve

MA        c
Connected to remote server/host 9.12.6.55 using port 23    HP DeskJet 890C on LPT1:
```

msys for Operations - CDS Allocation (6/8)

```
Session C - Trainer white screen.ws - [43 x 80]                    _ |□| X

File  Edit  View  Communication  Actions  Window  Help

INGKX300                      msys/Ops - Command Dialogs     Line   1     of 21
Domain ID   = MSO$1          ------- INGPLEX CDS -------     Date = 12/19/02
Operator ID = KYNEF              Sysplex = #@$#PLEX           Time = 12:49:19

System..: #@$1              Interval...: 85            OPNotify: 88
Maxmsg..: 750              Cleanup....: 15            Retry...: 10
Classlen: 956              Max CFlevel: 11            COUPLExx: COUPLE00
SMREBLD.: 1               Max SMlevel: 11

Cmds: A allocate alternate CDS  / C display CHPIDs
      D display CDS information / P switch alternate CDS to primary CDS

     Type        MS   Volume  Dev   Couple Dataset Name
     --------    --   -------  ----  --------------------------------------------

   _ SYSPLEX
     PRIMARY..:   4   #@$#X1  37AC  SYS1.XCF.CDS01
     ALTERNATE:   4   #@$#X2  37AD  SYS1.XCF.CDS02
   _ ARM
     PRIMARY..:   4   #@$#X1  37AC  SYS1.XCF.ARM01
     ALTERNATE:   4   #@$#X2  37AD  SYS1.XCF.ARM02
   _ BPXMCDS
     PRIMARY..:   4   #@$#X1  37AC  SYS1.XCF.OMVS01
     ALTERNATE:   4   #@$#X2  37AD  SYS1.XCF.OMVS02
   P CFRM
     PRIMARY..:   4   #@$#X1  37AC  SYS1.MSOPS.CDS.CFRM.CDS02
     ALTERNATE:   4   #@$#X2  37AD  SYS1.XCF.CFRM01
   ■ LOGR
     PRIMARY..:   4   #@$#X1  37AC  SYS1.XCF.LOGR01
     ALTERNATE:   4   #@$#X2  37AD  SYS1.XCF.LOGR02
   _ SFM
     PRIMARY..:   4   #@$#X1  37AC  SYS1.XCF.SFM01
     ALTERNATE:   4   #@$#X2  37AD  SYS1.XCF.SFM02
   _ WLM
     PRIMARY..:  16   #@$#X1  37AC  SYS1.XCF.WLM01
     ALTERNATE:  16   #@$#X2  37AD  SYS1.XCF.WLM02




Command ===>
F1=Help      F2=End           F3=Return                     F6=Roll
                              F9=Refresh                    F12=Retrieve
MA            c

Connected to remote server/host 9.12.6.55 using port 23      HP DeskJet 890C on LPT1:
```

msys for Operations - CDS Allocation (7/8)


```
Session C - Trainer white screen.ws - [43 x 80]

File  Edit  View  Communication  Actions  Window  Help

INGKX30A                      msys/Ops - Command Dialogs
Domain ID    = MSO$1     ------- INGPLEX CDS -------        Date = 12/19/02
Operator Id  = KYNEF           Sysplex = #@$#PLEX          Time = 12:50:20


                        SETXCF PSWITCH Confirmation

You are going to remove the CFRM     primary couple data set.

The alternate couple data set SYS1.XCF.CFRM01

becomes the primary as soon as you proceed with the GO function key.

Immediately after the switch, automation will try to allocate a new alternate

couple data set on one of the spare volumes defined during the customization.

If you want the automation to allocate your own alternate couple data set

complete the necessary information below.


   Your alternate couple dataset...

      Name    ==> sys1.xcf.cfrm02

      Volume  ==> #@$#x1







Command ===> ▮
        F2=End         F3=Return
                                    F10=Go        F11=Cancel   F6=Roll
                                                               F12=Retrieve
MA▮      c

Connected to remote server/host 9.12.6.55 using port 23        HP DeskJet 890C on LPT1:
```

msys for Operations - CDS Allocation (8/8)


```
Session C - Trainer white screen.ws - [43 x 80]                    _ □ X

File   Edit   View   Communication   Actions   Window   Help

INGKX300                          msys/Ops - Command Dialogs      Line    1      of 21
Domain ID     = MSO$1         -------- INGPLEX CDS --------      Date = 12/19/02
Operator ID = KYNEF                Sysplex = #@$#PLEX            Time = 12:53:24

System..: #@$1                      Interval...: 85                OPNotify: 88
Maxmsg..: 750                       Cleanup....: 15               Retry...: 10
Classlen: 956                       Max CFlevel: 11               COUPLExx: COUPLE00
SMREBLD.: 1                         Max SMlevel: 11

Cmds: A allocate alternate CDS   / C display CHPIDs
      D display CDS information / P switch alternate CDS to primary CDS

         Type        MS    Volume   Dev    Couple Dataset Name
         --------    --    ------   ----   -------------------------------------
    _    SYSPLEX
           PRIMARY..:   4   #@$#X1   37AC   SYS1.XCF.CDS01
           ALTERNATE:   4   #@$#X2   37AD   SYS1.XCF.CDS02
    _    ARM
           PRIMARY..:   4   #@$#X1   37AC   SYS1.XCF.ARM01
           ALTERNATE:   4   #@$#X2   37AD   SYS1.XCF.ARM02
    _    BPXMCDS
           PRIMARY..:   4   #@$#X1   37AC   SYS1.XCF.OMVS01
           ALTERNATE:   4   #@$#X2   37AD   SYS1.XCF.OMVS02
    _    CFRM
           PRIMARY..:   4   #@$#X2   37AD   SYS1.XCF.CFRM01
           ALTERNATE:   4   #@$#X1   37AC   SYS1.XCF.CFRM02
    _    LOGR
           PRIMARY..:   4   #@$#X1   37AC   SYS1.XCF.LOGR01
           ALTERNATE:   4   #@$#X2   37AD   SYS1.XCF.LOGR02
    _    SFM
           PRIMARY..:   4   #@$#X1   37AC   SYS1.XCF.SFM01
           ALTERNATE:   4   #@$#X2   37AD   SYS1.XCF.SFM02
    _    WLM
           PRIMARY..:  16   #@$#X1   37AC   SYS1.XCF.WLM01
           ALTERNATE:  16   #@$#X2   37AD   SYS1.XCF.WLM02




Command ===> ■
F1=Help       F2=End            F3=Return                      F6=Roll
                                F9=Refresh                     F12=Retrieve
MA■■
        c
```

Connected to remote server/host 9.12.6.55 using port 23   HP DeskJet 890C on LPT1:

msys for Operations - CDS Allocation

Note that msys for Ops does NOT update the COUPLExx member to point to the new CDS

This may result in IXC289D messages the next time you IPL, asking if the system should use the CDS named in the COUPLExx member or the CDS that was used the last time the system was up.

Short term fix is to monitor for messages IXC257I and IXC260I indicating name of new alternate CDS. We also recommend giving msys for Ops a different naming convention for the CDSs that it allocates - this makes it easy to spot if msys for Ops has allocated a new CDS

msys for Operations -CF Management (1/3)

```
Session F - [32 x 80]

File   Edit   View   Communication   Actions   Window   Help

INGLX900                        msys/Ops - Command Dialogs        Line    1    of 6
Domain Id    = MSO$2            --------- INGCF ---------          Date = 09/13/02
Operator Id = KYNEF                                                Time = 18:24:04

Sysplex . . . . . . :    #@$#PLEX          SM process level  . : 11

Cmds: D drain CF / E enable CF / P display sender paths / S display structures

   CF Name     Total Space     Free Space Free%   Volatile  CF level
   -------     -----------     ---------- -----   --------  --------
_  FACIL01              N/A            N/A   N/A        N/A       N/A
_  FACIL02              N/A            N/A   N/A        N/A       N/A
_  FACIL03              N/A            N/A   N/A        N/A       N/A
_  FACIL04              N/A            N/A   N/A        N/A       N/A
_  FACIL05         489216 K       440064 K 89.95       YES        10
_  FACIL06         489216 K       456448 K 93.30       YES        10
```

Select Primary Option 3 to get list of CFs

Use 'S' to display structures in CF.....

```
Command ===> _
F1=Help          F2=End            F3=Return                    F6=Roll
                                   F9=Refresh                   F12=Retrieve

MA     f

Connected to remote server/host 9.12.6.55 using port 23          HP DeskJet 890C on LPT1:
```

msys for Operations - CF Management (2/3)

```
Session B - [32 x 80]                                              _  □  ✕

File   Edit   View   Communication   Actions   Window   Help

INGLX904                        msys/Ops - Command Dialogs    Line  1    of 15
Domain ID    = MSO$2           ----- INGCF STRUCTURE -----    Date = 09/14/02
Operator ID = KYNEF                                           Time = 12:43:39

Coupling Facility ==>  FACIL05
Sysplex . . . . . ==>  #@$#PLEX                Permission . . . . . : ALL
Include condition ==>  YES (Yes/No - Condition retrieval takes longer)
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
Cmds: D display details / F force / P stop duplex / R rebuild / S start duplex

    Structure           P D   Condition
    ---------------------- - - --------------------------------------------------
 _  CIC_DFHSHUNT_001          System-managed rebuild is supported.
 _  D#$#_GBP0             U   Duplex rebuild is active.
 _  D#$#_GBP1             U   Duplex rebuild is active.
 _  D#$#_LOCK1            S   System-managed rebuild is supported.
 _  D#$#_SCA              S   System-managed rebuild is supported.
 _  I#$#EMHQ                  The structure's initial size < its actual size.
 _  I#$#LOGEMHQ               System-managed rebuild is supported.
 _  I#$#LOGMSGQ               System-managed rebuild is supported.
 _  I#$#MSGQ                  The structure's initial size < its actual size.
 _  IXC_DEFAULT_2
 _  RRS_ARCHIVE_1            System-managed rebuild is supported.
 _  RRS_DELAYEDUR_1         System-managed rebuild is supported.
 _  RRS_MAINUR_1            System-managed rebuild is supported.
 _  RRS_RESTART_1           System-managed rebuild is supported.
 _  RRS_RMDATA_1            System-managed rebuild is supported.


Command ===>
 F1=Help        F2=End        F3=Return                        F6=Roll
MA    b

Connected to remote server/host 9.12.6.55 using port 23      HP DeskJet 890C on LPT1:
```

All structures (and status) in FACIL05.....

msys for Operations - CF Management (3/3)

Details about structure I#$#EMHQ.....

msys for Operations - CF Removal (1/13)

```
Session B - [43 x 80]                                                  _ □ X

File   Edit   View   Communication   Actions   Window   Help

INGLX904                        msys/Ops - Command Dialogs       Line   1      of 15
Domain ID   = MSO$2             ----- INGCF STRUCTURE -----      Date = 09/14/02
Operator ID = KYNEF                                             Time = 12:59:09

Coupling Facility ==X    FACIL05
Sysplex . . . . . . ==>  #@$#PLEX              Permission . . . . . : ALL
Include condition ==> YES (Yes/No - Condition retrieval takes longer)
----------------------------------------------------------------------------------
Cmds: D display details / F force / P stop duplex / R rebuild / S start duplex

      Structure           P D    Condition
      ----------------------------------------------------------------------------
  _   CIC_DFHSHUNT_001           System-managed rebuild is supported.
  _   D#$#_GBP0             U     Duplex rebuild is active.
  _   D#$#_GBP1             U     Duplex rebuild is active.
  _   D#$#_LOCK1            S     System-managed rebuild is supported.
  _   D#$#_SCA              S     System-managed rebuild is supported.
  _   I#$#EMHQ                    The structure's initial size < its actual size.
  _   I#$#LOGEMHQ                 System-managed rebuild is supported.
  _   I#$#LOGMSGQ                 System-managed rebuild is supported.
  _   I#$#MSGQ                    The structure's initial size < its actual size.
  _   IXC_DEFAULT_2
  _   RRS_ARCHIVE_1               System-managed rebuild is supported.
  _   RRS_DELAYEDUR_1             System-managed rebuild is supported.
  _   RRS_MAINUR_1                System-managed rebuild is supported.
  _   RRS_RESTART_1               System-managed rebuild is supported.
  _   RRS_RMDATA_1                System-managed rebuild is supported.




Command ===>
 F1=Help        F2=End        F3=Return                      F6=Roll
                              F9=Refresh                     F12=Retrieve

MA       b

Connected to remote server/host 9.12.6.55 using port 23       HP DeskJet 890C on LPT1:
```
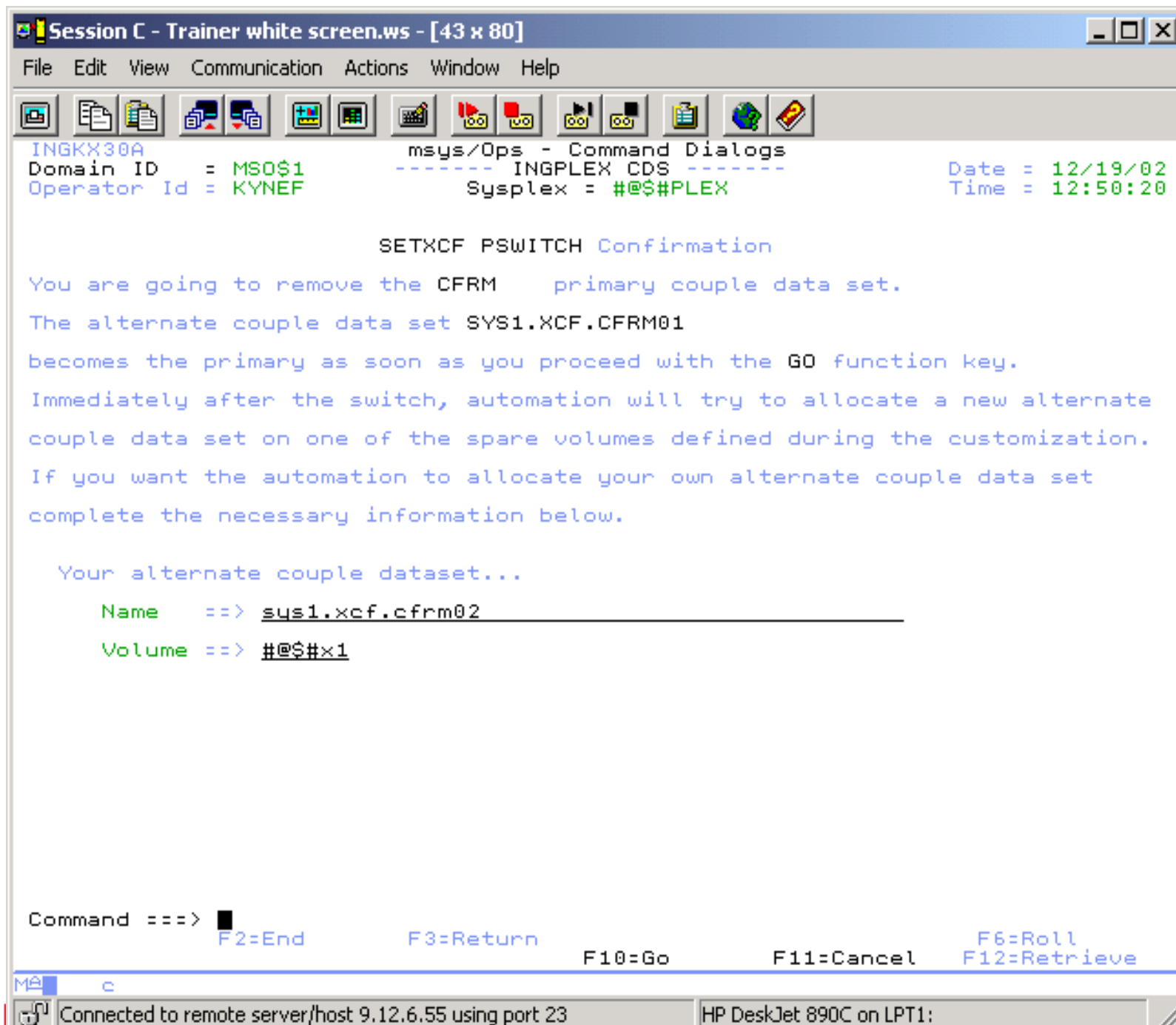
contents of FACIL05....

Redbooks   ibm.com/redbooks

msys for Operations - CF Removal (2/13)

```
Session B - [43 x 80]                                           _ □ X

File   Edit   View   Communication   Actions   Window   Help

[toolbar icons]

INGLX904                    msys/Ops - Command Dialogs      Line   1      of 13
Domain ID    = MSO$2        ----- INGCF STRUCTURE -----     Date = 09/14/02
Operator ID = KYNEF                                         Time = 13:00:48

Coupling Facility ==>   FACIL06
Sysplex . . . . . ==>   #@$#PLEX           Permission . . . . . : ALL
Include condition ==>   YES (Yes/No - Condition retrieval takes longer)
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
Cmds: D display details / F force / P stop duplex / R rebuild / S start duplex

    Structure          P D   Condition
    ---------------    - -   -------------------------------------------------
_   CIC_DFHLOG_001           System-managed rebuild is supported.
_   D#$#_GBP0            U    Duplex rebuild is active.
_   D#$#_GBP1            U    Duplex rebuild is active.
_   I#$#LOCK1                 System-managed rebuild is supported.
_   I#$#OSAM
_   I#$#VSAM
_   IGWLOCK00
_   ISGLOCK
_   ISTGENERIC               System-managed rebuild is supported.
_   IXC_DEFAULT_1
_   SYSIGGCAS_ECS
_   SYSZWLM_WORKUNIT         System-managed rebuild is supported.
_   SYSZWLM_1CE32066         System-managed rebuild is supported.




Command ===>
F1=Help         F2=End          F3=Return                       F6=Roll
                                F9=Refresh                      F12=Retrieve
MA           b
Connected to remote server/host 9.12.6.55 using port 23      HP DeskJet 890C on LPT1:
```
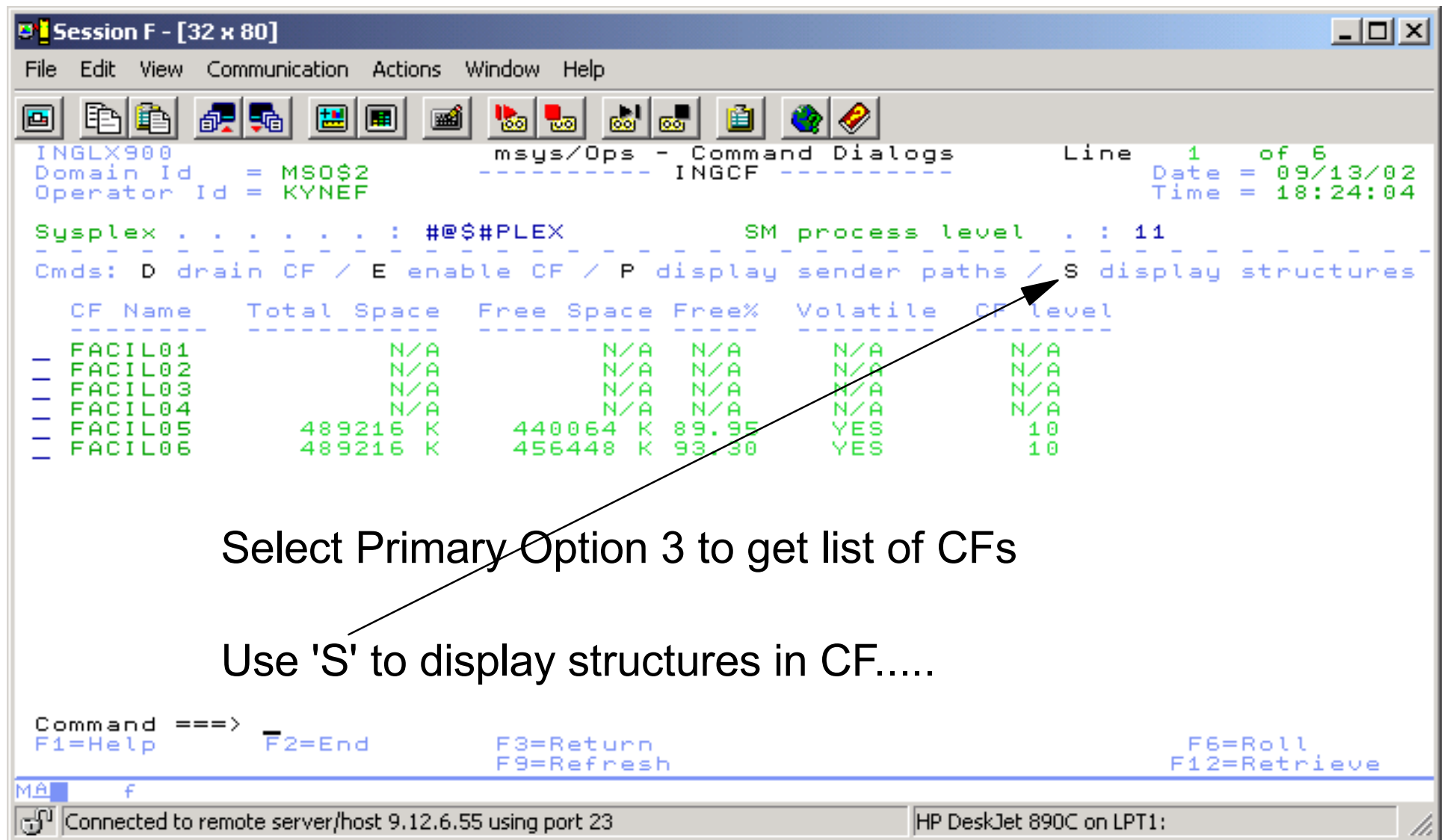
contents of other CF (FACIL06)....

msys for Operations - CF Removal (3/13)

```
Session B - [43 x 80]                                              _ □ X

File   Edit   View   Communication   Actions   Window   Help

[toolbar icons]

INGLX900                    msys/Ops - Command Dialogs        Line    1    of 6
Domain Id    = MSO$2       ---------- INGCF ----------        Date = 09/14/02
Operator Id  = KYNEF                                          Time = 13:01:41

Sysplex . . . . . . . :   #@$#PLEX              SM process level  . : 11
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
Cmds: D drain CF / E enable CF / P display sender paths / S display structures

   CF Name      Total Space   Free Space  Free%   Volatile   CF level
   -------      -----------   ----------  -----   --------   --------
 _ FACIL01              N/A          N/A    N/A        N/A        N/A
 _ FACIL02              N/A          N/A    N/A        N/A        N/A
 _ FACIL03              N/A          N/A    N/A        N/A        N/A
 _ FACIL04              N/A          N/A    N/A        N/A        N/A
 _ FACIL05        489216 K     424192 K  86.71        YES         10
 d FACIL06        489216 K     451328 K  92.26        YES         10








Command ===> ■
F1=Help         F2=End          F3=Return                    F6=Roll
                                F9=Refresh                   F12=Retrieve
MA      b
```

Want to drain FACIL06

Connected to remote server/host 9.12.6.55 using port 23   HP DeskJet 890C on LPT1:

msys for Operations - CF Removal (4/13)

```
Session B - [43 x 80]

File   Edit   View   Communication   Actions   Window   Help

INGLX901                        msys/Ops - Command Dialogs      Line      1      of 13
Domain Id    = MSO$2            ------- INGCF DRAIN -------             Date = 09/14/02
Operator Id = KYNEF                                                    Time = 13:02:37

Coupling Facility ==>  FACIL06              Status . . . . . . : NORMAL
Sysplex . . . . . ==>  #@$#PLEX             Permission . . . . : ALL
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
Structure              Condition
------------------     --------------------------------------------------------------
CIC_DFHLOG_001         System-managed rebuild is supported.
D#$#_GBP0              Duplex rebuild is active.
D#$#_GBP1              Duplex rebuild is active.
I#$#LOCK1              System-managed rebuild is supported.
I#$#OSAM
I#$#VSAM
IGWLOCK00
ISGLOCK
ISTGENERIC             System-managed rebuild is supported.
IXC_DEFAULT_1
SYSIGGCAS_ECS
SYSZWLM_WORKUNIT       System-managed rebuild is supported.
SYSZWLM_1CE32066       System-managed rebuild is supported.




Command ===>
F1=Help        F2=End         F3=Return         F10=Rebuild               F6=Roll
                              F9=Refresh                                  F12=Retrieve
MA    b
```

must hit PF10 to proceed with rebuild of
all structures in affected CF....

Connected to remote server/host 9.12.6.55 using port 23   HP DeskJet 890C on LPT1:
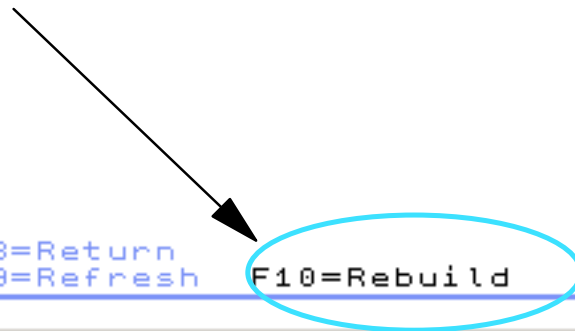
msys for Operations - CF Removal (5/13)

```
Session B - [43 x 80]
File   Edit   View   Communication   Actions   Window   Help

 INGLX92R                     msys/Ops - Command Dialogs
 Domain Id   = MSO$2        ------- INGCF DRAIN -------        Date = 09/14/02
 Operator Id = KYNEF                                           Time = 13:03:42

 Coupling Facility . :   FACIL06
 Sysplex . . . . . . :   #@$#PLEX

                        R E B U I L D   Confirmation

 The REBUILD process runs asynchronously on the next system in the sysplex that
 has access to the CFRM couple data set and can perform all necessary actions.
 Each structure that has no * indicator in front of its status is rebuilt to its
 status accordingly. The structures are processed in sequence. Once started use
 the refresh PF key for getting the current status of the process. When more
 than one structure is being rebuilt a timeout occured indicating that XCF is
 very busy. But processing continues. A display without any structure or only
 structures that cannot be rebuilt indicates a successful completion.
```

must hit PF10 (GO) to proceed with rebuild of all structures to other CF....

```
 Command ===> ■
         F2=End          F3=Return                                 F6=Roll
                                       F10=Go        F11=Cancel    F12=Retrieve
MA     b
Connected to remote server/host 9.12.6.55 using port 23          HP DeskJet 890C on LPT1:
```

msys for Operations - CF Removal (6/13)

```
Session B - [43 x 80]

File   Edit   View   Communication   Actions   Window   Help

INGLX901                    msys/Ops - Command Dialogs       Line    4    of 13
Domain Id    = MSO$2       ------- INGCF DRAIN -------              Date = 09/14/02
Operator Id  = KYNEF                                                Time = 13:04:52

Coupling Facility ==>  FACIL06              Status . . . . . . :   REBUILDING
Sysplex . . . . . ==>  #@$#PLEX             Permission . . . . :   ALL
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
Structure                   Condition
------------------          ----------------------------------------------------
CIC_DFHLOG_001              Structure is awaiting rebuild.
D#$#_GBP0                   Duplex rebuild is active.
D#$#_GBP1                   Duplex rebuild is active.
I#$#LOCK1                   Structure is awaiting rebuild.
I#$#OSAM                    Structure is awaiting rebuild.
I#$#VSAM                    Structure is awaiting rebuild.
IGWLOCK00                   Structure is awaiting rebuild.
ISGLOCK                    *Preference list is empty.
ISTGENERIC                  Structure is awaiting rebuild.
IXC_DEFAULT_1               Structure is awaiting rebuild.
SYSIGGCAS_ECS               Structure is being rebuilt.
SYSZWLM_WORKUNIT            Structure is awaiting rebuild.
SYSZWLM_1CE32066            Structure is awaiting rebuild.







Command ===>
F1=Help        F2=End              F3=Return                        F6=Roll
                                   F9=Refresh                       F12=Retrieve
MA          b
Connected to remote server/host 9.12.6.55 using port 23        HP DeskJet 890C on LPT1:
```

Hit PF9 as rebuild proceeds for latest status....

msys for Operations - CF Removal (7/13)

```
Session B - [43 x 80]
File   Edit   View   Communication   Actions   Window   Help

INGLX901                        msys/Ops - Command Dialogs      Line    1    of 6
Domain Id    = MSO$2            -------- INGCF DRAIN --------           Date = 09/14/02
Operator Id = KYNEF                                                     Time = 13:05:58

Coupling Facility ==>  FACIL06              Status . . . . . :  REBUILDING
Sysplex . . . . . ==>  #@$#PLEX             Permission : . . :  ALL
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
Structure               Condition
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
CIC_DFHLOG_001          Structure is awaiting rebuild.
D#$#_GBP1               Duplex rebuild is active.
ISTGENERIC              Structure is awaiting rebuild.
IXC_DEFAULT_1           Structure is awaiting rebuild.
SYSZWLM_WORKUNIT        Structure is awaiting rebuild.
SYSZWLM_1CE32066        Structure is being rebuilt.




Command ===>
F1=Help        F2=End          F3=Return                          F6=Roll
                               F9=Refresh                         F12=Retrieve
MA       b
Connected to remote server/host 9.12.6.55 using port 23          HP DeskJet 890C on LPT1:
```

Number of structures reduces as they move - but you have to hit PF9 to get latest status (panel is not dynamic)....

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msys for Operations - CF Removal (8/13)

Session B - [43 x 80]

File Edit View Communication Actions Window Help

```
INGLX901                         msys/Ops - Command Dialogs        Line
Domain Id   = MSO$2           ------- INGCF DRAIN -------        Date = 09/14/02
Operator Id = KYNEF                                              Time = 13:08:02

Coupling Facility ==> FACIL06              Status . . . . . :  NORMAL
Sysplex . . . . . ==> #@$#PLEX             Permission . . . :  ALL
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
Structure               Condition
---------------         ------------
```

When CF is empty, you are prompted to hit
PF4 to proceed with draining CF....

```
Command ===>  ▪
F1=Help        F2=End         F3=Return        F4=Drain             F6=Roll
                              F9=Refresh                            F12=Retrieve
MA▪    b
```

Connected to remote server/host 9.12.6.55 using port 23   HP DeskJet 890C on LPT1:

msys for Operations - CF Removal (9/13)

```
Session B - [43 x 80]                                                   _ □ ×

File   Edit   View   Communication   Actions   Window   Help

INGLX92D                     msys/Ops - Command Dialogs
Domain Id   = MSO$2          ------- INGCF DRAIN -------       Date = 09/14/02
Operator Id = KYNEF                                            Time = 13:09:22

Coupling Facility . :  FACIL06
Sysplex . . . . . . :  #@$#PLEX

                        D R A I N   Confirmation

The DRAIN process runs asynchronously on the next system in the Sysplex that
has access to the CFRM couple data set. Each sender path of each connected
system is set to OFFLINE. Once started use the refresh PF key for getting the
current status of the process. The status DRAINED indicates a successful
completion.












Command ===>  ■
              F2=End          F3=Return        F10=Go        F11=Cancel      F6=Roll
                                                                             F12=Retrieve
MA       b

Connected to remote server/host 9.12.6.55 using port 23          HP DeskJet 890C on LPT1:
```

Once again, action will not proceed till you press PF10 (go)....

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msys for Operations - CF Removal (10/13)

CF is now drained and ready to be deactivated....

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msys for Operations - CF Removal (11/13)

Session B - [43 x 80]

File   Edit   View   Communication   Actions   Window   Help

```
INGLX92S                        msys/Ops - Command Dialogs
Domain Id   = MSO$2         ------- INGCF DRAIN -------          Date = 09/14/02
Operator Id = KYNEF                                              Time = 13:15:22

Coupling Facility . : FACIL06
Sysplex . . . . . . : #@$#PLEX

                     D E A C T I V A T E  Confirmation

The DEACTIVATE process runs asynchronously on the next system in the Sysplex
that has access to the coupling facility via the BCP internal interface. It
sends the deactivation command to the Support Element. Once started use the
refresh PF key for getting the current status of the process. The status
INACTIVE indicates a successful completion.
```

Once again, action will not proceed till you press PF10 (go)....

```
Command ===> ▮
        F2=End          F3=Return       F10=Go       F11=Cancel    F6=Roll
                                                                   F12=Retrieve
MA       b
```

Connected to remote server/host 9.12.6.55 using port 23   HP DeskJet 890C on LPT1:

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msys for Operations - CF Removal (12/13)

CF LPAR has been deactivated

Window title: SCZHMC4: SCZP802:C2 Details - Netscape

SCZP802:C2 Details

Instance information

Status:	Not Activated
Group:	CPC Images
SysPlex name:	
Lockout disruptive tasks: ○ Yes ● No	

Activation profile:	C2
Last used profile:	C2
Operating system:	
CPU LPAR Cluster Name:	

Last task information

Task name: Activate
Task status: Completed

Acceptable status

☑ - Operating   ☐ - Not operating   ☐ - Power save
☐ - Not Activated   ☐ - Exceptions   ☐ - Status check

[Save]   [Change Options]   [Return]

Document: Done

msys for Operations - CF Removal (13/13)

```
Session B - [43 x 80]

File   Edit   View   Communication   Actions   Window   Help

INGLX901                     msys/Ops  -  Command  Dialogs        Line
Domain Id    = MSO$2        -------  INGCF DRAIN  -------         Date = 09/14/02
Operator Id  = KYNEF                                              Time = 13:16:42

Coupling Facility ==>   FACIL06              Status . . . . . :  INACTIVE
Sysplex . . . . . ==>   #@$#PLEX             Permission : : : :  ALL
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
Structure              Condition
-------------          -------------                             -------------



















Command ===>  ■
F1=Help       F2=End            F3=Return                         F6=Roll
                                F9=Refresh                        F12=Retrieve

MA   b
Connected to remote server/host 9.12.6.55 using port 23          HP DeskJet 890C on LPT1:
```

CF is now completely deactivated....

msys for Operations - CF Enabling (1/9)

```
Session C - Trainer white screen.ws - [43 x 80]                    _ □ X
File  Edit  View  Communication  Actions  Window  Help

INGLX900                       msys/Ops  -  Command Dialogs      Line    1    of 6
Domain Id    = MSO$1           ---------- INGCF ----------         Date = 12/18/02
Operator Id  = KYNEF                                               Time = 17:17:58

Sysplex . . . . . . . :  #@$#PLEX            SM process level  . : 12 (#@$3)
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
Cmds:  D drain CF / E enable CF / P display sender paths / S display structures

    CF Name      Total Space     Free Space Free%   Volatile   CF level
    ----------   -----------     ---------- -----   --------   --------
_   FACIL01             N/A             N/A   N/A        N/A        N/A
_   FACIL02             N/A             N/A   N/A        N/A        N/A
_   FACIL03             N/A             N/A   N/A        N/A        N/A
_   FACIL04             N/A             N/A   N/A        N/A        N/A
_   FACIL05        461056 K        326912 K 70.91       YES         12
e   FACIL06             N/A             N/A   N/A        N/A        N/A




Command ===> ■
F1=Help        F2=End          F3=Return                       F6=Roll
                               F9=Refresh                      F12=Retrieve
MA                c
```

Connected to remote server/host 9.12.6.55 using port 23   HP DeskJet 890C on LPT1:

After work is complete, we want to bring the
CF back into service......

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msys for Operations - CF Enabling (2/9)

```
Session C - Trainer white screen.ws - [43 x 80]

File   Edit   View   Communication   Actions   Window   Help

INGLX901                    msys/Ops - Command Dialogs         Line
Domain Id   = MSO$1        ------ INGCF ENABLE ------        Date = 12/18/02
Operator Id = KYNEF                                          Time = 17:19:41

Coupling Facility ==>  FACIL06              Status . . . . . : INACTIVE
Sysplex . . . . . ==>  #@$#PLEX             Permission . . . : ALL

Structure              Condition
----------             ----------









Command ===>
F1=Help        F2=End          F3=Return                         F6=Roll
                               F9=Refresh                   F11=Activate  F12=Retrieve
MA                c
```

Connected to remote server/host 9.12.6.55 using port 23   HP DeskJet 890C on LPT1:

Current status is INACTIVE, so we need to do ACTIVATE to re-activate CF LPAR

msys for Operations - CF Enabling (3/9)

Session C - Trainer white screen.ws - [43 x 80]

File Edit View Communication Actions Window Help

```
INGLX92P                        msys/Ops - Command Dialogs
Domain Id    = MSO$1            ------ INGCF ENABLE ------              Date = 12/18/02
Operator Id  = KYNEF                                                   Time = 17:20:29

Coupling Facility . :  FACIL06
Sysplex . . . . . . :  #@$#PLEX

                        A C T I V A T E   Confirmation

The ACTIVATE process runs asynchronously on the next system in the Sysplex
that has access to the coupling facility via the BCP internal interface. It
sends the activation command to the Support Element. Once started use the
refresh PF key for getting the current status of the process. The status
DRAINED indicates a successful completion.
```

Must hit PF10 (GO) to proceed with ACTIVATE

```
Command ===> █
       F2=End           F3=Return                                        F6=Roll
                                         F10=Go          F11=Cancel       F12=Retrieve
MA  c
```

msys for Operations - CF Enabling (4/9)

```
Session C - Trainer white screen.ws - [43 x 80]                    _ □ X

File  Edit  View  Communication  Actions  Window  Help

INGLX901                    msys/Ops - Command Dialogs        Line
Domain Id    = MSO$1        ------- INGCF ENABLE -------      Date = 12/19/02
Operator Id  = KYNEF                                          Time = 10:12:52

Coupling Facility ==>  FACIL06          Status . . . . . . : DRAINED
Sysplex . . . . . ==>  #@$#PLEX         Permission . . . . : ALL
-  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
Structure            Condition
-  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
```

Status changes to DRAINED - LPAR is now active,
but all CHPIDs are offline. To bring paths back
online, must do ENABLE

```
Command ===> ■
F1=Help       F2=End        F3=Return     F4=Enable        F6=Roll
                            F9=Refresh                     F12=Retrieve
MA■      c
```

Connected to remote server/host 9.12.6.55 using port 23   HP DeskJet 890C on LPT1:

msys for Operations - CF Enabling (5/9)

```
Session C - Trainer white screen.ws - [43 x 80]

File  Edit  View  Communication  Actions  Window  Help

INGLX92E                      msys/Ops  -  Command  Dialogs
Domain Id    = MSO$1          ------  INGCF ENABLE  ------          Date = 12/18/02
Operator Id  = KYNEF                                                Time = 17:21:56

Coupling Facility . :  FACIL06
Sysplex . . . . . . :  #@$#PLEX

                         E N A B L E   Confirmation

The ENABLE process runs asynchronously on the next system in the Sysplex that
has access to the CFRM couple data set. All sender paths of all system in the
sysplex are set to ONLINE. Once started use the refresh PF key for getting
the current status of the process. The status NORMAL indicates a successful
completion.
```

Of course, we have to confirm that we want to proceed

```
Command ===> █
         F2=End          F3=Return         F10=Go          F11=Cancel    F6=Roll
                                                                         F12=Retrieve
MA█    c
```
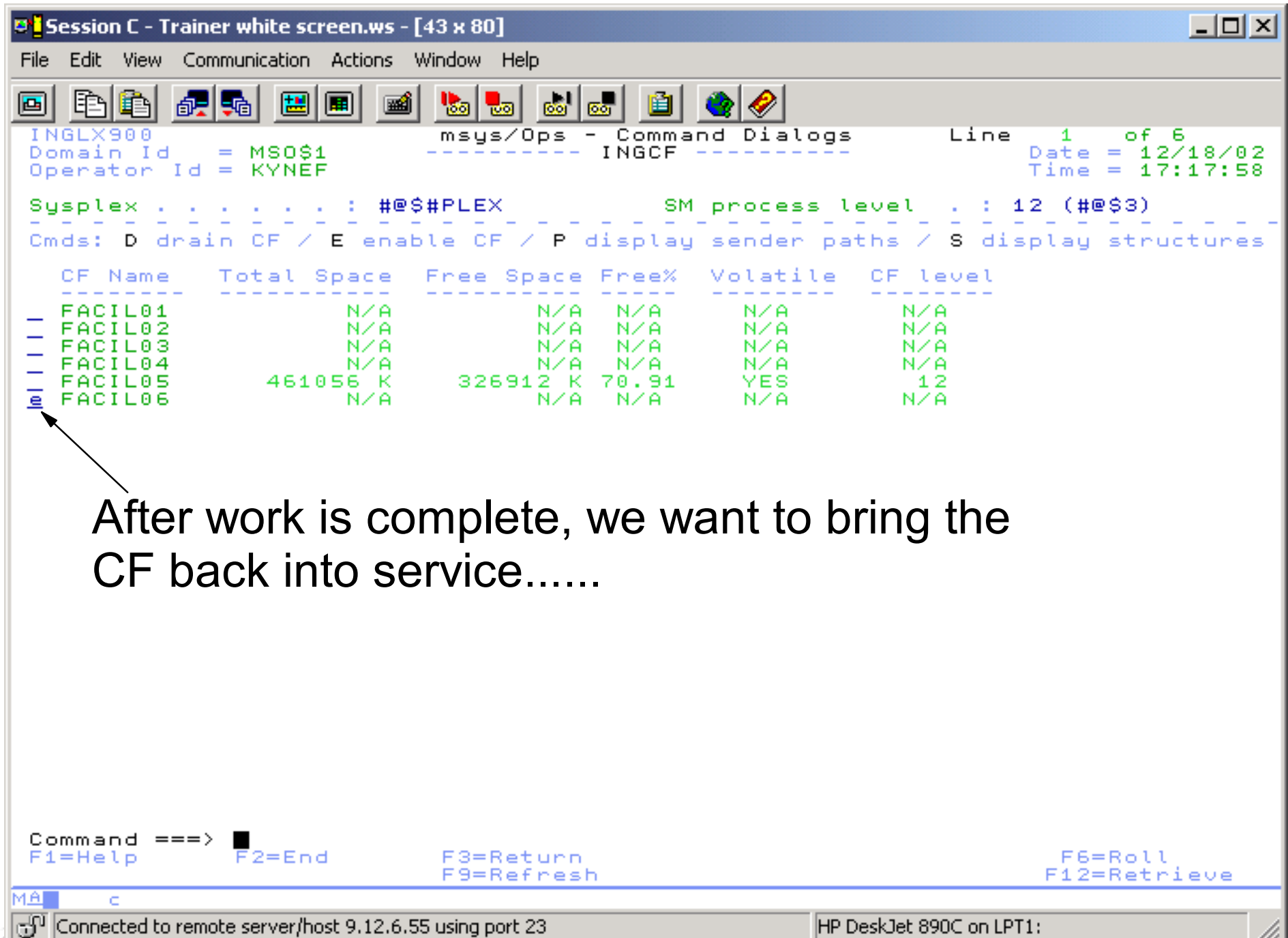
Connected to remote server/host 9.12.6.55 using port 23   HP DeskJet 890C on LPT1:

msys for Operations - CF Enabling (6/9)


```
Session C - Trainer white screen.ws - [43 x 80]

File  Edit  View  Communication  Actions  Window  Help

INGLX901                    msys/Ops - Command Dialogs          Line     1     of 11
Domain Id   = MSO$1         ------- INGCF ENABLE -------        Date = 12/18/02
Operator Id = KYNEF                                             Time = 17:24:10

Coupling Facility ==>  FACIL06              Status . . . . . . : NORMAL
Sysplex . . . . . ==>  #@$#PLEX             Permission . . . . : ALL
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
Structure                   Condition
--------------              ------------------------------------------------
CIC_DFHLOG_001              Structure is currently allocated in FACIL05.
D#$#_GBP0                   Duplex rebuild is active.
D#$#_GBP1                   Duplex rebuild is active.
IGWLOCK00                   Structure is currently allocated in FACIL05.
ISGLOCK                     Structure is currently allocated in FACIL05.
ISTGENERIC                  Structure is currently allocated in FACIL05.
IXC_DEFAULT_1               Structure is currently allocated in FACIL05.
PSMGAPPL01                  Structure is currently allocated in FACIL05.
SYSIGGCAS_ECS               Structure is currently allocated in FACIL05.
SYSZWLM_WORKUNIT            Structure is currently allocated in FACIL05.
SYSZWLM_1CE32066            Structure is currently allocated in FACIL05.




Command ===>
F1=Help        F2=End         F3=Return        F10=Populate            F6=Roll
                              F9=Refresh                               F12=Retrieve
MA           c
```
Connected to remote server/host 9.12.6.55 using port 23   HP DeskJet 890C on LPT1:

Status changes to DRAINED, then NORMAL OFFLINE, and finally NORMAL. Note that only DUPLEX(ENABLED) structures are in CF at this point...

Must do POPULATE to move other structures back.

msys for Operations - CF Enabling (7/9)

```
Session C - Trainer white screen.ws - [43 x 80]

File   Edit   View   Communication   Actions   Window   Help

INGLX92P                          msys/Ops  -  Command Dialogs
Domain Id   = MSO$1       ------- INGCF ENABLE -------        Date = 12/18/02
Operator Id = KYNEF                                           Time = 17:25:54

Coupling Facility . :  FACIL06
Sysplex . . . . . . :  #@$#PLEX

                       P O P U L A T E   Confirmation

The POPULATE process runs asynchronously on the next system in the Sysplex
that has access to the CFRM couple data set and supports this action. XCF
tries to allocate all structures in the coupling facility that are designated
to be allocated there. Once started use the refresh PF key for for getting
the current status of the process. A display without any structure still being
allocated elsewhere indicates a successful completion. In case the operation
does not complete successfully check the netlog for XCF messages giving the
reason for this situation.
```

Once again, action will not proceed till you press PF10 (Go)....

```
Command ===> █
              F2=End          F3=Return                                F6=Roll
                                        F10=Go        F11=Cancel   F12=Retrieve
MА█
      c
Connected to remote server/host 9.12.6.55 using port 23     HP DeskJet 890C on LPT1:
```
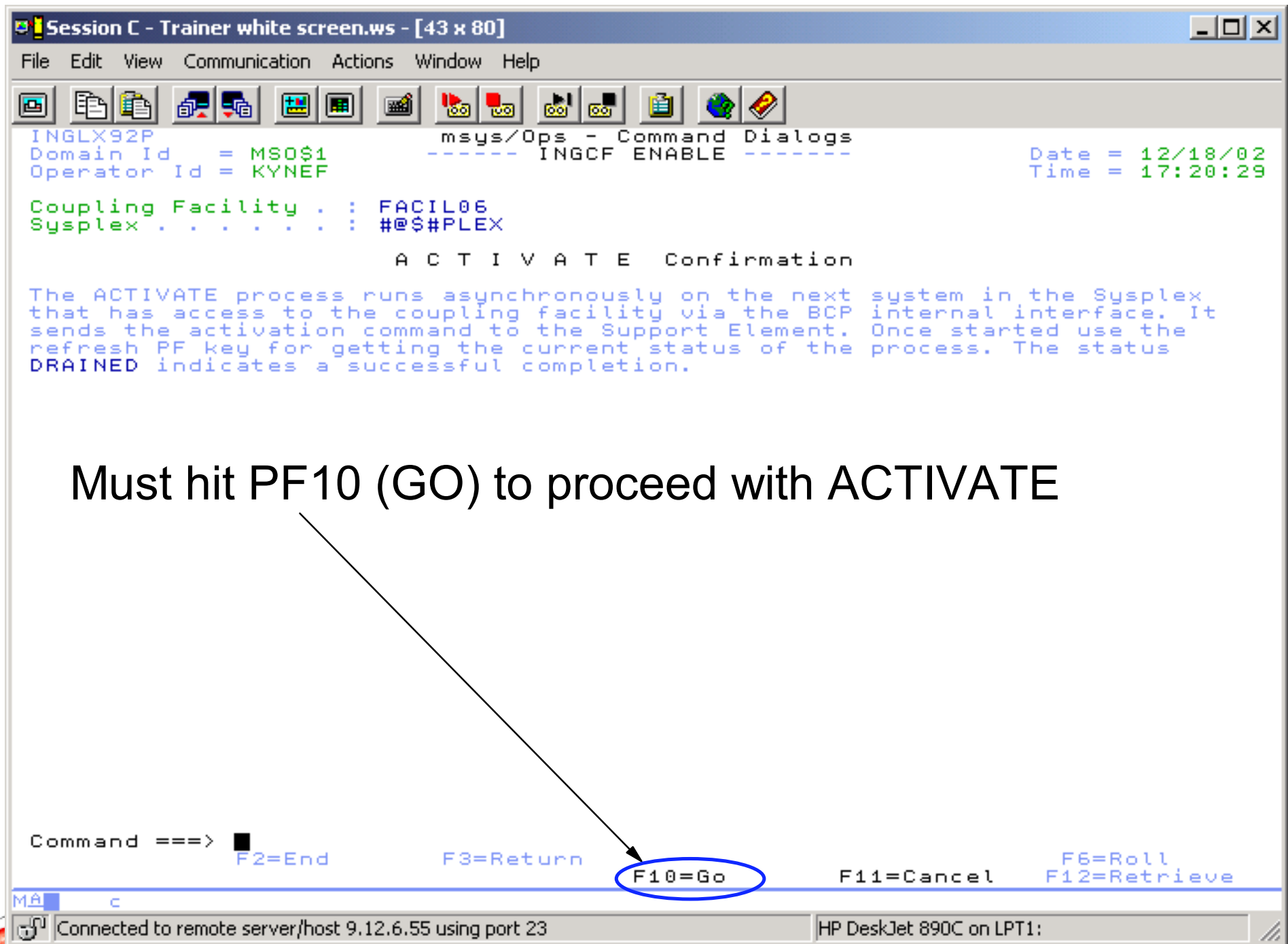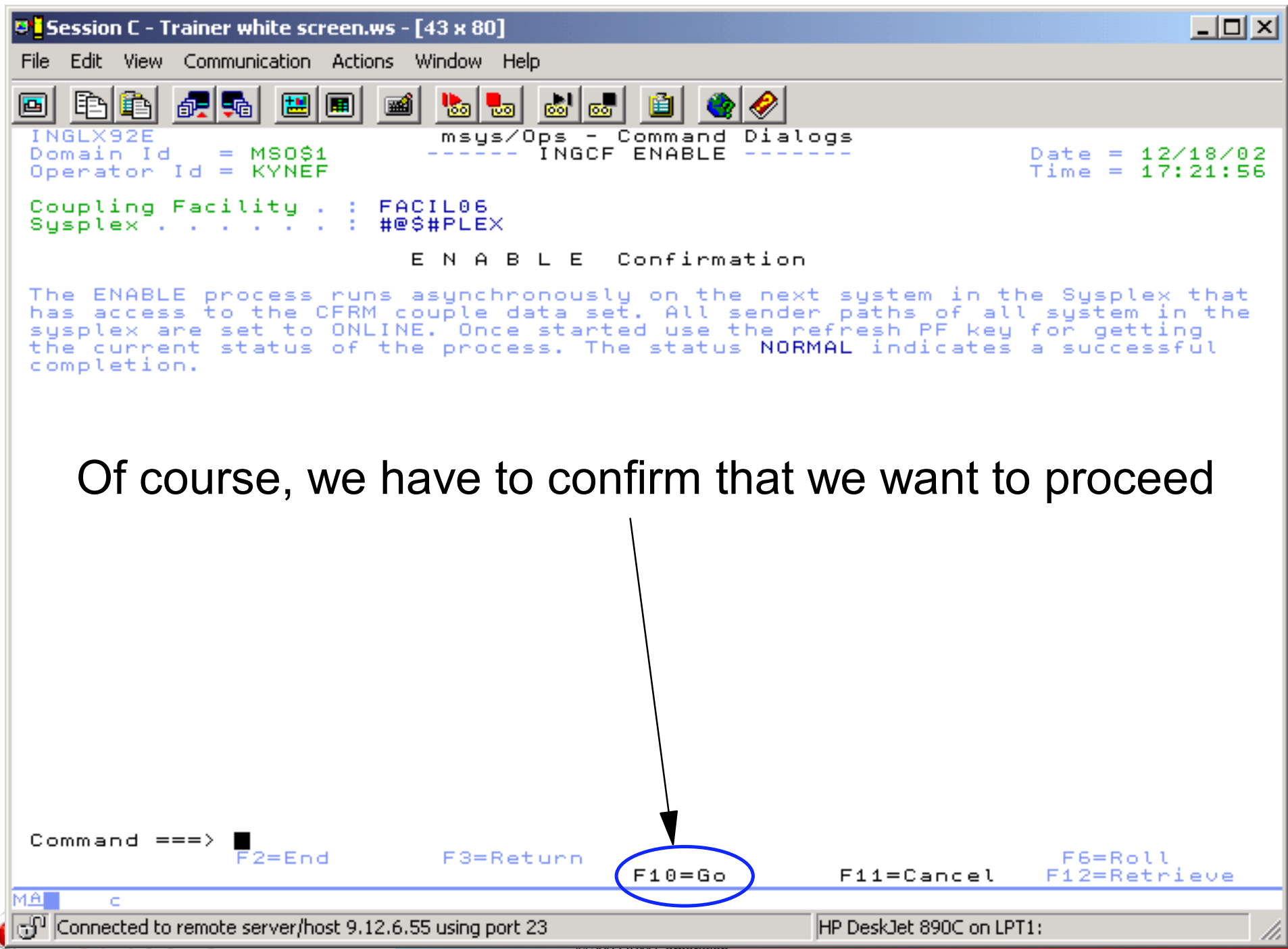
msys for Operations - CF Enabling (8/9)

```
Session C - Trainer white screen.ws - [43 x 80]                    _ □ X

File  Edit  View  Communication  Actions  Window  Help

[toolbar icons]

INGLX901                        msys/Ops - Command Dialogs      Line    1    of 11
Domain Id   = MSO$1             ------ INGCF ENABLE ------             Date = 12/18/02
Operator Id = KYNEF                                                   Time = 17:26:41

Coupling Facility ==>  FACIL06              Status . . . . . :  POPULATING
Sysplex . . . . . ==>  #@$#PLEX             Permission : : : :  ALL
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
Structure                  Condition
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
CIC_DFHLOG_001         Structure is currently allocated in FACIL05.
D#$#_GBP0              Duplex rebuild is active.
D#$#_GBP1              Duplex rebuild is active.
IGWLOCK00             Structure is currently allocated in ?.
ISGLOCK              Structure is currently allocated in FACIL05.
ISTGENERIC            Structure is currently allocated in FACIL05.
IXC_DEFAULT_1         Structure is currently allocated in FACIL05.
PSMGAPPL01            Structure is currently allocated in FACIL05.
SYSIGGCAS_ECS         Structure is currently allocated in FACIL05.
SYSZWLM_WORKUNIT      Structure is currently allocated in FACIL05.
SYSZWLM_1CE32066      Structure is currently allocated in FACIL05.








Command ===>
F1=Help        F2=End         F3=Return                      F6=Roll
                              F9=Refresh                     F12=Retrieve
MA              c

Connected to remote server/host 9.12.6.55 using port 23    HP DeskJet 890C on LPT1:
```

Status changes to POPULATING......

msys for Operations - CF Enabling (9/9)

```
Session C - Trainer white screen.ws - [43 x 80]

File  Edit  View  Communication  Actions  Window  Help

INGLX901                      msys/Ops - Command Dialogs      Line    1     of 11
Domain Id    = MSO$1          ------ INGCF ENABLE ------               Date = 12/18/02
Operator Id  = KYNEF                                                   Time = 17:35:35

Coupling Facility ==>  FACIL06              Status . . . . . :  NORMAL
Sysplex . . . . . ==>  #@$#PLEX             Permission : : : :  ALL
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
Structure              Condition
------------------     --------------------------------------------------
CIC_DFHLOG_001         The structure's initial size < its actual size.
D#$#_GBP0              Duplex rebuild is active.
D#$#_GBP1              Duplex rebuild is active.
IGWLOCK00             System-managed rebuild is supported.
ISGLOCK
ISTGENERIC            System-managed rebuild is supported.
IXC_DEFAULT_1         The structure's initial size < its actual size.
PSMGAPPL01           System-managed rebuild is supported.
SYSIGGCAS_ECS
SYSZWLM_WORKUNIT     System-managed rebuild is supported.
SYSZWLM_1CE32066     System-managed rebuild is supported.




Command ===>
F1=Help        F2=End         F3=Return                          F6=Roll
                              F9=Refresh                         F12=Retrieve
MA               c
```
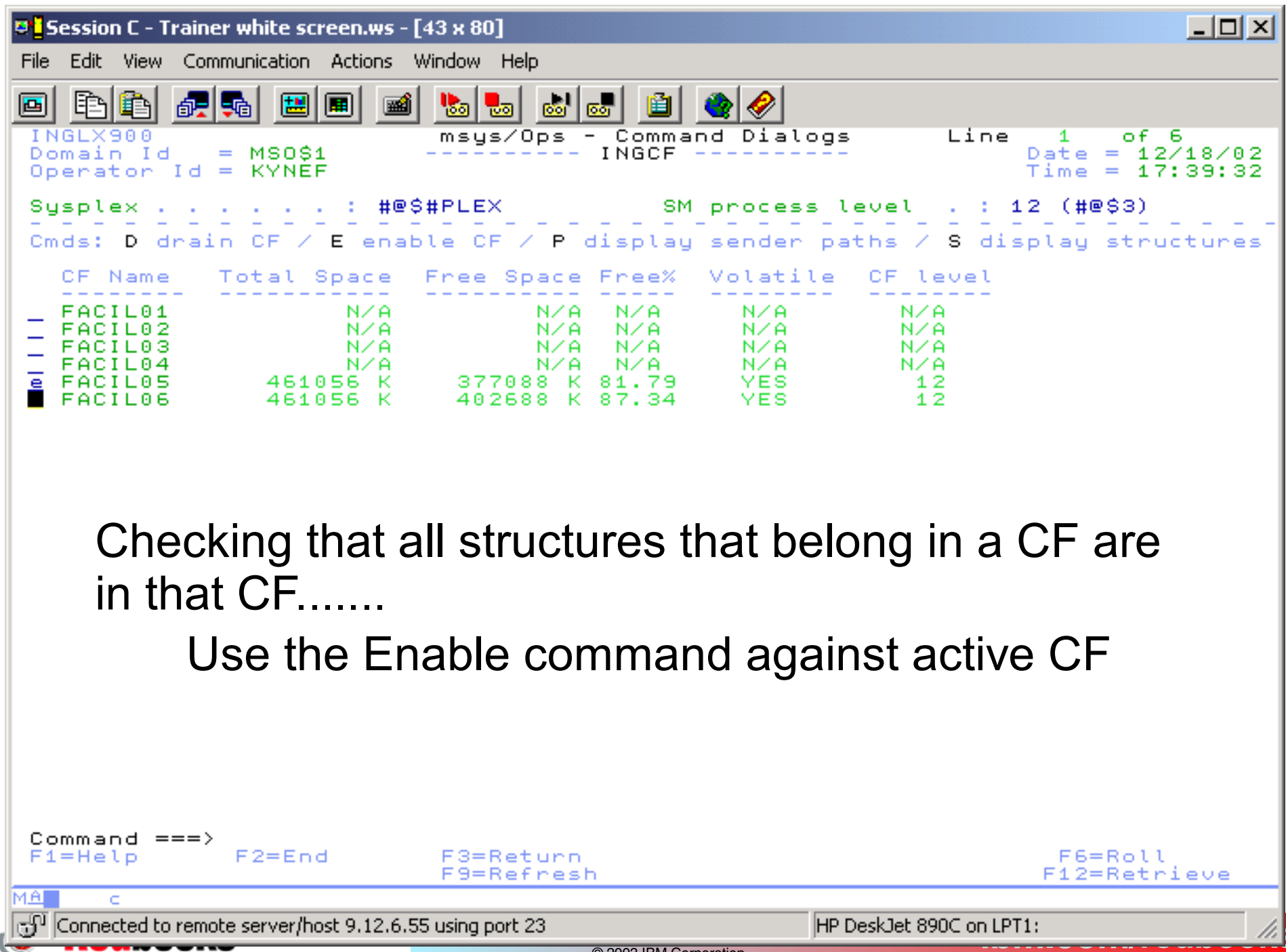
Connected to remote server/host 9.12.6.55 using port 23   HP DeskJet 890C on LPT1:

Resulting in all structures with FACIL06 as preferred
CF moving back into that CF.....

msys for Operations - CF Verification (1/5)


```
 Session C - Trainer white screen.ws - [43 x 80]                         _ □ X
File  Edit  View  Communication  Actions  Window  Help

 □   ⬚⬚  ⬚⬚   ⬚⬚⬚  ⬚⬚   ⬚⬚  ⬚⬚   ⬚   ⬚⬚  ⬚⬚   ⬚⬚  ⬚⬚   ⬚   ⬚   ⬚

 INGLX900                        msys/Ops - Command Dialogs      Line    1     of 6
 Domain Id    = MSO$1            ----------  INGCF  ----------   Date = 12/18/02
 Operator Id  = KYNEF                                           Time = 17:39:32

 Sysplex . . . . . . . : #@$#PLEX            SM process level  . : 12 (#@$3)
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 Cmds:  D drain CF / E enable CF / P display sender paths / S display structures

   CF Name      Total Space    Free Space  Free%  Volatile   CF level
   -------      -----------    ----------  -----  --------   --------
 _ FACIL01            N/A            N/A   N/A      N/A         N/A
 _ FACIL02            N/A            N/A   N/A      N/A         N/A
 _ FACIL03            N/A            N/A   N/A      N/A         N/A
 _ FACIL04            N/A            N/A   N/A      N/A         N/A
 e FACIL05       461056 K       377088 K 81.79     YES          12
 ▮ FACIL06       461056 K       402688 K 87.34     YES          12













 Command ===>
 F1=Help          F2=End          F3=Return                      F6=Roll
                                  F9=Refresh                     F12=Retrieve
MA                c
 Connected to remote server/host 9.12.6.55 using port 23         HP DeskJet 890C on LPT1:
```
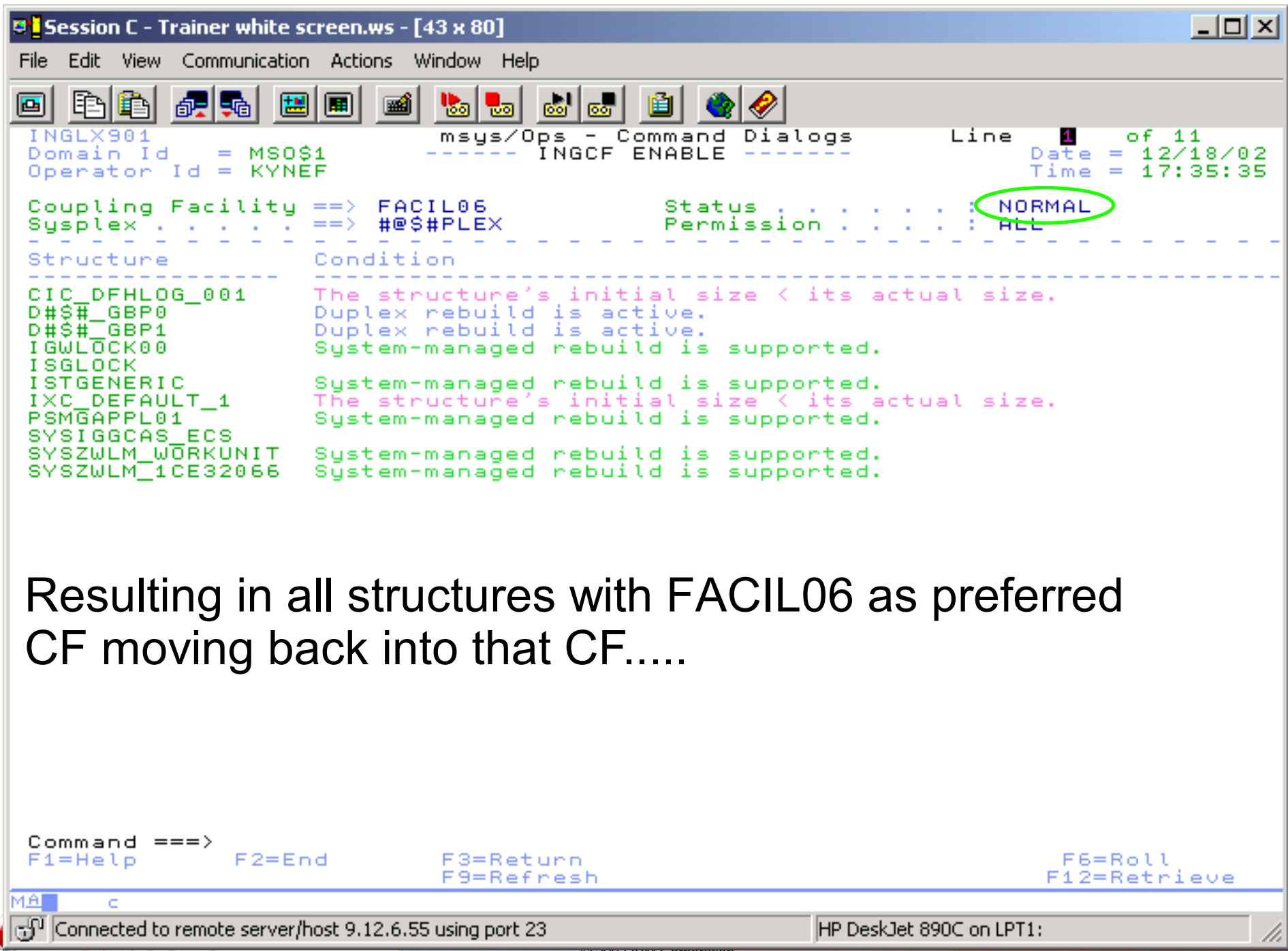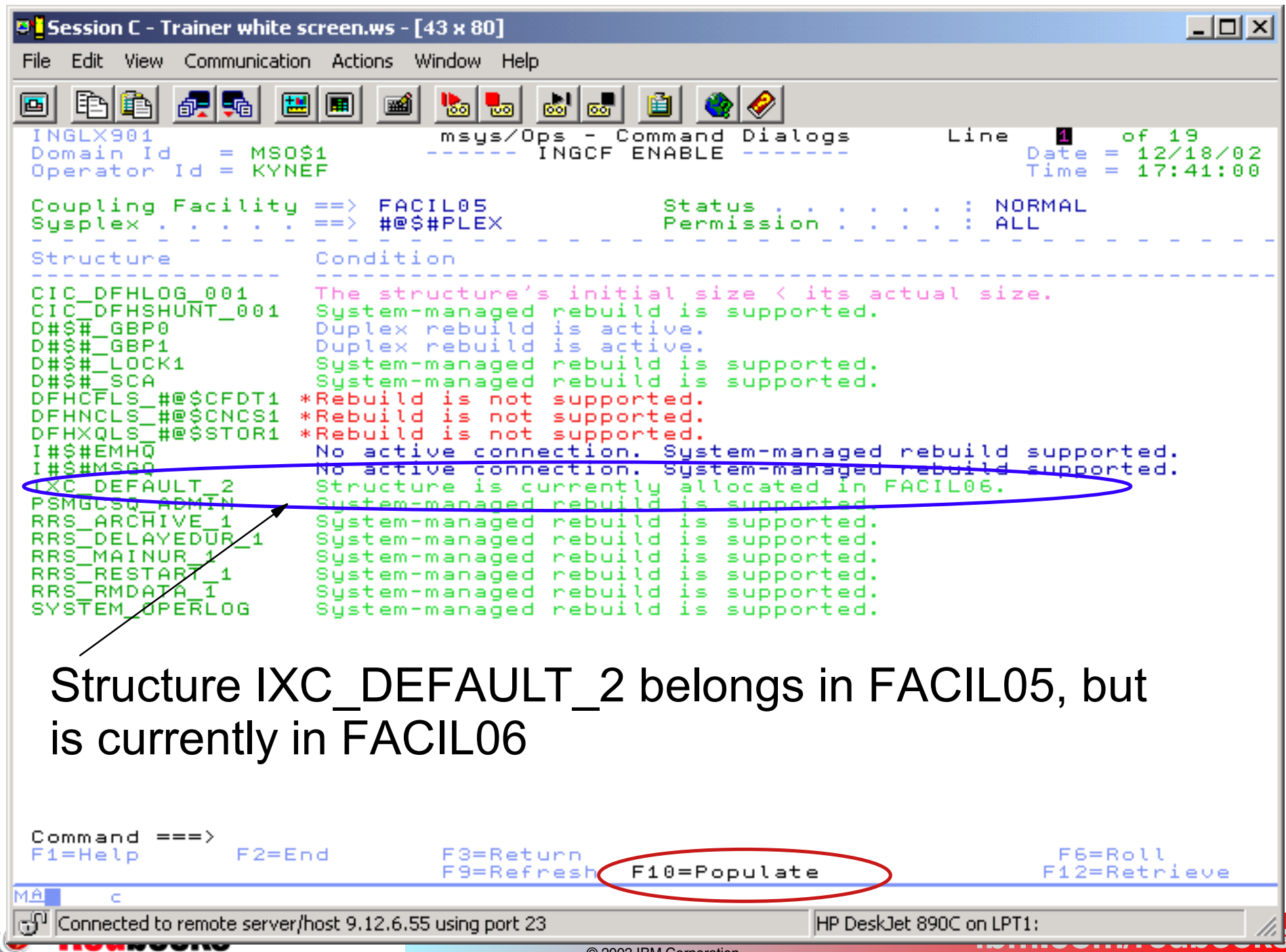
Checking that all structures that belong in a CF are in that CF.......

  Use the Enable command against active CF

msys for Operations - CF Verification (2/5)

```
Session C - Trainer white screen.ws - [43 x 80]                    _ □ X

File   Edit   View   Communication   Actions   Window   Help

[toolbar icons]

INGLX901                    msys/Ops - Command Dialogs        Line    1     of 19
Domain Id   = MSO$1         ------- INGCF ENABLE -------        Date = 12/18/02
Operator Id = KYNEF                                             Time = 17:41:00

Coupling Facility ==>  FACIL05            Status . . . . . . : NORMAL
Sysplex . . . . . ==>  #@$#PLEX           Permission . . . . : ALL

Structure                  Condition
--------------------------------------------------------------------------------
CIC_DFHLOG_001     The structure's initial size < its actual size.
CIC_DFHSHUNT_001   System-managed rebuild is supported.
D#$#_GBP0          Duplex rebuild is active.
D#$#_GBP1          Duplex rebuild is active.
D#$#_LOCK1         System-managed rebuild is supported.
D#$#_SCA           System-managed rebuild is supported.
DFHCFLS_#@$CFDT1   *Rebuild is not supported.
DFHNCLS_#@$CNCS1   *Rebuild is not supported.
DFHXQLS_#@$STOR1   *Rebuild is not supported.
I#$#EMHQ           No active connection. System-managed rebuild supported.
I#$#MSGQ           No active connection. System-managed rebuild supported.
IXC_DEFAULT_2      Structure is currently allocated in FACIL06.
PSMGCSQ_ADMIN      System-managed rebuild is supported.
RRS_ARCHIVE_1      System-managed rebuild is supported.
RRS_DELAYEDUR_1    System-managed rebuild is supported.
RRS_MAINUR_1       System-managed rebuild is supported.
RRS_RESTART_1      System-managed rebuild is supported.
RRS_RMDATA_1       System-managed rebuild is supported.
SYSTEM_OPERLOG     System-managed rebuild is supported.




Command ===>
F1=Help        F2=End          F3=Return                    F6=Roll
                               F9=Refresh    F10=Populate    F12=Retrieve
MA     c
```

Connected to remote server/host 9.12.6.55 using port 23   HP DeskJet 890C on LPT1:

Structure IXC_DEFAULT_2 belongs in FACIL05, but is currently in FACIL06

msys for Operations - CF Verification (3/5)

```
Session C - Trainer white screen.ws - [43 x 80]                    _ □ X

File   Edit   View   Communication   Actions   Window   Help

INGLX92P                      msys/Ops - Command Dialogs
Domain Id    = MSO$1          ------ INGCF ENABLE ------        Date = 12/18/02
Operator Id = KYNEF                                             Time = 17:41:29

Coupling Facility . :  FACIL05
Sysplex . . . . . . :  #@$#PLEX

                    P O P U L A T E   Confirmation

The POPULATE process runs asynchronously on the next system in the Sysplex
that has access to the CFRM couple data set and supports this action. XCF
tries to allocate all structures in the coupling facility that are designated
to be allocated there. Once started use the refresh PF key for for getting
the current status of the process. A display without any structure still being
allocated elsewhere indicates a successful completion. In case the operation
does not complete successfully check the netlog for XCF messages giving the
reason for this situation.
```

must hit PF10 (GO) to proceed with relocation of structures.....

```
Command ===> ■
          F2=End          F3=Return              F10=Go         F11=Cancel     F6=Roll
                                                                               F12=Retrieve
MA■    c
Connected to remote server/host 9.12.6.55 using port 23        HP DeskJet 890C on LPT1:
```

msys for Operations - CF Verification (4/5)

```
Session C - Trainer white screen.ws - [43 x 80]

File   Edit   View   Communication   Actions   Window   Help

INGLX901                          msys/Ops - Command Dialogs        Line    1      of 19
Domain Id    = MSO$1            ------- INGCF ENABLE -------         Date = 12/18/02
Operator Id = KYNEF                                                 Time = 17:42:15

Coupling Facility ==>  FACIL05             Status . . . . . .: POPULATING
Sysplex . . . . . ==>  #@$#PLEX            Permission . . . .  ALL
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
Structure                Condition
----------------------------------------------------------------------------
CIC_DFHLOG_001           The structure's initial size < its actual size.
CIC_DFHSHUNT_001         System-managed rebuild is supported.
D#$#_GBP0                Duplex rebuild is active.
D#$#_GBP1                Duplex rebuild is active.
D#$#_LOCK1               System-managed rebuild is supported.
D#$#_SCA                 System-managed rebuild is supported.
DFHCFLS_#@$CFDT1         *Rebuild is not supported.
DFHNCLS_#@$CNCS1         *Rebuild is not supported.
DFHXQLS_#@$STOR1         *Rebuild is not supported.
I#$#EMHQ                 No active connection. System-managed rebuild supported.
I#$#MSGQ                 No active connection. System-managed rebuild supported.
IXC_DEFAULT_2            Structure is currently allocated in ?.
PSMGCSQ_ADMIN            System-managed rebuild is supported.
RRS_ARCHIVE_1            System-managed rebuild is supported.
RRS_DELAYEDUR_1          System-managed rebuild is supported.
RRS_MAINUR_1             System-managed rebuild is supported.
RRS_RESTART_1            System-managed rebuild is supported.
RRS_RMDATA_1             System-managed rebuild is supported.
SYSTEM_OPERLOG           System-managed rebuild is supported.




Command ===>
F1=Help        F2=End         F3=Return                      F6=Roll
                              F9=Refresh                     F12=Retrieve
MA  c
Connected to remote server/host 9.12.6.55 using port 23        HP DeskJet 890C on LPT1:
```
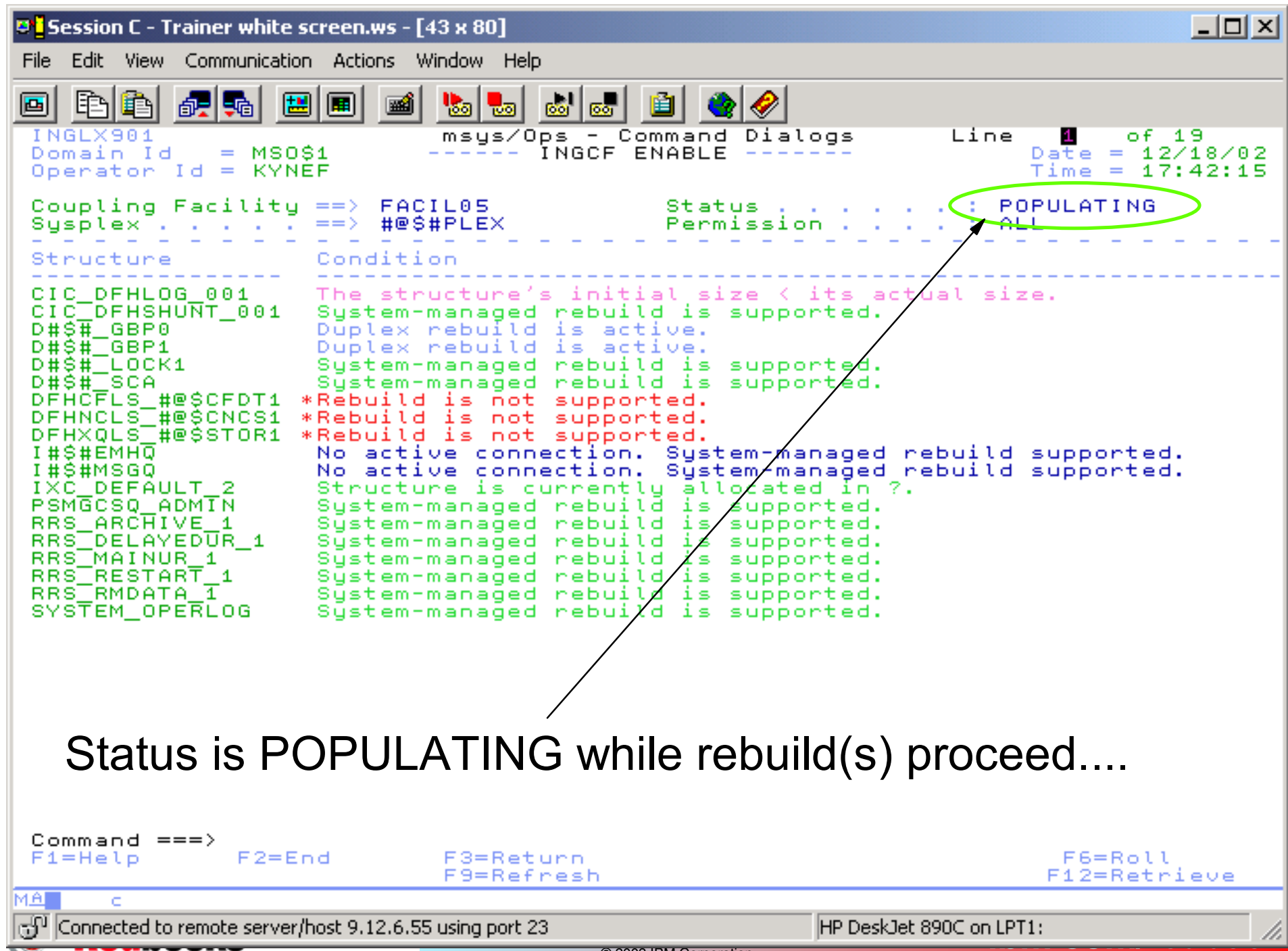
Status is POPULATING while rebuild(s) proceed....

msys for Operations - CF Verification (5/5)

```
Session C - Trainer white screen.ws - [43 x 80]
File  Edit  View  Communication  Actions  Window  Help

INGLX901                          msys/Ops  -  Command  Dialogs        Line     1      of  19
Domain Id    = MSO$1              ------  INGCF  ENABLE  ------          Date  =  12/18/02
Operator Id  = KYNEF                                                    Time  =  17:42:56

Coupling Facility  ==>  FACIL05                Status  .  .  .  .  .  :  NORMAL
Sysplex  .  .  .  .  ==>  #@$#PLEX              Permission  .  :  .  :  ALL
-  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
Structure                 Condition
-------------------------------------------------------------------------------------
CIC_DFHLOG_001            The structure's initial size < its actual size.
CIC_DFHSHUNT_001          System-managed rebuild is supported.
D#$#_GBP0                 Duplex rebuild is active.
D#$#_GBP1                 Duplex rebuild is active.
D#$#_LOCK1                System-managed rebuild is supported.
D#$#_SCA                  System-managed rebuild is supported.
DFHCFLS_#@$CFDT1         *Rebuild is not supported.
DFHNCLS_#@$CNCS1         *Rebuild is not supported.
DFHXQLS_#@$STOR1         *Rebuild is not supported.
I#$#EMHQ                  No active connection. System-managed rebuild supported.
I#$#MSGQ                  No active connection. System-managed rebuild supported.
IXC_DEFAULT_2             The structure's initial size < its actual size.
PSMGCSQ_ADMIN             System-managed rebuild is supported.
RRS_ARCHIVE_1            System-managed rebuild is supported.
RRS_DELAYEDUR_1          System-managed rebuild is supported.
RRS_MAINUR_1             System-managed rebuild is supported.
RRS_RESTART_1            System-managed rebuild is supported.
RRS_RMDATA_1            System-managed rebuild is supported.
SYSTEM_OPERLOG          System-managed rebuild is supported.
```
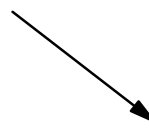
Structure back in preferred CF....

Note that POPULATE PF key is not presented if all structures are in correct CF

```
Command ===>
F1=Help         F2=End          F3=Return                                  F6=Roll
                                F9=Refresh                                 F12=Retrieve
MA          c
Connected to remote server/host 9.12.6.55 using port 23        HP DeskJet 890C on LPT1:
```

msys for Operations - CF Drain/Enable

Program Interaction With HMC/SE To Activate / Deactivate a CF - Linemode Support:

Processor must be 9672 G5 or later to initiate

  ► Uses SPI component & HMC APIs

Deactivation visually alters CF icon on HMC

- **Function invocation**

  ► INGPLEX panel navigation

  ► Directly using INGCFL command

```
>>--INGCFL---ACTIVATE------cfname---RESP---=---SYNC------------------------------------------>
            |-DEACTIVATE-|                |-RESP---=---ASYNC-|
            |-DRAIN------|
            |-ENABLE-----|
            |-POPULATE---|
            |-REBUILD----|

>---------------------------------------------------------------------------><
      |-,-|---TARGET---=---system----|
                       |-domain--|
                       |-sysplex-|
```
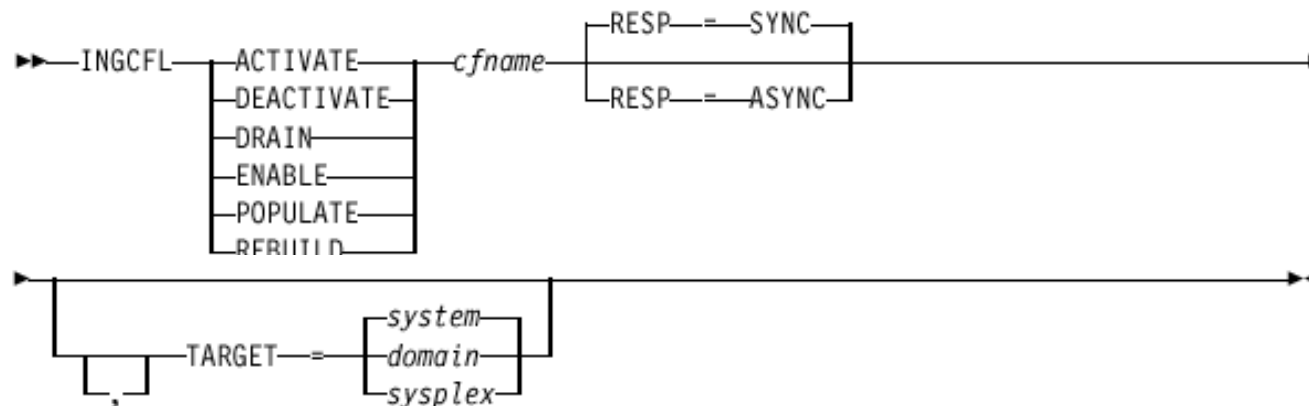
msys for Operations - Control Duplex Structures

```
Session B - [43 x 80]

File  Edit  View  Communication  Actions  Window  Help

INGLX904                    msys/Ops - Command Dialogs      Line   1      of 16
Domain ID   = MSO$2         ----- INGCF STRUCTURE -----     Date = 09/14/02
Operator ID = KYNEF                                         Time = 13:38:36

Coupling Facility ==>  FACIL05
Sysplex . . . . . ==>  #@$#PLEX            Permission . . . . . : ALL
Include condition ==>  YES  (Yes/No - Condition retrieval takes longer)
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
Cmds:  D display details / F force /  P stop duplex  R rebuild / S start duplex

   Structure        P D  Condition
   ---------------- - -  -------------------------------------------
   CIC_DFHSHUNT_001      System-managed rebuild is supported.
 P D#$#_GBP0         U   Duplex rebuild is active.
   D#$#_GBP1         U   Duplex rebuild is active.
_  D#$#_LOCK1        S   System-managed rebuild is supported.
_  D#$#_SCA          S   System-managed rebuild is supported.
_  I#$#EMHQ              The structure's initial size < its actual size.
_  I#$#LOGEMHQ           System-managed rebuild is supported.
_  I#$#LOGMSGQ           System-managed rebuild is supported.
_  I#$#MSGQ              The structure's initial size < its actual size.
_  IXC_DEFAULT_2
_  RRS_ARCHIVE_1         System-managed rebuild is supported.
_  RRS_DELAYEDUR_1       System-managed rebuild is supported.
_  RRS_MAINUR_1          System-managed rebuild is supported.
_  RRS_RESTART_1         System-managed rebuild is supported.
_  RRS_RMDATA_1          System-managed rebuild is supported.
_  SYSTEM_OPERLOG        System-managed rebuild is supported.




Command ===>
F1=Help       F2=End       F3=Return                        F6=Roll
                           F9=Refresh                       F12=Retrieve
MA       b
Connected to remote server/host 9.12.6.55 using port 23    HP DeskJet 890C on LPT1:
```

Stop duplexing GBP0 structure (currently user-managed duplexed)....

msys for Operations - Control CF Structures (2/5)

Session B - [43 x 80]

File Edit View Communication Actions Window Help

```
INGLX923                        msys/Ops  -  Command  Dialogs
Domain  Id    = MSO$2           -----  INGCF  STRUCTURE  -----        Date  = 09/14/02
Operator  Id  = KYNEF                                                  Time  = 13:39:09

Structure . . . . . . :  D#$#_GBP0
Sysplex . . . . . . . :  #@$#PLEX

                         S T O P   D U P L E X   Confirmation

You are going to stop the duplex process of the structure above. You have to
select the coupling facility where the structure should be kept.

           Sel     CF Name
           ---     -------
                   FACIL05
            s      FACIL06

After you have confirmed the action by the GO function key the automation
first checks whether the structure is still being duplexed. If this check is
passed the real action is scheduled asynchronously. Use the refresh key for
getting the current status of the process. When the structure doesn't show
   Duplex rebuild is active.
any longer the function has completed successfully.
A time-out occurred when the status of the structure hasn't changed, but the
status of coupling facility has changed from REBUILDING to NORMAL.
```

Select which instance of structure should be kept, then press PF10 to proceed....

```
Command ===> ▌
         F2=End          F3=Return                        F6=Roll
                                    F10=Go                 F12=Retrieve
MA      b
```

Connected to remote server/host 9.12.6.55 using port 23   HP DeskJet 890C on LPT1:

msys for Operations - Control CF Structures (3/5)

```
Session B - [43 x 80]                                                _ | □ | X |

File   Edit   View   Communication   Actions   Window   Help

[toolbar icons]

 INGLX904                          msys/Ops  -  Command Dialogs    Line   1     of 16
 Domain ID    = MSO$2              ----- INGCF STRUCTURE -----     Date = 09/14/02
 Operator ID = KYNEF                                              Time = 13:40:20

 Coupling Facility ==>  FACIL05
 Sysplex . . . . . ==>  #@$#PLEX              Permission . . . . : ALL
 Include condition ==>  YES (Yes/No - Condition retrieval takes longer)
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 Cmds: D display details / F force / P stop duplex / R rebuild / S start duplex

    Structure         P D   Condition
    ---------------   - -   -----------------------------------------------------
 _  CIC_DFHSHUNT_001        System-managed rebuild is supported.
 _  D#$#_GBP0          S  *Preference list is empty.
 _  D#$#_GBP1          U   Duplex rebuild is active.
 _  D#$#_LOCK1         S   System-managed rebuild is supported.
 _  D#$#_SCA           S   System-managed rebuild is supported.
 _  I#$#EMHQ               The structure's initial size < its actual size.
 _  I#$#LOGEMHQ            System-managed rebuild is supported.
 _  I#$#LOGMSGQ            System-managed rebuild is supported.
 _  I#$#MSGQ               The structure's initial size < its actual size.
 _  IXC_DEFAULT_2
 _  RRS_ARCHIVE_1          System-managed rebuild is supported.
 _  RRS_DELAYEDUR_1        System-managed rebuild is supported.
 _  RRS_MAINUR_1           System-managed rebuild is supported.
 _  RRS_RESTART_1          System-managed rebuild is supported.
 _  RRS_RMDATA_1           System-managed rebuild is supported.
 _  SYSTEM_OPERLOG         System-managed rebuild is supported.




 Command ===>
 F1=Help       F2=End          F3=Return                      F6=Roll
                               F9=Refresh                     F12=Retrieve
MA                   b

Connected to remote server/host 9.12.6.55 using port 23          HP DeskJet 890C on LPT1:
```

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msys for Operations - Control CF Structures (4/5)

Session B - [43 x 80]

File Edit View Communication Actions Window Help

```
INGLX904                    msys/Ops - Command Dialogs      Line   1     of  15
Domain ID    = MSO$2        ----- INGCF STRUCTURE -----      Date = 09/14/02
Operator ID = KYNEF                                          Time = 13:40:44

Coupling Facility ==>  FACIL05
Sysplex . . . . . ==>  #@$#PLEX                  Permission . . . . . :  ALL
Include condition ==>  YES (Yes/No - Condition retrieval takes longer)
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
Cmds: D display details / F force / P stop duplex / R rebuild / S start duplex

     Structure            P D  Condition
     -----------------    - -  -----------------------------------------
  _  CIC_DFHSHUNT_001           System-managed rebuild is supported.
  _  D#$#_GBP1             U    Duplex rebuild is active.
  _  D#$#_LOCK1            S    System-managed rebuild is supported.
  _  D#$#_SCA              S    System-managed rebuild is supported.
  _  I#$#EMHQ                   The structure's initial size < its actual size.
  _  I#$#LOGEMHQ                System-managed rebuild is supported.
  _  I#$#LOGMSGQ                System-managed rebuild is supported.
  _  I#$#MSGQ                   The structure's initial size < its actual size.
  _  IXC_DEFAULT_2
  _  RRS_ARCHIVE_1              System-managed rebuild is supported.
  _  RRS_DELAYEDUR_1            System-managed rebuild is supported.
  _  RRS_MAINUR_1               System-managed rebuild is supported.
  _  RRS_RESTART_1              System-managed rebuild is supported.
  _  RRS_RMDATA_1               System-managed rebuild is supported.
  _  SYSTEM_OPERLOG             System-managed rebuild is supported.



                    D#$#_GBP0 no longer allocated in this CF




Command ===>
 F1=Help       F2=End        F3=Return                        F6=Roll
                             F9=Refresh                       F12=Retrieve
```

MA   b

Connected to remote server/host 9.12.6.55 using port 23   HP DeskJet 890C on LPT1:

msys for Operations - Control CF Structures (5/5)

```
Session B - [43 x 80]                                                    _ □ ×

File   Edit   View   Communication   Actions   Window   Help

[toolbar icons]

INGLX904                        msys/Ops - Command Dialogs      Line  1    of 13
Domain ID    = MSO$2            ----- INGCF STRUCTURE -----      Date = 09/14/02
Operator ID = KYNEF                                             Time = 13:42:35

Coupling Facility ==>  FACIL06
Sysplex . . . . . ==>  #@$#PLEX              Permission . . . . . : ALL
Include condition ==>  YES (Yes/No - Condition retrieval takes longer)
-------------------------------------------------------------------------------
Cmds: D display details / F force / P stop duplex / R rebuild / S start duplex

   Structure          P D  Condition
   ---------------    - -  -----------------------------------------------------
_  CIC_DFHLOG_001          System-managed rebuild is supported.
_  D#$#_GBP0             U
_  D#$#_GBP1             U  Duplex rebuild is active.
_  I#$#LOCK1               System-managed rebuild is supported.
_  I#$#OSAM
_  I#$#VSAM
_  IGWLOCK00
_  ISGLOCK
_  ISTGENERIC              System-managed rebuild is supported.
_  IXC_DEFAULT_1
_  SYSIGGCAS_ECS
_  SYSZWLM_WORKUNIT        System-managed rebuild is supported.
_  SYSZWLM_1CE32066        System-managed rebuild is supported.
```

D#$#_GBP0 remaining instance. Is enabled for User-Managed duplexing, but Duplexing Not currently started

```
Command ===>
F1=Help        F2=End         F3=Return                          F6=Roll
                              F9=Refresh                         F12=Retrieve
MA          b

Connected to remote server/host 9.12.6.55 using port 23    HP DeskJet 890C on LPT1:
```

msys for Operations - Capture IPL Stats

⭐ **View & compare z/OS initialization parameters**

- ■ **Collection phase runs immediately after IPL**
    - ▸ Kicked off from COMMNDxx ... 'S HSAPIPLC'
    - ▸ Records stored in VSAM KSDS - New DDN <u>HSAIPL</u>

- ■ **Online access to recorded data**
    - ▸ Display IPL Information - what members did we use for the IPL?
    - ▸ Compare IPL Information - what's changed ?
    - ▸ Delete unwanted records

- ■ **Function invocation**
    - ▸ INGPLEX Panel navigation
    - ▸ Directly using INPLEX IPL command

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msys for Operations - Display IPL Stats (1/3)

Various information about recent IPLs

msys for Operations - Display IPL Stats (2/3)

```
Session B - [43 x 80]                                              _ □ X
File   Edit   View   Communication   Actions   Window   Help

INGLX201                    msys/Ops - Command Dialogs      Line   1      of 34
Domain ID     = MSO$2       -------- INGPLEX IPL --------   Date = 09/14/02
Operator ID = KYNEF                                         Time = 14:48:41

System . . . . . . . :  #@$2         IPL timestamp . . :  2002-08-23 16:04
Sysplex . . . . . . . :  #@$#PLEX     IPL device/volume :  37AF    /  #@$#R3
BCP name . . . . . . :  z/OS          BCP release/FMID  :  SP7.0.3  /  HBB7706
Load parameters . . :  37ABFKM1      LPAR / CPC name . :  A2      /  SCZP802
Node descriptor . . :  002066.003.IBM.02.000000011CE3
Configuration id . . :  TRAINER           Active IODF . . . . :  IODF.IODF69
MCAT volume / dsn . :  #@$#M1 / MCAT.V#@$#M1
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
Cmds:  C(S) compare (single) member(s) / D(S) display (single) member(s)

     Param.      Member  Suffix(es)
   --------      ------  ----------------------------------------------------
                LOAD     FK
__   IEASYM      IEASYM  XX
__   SYSPARM     IEASYS  00  00
     ALLOC       ALLOC
     APF         IEAAPF
__   CLOCK       CLOCK   VM
     CMD         COMMND  00
d    CON         CONSOL  00
     COUPLE      COUPLE  00
     DEVSUP      DEVSUP
__   DIAG        DIAG    00
     EXIT        EXIT
     FIX         IEAFIX
__   GRSCNF      GRSCNF  00
__   GRSRNL      GRSRNL  02
__   ICS         IEAICS  00
__   IOS         IECIOS  00
__   IPS         IEAIPS  00
__   LNK         LNKLST  00
__   LPA         LPALST  00
__   MLPA        IEALPA  00
__   MSTRJCL     MSTJCL  00
__   OMVS        BPXPRM  00  FS

Command ===>
F1=Help        F2=End        F3=Return                      F6=Roll
               F8=Forward                   F10=Show all     F12=Retrieve
MA         b
Connected to remote server/host 9.12.6.55 using port 23      HP DeskJet 890C on LPT1:
```
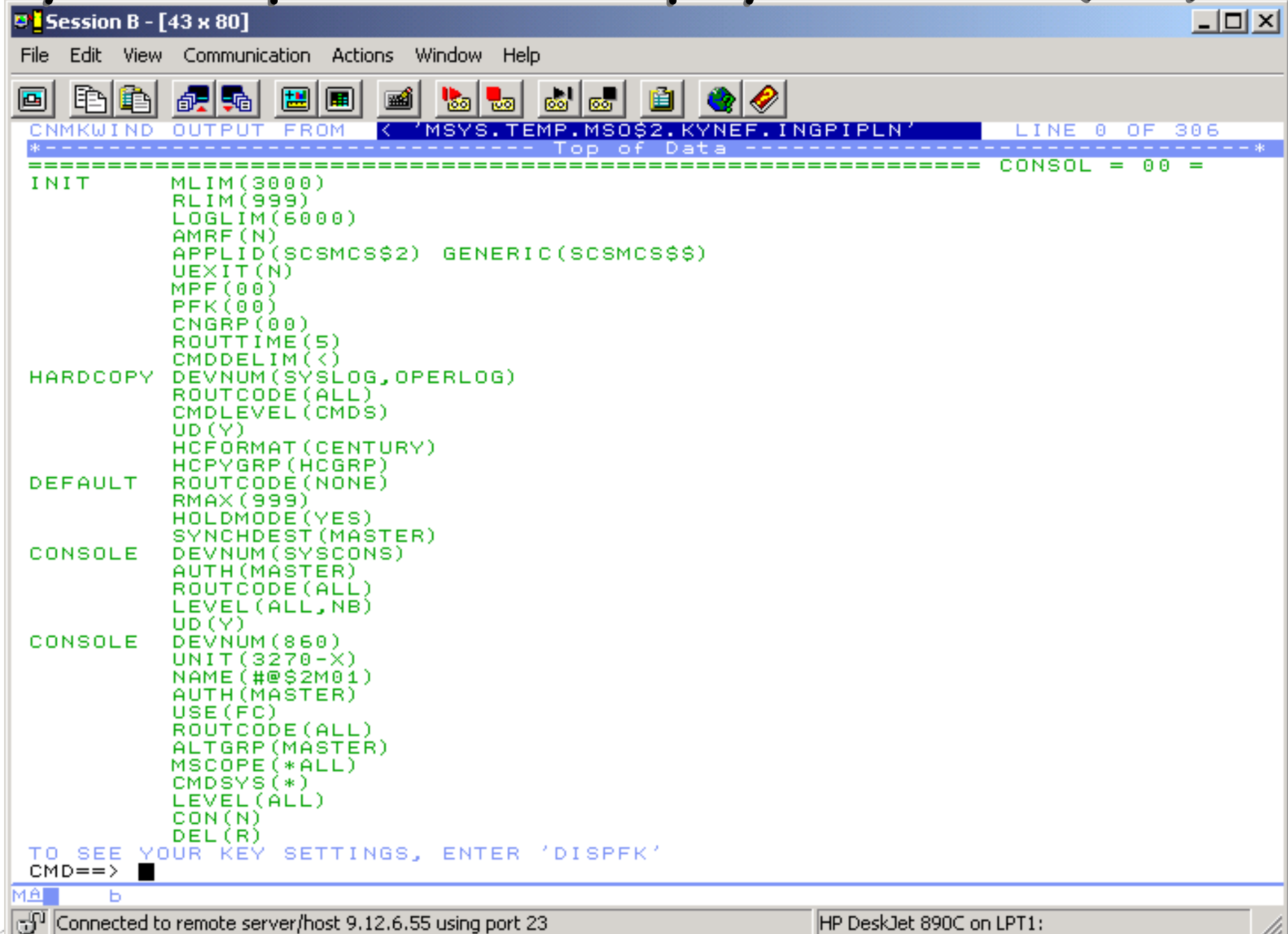
Shows Parmlib members used for selected IPL, and allows you to display contents of that member as it was at the time of the IPL.

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msys for Operations - Display IPL Stats (3/3)


```
Session B - [43 x 80]                                          [_][□][X]

File  Edit  View  Communication  Actions  Window  Help

CNMKWIND  OUTPUT  FROM  <  'MSYS.TEMP.MSO$2.KYNEF.INGPIPLN'      LINE 0 OF 306
*-------------------------------- Top of Data --------------------------------*
========================================================= CONSOL = 00 =
INIT        MLIM(3000)
            RLIM(999)
            LOGLIM(6000)
            AMRF(N)
            APPLID(SCSMCS$2)  GENERIC(SCSMCS$$)
            UEXIT(N)
            MPF(00)
            PFK(00)
            CNGRP(00)
            ROUTTIME(5)
            CMDDELIM(<)
HARDCOPY  DEVNUM(SYSLOG,OPERLOG)
            ROUTCODE(ALL)
            CMDLEVEL(CMDS)
            UD(Y)
            HCFORMAT(CENTURY)
            HCPYGRP(HCGRP)
DEFAULT   ROUTCODE(NONE)
            RMAX(999)
            HOLDMODE(YES)
            SYNCHDEST(MASTER)
CONSOLE   DEVNUM(SYSCONS)
            AUTH(MASTER)
            ROUTCODE(ALL)
            LEVEL(ALL,NB)
            UD(Y)
CONSOLE   DEVNUM(860)
            UNIT(3270-X)
            NAME(#@$2M01)
            AUTH(MASTER)
            USE(FC)
            ROUTCODE(ALL)
            ALTGRP(MASTER)
            MSCOPE(*ALL)
            CMDSYS(*)
            LEVEL(ALL)
            CON(N)
            DEL(R)
TO SEE YOUR KEY SETTINGS, ENTER 'DISPFK'
CMD==> ▊

MA▊     b
```

Connected to remote server/host 9.12.6.55 using port 23   HP DeskJet 890C on LPT1:

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msys for Operations - Compare IPL Stats (1/3)

Session B - Trainer white screen.ws - [43 x 80]

File Edit View Communication Actions Window Help

```
INGLX200                        msys/Ops - Command Dialogs      Line   1     of 30
Domain ID    = MSO$2            ------- INGPLEX IPL -------          Date = 01/07/03
Operator ID  = KYNEF                                                Time = 12:10:13

System . . . . . ==>                 Max. number of IPL records/system : 10
Sysplex . . . . . ==>  #@$#PLEX      Suppression of PARMLIB comments . : N

Cmds: C compare record / D display details / E erase record

     System     IPL Timestamp        Dev   Volume   OpSys    Release    FMID
     ------     -------------        ----  ------   -----    -------    --------
  _  #@$1       2003-01-07 09:49     3728  #@$#R1   z/OS     SP7.0.3    HBB7706
  c  #@$1       2002-12-18 11:57     3728  #@$#R1   z/OS     SP7.0.3    HBB7706
  ■  #@$1       2002-12-13 17:32     3728  #@$#R1   z/OS     SP7.0.3    HBB7706
     #@$1       2002-12-13 16:29     3809  #@$#R1   z/OS     SP7.0.3    HBB7706
  _  #@$1       2002-12-13 16:11     3809  #@$#R1   z/OS     SP7.0.3    HBB7706
  _  #@$1       2002-12-12 16:41     3728  #@$#R1   z/OS     SP7.0.3    HBB7706
  _  #@$1       2002-12-11 23:16     3728  #@$#R1   z/OS     SP7.0.3    HBB7706
  _  #@$1       2002-12-11 22:09     3728  #@$#R1   z/OS     SP7.0.3    HBB7706
  _  #@$1       2002-12-10 22:19     3728  #@$#R1   z/OS     SP7.0.3    HBB7706
  _  #@$1       2002-12-10 20:35     3728  #@$#R1   z/OS     SP7.0.3    HBB7706
  _  #@$2       2003-01-07 11:03     37AF  #@$#R3   z/OS     SP7.0.4    HBB7707
  _  #@$2       2003-01-07 09:50     37AF  #@$#R3   z/OS     SP7.0.4    HBB7707
  _  #@$2       2002-12-18 12:24     37AF  #@$#R3   z/OS     SP7.0.4    HBB7707
  _  #@$2       2002-12-13 17:35     37AF  #@$#R3   z/OS     SP7.0.4    HBB7707
  _  #@$2       2002-12-13 15:49     37AF  #@$#R3   z/OS     SP7.0.4    HBB7707
  _  #@$2       2002-12-11 21:29     37AF  #@$#R3   z/OS     SP7.0.4    HBB7707
  _  #@$2       2002-12-11 21:06     37AF  #@$#R3   z/OS     SP7.0.4    HBB7707
  _  #@$2       2002-12-11 20:48     37AF  #@$#R3   z/OS     SP7.0.4    HBB7707
  _  #@$2       2002-12-11 20:29     37AF  #@$#R3   z/OS     SP7.0.4    HBB7707
  _  #@$2       2002-12-11 20:06     37AF  #@$#R3   z/OS     SP7.0.4    HBB7707
  _  #@$3       2003-01-07 09:50     37AF  #@$#R3   z/OS     SP7.0.4    HBB7707
  _  #@$3       2002-12-18 12:44     37AF  #@$#R3   z/OS     SP7.0.4    HBB7707
  _  #@$3       2002-12-13 17:36     37AF  #@$#R3   z/OS     SP7.0.4    HBB7707
  _  #@$3       2002-12-10 21:29     37AF  #@$#R3   z/OS     SP7.0.4    HBB7707
  _  #@$3       2002-12-03 15:10     37AF  #@$#R3   z/OS     SP7.0.4    HBB7707
  _  #@$3       2002-10-14 16:14     37AF  #@$#R3   z/OS     SP7.0.4    HBB7707

Command ===>
F1=Help        F2=End         F3=Return                              F6=Roll
               F8=Forward     F9=Refresh     F10=Previous F11=Next    F12=Retrieve
```

MA   b

Connected to remote server/host 9.12.6.55 using port 23   HP DeskJet 890C on LPT1:

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msys for Operations - Compare IPL Stats (2/3)

msys for Operations - Compare IPL Stats (3/3)

```
Session B - Trainer white screen.ws - [43 x 80]                    _  □  ×

File   Edit   View   Communication   Actions   Window   Help

CNMKWIND OUTPUT FROM  < 'MSYS.TEMP.MSO$2.KYNEF.INGPIPLL'      LINE 0 OF 2209
*-------------------------------- Top of Data --------------------------------*
COMP=NEW: #@$1        / 2002-12-18 11:57
WITH=OLD: #@$2        / 2002-12-18 12:24

ID          SOURCE LINES
       ----+----1----+----2----+----3----+----4----+----5----+----6----+----7----+
       ===================================================================== LOAD   = FK =
       IODF        ** IODF       TRAINER   01 Y
       NUCLEUS   1
       NUCLST    $$
       IEASYM    XX
       SYSPLEX   #@$#PLEX Y
       SYSCAT    #@$#M1123CMCAT.V#@$#M1
       SYSPARM   00
       PARMLIB   SYS1.PARMLIB
       PARMLIB   CPAC.PARMLIB
       PARMLIB   SYS1.IBM.PARMLIB
       ===================================================================== IEASYM = XX =
I -    SYSDEF              SYSCLONE($1)
D -    SYSDEF              SYSCLONE($2)
                          SYMDEF(VM='VM')            /* USE CLOCKVM    */
                          SYMDEF(00='00')            /* USE COMMND00   */
                          SYMDEF(V7LVL4='V7LVL4')    /* FOR DB2 V7 */
                          SYMDEF(V7LVL4='V7LVL4')    /* FOR DB2 V7 */
                          SYMDEF(V7LVL4='V7LVL4')    /* FOR IMS V7    @DGL */
                          SYMDEF(V13LVL4='V13LVL4')  /* FOR CICS 1.3    */
                          SYMDEF(V52LVL4='V52LVL4')  /* FOR MQ 5.2    */
                          SYMDEF(C0,C2='C0,C2')      /* LNKLST         */
                          SYMDEF(00='00')            /* VATLST         */
                          SYMDEF(00='00')            /* POINT TO SMFPRM00 */
                          SYMDEF(00='00')            /* POINT TO IEFSSN00 */
                          SYMDEF(FS='FS')            /* SYSPLEX FILE SHARING */
       SYSDEF              VMUSERID(CFUSER1)
                          SYSNAME(#@$1)
                          SYSPARM(00,01)
I -                       SYMDEF(#@$1='#@$1')
I -                       SYMDEF(#@$#R2='#@$#R2')
I -                       SYMDEF(1='1')
I -                       SYMDEF(ZOSR13='ZOSR13')
I -                       SYMDEF(LINK='LINK')
TO SEE YOUR KEY SETTINGS, ENTER 'DISPFK'
CMD==> █
MA      b
Connected to remote server/host 9.12.6.55 using port 23    HP DeskJet 890C on LPT1:
```
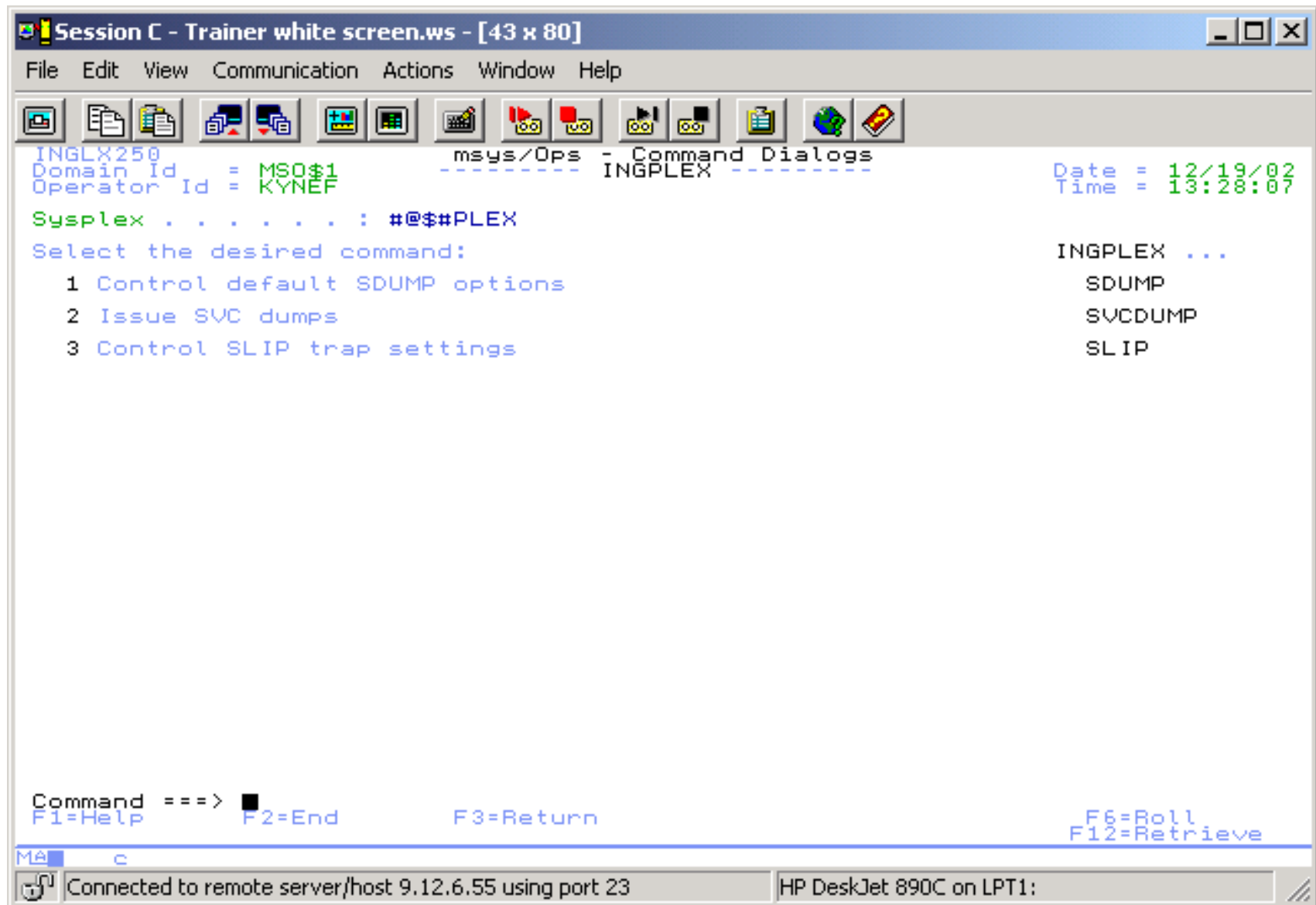
msys for Operations - Compare IPL Stats

Note that at the time of writing, ALL system symbols are resolved when the member contents are written to the VSAM data set (e.g. SYMDEF(&CLOCK='VM') is written as SYMDEF(VM=VM)). Currently looking at ways to address this so that data set would contain SYMDEF(&CLOCK='VM').

msys for Operations - Controlling Dumps, SLIPs

★ **Panels to set dump options, take SVCDUMP and Display and Modify SLIP traps**

- **Three panel-driven functional capabilities**
  - ▸ Display & Change dump options on one or all systems
  - ▸ Take an SDUMP - up to 15 ASIDs + Data spaces & Structures
  - ▸ Display SLIP traps - Enable, Disable, Delete

- **Function Invocation**
  - ▸ INGPLEX Panel navigation
  - ▸ Directly using INGPLEX DUMP|SDUMP|SVCDUMP|SLIP commands

- **No customization required for this function**

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msys for Operations - Change Dump Options (1/4)

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msys for Operations - Change Dump Options (1/4)

```
Session B - [43 x 80]                                               _ □ X

File   Edit   View   Communication   Actions   Window   Help

INGLX251                    msys/Ops - Command Dialogs      Line    1    of 9
Domain Id   = MSO$2        ------ INGPLEX SDUMP ------           Date = 09/14/02
Operator Id = KYNEF                                              Time = 14:54:50

Sysplex . . . . . ==>  #@$#PLEX              Permission . . . . . : ALL
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
Cmds: C change

   System      Dump options
   ------      ------------
_  #@$1        Q=       Type=         Buffers=    0K   MaxSpace=    500M   MsgTime=99999
                             TRT                          LSQA           RGN SERVERS

_  #@$2        Q=       Type=         Buffers=    0K   MaxSpace=    500M   MsgTime=99999
                             TRT                          LSQA           RGN SERVERS

_  #@$3        Q=       Type=         Buffers=    0K   MaxSpace=    500M   MsgTime=99999
                             TRT                          LSQA           RGN SERVERS

Command ===>
F1=Help      F2=End       F3=Return                              F6=Roll
                          F9=Refresh                             F12=Retrieve
MA           b

Connected to remote server/host 9.12.6.55 using port 23          HP DeskJet 890C on LPT1:
```

msys for Operations - Change Dump Options (2/4)

```
Session B - [43 x 80]                                            _ □ X

File  Edit  View  Communication  Actions  Window  Help

 INGLX252                     msys/Ops - Command Dialogs
 Domain Id   = MSO$2          ------ INGPLEX SDUMP ------        Date = 09/14/02
 Operator Id = KYNEF                                            Time = 14:55:27

 System . . . . . . . :  #@$1
 Sysplex . . . . . . . :  #@$#PLEX            Recommended options are underlined.

 NODUMP ... ==> N       (all other options below are ignored)

 ALLNUC ... ==> y     ALLPSA(*)  ==> y      COUPLE ... ==> y    CSA ...... ==> y

 GRSQ ...... ==> y    LPA ...... ==> _      LSQA ..... ==> Y    NUC ....... ==> _

 PSA ....... ==> _    RGN ...... ==> n      SERVERS .. ==> Y    SQA(*) ... ==> _

 SUMSUMP(*) ==> _     SWA ...... ==> _      TRT ...... ==> Y    WLM ...... ==> _

 XESDATA .. ==> _       (*) = The NOxxx option is generated when not selected.

 Q(uiesce)  ==> ____    (YES / NO)

 Type ..... ==> _____  (XMEM / XMEME)

 Buffers .. ==> 0K      (nnnnK / nnnM)

 MaxSpace . ==> 500     (MB)

 MsgTime .. ==> 99999   (minutes)




 Command ===>
 F1=Help       F2=End       F3=Return     F4=Set SYS    F5=Undo all  F6=Roll
                                          F10=Set SYSS  F11=Set SYSP F12=Retrieve
MA            b

 Connected to remote server/host 9.12.6.55 using port 23        HP DeskJet 890C on LPT1:
```

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msys for Operations - Change Dump Options (3/4)

msys for Operations - Change Dump Options (4/4)

msys for Operations - Capture SVC Dumps (1/4)

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msys for Operations - Capture SVC Dumps (2/4)


```
INGLX260                        msys/Ops - Command Dialogs         Line    1    of 60
Domain Id     = MSO$2             ----- INGPLEX SVCDUMP -----          Date = 09/14/02
Operator Id = KYNEF                                                    Time = 15:00:22

System  . . . . .  ==>  #@$2
Sysplex . . . . .  ==>  #@$#PLEX
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
Cmds:  D/S de-/select job names for the SVC dump (up to 15 can be specified)

    Jobname     ASID   WorkUnitID     Userid
    --------    ----   ----------     ------
_   *MASTER*    0001   STC18064       _MASTER_
_   #@_CCC_2    004F   STC18321       #@_C
_   #@_CCM_2    0089   STC18322       #@_C
_   ALLOCAS     0013
_   ANTAS000    000E
_   ANTMAIN     000D
_   AVM         004E
_   BPXOINIT    0026
_   CATALOG     0025
_   CONSOLE     000B
_   D#_2DBM1    008D   STC18305       D#_2
_   D#_2DIST    008C   STC18306       D#_2
_   D#_2IRLM    0049   STC18304       D#_2
_   D#_2MSTR    008E   STC18303       D#_2
_   D#_2SPAS    008B   STC18307       D#_2
_   DUMPSRV     0005
_   EYUX140     0047
_   FTPD1       0036   STC18079       TCPIP
s   GRS         0007                                    selected
█   I#_#IRLM    0087   STC18374       I#_#IRLM
_   I#_2CQS     004D   STC18334       I#_2
_   I#_2CTL     003B   STC18326       I#_2
_   I#_2DBRC    0085   STC18337       I#_2
_   I#_2DLI     0086   STC18336       I#_2
_   I#_2IFP1    002A   JOB18392       I#_2
_   I#_2IFP2    002B   JOB18393       I#_2



Command ===>
F1=Help        F2=End         F3=Return              F5=NextPnl          F6=Roll
               F8=Forward     F9=Refresh                                 F12=Retrieve
```
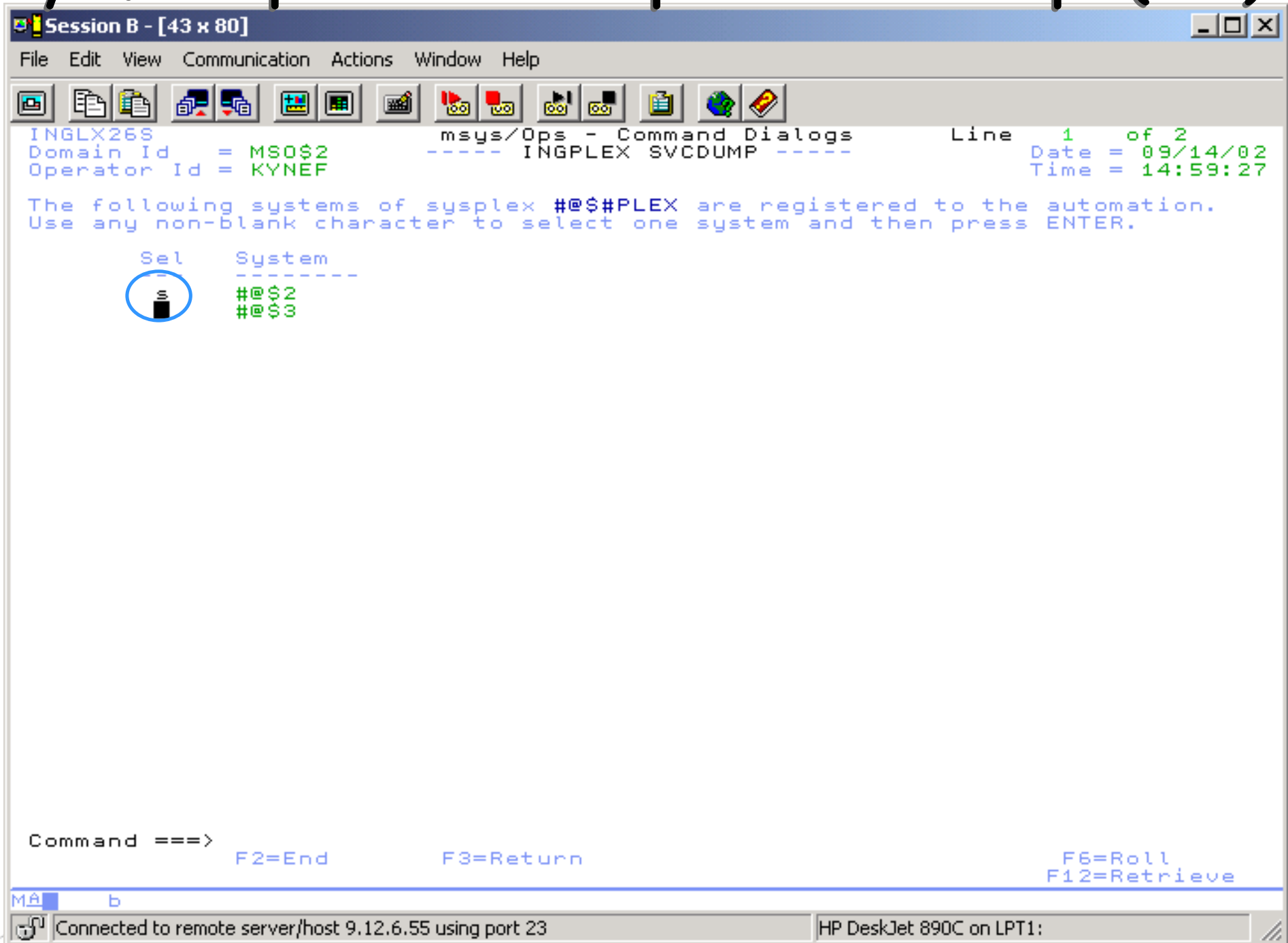
msys for Operations - Capture SVC Dumps (3/4)

```
Session B - [43 x 80]

File   Edit   View   Communication   Actions   Window   Help

INGLX261                        msys/Ops - Command Dialogs       Line   1    of 10
Domain Id    = MSO$2          ----- INGPLEX SVCDUMP -----        Date = 09/14/02
Operator Id  = KYNEF                                             Time = 15:01:24

System  . . . . . . . :   #@$2
Sysplex . . . . . . . :   #@$#PLEX
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
Cmds:  D/S de-/select the areas to be dumped (max. 113 structures)
              A selection of the job name includes all related areas.

   Jobname      ASID   T Data Space/XCF Group Member/Structure
   -------      ----   - ----------------------------------------
   GRS          0007
s_                     D  ISGQSCAN                                selected
                       D  IXCM006G
s_                     D  00004IXL                                selected
                       D  00005IXL
_                      L  ISGLOCK
s_                     M  IXCLO004.#@_1.GRS.M520                  selected
s_                     M  IXCLO004.#@_3.GRS.M523                  selected
█                      M  SYSGRS.#@_1.GRS.#@_1
_                      M  SYSGRS.#@_3.GRS.#@_3
```

Command ===>
F1=Help   F2=End   F3=Return   F4=PrevPnl   F5=NextPnl   F6=Roll
                               F9=Refresh   F12=Retrieve

MA   b
Connected to remote server/host 9.12.6.55 using port 23   HP DeskJet 890C on LPT1:
```

# msys for Operations - Capture SVC Dumps (4/4)

```
Session B - [43 x 80]                                          _ □ X

File   Edit   View   Communication   Actions   Window   Help

INGLX262                    msys/Ops - Command Dialogs
Domain Id  = MSO$2         ------- INGPLEX SVC -------       Date = 09/14/02
Operator Id = KYNEF                                          Time = 15:01:57

System . . . . . . . :  #@$2
Sysplex . . . . . . . :  #@$#PLEX

Title .... ==>  Test dump■
           ==>

SDATA Dump Options  (recommended options are underlined)

ALLNUC ... ==>  _      ALLPSA(*)  ==> Y     COUPLE ... ==> _     CSA ...... ==> Y

GRSQ ...... ==> Y      LPA ...... ==> _     LSQA ..... ==> _     NUC ...... ==> Y

PSA ...... ==> _       RGN ...... ==> Y     SERVERS .. ==> _     SQA(*) ... ==> Y

SUMSUMP(*) ==> Y       SWA ...... ==> _     TRT ...... ==> Y     WLM ...... ==> _

XESDATA .. ==> _       (*) = The NOxxx option is used when not selected.

Structure Dump Options (SUMMARY and ADJUNCT/ENTRYDATA are mutually exclusive)

COCLASS .. ==> _       EMCONTROLS ==> _     LISTNUM .. ==> _     STGCLASS . ==> _

ADJUNCT .. ==> _       ENTRYDATA  ==> _     SUMMARY .. ==> _




Command ===>
F1=Help       F2=End        F3=Return     F4=PrevPnl    F5=Dump       F6=Roll
                                                                      F12=Retrieve
MA    b

Connected to remote server/host 9.12.6.55 using port 23        HP DeskJet 890C on LPT1:
```

msys for Ops - WTO recovery Automation

★ **WTO and WTOR buffer shortages can result in system or multi-system outages**

- ■ **When messages fill up the buffers, most jobs that issue a WTO or WTOR go into a wait until buffers are available.**

- ■ **Some reasons**

  - ◆ Unattended MCS consoles queueing up message buffers
  - ◆ Program loops causing message flooding
  - ◆ CONSOLxx PARMLIB member containing insufficient specifications

msys for Ops - WTO recovery Automation

★ **Upon WTO,WTOR buffer shortage conditions (indicated by messages)**

- Adjust buffer limits temporarily and permanent
- Perform buffer backlog analysis
- Adjust MCS console characteristics temporarily or permanently
- If max number of buffers is reached, support a user-defined policy to KEEP or CANCEL jobs

msys for Ops - WTO recovery Automation

★ **Messages to kickoff automation are...**

- IEE899I - Console Info (used for pre-analysis)

- IEA405E - WTO buffer shortage 80%
- IEA404A - Severe WTO buffer shortage 100%
- IEA406I - WTO buffer shortage relieved

- IEA230E - WTOR buffer shortage 80%
- IEA231A - Severe WTOR buffer shortage 100%
- IEA232I - WTOR buffer shortage relieved

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msys for Ops – WTO recovery Automation

★ To enable, in AOFCUST member:

```
AUTO(
   WTO
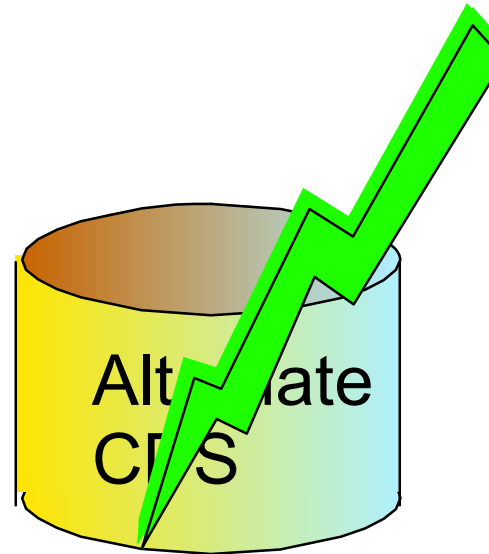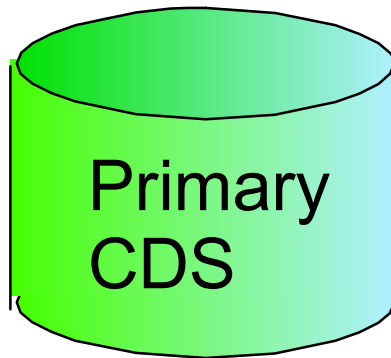)

WTOBUF(
   jobname1      WTO      CANCEL
   jobname2      WTOR     CANCEL
   jobna*        *        CANCEL
)
Note: Default is    " *     *     KEEP
"
```

msys for Ops - CDS Automation

★ **Problem: Loss of Couple Data Set**

- CDS's are critical resources in a Parallel Sysplex

  ◆ SYSPLEX and CFRM CDS failures can cause sysplex outages

- Single-Point-Of-Failure Situation if no alternate CDS is allocated

Primary CDS

Alternate CDS

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msys for Ops - CDS Automation

★ **When it is started, or when MSG IXC253I is issued:**

- **msys for Operations finds out if any alternate CDS is not allocated.**

- **It reads the candidate list of DASD where an alternate CDS can be formatted and allocated.**

  ▶ **The list of DASD volumes can be predefined by the user.**

- **It gets the first available DASD and formats/allocates the respective alternate CDS**

  ◆ **Using the HLQ defined by the user.**

- **msys for Ops currently supports the following CDS types: SYSPLEX, CFRM, ARM, LOGR, SFM**

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msys for Ops - CDS Automation

★ **To enable, in AOFCUST member:**

AUTO(
   CDS
)

CDS(
   HLQ hlq1.hlq2.hlq3
   VOL (SYSPLEX,vol1,vol2,vol3,vol4,vol5,vol6,vol7,vol8)
   VOL (CFRM,vol1,vol2,vol3,vol4,vol5,vol6,vol7,vol8)
   VOL (ARM,vol1,vol2,vol3,vol4,vol5,vol6,vol7,vol8)
   VOL (LOGR,vol1,vol2,vol3,vol4,vol5,vol6,vol7,vol8)
   VOL (SFM,vol1,vol2,vol3,vol4,vol5,vol6,vol7,vol8)
)

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msys for Operations - System Log Automation

- IEE037D indicates that the SYSTEM LOG is NOT ACTIVE.

- If the system log is critical an immediate log (re)start must be done by the operator.

- If the operator misses that message, vital data may be lost.

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msys for Operations - System Log Automation

- **Upon IEE043I or IEE533E followed by IEE037D:**

  WRITELOG START

- **Upon IEE769E (recursive abends) followed by IEE037D:**

  No automation

- **Upon IEE041I (syslog available again):**

  VARY SYSLOG,HARDCPY

Invocation:

The action is automatically

taken upon receiving one of the above

messages.

_____

Literature: OS/390 MVS System Messages Vol.4

msys for Operations - System Log Automation

★ To enable, in AOFCUST member:

AUTO(
  LOG
)

msys for Operations - Logger Automation

★ **Logstream directory shortage recovery:**

- **IXG257I DATA SET DIRECTORY FOR LOGSTREAM logstream IN STRUCTURE strname IS OVER 90% FULL.**

- **IXG261E SHORTAGE OF DIRECTORY EXTENT RECORDS TOTAL n1 IN USE: n2 AVAILABLE: n3**

SYS A　　　**LOGR CDS**

APPL A　S Y S T E M　L O G G E R　LOCAL STORAGE BUFFERS

Policy

SYS B

APPL B　S Y S T E M　L O G G E R　LOCAL STORAGE BUFFERS

Coupling Facility Structure

Log Stream

Log Stream Data Set

"Data Set Directory Full" causes application to stop/abend !

msys for Operations - Logger Automation

★ **Logstream directory shortage recovery:**

- Find out the current number of directories

- Allocate new LOGR CDS's with larger DSEXTENT values

- Roll the new CDSs into production using the SETXCF COUPLE command

- Issue message when done

  - Note that it is YOUR responsibility to update the COUPLExx member to reflect the new CDS names....

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★ **Automation is triggered by IXG257I or IXG261E messages**

- ■ IXG257I DATA SET DIRECTORY FOR LOGSTREAM logstream IN STRUCTURE strname IS OVER 90% FULL.

- ■ IXG261E SHORTAGE OF DIRECTORY EXTENT RECORDS TOTAL decimalnumber1 IN USE:decimalnumber2 AVAILABLE: decimalnumber3

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★ **To enable, in AOFCUST member:**

```
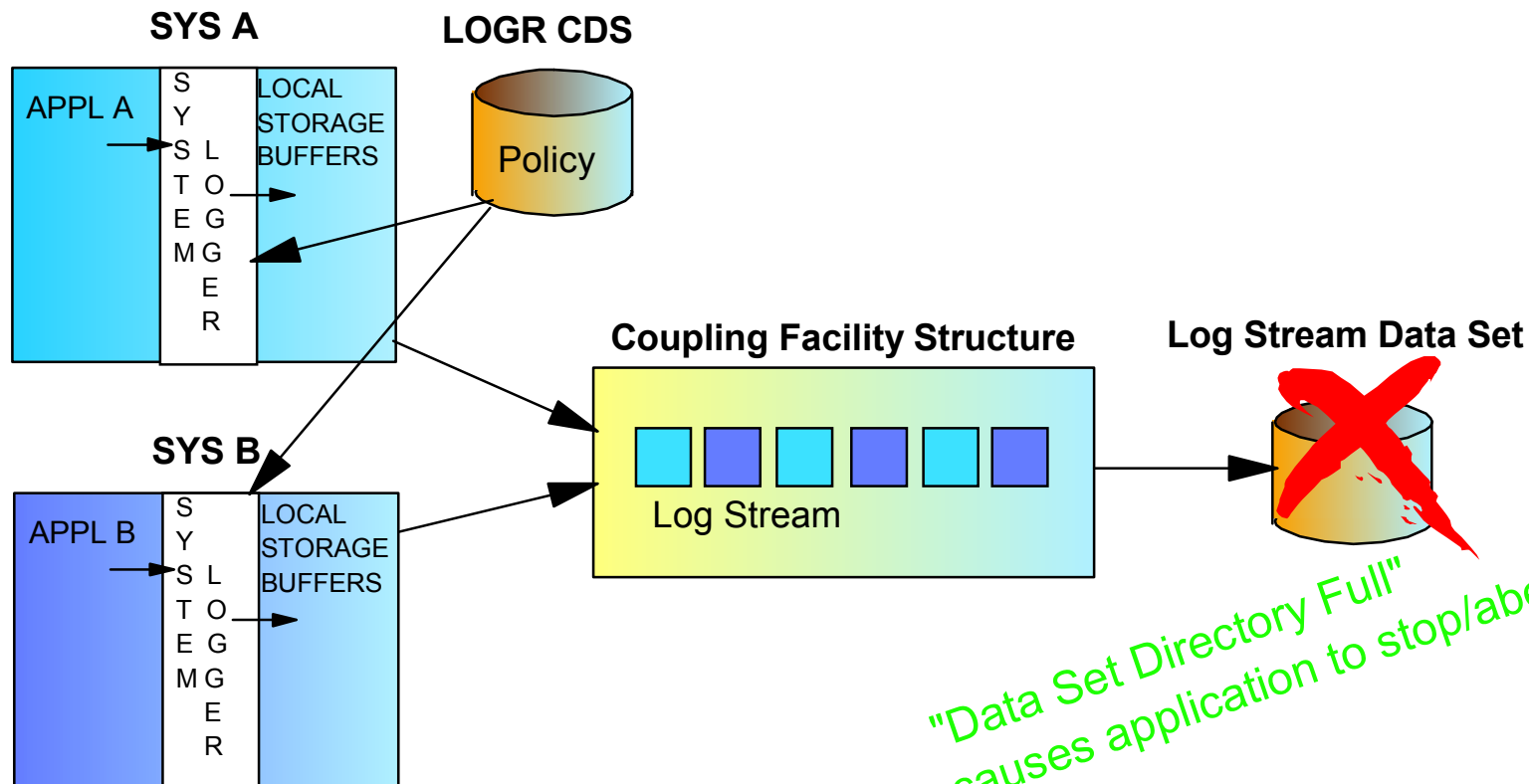AUTO(
   LOGGER
   CDS
)

CDS(
   HLQ hlq1.hlq2.hlq3
   VOL
(LOGR,vol1,vol2,vol3,vol4,vol5,vol6,vol7,vol8)
)
```

msys for Operations - Long ENQ Automation

⭐ **Identify long-blocking tasks causing contention and terminate them**

- ■ **A result of outage analysis activities**
  - ► Based on actual outage situations
  - ► Which this function would have prevented

- ■ **Uses Enhanced Contention Analysis**
  - ► D GRS,ANALYSE,BLOCK
  - ► D GRS,ANALYSE,BLOCKER,JOBNAME=jobnm
  - ► New macro ISGECA - returns everything at once

- ■ **Function invocation**
  - ► Timer-driven - pops every *waittime*
  - ► Shortest wait time specified in ENQ section

msys for Operations - Long ENQ Automation

- **Installation controls jobs that can be canceled**

- **IEECMDS service checks for hung commands**

- **Customization set in AOFCUST member**

  ► Add AUTO(ENQ) keyword

  ► Setup ENQ section

```
ENQ(
  RES(*|qname[*],*|rname[*],waittime)
  JOB({*|jobname[*]|asid},{DUMP|NODUMP|(xx[,xx])
  JOB({jobname[*]|asid},KEEP)
  TITLE(title)
  DUMP(sdata)
  SYMDEF({*|jobname[*]|asid},[&]&symbol.='value')
  )
```

msys for Operations - Page Data Set Automation

★ **React to auxiliary storage shortages**

■ **Messages on which this function is based:**

▶ IRA200E Auxiliary Storage shortage

▶ IRA201E Critical Auxiliary Storage shortage

▶ IRA202I Auxiliary Storage shortage relieved

▶ IRA203I nn% Auxiliary Storage allocated to uuu

▶ IEE205I PAGEDEL command - Local Page Data Set...

▶ ILR009E Local Page Data Set on Vol volser Bad

■ **Summary Of Actions Taken**

▶ Dynamically create Page Data Set

▶ PAGEADD - created by msops, or use predefined data set

▶ Cancel Job with most rapidly increasing storage use

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msys for Operations - Page Data Set Automation

- **Function invocation**

  ▶ Triggered by messages

- **Installation controls jobs to be cancelled**

- **Customization set in AOFCUST member**

  ▶ Add AUTO(PAGE) keyword

  ▶ Setup in PAGE section

```
PAGE(
    DSN(lpdsn)
    CYLS(nnnn)
    HLQ(qual[.qual..][,catname])
    VOL(volume{,volume..])
    JOB({*|jobname[*]},{CANCEL|KEEP})
    )
```

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msys for Operations - IXC102A Automation

⭐ **Assist partitioning a system from a Parallel Sysplex**

- ■ **Automation requires HW interaction**
  - ► CPC must be G5 or later to initiate
  - ► G3 / G4 CPCs can be targeted
  - ► Uses SPI component and HMC APIs

- ■ **ProcOps coexistence**
  - ► msys/Ops takes precedence
  - ► Only owner of lock can automate
  - ► Global Lock - major <u>INGPLEX</u> - minor <u>Failed Sysname</u>

- ■ **Summary of actions taken**
  - ► Check if automation flag(XCF) is enabled
  - ► Get global lock
  - ► Acquire & issue customized SE request

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msys for Operations - IXC102A Automation

- **Function invocation**
  - ▶ Triggered by IXC102A

- **Customization set in AOFCUST member**
  - ▶ Add AUTO(XCF) keyword

  - ▶ Setup XCF section

```
IXC102A(
   ENABLE(sysname[,sysname..])
   ENABLE(sysname)
   DISABLE(sysname[,sysname..])
   DISABLE(sysname)
)
```

  - ▶ Setup Type of SE request - SYSRESET, DEACTIVATE, ACTIVATE, LOAD

```
IXC102A(
   CMD(sysname1,command)
   CMD(sysname2,command)
)
```