Smarter Systems for a Smarter Planet

MVS Core Technologies Project Opening

WSC Hot Topics

Session 14654 – March 10, 2014

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IBM Washington Systems Center

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Agenda

- Operating Systems status
- Washington Systems Center Flashes
- Announcements
- Parallel Sysplex™

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z/OS Key Dates

- z/OS Version 2 Release 1
  - **July 23, 2013:** Announced
  - **September 30, 2013:** General availability via ServerPac, CBPDO

z/OS is on a 2-year release cycle - started with z/OS 2.1

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z/OS Support Summary

Release	z900/z 800 WdfM	z990/ z890 WdfM	z9 EC z9 BC WdfM	z10 EC z10 BC WdfM	z196 CPC	z196 w/zBX	z114 CPC	z114 w/zBX	zEC12 zBC12	End of Service	Coexist with	Lifecycle Extension for z/OS
z/OS V1.10	X	X	X	X	X	X	X	X	X	9/11[1]	R12	9/13[1]
z/OS V1.11	X	X	X	X	X	X	X	X	X	9/12*	R13	9/14[1]
z/OS V1.12	X	X	X	X	X	X	X	X	X	9/14*	2.1	3*
z/OS V1.13	X	X	X	X	X	X	X	X	X	9/16*	2.2	3*
z/OS V2.1			X	X	X	X	X	X	X	9/18*	2.3	3*
z/OS V2.2*										9/20*	2.4*	3*

Notes:

1 **The IBM Lifecycle Extension for z/OS provides the ability for customers to purchase extended defect support for that release of z/OS for up to 24 months after the z/OS release's end of service date**

2 **See IBM GTS services for additional fee-based extended service**

3 **Optional extended service is planned to be offered**

• **Planned. All statements regarding IBM's plans, directions, and intent are subject to change or withdrawal without notice.**

WdfM – Server has been withdrawn from Marketing

Out of Lifecycle Extension for z/OS support[4]

Defect support provided with Lifecycle Extension for z/OS

Generally supported

*** Planned. All statements regarding IBM's plans, directions, and intent are subject to change or withdrawal without notice.**

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IBM Lifecycle Extension for z/OS V1R11 (5657-A01)

- The IBM Lifecycle Extension for z/OS V1.11 provides fee-based corrective service (a fix, bypass, or restriction to a problem) for up to two years beyond the September 30th 2012 end of service date for z/OS V1.11

- This Lifecycle Extension for z/OS V1.11 enables z/OS V1.11 users to continue to receive corrective service for z/OS V1.11 for the 2 year period of October 1, 2012 through **September 30, 2014**.

- The Lifecycle Extension for z/OS V1.11 was announced February 15, 2011 and made available October 1, 2012.

- **More details: Announcement Letter 212-025 Dated April 11, 2012**

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z/OS CPENABLE Settings
IBM Enterprise, System z and zSeries Processors

- **Flash10337**
- This document has the recommended settings for the z/OS CPENABLE parameter

Processor	LPAR Dedicated	LPAR Shared
IBM zEnterprise EC12	10,30	10,30
IBM zEnterprise BC12	10,30	10,30
IBM zEnterprise 196	10,30	10,30
IBM zEnterprise 114	10,30	10,30
IBM System z10	10,30	10,30
IBM System z9	10,30	10,30
zSeries 990 (2084	10,30	10,30
zSeries 890 (2086)	10,30	10,30

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Recommended Methods for Testing STP Recovery

- **Flash10593**
- This Flash documents IBM recommended procedures for testing STP Recovery that simulates a loss of clock source for a server in diad configuration
  - A diad configuration consists of only one Stratum-1 (PTS/CTS) and one Stratum-2 (BTS)
  - Additional STP information:

http://www.ibm.com/systems/z/advantages/pso/stp/hardware.html

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z/OSMF Resource Requirements

- **WP101779**
- This white paper has two sections in it:
  - z/OSV1.12 and V1.13 performance and resource usage information
  - z/OS V2.1 provides performance and resource usage information

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IBM HyperSwap Technology

- **WP101289**
- This white paper discusses the four different HyperSwap implementation options:
  - z/OS Basic Hyperswap
  - TPC-R HyperSwap
  - GDPS/PPRC HyperSwap Manager
  - Full function GDPS/PPRC HyperSwap solution

- **WP101959**
- This is an accompanying white paper to WP101289 that contains Q&As on z/OS Basic HyperSwap and can be used as a basic review when installing z/OS Basic HyperSwap

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Best Practices Upgrading a Coupling Facility Version 2

- **WP101905**
- This paper documents the best practices for installing a new CF, doing a POR of CEC with a coupling facility image on it and reactivating a coupling facility image.
- IBM recommends that the best practices be followed to prevent unplanned down time, other adverse impacts to applications and minimize the maintenance upgrade window.
- Version 2 of the Best Practices:
  - Upgrading a CF procedure simplify the removal of the last CF link which is also the last timing link, or ensure STP timing will not be disrupted.
  - Procedures have been updated to use the CF SHUTDOWN command instead of the DEACTIVATE command
    - SUHTDOWN is safer as it will not complete if there are still structures in the CF
    - SHUTDOWN was specifically added to avoid a sysplex outage as a result of the incorrect CF being DEACTIVATEd

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Coupling Thin Interrupts and Coupling Facility Performance in Shared Processor Environments

- **WP102400**
- How various sharing protocols, including the new Coupling Thin Interrupts introduced with CF Level 19 supported on zEC12 and zBC12, is examined in this paper.
- Comparing the performance of these shared CF processor options it will be evident that the use of coupling thin interrupts in the CF provides significant improvement in CF shared processor environments
  - This improvement will be evident in environments that are already using shared CF processors and will expand the number of environments in which shared CF processors are viable.

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z/OS V2.1 Updates
February 24, 2014

- This z/OS V2.1 Enhancement is now available:
  - Support for recovering prior levels of PDSE Version 2 members
  - This new support is designed to allow you to specify how many member versions will be kept in a PDSE when creating one using JCL, ISPF, and dynamic allocation
  - Support is provided by specifying a system-wide maximum using **MAXGEN_LIMIT** keyword in **IGDSMSxx** member of PARMLIB
  - Programming services have also been updated to support this function
  - Support is provided by the PTF for APAR OA42358
- OA42247 & OA42248 ISPF PDSE Member Generation SPE
  - Support is only available when *Data Set Name Type* is LIBRARY and version of the Library is **2**
  - When member generation is active, the default action for the SAVE is to create a new generation when editing the current member
    - SAVE NOGEN
    - The absolute number starts at **1** for a new member generation

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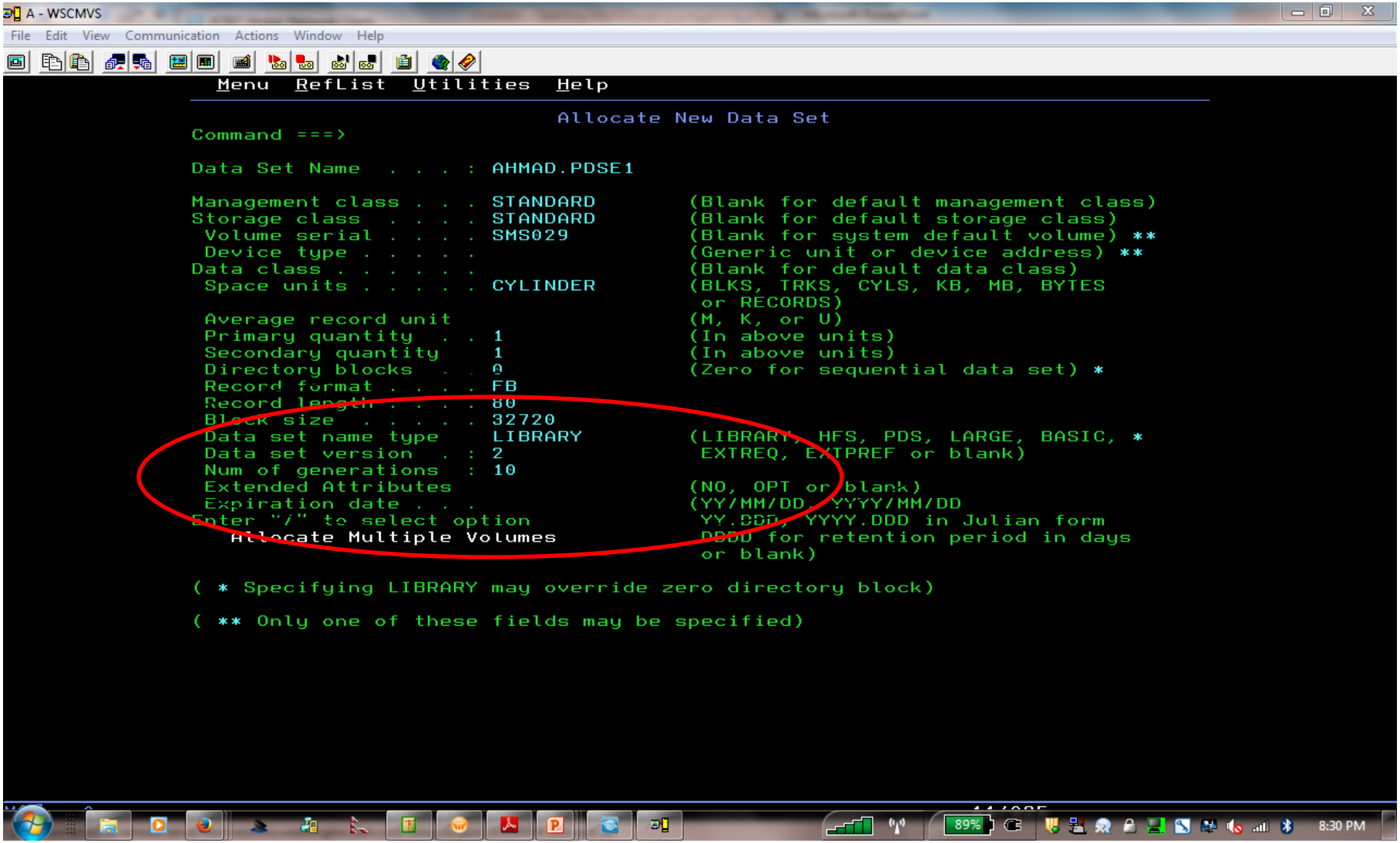
ISPF Support for PDSE Enhancement



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z/OS V2.1 Updates …
February 24, 2014

- This z/OS V2.1 Enhancement is now available:
  - CCA (Common Cryptographic Architecture) enhancement support for the IBM zEnterprise servers with an MCL when a Crypto Express4S (zEC12, zBC12) or crypto Express3 (zEC12, zBC12, z196, z114) PCIe adapter configured as a CCA co-processor
  - CCA supports new functions defined by German DK organization
    - Key management support for new AES key types
    - AES key derivation support
    - Several DK-specific PIN and administrative functions
  - The ICSF support for these functions is provided by the PTF for APAR OA42246

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New z/OS V2.1 Function
February 24, 2014

- A new, browser-based SDSF application designed to run in a z/OSMF environment
  - This new SDSF Task is designed to support many of the same functions provided by the ISPF and TSO/E based SDSF application, but takes advantage of the richer display capabilities of a GUI
  - Requires z/OSMF V2.1 (5610-A01)
  - Support is provided by the PTF for APAR PM86303 in 1Q2014

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Improved Coupling Facility Resiliency

- Coupling Facility Control Code (CFCC) Level 19's exploitation of the Flash Express feature is designed to improve resiliency while providing standby capacity to handle the overflow of WebSphere MQ shared queues
  - The overflow area is specified for certain Coupling Facility list structures in the Storage Class Memory (SCM) provided by Flash Express feature
  - This will allow structure data to be placed in Flash Express memory and be brought back to the CF structure to be processed
  - This is expected to provide significant buffering against enterprise messaging workload spikes and support very large amount of data in shared queue structures
    - Potentially allowing several hours of data to be stored without causing interruption in processing
  - Hardware requirements:
    - zEC12, zBC12 with driver 15+MCLs and Flash Express Feature (#0402)
  - Software requirements:
    - z/OS V2.1 and APAR OA40747
    - z/OS 1.13 and APAR OA40747
  - Availability 1H2014

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Today's CF Processing

- CFCC Dispatcher's polling model provides *consistently* good CF request performance only when there is a dedicated engine assigned to the CF image, which is always polling for work
  - Shared engine CFs actually yield good performance when the CF image is truly dispatched on the engine, but VERY poor performance when the CF image is NOT dispatched on the engine (due to PR/SM timeslicing)
    - Typically on the order of 5000-10000 microseconds latency waiting for the CF engine to get re-dispatched to the image
    - This results in both highly variable, and on average, very poor, CF request service times for shared-engine CFs
  - As CF engine speeds increase, using CFs with dedicated CF engines (often running at relatively low utilization) becomes increasingly expensive
  - Techniques such as Dynamic CF Dispatching, careful LPAR weighting, and LPAR time-slicing changes, have not provided an effective solution, though they CAN work well if used carefully and monitored closely

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Todays z/OS processing

- On the z/OS side:
  - z/OS polling to recognize either
    - Receipt of asynchronous CF list-notification signals -or-
    - Asynchronous CF request completion
  - Introduces significant latencies, delaying z/OS messaging (e.g. XCF signals) or other processing that depends on recognizing this asynchronous CF activity
  - z/OS “short wait management” has been introduced to enable z/OS to “poll faster” for these asynchronous events, which reduces the observed latencies, but at a high overall cost in host CPU – which is often seen as a bad tradeoff

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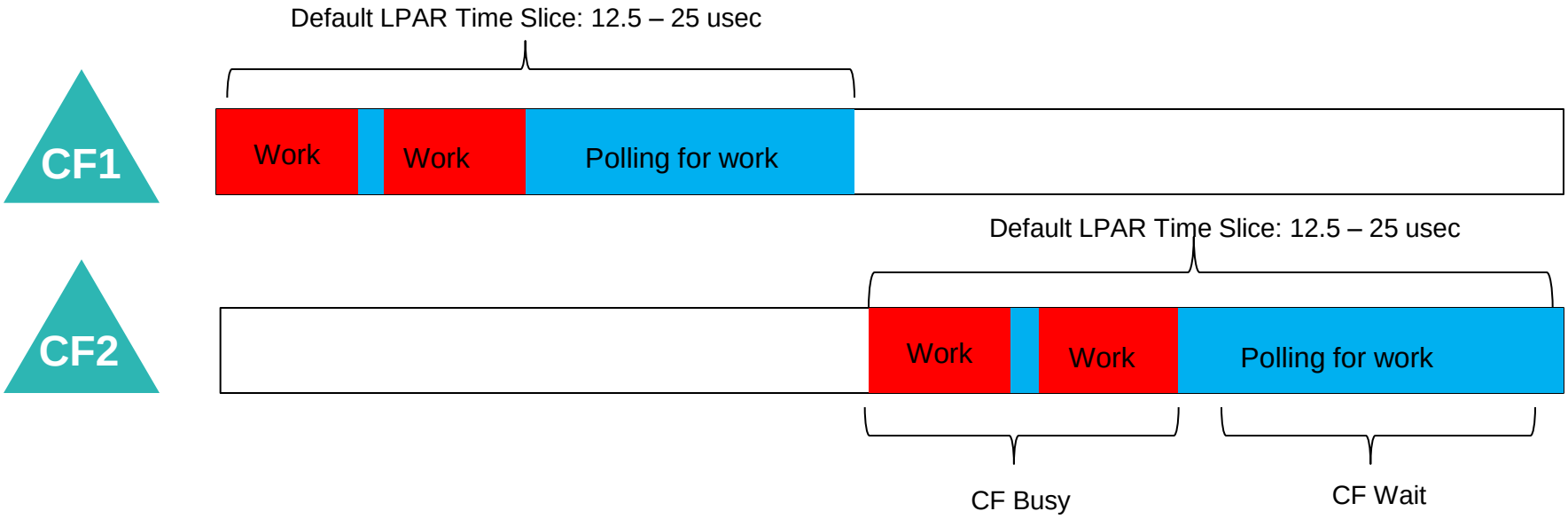
CF Sharing – Dynamic CF Dispatching

CF1 and **CF2** default Sharing – DYNDISP=OFF

CF will never give-up its shared engine until the engine is taken away by PR/SM and given to another logical partition



Effective Engines < Defined Engines = (CF Busy + CF Wait) / Interval Time

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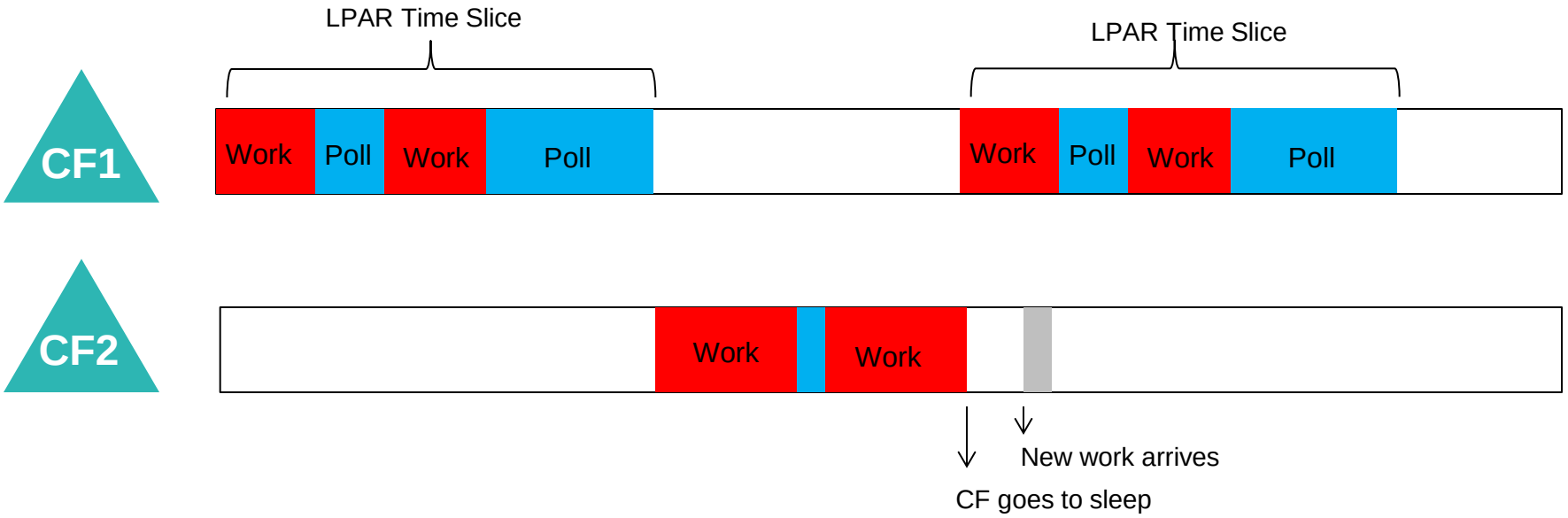
CF Sharing …

CF1 DYNDISP=OFF & **CF2** DYNDISP=ON

CF releases the shared engine when there is no more work

CF sets a timer, and goes back to sleep, releasing the shared engine



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Coupling “Thin Interrupts” - The Solution

- Provide hardware, firmware, and software support for Coupling related “thin interrupts” to be generated when
  - On the CF side:
    - A CF command is received by a shared-engine CF image
    - A CF signal is received by a shared-engine CF image (e.g. arrival of a CF-to-CF duplexing signal)
    - Completion of a CF signal previously sent by the CF (e.g. completion of a CF-to-CF duplexing signal)
  - On the z/OS side:
    - A CF signal is received by a shared-engine z/OS image (e.g. arrival of a List Notification signal)
    - An asynchronous CF operation completes on a shared-engine z/OS image
- The interrupt causes the receiving partition to be dispatched by PR/SM, if it is not already dispatched, thus allowing the request, signal, or request completion to be recognized and processed in a more timely manner
- Once the image is dispatched, existing “poll for work” logic in both CFCC and z/OS can be used largely as-is to locate and process the work – the new interrupt simply expedites the re-dispatching of the partition

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Coupling “Thin Interrupts” - *The Solution*

- System z architecture provides a new thin interrupt class for these new coupling thin interrupts, to differentiate from existing types of interrupts
- PR/SM presents these coupling thin interrupts to the guest partition, so CFCC and z/OS both require interrupt handler support capable of dealing with them
- CFCC also needs to handle giving up control of the processor as soon as all available pending work has been exhausted (or when PR/SM un-dispatches it off the shared processor, whichever comes first)
  - Dynamic CF Dispatching options:
    - **DYNDISP=NO** (existing) – The CF does not do dynamic dispatching. It always retains control of the shared CF processor from the time PR/SM dispatches it, until PR/SM un-dispatches it at end of timeslice. The CF *never* voluntarily gives up control of the shared CF processor.
    - **DYNDISP=YES** (existing) – The CF uses a timer-based algorithm to heuristically determine when to voluntarily give up control of the shared CF processor, and sets a timer interrupt to cause the image to be re-dispatched some number of milliseconds into the future.
    - **DYNDISP=THIN** (new) – The CF voluntarily gives up control of the shared CF processor whenever it runs out of work to do, relying on coupling thin interrupts to cause the image to get re-dispatched in a timely fashion when new work (or new signals) arrive at the CF to be processed. Allows efficient sharing and timeslicing between the sharing CF images, and avoids many latencies inherent in polling-based techniques.
- z/OS also allows coupling thin interrupts to be enabled/disabled for z/OS images
  - **COUPLExx** and **SETXCF FUNCTIONS** support

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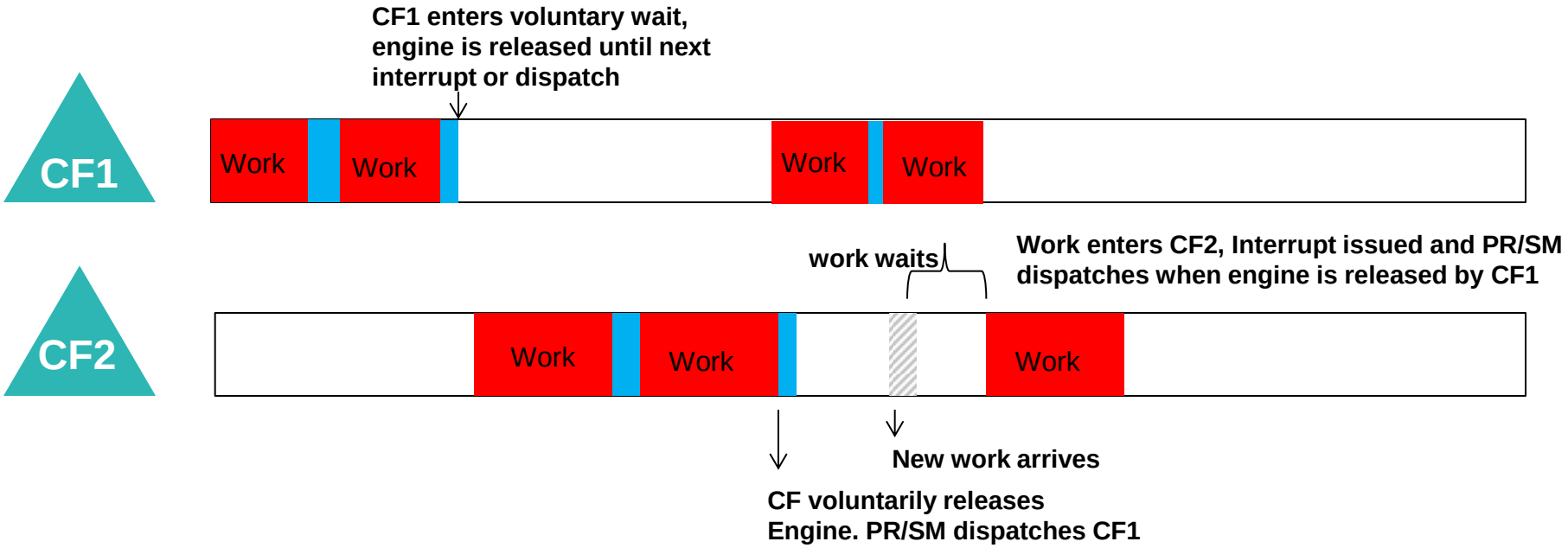
CF Sharing … Thininterrupt

CF1 DYNDISP=THIN & CF2 DYNDISP=THIN

- New class of thin Interrupts associated with CF usage to enable more effective processor sharing
- Thin Interrupts are to get the processor re-dispatched in a more timely manner when new work arrives at the CF
- When CF is dispatched, the existing “poll for work” logic is used to locate and process the work
- CF will voluntarily give up control when work is exhausted (or when PR/SM takes away the shared processor) so it can be dispatched to another LPAR



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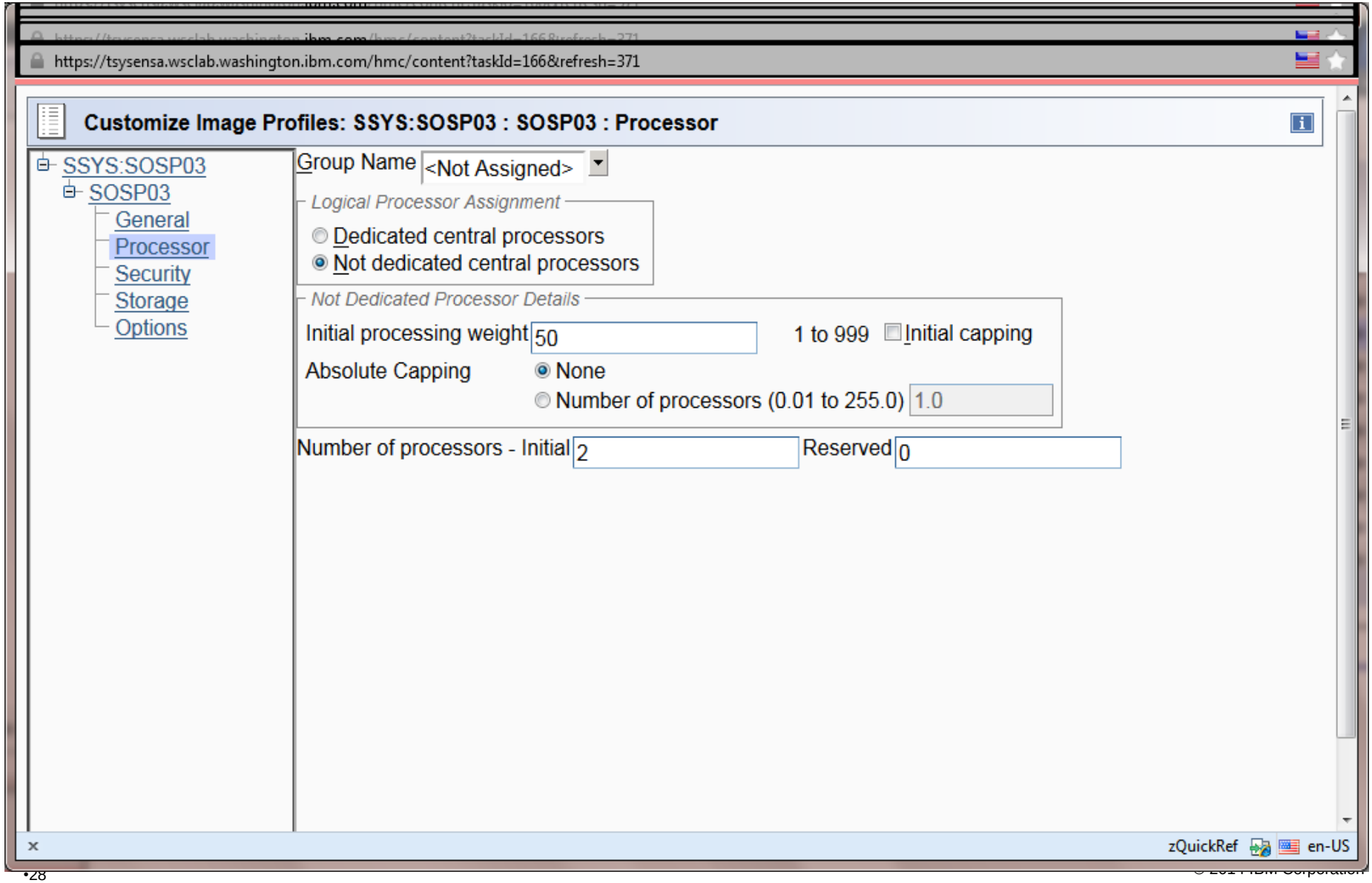
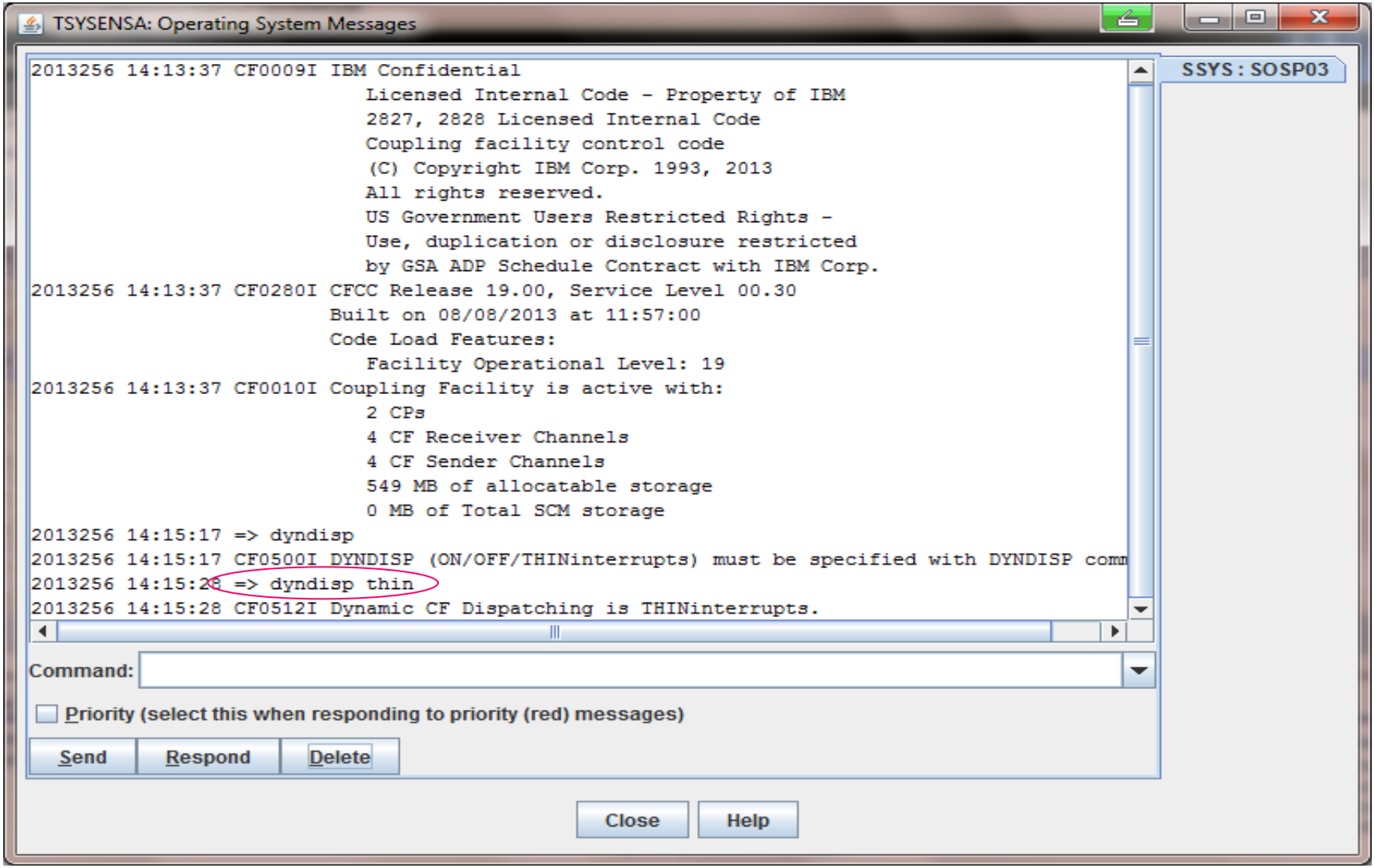
Customize Image Profile



Operating System Messages – Enable Thin Interrupts



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Display CF

```
D CF,CFNM=CF3
IXL150I  15.54.28  DISPLAY CF 323
COUPLING FACILITY 002827.IBM.02.0000000132C7
                  PARTITION: 03  CPCID: 00
                  LP NAME: SOSP03   CPC NAME: SSYS
                  CONTROL UNIT ID: FFFC
NAMED CF3
COUPLING FACILITY SPACE UTILIZATION
 ALLOCATED SPACE                    DUMP SPACE UTILIZATION
  STRUCTURES:          445 M         STRUCTURE DUMP TABLES:          0 M
  DUMP SPACE:           10 M                   TABLE COUNT:          0
  FREE SPACE:           94 M              FREE DUMP SPACE:         10 M
 TOTAL SPACE:          549 M             TOTAL DUMP SPACE:         10 M
                                      MAX REQUESTED DUMP SPACE:          0 M
   VOLATILE:              NO
    CFLEVEL:              19
    CFCC RELEASE 19.00, SERVICE LEVEL 00.30
    BUILT ON 08/08/2013 AT 11:57:00
    STORAGE INCREMENT SIZE: 1 M
    STORAGE-CLASS MEMORY INCREMENT SIZE: 1 M
    COUPLING FACILITY HAS 2 SHARED AND 0 DEDICATED PROCESSORS
    DYNAMIC CF DISPATCHING: THIN INTERRUPTS
    COUPLING FACILITY IS NOT STANDALONE
    COUPLING THIN INTERRUPTS: ENABLED

 CF REQUEST TIME ORDERING: REQUIRED AND ENABLED
```


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Display XCF

```
D XCF,C

 PARTITION IMAGE NAME: N/A

 IPL TOKEN: N/A

 COUPLEXX PARMLIB MEMBER USED AT IPL:  COUPLEZ1

 OPTIONAL FUNCTION STATUS:
   FUNCTION NAME                    STATUS      DEFAULT
   DUPLEXCF16                       DISABLED    DISABLED
   SYSSTATDETECT                    ENABLED     ENABLED
   USERINTERVAL                     DISABLED    DISABLED
   CRITICALPAGING                   DISABLED    DISABLED
   DUPLEXCFDIAG                     DISABLED    DISABLED
   CFLCRMGMT                        DISABLED    DISABLED
   COUPLINGTHININT                  ENABLED     ENABLED
```


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Coupling “Thin Interrupts” - The Benefits

- Elapsed time performance improvements for CF-based messaging functions (e.g. shared MQ, XCF signalling, IMS shared queues, etc.) and any CF- exploiting functions operating in environments with significant amounts of asynchronous CF accesses
  - Improved performance and throughput
- Faster and far more consistent CF service times will be achieved by shared-engine CF images
  - Should be reasonably close to dedicated-engine CF performance, as long as the CF engines are not “overcommitted” in terms of utilization
  - ***Dedicated CF processors will still provide the very best CF performance***
- Multiple test and/or production CF images can be aggregated onto a single shared CF engine (or multiple shared CF engines), with reasonably good performance
  - May avoid the need to dedicate ICF engine(s) to each CF image
- Configuration simplification
  - Makes shared-engine CFs as simple and natural to use as shared-engine z/OS images are today

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Coupling “Thin Interrupts” - The Delivery

- Coupling Thin Interrupts support requires:
  - z/OS 2.1
    - Rollback to z/OS 1.12 and z/OS 1.13
      - **OA38734, OA38781, OA37186 and OA42682**
  - zEC12 GA2 or zBC12 GA1 machine –and-
    - **CFLEVEL 19**

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CFSizer has been updated

- Support for CFCC Level 19 exploitation of the Flash Express feature
- Following are now available:
  - The **MQSeries** input page now accepts an input describing the number of minutes of overflow capacity desired
  - Specifying a non-zero value for the input will trigger the Flash Express calculations
  - http://www.ibm.com/systems/support/z/cfsizer/mqseries
  - The alternate sizing technique page now provides two versions of the Sizer utility for download
    - The new version 1.01 supports Flash Express along with other significant changes
    - The previous version 0.12, is provided for fallback/compatibility and will eventually be depricated
  - http://www.ibm.com/systems/support/z/cfsizer/altsize.html

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Thank You !

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