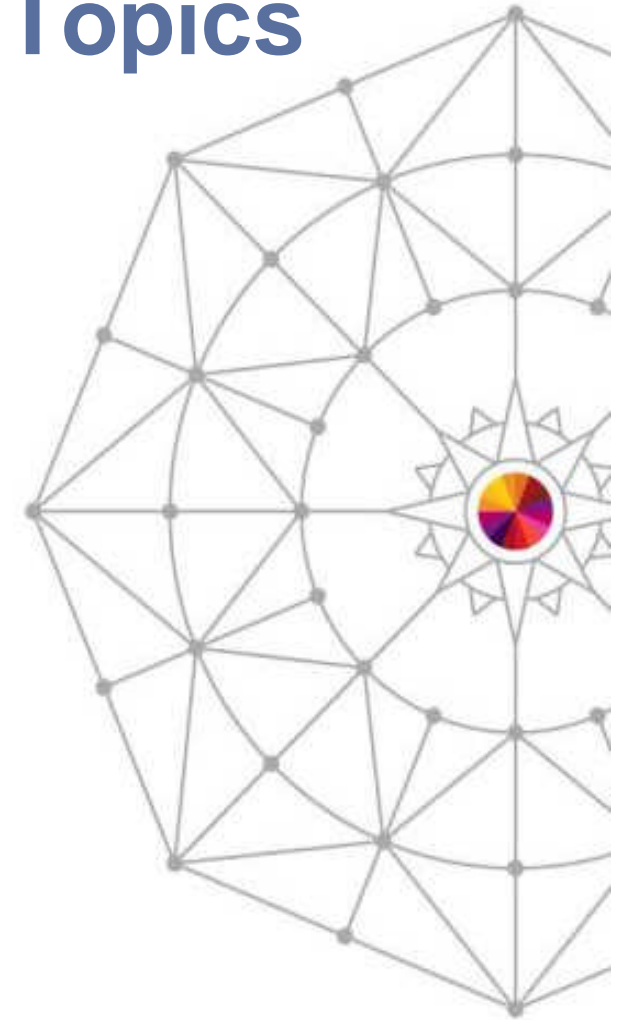


z/OS Performance “HOT” Topics

Kathy Walsh
IBM

March 10, 2014
Session Number: 15266



Agenda

- Processor Information
 - PR/SM Absolute Capping
 - Instructions Counts
 - Warning Track
 - New PCIe Support - RoCE and zEDC
- Performance and Capacity Planning Topics
 - zEDC Compression
 - zBNA Latest Status
 - zPCR Latest Status
 - CPU MF and HIS Support
 - New RSM and WLM APARS
 - New z/OS 2.1 Support – GRS, USS, Allocation
 - New CF DYNDISP Support
 - zIIP Capacity Planning in DB2
- ▶ Addendum
 - Older APARs or Performance Information

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PR/SM Absolute Capping

- zEC12 GA2 and zBC12 allows specification of an “**absolute capping limit**”
 - Expressed in terms of 1/100ths of a processor (0.01 to 255.0)
 - Specified independently from the LPAR weight
 - The shared partition's processing weight still dictates the logical partition priority compared to other shared logical partitions
 - Most effective for absolute caps higher than the capacity the partition's relative weight would deliver
 - Absolute capping is not recommended to be set below the capacity the logical partition's weight would deliver
 - Insensitive to capacity changes or LPAR (de)activations
 - Specified per processor type in image profile and partition controls panel
- Unlike initial capping may be used concurrently with defined capacity and/or group capacity management
 - The absolute capacity becomes effective before other capping controls
 - WLM/SRM recognizes new cap, e.g. for routing decisions

PR/SM Absolute Hardware Capping

Customize Image Profiles: SSYS : SOSP15 : Processor

SSYS
SOSP15
General
Processor
Security
Storage
Options
Load
Crypto

Group Name <Not Assigned>

Logical Processor Assignments

Dedicated processors

Select	Processor Type	Initial	Reserved
<input checked="" type="checkbox"/>	Central processors (CPs)	3	1
<input type="checkbox"/>	System z application assist processors (zAAPs)	0	0
<input checked="" type="checkbox"/>	System z integrated information processors (zIIPs)	2	0

Not Dedicated Processor Details for :

CPs zIIPs

CP Details

Initial processing weight: 100 (1 to 999) Initial capping

Enable workload manager

Minimum processing weight: 0

Maximum processing weight: 0

Absolute Capping: None Number of processors (0.01 to 255.0) 1.23

Cancel Save Copy Profile Paste Profile Help

z/OS 2.1 - Instruction Counts

- Provide a more consistent metric which does not see as much CPU variability due to:
 - Impacts of hardware caching
 - LPAR configurations
 - Software stack
 - Workload interactions – dispatch rate
- New support provides Instruction Counts in SMF 30 records
 - Supported on z10 processors and later which supports CPUMF
 - Similar to the SMF 30 CPU time fields
 - SMFPRMxx new keyword `SMF30COUNT|NOSMF30COUNT`
 - Requires CPUMF basic and extended counters in HIS be active

15274: Why is the CPU Time so Variable, : Tuesday, 11:00 AM

14744: System z Processor Consumption Analysis, Tuesday, 4:30 PM

New Function - Warning Track

- Requires zEC12 or zBC12
- APARs OA37186 and OA37803
- PR/SM recognizes a logical CP has to be undispached from a physical CP and issues a Warning Track Interrupt (WTI, aka EXT 1007) and sets a grace period for z/OS to return the logical CP to PR/SM
 - If grace period expires before z/OS returns logical CP to PR/SM, PR/SM undispaches the logical CP and will redispach it later
- Once z/OS receives a WTI
 - Saves status for the work running (makes work available to dispatch on another CP)
 - Issues a DIAG 49C to return the CP to PR/SM
 - Becomes PR/SM's responsibility to redispach the logical CP when able and resume execution at instruction after DIAG 49C
 - z/OS keeps track of the following statistics:
 - How many DIAG 49Cs were successful / unsuccessful in returning CP to PR/SM before the end of the grace period
 - How long PR/SM undispached the logical CP for successful DIAG 49Cs

zEC12 - Data Compression Express - zEDC

- The z Enterprise Data Compression (zEDC) Express offering provides a low-cost data compression to z/OS system services and applications
 - Implemented as a Peripheral Component Interconnect Express (PCIe) device
 - The compression function is provided via FPGA firmware
 - Can install up to 8 devices in a single processor
 - Each device is sharable by up to 15 LPARs
- Exploiters will see the following benefits
 - Increased performance for reading and writing compressed data
 - Reduced disk space
- Exploiters:
 - SMF Logstreams
 - IBM SDK for z/OS, Java Technology Edition, V7 R1
 - IBM Encryption Facility for z/OS
 - IBM Sterling Connect:Direct for z/OS Standard Edition V5.2
 - Extended Format BSAM and QSAM data sets
 - z/VM 6.3 support for guest exploitation of zEDC



15209: Experiences with zAWARE and zEDC, Tuesday, 3:00 PM

RMF Support for zEDC Express

- New support in RMF will provide information on PCI Express based functions
 - zEnterprise Data Compression (zEDC) capability using zEDC Express
 - RDMA (Remote Direct Memory Access) over Converged Enhanced Ethernet
- Information added via new subtype to SMF 74 (74.9) called PCI Express Based Function Activity
- Written by RMF Monitor III
 - General PCIE Activity – both zEDC and RDMA activity
 - Hardware Accelerator Activity
 - Hardware Accelerator Compression Activity
 - Types of data provided:
 - I/O Queue Time
 - I/O Execution Time
 - Number of compressed bytes in and out
 - Number of decompressed bytes in an out
 - Device drive buffer statistics

SMF Logstream Exploitation of zEDC Express (OA41156)

- Writing to SMF Logstream:
 - Controlled by new SMFPRMxx keyword – COMPRESS
- Reading via IFASMF DL utility:
 - Uncompressed records will be read as done today
 - Compressed blocks encountered, decompression will be attempted
 - New keyword, SOFTINFLATE, provided to allow blocks to be read on down level systems or on z/OS V2.1 systems running without the zEDC Express hardware
 - Due to CPU usage, SOFTINFLATE is off by default
 - If SOFTINFLATE NOT specified on IFASMF DL jobs running on down level systems or on z/OS V2.1 running on hardware without zEDC enabled, then an error will occur
 - No records will be deleted from the SMF logstream
 - IFASEXIT will return an error when a compressed block is found

Hardware	Software	Accelerators	Decompression	Compression
zEC12 GA2 or zBC12	z/OS V2.1	Active	Hardware	Hardware
zEC12 GA2 or zBC12	z/OS V2.1	Not Active	Software (via SOFTINFLATE)	None
Pre-zEC12 GA2	z/OS V2.1	N/A	Software (via SOFTINFLATE)	None
All	z/OS V1R13 or V1R12	N/A	Software (via SOFTINFLATE and PTFs)	None

Java Exploitation via zlib

- The Open Source zlib library is a highly used cross platform library
- IBM is providing in z/OS V2.1 an enhanced zlib library as part of the z/OS USS Application Service Base (FMID HOT7790)
- IBM SDK for z/OS, Java Technology Edition, V7 R1 will provide zEDC compression access
 - Via the *java.util.zip* package
 - This package will replace the standard zlib library which is currently used with the IBM provided zlib library
 - May see reduced disk space or network bandwidth requirements using zEDC compression in Java with minimal CPU overhead
 - CPU cost of compression may be reduced using zEDC compression compared to software based zlib compression

QSAM / BSAM Exploitation of zEDC Express

- Enable support for zEDC compressed of BSAM/QSAM data sets
 - Requires Extended Format data sets
 - Data Class supports new zEDC compression type for existing COMPACTION keyword
 - SYS1.PARMLIB member IGDSMSxx supports new zEDC compression type on existing COMPRESS keyword

- The first OPEN of the data set determines the compression type for the data set based on data class and PARMLIB specifications
 - SMF 14 record is updated to indicate which form of compression is being used; none, zEDC, generic, tailored
 - Minimum compression space requirements for compressed format are 5MB, or 8MB Primary if no Secondary

■ System z Capacity Planning Opportunities:

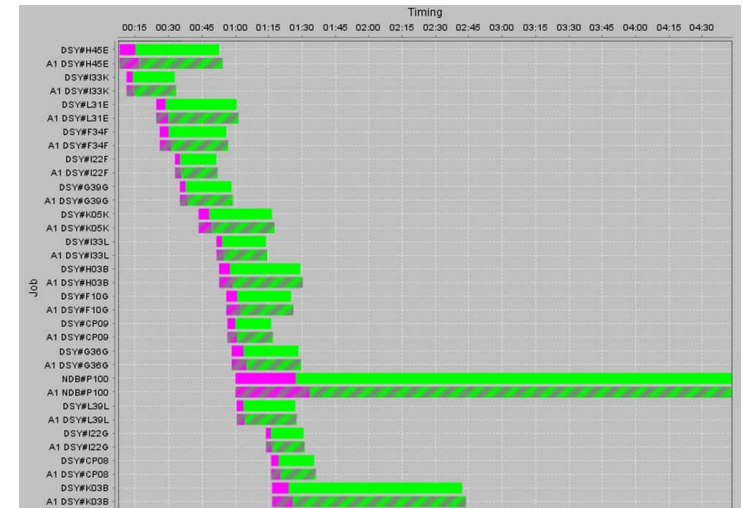
- Per thread (engine) speed improvements for CMOS CPs is slowing dramatically
 - Every CMOS platform is facing this issue
 - Future capacity gains will be by adding more CPs rather than much faster CPs
 - Enhances need for parallel operation and more reliance on parallel sysplex

- Availability of subcapacity models continues to grow
 - Provide capacity as more, slower processors increasing parallelism
 - Especially useful in environment with large number of LPARs
 - Additional capacity can be acquired in smaller increments
 - Receive benefit since Specialty CPs run at full n-way speed

**Impact of these trends will most likely be seen first in the
Batch Window**

IBM System z Batch Network Analyzer (zBNA)

- IBM System z Batch Network Analyzer
 - A free, “as is” tool to analyze batch windows
 - Available to Customers, Business Partners and IBMers
 - PC based, providing graphical and text reports
 - Includes Gantt charts and support for Alternate Processors (what if scenarios)
 - zBNA V1.3
 - Support for SMF 42 records to understand the “Life of a Data Set”
 - zBNA V1.4.2
 - Support for SMF 14/15 records to understand zEDC compression candidates



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Why use zBNA?

- Perform "what if" analysis and estimate CPU upgrade effect on batch window
- Identify job time sequences based on a graphical view
- Filter jobs by attributes like CPU time / intensity, job class, service class, etc.
- Review the resource consumption of all the batch jobs
- Drill down to the individual steps to see the resource usage
- Identify candidate jobs for running on different processors
- Identify jobs with speed of engine concerns (top tasks %)
- Identify by job which datasets are used and the datasets performance info
- For any dataset identify every job in the time window using the data set
- Identify top zEDC compression candidates and understand the zEDC card capacity required

15207: zBNA Tool – Because Batch is Back, Wednesday, 1:30 PM

15129: zBNA Hands-on Lab, Wednesday, 3:00 PM

15280: Batch Workload Analysis Using zBNA – User Experience, Wednesday, 4:30 PM

zPCR Latest Status

- Version 8.5 (1/31/2014)
 - LSPR data continues to be based on z/OS 1.13
 - zAware can be configured as an SCP type in either the GCP or IFL pool
 - Support for zIIP/zAAP 2:1 ratio on zEC12 / zBC12
 - Tool updated for Java7
 - Java7 and all tools installed by a user must be updated at the same time
 - Impacts zPCR, zBNA, and zSoftCap
 - Removes requirement for Windows “Administrator Authority”
 - Still need Admin Authority to remove old version

* All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.

z/OS 2.1 – CPU MF Summary

- New HISSERV Service
 - New Programming Interface for real time CPU MF access
- ZOS SOFTWARE Counters
 - New Counter Set (in addition to Basic, Problem, Crypto, and Extended)
 - Only recorded in SMF 113 subtype 1
- Command Changes to improve operability and data recording
- SMF 113 Record Changes
 - SMF 113 Subtype 2 - Interval Start and End Time
 - Machine Sequence Code (e.g. Processor Serial Number)
- SMF 113 Subtype 1 – New
 - Same as SMF 113 Subtype 2 but **only Delta values**
 - Includes ZOS Counter Set

Recommendation remains to continuously run CPU MF Counters (Basic and Extended) – collecting SMF 113 Subtype 2 records

“F HIS,B,TT='Text',PATH='/his',CTRONLY,CTR=(B,E),SI=SYNC”

Looking for zEC12 / zBC12 Migration “Volunteers” to send SMF data

- Want to validate / refine Workload selection metrics

Looking for “Volunteers”

(3 days, 24 hours/day, SMF 70s, 72s, 113s per LPAR)

“Before” and “After”

Production partitions preferred

If interested send note to jpburg@us.ibm.com,

No deliverable will be returned

Benefit: Opportunity to ensure your data is used to influence analysis

New RSM APAR - OA41968

- New IFASYSxx LFAREA parameter INCLUDE1MAFC
 - LFAREA=(64M,INCLUDE1MAFC)
 - Specifies the 1 MB pages are to be included in the available frame count (RCEAFC)
- RSM changes to:
 - Performs less paging when there is an abundance of available fixed 1M pages
 - More often break up fixed 1M pages to satisfy 4K page demand
 - Attempt to coalesce broken up fixed 1M pages when there is fixed 1M page demand, no guarantee coalescing will be successful
- RMF APAR in Support - OA42510
 - RMF PTFs must be applied prior to specifying INCLUDE1MAFC
 - RMF uses the RCEAFC to generate some of their reports and not applying OA42510 may lead to incorrect RMF reports
- Application programs:
 - Can check the RCEINCLUDE1MAFC bit to determine if the installation specified INCLUDE1MAFC in their LFAREA specification
 - When using STGTEST SYSEVENT to get information about the amount of storage available in the system if INCLUDE1MAFC is specified, available fixed 1M pages are included in this amount
- In a future IBM z/OS release, fixed 1M pages will be unconditionally included in the available frame count regardless of whether the INCLUDE1MAFC value is specified or not

New WLM APAR - OA44526 - OPEN

- BLWLINTHD enhancements
- New support for blocked workloads
 - Allows lower threshold to be set
- Useful for all online environments, with little to no batch workload, and use of DB2
 - Helps prevent CPU starved workloads from holding locks which impact higher priority work
- Use RMF Workload Activity Report to measure the amount of blocked workload activity

WORKLOAD ACTIVITY

```
--PROMOTED--  
BLK      3.240  
ENQ      0.000  
CRM      0.000  
LCK      0.000  
SUP      0.000
```

Check and understand why there are CPU times in any service classes

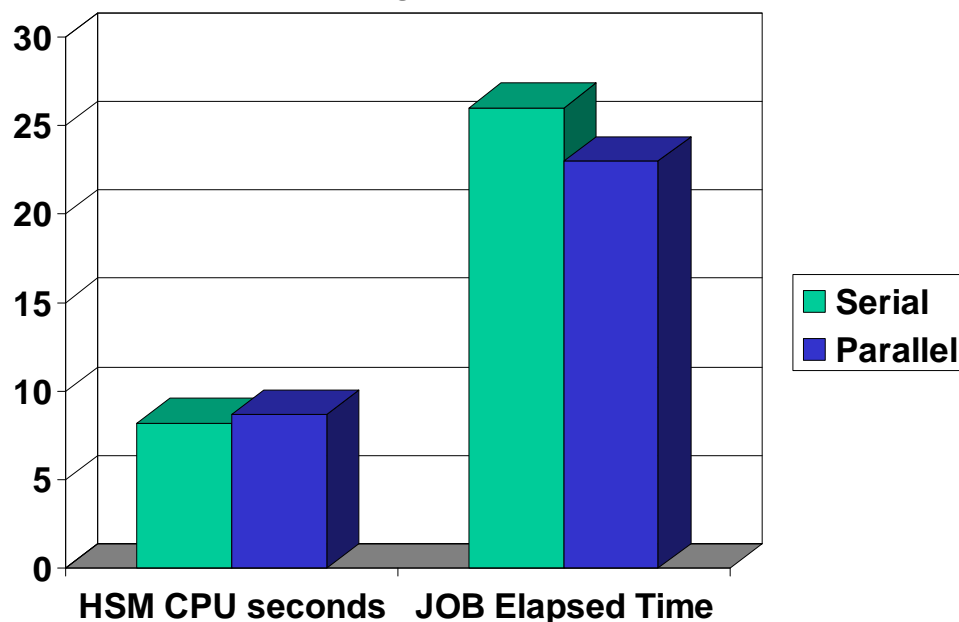
15214: WLM Update for z/OS 2.1 & 1.13, Monday, 3:00 PM

15217: Route Me, WLM – WLM Functions for Dynamic Routing, Tuesday, 11:30 AM

14745: WLM – Performing a Quick WLM Performance Checkup, Wednesday, 3:00 PM

z/OS 2.1 Batch Enhancements

- Allocation does a Catalog Locate to gather data set info, this causes a call to HSM under the covers to recall any data sets on a per-data set basis
- New support to allow recalls in parallel instead of serially
 - New ALLOCxx keyword BATCH_RCLMIGDS(SERIAL|PARALLEL)
 - New command: SETALLOC SYSTEM,BATCH_RCLMIGDS=<value>
- Improves batch elapsed times for jobs with many migrated data sets
- Needs to work in conjunction with HSM parameters MAXRECALLTASK – default is 15 recall tasks
- Simple test: 10 migrated data sets (ML1) and recalled via IEFBR14



- Slight Increase in CPU time of about 6%
- Decrease in elapsed time of about 12%
- Increased parallelism cost felt at DFHSM's dispatching priority

New Coupling Thin Interrupts – DYNDISP=THIN

Goal: Expedite the dispatching of the CF partition

- Generate Coupling Thin Interrupts to wake up and dispatch a shared engine in a timely fashion to service work as opposed to having the engine wait for PR/SM to perform its processing
- Once the CF image gets dispatched, the existing “poll for work” logic in both z/OS and CFCC can be used to locate and process the work
- CF will give up control when work is exhausted or when LPAR kicks it off the shared engine
- Requires:
 - CFCC Level 19
 - z/OS 2.1 or z/OS 1.12 / z/OS 1.13 with PTFs
- White Paper: Coupling Thin Interrupts and Coupling Facility Performance in Shared Processor Environments
 - <http://www-03.ibm.com/support/techdocs/atmastr.nsf/WebIndex/WP102400>

15203: Coupling Technology Overview and Planning, Thursday, 8:00 AM

DYNDISP Modes

CF Polling	Dynamic CF Dispatching	Coupling Thin Interrupts
DYNDISP=NO	DYNDISP=YES	DYNDISP=THIN
LPAR Time Slicing	CF Time based algorithm for CF engine sharing	CF releases shared engine if no work left to be done
<ul style="list-style-type: none"> –CF does not “play nice” with other shared images sharing the processor –CF controls processor long after work is exhausted 	<ul style="list-style-type: none"> –CF does its own time slicing –More effective engine sharing than polling –Blind to presence or absence of work to do –No Interrupt Available 	<ul style="list-style-type: none"> –Event Driven Dispatching –CF relies on generation of thin interrupt to dispatch processor when new work arrives –Now the most effective use of shared engines across multiple CF images

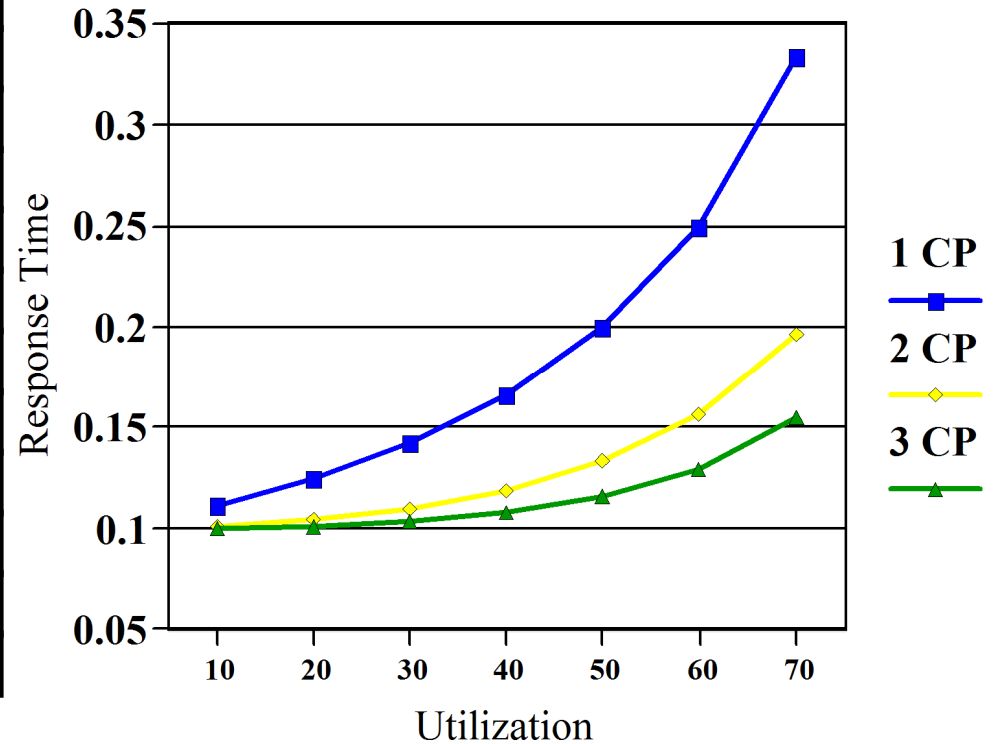
Predicting DB2 10 zIIP Eligibility for Prefetch and Deferred Writes

- In DB2 V9 workloads executing under 'non-preemptable' SRBs in DBM1 include:
 - Prefetch
 - Deferred write
 - Castout
 - Pseudo close
 - Write scheduling
- In DB2 10, prefetch and deferred write are executed under 'preemptable' SRB processing in DBM1
 - These workloads are marked as zIIP eligible
 - Represents the vast majority of the DB2 9 'non-preemptable' SRB processing in DBM1 address space
 - Will depend on workload mix

- Be sure you have sufficient zIIP capacity and DB2 address spaces are appropriately defined to support time sensitive activities
- If you have 5 GCP and 1 zIIP you have 1/5th the opportunity to get dispatched
- May need to plan increased zIIP capacity when moving to DB2 10

Queuing Impacts of Server Busy

	1 CP	2 CP	3 CP	4 CP
1	0.1010	0.1000	0.1000	0.1000
10	0.1111	0.1010	0.1001	0.1000
20	0.1250	0.1042	0.1010	0.1003
30	0.1429	0.1099	0.1033	0.1013
40	0.1667	0.1190	0.1078	0.1038
50	0.2000	0.1333	0.1158	0.1087
60	0.2500	0.1563	0.1296	0.1179
70	0.3333	0.1961	0.1547	0.1357
80	0.5000	0.2778	0.2079	0.1746
90	1.0000	0.5263	0.3724	0.2969
99	10.0000	5.0251	3.3706	2.5448



- Arrival rates and zIIP busy will influence ‘Needs Help’
- Can run zIIPs very busy IF there are multiple classes of work with different response time objectives, but watch IIPCP time
- Recommendation for online workloads:
 - 1-2 Specialty CPs: Keep zIIPs 40-50% busy
 - >= 3 Specialty CPs: Keep zIIPs 60-70% busy

V9 and V10 Sample CPU Times from SMF 100

■ V9 example:

CPU,TIMES	TCB TIME	PREEMPT SRB	NONPREEMPT SRB	TOTAL TIME	PREEMPT IIP SRB	/COMMIT
SYSTEM SERVICES ADDRESS SPACE	6.186504	0.001054	13.465251	19.652809	N/A	0.001272
DATABASE SERVICES ADDRESS SPACE(DBM1)	0.292939	0.013103	41.596518	41.902560	0.000000	0.002712
IRLM	0.000128	0.000000	0.420866	0.420994	N/A	0.000027
DDF ADDRESS SPACE	0.003241	0.000000	0.005809	0.009051	0.000000	0.000001

■ V10 example:

CPU,TIMES	TCB TIME	PREEMPT SRB	NONPREEMPT SRB	TOTAL TIME	PREEMPT IIP SRB	/COMMIT
SYSTEM SERVICES ADDRESS SPACE	5.388198	9.265621	1.226727	15.880545	N/A	0.001083
DATABASE SERVICES ADDRESS SPACE	0.144509	0.838230	0.022309	1.005048	25.877390	0.000069
IRLM	0.000060	0.000000	0.266525	0.266585	N/A	0.000018
DDF ADDRESS SPACE	0.086311	0.000138	0.004407	0.090856	0.000000	0.000006
TOTAL	5.619079	10.103988	1.519967	17.243034	25.877390	0.001176

Example of Potential Offload

- Eight Data Sharing Members during Online Peak

Total DB2 Started Task Avg. GCPs used minus DDF Threads	DBM1 NonPreempt Avg. GCPs	Total DBM1 Avg. GCPs	Estimated Average zIIP CPs Offloaded in V10	Estimated zIIP Offload as % of Total DB2 Started Tasks
1.08	0.49	0.57	0.49	46%
1.56	0.66	0.80	0.66	42%
1.01	0.41	0.50	0.41	41%
0.62	0.52	0.52	0.52	82%
0.30	0.26	0.26	0.26	86%
0.10	0.08	0.08	0.08	77%
1.08	0.51	0.58	0.51	47%
0.84	0.29	0.49	0.29	34%

GRS Support to monitor GQSCAN and ISGQUERY

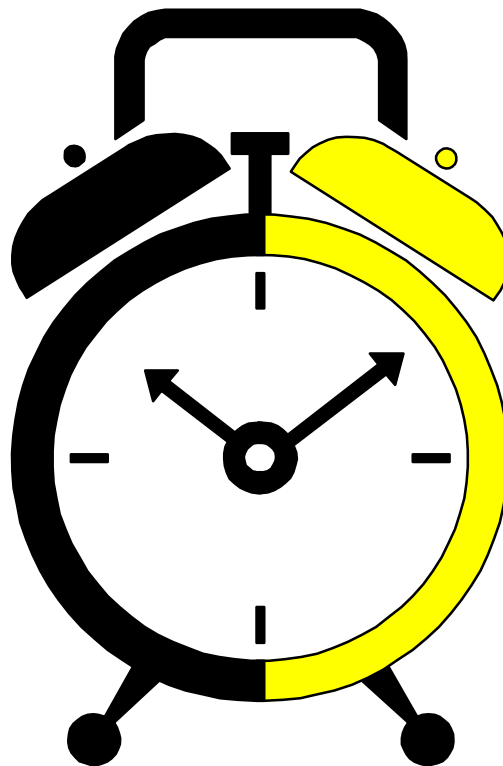
- New Function APAR OA42221
 - Supports z/OS 1.13 and above
 - New SMF 87 record provides monitoring of global, generic queue scans to help identify programs that issue global generic queue scans
 - GQSCAN and ISGQUERY REQINFO=QSCAN services can cause spikes in GRS CPU usage and GRS private storage when invoked many times for global, generic queue scans
 - Potential CPU Impact is greater in GRS STAR mode
 - SMF 87 records contain information about the caller such as TCB, ASID, PSW, and details about the queue scan service invocation
 - Setup:
 - The SMF 87 records are mapped by macro ISGYSMFR
 - Specify MONITOR(YES) in your GRSCNFxx PARMLIB member, or issue the SETGRS MONITOR=YES command

z/OS 2.1 UNIX I/O Count Enhancements

- Provide a better way of knowing which files or directories are heavily accessed
 - Current SMF 92.11 (close) records tend to produce too much output and do not give a good indication of which files are heavily accessed
- New support:
 - New SMF 92.16 record created to contain sockets and character special files (will no longer appear in subtype 11)
 - Clears 92.11 records of “noise” caused by sockets and character special files
 - New SMF 92.17 record created for accesses to regular files and directories
 - Records the amount of times a regular file or directory is accessed and the SMF record is written on two occasions:
 - When the internal representation of the file is deleted
 - At the end of the SMF global recording interval
(Note: count of accesses to the file is cleared after writing the record)
- Update SMFPRMxx to record the desired subtypes

Addendum

- Older information which should still be understood, or make you go Hmmm.
- APARs which are still causing issues, even though they are old.



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Any information contained in this document regarding Specialty Engines ("SEs") and SE eligible workloads provides only general descriptions of the types and portions of workloads that are eligible for execution on Specialty Engines (e.g., zIIPs, zAAPs, and IFLs). IBM authorizes customers to use IBM SEs only to execute the processing of Eligible Workloads of specific Programs expressly authorized by IBM as specified in the "Authorized Use Table for IBM Machines" provided at:

www.ibm.com/systems/support/machine_warranties/machine_code/aut.html ("AUT").

No other workload processing is authorized for execution on an SE.

IBM offers SEs at a lower price than General Processors/Central Processors because customers are authorized to use SEs only to process certain types and/or amounts of workloads as specified by IBM in the AUT.

LPAR I/O Interrupt Delay Processing

- APAR OA37160 – New Function
 - z/OS 1.12 and above
 - Requires zEC12 or zBC12 processor
- New Interrupt Delay Time
 - Keeps track of the time from when a subchannel is made status pending with primary status to when the status is cleared by TSCH
 - Tracking the accumulated delay encountered due to PR/SM needing to dispatch z/OS processing the interrupt as well as any z/OS delay
- APAR OA39993 - RMF support
 - RMF 74.1 record (device) and RMF 79.9
 - Enhanced RMF Post-processor device report

STORAGE	DEV	DEVICE	NUMBER	VOLUME	PAV	LCU	DEVICE	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG
GROUP	NUM	TYPE	OF	CYL	SERIAL		ACTIVITY	RESP	IOSQ	CMR	DB	INT	PEND	DISC	CONN	%	%	%	AVG	%	
							RATE	TIME	TIME	DLY	DLY	DLY	TIME	TIME	TIME	CONN	UTIL	RESV	ALLOC	ALLOC	
XTEST	2208	33903	3339	TRXSX9	1	0032	0.001	.384	.000	.128	.000	.123	.256	.000	.128	0.00	0.00	0.0	0.0	100.0	
XTEST	2209	33903	3339	TRXSXA	1	0032	0.001	.256	.000	.000	.000	.135	.256	.000	.000	0.00	0.00	0.0	0.0	100.0	
	220A	33909	10017	TRXT01	1	0032	0.000	.000	.000	.000	.000	.000	.000	.000	.000	0.00	0.00	0.0	0.0	100.0	
	220B	33909	10017	TRXT02	1	0032	0.000	.000	.000	.000	.000	.000	.000	.000	.000	0.00	0.00	0.0	0.0	100.0	
	220C	33909	10017	TRXT03	1	0032	0.000	.000	.000	.000	.000	.000	.000	.000	.000	0.00	0.00	0.0	0.0	100.0	
	220D	33909	10017	TRXT04	1	0032	0.000	.000	.000	.000	.000	.000	.000	.000	.000	0.00	0.00	0.0	0.0	100.0	

Specialty CP Update

■ 2012: zEC12 SOD

- With the zEC12 announcement August 28th, 2012: The IBM zEnterprise EC12 is planned to be the last high-end System z server to offer support for zAAP specialty engine processors
- IBM recommends users with zAAPs to consider planning for migration of zAAPs to zIIPs using zAAP on zIIP support

■ 2013: New zIIP and zAAP ratios

- zEC12 and zBC12 servers only
 - Ratio is now 2:1; for every GCP, may optionally purchase either two zIIPs and/or two zAAPs
- For servers before the zEC12 and zBC12
 - Ratio remains 1:1; for every GCP, may optionally purchase one zIIP and/or one zAAP

Workload Promotion – LCK – Local Lcok

- In HiperDispatch, when a work unit that held a local/CML lock is undispached from a CPU:
 - z/OS will temporarily promote it to x'FF' to give it a chance to give up the local/CML lock
 - If the work unit does not give up its lock during the temporary promotion, it will be demoted back to its original dispatch priority.
 - Once it runs for 1 dispatch at its original dispatch priority it is eligible to be promoted again
- Done so work will run at a high priority until it releases its Local/CML lock
- Monitors will not display the WLM designated Dispatch Priority
- May introduce CPU delay to high importance workloads

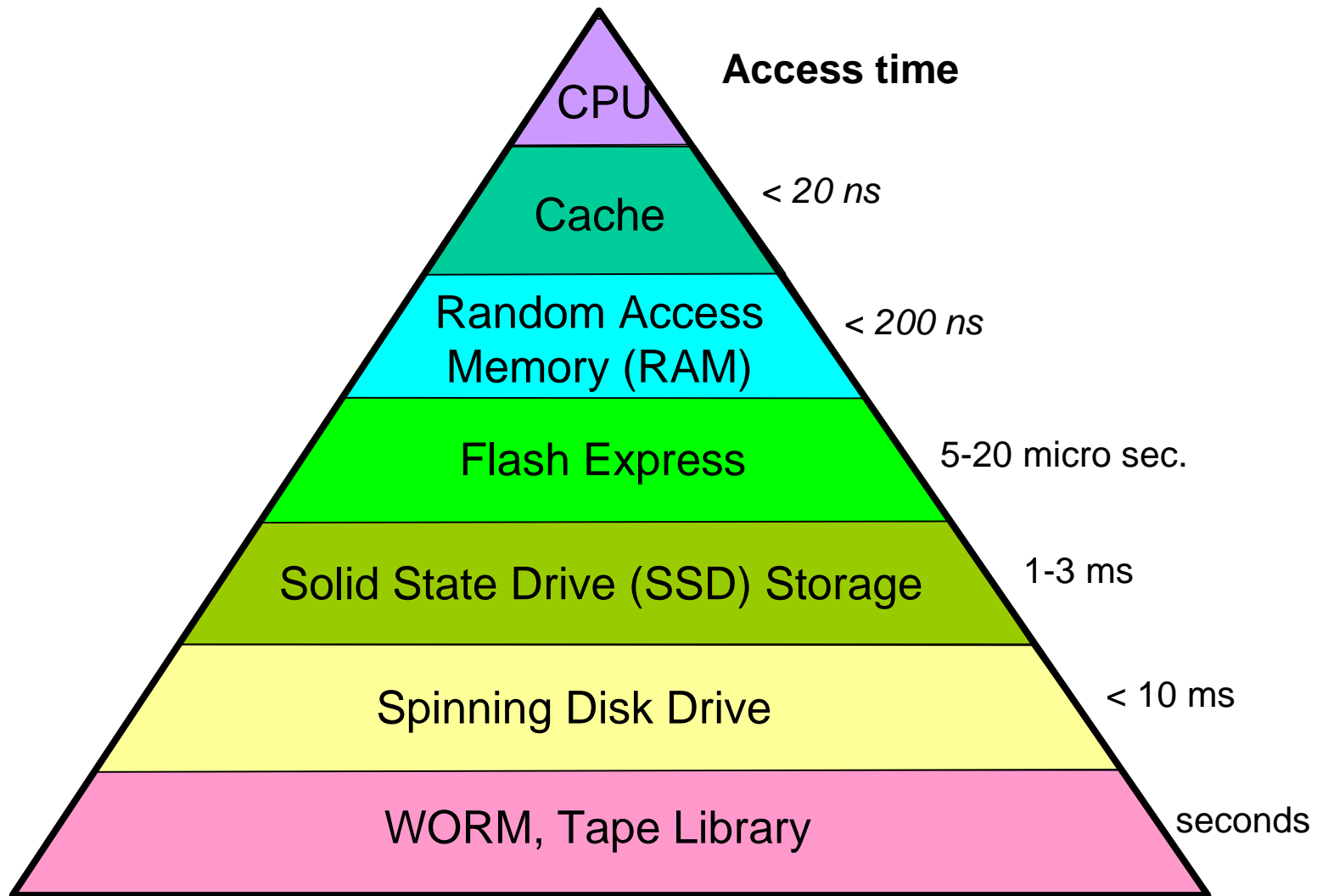
WORKLOAD ACTIVITY

--PROMOTED--

BLK	0.000
ENQ	0.000
CRM	0.000
LCK	123.420
SUP	0.000

Check and understand why there are CPU times in any service classes

Relative Access Times for different technologies

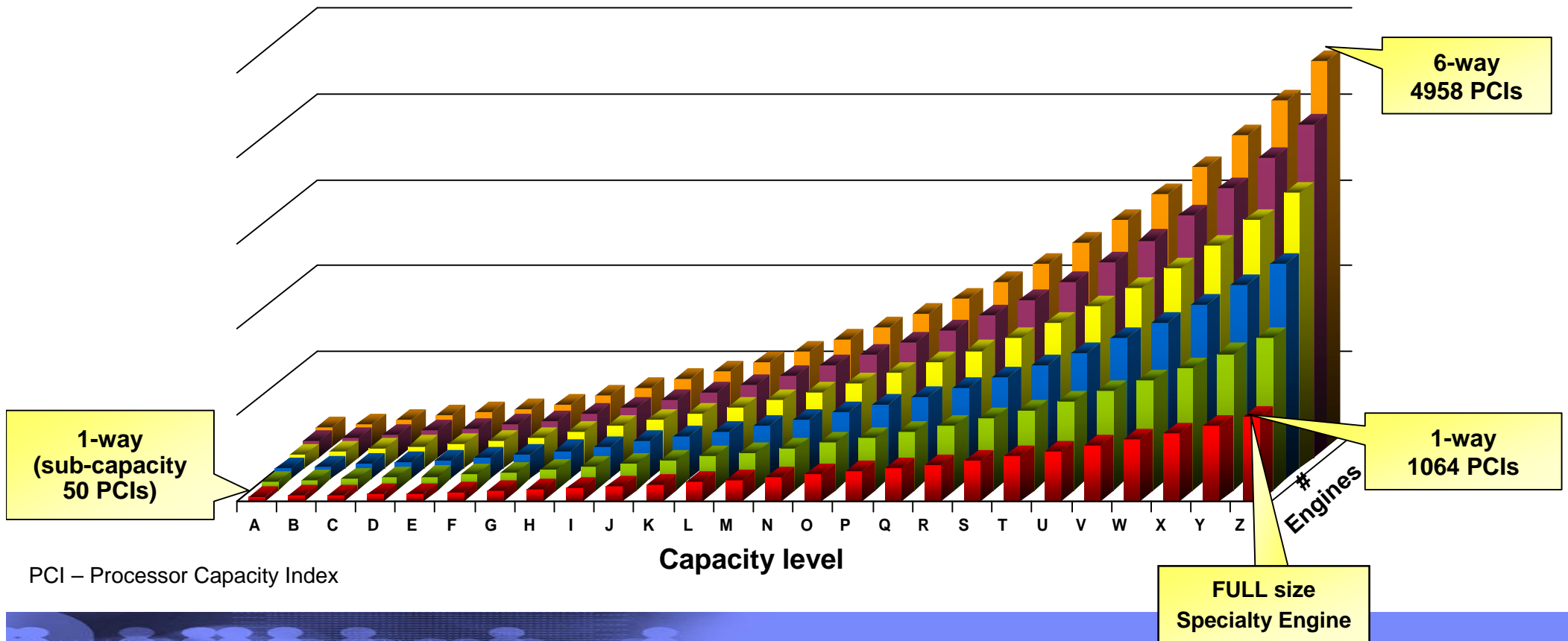


**Session 13464: Processor architecture and the importance of the storage hierarchy -
Tue Aug 13th - 9:30 AM-10:30 AM**

zBC12 Sub-capacity Processor Granularity

- The zBC12 has 26 CP capacity levels (26 x 6 = 156)
 - Up to 6 CPs at any capacity level
 - All CPs must be the same capacity level
 - All specialty engines run at full speed
 - Processor Value Unit (PVU) for IFL = 100

Number of zBC12 CPs	Base Ratio	Ratio z114 To zBC12
1 CP	z114 Z01	1.36
2 CPs	z114 Z02	1.37
3 CPs	z114 Z03	1.37
4 CPs	z114 Z04	1.36
5 CPs	z114 Z05	1.36
6 CPs	z114 Z05	1.58



System z Cache Topology – z114 vs. zBC12 Comparison

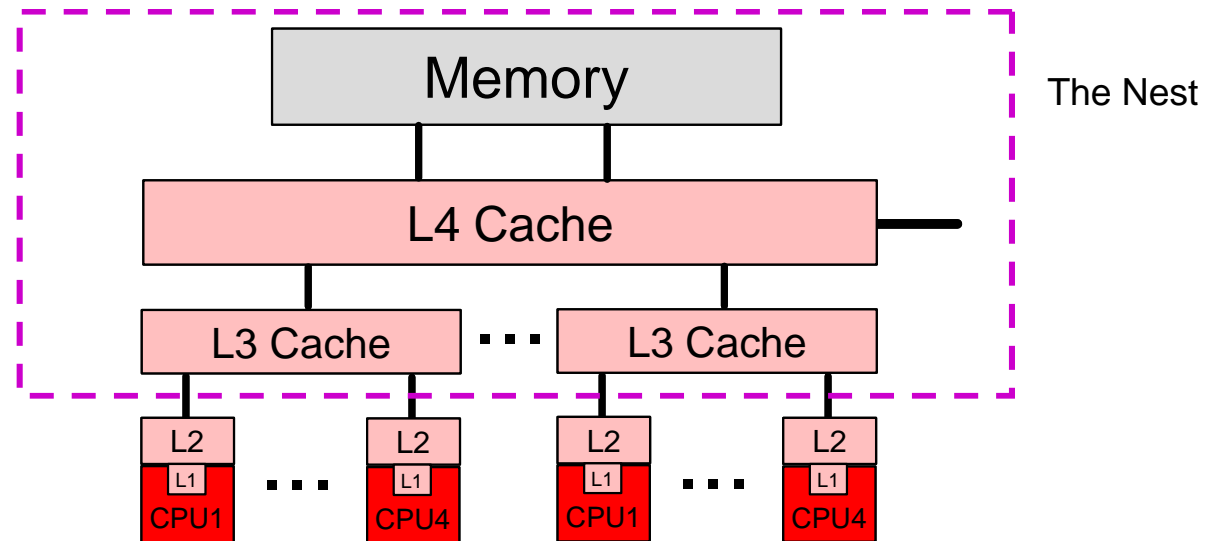
■ z114

▶ CPU

- 3.8 GHz
- Out-Of-Order execution

▶ Caches

- L1 private 64k i, 128k d
- L2 private 1.5 MB
- L3 shared 12 MB / chip
- L4 shared 96 MB / book
 - 24 MB to each core



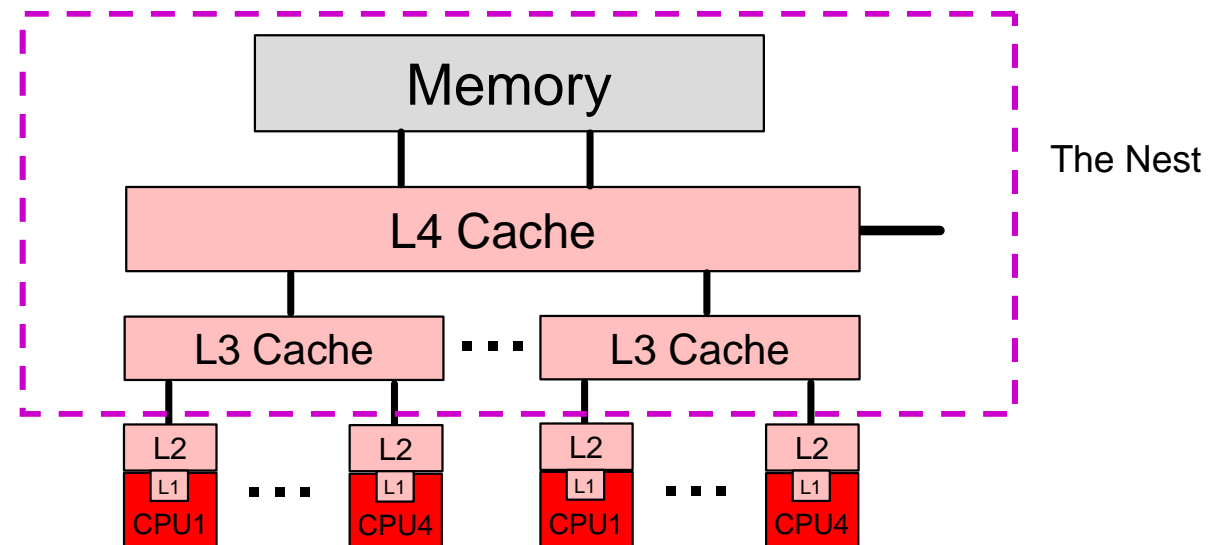
■ zBC12

▶ CPU

- 4.2 GHz
- Enhanced Out-Of-Order

▶ Caches

- L1 private 64k i, 96k d
- L2 private 1 MB i + 1 MB d
- L3 shared 24 MB / chip
- L4 shared 192 MB / book
 - 32 MB to each core



z/OS Performance **HOT** Topics

Session: 14022

Kathy Walsh
IBM Corporation

