IBM Systems & Technology Group

What's New in z/OS (and not so new)

Session 10642

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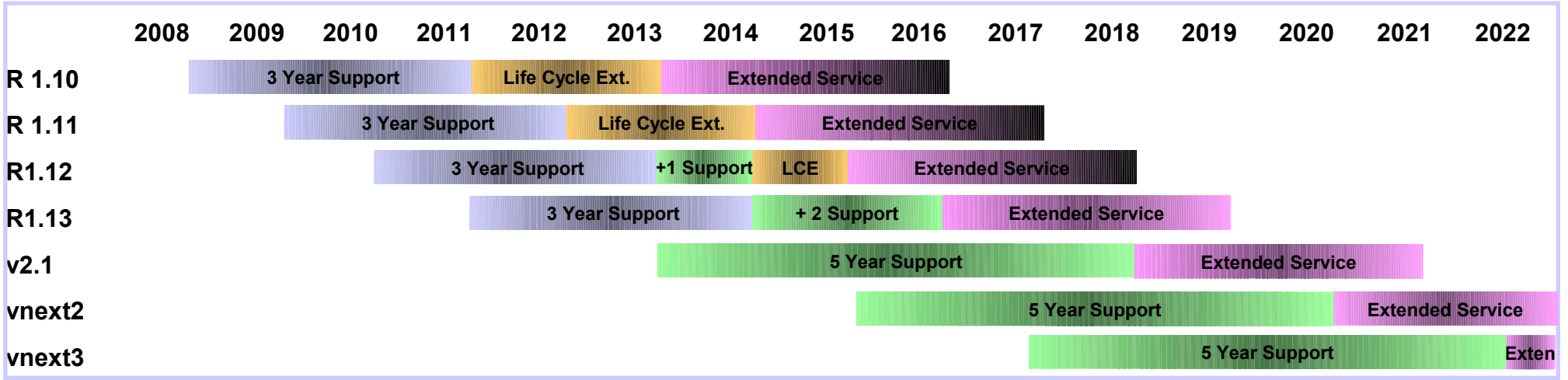
z/OS Release Directions Summary*

- **Shift z/OS to a 2 year release cycle**
  - Better aligns with client needs and trends
  - Opportunity for us to put more complete function in a release
- **Version 2.1 targeted to deliver in 2H2013**
  - Release delivery cycle is planned to be every 2 years, in the second half of that year.
  - Will continue to deliver key hardware support & updates in between releases
  - Maintain N-2 release migration (accommodate a 2 or 4 year migration cycle)
  - 5 Year Support with optional fee based service extension to accommodate migration
  - z/OSMF planned to be on the same release and service cycle
  - Minimum supported HW levels (z9 server or later, and 3990-3 disk controller or later)
  - R12 Support extended to 4 years, R13 Support extended to 5 years; bridges v2 migrations



See Statement Of Direction from April 11, 2012

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z/OS Support Summary*

Out of service

Lifecycle Extension withdrawal 2 or 3 years later

Service Withdrawal Dates

z/OS®	z800/ z900	z890/ z990	z9® EC z9 BC	z10 EC™ z10 BC	z196	zBX	z114	DS8000® DS6000®	TS1140 TS7700	End of Service	Coexists with z/OS...	Planned Ship Date[2]
R8	x	x	x	x	x[3]		x[3]	x		9/09	R10	
R9	x	x	x	x	x[3]		x[3]	x		9/10[1]	R11	
R10	x	x	x	x	x	x	x	x		9/11[1]	R12	
R11	x	x	x	x	x	x	x	x	x	9/12[2]	R13	
R12	x	x	x	x	x	x	x	x	x	9/14[2]	V2R1[2]	
R13	x	x	x	x	x	x	x	x	x	9/16[2]	V2R2[2]	
V2R1[2]			x	x	x	x	x	x	x	2H18[2]	V2R3[2]	2H13[2]

Migrating to z/OS 1.13:
Parts 1 & 2
Thursday 9:30 & 11:00

1. Fee-based service extension available
2. All statements regarding IBM future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.
3. Fee-based service extension required for support, or for some features

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IBM zEnterprise 196 (z196) System Functions and Features

- Five hardware models
- Quad-core 5.2 GHz processor chips
- Up to 80 processors configurable as CPs, zAAPs, zIIPs, IFLs, ICFs, or optional SAPs (up to 32-way on R7, 64-way on R9, 80-way on R11)
- Out of order instruction execution
- Improved processor cache design
- Up to 15 subcapacity CPs at capacity settings 4, 5, or 6
- Up to 3TB real memory (1TB per LPAR)
- Improved availability with Redundant Array of Independent Memory (RAIM)
- Power save functions
- On Demand enhancements
- IBM zEnterprise Unified Resource Manager (from HMC)
- New and enhanced instructions
- **Changes to the Common Cryptographic Architecture, Crypto Express3, and Trusted Key Entry**
- **IPL from an alternate subchannel set**
- **PCIe-based I/O infrastructure – FICON Express8S and OSA Express4S**
- **Large send for IPv6 packets**

Original z/OS support in blue

September 2011 z/OS support in red

z196 **zBX**

IBM VP Greg Lotko:- zEnterprise Update and Positioning with PureSystems Tuesday 11:00

- Capacity Provisioning enhanced
- 6.0 GB/sec InfiniBand® I/O interrupt
- Three subchannel sets per LCSS
- FICON® Discovery and AutoConfiguration (zDAC)
- OSA-Express3 Inbound Workload Queueing (IWQ)
- **IWQ for Enterprise Extender**
- **OSA-Express4S checksum offload for IPv6 and for LPAR to LPAR traffic (both IPv4 and IPv6)**
- CFCC Level 17 enhancements
- Up to 80 External Coupling Link Ports
- Up to 128 Coupling Link CHPIDs Defined
- Optional water cooling
- Optional High Voltage DC power
- Optional overhead I/O cable exit
- Support for OSX and OSM CHPIDs
- zBX-002 IBM Smart Analytics Optimizer
- zBX-002 select POWER7® and IBM System x Blades
- zBX-002 IBM WebSphere® DataPower® Integration Appliance X150 for zEnterprise
- **HiperSockets™ optimization for intraensemble data networks**

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IBM zEnterprise 114 (z114) Functions and Features

- 2 hardware models (M05, M10)
- Quad-core 3.8 GHz processor chips
- Up to 14 cores with 10 that are user configurable as CPs, zAAPs, zIIPs, IFLs, ICFs, and up to 2 dedicated spares
- Out of order instruction execution
- Improved processor cache design
- Up to 26 subcapacity settings across a maximum of 5 CPs
- Up to 248 GB real memory (with an additional 8 GB of fixed memory for the HSA)
- Improved availability with Redundant Array of Independent Memory (RAIM)
- On Demand enhancements
- IBM zEnterprise Unified Resource Manager (from HMC)
- New and enhanced instructions
- **Changes to the Common Cryptographic Architecture, Crypto Express3, and Trusted Key Entry**
- **IPL from an alternate subchannel set**
- **PCIe-based I/O infrastructure - – FICON Express8S and OSA Express4S**
- **Large send for IPv6 packets**

Original z/OS support in blue

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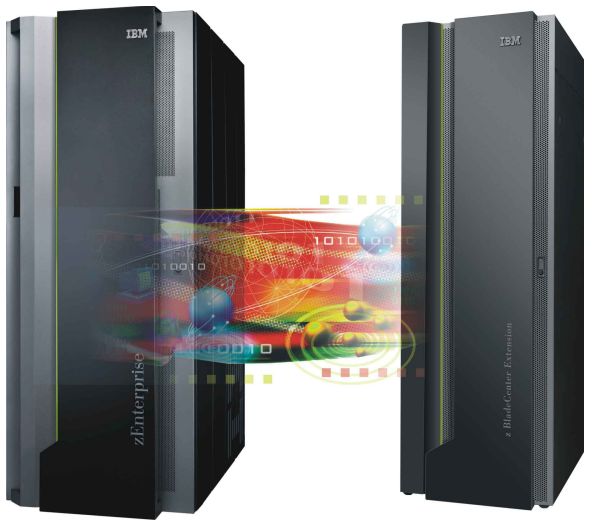

(z114 General Availability was September 2011)

- Capacity Provisioning enhanced
- 6.0 GB/sec InfiniBand I/O interrupt
- Two subchannel sets per LCSS
- FICON Discovery and AutoConfiguration (zDAC)
- OSA-Express3 Inbound Workload Queueing (IWQ)
- **IWQ for Enterprise Extender**
- **OSA-Express4S checksum offload for IPv6 and for LPAR to LPAR traffic (both IPv4 and IPv6)**
- CFCC Level 17 enhancements
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- Support for OSX and OSM CHPIDs
- zBX-002 IBM Smart Analytics Optimizer
- zBX-002 select POWER7 and IBM System x Blades
- zBX-002 IBM WebSphere DataPower Integration Appliance X150 for zEnterprise
- **HiperSockets optimization for intraensemble data networks (SoD)**

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Another Brief History of Time*, or…

…more multi-release rollouts that deserve another look

* With further apologies to Stephen Hawking

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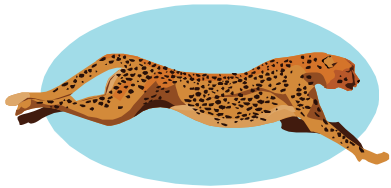
Focus on: Storage Latency Management

Have I lost my memory, or what?

- Processor speeds have gone up substantially over time:
  - 80ns machine cycle time for the 3168-3 in the 1970's
  - 192ps for the z196 today
  - **CPU is over 400 times faster** from 3168-3 to z196



- Memory speeds, not so much:
  - 480ns worst-case access time on the 3168-3 (6 machine cycles) vs. ~120ns local book access time on a z196 (~650 machine cycles)
  - **Memory is about 4 times faster** from 3168-3 to z196

- In relative terms, memory access is 100x costlier now!
- This is **not** "just an IBM problem!" Memory speeds are more-or-less comparable across the industry.

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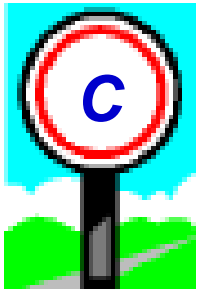
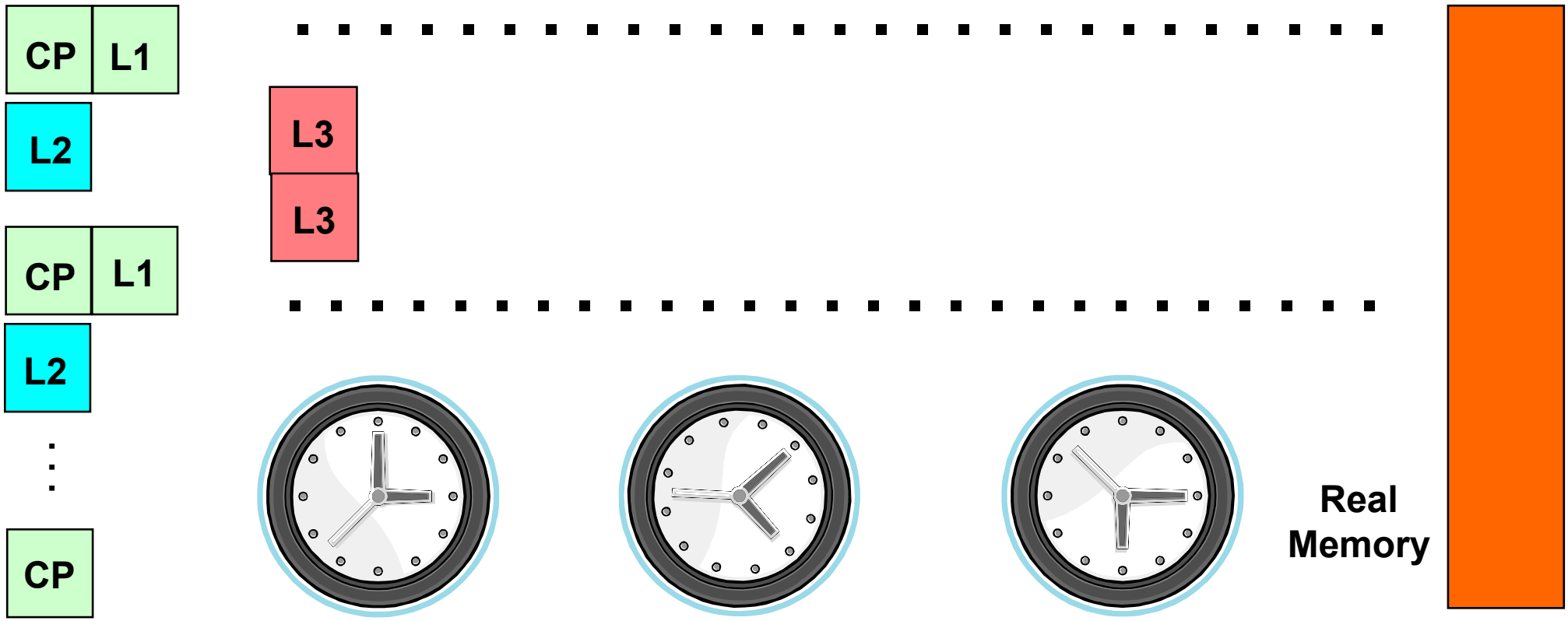
Focus on: Storage Latency Management



- Cache and memory latency on a hypothetical server
  - **L1 Cache – 1 machine cycle – Anaheim, CA — 0 miles**
  - **L2 Cache – 4 machine cycles – El Dorado Park—4 miles**
  - **Local L3 Cache – variable, 100+ machine cycles – Tijuana MX—112 miles**
  - **Remote L3 Cache – variable, 200+ machine cycles – Fresno, CA – 245 miles**
  - **Real memory – ~ 850 machine cycles – Boise, ID—860 miles**



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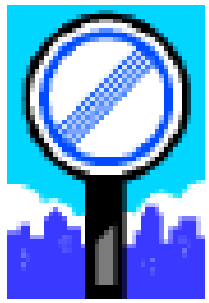
Bigger Pages are (Often) Better

- **What's a TLB?**
  - Translation Lookaside Buffer, actually a 2-level cache in recent designs, split between data and instructions
  - Simple tables: Virtual addresses mapped to real addresses
  - Virtual addresses found in the TLB need not be translated to real addresses during instruction execution, which saves time
- **System z engineers maniacally balance every aspect of chip design, but they can't have everything…**
  - One consequence is that the TLB-size-to-memory ratio has shrunk considerably; for 4K pages:
    - 3168-3 had 128 TLB entries per CPU for up to 16MB (1 entry per 128KB)
    - z196 has 3712 entries per CPU for up to 1TB (1 entry per 282MB)
- **Translations themselves are not a terrible thing**
  - They only cost a few tens of machine cycles
- **Storage access times for translations are an issue…**



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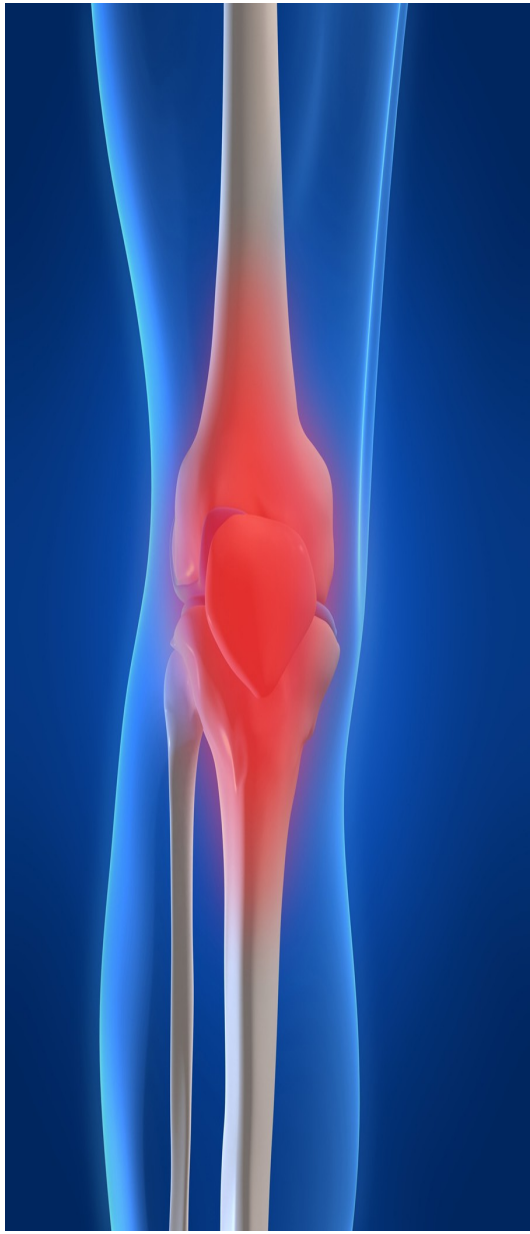
Bigger Pages are (Mostly) Better

- **4K page translation – the knee bone's connected to the thigh bone…**

1. Read Segment Table Origin from Control Register 1, 7, or 13 (non-AR mode)
2. Read from zero to three Region Tables
3. Read the Segment Table to find the Page Table Origin of interest
4. Read the Page Table to translate the virtual address to a real address
5. Store the result in the TLB

(ASCE => R1T => R2T => R3T => Segment Table => Page Table => Real Page Address)



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Bigger Pages are (Mostly) Better

- **Each of those read operations except the first is potentially a real storage operation…**
  - If the virtual address of interest is not in the TLB, it is either:
    - A new address to translate
    - An address that has aged off the TLB
  - In either case the odds of finding all the data needed for translation in a local cache are *not* particularly close to 100%
  - Best case is a 3-level lookup (STO, Segment Table, Page Table) with two possible storage accesses
  - Worst case is a 6-level lookup (STO, three Region Tables, Segment Table, Page Table) with five possible storage accesses
- **On our hypothetical server, the worst case is over 4,250 machine cycles spent waiting for translation for one address!**
  - …not counting the actual memory access, which can make it 5,100!
  - Now, think about an SS instruction with *two* translations…

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Bigger Pages are (Mostly) Better

- **The use of large pages can improve the ratios for exploiters…**
  - …by a factor of ~256 (it's more complicated than that under the covers)
  - So 1 entry per 282 MB becomes ~1 entry per 1128 KB
- **…and reduce the cost of translations for exploiters…**
  - Because 1 MB is the z/OS segment size, we never need to fetch the page table for a 1 MB page
  - This always reduces the potential storage accesses by one
    - Worst case is now 5-level lookup (from 6, a 16.7% improvement)
    - Best case is now 2-level lookup (from 3, a 33.3% improvement)
- **…and finally, help reduce translations for other programs running on the system:**
  - Each 1 MB page requires only one TLB entry
  - This can free up to 255 entries for 4K and 1M pages used by other programs

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More On Bigger Pages

- **Note that large pages are currently fixed in the predefined large frame area (LFAREA in IEASYSxx)**
  - Assigning too much storage is bad for other system users
  - Assigning too little prevents exploiters from using large pages
  - Pageable large pages APIs exist but are not currently implemented
- **Not-so-good candidates for the use of large pages:**
  - Programs with small working sets
  - Programs predominantly referencing small amounts of widely-scattered data in memory
  - Programs with very infrequent storage references
  - Very short-running programs

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Large (1MB) Page Support

- **Introduced in z/OS R10, PTF for z/OS R9**
  - Requires a z10 or later server
  - Current implementation fixes all large pages
- **Current exploiters include:**
  - Java 6 SR1 and later, and its exploiters
    - Including WebSphere Application Server
  - z/OS R11 and later XL C/C++ programs using Language Environment
  - The z/OS operating system, in z/OS R12 and up
  - IBM DB2 10 for z/OS (5605-DB2)

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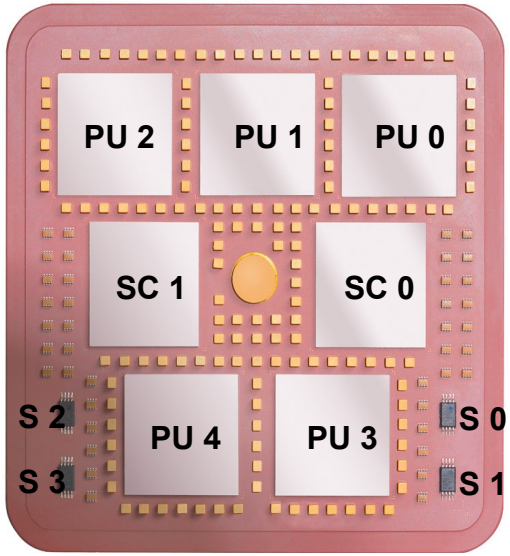
Focus on: Storage Latency Management

Hiperdispatching

- Introduced in z/OS R10:
  - HIPERDISPATCH= parameter in IEAOPTxx
    - Yes—Use Hiperdispatch
    - No—Use old dispatching algorithms
  - Hiperdispatch is designed to:
    - Create “affinity nodes” (usually ~4 CPs per node on z10, z196)
    - Try to dispatch a given unit of work within a single affinity node
    - Rebalance work between affinity nodes periodically



z10 EC Multi-Chip Module (MCM)

- Corresponding PR/SM™ support on System z10™ and zEnterprise servers
  - Needed to provide topology information to z/OS and to maintain correspondence between logical CPs and physical CPs
  - Dispatching to same logical CP…
  - …doesn’t help if PR/SM dispatches the logical CPs to different physical CPs!

Workload Management Update for z/OS 1.13 and 1.12
Monday 3:00

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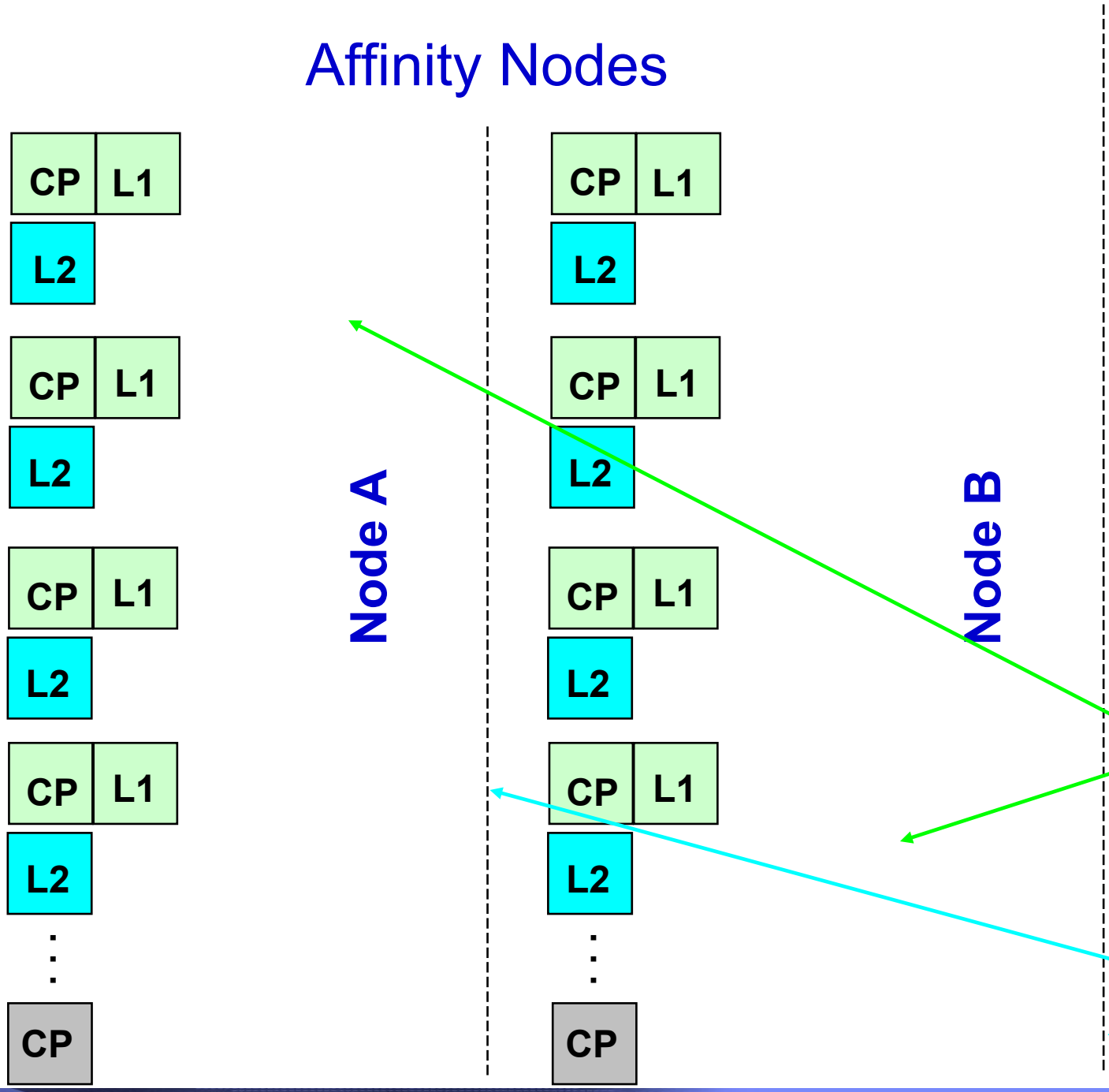
Focus on: Storage Latency Management



- Build appropriate affinity nodes using topology data from PR/SM (from 3 to 6 CPUs' worth of LPAR share per affinity node on z196)
- Try to keep unneeded CPs "parked"
- Try to dispatch a given unit of work within an affinity node
- Try to avoid crossing chip and book boundaries

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Focus on: Storage Latency Management

Prefetching

- **Prefetch instructions let you ask for data from memory before you need it**
  - First introduced on IBM System z10 servers
  - Enhanced on z196 servers
- **This can get them into local cache at a time closer to when a program will actually need them**
  - The idea being that it does not need to wait, or wait as long
  - Think of this like calling ahead for pizza before you leave work
    - Call the local pizza parlor
    - Pick it up on the way home without the 20-minute wait
    - Feed the spouse and kids on arrival
- **Prefetch exploiters include:**
  - Java 6 SR1 and later
  - DB2 10 and later
  - z/OS R11 and later
  - z/OS R10 XL C/C++ and later
  - CICS TS V3.2 and later

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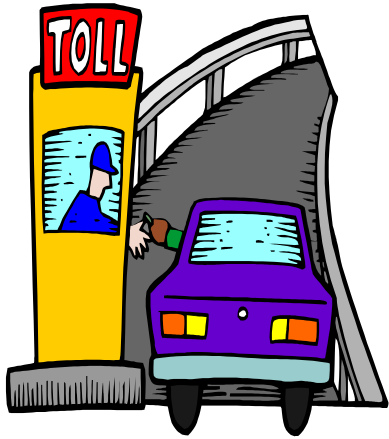
Cache Alignment



- **Cache alignment**
  - Gets very little if any press, even though a lot of work goes into it
    - Analysis, change, functional and performance testing
    - Started ~2005 by z/OS performance team
    - Scope spans z/OS and subsystems (DB2, WAS, IMS)
    - Some teams looking at expanding the scope independent of z/OS
  - Effects mostly show up in LSPR, zPCR, etc.
  - Important to optimize the use of (especially) local caches
  - For data, find cases of multiple fields with high update activity on a single cache line and move them apart to get them on different ones
    - We often call this “splitting a hot cache line”
    - Afterward, updating one field does not cause cross-processor cache line invalidation for the other field
  - For instructions, restructure the code to group likely-to-run code onto a minimum number of cache lines
    - Idea is to reduce those expensive trips down memory lane
  - These things can generate migration actions when we move fields that form part of the z/OS API

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Other Compiler Optimizations

- **In addition to using:**
  - New instructions in general
  - Prefetch instructions
  - …and supporting other new hardware facilities as they arrive…
- **Smart compilers and JITs avoid storage accesses**
  - Emphasize register and immediate operands…
  - …even if "theoretical path length" is sometimes greater
  - Done by current Java SDKs and z/OS XL C/C++ compiler



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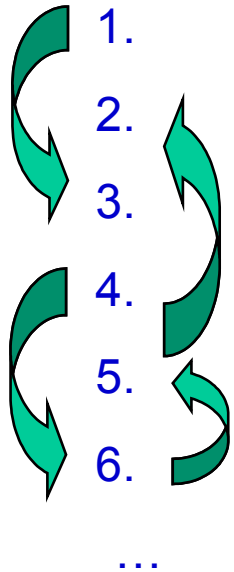
Focus on: Storage Latency Management

"Pure Hardware" Plays Too!

- **Out-of-Order execution (OOO)**
  - Just because your boss gives you an ordered list of priorities doesn't mean that:
    - You do the first thing until done, and then the second, etc.
    - If anything has to wait, you will be idle!
    - Not the way to get the most things done in the least time
  - What we all do (well, most of us):
    - Work on the first until you have to wait, begin the second, etc.
    - Be cognizant of dependencies so the results are the same as sequential execution
  - A z196 is smart enough to do this with instructions as they run
    - Avoid sitting idle waiting for instruction fetches and storage operands (among other things)
    - Run other instructions when possible without affecting the outcome
    - Iterate until the delay is over, a blocking dependency occurs, or until the machine can't see that far ahead
    - A z196 CPU can wait for more than one thing at a time…
  - I think this makes the machine smarter than I am!
    - (Add it to the list with my smartphone, microwave, etc.)

My CPU *really* <u>*does*</u> wait faster than your CPU!



Also, lots of HW cache optimization work

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z/OSMF "Started Small"

- Imbedded web server and a small number of applications
  - Introduced with z/OS R11 (also runs on z/OS R10)
  - Includes WASOEM
  - Included these initial applications:
    - An Incident Log capability to help you gather and send problem data to vendors
    - An updated Configuration Assistant for z/OS Communications Serve to help you configure TCP/IP networking policies
  - IBM's business systems make it hard to say "free" sometimes:
    - z/OSMF is a "priced product" with a price of zero dollars per value unit…
    - …and with "priced service and support" also priced at zero
    - z/OS Management Facility V1 5655-S28
    - z/OS Management Facility V1 Subscription and Support 5655-S29

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z/OSMF R12 Enhancements

- Added and updated applications:
  - Workload Management policy editor to help simplify WLM policy management
  - Sysplex Status and Monitoring Desktops tasks to provide combined real-time status monitoring for servers, sysplexes, and Linux® images, and let you drill down to detailed information about monitored systems
  - Configuration Assistant for the z/OS Communications Server updated with support for IPSec, IKEV2, new crypto and authentication algorithms, and enhanced AT-TLS support
  - Incident Log enhanced to add encrypted parallel FTP support and let you add information to incidents
  - Support for adding application launch points to the z/OSMF navigation tree

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Focus on: z/OSMF

z/OSMF R13 improvements

- z/OSMF Capacity Provisioning Manager application
  - Designed for easy monitoring of CPM status
- z/OSMF Configuration Assistant for Communications Server
  - Multiple release configuration support (both R12 and R13 systems)
  - Sysplex-wide policy definitions
  - IP address discovery from stacks
- Expanded SAF-based security for user authorization and roles
  - In addition to current z/OSMF security
  - Intended to supplant z/OSMF repository-based authorization support
- Consolidated workload monitoring
  - With RMF and z/OSMF you can monitor z/OS, AIX®, and Linux workloads
  - Monitor across zHybrid ensembles and other network-accessible AIX and Linux systems from within z/OSMF
- New RESTful API for batch (more about this later)
- z/OSMF support for application linking
  - Allow z/OSMF applications to link directly to others via URL
  - Both in-context linking and simple linking
  - Intended to make it simpler to navigate across apps…such as…

Manage your Workloads and Performance with z/OSMF
Monday 4:30

z/OSMF 1.13 Implementation and Configuration
Thursday 8:00

z/OSMF Hands-On Lab
Thursday 11:00

z/OSMF Roundtable
Thursday 12:15

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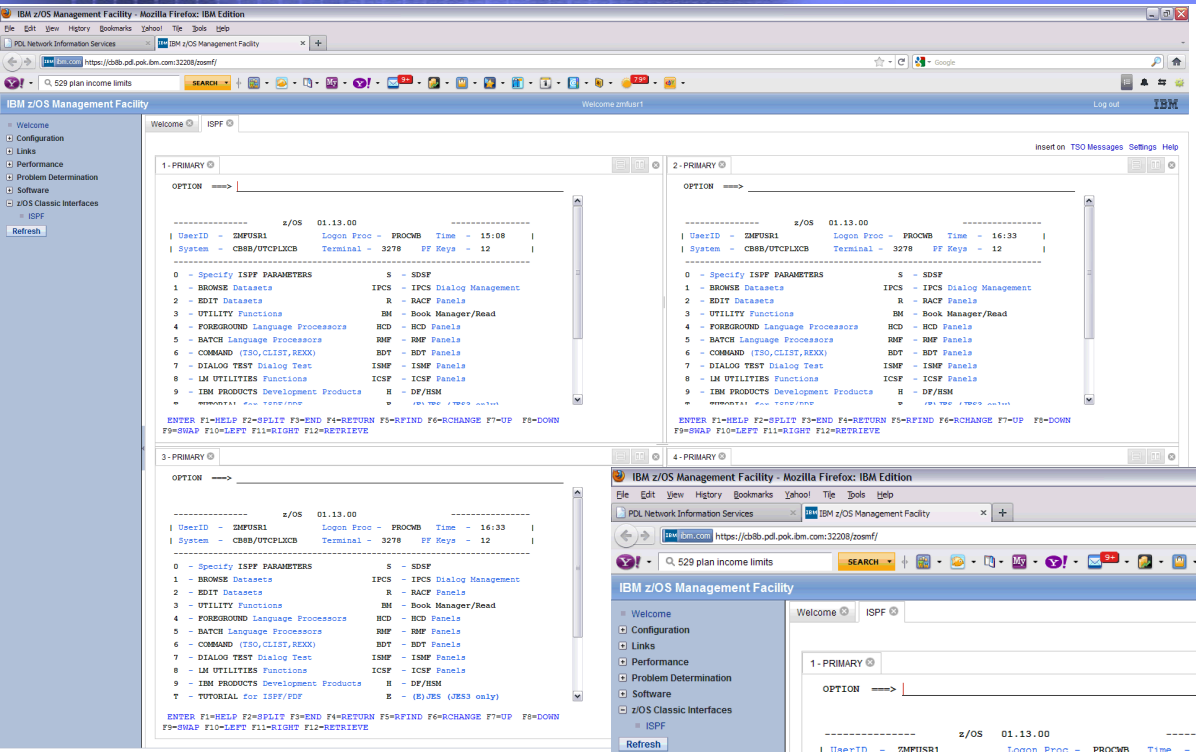
Focus on: z/OSMF



New web-enabled ISPF interface in z/OSMF R13 on z/OS R13

- Used by Incident Log application
- Can be linked to by other z/OSMF applications
- Can be used for other ISPF applications

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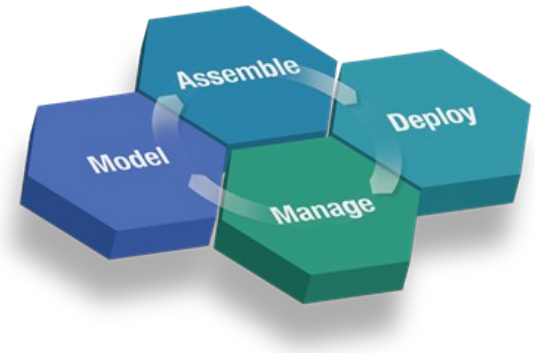
Focus on: z/OSMF

z/OSMF R13 Software Deployment

- New application to clone system software
- Support for all SMP/E-installed software
  - Supports anything packaged with SMP/E
- Designed to let you:
  - Identify, modify, delete software instances
  - Generate jobs to copy a software instance
  - Verify cross-system and cross-product requisites
  - Compare source/target environment HOLDDATA
- Copies include SMP/E target CSI data sets
  - Can opt to omit the DLIB zone for images you do not intend to service
  - Intended to help assure rigor in the cloning process
  - Help ensure you have a good inventory for service
- Designed to support both local copies (within a shared DASD environment) and remote copies (across a network)
  - Remote copies will require a running, remote z/OSMF
- Support for z/OS UNIX file system mount table with PTF UK73699
- Available with the PTF for APAR PM40764:
  - Additional security for software instances and deployment operations
  - Configuration reuse

z/OSMF Software Deployment Hands-on Lab Friday 11:00



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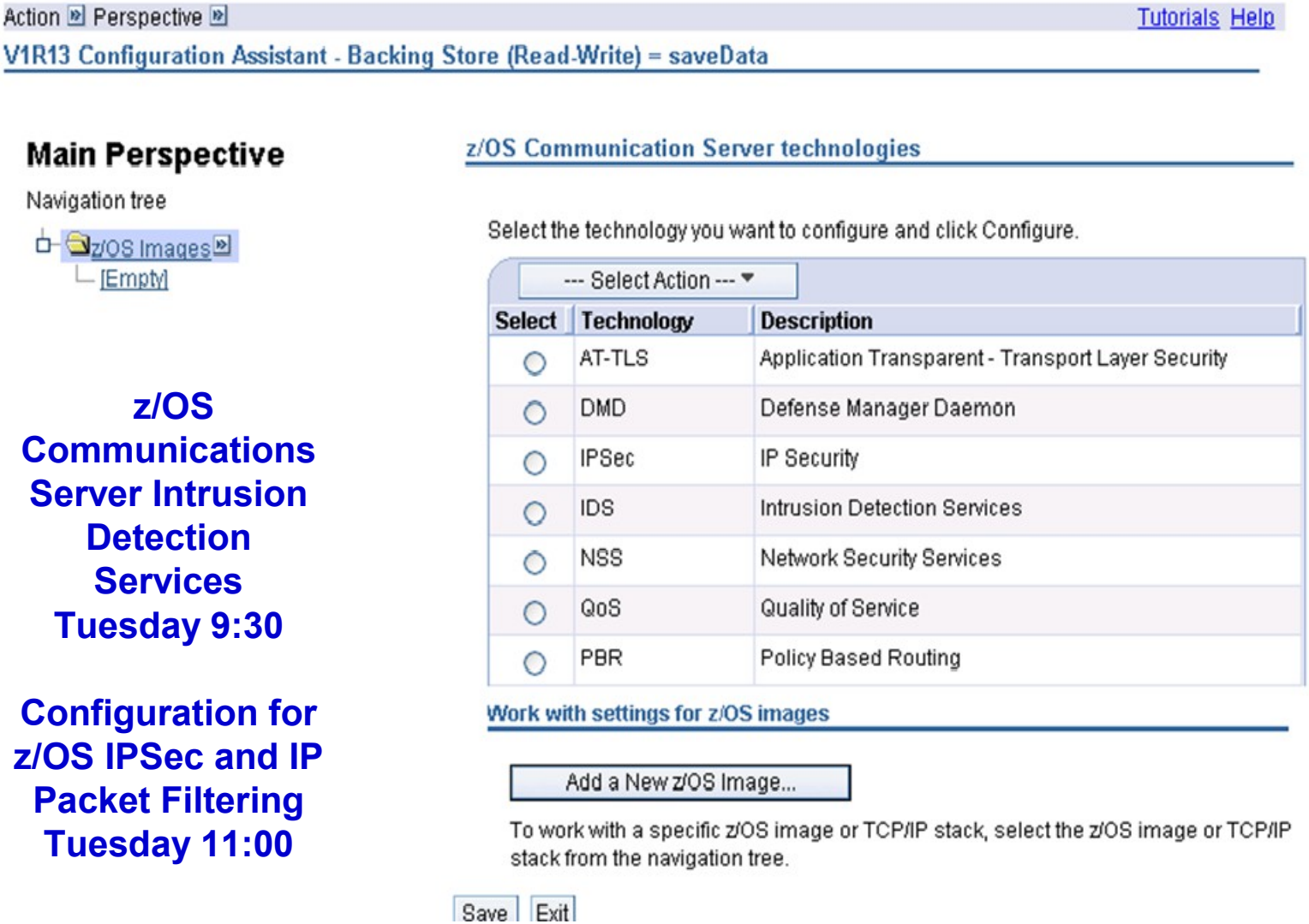
z/OSMF R13 Enhancements



z/OS Communications Server Intrusion Detection Services Tuesday 9:30

Configuration for z/OS IPSec and IP Packet Filtering Tuesday 11:00

Leveraging z/OS Communications Server Application Transparent Transport Layer Security (AT-TLS) for a Lower Cost and More Rapid TLS Deployment Wednesday 4:30

Safe and Secure Transfers with z/OS FTP Thursday 1:30

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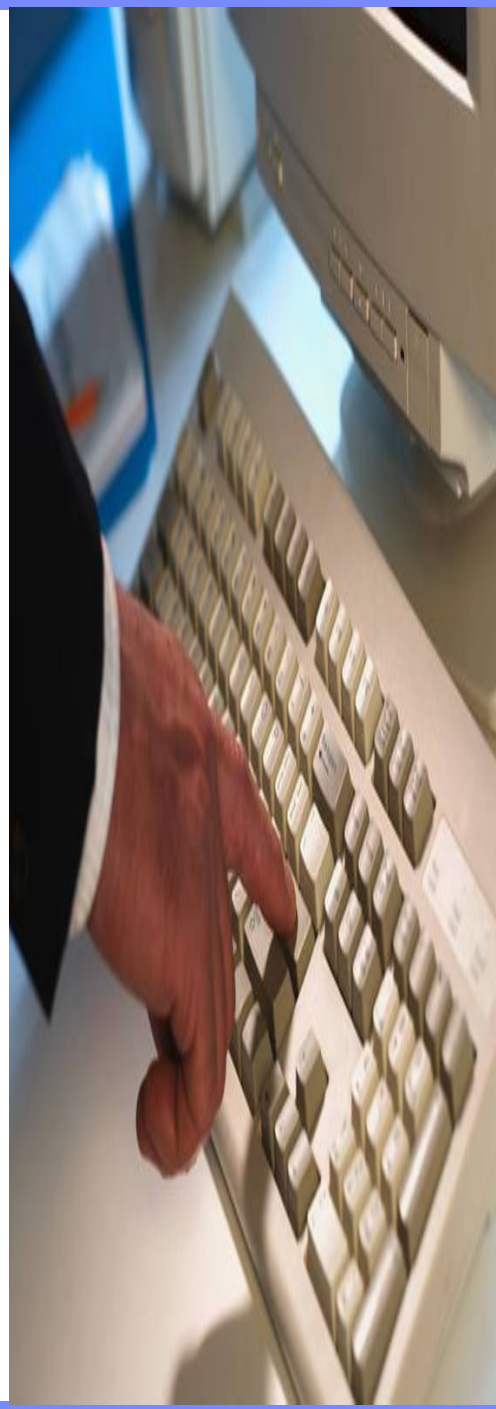
z/OSMF Outlook*

- No “new z/OSMF” release this year…
- But, can you spell “SPEs”?
- Functions planned for the next several quarters include designs to provide:
  - Software Deployment: More actions for software instances
  - Linking between Workload Manager and Resource monitoring
  - Capacity Provisioning support for creating, editing, & activating configurations and policies
  - Usability enhancements for Incident log and Classic ISPF
  - Enhanced RESTful interface for submitting z/OS jobs from data sets and z/OS UNIX files
  - Support for additional browsers



* Statements regarding IBM future direction and intent are subject to change or withdrawal, and represents goals and objectives only. ©2011, 2012 IBM Corporation

z/OS R13 Highlights

For a more complete view of z/OS R13 content, see the Winter 2012 SHARE proceedings. You can find Session 10642. “What's New in z/OS ” at:

https://share.confex.com/share/118/webprogram/Session10642.html

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z/OS 1.13

A smarter operating system with designs for:

Improving Usability and Skills

New and updated z/OSMF applications & web-enabled ISPF, User-level mount command for z/OS UNIX® System Services, Automatic UCB updates, SDSF Sysplex functions to work without MQ, Catalog parmlib member, Better O/C/EOV Messages, Health Checks, …

Integrating new Applications and Supporting Industry and Open Standards

Java™/COBOL interoperability, RESTful API for batch, Improved Support for unnamed sections, ISPF Edit Macros, Subsystem and Unauthorized XTIOT support, dbx hookless debug, DFSORT™ improvements, Job level return codes, …

Scalability & Performance

Fully-shared zFS in a sysplex, IEBCOPY performance, RMODE 64 extensions, 1 TB volumes*, IFASMFDL improvements, 500K+ aliases per user catalog, Larger VVDSs, FREEVOL=EOV, FTP support for large format data sets and EAS,…

Enhancing Security

RRSF over TCP/IP, LDAP improvements, enhanced SAF security for z/OSMF, NAS address checking and encryption negotiation, New restricted QNAMEs, PKI support for DB2® backstore, ICSF support for new HMACs, FTP & TN3270 password phrase support, …

Improving Availability

Warn before TIOT exhaustion, CMDS enhancements, Parallel FTP for dump transfers, PFA ENQ tracking, RTD improvements, zFS Refresh, DADSM Dynamic Exits, JES2 spool migration, JES3 dynamic spool addition, Better channel recovery, More ASID reuse, …

Self Managing Capabilities

WLM and RMF to provide response time distribution for all goals, DFSMShsm™ Journal Backup and space management improvements, Hybrid-wide monitoring…

Extending the Network

IDS IPv6 support, NAT Traversal for IKEV2, NMI extensions, More VLANs per OSA port, more 64-bit TCP/IP, EE improvements, …

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Improving Usability and Skills

- JCL Improvements with JES2
  - Stop journaled jobs on step boundaries
  - Job-level return codes
    - ✓ JOBRC=HIGHEST, LAST, STEPRC
  - Support for instream data sets in PROCs
    - ✓ //ddname DD *
  - SPIN= DD JCL (and dynamic allocation) support for spin interval specification similar to that on JESLOG
    - ✓ SPIN=(UNALLOC,interval|time|size)
- Remaining SDSF Sysplex functions no longer to require WebSphere MQ (aka MQSeries):
  - WLM enclaves (ENC)
  - z/OS UNIX processes (PS)
  - Health checks (CK)
  - Resource monitor (RM) (JES2 only)

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Improving Usability and Skills

- Automatically fix SMS CDS data set attributes
  - Health check for NOREUSE in R12
  - Automatically changed to REUSE in R13
- Automatic cross-sysplex UCB updates for DFSMSdss™ RESTORE and DFSMShsm Fast Replication Backup and Recovery processing
  - Specify a new REFUCB keyword in DEVSUPxx:
    - ENABLE|DISABLE(REFUCB)
  - Designed to issue VARY automatically on sharing systems when these operations change volume serial, VTOC pointer
- Better OPEN/CLOSE/End of Volume Messages
  - Additional information so you don't have to look up the message
  - New MPFLSTxx parameter to activate after PTFs for APAR OA37505:
    - ✓ .MSGOPTION VERBOSE(YES | NO)
    - ✓ Replaces DEVSUPxx parameter, OCE_ABEND_DESCRIP
  - No longer written to SYSLOG after PTF for APAR OA37957
  - Example:

```
IEC145I 413-40,IFG0194F,RDASL1,RDSL1,SYSUT1,0920,,DATASETX
ERROR DESCRIPTION:
THE DEVICE DOES NOT SUPPORT THE RECORDING MODE REQUESTED BY THE USER
    OR DETERMINED BY THE SYSTEM.
END ERROR DESCRIPTION: IEC145I
```

DFSMS Latest and Greatest Monday 3:00

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Improving Usability and Skills

- New Catalog parmlib Member
  - New optional IGGCATxx member
  - CATALOG=(xx,yy, …) in IEASYSxx
  - Default is IGGCAT00
  - Parmlib concatenation & multiple members supported
  - Catalog defaults taken if no parmlib member found
  - Support for specifying:
    - ✓ VVDS space defaults
    - ✓ Catalog utilization warning message threshold
    - ✓ Limit on CAS service tasks (overrides any specification in SYSCATxx)
    - ✓ Whether to enable extension records for user catalog aliases
    - ✓ A number of other things you also specify using MODIFY CATALOG
    - ✓ Some of these keywords inadvertently omitted from R13 Init & Tuning: EXTENDEDALIAS(YES/NO), DELFORCEWNG(YES/NO), DSNCHECK(YES/NO), SYMREC(YES/NO), UPDTFAIL(YES/NO), VVRCHECK(YES/NO), DELRECOVWNG(YES/NO)
    - ✓ Book refresh planned for April should include all these new keywords
- Warning message for usercatalog delete
  - For catalogs with RECOVERY attribute with DELRECOVWNG(YES) in IGGCATxx
  - Bypassed for those with ALTER authority to the master catalog

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DFSMSrmm improvements

- Automatic recovery for missing or out-of-sequence tape volumes
  - For multivolume data sets, DFSMSrmm will attempt to return the corrected list
  - New message: IEC716I ddname: TAPE MULTIVOLUME LIST CORRECTED
  - Note: Not available when you specify OPTCD=B, which bypasses label anomaly processing
- Specify expiration date or VRS management for data sets
  - Help simplify retention policies, avoid batch VRS policy management, and enable you to determine how long a tape data set will be retained
- SEARCHDATASET command to allow searching tape data set metadata based on:
  - Date ranges
  - Relative values
  - SMS constructs
  - Catalog status

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Health Checking

- Health Checker Framework improvements
  - Better control of check scheduling
  - New SYNCVAL keyword in HZSPRMxx parmlib member and MODIFY
  - Checks can raise message severity as conditions change

- New migration health checks:
  - Warn when zFS configuration option is not set to sysplex=filesys
  - Verify new symlinks added to enable read-only root in z/OS R13, available on R11 and R12 for easier read-only with the PTFs for APARs OA35636 and OA35605
  - Warn you that the z/OS console mode of operation has not been specified, available for z/OS R10 or later with the PTF for APAR OA32930.

- New health checks:
  - Detect and report on tape library devices that had initialization errors at IPL time, provide explanation and suggested remedy
  - Allocation checks for options that can cause deadlocks, small TIOT
  - Tape library IPL initialization

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True cross-system sharing of zFS in a sysplex

- Direct I/O from all sharing systems
- No more function-shipping
- Significant zFS file system performance improvements expected; most measurements showed a 50-150% improvement*

IEBCOPY improvements

- Much better performance expected for some operations; we measured elapsed time reductions from 19-70%* for:
  - PDS-to-PDS COPY
  - PDS-to-sequential unload
  - PDS compress
- Also, removed requirement for APF authorization

* Note: Performance improvements are based on internal IBM laboratory tests. Your results will vary. I/O performance improvements measured for fully shared zFS ranged from very small to 900%, with the majority of workload conditions tested falling between 50% and 150%. The actual amount of improvement will depend on the environment (monoplex or Parallel Sysplex) and the type of file processing being done. IEBCOPY improvement will depend on the amount of data being copied, the record format, the record length, and the block size.

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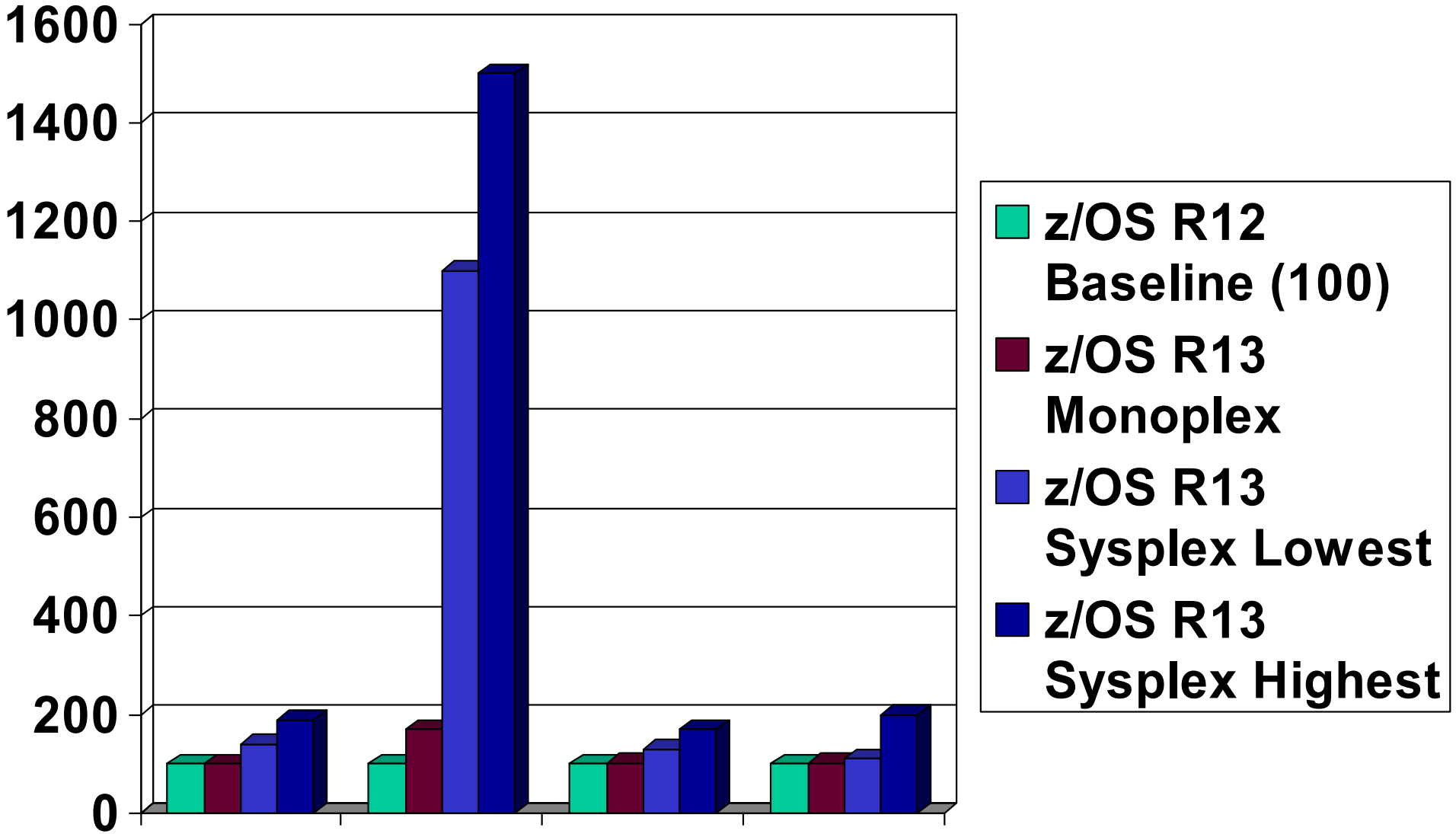
Scalability and Performance

zFS Performance, Transactions/second (relative improvement)*



* IBM Laboratory results; your results may vary. Measured zFS transaction rate varied with environment and operations performed.

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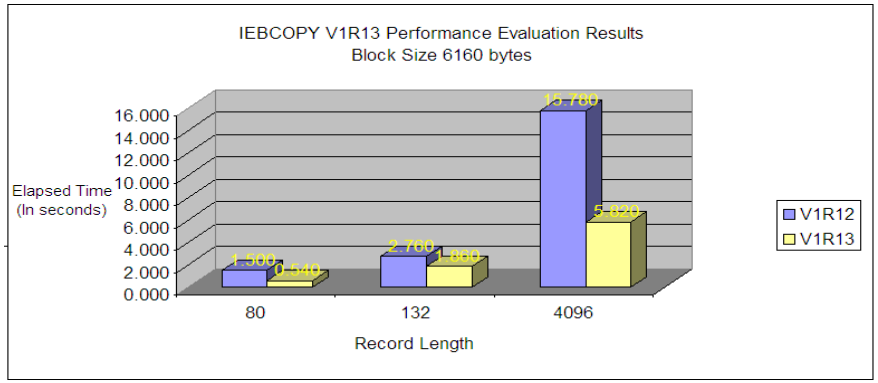
Scalability and Performance

IEBCOPY Performance*

Compress PDS Testing results
Block size 6160 Format (VB)

Elapsed Time measurements

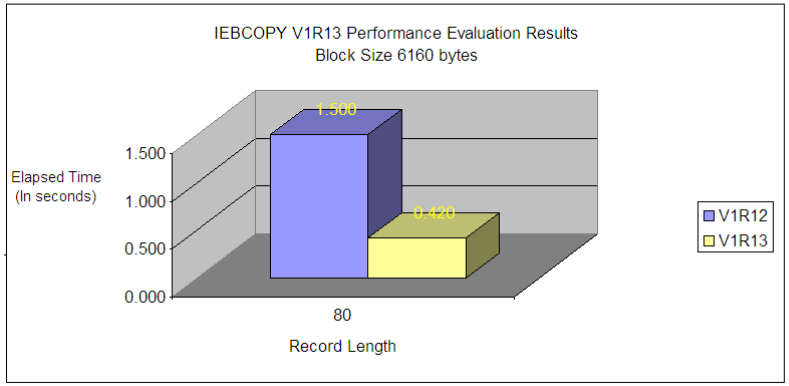
LRECL	V1R12	V1R13	Delta (%)
80	1.500	0.540	-64.00
132	2.760	1.860	-32.61
4096	15.780	5.820	-63.12



Compress PDS Testing results
Block size 6160 Format (FB)

Elapsed Time measurements

LRECL	V1R12	V1R13	Delta (%)
80	1.500	0.420	-72.00
132	*	*	---
4096	*	*	---

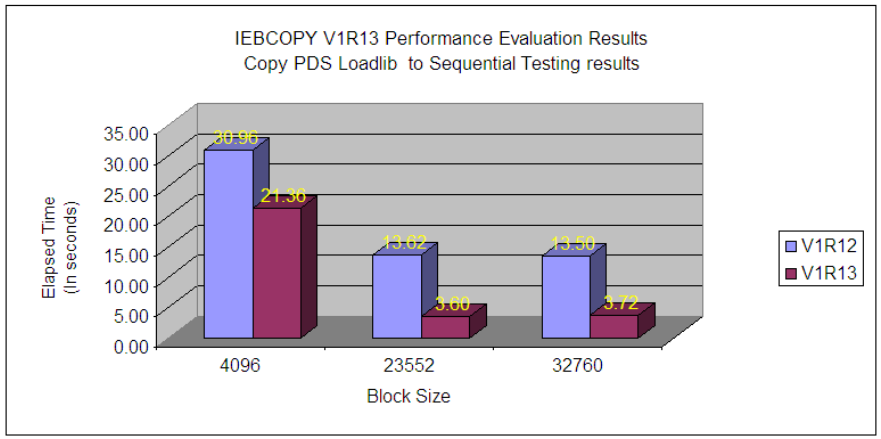


Note: * .- Record length is inconsistent with block size for this record format. Test not executed for this variation

Copy PDS Loadlib to SEQ Testing results
LRECL=0 Format (U)

Elapsed Time measurements

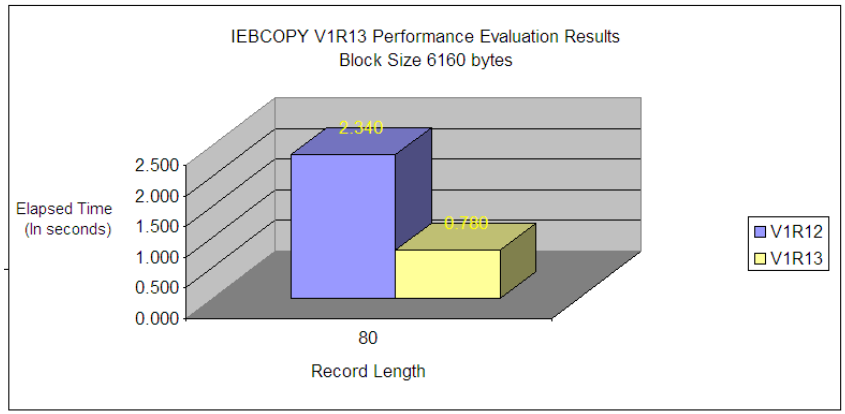
BLKSIZE	V1R12	V1R13	Delta (%)
4096	30.96	21.36	-31.01
23552	13.62	3.60	-73.57
32760	13.50	3.72	-72.44



Copy PDS to PDS Testing results
Block size 6160 Format (FB)

Elapsed Time measurements

LRECL	V1R12	V1R13	Delta (%)
80	2.340	0.780	-66.67
132	*	*	---
4096	*	*	---



Note: * .- Record length is inconsistent with block size for this record format. Test not executed for this variation

* IBM Laboratory results; your results may vary. Measured IEBCOPY performance improvements varied with the amount of data being copied, block size, record format, and record length.

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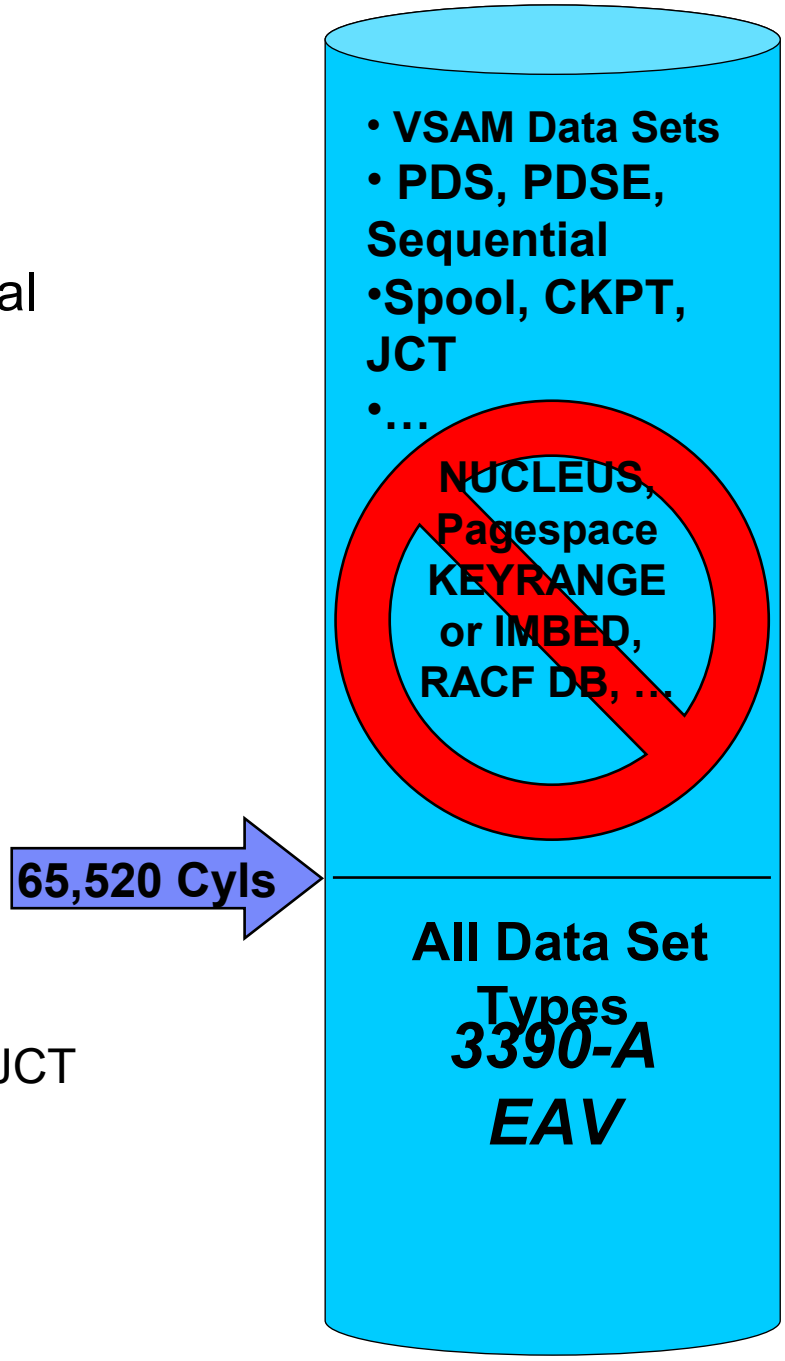
EAV Support rollout:

- z/OS R10 introduced EAV with support for VSAM (including zFS)
- z/OS R11 added Extended Format Sequential and support for data sets spanning the 64K cylinder line
- z/OS R12 added:
  - PDS and PDSE (including load modules and program objects)
  - Plain vanilla (nonextended format) sequential
  - BDAM
  - GDG
  - LPALIB, LPA list, link list data sets, SYSn.IPLPARM, SVCLIB
  - Catalogs, VVDSs
  - JES2 and JES3 spool and checkpoint, JES3 JCT
  - DFSMSrmm, DFSMShsm™ data sets
  - Standalone Dump data set and AMASPZAP support
  - VSAM AIX support in Language Environment



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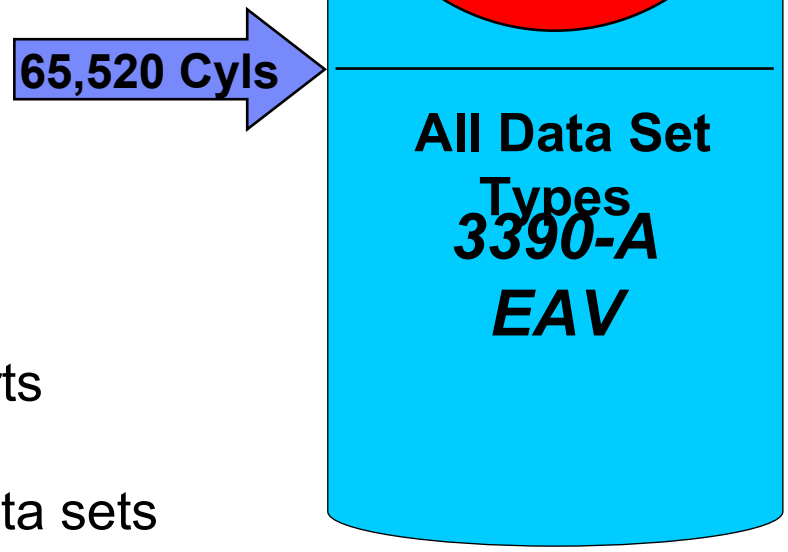
EAV Support:

- **z/OS R13 adds:**
  - Support for 1TB volumes (see next page)
  - SDSF support for output data sets
  - FTP support for SMS-managed and non-SMS-managed PS basic and large format, PDS and PDSE, and GDG data sets
  - PL/I Support with the PTF for APAR PM43745 on z/OS R11 and up
- **No support for above the line for:**
  - Imbed and Keyrange attributes
  - Incompatible CA sizes for VSAM
  - Page data sets, HFS data sets, LOGREC
  - NUCLEUS, SVCLIB, VTOC, VTOCIX
  - RACF® databases
  - DFSORT work data sets used for Peervale sorts
  - Parmlib concatenation data sets
  - XRC Control, Master, or Cluster non-VSAM data sets



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Scalability and Performance

1 TB EAVs

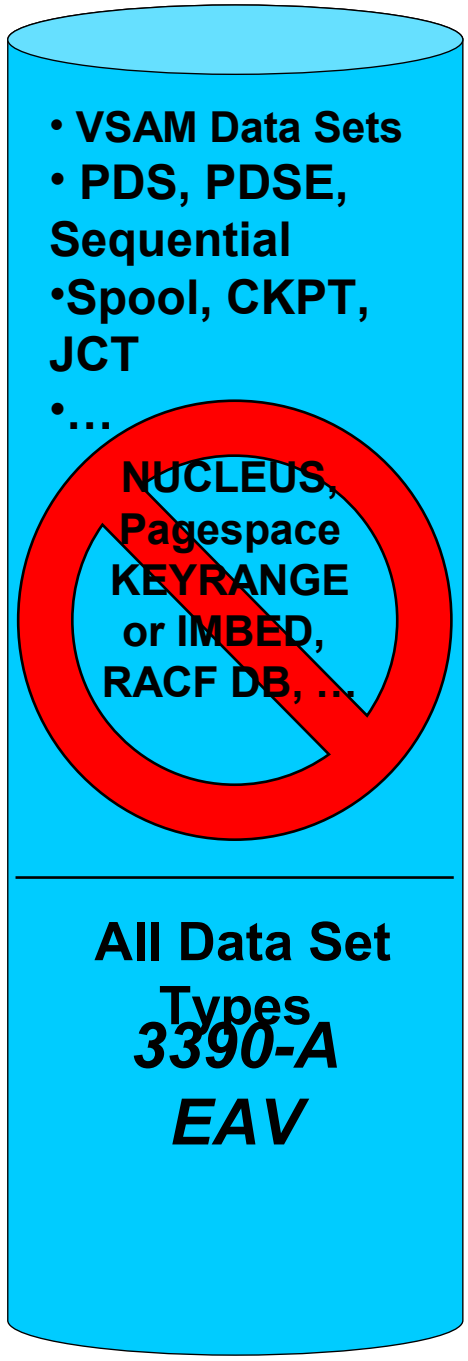
- z/OS R13 and R12 (with PTFs) support 1 TB EAVs
- Requires:
  - IBM System Storage DS8700 or DS8800
  - New DS8000 licensed machine code
  - Intended to relieve storage constraints while helping you simplify storage management by providing the ability to manage fewer, larger volumes as opposed to many small volumes
  - PTFs for APARs OA28553, OA35138, OA36148, PM08486
- Also of interest:
  - OA29933 (larger RBAs in LISTCAT),
  - OA30632, OA35034, OA36996, OA37221 (Data sets > 4TB)

VVDS maximum size increase

- For VVDSs in and out of EAS
- Maximum VVDS space increased from 5,460 tracks to 5,825 cylinders
- Increases practical maximum number of data sets from hundreds of thousands per volume to millions per volume

DFSMSdss™ Dump/Restore/Copydump performance (R12)

- Use 256K blocks rather than 64K blocks
- Expected to improve throughput for some operations



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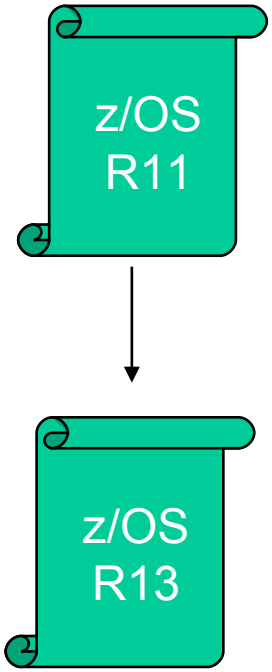
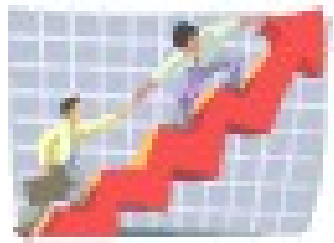
Scalability and Performance

- zHPF Multitrack support
  - More than a track's worth of data in a single transfer
  - Limited to 64K per transfer on servers before z196
  - Media Manager applications doing large I/O transfers expected to benefit, including zFS, HFS, PDSE, and striped Extended Format data sets.
  - Available on z/OS R9 and R10 with the PTFs for APARs OA26084 and OA29017, and later releases of z/OS
  - Requires DS8000 Licensed Machine Code (LMC) level 5.4.3.xx (bundle version 64.3.xx.xx) or later



- zHPF support for QSAM, BPAM, and BSAM access methods
  - Significant I/O performance improvements expected without application changes
  - Basic nonextended format Physical Sequential data sets
  - Basic and large format sequential data sets
  - Requirements include:
    - z/OS V1.13, z/OS V1.12, or z/OS V1.11 with PTFs
    - A zEnterprise System server with channels that support zHPF and a minimum Machine Change Level (MCL)
    - HMC V2.11.1
    - Support Element V2.11.1
    - IBM System Storage® DS8700 or DS8800 series with new DS8000 licensed machine code
    - New parameter in the IGDSMSxx member of parmlib



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Scalability and Performance

- With z/OS V1.13, new function is designed to provide improvements for DB2 list prefetch
  - Expected to provide significant performance improvements for certain DB2 queries and some DB2 utility operations
  - Will take advantage of new for IBM System Storage DS8700 or DS8800 series with:
    - New DS8000 licensed machine code
    - z/OS V1.13, z/OS V1.11 or z/OS V1.12 with PTFs

z/OS R13

- zHPF APARs of interest (BSAM, QSAM, BDAM, BiDi, EXCPVR, List Prefetch support, etc):
  - OA33089, OA34149, OA34661, OA34662, OA34663, OA34671, OA34672, OA34673, OA34674, OA33642, OA379460

IBM System z®

IBM System Storage™

IBM DB2

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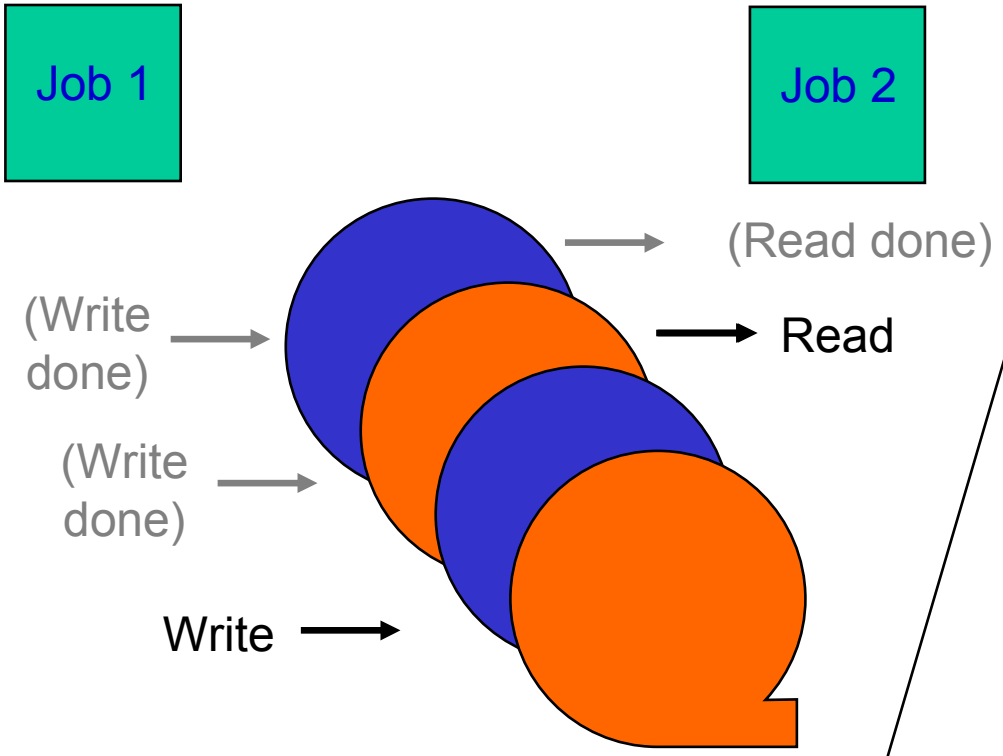
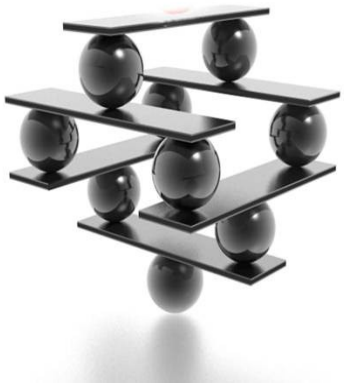
New JCL parameter, FREEVOL=EOV

- Specifies that a tape for part of a multivolume data set be available at end of volume rather than end of step
- Can allow other jobs to use the tape immediately
- Can allow overlapped processing of multivolume tape data sets





RMODE 64

- The next step...
- Allow execution of enabled code above 2G
- Support for code above 2G that calls no system services and is not loaded by normal system “load” methods
- Handle and resume after I/O and external interrupts

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Scalability and Performance

- **FTP support for large format data sets:**
  - FTP will be designed to allow you to transfer, restart transfers for, and allocate large format data sets
  - Support data sets larger than 65,525 tracks or more than 2 gigabytes of data, without requiring them to be SMS managed.
- **VSAM RLS improvements:**
  - Support for a new storage class (STORCLAS) attribute to specify whether VSAM RLS buffers and the associated resources are retained for a while (as before) or released immediately upon CLOSE
    - DCOLLECT to include information about this new attribute in SC records
  - Improved VSAM RLS buffer management of "aged" buffers
    - Expected to help improve performance when processing large RLS data sets with large buffer pools

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Improving Availability

JES2 SPOOL Migration*

- Dynamically remove a SPOOL volume using $T M SPOOL
- Also, can enlarge an existing spool data set using $TSPOOL,SPACE
  - For example, in combination with Dynamic Volume Expansion
- Available with PTF UA64366

JES3 Dynamic SPOOL Addition

- Add a SPOOL volume without a JES3 restart using the *MODIFY CONFIG command

z/OS 1.13 JES3 Product Update and Review of Newer Features
Monday 3:00

JES3 SYSOUT: How It Works and How to Manage It
Wednesday 1:30

z/OS 1.13 JES2 Product Update and Latest Status
Monday 4:30

JES2 Performance Considerations
Tuesday 11:00

What are All These JES2 NJE Options? (The A-Zs of NJE)
Thursday 9:30

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

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Improving Availability

Predictive Failure Analysis and Runtime Diagnostics Enhancements:

- PFA ENQ tracking
  - High and low rates for selected address spaces
  - High and low overall system rate
- PFA JES2 SPOOL utilization tracking
  - Track jobs started within an hour of IPL
  - Model the persistent jobs that use the most SPOOL space
  - Look for unexpectedly high usage
- RTD improvements
  - Now a persistent started task—start HZR at IPL time
  - Latch contention detection
  - z/OS UNIX System Services file system latch-related delays
  - New F HZR,ANALYZE command replaces S HZR command
- PFA and RTD integration
  - PFA to call RTD when it detects a lack in some tracked metrics (WTOs, SMF records, ENQs)
  - Issue a health check exception if RTD detects a potential problem

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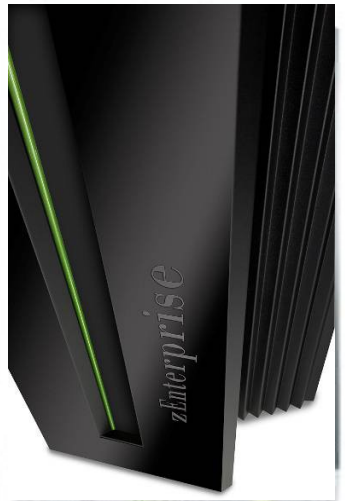
Improving Availability

CMDS Command enhancements

- CMDS ABEND,CMD=xxxxxxxx,ID=nnnn introduced many moons ago
- Enhanced in R12 to enforce “non-abendable” commands
- CMDS FORCE command added for z/OS R13; intended to be used when only alternative is IPL

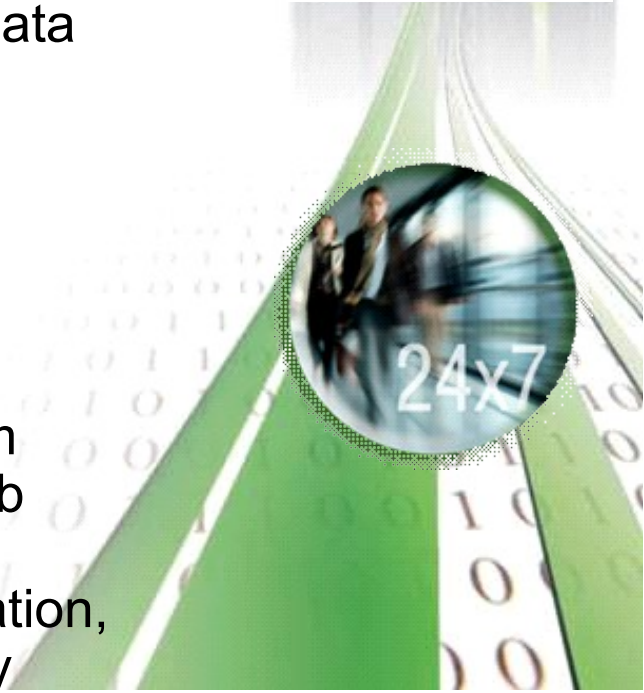


Parallel FTP tool now part of z/OS

- IBM z/OS Problem Documentation Upload Utility
- Messages to be split between SYSPRINT and DEBUG data sets
- New program name, AMAPDUPL
  - ✓ Alias MTFTPS for compatibility

Message flood automation processing improvements:

- Increase message ID limit from 50 to 1024
- Allow up to 128 address spaces to be tracked per system
- Allow the default message set to be identified in a parmlib member
- Intended to increase the scope of message flood automation, improve its usability, and help improve system availability



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Improving Availability

- IPL devices in subchannel sets other than 0
  - IPL, IODF, SADMP volumes supported for IPL from Subchannel Set 1 or Subchannel Set 2
  - Allow use of PPRC secondary devices for IPL after primary fails
  - Requires:
    - zEnterprise System
    - HMC V2.11.1
    - Support Element V2.11.1
    - Minimum Machine Change Level (MCL)
  - Also available for z/OS R11 and R12 with the PTF for APAR OA35140
- DADSM dynamic exits support
  - IGGPRE00
  - IGGPOST0
- DADSM and CVAF support for concurrent service
  - Dynamically update without IPL to help improve system and application availability
- ASID Reuse
  - DEVMAN address space now reusable
  - CATALOG, LLA, VLF, z/OS UNIX RESOLVER, TCP/IP, DFSMSrmm, and TN3270 already reusable

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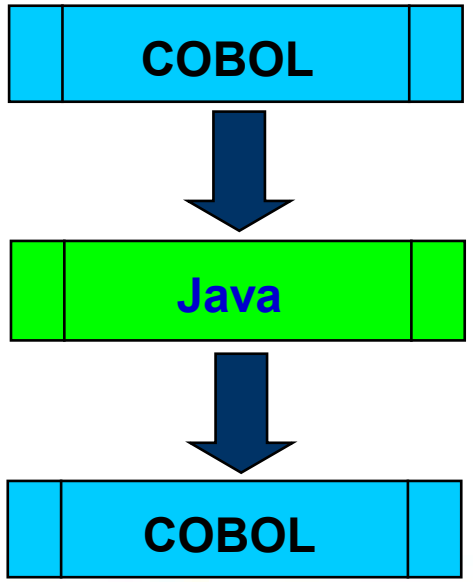
z/OS Batch Runtime environment—Java/COBOL interoperability

- Intended to provide the framework for Java to COBOL interoperability for transactional updates to DB2 while sharing database connections
- Designed to enable you to extend valuable COBOL assets using Java
- Note: Java programs eligible for zAAPs
- Requirements include:
  - IBM 31-bit SDK for z/OS, Java Technology Edition, Version 6.0.1 (5655-R31)
  - DB2 V9.1 for z/OS (5635-DB2) or later with PTFs
  - Enterprise COBOL for z/OS V4.2 (5655-S71), or later



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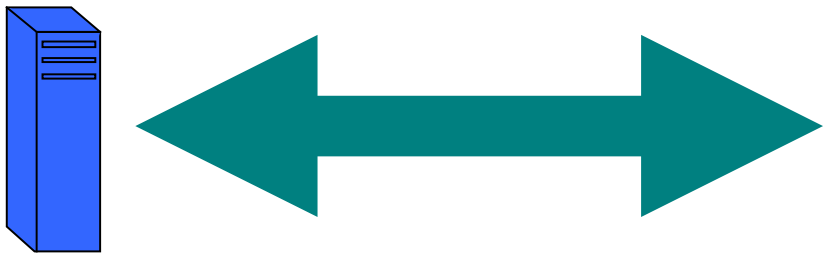
RESTful z/OS Batch Submit API

- Allow you to use z/OS batch from other z/OS systems and from other platforms using HTTP and HTTPS:
  - Submit a batch job
  - Obtain job status
  - List and retrieve spool files for a job
  - Cancel a job and purge it from the spool
- Can help create web-enabled applications that leverage batch
- Requirements include:
  - z/OS V1.13
  - z/OSMF V1.13



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Last stage of support for DSNTYPE=LARGE data sets in C/C++

- z/OS R8 implemented support using QSAM (noseek)
- z/OS R12 provided BSAM (seek) support for record I/O
- z/OS R13 adds support for BSAM (seek) for binary and text I/O

Better Binder support for unnamed sections

- Before, there was no way to remove them…and they can…accumulate
- Support now provided for:
  - Removing all unnamed sections with a new binder option, STRIPSEC=PRIV
  - Specifying unnamed sections and symbols on binder control statements
    - ✓ Name a previously-unnamed section
    - ✓ Replace an unnamed section
    - ✓ CHANGE and REPLACE support for unnamed symbols

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DFSMS™ support for very long retention periods

- RETPD=9999 was old limit (a bit over 27 years)
- New design limit is 93,000 days (a bit over 254 years)
- Notes:
  - 1-byte fields and 1900 TOD epoch date limit most expiration dates to YE2155
  - 99000 and 99366 remain as “never expire” dates no matter how derived
  - OAM and DFSMSrmm to support expiration dates up to the year 2264

SDSF support for REXX™ and Java access to OPERLOG

- In addition to access to syslog
- Use ISFLOG command for REXX
- Use ISFLogRunner class for Java

ISPF support for line command-level Edit macros

- In addition to initial and command line-level macros

User-level mounts and unmounts for z/OS UNIX

- BPXPRMxx support for limiting user mounts
- SAF-based security for allowing the function
- Can restrict which mountpoints a user may use and allow mounts only at empty mountpoints

New IEBPDSE utility

- Designed to verify PDSE structures

ISPF Editor - Beyond The Basics Hands-on Lab - Parts 1 & 2
Thursday 8:00 & Thursday 9:30

ISPF Hidden Treasures and New Features – Parts 1 & 2
Thursday 11:00 & Thursday 1:30

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New XL C/C++ support for:

- IPA and HOT options for Metal C
- A qsort() function
  - Allows an array to be sorted using a function you supply
  - Intended to relieve Metal C programmers from having to write sort routines with similar capabilities
- New ARCH(9) functions for programs running on zEnterprise System servers:
  - Interlocked storage access instructions
  - Multiply and Add in hexadecimal floating-mode with a new combination of FLOAT(MAF) and FLOAT(HEX) options
- New C++0x function, trailing return type, for which the compiler deduces the type of an auto variable from the type of its initializer expression
- – Debugging enhancements:
  - Hookless debug, intended to allow you to debug programs whose sizes and performance characteristics are more closely aligned with production programs.
  - New debugging APIs provide easier access to debug information in .mdbg and .dbg files.
  - Debug information for inline procedures, gives the ability to set entry breakpoints at all inlineinstances.
- …and more (see announcement or Summary of Changes)

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Language Environment now supports recovery from more I/O-related abends

- For output and close operations for C/C++ programs
- Return to C/C++ programs indicating that an I/O error has occurred rather than issuing an abend
- Intended to provide a more predictable recovery environment when I/O errors are encountered

Language Environment support for initializing multiple CEEPIPI main environments under one TCB

- Designed to provide access to a user word for each environment
- Intended to help you migrate Preinitialization Compatibility Interface (PICI) environments to CEEPIPI

dbx “hookless” debug support

- In prior releases, dbx inserted EX instructions, aka “hooks,” at compilation time to provide debugging breakpoints
- In R13, dbx provides support for programs compiled without hooks

Make Your PL/I and C/C++ Code FLY With the Right Compiler Options
Monday 11:00

Look What I Found Under the Bar!
Thursday 8:00

Finding Debugging Clues in LE Dumps
Thursday 9:30

Exploit Condition Handling in LE
Thursday 11:00

Heap Damage, Is Your Insurance Up-to-date?
Friday 11:00

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z/OS Unicode Services improved bidirectional character support

- For applications that process scripts that are read from right to left with imbedded strings that are read from left to right
- Samples included to show how to use these extended bidirectional services, with a sample object file you can include with C applications

More CCSID info from z/OS Unicode conversion information service

- Identifies substitution, newline, line feed, carriage return, end-of-file, and space characters

Support for access to 64-bit storage for tasks using subspaces

- Designed to allow access to 64-bit private and 64-bit shared storage in subspace mode without using Branch in Subspace Group (BSG) instructions
- Intended to make it easier for applications to access 64-bit storage and improve performance
- Note: No subspace storage isolation for 64-bit storage

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Simplified XCF interfaces for passing messages in a Parallel Sysplex®

- New services designed to allow a server to be established to process messages and for messages to be sent across the sysplex without first joining an XCF group
- Intended to make it easier to exploit XCF services for applications that do not require the member management and monitoring provided by the XCF group services interfaces

z/OS XML System Services now supports a binary XML format

- Extensible Dynamic Binary XML (XDBX)
- XDBX supports a subset of XML
- Appropriate expected to provide performance improvements for validating parsing operations compared to conventional XML text documents
- Available with PTF UA63422

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LDAP improvements

- SHA-2 password hashing
  - Support for salted and unsalted SHA224, SHA256, SHA384, and SHA512
- Set search limits by groups of users
  - Override server-wide limits imposed by sizeLimit and timeLimit
  - 500-entry maximum is the default
  - Range is from 1 to 2147483647, or no limit
  - Administrator searches not bound by any limits
- Support for paged results as described in RFC2696
  - Get back segmented results, a specified number of entries per “page”
- Support for server-side sorting as described in RFC2891
  - Sorted search results based on a list of criteria, where each criterion represents a sort key
- 64-bit support for TDBM
  - DB2 ODBC 64-bit support
  - 64-bit TDBM/Bulkload, ldif2ds, DSCONFIG, GDBM support.
  - Support more data in TDBM using DB2 9 for z/OS (5635-DB2) with PTF UK50918 or later
- Support to enable Kerberos binds to be processed by Microsoft's Active Directory Server
- LDAP administrative authority delegation

z/OS LDAP Plug-ins: Endless Opportunities Weds 9:30

Implementing z/OS LDAP Server 1.13 with RACF Hands-on Lab Monday 9:30

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CIM Server

- Now provides sequence identifiers in the indications profile
- Designed to allow:
  - Unsuccessful deliveries to be retried by the CIM Server
  - Lost and duplicate deliveries to be detected by a WBEM listener
  - Listeners to reorder any indications that arrive out of order
- This new function can provide better reliability and robustness for event processing in CIM

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Enhancing Security

System z Security Portal

- Want to be notified about Security and Integrity APARs? Sign up!
  - IBM recommends that you promptly install security and integrity PTFs
  - SECINT PTFs are included in RSUs periodically
  - The System z Security Portal can help you stay more current with SECINT PTFs by providing SMP/E HOLDDATA you can use to identify these fixes before they are marked RSU
  - The System z Security Portal also provides associated Common Vulnerability Scoring System (CVSS) V2 ratings for new APARs*
  - To get this information you must register!
    - Because widespread specifics about a vulnerability could increase the likelihood that an attacker could successfully exploit it
    - In response to customer requests to maintain the confidentiality
    - Other requirements on the website
  - IBM recommends that you visit the System z Security Portal site at http://www.vm.ibm.com/security/aparinfo.html to get the information you need to register
  - Questions can be directed to: syszsec@us.ibm.com

- Note: According to the Forum of Incident Response and Security Teams (FIRST), the Common Vulnerability Scoring System (CVSS) is an "industry open standard designed to convey vulnerability severity and help to determine urgency and priority of response." IBM PROVIDES THE CVSS SCORES "AS IS" WITHOUT WARRANTY OF ANY KIND, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. CUSTOMERS ARE RESPONSIBLE FOR ASSESSING THE IMPACT OF ANY ACTUAL OR POTENTIAL SECURITY VULNERABILITY IN THEIR SPECIFIC ENVIRONMENT. IBM DOES NOT PROVIDE A CVSS ENVIRONMENT SCORE. THE CVSS ENVIRONMENT SCORE IS CUSTOMER ENVIRONMENT SPECIFIC AND WILL IMPACT THE OVERALL CVSS SCORE. CUSTOMERS SHOULD EVALUATE THE IMPACT OF ANY ACTUAL OR POTENTIAL SECURITY VULNERABILITY IN THEIR SPECIFIC ENVIRONMENT.
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Enhancing Security

EAL5 Certification

- z/OS V1.12 RACF for z/OS 1.12 has achieved Common Criteria certification at EAL5, the highest commercial grade assurance level
- Certification presented to IBM on 29 February 2012 at RSA conference
- IBM System z PR/SM and z/OS RACF now *both* certified at that level
- IBM intends to submit z/OS V1.13 RACF for evaluation as well*

RRSF via TCP/IP

- In addition to APPC
- Secure the links via AT-TLS
  - AT-TLS required; RRSF will refuse to use an unsecured link
  - Server- and client-side authentication will be used
  - Sample rule will specify strongest available encryption method
  - More and better encryption algorithms available in AT-TLS
    - ✓ Note: RRSF via APPC uses 56-bit DES
- Can allow an EE link used for this purpose to be changed to native TCP/IP
- New operand on TARGET operator command or issued during RACF subsystem initialization:
  - PROTOCOL(TCP(ADDRESS(hostname_or_IP_address)))

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Enhancing Security

z/OS Communications Server intrusion detection technology adds support for IPv6 and more attack types

- Intended to provide IPv6 intrusion detection security and help you prevent certain error situations and denial of service attacks
- Configuration Assistant for z/OS Communications Server can help you configure the new IDS support

z/OS Communications Server Intrusion Detection Services Tuesday 9:30

z/OS UNIX file system security

- File system-level access control using SAF with the PTFs for APARs OA35970, OA35973, OA35974
  - Available for z/OS V1.12
- Optional access control check uses profiles in a new FSACCESS class
- When a user is authorized to use a file system, permission bits and ACLs used to control access to individual files and directories
- Intended to help improve security administration and auditability

IBM Ported Tools for z/OS (5655-M23)

- Provides the sudo utilities in the PTF for APAR OA34949, now available
- Included as part of the Supplementary Toolkit for z/OS feature
- Designed to deliver the sudo (su "do") open source tools that allow system administrators to delegate authority to users or groups of users

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Enhancing Security

Support for NAS to perform RFC 4120 address checking

- New CHECKADDRS setting in the KERB segment of the KERBDFLT profile in the REALM class
- Kerberos server should interrogate the addresses in tickets when CHKADDRS is set to YES
- New data returned by R_kerbinfo service

Support for encryption type negotiation in NAS

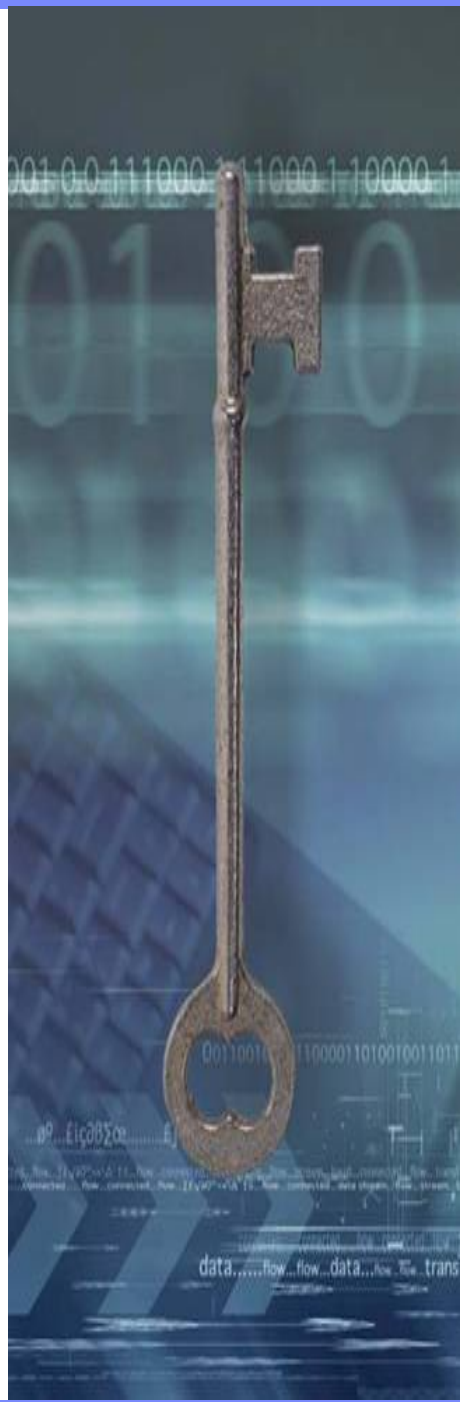
- Intended to work as described in RFC 4537
- Allow stronger encryption than that supported by a KDC

TN3270 and FTP support for password phrases

- In addition to existing support for passwords

z/OS UNIX now provides the capability for IPv4 UDP datagram reply packets to flow on the same interface where the request arrived

- When server system has multiple home addresses with multiple routes back to the client or is using a DVIPA
- Designed to be similar to existing support for IPv6
- Intended to allow applications to require that the response to a request be restricted to the same IPv4 address from which the request was received



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Enhancing Security

Cryptographic Support for z/OS V1.11 through z/OS V1.13 web deliverable*

- AES Key-Encrypting-Keys (KEKs)
- Diffie-Hellman key exchanges using ECC, and encryption of ECC keys under AES KEKs
- PKA RSA PKCS#1 Optimal Asymmetric Encryption Padding (OAEP) using SHA-256
  - Intended to help meet the requirements of the Japanese Banking Association
  - Available with z/OS V1.13, and with the Cryptographic Support for z/OS V1.10 through z/OS V1.12 web deliverable with PTF UA62056
- Storing up to 100 PIN decimalization tables inside cryptographic coprocessors
  - Intended to help you meet ANSI X9.8 PIN protection requirements
  - Requires a TKE V7.1 workstation, available on IBM zEnterprise servers
- Dynamic PKA Master Key Changes
  - Allow PKA callable services processing to continue
  - Aligns PKA master key change procedures with those for AES, DES, and ECC master key changes
  - Also available with a Crypto Express2 Coprocessor (CEX2C) card, available for IBM System z10 servers
- Dynamic CKDS Administration, CKDS Reencipher, and Symmetric Master Key changes
  - Designed to allow these operations to be processed in parallel with CKDS updates
  - Coordinated for all members of a Parallel Sysplex that share the same CKDS data
- Exchange DES and TDES keys with other cryptographic systems using ANSI TR-31 Key Blocks
  - TR-31 key blocks intended to allow keys to be exchanged between different cryptographic systems
- Support for hardware-based RSA 4096-bit cryptography using a Crypto Express3 Accelerator (CEX3A), available on zEnterprise System servers
  - In addition to existing support using the Crypto Express3 Coprocessor (CEX3C) available on IBM zEnterprise servers
- **Available from:**
  - http://www.ibm.com/systems/z/os/zos/downloads/

ICSF Update
Wednesday 8:00

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Enhancing Security

System SSL enhancements:

- ECC support for X.509 V3 certificates using the ECDSA and ECDH algorithms
  - Designed to let you to create them in key database files or ICSF PKCS#11 tokens
  - Certificate Management Services API support
- Extend use of ECC to enable TLS V1.0 and V1.1 handshakes with ECC cipher suites and digital certificates during connection negotiations per RFC 4492
- Support for ECC certificates residing in SAF key rings with their private keys stored in the ICSF PKDS
- Support for private keys in secure digital signature generation operations available through Crypto Express3 Coprocessor (CEX3C) cards on IBM zEnterprise servers

RACF support for generating ECC secure keys

- Using the CEX3Cs available for zEnterprise servers
- New RACDCERT keywords designed to allow you to specify that an ECC key be stored in the ICSF public key data set (PKDS); corresponding hardware ECC key support for PKI Services.
- Intended to allow you to expand your use of certificates with ECC keys protected by hardware

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Enhancing Security

Restrict additional QNAMES to authorized programs:

- Already restricted:
  - QNAMEs starting with SYSZ (such as SYSZVOLS)
  - ADRDFRAG, ADRDSN, ARCENQG, BWODSN,SYSCTLG, SYSDSN, SYSIEA01,SYSIEECT, SYSIEFSD, SYSIGGV1, SYSIGGV2, SYSPSWRD, SYSVSAM, and SYSVTOC
- Now also restricted:
  - ARCDSN, ARCBTAPE
  - ARCGPA, ARCBACV, and ARCMIGV, when converted from RESERVE to ENQ

PKI Services Support for DB2 Backstore

- Optional use of DB2 rather than native VSAM for Object Store (OST) and Issued Certificate List (ICL)
- Allows DB2-based queries and reporting
- Other advantages of DB2 apply (e.g., online REORG)
- Support for lots and lots (billions) of certificates
- Support for much larger CRLs
  - Without DB2, maximum CRL size extended from 32k to over 500k
- ICL duplexing via DB2
- Most value thought to be for large-scale certificate deployments

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Enhancing Security

VIPARANGE DVIPA Security

- Support for RACF profiles controlling which user IDs can create and destroy VIPARANGE DVIPAs extended
- Allow you to specify ranges of VIPARANGE DVIPAs or individual VIPARANGE DVIPA addresses

IPSec support for FIPS 140-2 cryptographic mode enhanced

- AES-GCM and AES-GMAC support when using sysplex-wide security associations in FIPS 140-2 mode
- IKE daemon uses new ICSF services in FIPS mode

IKEv2 support

- Added to z/OS Communications Server V1.12
- In V1.13, Communications Server adds Network Address Translation (NAT) traversal support using IKEv2 for IPv4
- Intended to make it easier to migrate to IKEv2 if you use NAT
- Also, sysplex-wide security associations support for IPSec tunnels negotiated using IKEv2 and IPv4 addresses

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Self-Managing Capabilities

Better DFSMShsm journal backups

- Old way was to lock the journal for the entire backup
- New design:
  - Read control record
  - Back up journal data described by original control record
  - Lock journal, back up control record, back up balance of journal
- Expected to be much less disruptive for very active DFSMShsm systems
- Should be particularly nondisruptive if run when DFSMShsm activity is at its nadir for the day
- Note: Must use Concurrent Copy to back up CDS and specify SETSYS JOURNAL(RECOVERY) to use this function

DFSMShsm Space Management improvements

- New option to specify that space management to start when any volume in an automigration storage group exceeds the utilization threshold rather than using Interval Migration processing
- Intended to make DFSMShsm space management more responsive while reducing Interval Migration CPU utilization spikes
- Also, improvements in volume data set list processing so data movement can start sooner

The Wonderful World of DFSMShsm SETSYS Commands Monday 4:30

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Self-Managing Capabilities

RMF monitoring for zEnterprise ensembles:

- RMF provides CIM-based performance data gatherers for:
  - Linux on System z and Linux on IBM System x®
  - AIX systems
- Designed to provide a consistent monitoring solution for zEnterprise ensembles
- Along with the Resource Monitoring plug-in for the z/OS Management Facility, first made available with z/OSMF V1.12, this is intended to display performance metrics from those platforms and combine them with z/OS metrics in common graphic views

Response time distributions calculated by WLM and reported by RMF for velocity and discretionary goals

- As for response time goals, reported in 14 “buckets”
- Unlike response time goal reporting, mid-points can be recalculated and changed from time to time

RMF support for additional contention reporting

- For system suspend lock, GRS enqueue, and GRS latch contention
- New Postprocessor Serialization Report available in XML output format
- New SMF Type 72 subtype 5 records
- Help make it easier to respond to serialization-related performance issues.

RMF: The Latest and Greatest Monday 11:00

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Self-Managing Capabilities

OAM improvements

- Support for file systems in the disk level for zFS and NFS, in addition to DB2-backed object storage
  - Allows you to use z/OS UNIX file systems to store, retrieve, and delete objects, and to move objects between file systems and other locations in the OAM hierarchy
  - Intended to provide you more flexible ways to configure your OAM storage hierarchy
- Wildcard support for the MODIFY OAM,START,STORGRP command to allow you to initiate OSMC storage group processing for multiple object and object backup storage groups in single commands
- Dynamic update capabilities to enable changing the maximum number of tape drives OAM allocates to an object or object backup storage group without restarting OAM
- Enhanced MOVEVOL to improve performance when moving objects from a source volume that contains a large number of OAM collections
- CTICBR00 now shipped in the SMP/E-managed parmlib so you can use parmlib concatenation rather than copying it from samplib to parmlib during migration
- SMF Type 85 records now include counter fields with higher maximum values, in addition to the existing fields in KB

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Self-Managing Capabilities

InfoPrint improvements

- Support for specifying either a primary or a secondary JES2 subsystem
  - Intended to allow you to isolate print data on a secondary JES2 spool so unexpectedly large amounts of print output do not disrupt a primary JES2 subsystem
- PrintWay™ Extended Mode designed to allow you to select output to be printed based on the amount size of each job, and direct it appropriately
  - For example, direct large print jobs to high-speed, high-volume printers and small ones to lower-speed distributed printers
  - Intended to remove one of the last significant inhibitors for migrating from Infoprint® Server PrintWay Basic Mode to Extended Mode
- PrintWay Extended Mode enhancements for emailing documents:
  - Include text and line-data documents in the body of an email
  - Use a subset of RFC 2822-compliant email headers in line-data documents without modifying JCL or printer definitions
  - Send different documents from a print job to the same people or different people using email headers, job attributes, or JCL, with common introductory text
- Infoprint Central now supports:
  - Showing the age of print jobs, and displaying print jobs by age
  - Displaying new PrintWay Extended Mode fields used for job selection in printer properties

Configuring and Exploiting the New Infoprint Server FromAFP Transforms
Tuesday 9:30

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Continued focus on IPv6

- We have been talking about IPv4 address exhaustion for a couple of years now…
- The last IPv4 address was assigned to a regional pool by IANA in February 2011
- IPv4 address exhaustion started this year as Regional Internet Registry pools began to run dry
- RIR APNIC's pool exhausted 15 April 2011[1]
- More than you ever wanted to know at: http://www.potaroo.net/tools/ipv4/index.html

- If your z/OS system talks to the outside world and does not yet speak IPv6 you need to get going!
- z/OS R8 was IPv6 Ready
- z/OS R12 is IPv6 Phase 2 Ready
- z/OS R13 is IPv6 Phase 2 Ready

1. According to http://en.wikipedia.org/wiki/IPv4_address_exhaustion

IPv6 on z/OS
Thursday 9:30

IANA IPv4 Address Space Registry

Final Update:

3 February 2011

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Networking

- More flexibility for specifying reserved TCP/IP port ranges
- New CSSMTP server design for better memory and JES resource management when retrying mail send operations
- Improved z/OS system resolver processing when name servers are unresponsive
- More VLANs per OSA port
  - Define up to 32 VLANs per OSA port per IP version
- Autonomic recovery for APPN routing tree corruption
- New design to monitor for CSM-constrained conditions and taking specified recovery actions
- Enterprise Extender connectivity tests initiated using the DISPLAY NET,EEDIAG,TEST=YES command when firewalls block ICMP messages expected to complete more quickly

z/OS Communications Server Technical Update, Parts 1 & 2
Monday 9:30 & 11:00

z/OS CS Performance Improvements
Tuesday 4:30

Sysplex Networking Technologies and Considerations
Wednesday 11:00

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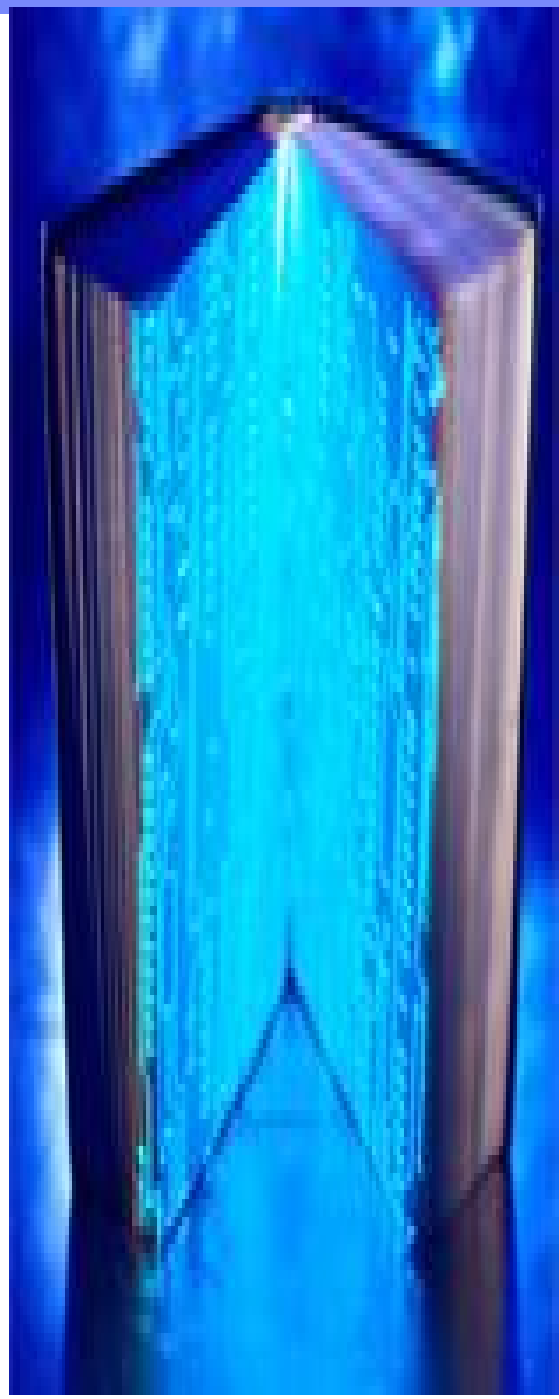
Networking

- New DISPLAY TCPIP,TELNET command you can use to display a list of TN3270E Telnet servers
- New Network Management Interface (NMI) functions for the system resolver, and improvements to the NMI TMI_Copybuffer callable services
- Sysplex Distributor takeover and distribution of IPSec tunnels and traffic for dynamic VIPAs using IKEv2 for better workload balancing
- New design for more-responsive VIPAROUTE processing when TCP/IP stacks join or leave the group and when OMPROUTE is recycled



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Microsoft Windows Support

- The Microsoft® Windows®-based Capacity Provisioning Manager application supports 32- and 64-bit versions of Microsoft Windows 7 Professional Edition
- DFS SMB Server supports clients running both the 32- and 64-bit versions of Microsoft Windows 7 Professional, Microsoft Windows 7 Enterprise, and Microsoft Windows 7 Ultimate Editions
  - Also available for z/OS R11 and R12 with the PTF for APAR OA36149
- NFS supports 32- and 64-bit versions of Microsoft Windows 7 Professional Edition with Open Text NFS Client or Open Text NFS Server installed
- HCM supports the 32- and 64-bit versions of Microsoft Windows 7 Professional Edition
- z/OS PKI Services provides support to enable Mozilla-based web browsers on Windows and Linux platforms to use smart cards when generating certificates and to enable Microsoft Internet Explorer 6, Internet Explorer 7, and Internet Explorer 8 to use an updated PKI application that includes its own ActiveX controls, which allows users to install renewed certificates

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Installation Support

- **Individual products and groups via ServerPac:**
  - Products that can stand alone (no shared libraries or members) planned to be available separately
    - Covers most z/OS & DB2 checklist products
    - Install using the ServerPac installation dialog
    - Intended to allow easy installation of sets of products that you install and migrate separately
    - (To install in zones with existing products, use CBPDO)
  - Some restrictions apply (see ordering checklists when available)
  - Planned for October 2012 availability

Available on DVD, in addition to Internet and tape:

- ServerPac®
- CBPDO
- Customized Offerings Driver (COD)
- ESO

- Notes:
  - IBM recommends Internet delivery
  - DVD installation requires a workstation with a network connection to the z/OS driving system
  - Installing the COD requires use of the HMC
  - No longer available in the USA: SystemPac®, ProductPac®, and FunctionPac fee-based offerings and selective follow-on Service (SFS)

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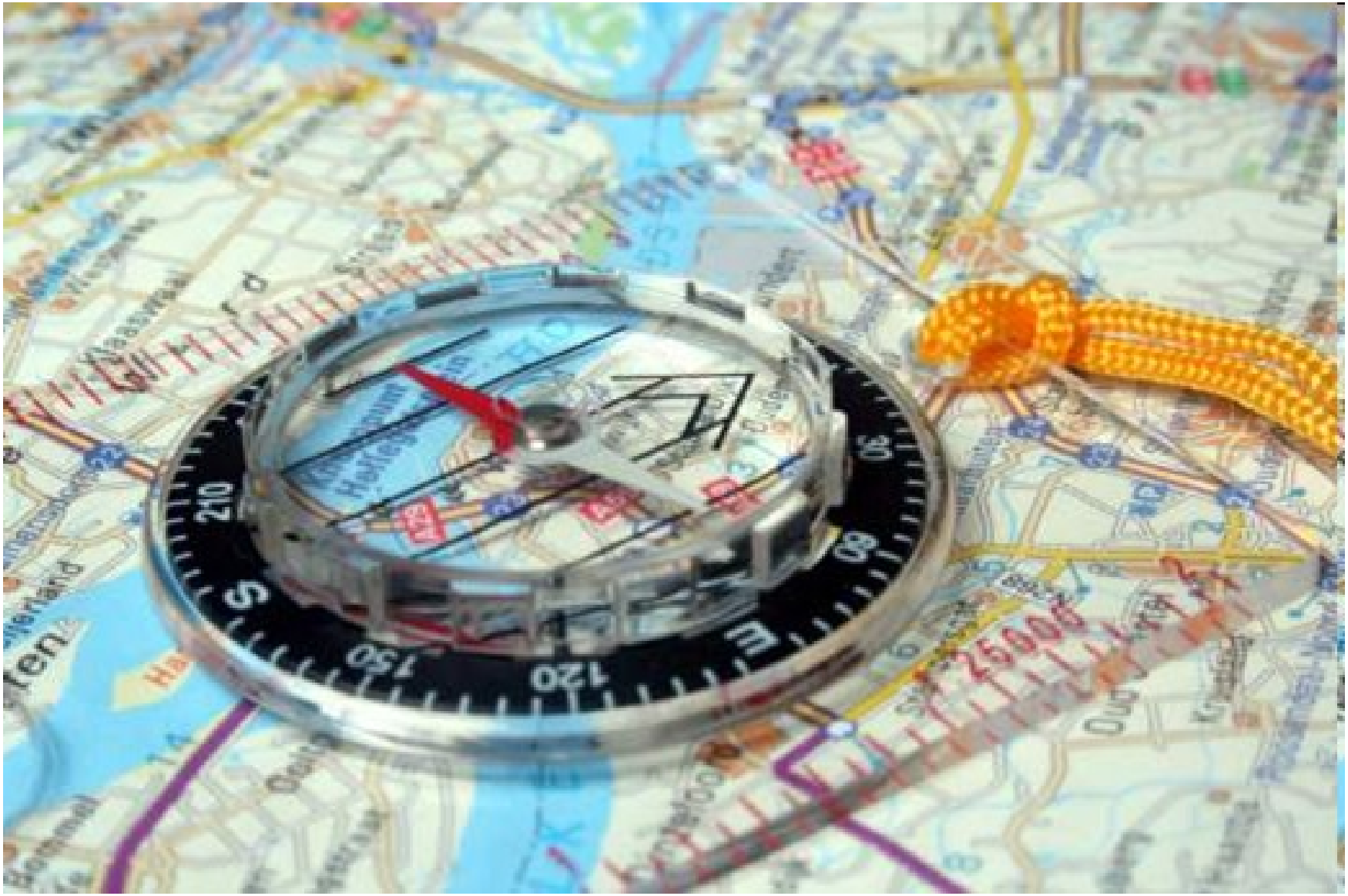
Statements of Direction*



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Statements of Direction*

Reminders:

- z/OS V1.13 is planned to be the last release to support multi-file system zFS aggregates, including zFS clones
  - Support for the zfsadm clone command and mount support for zFS file system data sets containing a cloned (.bak) file system will be removed
  - IBM recommends that you use copy functions such as pax and DFSMSdss to back up z/OS UNIX file systems to separate file systems.
  - Support for zFS compatibility mode aggregates will remain.
- z/OS V1.13 is planned to be the last release to support BPX.DEFAULT.USER
  - IBM recommends that you either use the BPX.UNIQUE.USER support that was introduced in z/OS V1.11, or assign unique UIDs to users who need them and assign GIDs for their groups.
- z/OS V1.13 is planned to be the last release to provide the z/OS Capacity Provisioning support that utilizes the System z API for communication with the Support Element (SE) or Hardware Management Console (HMC).
  - This protocol is based on IP network connection using SNMP.
  - IBM recommends configuring the Capacity Provisioning Manager for communication via the z/OS BCP Internal Interface (BCPii) protocol. The SE and HMC support for the System z API remains, and is not affected by this withdrawal of support.
- z/OS V1.13 is planned to be the last release in which the BIND 9.2.0 function will be available.
  - If you use the z/OS BIND 9.2.0 function as a caching-only name server, use the resolver function, which became generally available in z/OS V1.11, to cache Domain Name Server (DNS) responses.
  - If you use the z/OS BIND 9.2.0 function as a primary or secondary authoritative name server, investigate using BIND on Linux for System z or BIND on an IBM blade in an IBM zEnterprise BladeCenter® Extension (zBX).

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Statements of Direction*

- z/OS V1.13 is planned to be the final release for which the IBM Configuration Assistant for z/OS Communications Server tool that runs on Microsoft Windows will be provided by IBM
  - Currently an as-is, nonwarranted web download
  - Use the supported z/OSMF Configuration Assistant application instead
- z/OS V1.13 is planned to be the last release to support a staged migration for JES2 and JES3. Future releases will require you to migrate to all elements of z/OS at the same time, including JES2, JES3, or both.
- z/OS V1.13 is planned to be the last release to support changing the default Language Environment runtime options settings using SMP/E-installable USERMODs. IBM recommends using the CEEPRMxx PARMLIB member to set these options.
- With the introduction of the SAF mode authorization in z/OSMF 1.13, IBM intends to withdraw support for Repository mode authorization in a future release. Both modes are being currently supported to allow customers time to migrate to the new authorization mode.

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

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Statements of Direction*

GDPS 3.9 Update
Friday 11:00

- HyperSwap™ support planned to be enhanced to improve recovery in HyperSwap-enabled configurations
  - Intended to mitigate impact of recovery scenarios
  - Targeted for GDPS/PPRC customers with IBM System Storage DS8700 or DS8800 series
  - GDPS/PPRC will be designed to initiate an unplanned HyperSwap that will allow the former primary PPRC DS8000 to complete its recovery while allowing host I/Os to proceed
  - Additional enhancements planned to reduce the amount of system resources consumed during a HyperSwap by GDPS/PPRC users with a large number of volume pairs
  - Availability is planned for fourth quarter 2011, and these functions will require the following:
    - z/OS V1.13
    - GDPS V3.8 with PTFs
    - An IBM System Storage DS8700 or DS8800 with new DS8000 licensed machine code

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Handy Resources

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System z Social Media

- **System z official Twitter handle:**
  - @ibm_system_z
- **Top Facebook pages related to System z:**
  - Systemz Mainframe
  - IBM System z on Campus
  - IBM Mainframe Professionals
  - Millennial Mainframer
- **Top LinkedIn Groups related to System z:**
  - Mainframe Experts Network
  - Mainframe
  - IBM Mainframe
  - System z Advocates
  - Cloud Mainframe Computing
- **YouTube**
  - IBM System z

- **Leading Blogs related to System z:**
  - Evangelizing Mainframe (Destination z blog)
  - Mainframe Performance Topics
  - Common Sense
  - Enterprise Class Innovation: System z perspective
  - Mainframe
  - MainframeZone
  - Smarter Computing Blog
  - Millennial Mainframer

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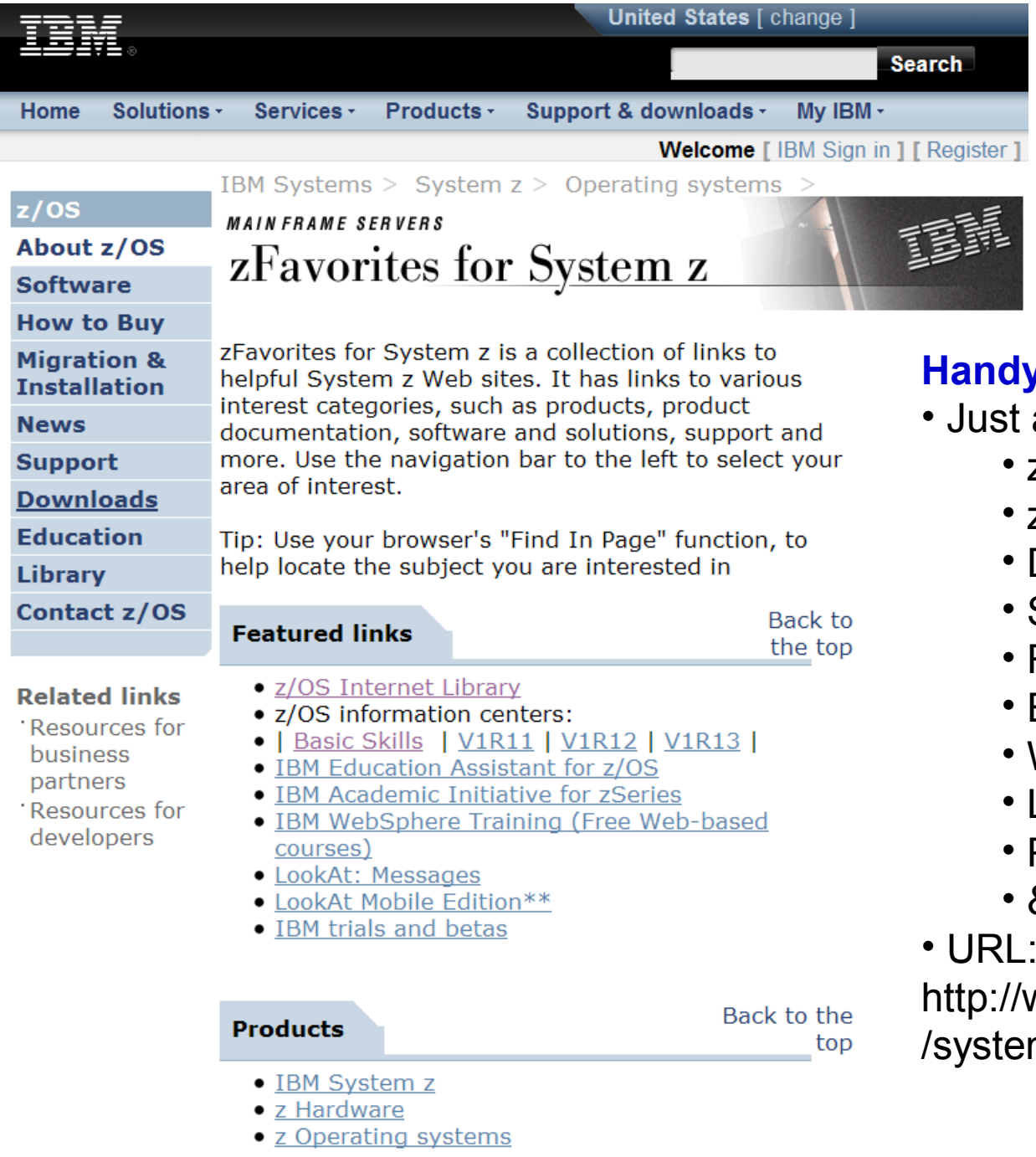
z Favorites Page



Handy links to:

- Just about everything!
  - z/OS platform libraries
  - z/OS wizards
  - Downloads
  - Support
  - Redbooks
  - Education Assistant
  - WebSphere courses
  - LookAt (and LookAt Mobile Edition)
  - Product info
  - & lots more…
- URL: http://www.ibm.com/developerworks/university/systemz/index.html

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z/OS Basics Page

z/OS basic skills information center

New to z/OS?

New to z/OS? You've come to the right place! The z/OS basic skills information center is the fastest way to learn and become productive on z/OS.

Once you've learned the basic z/OS concepts and skills presented here, you can find the z/OS product documentation at the z/OS Internet Library Web site.

What's New

In June 2010, We added an enhanced "online workloads" section with new detailed information on IMS and DB2 for z/OS.

- **Mainframe concepts**
  HTML | PDF
  Get started with the mainframe.
- **z/OS concepts**
  HTML | PDF
  Get started with the fundamental concepts of z/OS.
- **Application programming on z/OS**
  HTML | PDF
- **z/OS system installation and maintenance**
  HTML | PDF
  What the system programmer does.
- **Data and storage management on z/OS**
  HTML | PDF
  All about storing and managing data on z/OS.
- **Online workloads for z/OS**

What's new

- Find out what's new in the z/OS basic skills IC

Related links

- z/OS Internet Library

IBM Academic Initiative

- Mainframe education opportunities

Podcast

- Who uses mainframe computers? podcast

Some resources:

- Entry-level books on PDF
- Reusable JCL collection
- 30-minute courses
- Glossary of z/OS terms

Handy links to:

- z/OS Library
- IBM Academic Initiative
- URL: http://publib.boulder.ibm.com/infocenter/zos/basics/index.jsp

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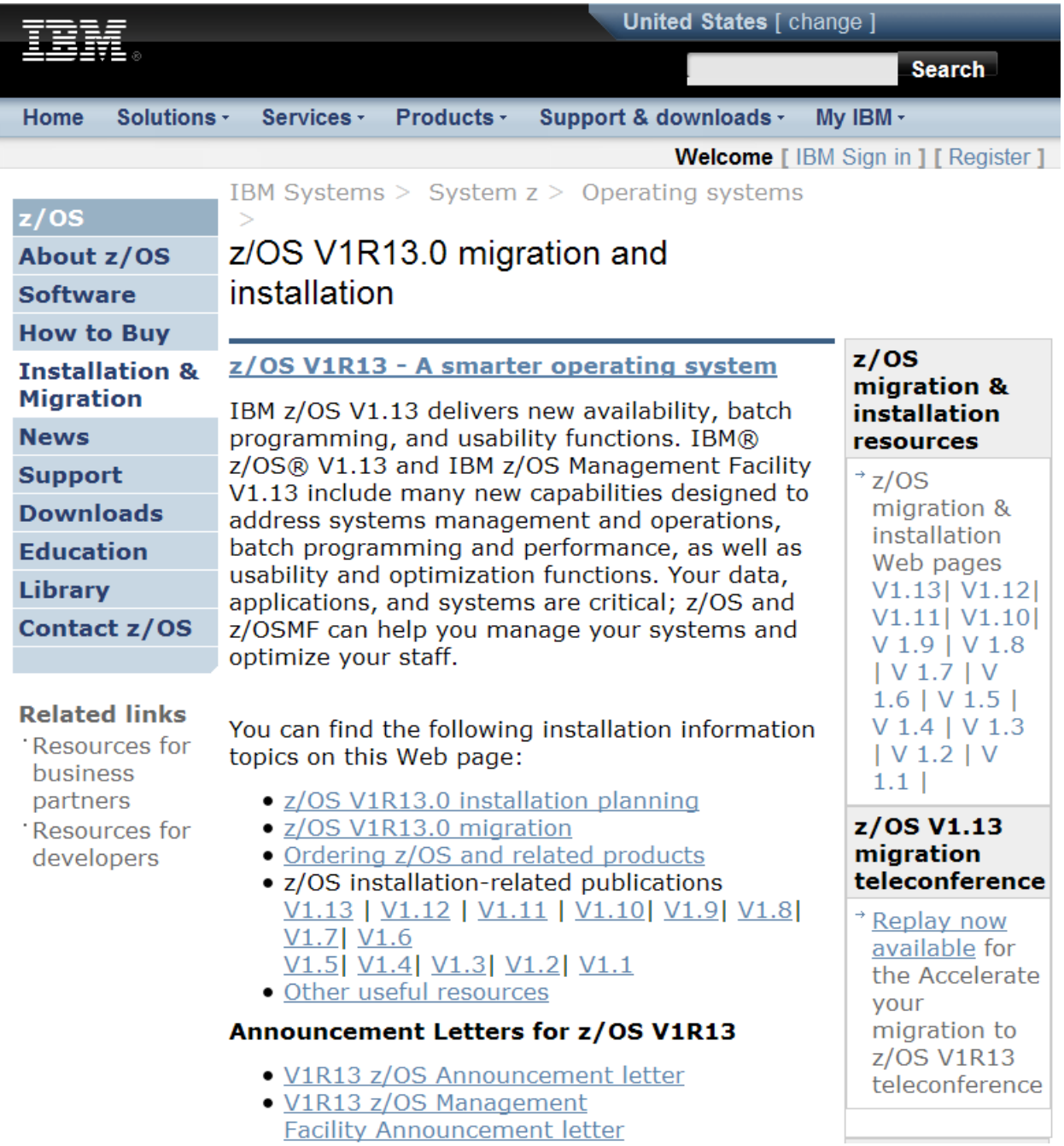
z/OS Installation Page



Some resources:

- Related books on PDF
- Telecon replay
- Hints & Tips
- Samples

Handy links to:

- Related books in BookManager format
- Minimum levels of IBM products that run on z/OS V1R13.0
- ShopzSeries
- Announcement letters
- CPPUPDTE documentation
- URL: http://www.ibm.com/systems/z/os/zos/installation/

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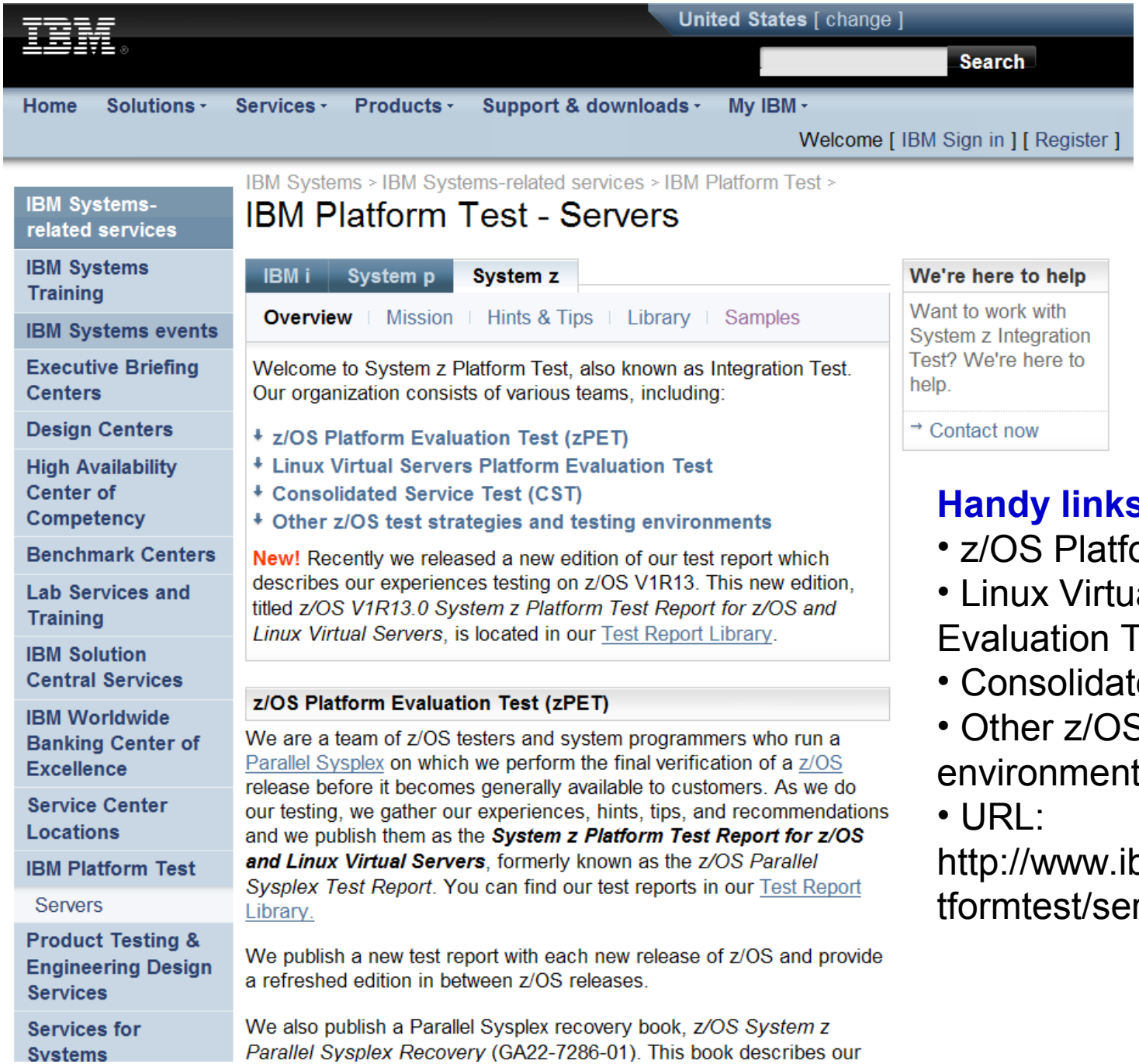
z/OS Platform Test Website



Some resources:

- Test experience reports about HW, OS, middleware
- Hints & Tips
- Samples

Handy links to:

- z/OS Platform Evaluation Test
- Linux Virtual Servers Platform Evaluation Test
- Consolidated Service Test (CST)
- Other z/OS test strategies and testing environments
- URL: http://www.ibm.com/systems/services/platformtest/servers/systemz.html

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System z Academic Initiative Page

Some resources:

- Textbooks on PDF
- Sample Mastery exams
- IBM System z Job Board

Handy links to:

- System z Seminar Schedule
- Upcoming technical conferences
- Online resources
- URL: http://www.ibm.com/developerworks/university/systemz/index.html

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IBM
The Future Runs on System z
Optimize your z/OS environment
z/OS