IBM

LSU Nordic

z/OS 1.9, Sysplex, Availability, Scalability and Performance Update

Nordic
Large Systems Update Seminar
October 2007

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Nordic LSU October 2007
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A THROUGH Z.

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Agenda

- z/OS strategy / values
- *z/OS 1.7 & 1.8 quick revisit*
- z/OS 1.9
  - Scalability and Performance
  - Availability
  - Optimization and Management
  - Security
  - Enterprise-wide roles
  - Networking
  - New applications and open standards
  - Usability and Skills
  - Bit bucket
    - Including sysplex and other updates not related to a specific z/OS release
    - Including IBM statements of direction
    - An early z/OS next preview
- Note: The presentation handout does not include all charts presented, nor do it 100% represent the slides presented

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z/OS and System z trends, strategy and value

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IBM Consolidation Announcement Highlights

- IBM transformation and "Big Green"
- Why IBM System z Now?
- IBM Global Account Infrastructure Challenge
- Consolidation to System z
- Implementation and Next Steps
- Critical Success Factors

IBM Consolidation Announcement Highlights

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IBM's Transformation: An Ongoing Journey

IBM Strategic Delivery Model

IBM Metrics	1997	Today
CIOs	128	1
Host data centers	155	7
Web hosting centers	80	5
Network	31	1
Applications	15,000	4,700
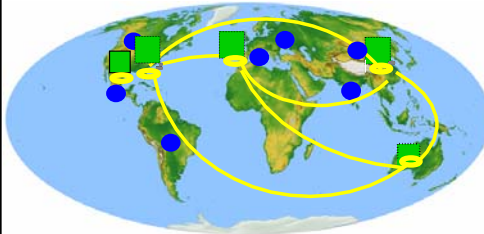
Legend:
- **Global Resources** (blue ellipse)
- Strategic IGA location (yellow ellipse)
- Strategic Web location for IGA (green square)
- Ethernet and Power9 Networks (yellow lines)

Tactical and operational efficiencies
- Consolidation of infrastructure
- Application consolidation/reduction
- Global resource deployment
- Enterprise end-to-end architecture optimization

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"Big Green"

- **IBM to reallocate $1 billion each year:**
  - Acceleration of "green" technologies and services
  - Roadmap for clients to address the IT energy crisis while leveraging IBM HW, SW, services, research, and financing teams
  - Global IBM "green" team of almost 1,000 energy efficiency specialists
- **Re-affirming a long standing IBM commitment:**
  - Energy conservation efforts *1990 – 2005 resulted in a 40% reduction in CO_2 emissions* and a quarter billion dollars of energy savings
  - Annually invest $100M in infrastructure to support remanufacturing and recycling best practices
  - *100%+ HW capacity by 2010 without increasing power consumption* or carbon footprint saving 5 billion KWh/year . . . equals energy consumed by Paris - "the City of Lights"
- **What "green" solutions can mean for you:**
  - Typical 2,500 square meter data center that spends $2.6 million on power annually, energy costs can be cut in half
  - Equals the reduction of emissions from taking 1,300 cars of the road

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Slide 11

Why System z Now?
Dollars and KWh!

New HW / SW spending

15 years ago

Today

Cost of management & administration
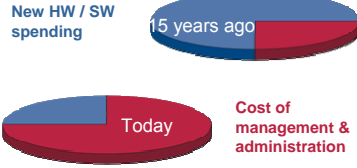
Source: Tony Picardi, IDC
Economist.com: Make it simple. October 28, 2004
From The Economist print edition

System z9 Managing Growth and Complexity

Workload

Ops Staff

2001 — 2006

Gartner

Worldwide Server Market:
Cost of Management Ramps Dramatically.

Worldwide IT Spending on Servers, Power and Cooling, and Management/Administration

Spending (US$B)

Installed Base (M Units)

- Power and Cooling Costs ×8
- Server Mgt and Admin Costs ×4
- New Server Spending

$300 / $250 / $200 / $150 / $100 / $50 / $0

1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010

Many Servers, Much Capacity, Low Utilization = $140B unutilized server assets

Source: IDC, 2006

POWER: System z9 vs. Linux on Intel

- IBM z9
- Intel

Kilowatts — 250 / 200 / 150 / 100 / 50 / 0

1 vs. 22 / 8 vs. 157 / 18 vs. 319 / 28 vs. 465 / 38 vs. 602 / 54 vs. 789

Processors

SPACE: System z9 vs. Linux on Intel

- IBM z9
- Intel

Square Feet — 120 / 100 / 80 / 60 / 40 / 20 / 0

1 vs. 22 / 8 vs. 157 / 18 vs. 319 / 28 vs. 465 / 38 vs. 602 / 54 vs. 789

Processors

The Linux on Intel servers selected in this example are functionally eligible servers considered for consolidation to a System z running at low utilization such that the composite utilization is approximately 5%. The utilization rate assumed for System z EC is 90%. This is for illustration only actual power and space reductions, if any, will vary according to the actual servers selected for consolidation.

Slide 12

IBM Consolidation Announcement Highlights

- IBM will consolidate thousands of servers onto approximately 30 System z mainframes

- We expect substantial savings in multiple dimensions: energy, software and system support costs

- Major proof point of IBM's '**Project Big Green**' initiative

- The consolidated environment will use 80 percent less energy

- This transformation is enabled by the System z's sophisticated virtualization capability

IBM'S PROJECT BIG GREEN SPURS GLOBAL SHIFT TO LINUX ON MAINFRAME

Plan to shrink 3,900 computer servers to about 30 mainframes targets
80 percent energy reduction over five years

Optimized environment to increase business flexibility

ARMONK, NY, August 1, 2007 – In one of the most significant transformations of its worldwide data centers in a generation, IBM (NYSE: IBM) today announced that it will consolidate about 3,900 computer servers onto about 30 System z mainframes running the Linux operating system. The company anticipates that the new server environment will consume approximately 80 percent less energy than the current set up and expects significant savings over five years in energy, software and system support costs.

At the same time, the transformation will make IBM's IT infrastructure more flexible to evolving business needs. The initiative is part of Project Big Green, a broad commitment that IBM announced in May to sharply reduce data center energy consumption for IBM and its clients.

IBM Global Account
Significant organic growth in the System z and p platforms

z Platform Growth – IBM Global Account
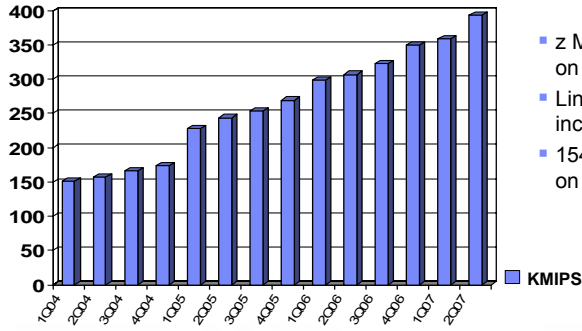
- z MIPS grew 160% from 04 to 07 on 76 machines worldwide
- Linux on System z MIPS have increased over 300% in the last year
- 1540 of IBM's 4700 applications run on z

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Server growth and physical space challenges

Infrastructure Challenges

- **Floor space** challenges in key facilities
- **Underutilized assets** maintaining outdated Web infrastructure
- Additional physical space needed for future **SO growth**
- Continued infrastructure **cost pressure**

Distributed server consolidation is the next step in cost savings after the massive consolidation of IGS/ITD Data Centers

Application Distribution: MF and Distributed

67% of apps — 3,160 apps

33% of apps — 1,540 apps

Number of Applications (4,700 total)
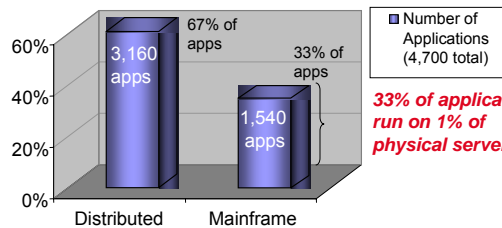
33% of applications run on 1% of physical servers

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IBM Global Account team identified 3900 OS images

Simple and effective approach

1. Enlisted Linda Sanford, Sr VP, Enterprise On Demand Transformation & Information Technology, as IBM Executive Champion
2. Included scope of 8600 images eligible for migration to find 3900 'fit for purpose' and with TCO savings
3. Used commercial TCO model to estimate savings
4. Holistic approach taken, including System p virtualization for appropriate work, application portfolio reduction, asset optimization
5. Selected workload that runs on multi-platforms for ease of migration – focus on transactional based workload

Initial Priority for consolidation to Linux on System z

DB2

WebSphere

Lotus

SAP

IBM Distributed Consolidation to System z

Linda Sanford, Executive Champion

- Performed TCO and consolidation assessment on IBM portfolio
  - **Cross-IBM effort: System z, SW Migration Services, TCO Academy, Migration Factory**
  - **Considers today's vs. "to be" environment; savings is net after HW and migration investments**

Cumulative 5 Year Cost Comparison

M$

1 000
800
600
400
200
0

1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year

→ z9 Cumulative   → Distributed Cum

Steady State Savings

Facilities Connectivity Storage 10%

Software 36%

Labor 54%
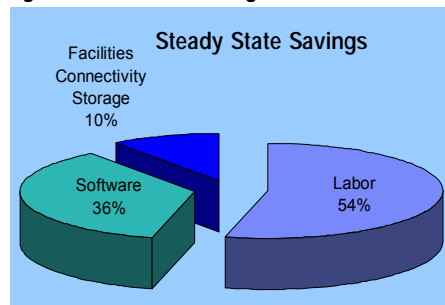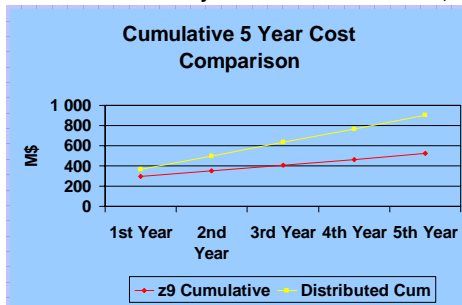
- **Identified substantial savings opportunity**
  - **Annual Energy Usage reduced by 80%**
  - **Total floor space reduced by 85%**

IBM cornerstone Quality of Service initiative

- Leverages maturity of System z stack products for robust high availability
- Reduces complexity and increases stability
- Centralizes service level process management
- Potential for faster provisioning speed (months → hours)
- Provides dynamic allocation of compute power
  - Capacity on demand; increase/reduce
  - Provides world class security

Integrated approach to optimize deployment plan

Elements from several approaches are being optimized
- Migrate servers delivering largest savings first (i.e., **stranded infrastructure**)
- Eliminate assets with **lowest utilization** first
- Identify assets with an upcoming compelling event to mitigate expense (**upgrade, move, asset refresh**)
- Aggregate by customer work portfolio to leverage strong customer buy-in
- Start with **oldest technology first**
- Focus on freeing up contiguous raised floor space
- Provision new applications to the mainframe

Value of z/OS 1.9

- A system designed with system integrity at its foundation
- The place for your data and transactions
    - Centralized security hub
    - Protecting your data and transactions
    - Extreme virtualization, scalability, and availability
    - Support for new data and application technologies
    - **.... a foundation for SOA**
- Simplifying the mainframe – improving productivity
    - Simplifying diagnosis and problem determination, network and security management, as well as overall z/OS, I/O configuration, Sysplex, and storage operations.
- Simplified access to System z skills
    - The infrastructure to support the Academic Initiative is complete – are you ready to use it?
    - Destination z
- Improved TCO with broader use of specialty engines.
    - zIIP Assisted IPSec and z/OS XML System Services enabled for zAAP

Security still big news

Security Flaw Exposes CVS Purchase Data;
50 Million customers exposed — The Washington Post

MasterCard security breached — MarketWatch
More than 40 million cardholders may be affected

Ohio Sues DSW Over Customer Data Theft — ConsumerAffairs.Com

Bill would punish retailers for leaks of personal data
THE WALL STREET JOURNAL.

Rogue Software Programmed to Wreak Havoc on
Target Web Sites — The New York Times
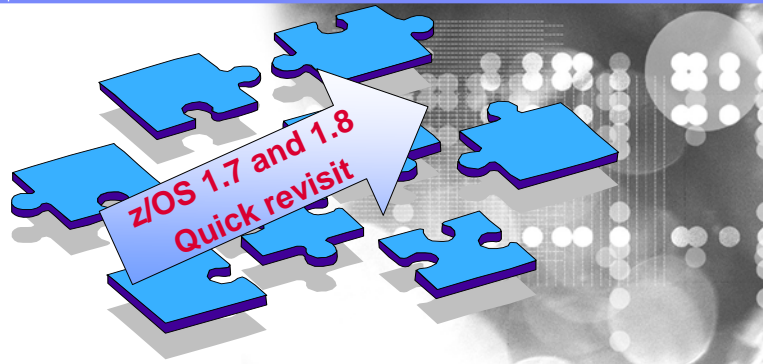
z/OS System Integrity - reaffirmed
Designed to help you protect your system, data, transactions, and applications from accidental or malicious modification

- IBM reaffirms its commitment to z/OS system integrity
  - Intended to prevent unauthorized application programs, subsystems, and users from gaining access, circumventing, disabling, altering, or obtaining control of key z/OS system processes and resources unless allowed by the installation.
  - System integrity is the inability to bypass the lock on system resources
    - System integrity is the foundation for security
    - Security is the key, System integrity is the lock

- Specifically, system integrity is defined for z/OS as the inability of any program not authorized by a mechanism under the installation's control to:
  - circumvent or disable store or fetch protection; or,
  - access a resource protected by the z/OS Security Server (RACF); or,
  - obtain control in an authorized state; that is, in supervisor state, with a protection key less than eight (8), or Authorized Program Facility (APF) authorized.

- IBM will always take action to resolve if a case is found where the above can be circumvented

> z/OS integrity statement and the Common Criteria certifications can be helpful proof points in addressing compliance requirements.

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z/OS 1.7 and 1.8
Quick revisit

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z/OS 1.7 (3Q 2005) news

Console Restructure Stage 1B

Old news

- The continuation of work started in Console Restructure Stage 1 (delivered in z/OS V1R4.2).
- EMCS Console removal support
  - No way to remove unused EMCS consoles which might lead to long IPL time, and console data refresh time in a sysplex
  - Information of all EMCS Consoles sent across systems
  - New Program IEARECLE now available. Can be executed to disgard EMCS consoles
- 1-byte Console ID Elimination
  - z/OS 1.4.2 Track all 1-byte Console ID usage
  - z/OS 1.7 Remove externals (macros, commands) that support 1-byte Console IDs and migration IDs
  - **This was the last release to support 1-byte Console IDs**

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z/OS 1.7 (3Q 2005) news

JES2

Old news

- NJE over TCPIP
  - Will support established TCP/NJE protocol
  - Overall better RAS characteristics
  - Stronger authentication will also be available
    - Uses SAF/RACF APPCLU class
  - New **NETSERV** Adresspace
  - Major change to JES2 exits
- Availibility enhancements & Migration considerations
  - JES2 checkpoint data corruption recovery
    - Designed to detect and correct certain additional kinds of checkpoint control block corruption when JES2 is restarted
  - Spool volume ENQ
    - A sysplex level ENQ is obtained when starting a spool volume to ensure only one MAS allocates this spool volume in the sysplex.
  - Can warm start z2 mode checkpoints only
    - R4 mode is no longer supported.

z/OS 1.7 Health Checker

Old news

- Health Checker for z/OS integrated into 1.7
  - Back bone shipped in its own FMID HZS7720
  - Current and future checks shipped with individual components.
  - Additional checks can be shipped in the service stream
  - You can develop your own checks
  - Checks may be provided by vendors/3rd parties

- SDSF support
  - Support to modify checks and view output

- IBM health Checker for z/OS can coexist with the web deliverable proto-type that has been available for a few years

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z/OS 1.7 Unix System Services

Old news

- Dynamic Service activation
  - **Not** intended to be used to as a complete replacement for regular preventative maintenance application
  - **Only** those PTFs with **++HOLD REASON(DYNACT)** data will be capable of dynamic activation
    - **New** **SERV_LPALIB** and **SERV_LINKLIB** Parmlib Parameters
    - **New** CMD: **F OMVS, ACTIVATE / DEACTIVATE=SERVICE**
- Latch contention analysis
  - Additional display capabilities are needed to better identify the reason for which the mount latch is being held and similar information is needed for outstanding cross system messages.

- Mounting from the console
  - **SET OMVS=xx** console command

- zFS preferred filesystem, HFS will be discouraged
  - Migration tool available to assist in migration from HFS to zFS

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z/OS 1.7 Security Server   / RMF

Old news

- Security Server.
  - Mixed Case Password support
    - Switch to turn on Mixed case password
- RMF
  - zFS Support
    - Monitor III zFS reports provides data on
      - zFS response time / wait times
      - zFS cache activity
      - zFS activity / capacity by aggregate
      - zFS activity / capacity by filesystem
  - Disk space monitoring
    - New Monitor III report provides data on
      - Storage space (storage group based)
      - Disk space (volume based)

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z/OS 1.8 Scalability
more: memory, GRS ENQs, GRS VSCR, faster UNIX

Old news

- Support for more real memory
  - **New z/OS limit will be 4 TB**; **old limit was 128 GB**
  - Up to 512 GB supported on z9 EC, up to 256 GB on z990
- GRS support for more concurrent ENQs
  - Default limits unchanged: Unauthorized ENQ default limit remains 4096; authorized default ENQ limit is 250k; can specify higher max than defaults
  - **New maximum is 2G**
  - New ISGADMIN authorized interface, `T GRS` command, `GRSCNFxx` parmlib support for setting higher maximums
- GRS 31-bit constraint relief
  - **Move star-mode global QCBs and QCBS control blocks above bar**
  - **Better compaction for remaining QCBs**
- z/OS UNIX asynch socket read/write now designed to use fast-path processing
  - **Improve performance for applications that use asynchronous I/O or that run in SRB mode**

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z/OS 1.8 Scalability

more: UNIX file descriptors, device groups, PDSE VTOC rebuild perf...

Old news

- z/OS UNIX limit on file descriptors per process increased from **128K** to **512K**
  - MAXFILEPROC limit now 512K in BPXPRMxx and SET OMVS command
  - Can restrict individual users by setting FILEPROCMAX in the OMVS segment
  - Mostly a TN3270 CICS issue, raised from 64K in 1.6, **better performance**
- Support for more than **32K** device groups
  - DGs consumed by tape devices (1 per dev) and DASD esoteric names (1 per dev. range per esoteric name).
  - You can reach this limit with fewer than the 64K maximum number of devices
  - APAR OA02983 increased limit to **64K** devices in 03; The new limit will be **4G**
  - Note: check your system by looking at the number of entries in the Group Pointer Table using the IPCS LISTEDT command.
- DADSM/CVAF Rapid VTOC Index Rebuild
  - Designed to help **speed VTOC conversions from non-indexed to indexed**

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z/OS 1.8 Scalability

more performance: LE, VARY processing, PDSE, CFRM

Old news

- Parallel VARY ONLINE processing:
  - Reduce duration of VARY commands for large numbers of devices, **reduced serialization contention**
  - Complements parallel VARY OFFLINE processing in z/OS 1.7
- LE support for sequential data sets larger than 64K tracks and for VSAM extended addressability data sets
  - QSAM support in LE for C/C++ programs (using noseek)
  - Support for ESDS, KSDS, RRS extended format data sets with extended addressability
- PDSE exploitation of 64-bit addressing
  - New SMS init parameter to specify amount of storage to use above bar
  - Relieves the prior limitation of about a million open PDSE members
  - Option to retain directory and member cache for closed data sets and SMF14/15 cache
- CFRM performance enhancements Stage 2
  - Designed to allow more systems, structures, and connectors to be added **without availability impacts**

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Some z/OS 1.8 Availability Enhancements at a Glance

Old news

- Master Console **elimination**
- Log Stream **rename**, test and production logstream **separation**
- DFSMS fast replication
- z/OS UNIX latch contention detection
- z/OS UNIX recoverable BRLM
- GDPS enhanced recovery
- GDPS HyperSwap trigger

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IBM Workload Manager enhancements for z/OS 1.8

WLM enhancements at a glance

Old news

- Enhanced zAAP and zIIP Support
- RSM/SRM Support for Large Real storage > 128GB
- Preview: Group Capacity limit
  - Satisfies Danish WLM User Requirement!
- JES2 enhancements for WLM-managed batch (enhanced again)
- New Resource Group types
- Routing enhancements
- User Friendly Interface for WLM Admin Application
- WLM support for DB2 Buffer Pool automatic adjustment *
  - To be picked up by future release of DB2
- WLM/IOS/DASD (DS8000) HyperPAV co-operation preview *

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Enterprise-Wide Roles   z/OS 1.8

Old news

- EWLM/WLM service class correlation
  - WLM accepts classification when same-named SC passed from EWLM

- zAAP reporting for EWLM
- New DFSMSrmm CIM agent support
  - Support creation, change, and deletion of volumes and data sets
  - Complements the query and display functions in z/OS 1.7

- Infoprint Server Central GUI improvements
  - Real-time status information display
  - Change online/offline status, reset a printer
  - Stop a print job without canceling it
  - Auditability enhancements
  - TRACEROUTE support

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z/OS 1.8 Security Enhancements

Old news

- **Enhancements to RACF profiles:**
  - RACF database enhancements to allow a template block to be continued into another block
  - New class attribute for disallowing generic profiles in a class
  - IRRDPI00 LIST command granularity
- **IRRUT200 and IRRUT400 utility updates:**
  - Improvements will help prevent database corruption
- **Distributed identity support:**
  - SAF Identity Token support
  - EIM/TAM schema convergence
- **Password phrase support**
  - 14-100 character password phrases
  - Vastly larger namespace
- **Virtual key-ring support**
  - All certificates owned by the same user ID can be in a virtual key-ring
  - No need to manually create the virtual key-ring
  - Can help simplify administration for SSL applications such as FTP

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z/OS 1.8 Security Enhancements…

Old news

- **PKI Extensions**:
  - SCEP support (programmatic certificate request support for network devices)
  - Multiple CA support (in a single image)

- **Support for defining IDS policy in a file**
  - In addition to via LDAP

- **Improved tape data set security administration**
  - Can use DATASET class without activating TAPEVOL or TAPEDSN
  - Can specify that all data sets on the same tape should have common authorization

- **IPSEC support for 128-bit AES**

- **EAL4+ certification for z/OS 1.7 with the optional RACF feature:**
  - For Controlled Access Protection Profile (CAPP) and Labeled Security Protection Profile (LSPP)

- **PKDS Key Management SPE**

---

z/OS 1.8 Communications Server news

Old news

- **VTAM and TCP/IP network sysplex partitioning support**
  - Can define multiple logical networks within a sysplex

- **Dynamic DNS registration/deregistration**

- **IBM Configuration Assistant for z/OS Communications Server GUI**
  - Introduced in z/OS 1.7 as the Network Security Configuration Assistant
  - Extended in z/OS 1.8 to help with IDS and QoS configuration

- **IPv6 support improved**

- **WTS (Windows Terminal Server) support**

- **SMB support for Linux Samba clients**

- **REXX interface designed to allow calling FTP programmatically**
  - Sample program included

- **JES3 support for NJE via TCP/IP (delayed availability)***
  - New `NJERMT` parameters
  - New `NETSERV`, and `SOCKET` statements.
  - Planned availability 1H2007

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

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z/OS 1.8 Communications Server news…

Old news

- **Communications Server callable APIs:**
  - Support for dropping multiple TCP connections or UDP endpoints
  - Enhancing the Enterprise Extender network management interface to allow CP name wildcarding for HPR connection requests

- **TN3270 connection management:**
  - New API designed to allow for the retrieval of performance data for TN3270 server sessions
  - Add TCP connection IDs to TN3270 SMF records

- **Telnet enhancements:**
  - Ability to specify TN3270 servers should automatically clean up hung SNA Telnet sessions when a new TN3270 connection is initiated
  - Support for the resolution of system symbols for Telnet unformatted system services message (USSMSG) processing.
  - USS table assignment from the LU exit designed to provide more flexibility in assigning a USS table based on client criteria.

---

z/OS 1.8 Enhancements at a Glance
Integrating New Applications

Old news

- **NEW** LDAP server

- BPXBATCH enhancements

- z/OS XML System Services

- Unicode improvements

- USS `/etc/inittab` support

- XPLINK enhancements

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z/OS 1.8 Simplification
IBM Health Checker for z/OS

Value
• Configuring for best practices
– Helping to avoid outages
• Checks against active settings
• Notifies when exceptions found
• Runs on all supported releases of z/OS

Latest Enhanc...

Old news

- In z/OS 1.8, the Health Checker Framework is enhanced and will provide following:

- Enabled for NLS
- PARMLIB Check Definition
  - Define/add a check via a PARMLIB definition instead of needing a program that does the definition
- Enhanced Policy Support
  - Support multiple policies
- Verbose command output
  - Check output be as verbose as possible
- Parameter Parser
  - Provide a service usable by check routines to parse parameters

¹ Majority of these checks are available on prior releases

---

z/OS 1.8 Timeframe News:
Recent HW support

Old news

- **System z HW support**
  - System z Specialty Engines (zIIPs, zAAPs, ICFs, IFLs)
  - z9 separate processor pool reporting
  - Support for >128 GB
    - New memory management (UIC calculation)
    - More precise and less CPU consuming UIC calculation

- **Disk Space Monitoring**
  - Monitor III disk space reports

- **SPEs and RMF Distributed Data Server (DDS) extensions**
  - Monitor III now collects MASTER AS User/LSQA/SWA/229/230 page information (no Report displays it)
  - Monitor III Common Storage report enhanced to show unallocated common storage
  - RMF Monitor III Data Portal preview

LSU Nordic

Nordic LSU October 2007
Uno Bengtsson and Henrik Thorsen

11/12/2007

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z/OS Roadmap

1.11*

1.10*

9/09

1.9

9/08

1.8

9/07

1.7

9/06

1.6

9/05

9/04

Architectural Level Set

- XML System Services and
  specialty engines for 1.7 +   9/07
- zIIP Assisted IPSec for 1.8   +   9/07
- zIIP for 1.6+   6/06
- Enhanced Crypto Support for 1.7   5/06
- Encryption Facility for z/OS   12/05
- z/OS Omegamon Mgt Console   12/05
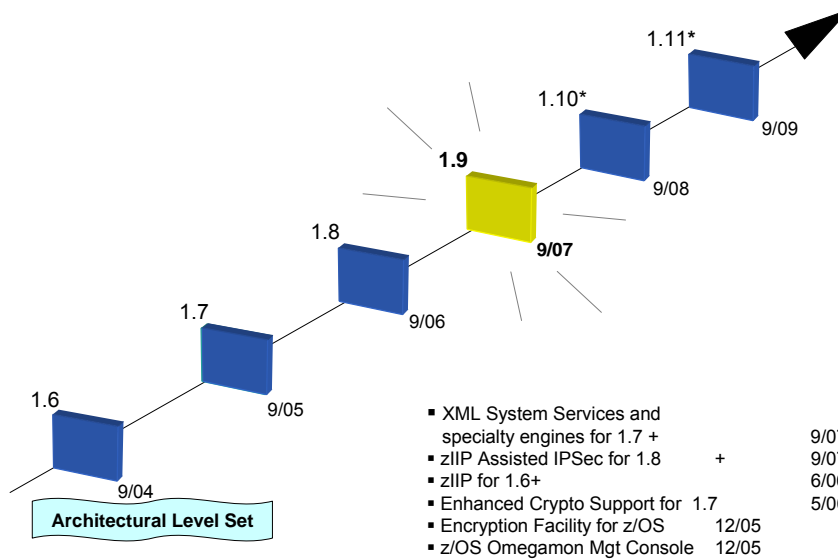
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z/OS Support and Release Coexistence Summary

z/OS	G5/G6 Multiprise 3000	z800	z890	z900	z990	z9 EC	z9 BC	DS8000 DS6000	TS1120	End of Service	Coexists with z/OS...	Planned Ship Date
R4	x	x	x^1	x	x^1	x^1	x^1	x	x^1	3/07	1.7	
R5	x	x	x	x	x	x	x	x	x	3/07	1.8	
R6		x	x	x	x	x	x	x	x	9/07	1.8	
R7		x	x	x	x	x	x	x	x	9/08*	1.9	
R8		x	x	x	x	x	x	x	x	9/09*	1.10*	
R9		x	x	x	x	x	x	x	x	9/10*	1.11*	9/07
R10*		x	x	x	x	x	x	x	x	9/11*	1.12*	9/08*
R11*		x	x	x	x	x	x	x	x	9/12*	1.13*	9/09*

- z/OS 1.9 Coexistence-supported releases*

Release	**Coexistence-supported**
z/OS 1.9	**z/OS 1.7, z/OS 1.8, z/OS 1.9**
z/OS 1.10*	z/OS 1.8, z/OS 1.9, z/OS 1.10*
z/OS 1.11*	z/OS 1.9, z/OS 1.10*, z/OS 1.11*

3 year support,
3 consecutive
Release coexistence

z/OS.e 1.3, 1.4, 1.5, 1.6, 1.7, 1.8 supported on z800, z890, and z9 BC only. There is no z/OS.e 1.9
x^1 – IBM eServer™ zSeries® 990 (z990) compatibility or exploitation feature required (no longer orderable)

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

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z/OS 1.9 Coexistence

z/OS 1.4   *z/OS 1.5*   *z/OS 1.6*   *z/OS 1.7*   *z/OS 1.8*   *z/OS 1.9*   *z/OS 1.10*

- Starting with z/OS R6, IBM has aligned the coexistence, fallback, and migration policy with the service policy.

- z/OS 1.7, z/OS 1.8, and z/OS 1.9 are supported for coexistence, migration, and fallback
  - If you are on z/OS 1.7 your planning for migration to z/OS 1.9 should be starting!

- Only JES2/JES3 that can coexist with the shipped JES can be "staged" on z/OS. This is enforced in z/OS 1.9:
  - z/OS 1.7 JES2 and z/OS 1.8 JES2 are supported for coexistence, migration, and fallback
  - z/OS 1.7 JES3 and z/OS 1.8 JES3 are supported for coexistence, migration, and fallback
  - At z/OS 1.9, SDSF must be staged with JES2! So, on z/OS 1.9 with:
    - z/OS 1.8 JES2 has z/OS 1.8 SDSF. z/OS 1.7 JES2 has either z/OS 1.8 SDSF or 1.7 SDSF.

z/OS Key Dates *

- z/OS 1.9
  - Previewed Feb. 6 2007
  - Announcement August 7, 2007
  - Ordering starts September 14
  - GA / shipment September 28

- z/OS 1.8
  - October 9 2007, recommended last date for ordering z/OS 1.8 no-charge ServerPac and CBPDO (z/OS V1.8 SystemPac available thru June 2008)
  - z/OS.e 1.8 - October 9 last date for ServerPac, CBPDO, and SysemPac

- z/OS (and z/OS.e) 1.7 planned end of service is September 2008*

- z/OS (and z/OS.e) 1.6 end of service was September 30 2007

  - **z/OS.e 1.8 is the last release of z/OS.e**

JES2 and z/OS Compatibility

- JES levels supported by a given z/OS release are the same as the JES levels that can coexist in a MAS, which are essentially all currently supported releases of JES2

z/OS Release	JES2 z/OS R.2 HJE7705	JES2 z/OS R.4 HJE7707	JES2 z/OS R.5 HJE7708	JES2 z/OS R.7 HJE7720	JES2 z/OS R.8 HJE7730	JES2 z/OS R.9 HJE7740
z/OS R2	X					
z/OS R3	X					
z/OS R4	X	X				
z/OS R5	X	X	X			
z/OS R6	X	X	X			
z/OS R7		X	X	X		
z/OS R8			X	X	X	
z/OS R9				X	X	X

z/OS 1.9 - Migration

- z/OS 1.9 *Migration* Book on z/OS 1.9 bookshelf
  - z/OS Migration Version 1 Release 9 GA22-7499

- z/OS 1.9 requires one of the following servers:
  - IBM System z9 EC
  - IBM System z9 BC
  - IBM eServer zSeries® 990 (z990)
  - IBM eServer zSeries® 890 (z890)
  - IBM eServer zSeries® 900 (z900)
  - IBM eServer zSeries® 800 (z800)

- Simplify migration, ordering, and maintenance:
  - ServerPac electronic delivery available
  - SMP/E Internet Service Retrieval available since September 2005
  - SystemPac® electronic delivery will be available July 2007
  ibm.com/servers/eserver/zseries/zos/installation/

Ordering and Installing z/OS 1.9 Electronically

- In many countries you can order z/OS electronically
  - ShopzSeries provides a self-service capability for ordering software (and service) upgrades over the Web
- In most countries, ShopzSeries provides electronic ordering and electronic delivery support for z/OS service
  - http://www.ibm.com/software/shopzseries
- Ordering the z/OS on ServerPac from ShopzSeries
  - Can choose to have it electronically delivered
  - This electronic ability was made generally available on January 10, 2005

z/OS 1.9

Meeting the business challenges !!

Improving Usability and Skills
Health Checker improvements & checks, ISPF, DFSMSrmm, Configuration and Management Usability for Communications Server, HCM, CF management…

Scalability & Performance
54-way support, 64-bit GRS, SMF to Logger, TSO/E support for large sequential data sets, Message Flooding Automation, XCF CDS Performance, heap pools, cache alignment, LAN idle, VSCR

Improving Availability
Improved latch contention detection, CF duplexing, Logger enhancements, SFM improvements, New RRS options

Integrating new Applications and Supporting Industry and Open Standards
XML offload to zIIPs & zAAPs, System REXX, SDSF REXX, Metal C, NFS V4 Server, pthread enhancements, Decimal Floating Point, porting enablement, Binder, PKCS#11…

Self Managing Capabilities
WLM support for cross-system routing of zAAP workloads, WLM "Trickle" Support, Promotion of canceled jobs, Start servers in parallel, RMF reporting for CF structures…

Enhancing Security
IPSec offload to zIIP, Additional password phrase support, Kerberos AES & Enhanced CRL support, PKI Services & RACF extensions, z/OS UNIX System Services auditability, Java user and group SAF admin classes, Crypto, NAS AES …

Extending the Network
Policy-based TCP/IP Routing, Centralized Policy-Based Networking, Expanded use of AT-TLS, FTP Unicode support, new Network Management Interfaces

Enterprise-Wide Roles
CIM monitoring enhancements, Updated Pegasus server, DFSMSrmm CIM Update, IRMM, ARM 4.1 support

z/OS R9

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z/OS 1.9 enhancements at a glance

the flagship operating system

- Scalability and performance improvements

- Availability improvements

- Optimization and management

- Enhanced security

- Enterprise-wide roles

- Extending the network

- Integrating new Applications and Supporting Industry and Open Standards

- Improving Usability and Skills

- Bit bucket
  - **Statement of directions & functions withdrawn**

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z/OS 1.9

Meeting the business challenges !!

Scalability & Performance
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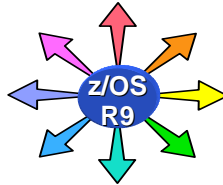
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z/OS R9

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z/OS 1.9 – Scalability and Performance
More: CPs per LPAR, VSCR for GRS, tracks per sequential DS

- **z/OS 54-way support**
  - Support for up to 54 processors per z/OS image on System z9 EC
    - Up to 32 processors have been supported since z/OS 1.6
    - Processors are the sum of CPs, zAAPs, and zIIPs

- **64-bit exploitation by Global Resource Serialization (GRS)**
  - Move QCBs, QELs, QXBs above the bar
  - New authorized APIs to provide interoperability with other serialization products
  - Some exits to be called in cross-memory mode (`ISGNQXITBATCH, ISGNQXITBATCHCND, ISGNQXITQUEUED1, ISGENDOFLQCB`)

- **TSO/E support for large (>64K TRK) sequential data sets**
  - DFSMS in z/OS 1.7 provided support for `DSNTYPE=LARGE`
  - `LISTDSI` (REXX and CLIST)
    - Designed to return new `SYSSEQDSNTYPE` variable indicating data set type (`BASIC` or `LARGE`)
  - `TRANSMIT/RECEIVE`
    - New value for `INMTYPE` and a new text unit, `INMLSIZE`
  - `PRINTDS` command

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z/OS 1.9 Scalability and Performance …
VSCR: DFSMS, IOS, BCP, NFS above the bar and the line…

- **DFSMShsm storage reduction below the line**
  - DFSMSdss is called in separate AS
  - This will help issues related to address abends (878, 80A, ….)

- **Virtual Storage Constraint Relief**
  - IOS is relocating CDTs from 31-bit common storage to CADs
    - common area data spaces
  - BCP, ALLOCATION's dynamic storage area moves above the 16 MB line
  - z/OS 1.9 NFS moves stacks and heaps above the 16 MB line

---

z/OS 1.9 Scalability and Performance
SMF data collection background and overview

- **z/OS images are getting larger and faster**
- **SMF data set recording has not kept pace well**
- **SMF recording limitations can cause data to be lost**
- **SMF Dump Program must read every record to dump required records**
- **SMF Data Volume will enhance Scalability in two ways:**
  1. **Utilize System Logger to improve the write rate and increase the volume of data that can be recorded**
     - System Logger utilizes modern technology (CF, Media Manager) to write more data at much higher rates than SMF's "MANx" dataset allows
  2. **Reduce processing time as less filtering needed by dump program**
     - Provide better management of the data by separating different record types into a number of different logstreams
     - Providing keywords on the `OUTDD` keyword of dump program that allow data to be "read once, written many"
  - Note that use of Logstreams for SMF Data is optional. Existing "`MANx`" function
  continues to exist for customers satisfied with this functionality.

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z/OS 1.9 Scalability and Performance …
SMF data collection performance enhancement (called "SMF Data Volume")

- **Expected to support <u>much</u> higher SMF write rates when the CF is used**
  – **DASDONLY** log streams supported, but lower write rates expected
  – Can specify that SMF records from different systems be combined into one log stream
  – Can specify different log streams for different SMF record types in **SMFPRMxx**
    - Better scalability expected (particularly when using CF)
    - Different log streams can have different retention periods
    - Can also specify SMF records be written to more than one log stream
  – New program (**IFASMFDL**) will be used to retrieve SMF data from log streams, and optionally archive it
    - Designed to provide **OUTDD** filtering to reduce the need for multiple-pass processing
  – New exit (**IEFU29L**) for initiating actions after *I SMF* commands
  – **SETSMF** support for changing to/from Logger without an IPL

  – No need to figure out which GDGs SMF data is in any more!
    - **SYS1.MAN** data sets are still supported as before

---

z/OS 1.9 Scalability and Performance
Current SMF data flow

- Program requests to write a SMF record
- Locates appropriate buffer in SMF A.S. to write the record
- When ready to write, writes full buffers to the SMF dataset

Note: Each buffer is numbered to correspond to a particular record in the SMF dataset

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z/OS 1.9 Scalability and Performance

SMF data flow using log streams

- Program requests to write a SMF record
- SMF locates correct dataspace
- Locates appropriate buffer to write the record
- If full, buffer passed to task to be written to logstream

z/OS 1.9 Scalability and Performance
SMF data collection usage & invocation

- **Define new log streams to System Logger**
  - See "Setting up a Sysplex" for documentation
- **Defining new keywords in `SMFPRMxx`:**
  ```
  LSNAME(IFASMF.q1.q2,TYPE(xx:yy))
  DEFAULTLSNAME(IFASMF.q1.q2)
  RECORDING(DATASET|LOGSTREAM)
  ```
    - `SETSMF RECORDING` can be used to toggle recording settings (for fallback, for example)
- **Creating new JCL to use `IFASMFDL` with new log streams**
- **Update processes to use data from log streams, if necessary**
  - Ex. Automate periodic "Switch SMF" commands to drive new SMF Dump program
- **Activate parmlib changes via IPL or `SET SMF=xx` command**

z/OS 1.9 Scalability and Performance
SMF data collection usage and invocation (example of simple approach)

- **Using SMF Data Volume, you can:**

  1. Write data to a DASDONLY log stream, simply replacing SMF MANx datasets
     - Use `DEFAULTLSNAME(IFASMF.xxx)` or `LSNAME(IFASMF.xxx,TYPE(0:255))` to specify log stream
     - Run new SMF Dump Program to archive data

  Value

  1. Simplest approach to using log streams
  2. Better performance using log stream vs. SMF data sets

---

z/OS 1.9 Scalability and Performance
SMF data collection usage and invocation (advanced example)

- **A more sophisticated approach is also possible…**

  2. Write data to a log stream on a 'task oriented' basis, ex:
     - **Record Types (30,70:72,99)** to one log stream (eg. `IFASMF.PERF.DATA`)
     - **Record Types 30,80:81,83** to another log stream (eg. `IFASMF.AUDIT.DATA`)
     - Record DB2 data (Type 101) to a third stream (eg. `IFASMF.DB2.DATA`)
     - And use the `DEFAULTLSNAME` keyword to record all other record types.
     - Run new SMF Dump Program to dump performance data OR audit data, without reading other data
     - Tune log stream parameters for retention via logger interfaces

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z/OS 1.9 Scalability and Performance
SMF data collection usage and invocation (output example)

A feature in the SMF Dump Program for log streams allow you to partition output data based on date, time, SMF id (SID)

– Example SYSIN for IFASMFDL :

```
//DUMPMULT JOB MSGLEVEL=(1,1),MSGCLASS=A
//*******************************************************************
//* Function:  Dump and Print SMF records from a Logstream
//*******************************************************************
//DUMPMAN  EXEC PGM=IFASMFDL
//OUTDD1   DD
DSN=SYS1.SMFDATA.REC4.SY1(+1),DISP=(NEW,PASS,DELETE),
//         UNIT=3390,VOL=SER=D72CT3,SPACE=(CYL,(5,1),RLSE),
//         DCB=(LRECL=32760,RECFM=VBS,BLKSIZE=4096)
//OUTDD2   DD
DSN=SYS1.SMFDATA.REC4.SY2(+1),DISP=(NEW,PASS,DELETE),
//         UNIT=3390,VOL=SER=D72CT3,SPACE=(CYL,(5,1),RLSE),
//         DCB=(LRECL=32760,RECFM=VBS,BLKSIZE=4096)
//SYSPRINT DD  SYSOUT=A
//DUMPOUT  DD  DUMMY
//SYSIN    DD  *
 LSNAME(IFASMF.MULTSYS.STREAM1)
 OUTDD(OUTDD1,TYPE(4),START(0000),END(2400),SID(SY1))
 OUTDD(OUTDD2,TYPE(4),START(0000),END(2400),SID(SY2))
 DATE(2007011,2007011)
```

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z/OS 1.9 Scalability and Performance
SMF data collection migration and coexistence considerations

- **SMF MAN datasets can still be defined in `SMFPRMxx`**

- **Recording can work to log stream or dataset, but not both!**
  - SETSMF RECORDING command can toggle environment for exploitation or for fallback, but buffered data may be lost if it could not be written

- **Exploitation of function may require business process updates!**
  - e.g, will Billing department find required data in same datasets?

- **Coexistence :**
  - Log streams can be single system (`DASDONLY`) or CF-based
  - When CF-based, be sure each system has a unique SMF "SID"

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z/OS 1.9 Scalability and Performance
SMF data collection installation

- **Prerequisites for installation:**
  - Use **IXCM2APU** to create log streams for SMF
    - Decide retention periods, CF vs. DASDONLY, staging/offload DS size, etc.
  - Ensure sufficient SMS storage for peak recording/offload datasets
  - Parmlib: SMFPRMxx
    - Be sure to plan for fallback to datasets in the event of errors.
  - Update procedures regarding
    - "SWITCH" processing and I**EFU29/IEFU29L** exits
    - Archiving data from log streams

- **Installation Publication References:**
  - SA22-7630   MVS System Management Facilities (SMF)
  - SA22-7592   MVS Initialization and Tuning Reference
  - SA22-7625   MVS Setting Up a Sysplex
  - SA22-7593   MVS Installation Exits

---

z/OS 1.9 Scalability and Performance
SMF Data Volume value

- **Value:**
  1. Segment data according to purpose
  2. Reduce reprocessing
  3. Record more data than previously allowed

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z/OS 1.9 Scalability and Performance …
CDS and LE performance enhancements

- **XCF Couple Data Set performance**
  - Includes support for improved parallelism in CDS access channel programs for all supported CDS types
  - Improved I/O performance and throughput
    - Originally made available on z/OS 1.4 and higher with APAR OA15409

- **Language Environment performance designs for:**
  - Better cache and boundary alignment for heap pools
  - Remove stack transitions for XPLINK applications using heappools
  - Eliminating stack transitions in an XPLINK environment for long long division and long long multiplication in AMODE 31
    - Also available on z/OS 1.8 with APARs PK31935, PK24077

---

z/OS 1.9 Scalability and Performance …
OSA-Express 2 performance

- **Dynamic LAN Idle**
  - TCP/IP adjusts interruption interval for OSA-Express2 adaptors based on network traffic
  - Designed to improve throughput on z9 EC and z9 BC servers having OSA-Express 2 with dynamic LAN idle timer support configured in QDIO mode (CHP type OSD)
  - Planned to be available 3Q2007 on z/OS R8 with APARs OA21405 and PK46764

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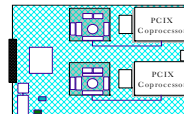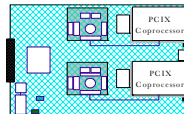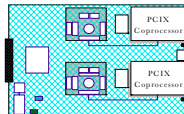
z/OS 1.9 Scalability and Performance
Message Flood Automation - the problem

- **Malfunctioning I/O devices and errant or malicious programs can generate *very* large volumes of messages**
  - In a *very* short amount of time.
  - This sometimes **cause a system outage**
- **Message Flood Automation able to react to potential message flooding**
  - In a matter of 10's or 100's of messages, as specified in installation policy
  - Does not result in large residual buffers or queues of messages that must be "worked down" to return to normal operation
    - **No need to take manual or automated action** against *each* console to discard unwanted messages
    - Handles messages to *all* **consoles, including EMCS**
- **Use of Message Flood Automation does:**
  - Targets the offending message, and offending job, or started task

---

z/OS 1.9 Scalability and Performance
Installing Message Flood Automation:

- **Message Flood Automation (MFA)**
  - Usage is optional
  - Based on function that has been distributed with GDPS since 2003.
  - Occupies two system exit points:
    - IEAVMXIT general message exit
    - System command exit
  - Requires "Some assembly"
    - MFA does not ship a part named IEAVMXIT, but the exit must have that name
    - MFA provides 2 sample programs which can become the IEAVMXIT front-end
    - Select one of them, assemble it, and link it with MFA CNZZVMXT load module

z/OS 1.9 Scalability and Performance
Message Flood Automation loading and activation

- Loading and activating MFA can be completely dynamic:
    - Use a **LLA refresh** command to load the code
    - Use a **K M,UEXIT=Y** command to enable the MFA message exit
    - Use a **SET MPF=** command to reload **MPFLSTxx** and cause the **.CMD** entry to be processed, loading the Message Flood Automation command exit

- You must prepare **one or more MSGFLDxx** members to contain MFA policy
    - Sample **MSGFLD00** provided in **SYS1.SAMPLIB**
    - Customize the msg thresholds in **MSGFLD00** *before* enabling MFA
    - Recommended message threshold values for Msg. Rate Monitoring function
    - **SETMF MONITORON**
    - **SETMF MONITOROFF**
    - **DISPLAY MSGFLD,MSGRATE**

---

z/OS 1.9 Scalability and Performance
Message Flood Automation: turning it on/off

- MFA **command** processing becomes active as soon as the MFA message exit and command exits loaded
    - Automatically at **IPL**
    - When a **SET MPF=** command is processed
- MFA **message** processing is loaded and enabled
    - Automatically at **IPL**
    - When a **CONTROL M,UEXIT=** command is processed
    - Processing is **Inactive** until you explicitly turn it ON
- Load your MFA policy:
    - **SET MSGFLD=00 -** Turn Message Flood Automation message processing ON
    - **SETMF ON -** Turn Message Flood Automation message processing OFF
    - **SETMF OFF -** Audit trail of activity provided in SYSLOG and/or OPERLOG
- Display commands:
    - **DISPLAY MSGFLD,PARAMETERS or DEFAULT or JOBS or MSGS**

z/OS 1.9 Scalability and Performance
Message Flood Automation: documentation

SPE OA17514 rollback to z/OS 1.6, 1.7, 1.8

IBM Education Assistant -
http://aimcp005.austin.ibm.com/infocenter/ieduasst/stgv1r0/topic/com.ibm.iea.zos/zos/1.0/Optimization.html

Message Flood Automation User's Guide – PDF document available for download from the z/OS downloads site:
http://publibz.boulder.ibm.com/zoslib/pdf/mfausersguide.pdf

z/OS 1.9 Planning For Operations – Incorporates User's Guide

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z/OS 1.9 Scalability and Performance
System Logger Log Stream Migrated Data Set Recall Processing

- **System Logger has single threaded, synchronous handling of recall requests for migrated log stream data sets:**
- **Log stream data set asynchronous recalls:**
  - Allows for multiple concurrent, migrated data set recalls
  - DFSMShsm or equivalent function
- **Allow up to 24 outstanding asynchronous recall requests for PRODUCTION group, and up to 8 for TEST group.**
- **Ability to display data sets being recalled by Logger**
- **Ability to have Logger stop waiting on a data set recall**

z/OS 1.9 Scalability and Performance
System Logger Log Stream Migrated Data Set Recall Processing Installation

- **No customization of z/OS is required to exploit**

- **z/OS will automatically make use of the Logger enhancements.**

- **Benefits include:**
  - Provides relief for all Logger exploiters when an installation makes use of data set migration/recall capabilities
  - Helps reduce the interference previously caused by the recall request of one log stream data set needing to be completely satisfied before Logger starts the next recall request

---

z/OS 1.9 Scalability and Performance
TSO Large Dataset support

- **Problem Statement / Need Addressed:**
  - **Changes needed** in `TRANSMIT / RECEIVE`, `PRINTDS`, `LISTDSI` to determine size of a data set correctly when using `LARGE` format sequential data sets .
  - **Changes needed** in `TRANSMIT / RECEIVE, PRINTDS, LISTDSI` (both the REXX function and CLIST), `CLIST I/O (OPENFILE /GETFILE /PUTFILE),` and `REXX EXECIO` and `REXX I/O` callable routine, and `TSO STACK I/O` to always be able to handle I/O **to** or **from** `LARGE` format data sets.

- **Using 64KTRK support, you can:**
  1. Transmit and Receive LARGE format data sets > 64K traks.
  2. Use `PRINTDS` to print from or to LARGE format data sets.
  3. Use `REXX EXECIO DISKR/DISRW/DISKRU` for REXX I/O to/from LARGE data sets
  4. Use `CLIST OPENFILE/GETFILE/PUTFILE` for CLIST I/O to/from LARGE data sets
  5. Use `REXX LISTDSI` function or `CLIST LISTDSI` statement for gathering size and `DSNTYPE` for `LARGE` format data sets
  6. Use `LARGE` format data sets on the TSO stack

- **Value:**
  1. **Enhanced I/O capability in TSO/E for CLIST and REXX.**
  2. **Ability to send LARGE format data set via XMIT/RECEIVE**.

z/OS 1.9

Meeting the business challenges !!

Improving Usability and Skills
Health Checker improvements & checks, ISPF, DFSMSrmm, Configuration and Management Usability for Communications Server, HCM, CF management…

Scalability & Performance
54-way support, 64-bit GRS, SMF to Logger, TSO/E support for large sequential data sets, Message Flooding Automation, XCF CDS Performance, heap pools, cache alignment, LAN idle, VSCR

Improving Availability
Improved latch contention detection, CF duplexing, Logger enhancements, SFM improvements, New RRS options

Integrating new Applications and Supporting Industry and Open Standards
XML offload to zIIPs & zAAPs, System REXX, SDSF REXX, Metal C, NFS V4 Server, pthread enhancements, Decimal Floating Point, porting enablement, Binder, PKCS#11…

Self Managing Capabilities
WLM support for cross-system routing of zAAP workloads, WLM "Trickle" Support, Promotion of canceled jobs, Start servers in parallel, RMF reporting for CF structures…

Enhancing Security
IPSec offload to zIIP, Additional password phrase support, Kerberos AES & Enhanced CRL support, PKI Services & RACF extensions, z/OS UNIX System Services auditability, Java user and group SAF admin classes, Crypto, NAS AES …

Extending the Network
Policy-based TCP/IP Routing, Centralized Policy-Based Networking, Expanded use of AT-TLS, FTP Unicode support, new Network Management Interfaces

z/OS R9

Enterprise-Wide Roles
CIM monitoring enhancements, Updated Pegasus server, DFSMSrmm CIM Update, IRMM, ARM 4.1 support

---

z/OS 1.9 Improved Availability
uninterrupted system and application enhancements

- **Consoles, System Logger, z/OS USS, zFS, SFM and others enhanced**

- **WLM design changed to increase the priority of canceled jobs**
  - **Terminate canceled jobs quickly** when system is very busy
  - Eliminates need to reset the priority of a canceled job

- **WLM adds new parameter on the IWMSLIM service allow:**
  - Server regions **start a number of server regions in parallel**
  - Control whether WLM should start server regions in parallel or sequentially

z/OS 1.9 Improved Availability
Debugging enhancements for Dump, Trace and Slip processing

- **TRSMAIN has been added to the BCP**
  - Program used to send dumps to IBM and rewritten to conform to IBM programming standards and now supports large format sequential data sets
  - New program name, **AMATERSE**
    - Use with standard DD names, **SYSUT1** and **SYSUT2**
  - Alias **TRSMAIN**
    - Use with original DD names, INFILE and **OUTFILE**
    - OA19194 for z/OS 1.7 and 1.8

- **MVS System Trace command enhanced to accept K/M notations**
    - **TRACE ST,{nnnK | nnnM}**
    - **TRACE ST,BUFSIZ={nnnnnK | nnnnnM}**
- **SLIP**
  - Provides an option for SLIP to trace five words of variable information into the unique fields of system trace entries
  - Directed by new **STDATA** keyword:
  - **SLIP SET,IF,...,A=STRACE,STDATA=((2R?,+8),(10000,+4)),E**

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z/OS 1.9 Improved Availability
Debugging enhancements for System Logger and RRS

- **z/OS 1.9 System Logger improves availability by providing support for log stream data set asynchronous recalls**
    - Will allow for multiple, concurrent migrated data set recall requests to be processed by System Logger
    - **DISPLAY LOGGER,STatus,RECalls**
    - **SETLOGR FORCE,NORECall,DSName=data set name**
- **z/OS 1.9 Resource Recovery Services (RRS)**
  - Currently, if RRS was unable to properly unset a resource manager (RM) while processing a Registration Services unregister RM request, the RM could be left in a unregister state with Registration Services but still set with RRS
    - **This situation cannot be resolved without recycling RRS**
  - To avoid RRS warm start, z/OS 1.9 has an **option to reset the RM using the RRS panels**
  - Designed to allow for **less disruptive recovery** and allows the terminated **RM to restart and recover quickly**

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z/OS 1.9 Improved Availability
sysplex enhancements

- **Systems Managed CF Structure Duplexing**
  - Reduction in no. of synchronous CF requests to improve performance
  - Duplexing now feasible in some cases where prohibitive before
  - Available for z/OS 1.6 and up
    - APAR OA17055 and CFLEVEL 15 on z9 servers
    - RMF support APAR OA17070

- **Sysplex Failure Management enhancement**
  - Consider system sending XCF signals…but not updating its status in the Sysplex CDS… *-or-* one that is not signalling…*how long should they live?*
  - You can now specify a time limit for each situation.
  - Intended to partition out unresponsive systems more quickly to help **prevent sysplex-wide "sympathy sickness" problems from becoming severe**

---

z/OS 1.9 Improved Availability
z/OS UNIX System Services

- **z/OS USS improved management of automount file systems that are managing a directory located in an automove(unmount) file system.**
  - The automount file system will now inherit the automove(unmount) attribute rather than being mounted as automove(yes).
    - IBM Health Checker for z/OS flags the inconsistent settings when an automount file system is mounted as automove(yes).
  - `F BPXOINIT,FILESYS=FIX` is enhanced to detect and correct CDS serialization state information when failed system recovery is in progress
  - `F BPXOINIT,RECOVER=LATCHES` is enhanced to take multisystem dumps for file system problems when it detects that PFS operations are not completing
  - Use of Mount Latch is reduced
  - File and directory deletion will be recorded with a new subtype of SMF type 92 for improved auditability

z/OS 1.9 Improved Availability
z/OS UNIX System Services

- **Problem Statement**
  - **Inconsistent processing of various shutdown, and recovery scenarios based on AUTOMOVE setting and PFS capabilities may result in confusing results, impacting desired availability.**

- **Solution:**
  - Honor the specified AUTOMOVE setting.

- **Benefits:**
  - **Recovery and shutdown processing are more predictable, and process as desired.**
  - **File system availability increased.**
  - **Administration is easier.**

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z/OS 1.9 Improved Availability
z/OS UNIX System Services – processing overview

- **Allow NOAUTOMOVE and System List on MOUNTs for sysplex-aware file systems. Do not convert to AUTOMOVE.**

- **Base shutdown and recovery processing primarily on the AUTOMOVE setting; sysplex-aware and sysplex-unaware characteristics are no longer considered.**

- **The following slides depicts new behavior for:**
  - Soft shutdown
  - Member Gone Recovery / Partition Recovery
  - PFS Termination
  - Movement if multiple file systems to specific target
  - Movement of multiple file systems to any target

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z/OS 1.9 Improved Availability
USS – New behavior for soft shutdown

- **Soft shutdown processing:**
  - `F BPXOINIT,SHUTDOWN=FILESYS`
  - `F BPXOINIT,SHUTDOWN=FILEOWNER`
  - `F OMVS,SHUTDOWN`

NOAUTOMOVE or UNMOUNT	An attempt to unmount the file system occurs. The unmount will fail if there are other file systems mounted on it.
AUTOMOVE	Move the file system to any system.
System List	Move the file system to any specified eligible system in the system list.

---

z/OS 1.9 Improved Availability
USS – New behavior for member gone recovery / partition recovery

- **Member Gone Recovery / Partition Recovery**
  - Hard failure
  - After `F OMVS,SHUTDOWN` completes, all other systems perform "Member Gone"

NOAUTOMOVE	The file system becomes UNOWNED. The file system remains unowned until the prior owner system restarts.
UNMOUNT	File system is unmounted, as well as all file systems mounted within it.
AUTOMOVE	Move the file system to any system. If no new owner then the file system becomes UNOWNED.
System List	Move the file system to any specified eligible system in the system list. If no new owner then the file system as well as all file systems mounted within it are unmounted.

z/OS 1.9 Improved Availability

USS – New behavior for PFS termination

- **PFS Termination**
  - `F OMVS,STOPPFS=ZFS`
  - `C NFSMVSCL`
  - PFS has hard failure and terminates

NOAUTOMOVE	The file system is unmounted, as well as all file systems mounted within it.
UNMOUNT	File system is unmounted, as well as all file systems mounted within it.
AUTOMOVE	Move the file system to any system. If no new owner then the file system as well as all file systems mounted within it are unmounted.
System List	Move the file system to any specified eligible system in the system list. If no new owner then the file system as well as all file systems mounted within it are unmounted.

---

z/OS 1.9 Improved Availability

USS – New behavior for movement of multiple file systems to specific target

- **Move multiple file systems to specific target**
  - `SETOMVS FILESYS,FROMSYS=SY1,SYSNAME=SY2`

NOAUTOMOVE	Move is not attempted
UNMOUNT	Move is not attempted
AUTOMOVE	Move is attempted to the target system.
System List	Move is attempted to the target system; the system list is ignored.

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z/OS 1.9 Improved Availability

USS – New behavior for movement of multiple file systems to any target

- **Move multiple file systems to <u>any</u> target**
  - `SETOMVS FILESYS,FROMSYS=SY1,SYSNAME=*`

NOAUTOMOVE	Move is not attempted
UNMOUNT	Move is not attempted
AUTOMOVE	Move the file system to any system.
System List	Move is attempted to eligible target systems only.

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z/OS 1.9 Improved Availability

USS migration and coexistence considerations

- **Migration**
  - Review `BPXPRMxx ROOT & MOUNT` statements and make sure `AUTOMOVE` value is the desired behavior for sysplex-aware file systems.
- **Coexistence**
  - New support applies to 1.9 so you will have a mixture of behaviors until 1.9 is the lowest-level release level:
    - ZFS READ-ONLY with UNMOUNT attribute.
      - Prior releases will ignore, V1R9 will honor
    - ZFS READ-ONLY mounted on 1.9 with `NOAUTOMOVE`
      - Member gone on prior releases will take ownership and convert to `AUTOMOVE`

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z/OS 1.9 Improved Availability

WLM cancelled job promotion

- **Problem Statement/Need Addressed:**
  - When an AS is cancelled, the majority of cancel processing runs in the AS being cancelled so it is running at the AS dispatch priority.
  - Today it can happen that a **cancelled AS takes a long time to terminate**, if all CPUs are busy to process work with higher importance.
- **Solution:**
  - SRM now promote AS being cancelled to a higher dispatch priority to give the AS sufficient access to CPU in order to have it **terminate fast**
- **Benefit:**
  - **Eliminates need to reset the priority of a canceled job, task, or user to speed AS termination when resolving resource contention issues.**

---

z/OS 1.9 Improved Availability

New RRS options to avoid recycling

- **Problem Statement / Need Addressed:**
  - Un-register processing for a resource managers (RM) **may not complete**
  - The RM left in limbo, unregistered w. Reg. Services but still set with RRS
  - The RM cannot restart
  - To resolve, must recycle RRS, not desirable
- **Solution:**
  - Provide RRS ISPF Panel, `ATRSRV`, and `ATRQSRV` batch utility to clean up RM involvement with RRS
  - Called "Un-register RM"
- **Benefit:**
  - **Avoid RRS outages when an RM un-register fails and needs to restart**

z/OS 1.9 Improved Availability

New RRS options - usage and invocation

- **The support is invoked by:**
  - User of the RRS ISPF panels
  - Applications via updated **ATRSRV** interface
  - JCL via **ATRQSRV** batch utility

- **Network events:**
  - None

- **New/Changed External Output:**
  - Updates to ISPF panels
  - New messages, return and reason codes for **ATRSRV**

---

z/OS 1.9 Improved Availability

New RRS options - usage and invocation: ISPF panel

ISPF panel – Un-register RM Request

```
              RRS Resource Manager List        ROW 1 TO 1 OF 1
Command ===>                                   Scroll ===> PAGE

Commands: v-View Details u-View URs r-Remove Interest d-Delete RM
        n-Unregister RM

S   RM Name           State          System        Logging Group
n   LOGGING1_RM1E     Run            SY1           PLEX1
```

z/OS 1.9 Improved Availability

New RRS options - usage and invocation: ISPF panel…

ISPF panel – Un-register RM Confirmation

```
                    RRS Unregister RM Confirmation
Command ===>

You are requesting that this resource manager be Unregistered to
clean up the resource manager's involvement with RRS.
RM name  . . . . . : LOGGING1_RM1E
System  : SY1
Logging Group  . : PLEX1

Press ENTER to continue, PF3 to cancel
```

---

z/OS 1.9 Improved Availability

New RRS options - usage and invocation: ISPF panel…

ISPF panel – Un-register RM Request

```
                RRS Resource Manager List          ROW 1 TO 1 OF 1
Command ===>                                       Scroll ===> PAGE

Commands: v-View Details u-View URs r-Remove Interest d-Delete RM
          n-Unregister RM

S   RM Name            State            System       Logging Group
    LOGGING1_RM1E      Reset            SY1          PLEX1

ATR534I RM LOGGING1_RM1E was unregistered successfully.
```

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z/OS 1.9 Improved Availability

New RRS options - usage and invocation: ISPF panel…

ISPF panel – Un-register RM Request

```
               RRS Resource Manager List        ROW 1 TO 1 OF 1
Command ===>                                    Scroll ===> PAGE

Commands: v-View Details u-View URs r-Remove Interest d-Delete RM
          n-Unregister RM

S    RM Name            State            System      Logging Group
     LOGGING1_RM1E      Run              SY1         PLEX1

ATR536I RM LOGGING1_RM1E is still registered with Registration
Services and cannot be unregistered with RRS.
```

---

z/OS 1.9 Improved Availability

New RRS options - usage and invocation: ISPF panel…

ISPF panel – Un-register RM Request

```
               RRS Resource Manager List        ROW 1 TO 1 OF 1
Command ===>                                    Scroll ===> PAGE

Commands: v-View Details u-View URs r-Remove Interest d-Delete RM
          n-Unregister RM

S    RM Name            State            System      Logging Group
     LOGGING1_RM1E      Reset            SY1         PLEX1

ATR537I Unregister processing for RM LOGGING1_RM1E is not allowed
when the RM state is either Reset or Unset.
```

z/OS 1.9 Improved Availability

New RRS options - usage and invocation: ?ATRSRV interface

```
?ATRSRV            +       REQUEST(REMOVINT) …
                   +          REQUEST(COMMIT) …
                   +          REQUEST(BACKOUT) …
                       +          REQUEST(REMOVRM) …
                   +       REQUEST(UNREGRM)
                              |

    [RMNAME(xrmname)]
                                      [GNAME({xgname |
    current_gname})]
                              [SYSNAME({xsysname |
current_sysname})]

                              [RCTABLE({xrctable | 0})
                                      RCNUM({xrcnum})]
                   RETCODE = retcode
                   RSNCODE = rsncode
```

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z/OS 1.9 Improved Availability

New RRS options usage and invocation – ATRQSRV batch utility

Input:

```
    UNREGRM RMNAME(LOGGING1_RM1E)
```

Output:

```
UNREGRM  2006/09/07 17:08:39   -- ATRQSRV - HBB7740 - 2006250 --
   UNREGRM  RMNAME(LOGGING1_RM1E)
       DEFAULTS: GNAME(PLEX1) SYSNAME(SY1)
ATR534I RM LOGGING1_RM1E was unregistered successfully.
```

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z/OS 1.9 Availability

New RRS options - migration and coexistence considerations

- **Invocation and execution must happen on 1.9 level system.**

- **The RRS panels, ATRSRV, and ATRQSRV allow routing the execution of the Un-register RM request to a non 1.9 system using the SYSNAME parameter.**

  - **Such a request will fail** since a lower level system does not recognize the request.

  - Non-1.9 systems will issue message:
    - `TR538I The ATRSRV request was processed on a downlevel RRS system that could not honor the request.`

---

z/OS 1.9

Meeting the business challenges !!

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Health Checker improvements & checks, ISPF, DFSMSrmm, Configuration and Management Usability for Communications Server, HCM, CF management...

Scalability & Performance
54-way support, 64-bit GRS, SMF to Logger, TSO/E support for large sequential data sets, Message Flooding Automation, XCF CDS Performance, heap pools, cache alignment, LAN idle, VSCR

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Improved latch contention detection, CF duplexing, Logger enhancements, SFM improvements, New RRS options

Integrating new Applications and Supporting Industry and Open Standards
XML offload to zIIPs & zAAPs, System REXX, SDSF REXX, Metal C, NFS V4 Server, pthread enhancements, Decimal Floating Point, porting enablement, Binder, PKCS#11...

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z/OS R9

Enhancing Security
IPSec offload to zIIP, Additional password phrase support, Kerberos AES & Enhanced CRL support, PKI Services & RACF extensions, z/OS UNIX System Services auditability, Java user and group SAF admin classes, Crypto, NAS AES ...

Extending the Network
Policy-based TCP/IP Routing, Centralized Policy-Based Networking, Expanded use of AT-TLS, FTP Unicode support, new Network Management Interfaces

Enterprise-Wide Roles
CIM monitoring enhancements, Updated Pegasus server, DFSMSrmm CIM Update, IRMM, ARM 4.1 support

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z/OS 1.9 Optimization & Management
Blocked Workload Analysis

Low Priority Work		High Priority Work

Low Priority Work
- ► Requests a resource
- ► Gets suspended in favour of more important work
- ► Remains undispatched over long periods
- ► Cannot free up the resource

High Priority Work
- ► Requests the same resource
- ► Gets blocked due to the resources unavailability

Solution
- ► Provide limited access to the CPU for low priority work
- ► Promote dispatching priority for short periods

---

z/OS 1.9 Optimization & Management
WLM improved self managing capabilities

- ▪ **WLM "Trickle" support for blocked workloads**
  - – Ability to specify small amount of processor resource to be used for **discretionary work that otherwise would "never" get done on a 100% busy system**
  - – PARMLIB control CP resource and when to consider work "CPU starved"
    - • New IEAOPTxx parameters
    - • BLWLTRPCT
      - – Maximum percentage of a standard CP to be used to promote blocked dispatchable units.
    - • BLWLINTH
      - – Swapped-in starvation threshold. When an AS is considered being blocked
  - – RMF Support
  - – Available on z/OS 1.7 and up with APARs OA17735, OA18639

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RMF 1.9 Blocked Workload Analysis…

New IEAOPTxx Parameters
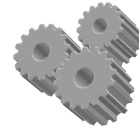
Parameter	Meaning
BLWLTRPCT	Maximum percentage of a standard CP to be used to promote blocked dispatchable units. The value is specified as whole number between 0 and 200 where 200 accounts for 20.0% of a CP. Default on z/OS 1.9 is 5 (=0.5%) Disabled on previous releases (OA17735)
BLWLINTHD	Swapped-in starvation threshold. When an AS or enclave has not received CPU service within this time interval, it is considered being blocked Minimum is 5 seconds. Maximum is 65535 seconds. Default is 60 seconds.

Defined Promote Rate

Average number of blocked dispatchable units which may get promoted in their dispatching priority (per second)

---

z/OS 1.9 Optimization & Management
Blocked Workload Support: Implementation

Time Slices
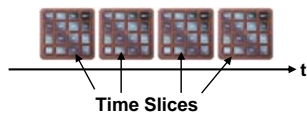
BLWRTRPCT

- **Usually work uses the CPU for a predefined amount of time**
  - Named a time slice
    - After that period the work gets re-dispatched
  - z/OS uses a major and a minor time slice
- **Approach**
  - Convert the capacity of the LPAR into multiple of major time slices

$$LPAR\ WCap = \frac{LPAR\ Weight}{Total\ Weight + Phantom\ Weight} \bullet Shared\ Regular\ CPs$$

$$LPAR\ Capacity = MIN(LPAR\ WCap;\ Logical\ Regular\ CPs\ of\ LPAR)$$

  - Define a percentage value of how many time slices can be used for blocked workloads (as trickles)
  - Parameter: BLWLTRPCT
    - Values: 0.. 200
    - 200 = 20%
    - Default: 5 = 0.5% of the LPAR capacity

z/OS 1.9 Optimization & Management

Enhancements for Blocked Workloads - Example

SOAKI1,SOAKI2,SOAKI3 started, BLWLTRPCT=200

BLWLTRPCT=0 (no trickling)

no discretionary any workload started

Plot Area

Defined Capacity 10

BLWLTRPCT=200

dump taken

canceling workload

[Service]

CPU Utilization   TrUse   AsWait

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z/OS 1.9 Optimization & Management

Enhancements for Blocked Workloads - RMF PP Support

```
                              C P U   A C T I V I T Y   R E P O R T

SYSTEM ADDRESS SPACE ANALYSIS          SAMPLES =    900

---------NUMBER OF ADDRESS SPACES---------     ----------------------DISTRIBUTION OF IN-READY QUEUE-----------------------
QUE                                                                          70   80    90  100
```

- Extensions of RMF Postprocessor CPU Activity and WLMGL reports with information about blocked workloads and the temporary promotion of their DP

```
IN
IN READY          1     8     1.0    <=  N        #2.1
```

- SMF record 70-1 (CPU activity) and SMF 72-3 (Workload activity)

```
OUT
OUT WAIT          0     0     0.0    =  N - 3      1.1    >
                                     <=  N +  5    0.0
LOGICAL OUT RDY   0     0     0.0    <=  N + 10    0.0
LOGICAL OUT WAIT  106   107   106.6  <=  N + 15    0.0
                                     <=  N + 20    0.0
ADDRESS SPACE TYPES                  <=  N + 30    0.0
                                     <=  N + 40    0.0
BATCH             0     0     0.0    <=  N + 60    0.0
STC               149   149   149.0  <=  N + 80    0.0
TSO               1     1     1.0    >   N + 80    0.0
ASCH              0     0     0.0
OMVS              2     2     2.0    N = NUMBER                 ON AVG)

BLOCKED WORKLOAD ANALYSIS

OPT PARAMETERS: BLWLTRPCT (%)   0.5    PROMOTE RATE:  DEFINED     120   WAITERS FOR PROMOTE: AVG   0.001
                BLWLINTHD        60                   USED (%)    95                        PEAK    15
```

Defined vs. Actuals

Detect Latent Demand

Verify OPT Parameters

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z/OS 1.9 Optimization & Management
Enhancements for Promotion of Canceled Jobs

- **When an AS is cancelled, the majority of cancel processing runs in the AS being cancelled**

  – So it is running at the DP of the AS

- **Cancel processing may take a long time to complete**

- **With this support SRM:**
  – Swaps in the AS
  – Promotes the AS being cancelled to a higher DP
  – **Thus cancel processing completes faster**
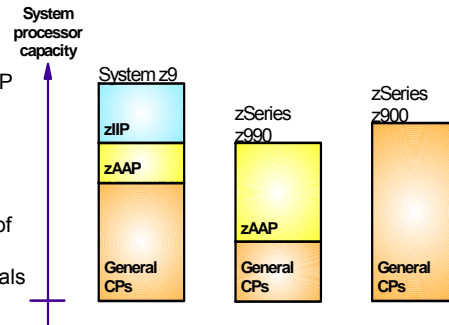
---

z/OS 1.9 Optimization & Management
WLM improved self managing capabilities…

- **WLM Support for Cross-System Routing of zAAP & zIIP work**
  – WLM's Sysplex Routing Services will return weights for zAAPs and zIIPs
  – This can allow functions that route workloads to different systems to make routing decisions based on CP, zAAP and zIIP capacity

z/OS 1.9 Optimization & Management

WLM routing service enhancements for zAAP and zIIP

- **Workload balancing is optimized by using specialty processors as well as the general purpose System z processor**
  - Configure expected processor usage proportions for `BaseWLM`
    - Analyze the capacity/utilization requirements for each workload to determine the expected utilization proportion for each processor type
  - Sysplex distributor will make routing decisions using the composite weight
  - Load Balancing Advisor (LBA) will report the composite weights to external load balancers in place of the conventional CP weight

- **`BASEWLM` - system weights**
  - Based on a comparison of conventional CP capacity

- **`SERVERWLM` - server-specific weights**
  - Based on a comparison of
    - The CP capacity given the importance of the server's work
    - How well each server is meeting the goals of its service class
  - No configuration required for `ServerWLM`

System processor capacity

System z9 — zIIP / zAAP / General CPs
zSeries z990 — zAAP / General CPs
zSeries z900 — General CPs

---

z/OS 1.9 Optimization & Management

Routing Services: Summary

Service	Function	Remark	Description
IWMSRSRS	Existing function SELECT		Returns capacity for the system relative to other systems in the sysplex (accounts for the number of registered server instances)
IWMSRSRS	New parameter SPECIFIC	(1)	Returns capacity for the registered server relative to all other registered servers of the same type in the sysplex. With R9, contains information on general purpose, zAAP and zIIP capacities. Considers: • Goal Achievement (PI) • Queue Time for Enclaves • Health Indicator
IWMSRSRG	New Parameter HEALTH		Allows the server which registers to provide a health indicator from ok=100 to not ok=0. The factor is considered as part of the weight. IWMSRSRG HEALTH can be updated by the server at any time
IWM4HLTH	New Service		For address spaces which are not registered and which want to set a health status. This status is factored into IWM4SRSC return data
IWM4SRSC	New service	(1)	Returns capacity for another address space to which the request is provided by the registered server. Considers • Goal Achievement (PI)
	New parameter ABNORM_COUNT		• abnormal termination rate expressed as the number of abnormal terminations (as passed to WLM by the IWMRPT interface) per 1000 total terminations.

(1) Goal achievement is derived from the service class the working is running in. Can be an enclave service class, a transaction manager service class or the service class to which the address space is classified too

z/OS 1.9 Optimization & Management

Sysplex Routing: Enhancements for IWMSRSRS Service

- **New Function code „SPECIFIC"**
- **Weight calculation: Product of four factors**
  1. System Utilization Factor:
     - Same as the resulting system weight for old „SELECT" function
  2. PI Factor:
     - This gives an indication of how good this server, respective the work that is related to this server, is achieving its goals as defined in the active WLM policy.
  3. Queue Time Ratio Factor:
     - If the server owns independent enclaves, the ratio of queue time to elapsed time of those enclaves
  4. Health Indicator Factor:
     - A registered server can use the IWMSRSRG HEALTH= parameter to inform WLM about additional states which are unknown to WLM but should be factored into the returned weight. Abnormal termination rate
  – Remark
    - If multiple servers are registered on the same system, the weight is divided by the number of the servers.

z/OS 1.9 Optimization & Management

Effect of Performance Factor on WLM Routing Recommendations

SYS	Avail Cap	Original Server weight	PI	WLM weight
SYS1	110	18	1.3	14
SYS2	100	16	0.8	16
SYS3	95	15	1.0	15
SYS4	95	15	2.0	8
SUM		64		53

- **Example assuming a 4-way Sysplex**
- **If the server specific PI is >1 the weight is divided by the PI.**
- **Consequently the sum of all weight is no longer normalized to 64.**
- **WLM server weight influences the distribution of work across the sysplex by the subsystem.**

z/OS 1.9 Optimization & Management
z/OS R9 IWMSRSRS: Enhancements for zAAPs and zIIPs

- **Base calculation for FUNCTION=SPECIFIC and FUNCTION=SELECT is the same**
- **In previous releases**
  - Only one weight (SYSR_WEIGHT) is returned
  - It is based only on regular CP capacity
  - A system was NOT returned if it had less than 5% of displaceable capacity at the selected importance level
- **With z/OS 1.9**
  - SYSR_WEIGHT now is the combined weight of all available processor resources
  - The individual weights have been added:
    - SYSR_CPU_WEIGHT (corresponds to SYSR_WEIGHT of previous releases)
    - SYSR_ZAAP_WEIGHT
    - SYSR_ZIIP_WEIGHT
  - A system is NOT returned if it has NO displaceable capacity for regular CPs at the selected importance level
    - As a result potentially more systems may be returned
    - If a system has no displaceable for an assist processor it is returned and missing capacity is reflected in the weight

---

z/OS 1.9 Optimization & Management
### *IWMSRSRS additional enhancements*

- **Restriction that no more than 96 servers per system could be returned is relieved**
  - **Now up to 300 servers per system will be returned**
  - Also valid for IWMSRSRS FUNCTION=QUERY
  - This support is available for z/OS V1R6 and above via APAR OA18531

- **The C interface to IWMSRSRS IWMDNSRV has also been extended to return the new weights**

z/OS 1.9 Optimization & Management

IWMWSYSQ pictorial return of capacity information
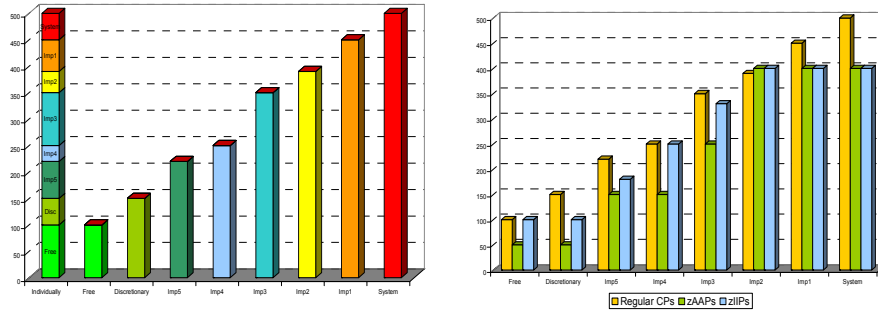
- **Returns capacity information of systems in a sysplex**
  - Each bucket contains the accumulated capacity of all lower importance levels

---

z/OS 1.9 Optimization & Management

IWMWSYSQ Enhancements

- **Enhancement for z/OS 1.9 is available via new parameter**
  EXTENDED_DATA
  - With `EXTENDED_DATA=YES` additional information is returned in the output area
    - The system level (0) which contains the total system capacity was added
    - Data now returned for all processor types
    - In addition:
      - Uniprocessor speed of a single processor
      - zAAP and zIIP normalization factors (deviation from regular processor speed if applicable)
  - `EXTENDED_DATA=NO` returns the output area as before (pre 1.9 layout)

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z/OS 1.9 Optimization & Management

Capacity Based Routing for WebSphere

- In the past the **routing algorithm was round robin**.

- With z/OS 1.9 the **default routing is based on available processor capacity** of the systems.

  – May result in changed routing recommendations compared to current behavior.

- The new IEAOPT parameter **`WasRoutingLevel=1`** allows going back to the old round robin routing algorithm.

- Function can be enabled on z/OS Releases ≥6 with **OA16486**

---

z/OS 1.9 Optimization & Management

IEAOPT WASROUTINGLEVEL

WASROUTINGLEVEL	
0	**Use the most advanced routing algorithm supported by all systems in the sysplex.** ▪ If release level of the lowest system is z/OS 1.9 (or above), or APAR OA16486 is installed, routing decisions are based on available /displaceable capacity of standard and assist processors. ▪If the release level of the lowest system is below z/OS 1.9 and runs without the APAR OA16486 installed, the routing algorithm round robin is used.
1	**WLM uses the routing algorithm round robin.** If this option is used, set it on all systems of the sysplex so that all are using the same algorithm. Otherwise, the WebSphere routing service on each system uses the specific algorithm setting for the system, which can lead to inconsistent results.

z/OS 1.9 Optimization & Management

Advanced Routing For WebSphere

Find the importance level at which at least one system has 5% capacity, compare the capacities of the systems and calculate the system weights.

SYS 1		
CP	zAAP	zIIP
10	21	15

SYS 2		
CP	zAAP	zIIP
20	21	15

SYS 3		
CP	zAAP	zIIP
34	21	34

Calculate the workload distribution over the processor types.

CP	zAAP	zIIP
30	20	14

Calculate a combined system weight considering all processor types.

S1	S2	S3
15	19	30

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z/OS 1.9 Optimization & Management

WLM starting minimum number of Servers without Delay

- Problem:
  - If a WLM managed server performs heavy processing before connecting to WLM, the **startup of the minimum amount of servers can take a long time**

- Solution:
  - When requested by the managed server, WLM starts the minimum amount of servers **without waiting on the connect status of the previously started servers.**

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z/OS 1.9 Optimization & Management

Flow for starting minimum number of servers without delay

Control Region

Server Region

ServerMin

Connect (IWM4CON)

Classify (IWMCLSFY)
Insert (IWM4QIN)

Disconnect (IWM4DIS)

W L M

Connect (IWM4CON)

Limit (**IWM4SLI**)

Select (IWM4SSL)
Begin (IWM4STBG)
End (IWM4STEN)

Disconnect (IWM4DIS)

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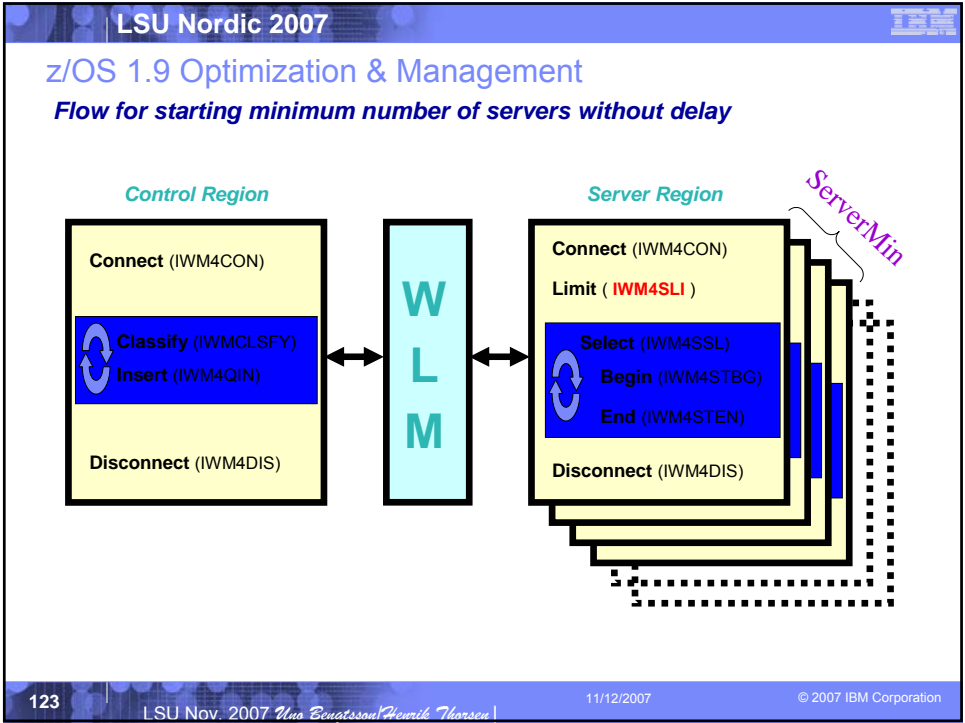
z/OS 1.9 Optimization & Management

Starting Minimum Number of Servers Without Delay - Invocation

- **The support is invoked by the managed server via:**
  - New parameter on the Application Environment Limit Service macro

IWM4SLI —— AE_SERVERMIN = **ServerMin** ——
START_MINIMUM = SERIAL ...
START_MINIMUM = PARALLEL

New

- **Called by:**
  - WLM started server ASes. The first server AS decides in which way the remaining servers will be started.

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z/OS 1.9 Optimization & Management
Monitor III Coupling Facility Overview Report

► New CF processor statistics:
  – **Dynamic dispatch status**
  – **# defined processors**
  – **# shared processors**
  – **Average weight of shared processors**

```
                 RMF V1R9   CF Overview    - SYSPLEX       Line 1 of 2
Command ===>                                          Scroll ===> CSR

Samples: 120    Systems: 6   Date: 02/23/06  Time: 13.31.00  Range: 12   Sec

CF Policy: SYSPOL1    Activated at: 01/14/06 09.31.07

----- Coupling Facility ------  ------ Processor -------  Request  - Storage --
Name      Type  Model Lvl  Dyn  Util% Def Shr Wgt Effect  Rate      Size  Avail

CF01      2084  B16   nn   ON   0.9   2   0       0.9     203.3     446M  301M
CF02      2084  B16   nn   ON   0.7   3   2  60   0.5     132.5     446M  349M
CF02T     2084  B16   nn   ON   0.7   1   1  40   0.5     112.1     446M  349M
```
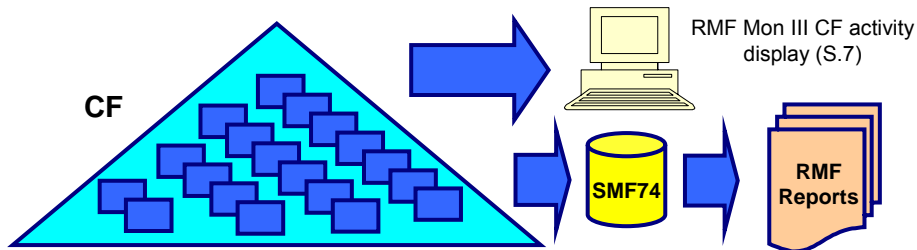
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Optimization and Management Capabilities
RMF Support for Coupling Facility Activity Reporting

- ▪ "*How's my CF doing…?*", "*What if I add or change that structure…?*"
- ▪ **z/OS 1.9 RMF Mon. III and Postprocessor: CF CPU resource consumption by structure**
- ▪ **CFLEVEL 15 and up (available on z9)**
- ▪ **Rollback to z/OS 1.6 and up**
  – APARs OA17055 (XES) and OA17070 (RMF)

CF

RMF Mon III CF activity display (S.7)

SMF74

RMF Reports

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z/OS 1.9 Optimization & Management

Postprocessor Coupling Facility Activity report

Structure summary section

CF processor utilization by structure

```
-----------------------------------------------------------------------
STRUCTURE SUMMARY
-----------------------------------------------------------------------
```

TYPE	STRUCTURE NAME	STATUS CHG	ALLOC SIZE	% OF CF STOR	# REQ	% OF ALL REQ	% OF CF UTIL	REQ/ SEC	LST/DIR ENTRIES TOT/CUR	DATA ELEMENTS TOT/CUR	LOCK ENTRIES TOT/CUR	DIR REC/ DIR REC XI'S
LIST	DB2D_SCA	ACTIVE	16M	2.1	1766	0.9	2.0	1.96	41K	81K	N/A	N/A
		PRIM							168	483	N/A	N/A
	DB2E_SCA	ACTIVE	16M	2.1	1765	0.9	3.0	1.96	9915	20K	N/A	N/A
		PRIM							154	288	N/A	N/A
	DB2H_SCA	ACTIVE	16M	2.1	0	0.0	1.0	0.00	1024	1000	N/A	N/A
		PRIM							1	17	N/A	N/A
	IXCPLEX_PATH1	ACTIVE	5M	0.6	64993	34.8	25.0	72.21	7730	16K	N/A	N/A
		PRIM							11	96	N/A	N/A
LOCK	DB2D_LOCK1	ACTIVE	31M	4.0	1770	0.9	5.0	1.97	2032	0	131K	N/A
		PRIM							0	0	27	N/A
	DB2E_LOCK1	ACTIVE	31M	4.0	1770	0.9	5.0	1.97	15K	0	1049K	N/A
		PRIM							1	0	650	N/A
	DB2T_LOCK1	ACTIVE	125M	16.2	82436	44.1	30.0	91.60	0	0	66K	N/A
		PRIM							0	0	3215	N/A
CACHE	IRRXCF00_B001	ACTIVE	2M	0.2	221	0.1	1.0	0.25	390	75	N/A	0
									0	0	N/A	0
	SYSIGGCAS_ECS	ACTIVE	5M	0.6	27907	14.9	16.0	31.01	28	17	N/A	0
									0	0	N/A	0
	STRUCTURE TOTALS		420M	54.4	186917	100	88.0	207.69				

---

z/OS 1.9 Optimization & Management

Support for DB2 WLM Assisted Buffer Pool Management

- **Allows DB mgrs. to benefit from WLM/SRM goal-driven resource management capabilities**
- **Allows for dynamic adjustment of Buffer Pool sizes considering the requirements of data requesters and system / sysplex workload**
- **Implementation:**
  - Introduce a new delay-type being reported to WLM
  - Report these new delays via dedicated performance blocks (PBs)
  - Optimum Buffer Pool sizes are determined by means of the Data requesters' requirements
- **Exploitation:**
  - DB2 Version 9.1 for z/OS
    - `ALTER BUFFERPOOL… AUTOSIZE(YES|NO)`

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z/OS 1.9 Optimization & Management

DB2 WLM Assisted Buffer Pool Management - Overall Flow

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z/OS 1.9 Optimization & Management

Buffer Pool Size Adjustment - Example
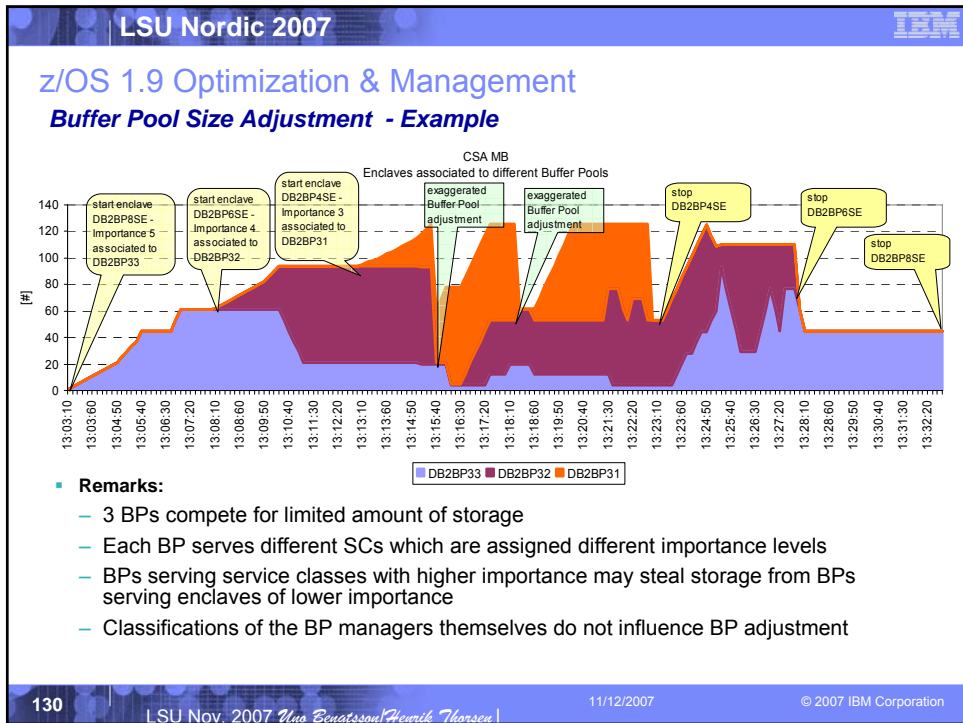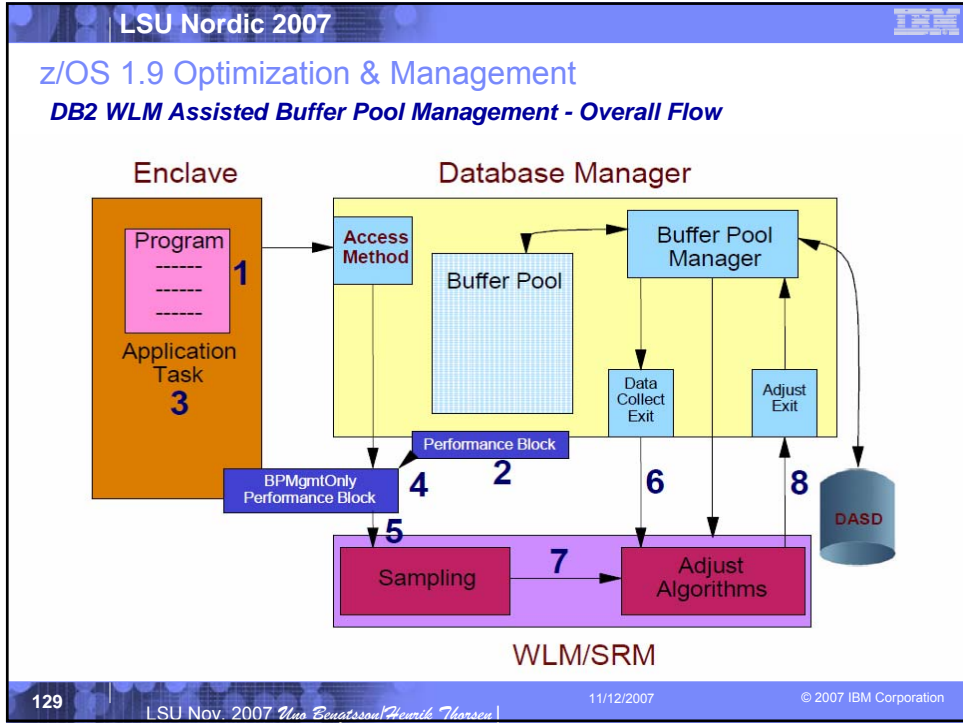
- **Remarks:**
  - 3 BPs compete for limited amount of storage
  - Each BP serves different SCs which are assigned different importance levels
  - BPs serving service classes with higher importance may steal storage from BPs serving enclaves of lower importance
  - Classifications of the BP managers themselves do not influence BP adjustment

z/OS 1.9 Optimization & Management

Support for DB2 WLM Assisted Buffer Pool Management

- **For more information refer to DB2 V9.1 documentation**
  - E.g. **DB2 V 9 for z/OS Technical Overview**
    http://www.redbooks.ibm.com/abstracts/sg247330.html

  - Need to consider impact on real storage requirements with PGFIX(YES)

---

z/OS 1.9

Meeting the business challenges !!

Improving Usability and Skills
Health Checker improvements & checks, ISPF, DFSMSrmm, Configuration and Management Usability for Communications Server, HCM, CF management...

Scalability & Performance
54-way support, 64-bit GRS, SMF to Logger, TSO/E support for large sequential data sets, Message Flooding Automation, XCF CDS Performance, heap pools, cache alignment, LAN idle, VSCR

Improving Availability
Improved latch contention detection, CF duplexing, Logger enhancements, SFM improvements, New RRS options

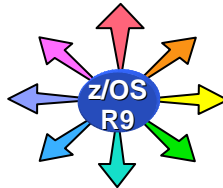**Integrating new Applications and Supporting Industry and Open Standards**
XML offload to zIIPs & zAAPs, System REXX, SDSF REXX, Metal C, NFS V4 Server, pthread enhancements, Decimal Floating Point, porting enablement, Binder, PKCS#11...

Self Managing Capabilities
WLM support for cross-system routing of zAAP workloads, WLM "Trickle" Support, Promotion of canceled jobs, Start servers in parallel, RMF reporting for CF structures...

Enhancing Security
IPSec offload to zIIP, Additional password phrase support, Kerberos AES & Enhanced CRL support, PKI Services & RACF extensions, z/OS UNIX System Services auditability, Java user and group SAF admin classes, Crypto, NAS AES …

Extending the Network
Policy-based TCP/IP Routing, Centralized Policy-Based Networking, Expanded use of AT-TLS, FTP Unicode support, new Network Management Interfaces

Enterprise-Wide Roles
CIM monitoring enhancements, Updated Pegasus server, DFSMSrmm CIM Update, IRMM, ARM 4.1 support

z/OS R9

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z/OS 1.9 Enhanced Security

Overview

- **Java user and group SAF admin classes**
  - Java classes designed to enable RACF user & group administration

- **PKI Services and RACF digital certificate enhancements planned**
  - Provide e-mail notification to PKI administrators for pending certificate requests.
  - Change the maximum period for certificate validity from 3650 to 9999 days
  - Allow queries based on the number of days until certificates will expire
  - Automated certificate renewal via e-mail before certificates expire

- **Improved auditability for z/OS UNIX**
  - z/OS UNIX file and directory deletion or rename recorded in new SMF92 subtype 14

- **New Network Security Services function designed to provide**
  - Single, centralized certificate storage for IPSEC
  - Cross-system and –sysplex monitoring and management for IPSec security

- **Enhanced System SSL support**
  - Hardware to Software cryptography notification to warn that software cryptography is being used after a hardware services error

---

z/OS 1.9 Enhanced Security

IPSec offload to zIIP

- **Even with System z specialized Crypto HW, IPSec data encryption, decryption and authentication processing can incur heavy CPU usage**

- **New ZIIP IPSECURITY option to GLOBALCONFIG statement, enabling SRB-mode IPSec protocol traffic to be processed on zIIP.**

- **Eligible enclave-mode SRB processing offloaded:**
  - Encryption processing
  - Cryptographic validation of message integrity
  - IPSec header processing

- **Will provide CPU-relief on CPs if you already run IPSec on z/OS**
  - Could result in **lower SW charges** (since IBM imposes no SW charges for zIIP capacity)
  - Should make z/OS IPSec deployment more attractive

z/OS 1.9 Enhanced Security
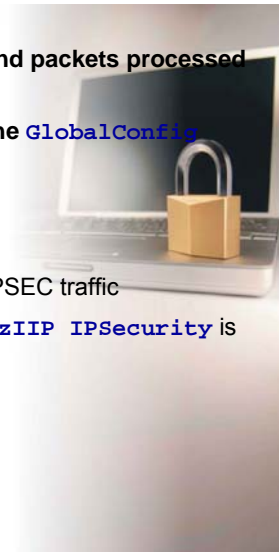### IPSec offload to zIIP - Installation

- **GLOBALCONFIG ZIIP IPSECURITY**
- **IPv4 and IPv6 IPSec traffic supported on zIIP**
  - Outbound IPSec AH|ESP protocol traffic may also be processed on zIIPs
  - Useful for performance projections even in a configuration with no zIIPs
  - Default is zIIP processors are NOT used for IPSec traffic (default is `GLOBALCONFIG ZIIP NOIPSECURITY`)

---

z/OS 1.9 Enhanced Security
IPSec offload to zIIP – configuration and usage

- `Netstat STATS/onetstat -S` **shows inbound/outbound packets processed on a zIIP.**
- `Netstat Config/onetstat -f` **shows the setting of the** `GlobalConfig` **setting for zIIP IPSecurity.**
- `MVS D M=CPU` **shows zIIP online/offline status.**
- **IPCS Commands:**
  - `TCPIPCS IPSEC` - shows whether zIIPs are handling IPSEC traffic
  - `TCPIPCS PROFILE` - shows whether `GLOBALCONFIG zIIP IPSecurity` is set.

z/OS 1.9 Enhanced Security

IPSec offload to zIIP - planning

- **Offload projection**

  - If you're already running IPSec, projection is straightforward use **PROJECTCPU** function in WLM

Using GLOBALCONFIG ZIIP IPSECURITY for projection purposes before you have any zIIPs in your configuration:

  - **IBM recommends you remove** this option from your TCP/IP profile once you've finished collecting your projection data. (Running in this mode with no zIIPs online will result in **slightly higher CPU consumption**.)

- **This capability available August 2007 with:**

  - z/OS 1.8 Communications Server APAR PK40178
  - z/OS 1.8 APAR OA20045
  - System z9 with zIIPs

Whitepaper: *'Capacity Planning for zIIP Assisted IPSec'*
More in-depth discussion of this function
http://www.ibm.com/support/docview.wss?rs=852&uid=swg27009459

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z/OS 1.9 Security

Password phrase support

- This function continues the evolution of password phrase support, introduced in R8. which allows for Passwords between 13-100 chars

  - Password phrases solved interoperability problems with other platforms.

  - While solving one problem another one was introduced

    - Some platforms allow 9-13 character passwords
    - To allow for Password phrase between 9-13 characters will require new password phrase exit **ICHPWX11.**
    - Sample **ICHPWX11** exit routine, and the REXX exec **IRRPHREX** that it invokes, contained in SYS1.SAMPLIB.
    - **IRRPHREX** should be copied to **SYS1.SAXREXEC (System REXX)**
    - Password phrase quality rules are in IRRPHREX, If need to change rules, just change REXX exec
    - Default checking: Maximum/minimum length, Allowable characters, Leading/trailing blanks, User name allowed or not, Triviality checks with respect to previous phrase

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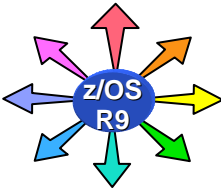
z/OS 1.9

Meeting the business challenges !!

Improving Usability and Skills
Health Checker improvements & checks, ISPF, DFSMSrmm, Configuration and Management Usability for Communications Server, HCM, CF management…

Scalability & Performance
54-way support, 64-bit GRS, SMF to Logger, TSO/E support for large sequential data sets, Message Flooding Automation, XCF CDS Performance, heap pools, cache alignment, LAN idle, VSCR

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z/OS R9

Enterprise-Wide Roles
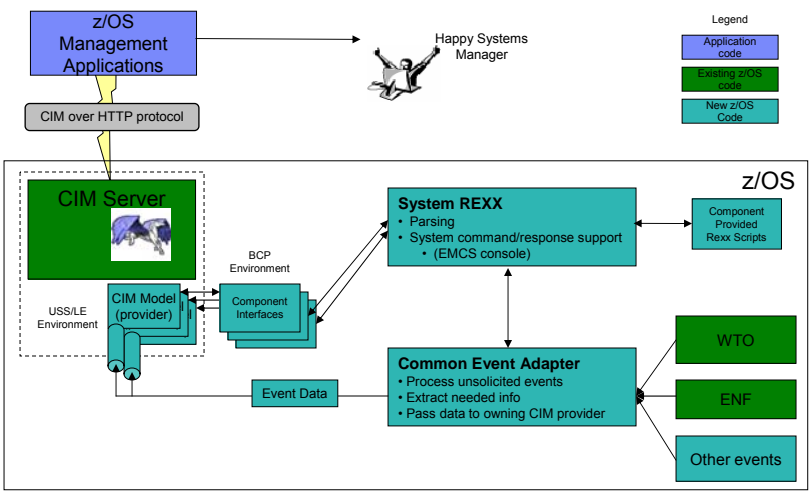CIM monitoring enhancements, Updated Pegasus server, DFSMSrmm CIM Update, IRMM, ARM 4.1 support

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New Face of z/OS – Systems Management Architecture

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z/OS 1.9 Optimization & Management

EWLM and "new face" enhancements

- **ARM 4.1 Support**
  - EWLM's Application Response Measurement (ARM) V4.1 support extensions
  - Asynchronous messaging extensions for CICS applications using WLM Delay Monitoring Services
    - Note: ARM 4.1 standard in draft status with *The Open Group*

- **Updated Pegasus Server – Enterprise Wide Role**
  - OpenPegasus CIM Server upgraded to 2.6
  - CIM schema upgrade to Version 2.11
  - DFSMSrmm CIM provider code updated to support OpenPegasus CIM Server 2.5.1
    - Subclasses supported extended to cover all DFSMSrmm-managed resources
  - New sysplex and job resource & z/OS UNIX process CIM classes
  - Added ARM support
  - Now supports SSL client authentication

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z/OS 1.9 Enterprise Wide Roles

- **Updated Pegasus Server**
  - **OpenPegasus CIM Server 2.6 with CIM schema 2.11**
  - **Subclasses supported extended to cover all DFSMSrmm-managed resources**
  - **New sysplex and job resource CIM classes**
- **Integrated Removable Media Manager for the Enterprise on System z**
  - **Centralized media management, administration, and reporting**
  - **Can use the *same* DFSMSrmm inventory to manage removable media for z/OS *and* for distributed**
  - **Extend DFSMSrmm function to distributed: Manage vaulting, retention, media retirement**

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z/OS 1.9

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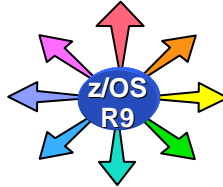
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XML offload to zIIPs & zAAPs, System REXX, SDSF REXX, Metal C, NFS V4 Server, pthread enhancements, Decimal Floating Point, porting enablement, Binder, PKCS#11...

z/OS R9

Self Managing Capabilities
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CIM monitoring enhancements, Updated Pegasus server, DFSMSrmm CIM Update, IRMM, ARM 4.1 support

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z/OS 1.9 Networking

- **Policy-Based TCP/IP Routing**
  - Designed to provide policy-based routing based on job name, source/destination port, protocol type (TCP or UDP), source IP address, NetAccess security zone, security label, application
  - Can specify that outbound traffic be separated by application

- **FTP Unicode support**
  - Added file transfer support for UTF-16, UTF-16LE, and UTF-16BE
  - Added file storage support for UTF-16

- **z/OS Communications Server is planned to provide:**
  - New APIs designed to allow applications to specify source filter lists
  - Support to allow local systems to filter on source addresses even when not attached to multicast routers with source address filtering support
  - Host support for IGMPv3 and MLDv2

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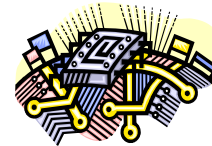
z/OS 1.9 Networking

- **Will be covered in next session**

---

z/OS 1.9

Meeting the business challenges !!

Improving Usability and Skills
Health Checker improvements & checks, ISPF, DFSMSrmm, Configuration and Management Usability for Communications Server, HCM, CF management…

Scalability & Performance
54-way support, 64-bit GRS, SMF to Logger, TSO/E support for large sequential data sets, Message Flooding Automation, XCF CDS Performance, heap pools, cache alignment, LAN idle, VSCR

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z/OS 1.9 Application Development …

- **Binder improvements**
  - New C/C++ front end to Binder APIs
  - `RECFM=U` verification
  - Definition Side-Files in z/OS UNIX archives
  - New `INFO` option to list installed PTFs in Binder SYSPRINT
  - New `-IMMED` option on the `CHANGE` and `REPLACE` control statements

- **PKCS#11 support (also called Cryptoki)**
  - Expected to enable applications developed for other platforms to be recompiled and run on z/OS.
  - Integrated Cryptographic Services Facility (ICSF) and RACF support planned
  - Intended to provides an alternative to IBM's Common Cryptographic Architecture (CCA) and broaden the scope of cryptographic applications that can make use of System z cryptography
  - `RACF RACDCERT` command designed to provide token management of certificate, public key, and private key objects

---

z/OS 1.9 Application Development …

- **New `METAL C` option:**
  - Designed for XL C++ system program development
  - No Language Environment run-time dependency
  - Can imbed HLASM statements in a C program
  - Assembler calls to system services are allowed
  - XL C/C++ support in IBM WebSphere Developer for System z V7.0 (5724-L44)

- **z/OS 1.9 implements NFS V4 Client support**
  - In addition to NFS V4 Server support, implemented in z/OS 1.7
  - z/OS NFS Client can communicate with NFS Servers using V2, V3, or V4 protocol
  - NFS Server `CTRACE` function updated to support NFS V4

z/OS 1.9 Application Development

XML System Services enhancement - overview

- **Using XML System Services R9 you can:**
  1. Realize improved performance for XML parsing
  2. Use the C/C++ interfaces to invoke the XML parser
  3. Take advantage of zAAP specialty engines for XML parsing

- **Performance:**
  - Improvements primarily made to internal algorithms
  - About a **30% improvement in performance** attained (cycles per bytes parsed)

- **Interfaces:**
  - With new C/C++ APIs no need to switch to PL/1 or assembler to invoke XML System Services

- **zAAP**
  - XML code switches over to zAAPs prior to parsing a document.
  - zAAP do not apply, when running in SRB mode.

---

z/OS 1.9 Application Development

XML System Services enhancement - future

- z/OS XML System Services parsing workload done in TCB mode offloaded to zAAP, enclave-mode SRB work to zIIP in the future *

- IBM intends to add validating parsing to z/OS XML System Services *

- IBM intends to enhance the XML Toolkit for z/OS so eligible workloads use z/OS XML*

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

z/OS 1.9 Application Development/Simplification
System REXX - overview

- **SYSREXX**
  - Is part of the BCP product, rollback support to z/OS 1.8 (Web deliverable)
  - SYSREXX allows execs to be run simply and independently from traditional TSO/E & Batch
- **Exploiters**
  - CIM Server .. Cluster Instrumentation
  - Health Checker
  - Open to exploitation by IBM, ISV and Customer Code
  - Can be exploited by new and old style applications
- **SYSREXX is a Server**
  - Starts early during Master Scheduler Initialization

---

z/OS 1.9 Application Development/Simplification
System REXX – details

- **System REXX execs may be initiated through an assembler macro interface called AXREXX or via operator command**
- **Two execution environments supported: TSO=NO and TSO=YES**
- **Exec runs in problem state, key 8, in an APF authorized AS under the MASTER subsystem**
- **Any modules that are loaded, linked or attached from the exec must reside in an APF authorized library.**
- **Also in both cases, the REXX exec runs under the WLM enclave of the AXREXX invoker**

Note for z/OS 1.8:
IBM Health Checker for z/OS SPE APAR for System REXX available at 1.9 GA.
HBB77SR: System REXX 'web deliverable'

z/OS 1.9 Application Development/Simplification
System REXX – TSO YES/NO

- **When `TSO=NO` on the `AXREXX` invocation**
  - Exec is executed in an MVS host command environment
  - Dataset allocation, other than `REXXINDSN` and `REXXOUTDSN` provided by the `AXREXX` macro, is not supported in this environment
    - Runs AXR AS
- **When `TSO=YES` on the `AXREXX` invovation**
  - Exec runs isolated in a single AS, and can safely allocate datasets without concern of a `DDNAME` conflict with a concurrently running exec
    - Runs in AXRxx AS
- ➢ **Note that not every command, function or service that runs under the TSO/E is supported in the `TSO=YES` environment.**

  Only commands documented supported

  There can be up to 64 REXX worker tasks, running `TSO=NO` execs and up to 8 TSO Server address spaces running `TSO=YES` execs.

---

z/OS 1.9 Application Development/Simplification
System REXX - security and enclave Considerations

- **`AXREXX` is an <u>Authorized</u> System Service**
  - Security Controls Essential
    - Access to APF Library
    - Permissions:
      - Standard security administration
        - > what can be accessed and/or run
- **EXECs by default use Invoker's Security Environment**
  - Alternatively may use:
    - Authority of a 3rd party
    - Special userid assigned to `AXRUSER`
- **EXECs use Invoker's Enclave service class**
    - Prevent CPU priority inversion and excessive resource usage
    - Resource usage is charged back

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z/OS 1.9 Application Development/Simplification

System REXX - installation and using

- **Starting SYSREXX Requires**
  - `CTIAXR00` Parmlib member
  - The `SYS1.SAXREXEC` data set
    - REXX Execs Read From `SYS1.SAXREXEC`
  - **Restart** `AXR` using the `AXRPSTRT` procedure

- **Parmlib Support**
  - SYSREXX Customization: `AXR00`
    - `CPF('cpfvalue',SYSTEM|SYSPLEX)`
    - `AXRUSER(userid)`
  - Component Trace (`SYSAXR): CTIAXRxx`

- **Proclib Support**
  - SYSREXX is restarted using procedure `AXRPSTRT`
    - `S AXRPSTRT`

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SYSREXX Logical Overview

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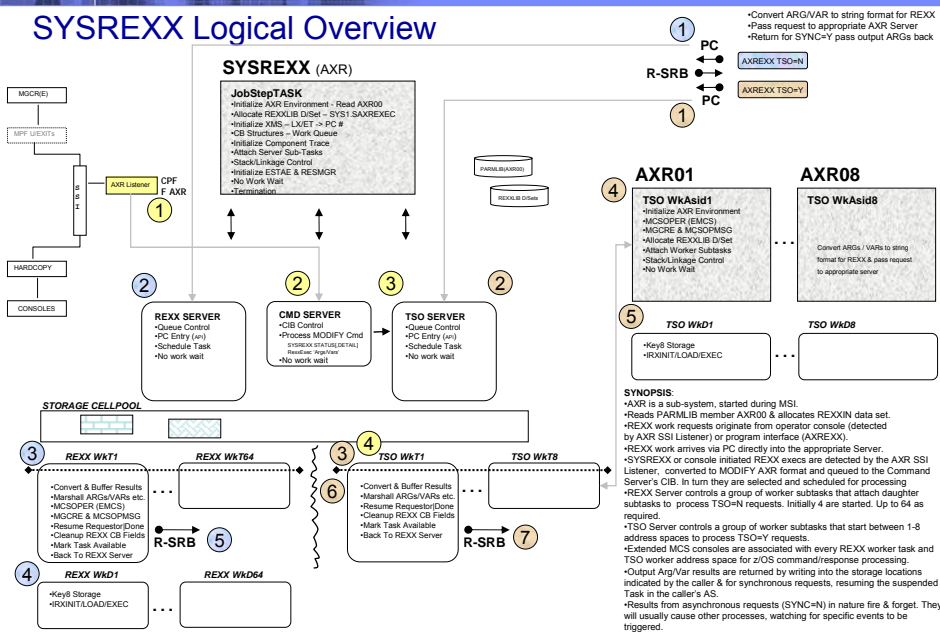
z/OS 1.9 Application Development/Simplification
System REXX - REXX Server versus TSO Server

REXX Server

- **Execs run in AXR AS**
  - 1-64 Worker Subtasks
  - EMCS for each subtask
  - Detach after 100 execs
  - Default HCE - MVS
  - Recommend no Data Set Allocation here
- **Availability impact if something serious breaks**

TSO Server

- **Execs run in AXRnn AS**
  - 1-8 Worker Address Spaces
  - EMCS for each AS
  - Detach after 1000 execs
  - All Allocation capabilities
  - Default HCE + TSO
    - IKJTSOEV Service
    - SYSCALL not supported
- **Better availability should something serious break.. just cancel AXRnn AS**

---

z/OS 1.9 Application Development/Simplification
SDSF SYSREXX - overview

- **SDSF REXX allows REXX execs to be written that can directly access SDSF data and function**
- **Using SDSF REXX, you can perform SDSF functions through REXX:**
  - Display and modify jobs
  - Display and modify devices
  - Browse sysout data sets
  - Print sysout data sets
- **Host environment commands**
  - **ISFEXEC**, executes an SDSF command
  - **ISFACT**, performs an SDSF action or column overtype

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z/OS 1.9 Application Development/Simplification

SDSF SYSREXX Quick Start – Cancel a Job

Add host command environment

rc=isfcalls("ON")

Access the ST panel

Address SDSF "ISFEXEC ST"

do ix=1 to JNAME.0   (variable names same as FLD names)
    if pos("KEN",JNAME.ix) = 1 then

Find the job

        Address SDSF "ISFACT ST TOKEN('"TOKEN.ix"') PARM(NP P)"

Take an action on the job

rc=isfcalls("OFF")

Remove the host command environment (after closing the loop)

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z/OS 1.9 Application Development/Simplification

SDSF SYSREXX - More info

http://www-03.ibm.com/servers/eserver/zseries/zos/sdsf/

Usefull redbook: Implementing REXX Support in SDSF SG24-7419-00

z/OS 1.9

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z/OS 1.9 Usability

- **IBM Health Checker for z/OS**
  - Planned to support checks written in REXX (uses SYSREXX)
  - More health checks planned for VSM, z/OS UNIX System services, Communications Server, TSO/E
  - Improved SDSF interface

- **ISPF improvements**
  - Edit and Browse support for z/OS UNIX and ASCII files
  - System symbol support for data set names on panels
  - Improved EDIT recovery
  - Cross-system sharing of profile variables in a Parallel Sysplex

- **DFSMSrmm improvements**
  - System symbol support for DFSMSrmm PARMLIB members
  - Support for multiple RMM Plexes in a sysplex
  - Support for additional media types
  - New APIs for maintaining media types and characteristics
  - Data set name and TSO/E subcommand parsing rules relaxed

z/OS 1.9 Usability …

- **Batch query/update interface to RRS**
- **New fields in DFSMShsm function statistics records (FSRs)**
- **New tape sublevels in the DFSMSdfp OAM storage hierarchy**
- **IDCAMS enhanced to support data set name masking for DELETE**
- **`D XCF, COUPLE,TYPE=BPXMCDS` command enhancements display `MAXSYSTEMS, MOUNTS and AMTRULES` for the `TYPE(BPXMCDS)` couple dataset.**

---

z/OS 1.9 Usability

Sysplex Management - CF maintenance and structure reallocation

- **CF maintenance mode**
  - New "CF Maintenance Mode" – `SETXCF,START,MAINTMODE`
  - CF logically ineligible for structure allocation
    - Acts as if CF has been **removed** from the PREFLIST, No CFRM Policy updates are required
  - Subsequently, `REBUILD/REALLOCATE` will relocate any allocated structures
  - **In conjunction with REALLOCATE command this support should greatly simplify operational procedures related to taking a CF down for maintenance**
- **REALLOCATE enhancements (in support of CF maintenance mode)**
  - With z/OS 1.4 APAR OA08688, REALLOCATE command was introduced
    - A simple mechanism for dynamically optimizing placement of structures in CFs
  - z/OS 1.9 provides:
    - Structure level CFRM policy controls to bypass REALLOCATE
    - Support to automatically duplex structures
    - Complete pending policy changes without structure rebuild when possible
    - Maintenance mode CF ineligible for structure allocation purposes.
    - Maintenance mode CF an undesirable location, so that it will serially relocate structures out of such CFs as part of normal processing.

z/OS 1.9 Usability

CF maintenance mode - usage and invocation

Typical procedures to **start** maintenance mode:

– Invoke `SETXCF START, MAINTMODE` for a CF to get into maintenance mode

– Invoke `SETXCF START, REALLOCATE` to evaluate and process the CF structures.

- Reallocate **will move the CF Structures out** of the CF
- Reallocate **will not move any CF Structures into** the CF

– Maintenance mode CF is now empty and ready for upgrade action or maintenance.

Typical procedures to **stop** maintenance mode:

– Invoke `SETXCF STOP, MAINTMODE` for a CF to turn off maintenance mode

– Invoke `SETXCF START, REALLOCATE` to evaluate and process CF Structures.

- Reallocate will move the CF Structures as appropriate into the CF
- CF taken out of Maintenance mode is now eligible for structure allocation.

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z/OS 1.9 Usability

CF maintenance mode - migration and coexistence considerations

Compatibility Considerations

- A compatibility PTF is available to enable lower level systems (z/OS 1.8 down to z/OS 1.6) to understand that a CF in maintenance mode is not eligible for CF Structure allocation.
  – APAR OA17685

- CFs may only be placed into and out of maintenance mode by a system running z/OS 1.9

- z/OS systems running 1.8 down to 1.6 with this support installed can recognize that a CF is not eligible for CF Structure allocation and the following have been modified with a new message insert indicating `'ALLOCATION NOT PERMITTED'`
  – IXC361I, IXC362I, IXC367I, IXL015I, IXC574I, IXC463I

z/OS 1.9 Usability

CF Maintenance Mode - Migration & Coexistence Considerations

Fallback Consideration

- Systems running pre-z/OS 1.9 with or without the compatibility support will **not** be able to place a CF into or out of maintenance mode.

- **A sysplex that is falling back to a configuration without any z/OS 1.9 systems may leave a CF stuck in maintenance mode.**

- Before any fallback actions are taken, ensure that all the CFs are taken out of maintenance mode.

- Note: CF maintenance mode indication will be cleared by a sysplex-wide IPL

---

z/OS 1.9 Usability

Shared ISPF Profiles (ISU) - overview

- **Problem Statement/Need Addressed**
  - Some z/OS sites allow same userid to logon to multiple sysplex systems concurrently
  - Without ISPF support for sharing profile these users must either:
    - Use separate or unique ISPF profile data sets for each logon
      - Inconvenient, confusing for users
    - Use the same ISPF profile data set for each logon
      - Possible loss or corruption of data in the ISPF profile

- **Profile sharing support the same user logged on the multiple systems concurrently**
  - ISPF profile sharing enabled and customized through settings in new keyword the ISPF Configuration Table
    - `PROFILE_SHARING` used to enable the ISPF Profile Sharing facility. Valid values: `YES`|`NO.` More keywords available

  More info can be found in **GC34-4821 Dialog Developer's Guide**

z/OS 1.9 Usability

System symbols in data set Names, Volume serial - usage and invocation

- **Data Set List Utility (ISPF option 3.4)**
  - The Data Set List Utility entry panel "Dsname Level" and "Volume serial" fields now support system symbols as input
    - Example:

```
Enter one or both of the parameters below:
   Dsname Level . . . SYS2.**.&SYSPLEX
   Volume serial  . .  _____
```

  - System symbols are now accepted in the parameter for the APPEND primary command
    - Example:
      APPEND 'SYS2..&SYSPLEX'**

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z/OS 1.9 Usability

Edit and Browse z/OS UNIX Files - overview

- **Browse and Edit of z/OS UNIX files not possible outside USS**
  - Besides the use of EDIF and BRIF. These services does provide full function ISPF EDIT and BROWSE
- **ISPF support implemented for z/OS UNIX file support into ISPF EDIT and BROWSE**
- **Benefits:**
  - Users get full functionality of ISPF EDIT and BROWSE
  - Enables ISPF VIEW for z/OS UNIX files
  - Easier when having to process both z/OS UNIX files and MVS data sets
  - Applications can process z/OS UNIX files using the EDIT, VIEW, and BROWSE services

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z/OS 1.9 Usability

Edit and Browse z/OS UNIX Files - Overview Usage and Invocation

- **Edit/View/Browse "Other" Data Set Name fields support entry of z/OS UNIX pathnames**
  - Scrollable field allows input of pathnames up to 1023 bytes in length

- **Pathname assumed when first character is:**
  - / (forward slash)   absolute pathname
  - ~ (tilde)   user's home or initial working directory
  - . (dot)   current working directory
  - . . (dot dot)   parent of the current working directory

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z/OS 1.9 Usability

Edit and Browse z/OS UNIX Files Overview Usage and Invocation. Example

z/OS UNIX Directory List displayed when pathname for directory entered in the "Other" data set name field

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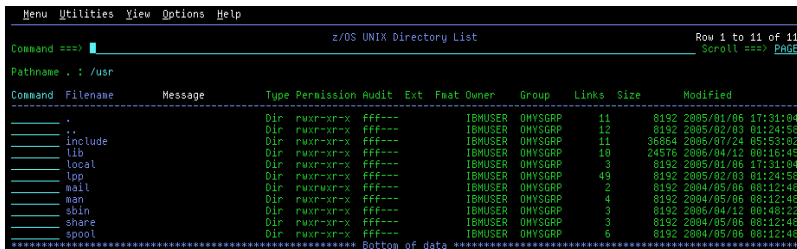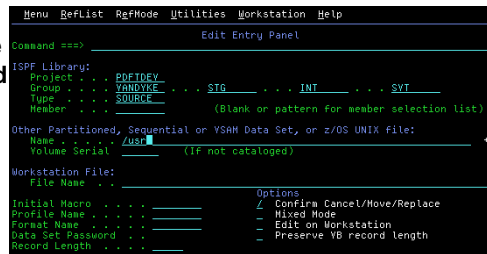
z/OS 1.9 Usability

Edit and Browse z/OS UNIX Files - Example

- **z/OS UNIX pathname can be specified as an operand with the following edit primary and macro commands**
  - **COMPARE**
  - **COPY**
  - **CREATE**
  - **MOVE**
  - **REPLACE**
- **Pathname can be specified in same format accepted for "Other" data set name field**
- **If editing a z/OS UNIX file, + as first character represents the pathname of the directory containing the file being edited**
  - For example, if editing file **/u/usr1/prog1** entering the command **copy +/src1** will copy in data from file **/u/usr1/src1**

---

z/OS 1.9 Usability

Support for editing ASCII Data - Overview

- **Limited tools available on z/OS to view and edit ASCII data**
- **With this enhancement to ISPF it will be possible to VIEW and EDIT ASCII data**
- New edit **SOURCE** primary and macro command
  - Syntax: **SOURCE ASCII**
  - Converts the data from ASCII (CCSID 850) to the CCSID of the terminal using z/OS Unicode Services
  - Data converted back to ASCII when saved
- New edit **LF** primary and macro command
  - Syntax: **LF**
  - Restructures the data display using the ASCII linefeed character (x'0A') as the edit record delimiter
- New optional **SOURCE** parameter added to the **RESET** primary and macro command
  - **RESET SOURCE** reverts display back to normal mode where data is not translated to/from ASCII

z/OS 1.9 Usability

Support for Editing ASCII Data - Example

```
 File  Edit  Edit_Settings  Menu  Utilities  Compilers  Test  Help
 EDIT       server-pme51.xml                                      Columns 00001 00124
 Command ===> source ascii;lf                                     Scroll ===> CSR
 ****** *********************************** Top of Data ***********************************
 000001  1_% ÍÂÉÊÑ?>      Á>Á?ÁÑÐ A  Íèã    n_ÂÉÂÉÂÉÂÉ 8(á  sÂÉÍÂÉáÍÉÂ>ÊÑ?> 1_Ñ ÍÂÉÊÑ?>    1_8>Ê 1_Ñ  ÇÊÊn   ÍÍÍ ?_Á ?ÊÂ 1(Ñ
 ****** *********************************** Bottom of Data ********************************
```

```
 File  Edit  Edit_Settings  Menu  Utilities  Compilers  Test  Help
 EDIT       server-pme51.xml                                      Columns 00001 00124
 Command ===>                                                     Scroll ===> CSR
 ****** *********************************** Top of Data ***********************************
 000001 <?xml version="1.0" encoding="UTF-8"?>
 000002 <pmeserver:PME51ServerExtension xmi:version="2.0" xmlns:xmi="http://www.omg.org/XMI" xmlns:pmeserver="http://www.ibm.com/web
 000003   <compensationService xmi:id="CompensationService_1" enable="false"/>
 000004   <workAreaPartitionService xmi:id="WorkAreaPartitionService_1" enable="false"/>
 000005 </pmeserver:PME51ServerExtension>
 000006 0000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
 ****** *********************************** Bottom of Data ********************************
```

---

z/OS 1.9 Usability

Mixed Case in Command Tables - Usage and Invocation

- **The Extended ISPF Command Entry panel now has an option allowing data in the ACTION field to be mixed-case**

```
                    Command Table Utility
                    Extended Command Entry
 Command ===>

 Make changes to the command and select Update to update the entry or
 Cancel to ignore the changes.

   Verb  . . .  EDPROF
   Trunc . . .  3
   Action  . .  SELECT CMD(%OEDIT ./.profile)



   Description  Edit z/OS UNIX profile


 Enter / to select option
 /  Allow mixed-case in Action field

                    Update              Cancel
```

- **The new MIXC keyword for the Dialog Tag Language tag CMDACT stops the data specified with the ACTION keyword from being converted to uppercase**

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RMF for z/OS 1.9 Usability enhancements:

- **New metrics to monitor utilization of FICON channels**
- **RMF Monitor III Data Portal**
  - Enhances usability of RMF Monitor III reports by adding sort capability to any column of all RMF Monitor III reports
- **RMF Spreadsheet Reporter is enhanced to support:**
  - zAAP and zIIP
  - Report Class Periods
  - RMF XCF Activity Report
  - Process user-defined overview records

RMF for z/OS 1.9 Usability enhancements:
Two new columns in I/O Queuing Activity PP report

New:
AVG OPEN EXCH
DATA XFER CONC

```
                        I/O  QUEUING  ACTIVITY

        z/OS V1R9            SYSTEM ID JC0           DATE 06/20/2006          INTERVAL 30.00.002
                            RPT VERSION V1R9 RMF     TIME 11.00.00            CYCLE 0.100 SECONDS

 TOTAL SAMPLES =  18000   IODF = D3   CR-DATE: 05/30/2006   CR-TIME: 13.00.59   ACT: ACTIVATE

                                          AVG  AVG               DELAY AVG                       AVG    DATA
 LCU    CU     DCM GROUP    CHAN  CHPID  % DP  % CU  CUB  CMR  CONTENTION    Q   CSS   HPAV        OPEN   XFER
               MIN MAX DEF  PATHS TAKEN  BUSY  BUSY  DLY  DLY    RATE     LNGTH DLY  WAIT MAX     EXCH   CONC

 001C   2700                 24 P  0.542 12.16 0.00  0.0  0.0
                             2B P  0.438 14.72 0.00  0.0  0.0
                             38 NP 0.000 00.00 0.00  0.0  0.0
                             6D NP 0.000 00.00 0.00  0.0  0.0
                 0   0   4          0.000  0.00 0.00  0.0  0.0
                             *      1.816 14.78 0.00  0.0  0.0     0.001    0.00  0.2 0.002 256   0.052  0.001
                             *                                                                    LCU DYNAMICALLY CHANGED

 001D   2800                 D5 NP 0.000  0.00 0.00  0.0  0.0
                             C8 P  0.624 12.46 0.00  0.0  0.3
                             C9 P  0.453  9.87 0.00  0.0  0.0
                             D7 P  0.000  0.00 0.00  0.0  0.0
                             CF NS 0.000  0.00 0.00  0.0  0.0
                             D3 NS 0.000  0.00 0.00  0.0  0.0
                             *      1.673 15.53 0.00  0.0  0.3     0.000    0.00  0.5 0.001   5   0.001  0.050
```

- ► **AVG OPEN EXCH: Average Number of Open Exchanges**
- ► **DATA XFER:** **Data Transfer Concurrency**

RMF Monitor III Data Portal

Using RMF Monitor III Data Portal, you can:

1. **Browse the complete resource tree of the monitored system.**

2. **Display complete Monitor III reports (incl. „hidden" columns).**

3. **Monitor a resource by selection of a metric.**

4. **Sort any RMF Monitor III report on any column selected.**

RMF Spreadsheet reporter

**The Spreadsheet Reporter is the powerful workstation solution for graphical presentation of long term Postprocessor data.
The spreadsheets generate representative charts for performance-related areas.**
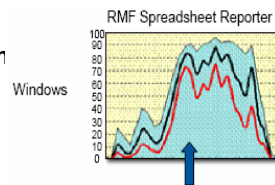
- **Enhancements:**
  - zAAP/zIIP support in Workload Activity and LPAR Trend report spreadsheet
  - Report Class Period support in Workload Activity report spreadsheet
  - New XCF Activity report spreadsheet
  - New Overview report spreadsheet for processing of overview working sets (based on user defined overview records)

New!

90
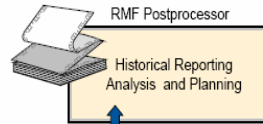
RMF Spreadsheet reporter example

zAAP/zIIP support: Workload Activity report spreadsheet

► Support zAAP/zIIP APPL% metrics:
  – **APPL% AAPCP**
  – **APPL% APP**
  – **APPL% IIPCP**
  – **APPL% IIP**

APPL% AAP on CP

APPL% AAP

Application Execution Time for Workload BATCH

---
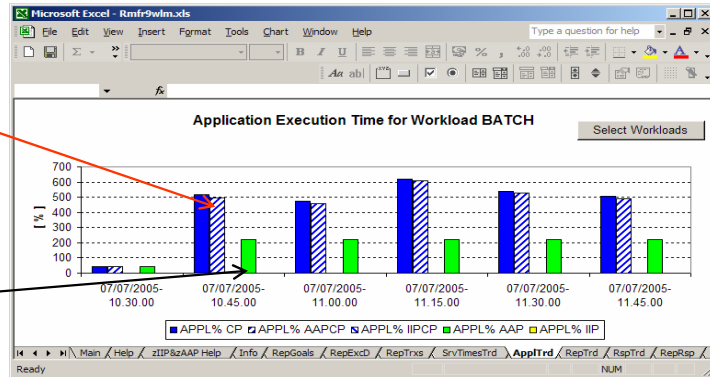
z/OS 1.9 Usability

Health Checker checks to use REXX

- **Prior to z/OS 1.9 HC checks had to be written in assembler**
- **1.9 checks can be written in REXX to run under SYSTEM REXX**
- **New parameters specified when the check is defined to indicate the check is a System REXX check:**
  - Name of exec.
  - **REXXTSO(YES|NO REXXIN (YES|NO))**
- **Check uses a conventional check message table as specified at check definition.**
- **New IBM Health Checker for z/OS callable services for System REXX checks**
  - **HZSLSTRT**: Used to indicate Check has started.
  - **HZSLFMSG**: Used to issue check messages.
  - **HZSLSTOP**: Used to indicate a check has completed
- **Check is run with a REXXOUT dsn when the check is in DEBUG mode**
- **Sample REXX check will be included in SYS1.SAMPLIB**

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z/OS 1.9 Usability

Health Checker checks to use REXX- Extended SDSF CK support

- **New columns added to panel CK in SDSF**
  - **EInterval** (Exception Interval)
    - Interval check will run when it has raised an exception
  - **ExecName**
    - Name of exec to run
  - **Locale**
    - Where check is running (e.g. **HZSPROC, REMOTE, REXX**)
- **New columns (continued)**
  - Origin
    - Origin of check (e.g. **HZSADDCK, MODIFY, HZSPRMxx**)
  - Verbose mode for check, óvertypeable
    - Generates **f hc,check=,verbose=** command

---

z/OS 1.9 Usability

Health Checker checks - new and updated checks

CHECK(IBMRACF, RACF_SENSITIVE_RESOURCES)
- New sensitive resource – **'SYS1.SAXREXEC'**

CHECK(IBMUSS,USSPARMLIB)
- This check will compare z/OS UNIX System Services current system settings with those specified in the **BPXPRMxx** parmlib members used during initialization. Reason:
- Reconfiguration settings should be kept in a permanent location so they are available the next time z/OS UNIX is initialized.
- Parameters: n/a
- Interval(1:00)

Special considerations:
z/OS 1.9 only, Remote Check

If check is deleted, z/OS UNIX must be restarted to re-add the check

z/OS 1.9 Usability

Health Checker checks - New and Updated Checks…

- **CHECK(IBMTSOE,TSOE_USERLOGS)**
  - Verifies USERLOGS are in effect for SEND command

- **CHECK(IBMTSOE,TSOE_PARMLIB_ERROR)**
  - Verifies whether there were problems setting the groupings of settings (Authorized commands, Authorized programs, Send settings, etc.), when the **IKJTSOxx** parmlib members were processed.

- **Check(IBMCS,CSTCP_SYSPLEXMON_RECOV_*TCPIPStackname*)**
  - Verifies **IPCONFIG DYNAMICXCF** or **IPCONFIG6 DYNAMICXCF** parms and the **GLOBALCONFIG SYSPLEXMONITOR RECOVERY** parameter

- **Check(IBMCS,CSVTAM_VIT_SIZE)**
  - Verifies maximum VTAM Internal Trace (VIT) table size value

- **Check(IBMCS,CSVTAM_VIT_OPT_PSSSMS)**
  - Verifies the VIT PSS SMS options are active

- **Check(IBMCS,CSVTAM_VIT_DSPSIZE)**
  - Verifies a VIT dataspace table size of 5 (5 MB)

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z/OS 1.9 Usability

Health Checker checks - New and Updated Checks…

- **Check(IBMCS,CSVTAM_VIT_OPT_ALL)**
  - Verifies all VIT options are NOT in effect

- **Check(IBMCS,CSVTAM_T1BUF_T2BUF_EE)**
  - Verifies T1BUF and T2BUF buffer pool allocations are not the defaults when Enterprise Extender is in use

- **Check(IBMCS,CSVTAM_T1BUF_T2BUF_NOEE)**
  - Verifies T1BUF and T2BUF buffer pool allocations defaults are in effect when the Enterprise Extender is not in use

- **CHECK(IBMPDSE,PDSE_SMSPDSE1)**
  - Verifies PDSE restartable address space is enabled

- **CHECK(IBMVSAMRLS,VSAMRLS_DIAG_CONTENTION**) - OA17734
  - Verifies there is no VSAMRLS latch contention

- **Check(IBMVSAMRLS,VSAMRLS_SINGLE_POINT_FALURE**) – OA17782
  - Detects/flags single points of failure in the Share Control Data Sets (SHCDS).

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z/OS 1.9 Usability

Health Checker checks - New and Updated Checks…

- **CHECK(IBMIXGLOGR,IXGLOGR_STRUCTUREFULL)**
  - Detects any logstreams that have encountered structure full conditions
- **CHECK(IBMIXGLOGR,IXGLOGR_STAGINGDSFULL)**
  - Detects any LOGGER Staging ds. that have encountered structure full conditions
- **CHECK(IBMIXGLOGR,IXGLOGR_ENTRYTHRESHOLD)**
  - Detects any logstreams that have encountered entry threshold problems

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z/OS 1.9 Usability

Health Checker checks - New and Updated Checks…

- **CHECK(IBMCSV,CSV_LNKLST_NEWEXTENTS)**
  - Verifies that the number of extents used by each dataset in the LNKLST has not changed since the LNKLST was activated.
- **CHECK(IBMCSV,CSV_LNKLST_SPACE)**
  - Verifies that Partition Data Sets defined in any active LNKLST are allocated with only primary space.
- **CHECK(IBMCSV,CSV_APF_EXISTS)**
  - Verifies the data sets described by entries in the APF list are consistent with data sets that exist on the system.
- **CHECK(IBMCSV,CSV_LPA_CHANGES)**
  - Detects changes in LPA from IPL to IPL
- **CHECK(IBMSUP,IEA_ASIDS)**
  - Detects abnormal ASID usage, and detects/warns when a IPL may become necessary due to usage trends in ASIDs
- **CHECK(IBMSUP,IEA_LXS)**
  - Detects abnormal LX and ELX usage

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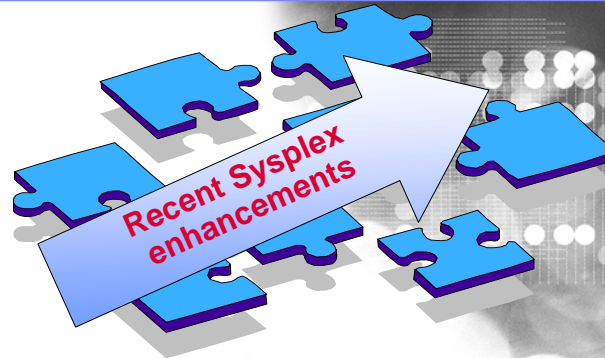
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Sysplex
Recent enhancement

- **New features in CF Level 15:**
  - More detail in D CF output and RMF reports about CF config
  - Structure-level CF CPU reporting in RMF PP reports and Monitor III
  - Increase maximum number of concurrent CF tasks from 48 to 112
  - Improved performance for System-Managed Duplexing
    - Reduce number of CF-to-CF interactions

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Sysplex
Recent enhancement Detailed D CF output

```
    D CF,CFNM=FACIL05
    IXL150I  11.07.43  DISPLAY CF 984
    COUPLING FACILITY 002094.IBM.02.00000002991E
                    PARTITION: 1E  CPCID: 00
                    CONTROL UNIT ID: FFF3
    NAMED FACIL05
    COUPLING FACILITY SPACE UTILIZATION
     ALLOCATED SPACE                DUMP SPACE UTILIZATION
      STRUCTURES:     284160 K    STRUCTURE DUMP TABLES:       0 K
      DUMP SPACE:       2048 K              TABLE COUNT:       0
     FREE SPACE:     1719808 K    FREE DUMP SPACE:          2048 K
    TOTAL SPACE:     2006016 K    TOTAL DUMP SPACE:         2048 K
                                  MAX REQUESTED DUMP SPACE:    0 K
       VOLATILE:           YES    STORAGE INCREMENT SIZE:    512 K
       CFLEVEL:             15
       CFCC RELEASE 15.00, SERVICE LEVEL 00.19
       BUILT ON 04/10/2007 AT 17:09:00
       COUPLING FACILITY HAS 0 SHARED AND 1 DEDICATED PROCESSORS
       DYNAMIC CF DISPATCHING: OFF

    CF REQUEST TIME ORDERING: NOT-REQUIRED AND NOT-ENABLED
    ...
```

New Information

Sysplex
Recent enhancement
Enhanced CF Information in RMF PP report.....

```
    PROCESSOR SUMMARY
    ------------------------------------------------------------------------------

    COUPLING FACILITY      2094      MODEL S18     CFLEVEL  15      DYNDISP OFF

    AVERAGE CF UTILIZATION  (% BUSY)       0.1     LOGICAL PROCESSORS:  DEFINED   1    EFFECTIVE   1.0
                                                                       SHARED    0    AVG WEIGHT  0.0
```

Sysplex

Recent enhancement   RMF

RMF PP now reports CF CPU utilization information at the structure level.....

```
                      C O U P L I N G   F A C I L I T Y   A C T I V I T Y
                                                                                    PAGE   1
      z/OS V1R8          SYSPLEX #@$#PLEX          START 07/31/2007-09.00.00      INTERVAL 000.30.00
                         RPT VERSION V1R8 RMF      END   07/31/2007-09.30.00      CYCLE 01.000 SECONDS

 -------------------------------------------------------------------------------------------------------------
 COUPLING FACILITY NAME = FACIL05
 TOTAL SAMPLES(AVG) =   60  (MAX) =   60  (MIN) =   59
 -------------------------------------------------------------------------------------------------------------
                           COUPLING  FACILITY  USAGE  SUMMARY
 -------------------------------------------------------------------------------------------------------------
 STRUCTURE SUMMARY
 -------------------------------------------------------------------------------------------------------------

                                         % OF           % OF   % OF   AVG    LST/DIR  DATA      LOCK     DIR REC/
            STRUCTURE                ALLOC CF      #    ALL    CF     REQ/   ENTRIES  ELEMENTS  ENTRIES  DIR REC
    TYPE    NAME         STATUS CHG  SIZE  STOR    REQ  REQ    UTIL   SEC    TOT/CUR  TOT/CUR   TOT/CUR  XI'S

    LIST    IXC_BIG_1    ACTIVE      13M   0.7  12491  52.8   16.8   6.94   1225     1207      N/A      N/A
                                                                           1        19        N/A      N/A

            IXC_DEFAULT_2 ACTIVE     13M   0.7   1690   7.1    2.8   0.94   1225     1207      N/A      N/A
    ....                                                                   1        16        N/A      N/A
```

VERY important for accurate CF capacity planning as different structure types use differing amounts of CF CPU per request AND helps problem determination if CF CPU unexpectedly high

---

Sysplex

Recent enhancement   RMF

RMF Mon III also provides near-realtime CF CPU utilization information at the structure level.....

```
                    RMF V1R8   CF Activity    - #@$#PLEX     Line 1 of 27
 Command ===>                                               Scroll ===> CSR

 Samples: 120    Systems: 2   Date: 07/31/07  Time: 11.17.00  Range: 120   Sec

 CF: FACIL06       Type ST System   CF   --- Sync ---   --------- Async --------
                                    Util  Rate  Avg     Rate  Avg    Chng   Del
 Structure Name                     %           Serv          Serv   %      %

 DB8QU_SCA          LIST  A  *ALL   11.2  0.0   0        2.0  1008   0.0    0.0
                    LIST     #@$2         0.0   0        0.0  0      0.0    0.0
                    LIST     #@$3         0.0   0        2.0  1008   0.0    0.0
 IRRXCF00_B001      CACHE A  *ALL    0.7  0.0   0        0.0  0      0.0    0.0
                    CACHE    #@$2         0.0   0        0.0  0      0.0    0.0
                    CACHE    #@$3         0.0   0        0.0  0      0.0    0.0
 ISGLOCK            LOCK  A  *ALL   20.7  1.3   217      9.8  1151   0.0    0.0
                    LOCK     #@$2         0.9   216      6.1  1196   0.0    0.0
                    LOCK     #@$3         0.4   217      3.7  1077   0.0    0.0
 ISTGENERIC         LIST  A  *ALL    1.6  0.0   0        0.8  994    0.0    0.0
                    LIST     #@$2         0.0   0        0.4  1029   0.0    0.0
                    LIST     #@$3         0.0   0        0.4  959    0.0    0.0
```

Sysplex
Recent enhancement RMF

Plus subchannel utilization information.....

```
             RMF V1R8   CF Systems    - #@$#PLEX       Line 1 of 4
  Command ===>                                      Scroll ===> CSR

  Samples: 120   Systems: 2   Date: 07/31/07  Time: 11.17.00  Range: 120   Sec

  CF Name  System   Subchannel  -- Paths --  -- Sync ---  ------- Async -------
                    Delay  Busy  Avail Delay  Rate  Avg    Rate  Avg  Chng  Del
                     %     %                        Serv          Serv  %    %

  FACIL05  #@$2     0.0   0.0    3   0.0     0.0    0     5.9   553  0.0  0.0
           #@$3     0.0   0.0    2   0.0    <0.1   245   <0.1  859  0.0  0.0
  FACIL06  #@$2     0.0   0.1    2   0.0     0.9   217   10.2  1062 0.0  0.0
           #@$3     0.0   0.0    4   0.0     0.4   217    9.8  916  0.0  0.0
```

Subchannel Busy column is Subchannel Utilization.

   Unfortunately this same information is NOT available in the PP reports

"Paths" in this report is the number of *defined* CF links from this z/OS to this CF - includes offline paths.

Sysplex
Recent enhancement   RMF/XCF

▪**Supporting APARs OA17070 (RMF), OA17055 (XCF) - PTFs available now**

  -APARs go back to z/OS 1.6
  -Requires CF at CF Level 15 to get the new information

▪**Not necessary to have all CFs at the new level**

  -Additional information is available for CFs running Level 15 or higher
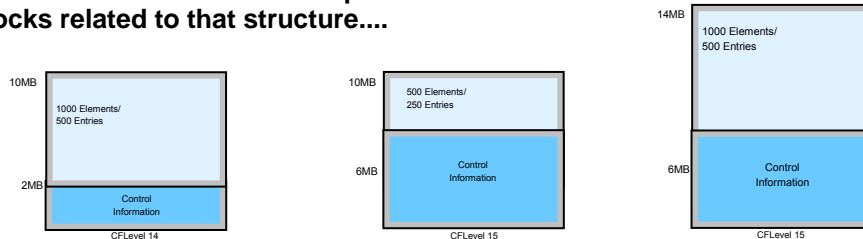
▪**Not necessary to have all systems at the new level**

  -Information comes from the CF, so any systems with the required APARs will be able to see this, other systems will not.

Sysplex

Recent enhancement

Structure size changes in CF Level 15

▪**Remember that some of the space in each structure is used for control blocks related to that structure....**

| | | 14MB |
| | | 1000 Elements/ 500 Entries |

10MB — 1000 Elements/ 500 Entries

2MB — Control Information

CFLevel 14

10MB — 500 Elements/ 250 Entries

6MB — Control Information

CFLevel 15

6MB — Control Information

CFLevel 15

▪**And CF Level 15 increases the maximum number of concurrent tasks per CF (means more control information)**

▪**Structure size increase for CF Level 15 is a fixed amount per structure, *not* a percent of current structure size**

▪**Vital that you adjust structure sizes to allow for this, especially for very small structures...**

WSC Flash available at:
http://www.ibm.com/support/techdocs/FLASH10572

Sysplex

Recent enhancement

CF Lvl 15 Structure Size Changes

▪**Following structures (with 64K max data entry size) will increase by 4MB:**

- XCF Signalling
- WLM IRD, Enclaves
- Logger (CICS, SA, IMS, OPERLOG, LOGREC, RRS, HealthChecker, WAS, APPC, IMS CQS, other logstreams)
- IMS EMH, CQS shared message queue
- MQ shared queues application and administrative
- VTAM MNPS (multi-node persistent sessions)
- TCP/IP sysplex wide security associations
- BatchPipes

Sysplex
Recent enhancement

CF Lvl 15 Structure Size Changes

▪**Following structures (with 32K max data entry size) will increase by 2MB:**
- DB2 GBPs (w/32K page size)
- VSAM RLS cache
- IMS cache (various types)
- CICS temp storage, shared data tables

Sysplex
Recent enhancement

CF Lvl 15 Structure Size Changes

▪**Following structures (with 16K max data entry size) will increase by 1MB:**
- DB2 GBPs (w/4K, 8K, 16K pagesize), SCA
- VTAM GR (ISTGENERIC)
- RACF cache
- Enhanced Catalog Sharing (ECS)
- HSM common recall queue
- CICS named counter server
- IMS VSO
- JES2 checkpoint
- TCP/IP sysplex ports

Sysplex
Recent enhancement

CF Lvl 15 Structure Size Changes

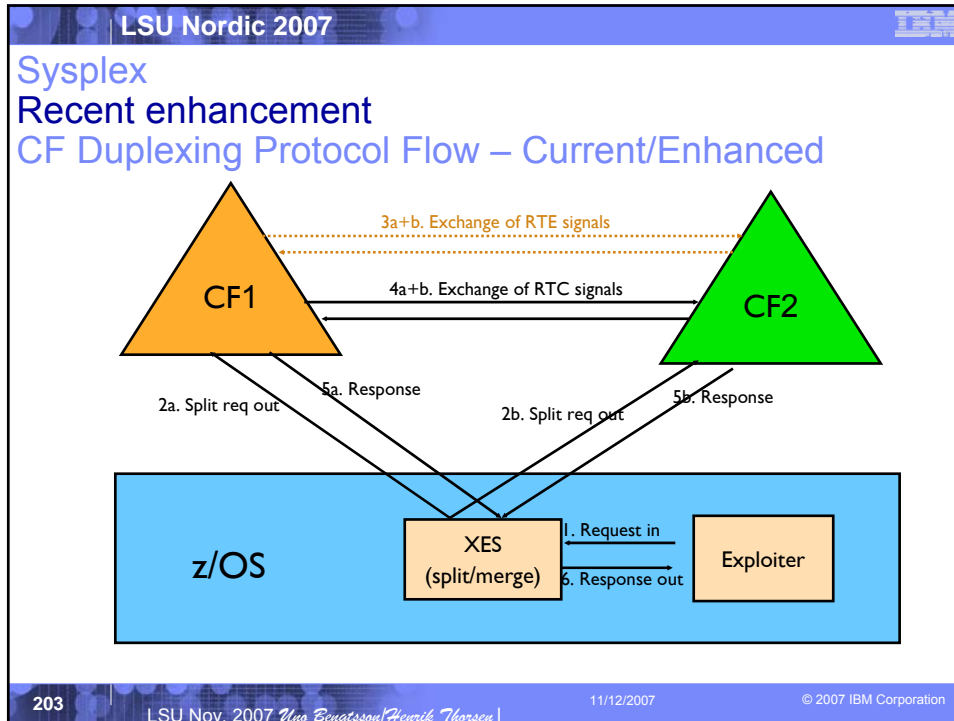- **Following structures will increase by .5 or .25 MB:**
  - All lock structures (GRS STAR ISGLOCK, IMS IRLM, DB2 IRLM, VSAM RLS IGWLOCK00, others)

Sysplex
Recent enhancement

CF Level 15 SM Duplexing Enhancements

- **However the performance impact of the current implementation means that SM Duplexing hasn't been as widely deployed as we expected it would be**
  - The root cause of the performance issue are the CF-to-CF signals that are used to synchronize processing
- **To try to improve performance, XES and CF Level 15 have been changed to reduce the number of CF-to-CF interactions**
- **CF Duplexing protocol remains a "synchronous mirroring" protocol, exchanging CF-to-CF signals to coordinate updates in lock step on every update request**

Sysplex
Recent enhancement
CF Duplexing Protocol Flow – Current/Enhanced

3a+b. Exchange of RTE signals

CF1

CF2

4a+b. Exchange of RTC signals

5a. Response

2a. Split req out

2b. Split req out

5b. Response

z/OS

XES
(split/merge)

1. Request in

Exploiter

6. Response out

Sysplex
Recent enhancement

System-Managed Duplex enhancements

- **System-Managed Duplexing enhancements require:**
  - APAR OA21913, OA17055 (XES), and OA17070 (RMF) on top of z/OS 1.6 to 1.9
  - Announced to be available in 1Q2008
  - CF Level 15 - Shipped with z9 GA3 (Driver 67). Will require new (yet-to-be identified) CF Service Level.
  - Same HW requirements as previous implementation of SM Duplexing
    - Still need CF-to-CF links

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Sysplex
Recent enhancement

System-Managed Duplex enhancements

- **Implementation of new function is transparent once support is installed:**
  - No externals to turn on or off
  - In a plex where some systems have the supporting PTFs and some don't, systems with new function support will operate in the new way, while those without the support will continue to operate as before:
    - Remember that each pair of duplexed requests come from same z/OS image - the intent of RTE and RTC is to coordinate between two instances of the same update request, so it is OK if requests from one system work the old way and requests from another system work the new way
  - With CFs with mixed CF Levels, new function will not come into effect (both structure instances must reside in CFCC Level 15 CF).

Sysplex
Recent enhancement

System-Managed Duplex enhancements

- **Performance:**
  - Measurement runs ongoing - no published results yet
- **Expected that:**
  - CF utilization may drop (depends on what percentage of requests are duplexed)
  - Response times for SM Duplexed requests should decrease
  - z/OS utilization will be unchanged
- **Installations may see a small increase in synchronous response time and CF utilization when moving from CF Level 14 to 15**
  - This applies to *all* requests, not just ones to SM duplexed structures

LSU Nordic

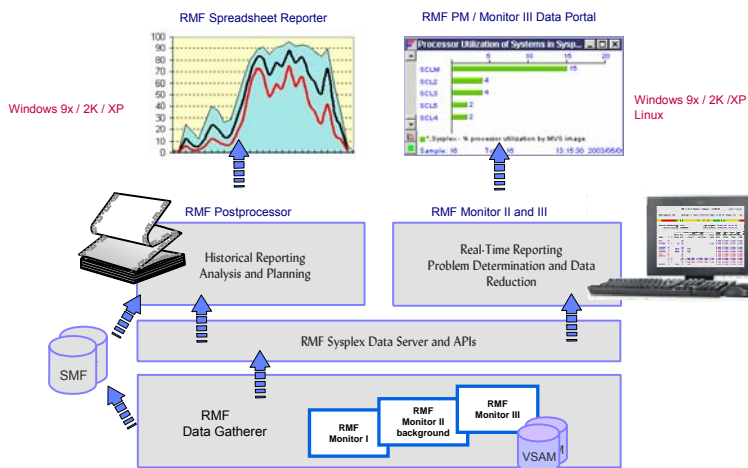Nordic LSU October 2007
Uno Bengtsson and Henrik Thorsen

11/12/2007

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RMF Product Overview

RMF Spreadsheet Reporter

RMF PM / Monitor III Data Portal

Windows 9x / 2K / XP

Windows 9x / 2K /XP
Linux

RMF Postprocessor

RMF Monitor II and III

Historical Reporting
Analysis and Planning

Real-Time Reporting
Problem Determination and Data
Reduction

RMF Sysplex Data Server and APIs

SMF

RMF
Data Gatherer

RMF
Monitor I

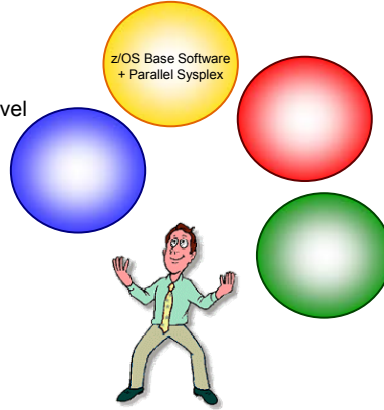RMF
Monitor II
background

RMF
Monitor III

VSAM

208

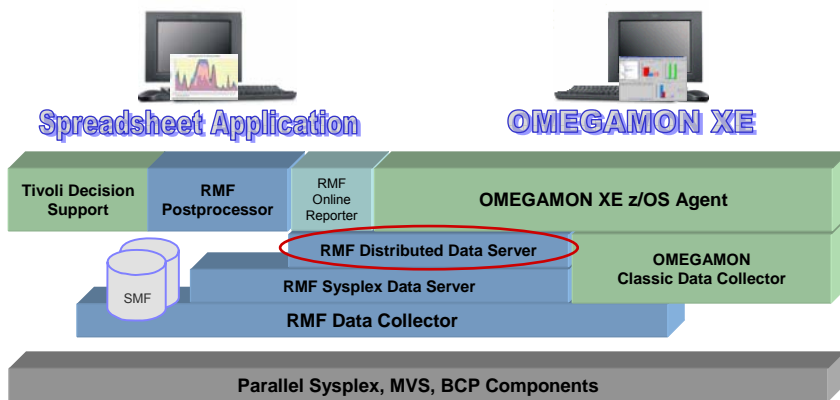LSU Nov. 2007 *Uno Bengtsson Henrik Thorsen*

11/12/2007

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RMF recent and 1.9 enhancements…

- **Extended XCF Reporting**
  - ▶ Examine Group and Member Activity
  - ▶ Detect Bottlenecks on System and TC Level
  - ▶ Identify Path Contention
- **Blocked Workloads Analysis**
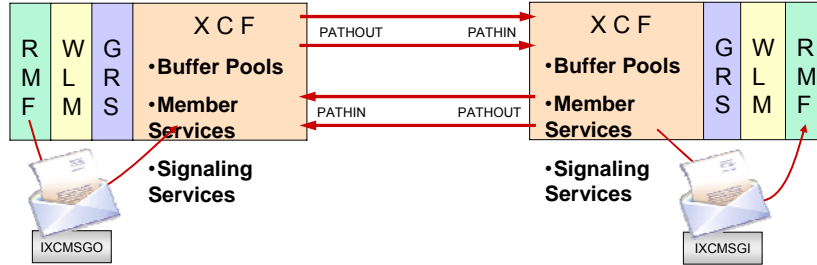 - ▶ New WLM Promotion Statisics
  - ▶ Tune IEAOPTxx Parameters

z/OS Base Software + Parallel Sysplex

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RMF Extended XCF Reporting

Spreadsheet Application   **OMEGAMON XE**

| Tivoli Decision Support | RMF Postprocessor | RMF Online Reporter | OMEGAMON XE z/OS Agent |

RMF Distributed Data Server

RMF Sysplex Data Server   **OMEGAMON Classic Data Collector**

SMF

RMF Data Collector

Parallel Sysplex, MVS, BCP Components

⇒ z/OS 1.8   **Common Coupling Facility Data Collection**
⇒ z/OS 1.9   **Common XCF Data Collection**

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XCF Overview

```
        X C F                PATHOUT        PATHIN              X C F
R W G                                                                    G W R
M L R  •Buffer Pools                                            •Buffer Pools    R L M
F   M                                                                    S     F
       •Member                PATHIN        PATHOUT             •Member
       Services                                                Services

              •Signaling                                •Signaling
              Services                                  Services

    IXCMSGO                                                        IXCMSGI
```

SYS1.PARMLIB(COUPLExx)

```
CLASSDEF CLASS(BIG)     CLASSLEN(40892) GROUP(UNDESIG) MAXMSG(180)
CLASSDEF CLASS(TCRMF)   CLASSLEN(62464) GROUP(SYSRMF)  MAXMSG(240)
CLASSDEF CLASS(DEFAULT) CLASSLEN(956)   GROUP(UNDESIG)

PATHOUT  STRNAME(IXCPLEX_PATH1) CLASS(BIG)
PATHOUT  STRNAME(IXCPLEX_PATH3) CLASS(TCRMF)
PATHOUT  STRNAME(IXCPLEX_PATH4)
PATHIN   STRNAME(IXCPLEX_PATH1,IXCPLEX_PATH2,IXCPLEX_PATH3,IXCPLEX_PATH4)
```

XCF Performance Considerations

► *What systems are involved in signaling?*
► *What is the load going to and from the systems?*
► *What are the Transport Classes and the load on each Transport Class?*
► *What is the size of the messages?*
► *How are my XCF buffers doing?*

► *What hardware resources are involved (CFs and CTCs)?*
► *Are there any malfunctions? How busy are the resources?*

► *What applications are causing the XCF load?*

**RMF Postprocessor
XCF Activity Report**

- XCF Usage By System
    – Buffer statistics from the local systems perspective
    – Outbound, Inbound and Local signaling activities on Transport Class granularity
- XCF Path Statistics
    – Physical connection statistics
    – Outbound and Inbound signaling activities and contention
- XCF Usage by Member
    – Message statistics on Group and Member granularity
    – Outbound and Inbound signaling activities

Monitor III Data Portal: XCF Statistics

✔ **SMF 74.2 data now displayed with any WEB Browser**

✔ **XCF statistics are combined to Sysplex-wide view**

✔ **Sysplex quick-check: members, z/OS level, status information**

RMF Report [,RMF7PLEX,SYSPLEX] : XCFOVW (XCF Systems Overview)

Time Range: 06/22/2007 17:33:20 - 06/22/2007 17:35:00

System Name	SMF Id	Partition Name	System Level	Monitoring Interval	Operator Interval	Status	RMF Master
RMF7	RMF7		SP7.0.9	90,000.00	90,000.00	Active	Yes
RMF8	RMF8		SP7.0.9	90,000.00	90,000.00	Active	No
RMF9	RMF9		SP7.0.9	90,000.00	90,000.00	Active	No

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XCF System Statistics Table

➡ Provides XCF statistics on system and transport class level
➡ Identifies message exchange between systems by transport classes

RMF Report [,RMF7PLEX,SYSPLEX] : XCFSYS (XCF System Statistics)

Time Range: 12/13/2006 16:03:20 - 12/13/2006 16:05:00

Systems	Transport Class	Signals Sent	Signals Received	Times Path Unavailable	Times Buffer Unavailable	Buffer Length	Fit %	Smaller %	Larger %	Degraded %	System (1)	System (2)	Direction
RMF7:RMF7	BIG	0	0	0	0	40892	0.0	0.0	0.0	0.0	RMF7	RMF7	L
RMF7:RMF7	DB2	0	0	0	0	956	0.0	0.0	0.0	0.0	RMF7	RMF7	L
RMF7:RMF7	DEFAULT	23	0	0	0	956	100.0	0.0	0.0	0.0	RMF7	RMF7	L
RMF7:RMF7	FEWFAST	0	0	0	0	956	0.0	0.0	0.0	0.0	RMF7	RMF7	L
RMF7:RMF7	JES2	0	0	0	0	956	0.0	0.0	0.0	0.0	RMF7	RMF7	L
RMF7:RMF7	TCCONS	0	0	0	0	956	0.0	0.0	0.0	0.0	RMF7	RMF7	L
RMF7:RMF7	TCGRS	6	0	0	0	956	100.0	0.0	0.0	0.0	RMF7	RMF7	L
RMF7:RMF7	TCOPC	0	0	0	0	956	0.0	0.0	0.0	0.0	RMF7	RMF7	L
RMF7:RMF7	TCRMF	0	0	0	0	62464	0.0	0.0	0.0	0.0	RMF7	RMF7	L
RMF7:RMF7	TCVLF	0	0	0	0	956	0.0	0.0	0.0	0.0	RMF7	RMF7	L
RMF7:RMF8	*ALL	0	54	6	0	0	0.0	0.0	0.0	0.0	RMF7	RMF8	I
RMF7:RMF8	BIG	10	0	1	0	40892	0.0	0.0	100.0	0.0	RMF7	RMF8	O
RMF7:RMF8	DB2	0	0	0	0	956	100.0	0.0	0.0	0.0	RMF7	RMF8	O
RMF7:RMF8	DEFAULT	44	0	1	0	956					RMF7	RMF8	O
RMF7:RMF8	FEWFAST	0	0	0	0	956					RMF7	RMF8	O
RMF7:RMF8	JES2	0	0	1	0	956	0.0	0.0	0.0	0.0	RMF7	RMF8	O
RMF7:RMF8	TCCONS	0	0	0	0	956	0.0	0.0	0.0	0.0	RMF7	RMF8	O
RMF7:RMF8	TCGRS	3	0	1	0	956	0.0	0.0	0.0	0.0	RMF7	RMF8	O
RMF7:RMF8	TCOPC	0	0	0	0	956					RMF7	RMF8	O
RMF7:RMF8	TCRMF	3	0	1	0	62464	0.0	0.0	0.0	0.0	RMF7	RMF8	O
RMF7:RMF8	TCVLF	0	0	1	0	956	0.0	0.0	0.0	0.0	RMF7	RMF8	O

▶ **What systems are involved in signaling?**
▶ **What is the load going to and from the systems?**
▶ **What are the Transport Classes and their load?**
▶ **What is the size of the messages?**
▶ **How are my XCF buffers doing?**

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XCF System Statistics – DDS Metrics

Sysplex

MVS Image
I/O Subsystem
Processor
Storage
Enqueue
Operator
Subsystems
CPC
LPAR
Coupling Facility
CF Structure

Resource	New metric
Sysplex	**Category: by XCF systems and transport class** ▪ **signals sent by XCF systems and transport class** ▪ **times path unavailable by XCF systems and transport class** ▪ **times buffer unavailable by XCF systems and transport class** ▪ **buffer length by XCF systems and transport class** ▪ **% fit by XCF systems and transport class** ▪ **% small by XCF systems and transport class** ▪ **% large by XCF systems and transport class** ▪ **% degraded by XCF systems and transport class** **Category: by XCF systems** ▪ **signals received by XCF systems**
MVS Image	**Category: by XCF systems and transport class** ▪ **signals sent by XCF systems and transport class** ▪ **times path unavailable by XCF systems and transport class** ▪ **times buffer unavailable by XCF systems and transport class** ▪ **buffer length by XCF systems and transport class** ▪ **% fit by XCF systems and transport class** ▪ **% small by XCF systems and transport class** ▪ **% large by XCF systems and transport class** ▪ **% degraded by XCF systems and transport class**

XCF Path Statistics Table

➡ Provides XCF statistics on physical connection level
➡ Identifies the connection infrastructure and path contention

RMF Report [,RMF7PLEX,SYSPLEX] : XCFPATH (XCF Path Statistics)

Time Range: 12/13/2006 15:21:40 - 12/13/2006 15:23:20

Systems	Structure or CTC Devices	Path Type	Transport Class	Status	Status (short)	Retry %	Retry Limit	Message Limit	Signals Sent	Times Path Busy	Signals Pending	Storage in Use	Restart Count	Signals Received	Times Buffer Unavailable	I/O Transfer Time	Line Type	System (1)	System (2)
RMF7,RMF8	IXCPLEX_PATH2 (0010)	LST	JES2	Working	WR	0.0	255	99999	0	0	0	22	0	0	0		O	RMF7	RMF8
RMF7,RMF8	IXCPLEX_PATH3 (0010)	LST	TCRMF	Working	WR	0.0	255	65536	0	0	0	726	0	0	0		O	RMF7	RMF8
RMF7,RMF8	IXCPLEX_PATH4 (0010)	LST	DEFAULT	Working	WR	0.0	255	240	85	0	0	22	0	0	0		O	RMF7	RMF8
RMF7,RMF8	IXCVLF(0010)	LST	TCVLF	Working	WR	0.0	255	99999	0	0	0	22	0	0	0		O	RMF7	RMF8
RMF7,RMF8	IXCGRS(0010)	LST	TCGRS	Working	WR	0.0	255	99999	3	0	0	22	0	0	0		O	RMF7	RMF8
RMF7,RMF8	IXCPLEX_PATH1 (0010)	LST	BIG	Working	WR	0.0	255	180	12	0	0	462	0	0	0		O	RMF7	RMF8
RMF7,RMF9	IXCGRS(0008)	LST	TCGRS	Working	WR	0.0	255	99999	4	0	0	22	0	0	0		O	RMF7	RMF9
RMF7,RMF9	IXCPLEX_PATH1 (0008)	LST	BIG	Working	WR	0.0	255	180	12	0	0	462	0	0	0		O	RMF7	RMF9
RMF7,RMF9	IXCPLEX_PATH4 (0008)	LST	DEFAULT	Working	WR	0.0	255	240	83	0	0	22	0	0	0		O	RMF7	RMF9
RMF7,RMF9	IXCVLF(0008)	LST	TCVLF	Working	WR	0.0	255	99999	0	0	0	22	0	0	0		O	RMF7	RMF9
RMF7,RMF9	IXCPLEX_PATH2 (0008)	LST	JES2	Working	WR	0.0	255	99999	0	0	0	22	0	0	0		O	RMF7	RMF9
RMF7,RMF9	IXCPLEX_PATH3 (0008)	LST	TCRMF	Working	WR	0.0	255	65536	0	0	0	504	0	0	0		O	RMF7	RMF9
RMF8,RMF7	IXCPLEX_PATH2 (0011)	LST	JES2	Working	WR	0.0	255	99999	0	0	0	22	0	0	0		O	RMF8	RMF7
RMF8,RMF7	IXCPLEX_PATH1 (0011)	LST	BIG	Working	WR	0.0	255	180	12	0	0	462	0	0	0		O	RMF8	RMF7

➤ **What hardware resources are involved (CFs and CTCs)?**
➤ **Are there any malfunctions?**
➤ **How busy are the resources?**

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## XCF Path Statistics – DDS Metrics

Sysple
x
MVS Image
  I/O Subsystem
  Processor
  Storage
  Enqueue
  Operator
  Subsystems
CPC
  LPAR
Coupling Facility
  CF Structure

Resource	New metric
Sysplex, MVS Image	**Category: by XCF systems and path** ▪%retry by XCF systems and path ▪retry limit by XCF systems and path ▪message limit by XCF systems and path ▪signals sent by XCF systems and path ▪times path busy by XCF systems and path ▪signals pending transfer by XCF systems and path ▪storage in use by XCF systems and path ▪restart count by XCF systems and path ▪signals received by XCF systems and path ▪times buffer unavailable by XCF systems and path ▪i/o transfer time by XCF system and path

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XCF Group Statistics Table

⇒ Provides XCF statistics on group and member level
⇒ Identifies the core components and their XCF activities

RMF Report [,RMF7PLEX,SYSPLEX] : XCFGROUP (XCF Group Statistics)

Time Range: 12/13/2006 16:01:40 - 12/13/2006 16:03:20

Group Name	Member Name	Status (short)	Status	Status Checking Interval	System Name	Job Name	Outbound Requests	Inbound Requests	Line Type
BOERMF7	*ALL						120	112	G
BOERMF7	BOERMF7$RMF7	A	Active	30,000.00	RMF7	JESXCF	40	37	M
BOERMF7	BOERMF7$RMF8	A	Active	30,000.00	RMF8	JESXCF	40	38	M
BOERMF7	BOERMF7$RMF9	A	Active	30,000.00	RMF9	JESXCF	40	37	M
COFVLFNO	*ALL						0	0	G
COFVLFNO	RMF7	A	Active	0.00	RMF7	VLF	0	0	M
COFVLFNO	RMF8	A	Active	0.00	RMF8	VLF	0		M
COFVLFNO	RMF9	A	Active	0.00	RMF9	VLF	0		M
EZBTCPCS	*ALL						0	0	G
EZBTCPCS	RMF7TCPIP	A	Active	3,000.00	RMF7	TCPIP	0	0	M
EZBTCPCS	RMF8TCPIP	A	Active	3,000.00	RMF8	TCPIP	0	0	M
EZBTCPCS	RMF9TCPIP	A	Active	3,000.00	RMF9	TCPIP	0	0	M
ISTCFS01	*ALL						0	0	G
ISTCFS01	IPVV7$$$DEIBMIPS	A	Active	0.00	RMF7	NET	0	0	M
ISTCFS01	IPVV8$$$DEIBMIPS	A	Active	0.00	RMF8	NET	0	0	M
ISTCFS01	IPVV9$$$DEIBMIPS	A	Active	0.00	RMF9	NET	0	0	M
ISTXCF	*ALL						92	83	G
ISTXCF	IPVV7$$$DEIBMIPS	A	Active	0.00	RMF7	NET	31	27	M
ISTXCF	IPVV8$$$DEIBMIPS	A	Active	0.00	RMF8	NET	30	29	M
ISTXCF	IPVV9$$$DEIBMIPS	A	Active	0.00	RMF9	NET	31	27	M

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XCF Group Statistics – DDS Metrics
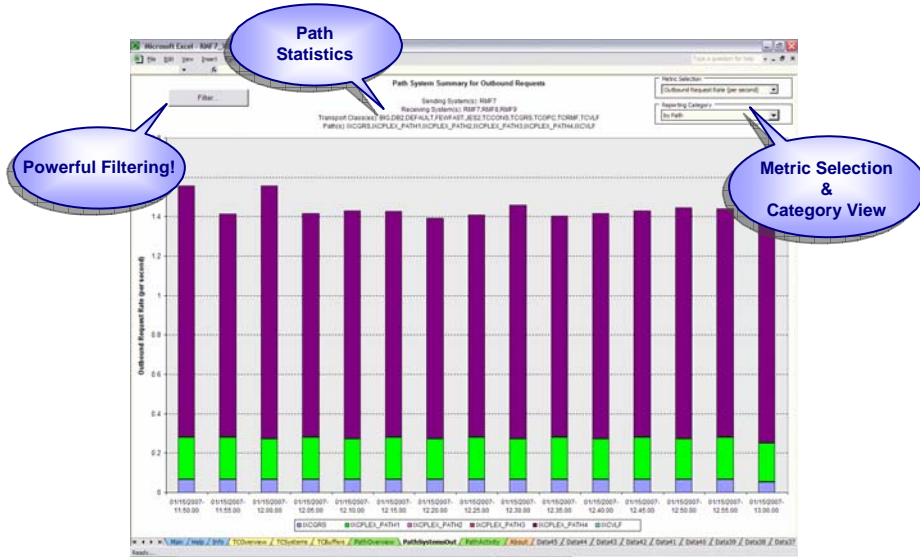
Sysplex

- MVS Image
  - I/O Subsystem
  - Processor
  - Storage
  - Enqueue
  - Operator
  - Subsystems
- CPC
  - LPAR
- Coupling Facility
  - CF Structure

Resource	New metric
Sysplex	**Category: by XCF Group** ▪**signals sent by XCF group** ▪**Signals received by XCF group** **Category: by XCF group and member** ▪**signals sent by XCF group and member** ▪**signals received by XCF group and member**
MVS Image	**Category: by XCF group and member** ▪**signals sent by XCF group and member** ▪**signals received by XCF group and member**

RMF 1.9 Spreadsheet Reporter: XCF Macro

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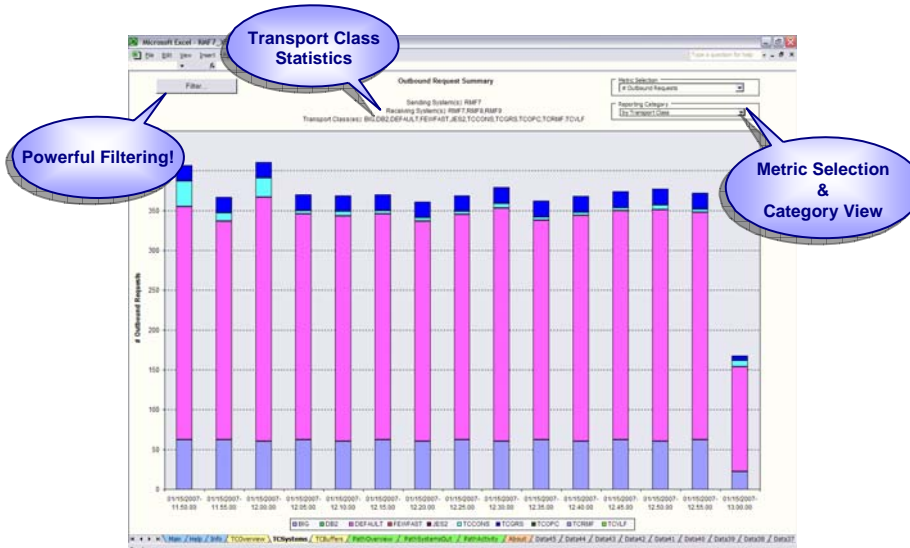
RMF 1.9 Spreadsheet Reporter: XCF Macro

Miscellaneous Enhancements

XCF signaling enhancement SSUMLIMIT: APAR OA11591

Problem addressed:

- **Message IXC426D presented for systems sending XCF signals but not updating system status on the sysplex CDS.**
- **A system that is in this state is not completely inoperable and yet it may not be fully functional either, so may cause sysplex sympathy sickness problems**
- **Currently SFM will not partition the system out**

Solution:

- **A new keyword in SFM policy to take automatic action against such systems:**
  – **SSUMLIMIT**, specify time interval, in seconds, that system can be in the status update missing condition but still producing XCF signals before SFM partition activity
  – No automatic action will be taken (the operator is prompted) if **SSUMLIMIT(NONE)** is specified or defaulted (as before this support).

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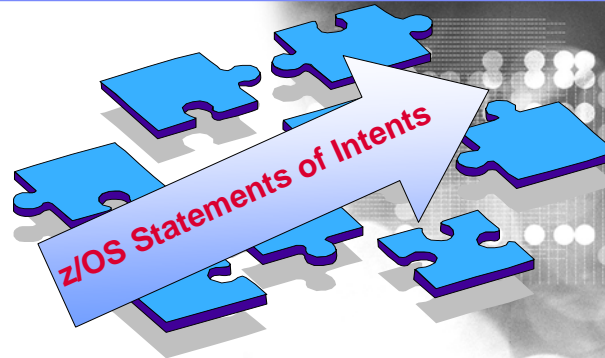
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Statements of Direction*
Modified

- **Before:**
  - VSAM support for IMBED, REPLICATE, & KEYRANGE will be removed in a future release.

- **After:**
  - VSAM support for IMBED & REPLICATE, & KEYRANGE will be removed in a future release. Support for the VSAM KEYRANGE attribute will <u>not</u> be withdrawn

  - VSAM data sets which have the IMBED or REPLICATE attributes which are recalled or restored by DFSMShsm or DFSMSdss, will have these attributes removed during the recall or restore**.**

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

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Statements of Direction …

- In the future, IBM intends to enable z/OS XML to take additional advantage of IBM System z9 Integrated Information Processors (zIIPs).
  - z/OS XML processing that runs in enclave SRB mode will be eligible for zIIP offload

- IBM intends to extend z/OS XML System Services with these enhancements:

  - IBM intends to enhance the XML Toolkit for z/OS so eligible workloads use z/OS XML. This will allow eligible XML Toolkit processing to exploit zAAPs.
  - IBM intends to add validating parsing to z/OS XML System Services. This extends zAAP and zIIP exploitation to include XML validating parsing workload.

Statements of Direction …

- z/OS R9 will be the last release to support CPU affinity
  - Meaningless on PR/SM in most cases anyway
  - Attempts to assign CPU affinity will be ignored by future releases
    - For example, specifications for assigning a program to a specific logical processor using PPT or SCHEDxx
- In a future release, Communications Server will remove support for:
  - Network Database (NDB) function; consider using the distributed data facility (DDF) provided by z/OS DB2, and the DB2 Run-Time Client instead
  - The DHCP server; consider replacing it with a DHCP server on Linux for System z
  - The Boot Information Negotiation Layer (BINL) function; consider using IBM Tivoli® Provisioning Manager for OS Deployment in its place

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ITSO Workshops Weeks 46 - Copenhagen

- **http://www.redbooks.ibm.com/projects.nsf/WorkshopIndex?OpenView&Start=59**

- **z/OS Version 1 Release 9**, ITSO1DK Open
  - **Starts 12 Nov 2007 for 1 day in Copenhagen, Denmark**
- **Parallel Sysplex Update and High Availability Topics**, ITSO2DK Open
  - **Starts 13 Nov 2007 for 1 day in Copenhagen, Denmark**
- **System z Hardware Update -2007**, ITSO3DK Open
  - **Starts 14 Nov 2007 for 1 day in Copenhagen, Denmark**
- **System z Security**, ITSO4DK Open
  - **Starts 15 Nov 2007 for 1 day in Copenhagen, Denmark**
- **System z Networking Technologies Update**, ITSO5DK Open
  - **Starts 16 Nov 2007 for 1 day in Copenhagen, Denmark**

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