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z/OS V1R9 Changes to the Base Control Program (BCP)



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geoManager	DFSMSdfp	IMS/ESA	RS/6000
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AFP	DFSMSrmm	Language Environment	SecureWay
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APPN	Enterprise System 3090	MQSeries	Sysplex Timer
BookManger	Enterprise System 4381	MVS/ESA	System/390
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z/OS V1R9 BCP Enhancements



- SMF recording to log streams
- GRS enhancements
- New face of z/OS
 - System Rexx
 - SDSF Rexx
 - Health Checker Rexx
 - C language capabilities for classical MVS exits, thanks to a new METAL option of the IBM z/OS XL C compiler
 - Common Event Adapter (CEA)
- Large format data set enhancements



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SMF and z/OS V1R9 Recording to Log Streams "SMF Data Volume"



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Current Problems with SMF



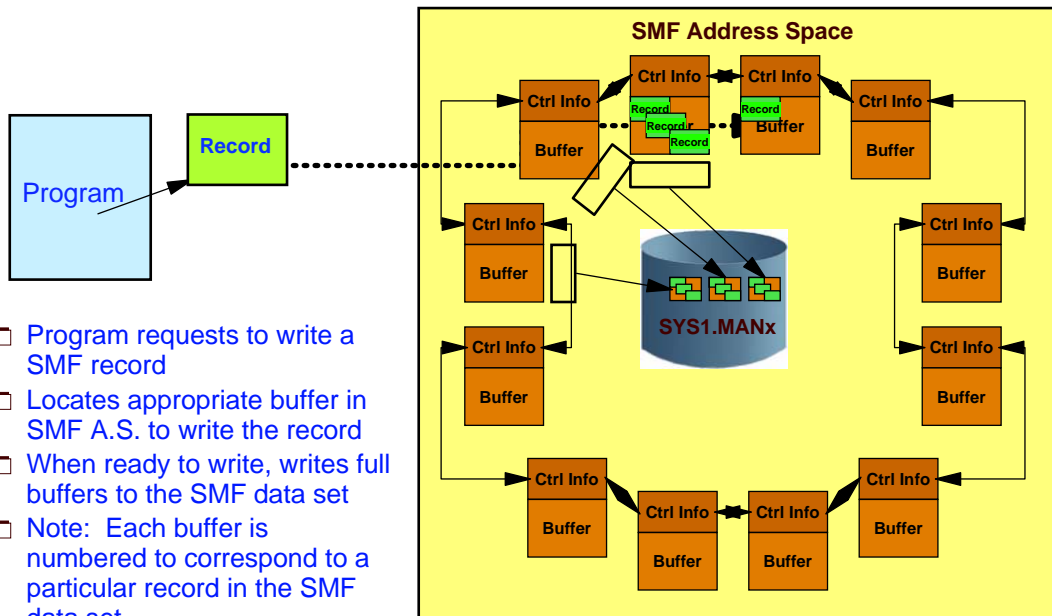
- ❑ z/OS images are getting larger and faster
 - More CPs, more real storage, more jobs run
- ❑ SMF data set recording has not kept pace well
- ❑ SMF recording limitations can cause data to be lost when:
 - I/O to active data set is held up
 - All SYS1.MANx data sets full (dump required)
 - Across SYS1.MANx data set “switch” processing
- ❑ Heavy recording can overrun buffers while processing a switch
- ❑ SMF dump program must read every record to dump required records

z/OS V1R9 Enhancements



- ❑ Utilizes System Logger to improve the write rate and increase the volume of data that can be recorded
- ❑ System Logger utilizes coupling facility and media manager to write more data at much higher rates than SMF's SYS1.MANx data set allows
- ❑ Reduce process time - less filtering for dump program
- ❑ Provide better management of the data by separating different record types into a number of different log streams
- ❑ Provide keywords on OUTDD keyword of dump program that allow data to be read once and written many times
- ❑ One SMF record type can be written to more than one log stream
- ❑ For each SMF log stream, a dataspace is created as a buffer in the SMF ASID, so each buffer is 32 GB

Current SMF Recording to SYS1.MANx



- ❑ 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 data set
- ❑ Note: Each buffer is numbered to correspond to a particular record in the SMF data set



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z/OS V1R9 SMF Log Stream Recording



- ❑ Enhance SMF to record to System Logger log streams
 - Data buffered in multiple data spaces (1 per log stream), increasing buffering capacity
 - Data written to log streams by multiple tasks (1 per log stream), increasing write rate
 - Allow data to be partitioned to log streams as it is created
- ❑ Records can be recorded to multiple log streams
- ❑ Create new dump program to read log streams

The use of log streams for SMF Data is optional. Existing SYS1.MANx function continues to exist for installations satisfied with this functionality.



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Using System Logger for SMF

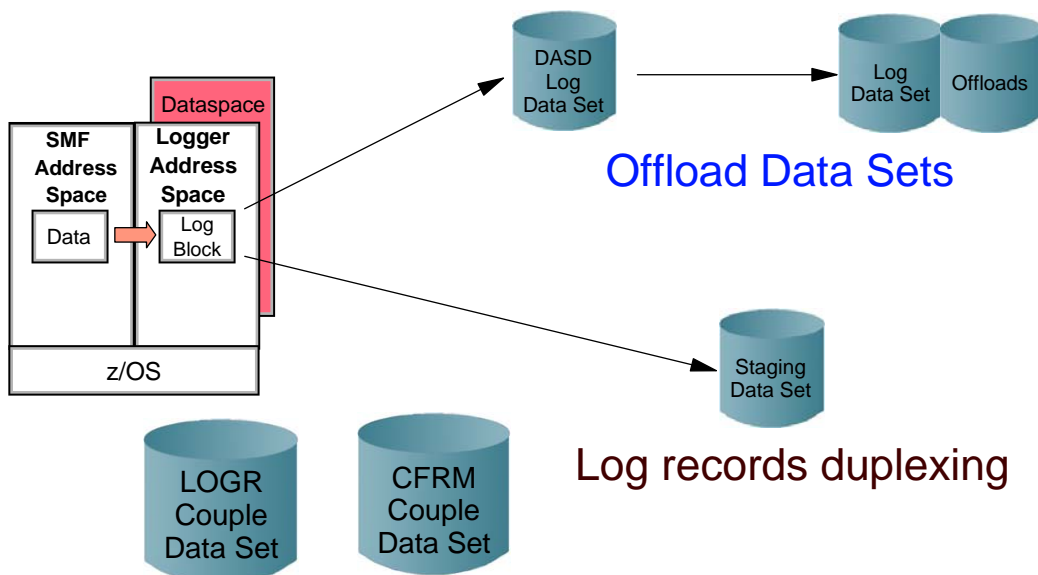


- ❑ System Logger captures data faster than MANx data sets
- ❑ No I/O during switch processing to cause data overrun
- ❑ Separate SMF Dump program only reads data in specified log stream(s) (not all data at once)
- ❑ Any function recording SMF data, no change to SMF callers



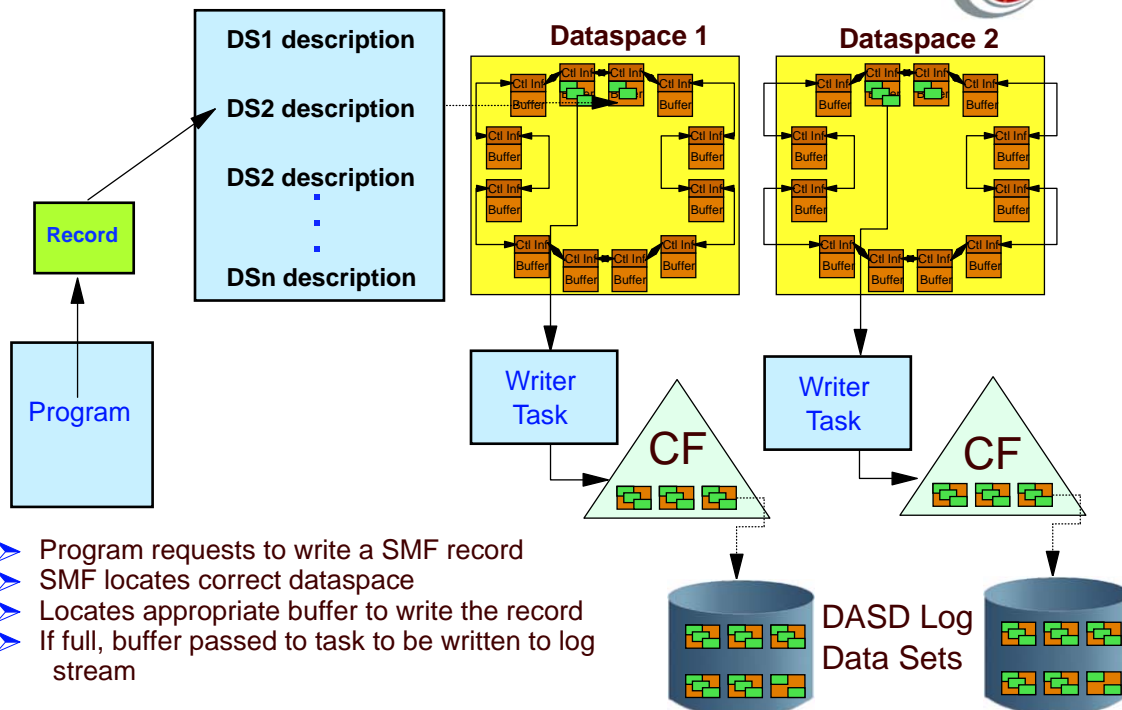
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SMF Recording to Log Streams



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z/OS V1R9 SMF Log Stream Recording



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Coupling Facility or DASD-only



- ❑ **Coupling facility log streams**
 - Data is stored in a coupling facility structure and then offloaded to DASD
 - A coupling facility log stream is ideal for merging SMF data from multiple systems
 - Make sure the SMF id (SID) is unique within the sysplex
- ❑ **DASD-only log streams**
 - Data is stored in local storage buffers and then offloaded to DASD
 - DASD-only log streams can only be single-system in scope, and only one system can write data to any given DASD-only log stream



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SMFPRMxx Parmlib Member



- ❑ Choose SMF recording type - RECORDING keyword
 - SYS1.MANx or log stream
- ❑ Define log stream names - LSNAME keyword
 - Specify record types by log stream
- ❑ Activate parmlib via IPL or SET SMF=xx command
- ❑ SETSMF RECORDING can be used to change recording settings (for fallback)

```
RECORDING(DATASET | LOGSTREAM)
DEFAULTLSNAME(logstreamname)
LSNAME(logstreamname,TYPE{aa,bb} | ({aa,bb:zz}))
```



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Defining SMF System Logging



- ❑ If you specify the same record type on two or more different LSNAME parameters
 - System writes the record to all specified log streams
- ❑ Could create a SMFPRMxx parmlib member with the following contents:

```
DEFAULTLSNAME(IFASMF.DEFAULT)
LSNAME(IFASMF.PERF,TYPE(30,89))
LSNAME(IFASMF.JOB,TYPE(30))
RECORDING(LOGSTREAM)
```



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Using DASD-only Log Streams



- ❑ Write data to a DASD-only log stream, simply replacing SMF MANx data sets
 - Use DEFAULTLSNAME(IFASMF.xxx) or
 - LSNAME(IFASMF.xxx,TYPE(0:255)) to specify log stream
- ❑ Run new SMF Dump Program to archive data
- ❑ Simplest approach to using log streams
- ❑ Better performance using log stream vs. SMF data sets



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SMF New Dump Program - Log Streams



- ❑ New JCL for the IFASMF DL dump program to dump new log streams
- ❑ 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 log streams
- ❑ Providing keywords on the OUTDD keyword of dump program that allow data to be - read once, written many



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SMF New Dump Program - Log Streams



- ❑ Update processes to use data from log streams
 - Ex. Automate periodic “Switch SMF” commands to drive new SMF dump program
- ❑ To dump an SMF log stream to archive the data
 - Dump SMF log stream data by issuing the SWITCH SMF command, which first dumps the SMF data in the buffers out to the log streams, and then passes control to the IEFU29L SMF log stream dump exit
 - Use the SMF IFASMF DL, to dump the specified log stream data to dump data sets
 - For more information on the IEFU29L exit, see [z/OS MVS Installation Exits, SA22-7593](#)



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JCL for New Dump Program



```
//IFASMF DL JOB accounting information
//STEP EXEC PGM=IFASMF DL
//OUTDD1 DD DSN=SMFREC.FEWYPES,DISP=(NEW,CATLG,DELETE)
//OUTDD2 DD DSN=SMF.TYPE10.TYPE255,DISP=(NEW,CATLG,DELETE),
//      DCB=BLKSIZE=32000
//OUTDD3 DD DSN=SMF.TYPE10.TYPE255B,DISP=(NEW,CATLG,DELETE),
//      DCB=LRECL=32760
//SYSPRINT DD SYSOUT=A
//SYSIN DD *
      LSNAME (IFASMF.DEFAULT)
      LSNAME (IFASMF.PERF)
      LSNAME (IFASMF.JOB)
      OUTDD (OUTDD1,TYPE(0,2,10,15:30,33(1)),START(0730),END(1850))
      OUTDD (OUTDD2,TYPE(10:255)),DATE(2006274,2006334)
      OUTDD (OUTDD3,TYPE(10:255))
      DATE (2006001,2006365)
      SID (308A)
      SID (308B)
      END(2400) - DEFAULT
      START(0000) - DEFAULT
```



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JCL for New Dump Program



- ❑ The OUTDD parameters contain filters selecting the SMF record types to be dumped:
 - OUTDD1 specifies that you want to dump record types 0,2,10,15-30, and subtype 1 of record type 33 starting with those issued at 7:30 am and ending at 6:50 pm.
 - OUTDD2 specifies that you want to dump record types 10 through 255 from dates October 1, 2006 through November 30, 2006.
 - OUTDD3 specifies that you want to dump record types 10 through 255.
- ❑ DATE parameter specifies for OUTDD statements with no DATE subparameter



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New Dump Program Output



```
SUMMARY ACTIVITY REPORT
START DATE-TIME 05/17/2007-23:55:41          END DATE-TIME 05/21/2007-12:22:38
RECORD          RECORDS          PERCENT          AVG. RECORD          MIN. RECORD          MAX. RECORD          RECORDS
TYPE           READ           OF TOTAL           LENGTH           LENGTH           LENGTH           WRITTEN
0              2,538           2.14 %           74.00           74              74              1,137
2                0
3                0
5                45           .04 %           148.64           145             161              0
14             2,367           2.00 %           471.79           344             716             1,612
15             1,457           1.23 %           347.11           344             380             1,400
17                17           .01 %           100.00           100             100              21
18                9           .01 %           144.00           144             144              3
20             360           .30 %           97.09           91              107             485
22                58           .05 %           52.00           52              52              120
23                51           .04 %           134.00           134             134              59
26                78           .07 %           444.98           442             449              0
28                14           .01 %           188.00           188             188              21
```



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SMF Log Stream Messages



- ❑ **New messages:**
 - IFA7xxxx messages, instead of IEE360, etc.
- ❑ **Notable messages:**
 - IFA710I – keywords accepted, recording to log stream
 - IFA718E – Logstream error requiring operator intervention to restart recording or fall back to data set recording

Migration Considerations



- ❑ For SMF log stream recording, you can direct record types to particular log streams using the TYPE subparameter on LSNAME
- ❑ You still select the records you want to write with the TYPE/NOTYPE option of SYS or SUBSYS
- ❑ This means that it is possible to specify record types on the TYPE subparameter of LSNAME that the system is not actually recording, because they are not specified on SYS or SUBSYS

Migration Considerations



- ❑ Using SMF data volume
 - Write data to a DASDONLY log stream, simply replacing SMF MANx data sets
 - Use DEFAULTLSNAME(IFASMF.xxx) or
 - LSNAME(IFASMF.xxx,TYPE(0:255)) to specify logstream
- ❑ Run new SMF dump program to archive data
 - Simplest approach to using log streams
 - Better performance using log stream versus SMF data sets



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Migration Considerations



- ❑ Write data to a log stream on a 'task oriented' basis
 - 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)
- ❑ Use 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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Migration Considerations



- ❑ Use the IXCM2APU utility with TYPE=LOGR to create the log streams
 - Plan the retention period, offload data set size, staging data set size and whether the log stream will be CF-based or DASD-only
- ❑ Ensure sufficient SMS resources for peak recording periods and offload data sets
- ❑ Update the SMFPRMxx parmlib member
 - Keep SMF MANx data sets as a fall back plan
- ❑ Update procedures for SMF SWITCH processing and IEFU29/IEFU29L exits
- ❑ Update procedures to indicate how the data is archived when using log streams



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GRS Enhancements



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GRS ENQ History



- ❑ V1R4: APAR OA03568-> compaction of STAR MODE global ENQs, ISG353E/ISG354I msgs to notify of a storage shortage, and DIAGxx to increase the storage area size
- ❑ V1R6: 64 bit storage used to prevent new function from increasing demand on below the bar storage.
- ❑ V1R8: Used 64 bit addressing for the majority of the storage needed for STAR MODE global ENQs, but not includes other GRS modes, local ENQs, and some ENQ storage required for STAR MODE global ENQs
- ❑ V1R9: Uses 64 bit addressing for storage used to represent all ENQs in all GRS modes



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GRS User Address Space Limits



- ❑ System wide authorized (250,000) and unauthorized (4,096) maximums for GRS “ENQ/DEQ” services
 - Some customers zap the unauthorized maximum in CICS environments
 - New authorized workloads (DB2 V8) will exceed the authorized limit
- ❑ Change ENQ limit from 4,096 to 16,384
- ❑ New ISGADMIN API to allow address space maximums
- ❑ GRSCNFxx, SETGRS, and DISPLAY support added to set and display system-wide values (including GRS=NONE)
- ❑ New ISGQUERY ENQSTATS support added
- ❑ New message ISG368E exceeding 80% of the maximum
 - ISG368E DOMed and ISG369I is issued once requests drop below 75% of the maximum



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GRS ENQ Parmlib Specifications



GRSCNFxx PARMLIB member:

- ENQMAXU(value): Identifies the system wide maximum of concurrent ENQ requests for unauthorized requesters
 - ENQMAXU range is 16,384 to 99,999,999
 - Default is 16,384
- ENQMAXA(value): Identifies the system wide maximum of concurrent ENQ requests for authorized requesters
 - ENQMAXA range is 250,000 to 99,999,999
 - Default is 250,000

```
SETGRS ENQMAXU=nnnnnnnn[,NOPROMPT|NP]  
SETGRS ENQMAXA=nnnnnnnn[,NOPROMPT|NP]
```



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Displaying Current GRS Parameters



D GRS

ISG343I 13.44.48 GRS STATUS 571

SYSTEM	STATE	SYSTEM	STATE
SC75	CONNECTED	SC74	CONNECTED

GRS STAR MODE INFORMATION

LOCK STRUCTURE (ISGLOCK) CONTAINS 1048576 LOCKS.

THE CONTENTION NOTIFYING SYSTEM IS SC74

SYNCHRES: YES

ENQMAXU: 16384

ENQMAXA: 250000

GRSQ: CONTENTION



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z/OS V1R9 Enhancements - 64-bit



- ❑ Directing ISVs to the existing ISGECA API
- ❑ New external ISGADMIN MOVEWAITER service for ISV serialization products that need to alter GRS structures
- ❑ New resource instance token is returned by ISGQUERY and presented to ISV oriented exits (ISGNQXITQUEUEU1, ISGENDOFLQCB) to allow ISVs to coordinate events
- ❑ ENQTOKEN is presented to the ISGNQXITQUEUEU1 exit
 - Provides ENQ storage constraint relief
 - Provides better DB2 performance as more data sets can be concurrently opened



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z/OS V1R9 Enhancements



- ❑ During rewrite of enhancements, improvements are:
 - The quality of dump contents improves which helps to insure better first failure data capture
 - A significantly reduced CMSEQDQ lock hold time will be experienced
 - Much better performance should be seen for ISGENQ and ENQ/DEQ/RESERVE LINKAGE=SYSTEM users
 - A detailed system trace is now issued for all ENQ related services
 - Time for an ENQ/RESERVE/ISGENQ is issued is externalized via GRS IPCS reports and ISGQUERY and is useful for problem determination or run time checks. It has been captured by GRS in previous releases but had not been externalized

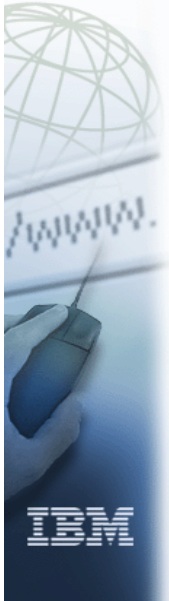


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"New Face of z/OS" (z/OS Ease of Use)



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z/OS V1R9 New Face Functions



- ❑ A set of new tools enhancing the “MVS face” of z/OS by providing:
 - System Rexx
 - SDSF Rexx
 - Health Checker Rexx
 - C language capabilities for classical MVS exits, thanks to a new METAL option of the IBM z/OS XL C compiler
 - Common Event Adapter (CEA)
- ❑ A set of new functions providing an “Open face” through a client/server structure implemented by the Common Information Model (CIM), also known as Pegasus

CEA Address Space



- ❑ Common event adapter (CEA) is a component of the BCP that provides:
 - Ability to deliver z/OS events to C-language clients, such as the z/OS CIM server
 - CEA address space is started automatically during initialization of every z/OS V1R9 system



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CEA Address Space



- ❑ Use the F CEA,DISPLAY command to display information about the common event adapter (CEA) address space
 - The information displayed shows which activities are being monitored by CEA on behalf of which internal z/OS components and clients using the CEA application programming interface

```
F CEA,DISPLAY
```

```
CEA0004I COMMON EVENT ADAPTER      734
STATUS: ACTIVE-FULL          CLIENTS: 0  INTERNAL: 0
EVENTS BY TYPE:  #WTO: 0  #ENF: 0  #PGM: 0
```



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Common Information Model (CIM)

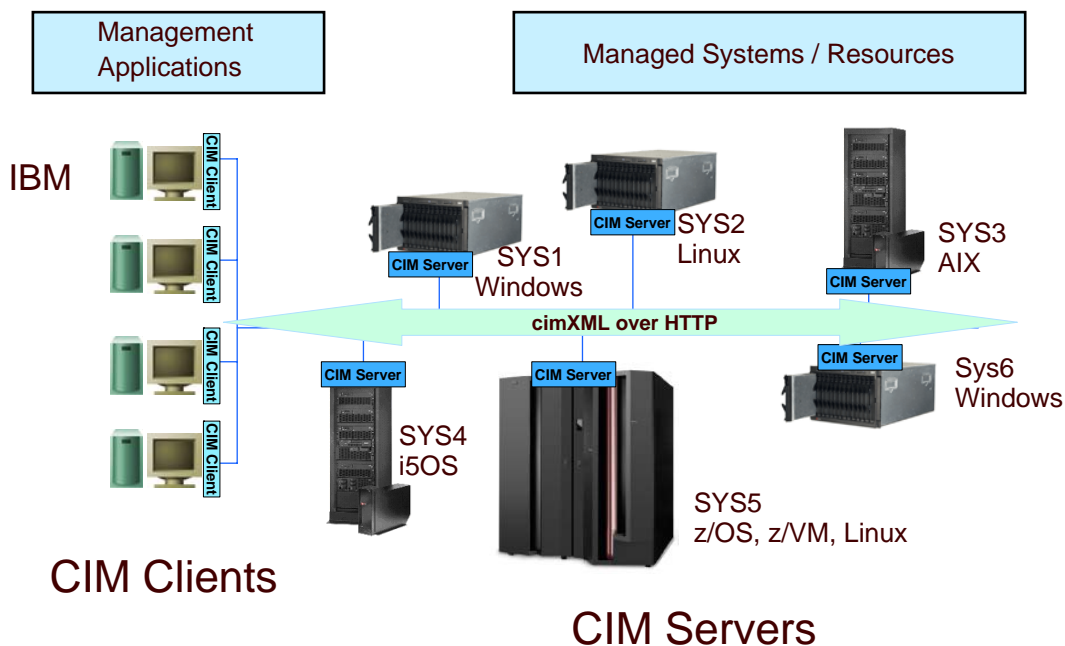


- ❑ CIM is a standard data model developed by a consortium of major hardware and software vendors (including IBM)
 - Called the Distributed Management Task Force (DMTF)
- ❑ Part of the Web Based Enterprise Management (WBEM) initiative
 - WBEM includes a set of standards and technologies that provide management solutions for a distributed network environment
 - Interoperability is a major focus of WBEM, and using WBEM technologies can help you develop a single set of management applications for a diverse set of resources



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Network Environment Managed with CIM Management Applications



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CIM Server

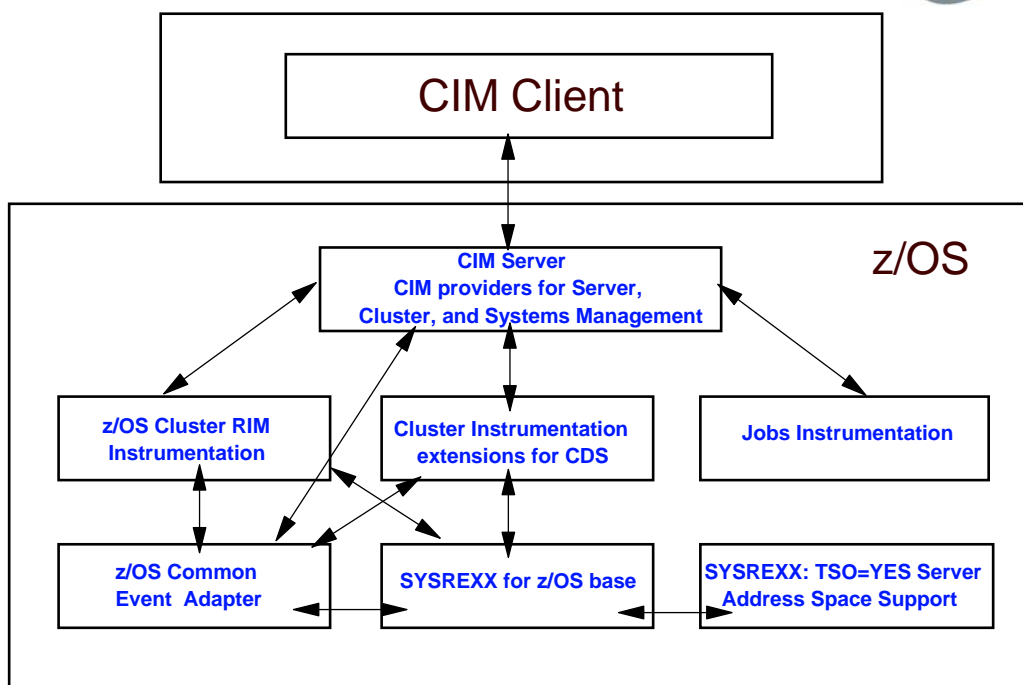


- ❑ Starting with z/OS V1R9, the CIM server exploits the functionality of Common event adapter (CEA)
- ❑ In order for the address space to start successfully, you must configure CEA to work with z/OS
 - Failure will cause CEA to run in a minimum function mode
- ❑ CIM server provides the ability to set a number of configuration options
- ❑ Many tasks and operations for the CIM server are performed under z/OS UNIX System Services, ideally within a telnet session
- ❑ For a user to be able to use the command line tools, the UNIX system services environment has to be set up



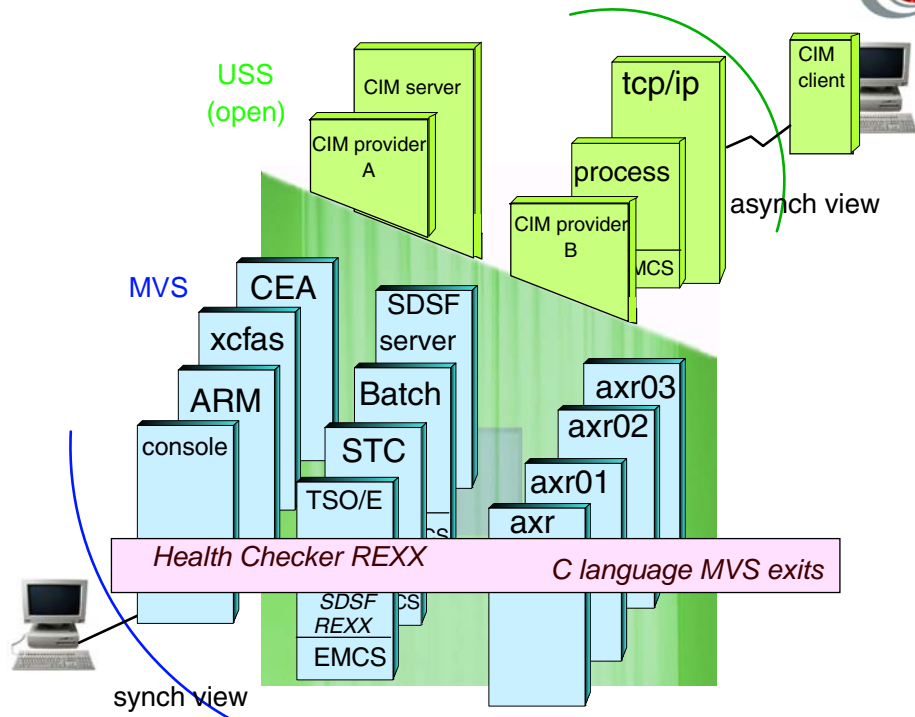
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Job Instrumentation Overview



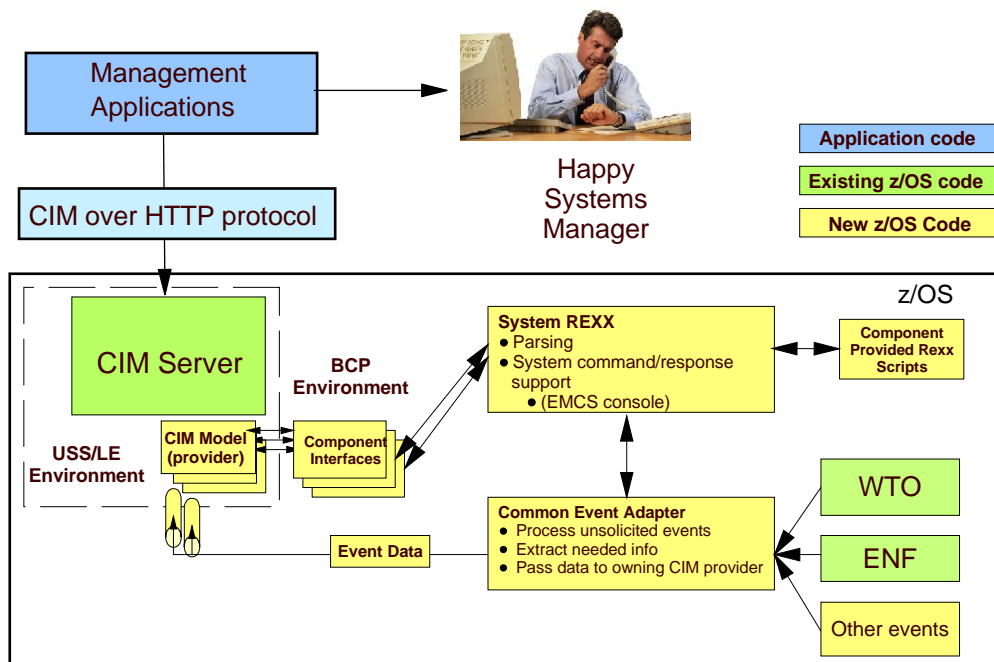
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New Function Overview



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CIM Overview



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Resource Providers



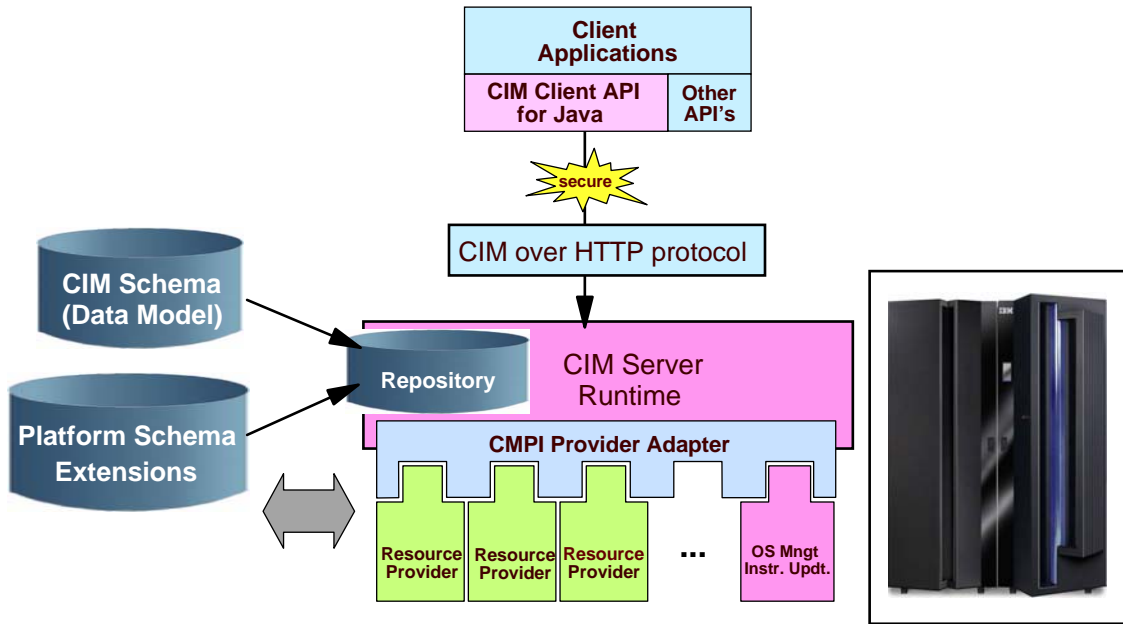
- ❑ CIM classes have been implemented as IBM supplied providers
 - Implemented according to the DMTF dynamic metrics model
 - You can find more information on this data model in the CIM Metrics White Paper (DSP0141), which is available at the DMTF web page in the CIM White Paper section at the following URL:
 - <http://www.dmtf.org>

CMPI Provider Adapter



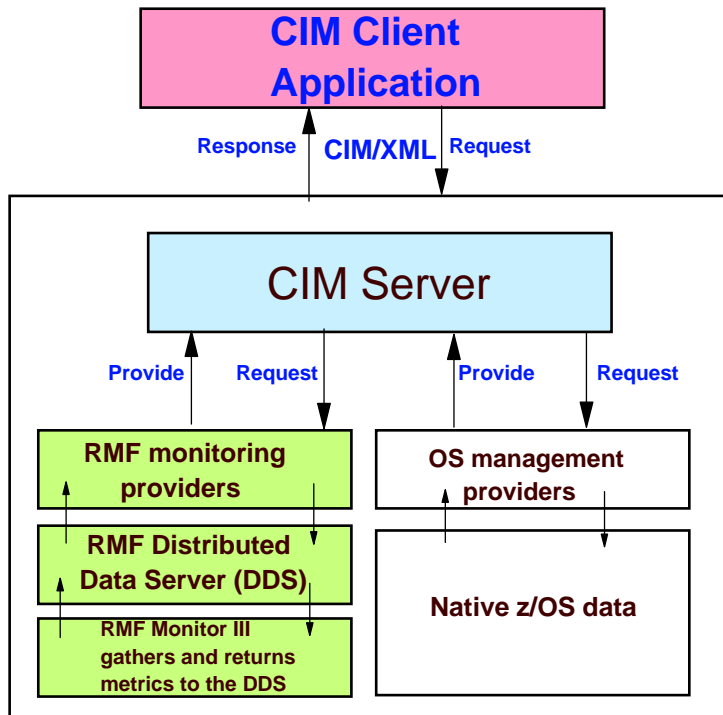
- ❑ CMPI is a C-based programming interface for providers designed for binary compatibility
- ❑ All management instrumentation included with the z/OS CIM server was developed following the CMPI standard and CMPI is the only supported provider programming interface for the z/OS CIM server
- ❑ Documentation about the CMPI Technical Standard is available from The Open Group
- ❑ Developers of management instrumentation for z/OS need to be familiar with the CMPI and CIM/WBEM standards

CIM Overview



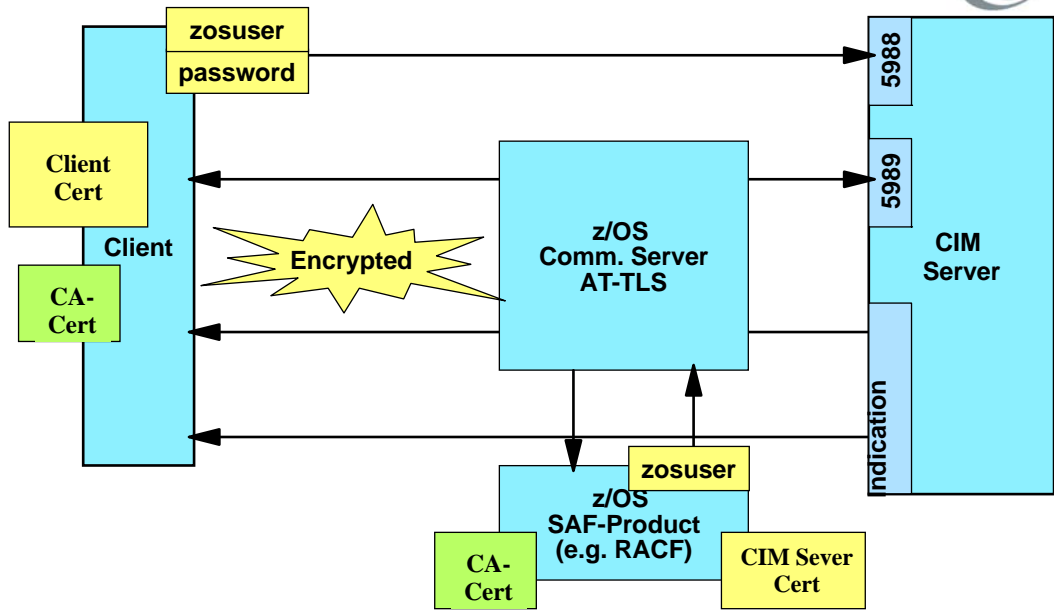
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CIM RMF Support



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Authentication with SSL Certificates



CIM client sends an SSL certificate to AT-TLS, AT-TLS sends the certificate to RACF and RACF associates the certificate to the appropriate user ID, which then accesses CIM server

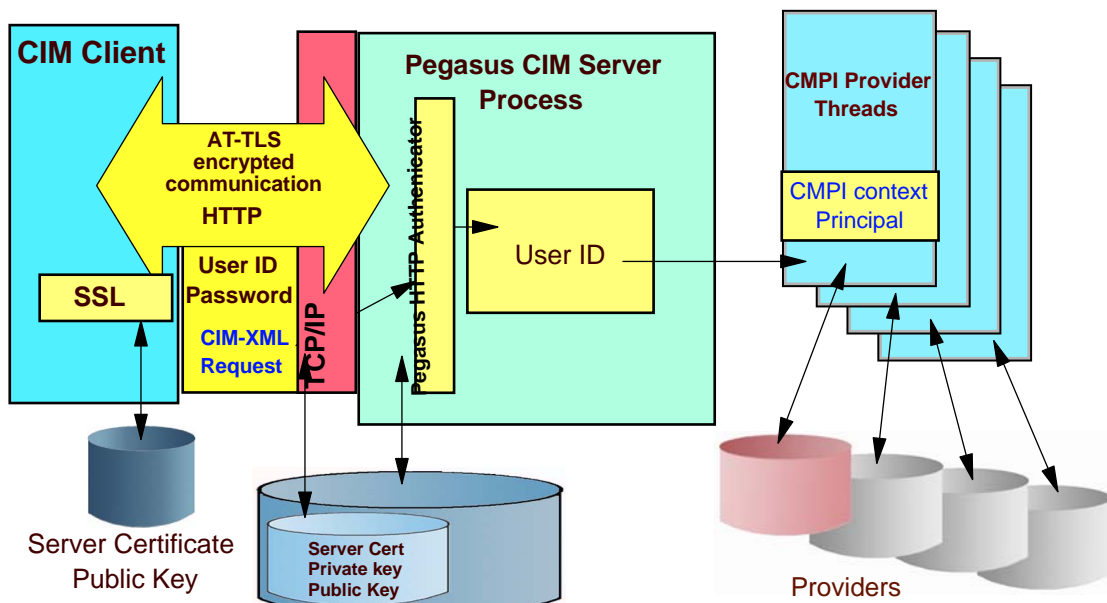


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Authentication with SSL Certificates



CIM Server



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Instrumentation of Batch Jobs



- ❑ IBM z/OS instrumentation of batch jobs allows the CIM provider to obtain generic information about a z/OS jobs
 - jobname, priority, JES properties, and status (Cancel, Hold, Release, Restart)
- ❑ Allows the CIM provider to obtain generic information about the name of the subsystem and its characteristics (JES2 or JES3, primary subsystem or not), sysout data sets and any details of this kind
- ❑ IBMzOS_Job is a new class that represents a z/OS job
 - Provider returns values requested by client



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Instrumentation for a Sysplex

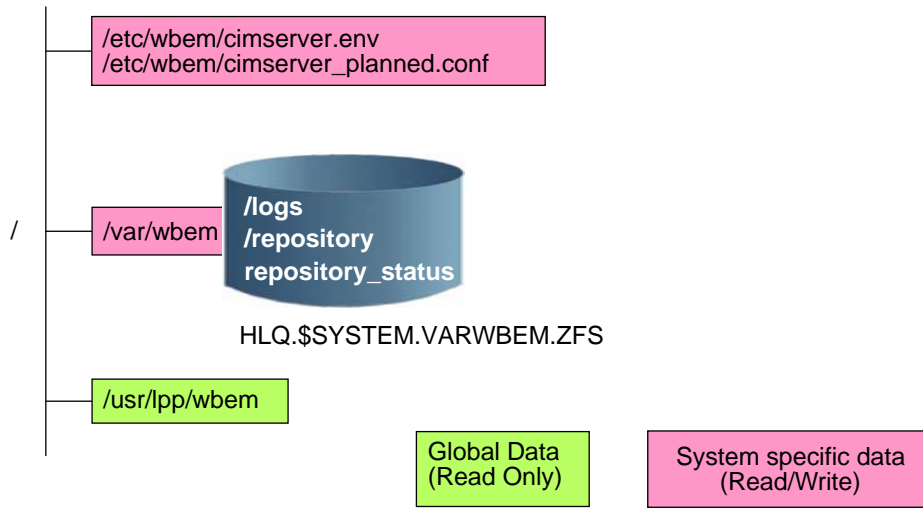


- ❑ IBM z/OS instrumentation of a sysplex allows the CIM provider to obtain generic information as follows:
 - Query SFM policy attributes, parmlib attributes
 - Update SFM policy information
 - Obtain sysplex name, coupling facility info
 - Start or stop reallocate command - CF structure
 - Start or stop maintenance mode on the CF
 - Obtain a structures name, type size, etc
 - Is it duplexed - start or stop duplexing
 - Initiate a rebuild



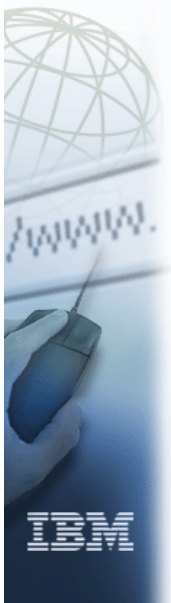
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CIM z/OS UNIX File Structure



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System REXX (SYSREXX)



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System REXX (SYSREXX)



- ❑ Designed to allow REXX code to run outside the TSO/E environment, via programming interface or operator command
- ❑ Support for running REXX routines authorized
- ❑ Support for using System REXX execs to automate complex operator command and other system functions
- ❑ System REXX designed to support invoking execs via a program interface and by operator command
- ❑ New address space (AXR)
- ❑ IBM plans to make this available for z/OS V1R8 via a Web deliverable in September 2007



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SYSREXX Overview



- ❑ Requirement is an infrastructure to support web based initiatives interacting with z/OS components
 - New Face of z/OS as part of:
 - z/OS simplification and management
- ❑ SYSREXX allows execs to be run simply and independently from traditional TSO/E and batch
 - Invocation uses a single program interface (AXREXX)
 - Operator exploitation directly from a console
- ❑ Enables rapid development of system programmer tools and operator assists
- ❑ Can be exploited by new and old style applications
- ❑ Health Checks may be written in REXX



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AXR Address Space



- ❑ AXR is a subsystem, started during master subsystem initialization
- ❑ AXR reads the AXR00 parmlib member and allocates the REXXIN data set
- ❑ When REXX work arrives via a PC directly into the appropriate server
 - SYSREXX or console initiated REXX execs are detected by the AXR SSI listener
 - Converted to F AXR command format and queued to the command server's CIB control block
 - They are selected and scheduled for processing



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AXR00 Parmlib Member



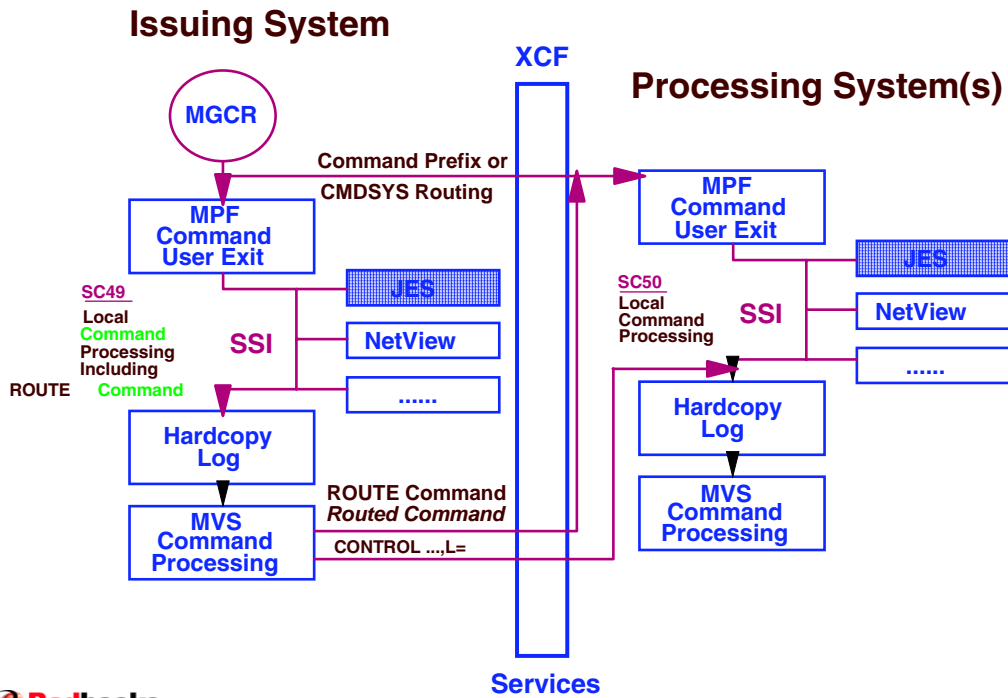
- ❑ Following is a parameter setting in the AXR00 parmlib member to set the CPF character to @ and having a sysplex scope
 - CPF('@',SYSPLEX)

```
CPF('REXX&SYSCLONE.',SYSPLEX) /* Defines REXXnn as a sysplex
                                wide cpf value */
AXRUSER(AXRUSER)                /* AXREXX security=axruser results in the
                                exec running in a security environment
                                defined by the userid AXRUSER */
```



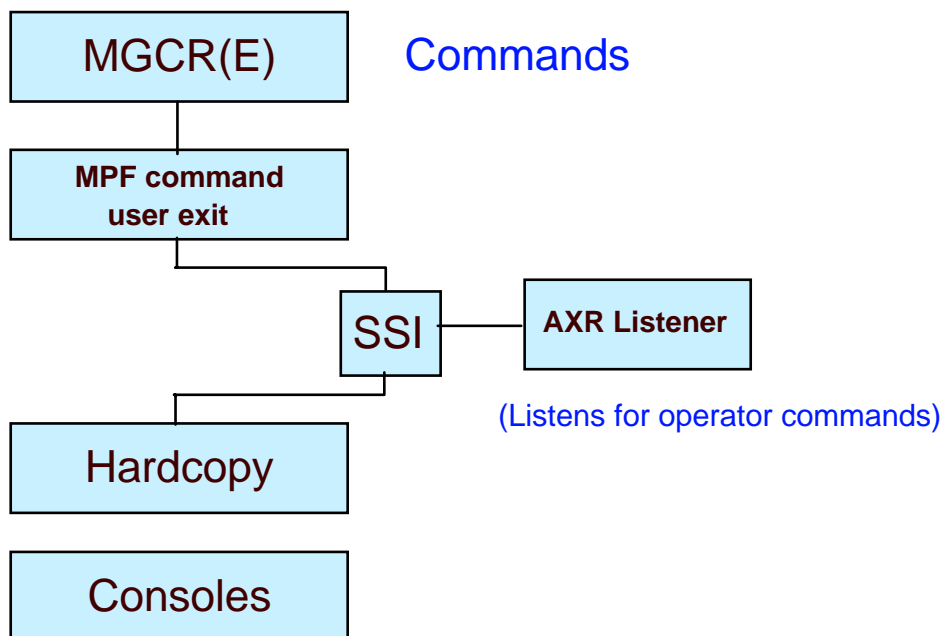
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Command Flow in a Sysplex



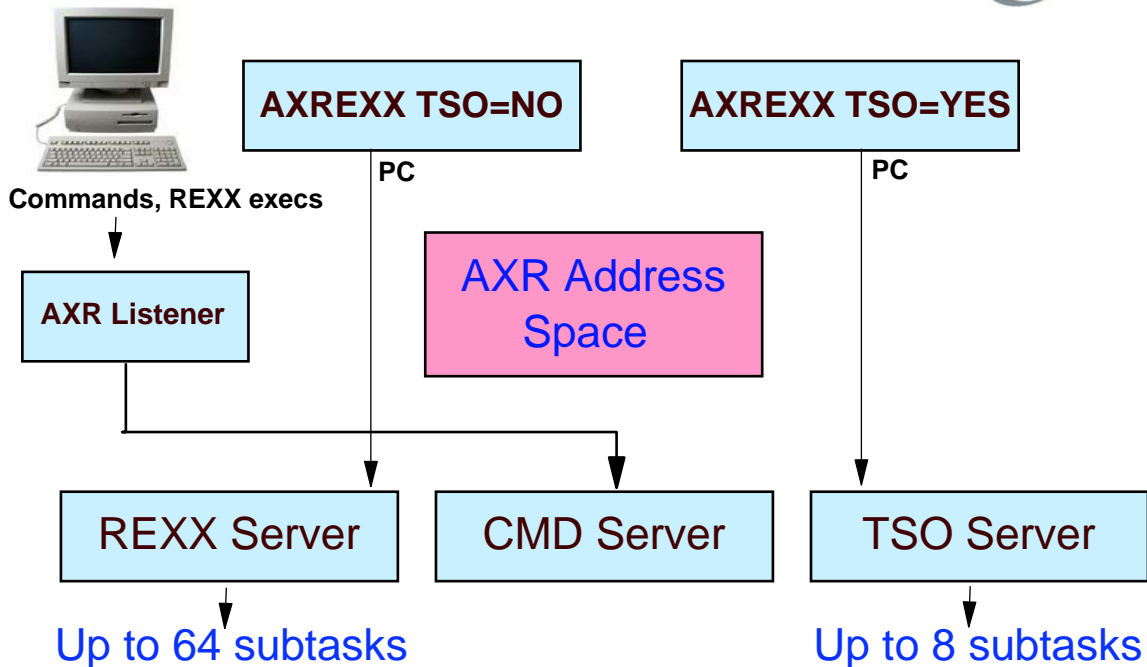
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AXR Listener SSI



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System REXX Overview



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System REXX Address Space



- ❑ You can use the F AXR command to:
 - Obtain status about system REXX
 - Initiate the execution of a REXX exec
- ❑ You can also use the prefix defined in the CPF to replace the F AXR

```
F AXR, {SYSREXX|SR[_|,]STATUS|ST[,DETAIL|D] }  
      {rexxexecname[,TIMEINT=seconds][argumentstring] }
```

```
F AXR,SR,ST,D  
AXR0201I SYSREXX STATUS DETAIL  
NO ACTIVE REQUESTS FOUND
```



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SYSREXX Status Command - @SR ST



@SR,ST

AXR0200I SYSREXX STATUS DISPLAY 296

SYSTEM REXX STARTED AT 14.35.42 ON 07/09/2007

PARMLIB MEMBERS: AXR00

CPF: @ (SYSTEM) AXRUSER: STC

TIMEINT: 30

SUBSYSTEM: AXR

REQUESTS QUEUED: 0 ACCEPTING NEW WORK

REXX WORKER TASKS: ACTIVE: 0 TOTAL: 4

IDLE: 4 MAX: 64

ASYNCH: 0 SYNC: 0

UNTIMED: 0

TSO SERVER SPACES: ACTIVE: 0 TOTAL: 0

IDLE: 0 MAX: 8

ASYNCH: 0 SYNC: 0



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System REXX Exec Named MYC



```
/* REXX */
```

```
MYRESULT = AXRCMD('D A,L',VAR.,5)
```

```
GADCON = 'FIRSTLINE'
```

```
X = AXRWTO('D A,L')
```

```
X = AXRMLWTO(SUBSTR(VAR.1,1,100),'GADCON','C')
```

```
DO I = 2 TO VAR.0
```

```
    X = AXRMLWTO(SUBSTR(VAR.I,1,100),'GADCON','D')
```

```
END
```

```
X = AXRMLWTO(,'GADCON','E')
```

```
EXIT 0
```

```
@myc
```

```
D A,L
```

```
IEE114I 07.52.27 2007.280 ACTIVITY
```

JOBS	M/S	TS	USERS	SYSAS	INITS	ACTIVE/MAX	VTAM	OAS
00004	00037	00001		00039	00037	00001/00030		00022
LLA	LLA	LLA	NSW	S	JES2	JES2	IEFPROC	NSW S
ASCH	ASCH	ASCH	NSW	S	APPC	APPC	APPC	NSW S
RMF	RMF	IEFPROC	NSW	S	VLF	VLF	VLF	NSW S



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System REXX Exec Named IPLINFO



@IPLINFO

D IPLINFO

```
IEE254I 17.53.40 IPLINFO DISPLAY
SYSTEM IPLED AT 12.08.53 ON 09/25/2007
RELEASE z/OS 01.09.00 LICENSE = z/OS
USED LOADS8 IN SYS0.IPLPARM ON C730
ARCHLVL = 2 MTLSHARE = N
IEASYM LIST = XX
IEASYS LIST = (R3,64) (OP)
IODF DEVICE C730
IPL DEVICE D14E VOLUME Z19RA1
```

@SR ST,D

```
AXR0201I SYSREXX STATUS DETAIL 1
NO ACTIVE REQUESTS FOUND
```



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SYS1.SAXREXEC Data Set



- The SYS1.SAXREXEC data set contains execs that IBM has provided
 - These execs should never be deleted or modified in any way
- Data set is where user written execs can be added
 - User written execs should not start with the letters A through I - they are reserved for IBM



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SYS1.SAXREXEC Data Set



- ❑ IBM supplies 9 REXX execs as samples in data set
- ❑ Procedure we are using:
 - Uncatalog SYS1.SAXREXEC on SYSRES volume
 - Copy to any volume and catalog
 - Create new user REXX execs in copied data set
- ❑ When any possible maintenance is applied to IBM execs or a clone of SYSRES occurs
 - Replace IBM members to new volume



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REXX exec Functions



- ❑ When writing a REXX exec 3 new functions are:
 - AXRCMD - Issue a console command and return command responses
 - AXRWTO - Issue a single line message to a console
 - AXRMLWTO - Issue a multiline line message to a console



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SYSREXX Status Command (error)



- ❑ If AXREXX encounters an error while attempting to control the invoker's input into an REXX argument or variable
 - System REXX indicates in AXRARGLstEntryInError the number of the argument or variable that caused the error
 - AXREXX returns a specific reason code indicating the problem with - argument or variable and abort the request

@hello

```
AXR0500I AXREXX OUTPUT DISPLAY 319
```

```
EXECNAME=HELLO REQTOKEN=0000400000000000C10D10CD805DA544
```

```
IRX0406E REXX exec load file REXXLIB does not contain exec member HELLO.
```

```
IRX0110I The REXX exec cannot be interpreted.
```

```
IRX0112I The REXX exec cannot be loaded.
```

```
AXR0203I AXREXX INVOCATION OF HELLO FAILED.
```

```
RETCODE=00000008 RSNCODE=05030851
```

```
REQTOKEN=0000400000000000C10D10CD805DA544
```

```
DIAG1=00000000 DIAG2=00000000 DIAG3=00000000 DIAG4=00000000
```



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Large Format Data Set Enhancements



Redbooks

International Technical Support Organization

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z/OS V1R9 Large Data Set Support



- ❑ Transmit and receive large format data sets > 64K trks
- ❑ Use PRINTDS to print from or to large format data sets
- ❑ Use REXX EXECIO DISKR/DISRW/DISKRU for REXX I/O to or from large format data sets
- ❑ Use CLIST OPENFILE/GETFILE/PUTFILE for CLIST I/O to or from large format data sets
- ❑ Use REXX LISTDSI function or CLIST LISTDSI statement for gathering size and DSNTYPE for large format data sets
- ❑ Use large format data sets on the TSO stack



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TSO/E TRANSMIT/RECEIVE Command



- ❑ Before z/OS V1R9, the TSO/E TRANSMIT and RECEIVE commands cannot handle large format data sets (DSNTYPE=LARGE)
 - The four-byte INMSIZE text unit (key X'102C'), which holds the file size in bytes, is limited to 2 GB
- ❑ In z/OS V1R9, a four-byte text unit called INMLSIZE (key X'8018') is introduced to hold the size of TRANSMIT and RECEIVE operations in MB (up to 4096 TB)
- ❑ If the size of a data set being transmitted is 2 GB or more, INMLSIZE is used instead of INMSIZE



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TSO/E TRANSMIT Command



- ❑ A new **WARN** | **NOWARN** operand allows or suppresses warning message **INMX034I** when writing to **OUTDA**
 - **WARN** - Request that the **TRANSMIT** command issue warning message **INMX034I** when warning threshold is initially met, and is the default
 - **NOWARN** - Request that the **TRANSMIT** command does not issue warning message **INMX034I** when the warning threshold is initially met

```
transmit sc70nje.naidoo da('naidoo.larged')
outda('naidoo.temp.larged') nowarn
```

```
RECEIVE INDA('naidoo.temp.larged')
INMR901I Dataset NAIDOO.LARGEDS from NAIDOO on SC70NJE
INMR906A Enter restore parameters or 'DELETE' or 'END' +
DA('naidoo.new.larged')
```



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TSO/E TRANSMIT Command



- ❑ When writing **TRANSMIT** output to an **OUTDA**:
 - The **OUTLIM** operand of the **TRANSREC** statement of the active **IKJTSO00** parmlib member no longer limits the output
 - The new **NOWARN** operand (**WARN** is default) can be used to eliminate the interval warning message (**INMX034I**)
 - This is controlled by the **OUTWARN** operand of the **TRANREC** statement of **IKJTSOxx**

```
INMX034I WARNING: nnn records transmitted. Your
installation limit is mmm records.
```



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TSO/E TRANSMIT Command



- ❑ With z/OS V1R9 when TRANSMIT is directed to an OUTDA
 - The OUTLIM maximum is no longer applicable
 - The TRANSMIT does not terminate when this limit is reached, and message INMX033I is not issued
 - This limit does still apply when transmitting to the NJE network

INMX033I You have EXCEEDED the MAXIMUM TRANSMISSION SIZE set by your installation.



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TSO/E TRANSMIT Command



- ❑ If you TRANSMIT a data set greater than 2GB from z/OS V1R8 to V1R9, TSO/E RECEIVE may get an x37 (out-of-space condition) abend on V1R9 because the V1R8 TRANSMIT cannot send a INMSIZE bigger than x'7FFFFFFF' bytes
 - The z/OS V1R8 system would be able to send the data set, but with incorrect size
 - If you pre-allocate a data set of sufficient size on V1R9, you should be able to RECEIVE into it



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TSO/E TRANSMIT Command



- ❑ TRANSMIT a data set greater than 2GB from a z/OS V1R9 system to a V1R8 or earlier
 - The earlier system will not recognize the new INMLSIZE giving the size in MB (max = x'FFFFFFFF' MB, or approximately 4096 TB)
- ❑ If you pre-allocate a large data set of sufficient size on the z/OS V1R8 system and point the RECEIVE command at it
 - RECEIVE should be able to receive the V1R9 data
- ❑ TRANSMIT may not accurately determine the size of a data set being transmitted such as a single member of a PDS or PDSE



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Migration Considerations



- ❑ Based on the INMSIZE or INMLSIZE sent in the TRANSMIT data
 - RECEIVE may either not get a data set of sufficient size, or it may get a data set significantly larger than needed
 - Avoid wasting space on the RECEIVE side by pre-allocating the receive data set of sufficient size
 - Then use the RECEIVE command to receive the data into that data set
- ❑ Types of data sets that cannot be allocated as large
 - PDS, PDSE, and direct data sets
 - Virtual I/O data sets, password data sets, and system dump data sets



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REXX and CLIST LISTDSI Function



- ❑ Use the LISTDSI (list data set information) function to retrieve detailed information about a data set's attributes is stored in variables, and displayed or used in instructions
- ❑ The function call is replaced by a function code that indicates whether the call was successful
- ❑ The LISTDSI function can be used only in REXX execs that run in the TSO/E address space
- ❑ In z/OS V1R9, LISTDSI handles large format data set >64K trks using the following LISTDSI variables:
 - SYSSEQDSNTYPE returns BASIC, LARGE, EXTENDED.
 - SYSUSED returns the correct size, for < 64K trks and > 64k trks