z/OS R9 Sysprog Goody Bag

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Looking back to previous releases

- **z/OS Release 7**
  - ▶ **z/OS XML System Services**

The z/OS XML System Services

A high performance parsing solution integrated with the BCP

- **Non-validating**

- **Handles very large documents**

- **Small memory footprint**

- **Works in task mode and other esoteric MVS environments**

  - ►**SRB, cross-memory mode, etc.**

- **Unique buffer-in/buffer-out interface**

  - ►**Allows documents to be parsed in segments**

- **C/C++ and assembler interfaces**

- **Runs in 31 and 64 bit modes**

Purpose: <u>minimize the cost of parsing a document</u>

The z/OS XML System Services

z/OS XML System Services natively supports 4 encodings:

- **UTF-8**
- **UTF-16**
- **IBM-1047**
- **IBM-037**

No transcoding is performed under the covers

- **All output is returned in the same encoding as the input**
- **Avoids the performance hit to convert to 1 supported encoding**

Design point:

- **Perform all processing in a single pass through the text**

April 18 Statement of Direction* concerning z/OS XML System Services

At a future date, IBM intends to deliver the following:

1. **IBM is intending to enable the z/OS XML to take advantage of zAAPs.**

   - **This is now announced for task mode as available in z/OS V1R9**

2. **IBM is intending to enable the z/OS XML to fully take advantage of zIIPs.**

3. **IBM intends to extend and expand on the use of z/OS XML System Services (enabled for zAAP specialty processors) as the basis for future enhancements:**

   ► IBM intends to enhance the XML Toolkit for z/OS so that eligible workloads may exploit the z/OS XML component

   ► IBM intends to add validating parsing to the z/OS XML component

z/OS Release 9

- **64 Processor Support**

- **Reusable ASIDs**

- **Message Flooding Automation**

- **Serviceability Enhancements**

- **Constraint Relief Items**

- **Additional Specialty Engine Exploitation**

- **Good stuff in JES2 and JES3**

- **Other miscellany**

Meeting the challenges of on demand business with designs for:

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

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…

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

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

z/OS R9

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

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

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 …
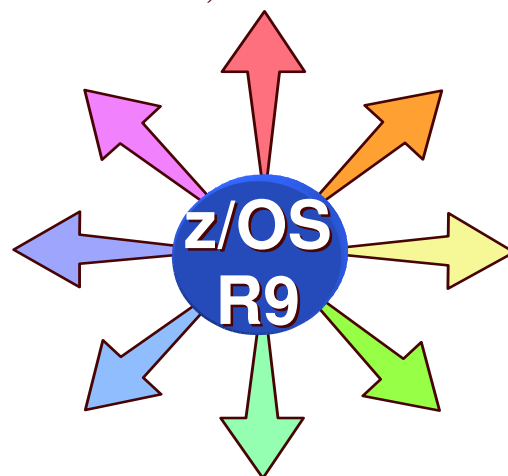
64 Processor Support

► **z/OS 1.9 supports up to 64 processors in a single z/OS image on System z9 EC servers**

► **Total processors is the sum of CPs, zAAPs, and zIIPs**

Reusable ASIDs

- **z/OS 1.6 provided support for the Linkage Index (LX) part of the "ASID and LX Reuse Facility"**

  ► **Z990/z890 and z9 EC/BC processors only**

- **z/OS 1.9 provides enablement and exploitation of the ASID Reuse part to mitigate the problem of running out of ASIDs**

- **Authorized Applications can request "reusable ASID" via REUSASID=YES on a start command or ATTR=REUSASID on the ASCRE macro.**

- **The capability is enabled via REUSASID(YES) in a DIAGxx parmlib member. If not enabled, the request is ignored. The default is REUSASID(NO).**

z/OS Message Flood Automation

- ► **Policy-driven automation for dealing with high volumes of messages occurring at very high message rates**
- ► **Parmlib and operator command support**
- ► **Can specify types of messages to monitor, criteria for message flood start/end, and the actions**
- ► **Can apply different policies to message types, jobs and individual message IDs**
- ► **To prevent a flood, you can specify that messages:**
  - ● Not be displayed, Not be logged, Not be queued for automation, Not be propagated to other systems in a sysplex, Not be queued to the Action Message Retention Facility (AMRF), Be stemmed by taking action against the address space by issuing a command (such as CANCEL)
- ► **A message rate monitoring facility is provided to assist the installation in establishing Message Flood Automation policy**
- ► **Implemented using IEAVMXIT**
- ► **Delivered as an SPE (OA17514) for z/OS R6, R7 and R8.**

SMF data to System Logger

- ► **Expected to support <u>much</u> higher write rates to a CF**
  - DASDONLY log streams also supported, but lower write rates are expected
- ► **SETSMF support for changing to/from Logger w/o an IPL**
- ► **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**
  - **Even better scalability expected (particularly when using the CF)**
  - **Note that different log streams can have different retention periods**
- ► **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**
- ► **No need to figure out which GDGs SMF data is in any more!**
- ► **...but SYS1.MAN data sets are still supported**

System Trace

TRACE ST,{nnnK | nnnM}

TRACE ST,BUFSIZ={nnnnnK | nnnnnM}

- ►TRACE system command enhanced to accept kilobyte and megabyte notations

- ►Notation applies to first option, designating storage per CPU

- ►New BUFSIZ option allows aggregate storage specification

TRACE ST,BR={ON | OFF},MODE={ON | OFF}

- ►Branch and mode tracing separately controlled

SLIP enhancements

- ## Dynamic remote system identification

  - ► Currently, the name of a remote system must be known at the time the SLIP command is entered.

  - ► System names may now be specified with direct or indirect addresses.

  - ► SLIP SET,IF,LPAMOD=(IEFBR14),A=SVCD,

    REMOTE=(UNCOND,SYSLIST=(SYS1,(2R?),(2R?+8),ACTION=SVCD),E

- ## Additional data can be provided with for ACTION=STRACE

  - ► A new STDATA keyword can be use to specify pairs of direct or indirect addresses that designate extra data to trace.

  - ► SLIP SET,IF,LPAMOD=(IEFBR14),A=STRACE,STDATA=(1R?,+4,2R?,+8),E

Live system analysis with IPCS

IPCS ACTIVE

- **Users with no special authorization now can ask IPCS ACTIVE to access data spaces that unauthorized code can see that are owned by the ASID.**

- **Facility class BLSACTIVE ADDRSPAC read access now permits all data spaces owned by the ASID to be viewed.**

- **Facility class BLSACTV SYSTEM read access now permits access to the following:**
  - ► **ABSOLUTE storage, All ASIDs, All data spaces**

- **IPCS does not serialize (Caveat emptor)**
  - ► **Static areas of the system can yield good analysis**
  - ► **Areas of the system that are altered frequently cannot**

SADMP collection and analysis

- **SADMP in z/OS R9 improves data capture:**

  ► Uses all-zero pages to supplement I/O buffers

  ► Dumps the page frame table in virtual address order

  ► Collects data in virtual address order by ASID

- **IPCS speeds dump initialization:**

  ► Maps ABSOLUTE storage only for common storage during dump initialization

    ● Uses a new RSM service to access ABSOLUTE storage later as needed

  ► Maps all virtual storage during dump initialization

AMATERSE for compressing

- **z/OS R9 includes AMATERSE to replace web utility TRSMAIN**
  - ► TRSMAIN is an alias which is fully compatible with the web utility
  - ► AMATERSE entry point uses SYSUT1 and SYSUT2 ddnames for compatibility with DFSMS data set utilities, various compilers, … instead of ddnames INPUT and OUTPUT respectively

- **APAR OA19194 will make AMATERSE available on R7 and R8**

- **Web utility still runs on z/OS R9. You can upgrade JCL to use AMATERSE or its TRSMAIN alias as time permits**

- **AMATERSE archives are interchangeable with web utility and with VM TERSE**

- **Improvements in AMATERSE include the following:**
  - ► Full support for large format sequential data sets (DSNTYPE=LARGE)
  - ► PDSE data library support

WLM Promotion of Cancelled Jobs

- In releases prior to release 9, cancel processing runs at the dispatch priority of the address space being cancelled.

- If all processors are busy running higher priority work, a cancelled address space can take a long time to terminate.

- This sometimes made it desirable to reset the priority of a cancelled job to expedite the termination and the release of resource for which there may be contention.

- In z/OS Release 9, WLM promotes an address space being cancelled to a higher dispatch priority to ensure that it is given sufficient access to CPU to terminate in a timely manner.

- The automatic adjustment by WLM removes the need for the manual reset, making the system easier manage.

IPSec offload to zIIPs

- z/OS Communications Server IPSec processing to use zIIPs if they are available
- Eligible enclave-mode SRB processing will be offloaded:

  ► Encryption processing
  ► Cryptographic validation of message integrity
  ► IPSec header processing

- <u>All</u> IPSec enclave SRB work is made eligible to run on a zIIP
- Also planned to be available on z/OS R8 with APAR PK40178

- Specify GLOBALCONFIG ZIIP IPSECURITY=YES in your TCPPARMS data set

  ► **Note: To enable IPSec, specify IPCONFIG IPSECURITY (IPv4) and/or IPCONFIG6 IPSECURITY (IPv6)**
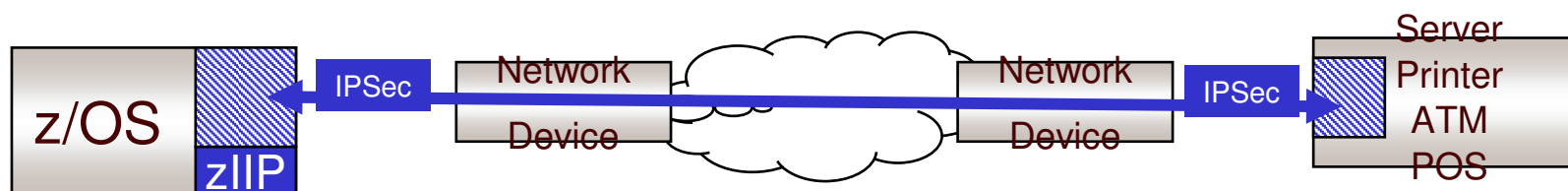
Constraint Relief

- **Allocation dynamics storage above 16MB**

- **TSO/E support for Large Format Data Sets**

- **GRS uses 64-bit virtual storage to represent all ENQs in all GRS modes.**

System REXX (SYSREXX)

► **Enables REXX code to run outside the TSO environment**

► **Supports invoking execs via a program interface and by operator command**

► **Supports running REXX routines authorized**

► **Enables the use of System REXX execs to automate complex operator command and other system functions**

► **Introduces a new address space (AXR)**

► **IBM plans to make this available for z/OS V1.8 via a Web deliverable in September 2007**

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**

JES2 APF Mitigation

- **Historically, JES2 SSI calls have required APF authorization**

- **In release 9, the requirement for APF authorization will be relaxed for some SSI calls and sub functions.**

- **Some SSI calls can now be made by non-APF authorized programs.**
  - ► **Some now require no authorization at all**
  - ► **Some now optionally use SAF authorization instead of APF authorizaiton**

- **For the SSI calls that no longer require APF authorization:**
  - ► **Access checking will be done for all input and output parameters.**
  - ► **Access check failure leads to a 1E0 abend**
  - ► **Checking is done even if caller is APF-authorized**

JES2 Cancel Job During Job Select

- **Problem: Cannot CANCEL/FORCE job during job select**
  - ▶ **Identity of space is changing from INIT to batch job**
  - ▶ **MVS CANCEL, FORCE, FORCE ARM do not work**

```
d a,init,l=z

INIT        INIT         IEFPROC   OWT   I    A=001C    PER=NO      SMC=000
                                                PGN=N/A   DMN=N/A   AFF=NONE
                                                CT=000.003S   ET=NOTAVAIL
                                                WUID=JOB00018
                                                WKL=SYSTEM     SCL=SYSSTC

      P=1
                                                RGP=N/A        SRVR=NO

   QSC=NO
                                                ADDR SPACE ASTE=0EE86700

c init,a=1c

IEE341I INIT               NOT ACTIVE IN SPECIFIED ADDRESS SPACE
```

JES2 Cancel Job During Job Select ....

- **Solution:**
  - ► **The JES $C command uses CALLRTM to terminate the address space**
    - ● **Only JES knows what job has been given to the address space**

```
$cj18
JOB00018  $HASP890 JOB(JOBT)
$HASP890 JOB(JOBT)        STATUS=(EXECUTING/IBM1),CLASS=A,
$HASP890                  PRIORITY=9,SYSAFF=(ANY),HOLD=(NONE),
$HASP890                  CANCEL=YES
STC00017  IEF450I INIT INIT - ABEND=S222 U0000 REASON=D1C5E2F2
        TIME=19.00.14
STC00017  $HASP395 INIT     ENDED
JOB00018  $HASP311 JOBT     RE-QUEUED AT END OF MEMORY AND HELD
```

  - ► **ABEND 222 with or without dump**
  - ► **Reason code is X' D1C5E2F2' = C'JES2'**

Healthchecker checks in System REXX

- **Checks can be written in REXX and are scheduled to run under SYSTEM REXX.**
- **SDSF functions designed to be supported via REXX variables**
  - ► Variables loaded with data from the SDSF panels
  - ► Designed to enable scripts to access the data programmatically
  - ► Variable changes are intended to provide a capability similar to action characters and overtyping

JES2 $TRACE Enhancements

- **JES2 internal tracing has been enhanced**

  ► **Greater precision of timestamp in trace records**

  ► **Ability to filter $TRACE collection by JOBNAME, JOB number or ASID and additionally TCB address**

  ► **Simplifies getting diagnostics for a problem**

  ► **Keywords on new $T TRACE(nnn) command**

- **INTRDR tracing also enhanced**

  ► **Internal reader tracing can be activated based on JOBNAME, JOB number, or ASID**

  ► **Keywords on $TINTRDR**

JES3 Long Running Spinoff

- **JES3 was previously limited to 32K Output Scheduling Element (OSE)buffers because the buffer number was a half word.**

  ▶ **APAR OW55574 in January 2003 bought a little time but it didn't fix the real problem.**

  ▶ **Answers the following requirement:**

    MR0103073711: IAT6718 OSE BUFFER LIMIT REACHED

    Currently there is a buffer limit of x'FFF0' buffers in JES3. Applications which allocate lots of sysout data sets can reach this limit.

- **In release 9, all 2-byte OSE buffer numbers are expanded to 4-byte numbers.**

  ▶ **The buffer limit takes much longer to reach now.**

New METAL C Compiler option:

- **A new mode of code generation is added to the XL C compiler**
    1. The METAL option serves as the switch to enable this new mode of code generation that the code generated follows the standard MVS linkage conventions and does not have Language Environment dependencies.
    2. The GENASM option signals the compiler to generate code in HLASM source code.
    3. The #pragma prolog/epilog directives can be used to supply programmer's own prolog and epilog code.
    4. The __asm syntax can be used to supply embedded HLASM statements
    5. The new language constructs and facilities to support accessing data stored in data spaces.
    6. Subset of C library functions available for this mode.

- **With this new mode of code generation it is possible to use C language to:**
    1. Write installation exits.
    2. Develop programs that runs without Language Environment assistance.
    3. Have much simpler way for writing AR mode programs.

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**