z/OS 2.3 Sysprog Goody Bag
Session 20778

Bob Rogers

Trident Services, Inc.

March 8, 2017

Disclaimer

"Statements regarding IBM future direction and intent are subject to change or withdrawal, and represents goals and objects only."

In this presentation, the verb "will" is often used often shorthand for "is intended to be design to".

Good Stuff in z/OS 2.3

- Improved real storage frame management
- Improved real storage resource management
- More Granular Crossover Management
- Improved Response Time Goal Management
- Improved WLM Sysplex Routing
- Progress on RMODE64 Roadmap
- JES2 Modernization – email
- JES2 Modernization – password phrase
- JES2 recognition of JES3 JECL
- Accessing SMF Data in Real-time
- Enhanced VTOC integity
- TSO/E Modernization
- DFSort Performance
- Tempus Fugit (twice)
- Other Miscellany

SHARE
San Jose 2017

z/OS v2.3 "Preview Announcement"

SHARE
EDUCATE • NETWORK • INFLUENCE

Usability and Skills
z/OSMF Configuration Assistant enhancements for TCP/IP (import, dynamic updates, support for Disaster Recovery configurations), Sysplex Management stage I, Incident Log, Software Management, SMP/E improvements, z/OSMF always on, …

Scalability & Performance
RMODE 64, Open Data Set Constraint Relief, SMF Constraint Relief, SMF real-time APIs, VSAM RLS Constraint Relief, …

Availability
zFS dynamic attribute changes, SSL hardware auto-detect, HFS to zFS online migration tool, JES2 Resiliency – Spool management, …

Systems Management
JES3 to JES2 Migration aids, 8-Character TSO/E User IDs, BCPii Performance and constraint relief, VTOC Update SMF records, zFS Shrinking, KC4Z Improvements, zFS Improvements, …

Application Development
z/OS UNIX System Services support for Years 2038, Year 2042 TOD Clock Issue, e-Mail notification for job completion, Web Enablement Toolkit Enhancements, ISPF Improvements, …

Enhancing Security
SAF Security Deployment Descriptor, Encrypting access methods, FIPS Mode for System SSL Services, Network Authentication Services Improvements, Audit Key Lifecycle Events & FIPS Mode Audit Trail, …

Networking
SMC-D, 3270 Intrusion Detection Services, Improved reporting of Network Security Encryption protocol usage, AT-TLS Currency, …

SHARE
San Jose 2017

Improved real storage frame management

Dynamic Large Page Support

- Currently, the management of large (1MB) pages is rigid and requires the installation to guess how much is needed.

- With dynamic large page support in z/OS 2.3 the LFAREA system parameter will no longer describe a defined area of memory, but rather it will specify the maximum number of large frames that can be allocated.

- More memory will be available for pageable large page requests because there will no longer be the arbitrary limit of 1/8 of total memory.

- The implementation will make it easier to reconstitute large frames after they have been broken up to satisfy demand for 4K pages.

- The INCLUDE1MAFC system parameter will no longer be meaningful and will essentially be forced to YES.

Improved real storage resource management

Memory Pools

- Currently, it is not possible to limit the amount of real storage used by a workload.
- In z/OS 2.3, WLM will provide a means to limit the amount of real storage allocated for a set of service classes.
- A Memory Limit resource group attribute will be introduced as a means to limit the total real memory allocated to address spaces classified into service classes associated with a resource group.
- The z/OS Real Storage Manager will enforce the limits.
- z/OS RMF will report on the new attribute.
- Rollback to 2.1 and 2.2 will be provided by APAR OA50845.

More Granular Crossover Management

Honor Priority by Service Class

- Specialty engine crossover is when zIIP-eligible work is run on general purpose processors.
- Currently, whenever z/OS sees an instantaneous backlog of specialty engine work and IFAHONORPRIOTITY [or IIPHONORPRIORITY] is YES, it will dispatch eligible work on general purpose processors.
- This can cause unimportant work to consume the more expensive resources when delaying the work would have been acceptable.
- In z/OS 2.3, WLM will provide a new service class attribute so that crossover can be controlled at a service class granularity so that important work can be expedited while unimportant work can be delayed.
- As a default, a service class will be treated in accordance with the IEAOPTxx IFAHONORPRIORITY [or IIPHONORPRIORITY] value. Alternately, a value of YES or NO will be allowed for any service class.

Improved Response Time Goal Management

Shorter WLM response time goals

- Currently, the minimum WLM response time goal is 15 ms.

- On modern processors, many types of transaction typically complete in much less than 15 ms, allowing the service class to consistently overachieve the stated goal.

- Overachieving service classes can be run at lower priority and become vulnerable to workload spikes.

- Work in such a service class can be delayed as the average response is allowed to rise toward the 15 ms goal.

- To remedy this, WLM will support goals as low as 1 ms.

Improved WLM Sysplex Routing

WLM routing for soft Capping Environments

- Currently, WLM Sysplex routing service base recommendations on the rolling 3 minute average of available and displaceable capacity.

- A system which currently has ample available capacity may be about to be capped due to Defined Capacity Limit or Group Capacity Limit making it a poor choice for the routing of additional work.

- In z/OS 2.3, WLM will adjust the estimate of available and displaceable capacity based on the estimate time until a capping action will be taken. The closer a system is to an expected capping, the more the estimated capacity will be reduced.

- This will reduce the occurrences of work being slowed because it was routed to a system that actually did not have sufficient capacity due to capping.

- WLM will provide an OPTxx parameter to allow an installation to state how far in advance they want an expected capping to influence routing recommendations.

SHARE
San Jose 2017

Progress on RMODE64 Roadmap

- The supervisor support for running code above 2GB was provided some releases ago. But there was no way to load a normal executable module above the bar nor was support enabled for services to be invoked.

- It is planned that that support will be provided in z/OS 2.3.

- But that does not mean than any program can execute correctly above the bar. It depends on what services, if any, a program uses.

- If you think you want to create a program that will be loaded above 2GB, there are some compatibility concerns that you will need to be aware of.

- It is also planned that Java JITed code be able to reside above 2GB, simplifying the JVM and providing virtual storage constraint relief for address spaces that contain a lot of Java code.

JES2 Modernization - email

- JES2 support for email
  - An email address can be used in lieu of USERID.
  - Of course, the email address must be in the security product for verification and mapping.
  - The email address will be set into JCL symbol &SYSEMAIL.
- New NOTIFY JCL statement requests a completion message.
  - There can be up to 8 NOTIFY statements in a job or a job group
  - Not mutually exclusive with NOTIFY keyword on JOB statement.
  - The syntax of the NOTIFY statement:
    ```
    //name  NOTIFY [EMAIL=address | USER=userid],TYPE=EMAIL|MSG,
                   WHEN=expression
    ```
- The NOTIFY keyword is now allowed on a JOBGROUP JCL statement

SHARE
San Jose 2017

JES2 Modernization – password phrases

- The PASSWORD= keyword on the JOB and JOBGROUP JCL statements will accept password phrases.

- A value longer than 8 characters will be treated as a password phrase. Password phrases will be 9 to 100 characters long.

- Both an old and a new values can be specified on PASSWORD=.
  – However, both values must be either passwords or password phrases. Combination of a password and a password phrase is not supported.

- Password values will not appear in a job log or other JES2 data sets.

JES2 recognition of JES3 JECL

- The intention is to greatly reduce the JECL conversion needed to run jobs originally coded for the JES3 environment in a JES2 environment.

- The processing of //*xxx statements will be activated by:
  - `$T INPUTDEF,JES3JECL=PROCESS`

- The processing of each statement type will be controlled by:
  - `$T JECLDEF,JES3=(MAIN=PROCESS,DATASET=PROCESS,….)`

JES2 recognition of JES3 JECL

Support that will be provided:

//*MAIN **Partially supported**
- **Obsolete:** ACMAIN, IORATE, LREGION, MSS, RINGCHK, TRKGRPS, TYPE
- **Supported:** BYTES, CARDS, CLASS, HOLD, JOURNAL, LINES, ORG, PAGES, PROC, SYSTEM, USER
- **Not Supported:** DEADLINE, EXPDTCHK, FAILURE, FETCH, SETUP, SPART, THWSSEP, UPDATE

//*FORMAT **Partially supported**
- **Ignored:** PR/PU positional
- **Supported:** DDNAME,CARRIAGE/FCB,CHARS,COMPACT,COPIES,DEST,EXTWTR,FLASH,FORMS,MODIFY,PRTY,STACKER,TRAIN
- **Not Supported:** CHNSIZE, INT, OVFL, THRESHLD

//*ROUTE **Not supported, job stream flushed**

//*DATASET **Tolerated, but not supported**

//*ENDDATASET **Required if //*DATASET used**

//*PROCESS **Tolerated, but not supported**

//*ENDPROCESS **Tolerated, but not supported**

//*NETACCT **Fully supported**

//*NET **Partially supported**
- **Supported:** ID/NETID, ABCMP/AC,ABNORMAL,NORMAL,NETREL/NR,NHOLD/HC,NRCMP/PC,OPHOLD/OH,RELEASE/RL
- **Obsolete:** DEVPOOL, DEVRELSE,RELSCHCT/RS

//*PAUSE **Not supported, ignored if present**

//*OPERATOR **Supported, but message text ends in 71, not 80**

Obsolete means that a warning diagnostic is written, but is otherwise ignored.
Not supported means that an error message is generated and the job is given a JCL ERROR

Generic tracking added in JES2 for JECL
- Similar to what was done in JES3 in z/OS 2.2 and will apply to both JES2 and JES3 JECL

Accessing SMF Data in Real-time

- Currently, SMF data can be accessed as it is written using the IEFU83/IEFU84/IEFU85 exits.
  - Requires authorized user exit code
  - No ability to limit processing to specific SMF record types
- z/OS 2.3 will provide new SMF Real-time Services
  - Define new "In-memory (INMEM) Resources" for specific records
  - Will be able to write any set of SMF records to a in-memory resource only
  - APIs will allow applications to access SMF data as it is buffered
  - Access by unauthorized programs will be policed via SAF
  - It will provide a Connect/Get/Disconnect model similar to traditional QSAM access
  - Potential use-cases include
    - Detect security violations in real-time
    - Real time monitoring of resource usage
    - Dynamic Job Scheduling based on current resource consumption
  - Support was rolled back to V2R1 and V2R2 via APAR OA49263

NB. Not Supported when RECORDING(DATASET) is use.

8 Character TSO User IDs

- TSO/E will allow userids that are up to 8 characters long
  - Users in UADS still have 7 character restriction
- All commands that accept userids will accept 8 character userids/prefixes
  - except ACCOUNT sub-commands
- PROFILE PREFIX will accept 8 character PREFIX values
- New IKJTSOxx keyword to support activation
  - USERID MAX {(7)} | {(8)} on the LOGON statement
- Messages for 8 character IDs can only be stored in User Logs
  - If User Logs not activated then message will not be stored

Health Checker Enhancements

- To make it easier to share a single policy member across all the systems in a Sysplex:

  - V2R2 APAR OA49807 introduced the capability to provide **conditional phrases** for POLICY statements as well as other statements allowed in HZSPRMxx.

  - Best described with an example:

    ```
    WHEN(&SYSNAME. IN ('SY07','SY08','SY09'))
      DO
        ADDREP POLICY UPDATE CHECK(OWNER1,CHECK1) INACTIVE
            REASON('Not needed on system 7,8, and 9') DATE(20150811)
      WHEN(&SYSNAME. = 'SY08')
        DO
         ADDREP POLICY UPDATE CHECK(OWNER2,CHECK2) INACTIVE
              REASON('Not needed on system 8') DATE(20150811)
        END /* SY08 */
      ADDREP POLICY UPDATE CHECK(OWNER3,CHECK3) INACTIVE
            REASON('Not needed on system 7,8, and 9') DATE(20150811)
    END /* SY07, SY08, SY09 */
    ```

  - Debug aid message in hardcopy log:

    HZS0118I WHEN EVALUATED TO {*TRUE|FALSE*} IN PARMLIB MEMBER=HZSPRM*xx* ON LINE *n*

- A new CHECK command option will syntax check HZSPRMxx members before deploying

Enhanced VTOC integity

- Logging VTOC updates
  - z/OS 2.2 EXCP creates SMF type 42 subtype 27 records
  - In z/OS 2.3, DFSMS DADSM/CVAF will build SMF 42.27 record and include before and after DSCB images.
  - A new SMF type 42 subtype 28 record will log events that affect an entire volume.
- A new DFSMS CVAF interface will be provided to protect against accidental modification of critical fields
  - A new VALIDATE=YES/NO will be added to request the check.

Tempus Fugit 1

- The Year 2038 issue is also known as the UNIX Y2K problem.
  - Times after 03:14:07 UTC on 19 Jan 2038 cannot be encoded.
  - All AMODE 31 C/C++ programs which use time_t directly or indirectly can be affected by the Year 2038 issue.
  - z/OS 1.9 provided some support for dates beyond 2038
  - z/OS 2.3 will provide uniform support for a 64-bit time value.
    - A 64-bit value can encode dates out to **292,277,026,596**
    - Some of the support may be provided via PTF
  - Needless to say, application changes may be required.

Tempus Fugit 2

TOD Clock wrap-around in 2042

- S/370 architecture defines an *epoch* to be 142 years and 8½ months.
  - The 64-bit TOD value can encode the times in one epoch.
  - The Standard Epoch starts 1 Jan 1900 at 00:00:00 a.m.
- ESA/390 extended the clock to 104 bits
  - This only increased the precision of the TOD.
  - The STCKE instruction stores an 8-bit epoch index in front of the 104-bit TOD clock value. It is currently always 0.
  - For dates in TOD clock format, dates after 2042 have a non-zero epoch index, creating 9-byte timestamps.
- Timestamps in APIs, record formats future expiration dates, and interval calculation may require remediation
- z/OS is starting the process in this release.

SHARE
San Jose 2017

DFSort Performance

- DFSort performance improvement
  - DFSort generate code on the fly for some functions
  - The generated code would store into the same cache line as the code
  - Doing something that lets the processor think that an instruction in the i-cache may have been altered has gotten progressively more expensive with newer processors.
  - In z/OS 2.3 the generated code does a better job of separating data from code.

- DFSort multiple record support for E15 and E35 exits
  - Linkage overhead can be reduced by providing DFSort with multiple records through E15 and accepting multiple sorted records through E35.

Other Miscellany

- The Sub-Capacity Reporting Tool (SCRT) will be included as a component of z/OS
  - It will continue to be available as a web download
  - Also, SCRT will enable the generation of ISV-based reports

- To avoid running out of SMF record types, SMF will support up to 2048 unique record type values:
  - 0-127, 1152-2047 – IBM assigned
  - 128-1151 – available for non-IBM use
- Concurrently open datasets for DB2
  - DFSMSdfp VSAM enhancements are planned to provide improved performance and scalability for DB2 workloads by allowing the number of concurrent open data sets in a single address space to grow and by improving performance of data set close processing.
  - Target is 400,000 open data sets per address space

Trademarks