z/OS 2.4 IBM Education Assistance

Combined Device Allocation Education for:

Relief for Job Unallocation

High Water Mark

z/OS 2.4 IBM Education Assistance

Q4 Relief for Job Unallocation

Element(s)/Component(s): MVS BCP Device Allocation

Agenda

- Trademarks

- Session Objectives

- Overview

- Background

- Changes

- Usage & Invocation

- Interactions & Dependencies

- Migration & Coexistence Considerations

- Session Summary

Trademarks

- See url http://www.ibm.com/legal/copytrade.shtml for a list of trademarks.

- Additional Trademarks: None.

Session Objectives

- This session will discuss changes made in end-of-job unallocation processing for handling tape devices allocated by the job.

- These changes serve two purposes:

  - To improve throughput by minimizing bottlenecks in end-of-job unallocation.
  - To eliminate cases of job failures due to tape drives in use on other systems in the sysplex.

Overview

- ## Who (Audience)

  - System programmers, users writing JCL

- ## What (Solution)

  - Have Job Unallocation serialize tape devices more efficiently

- ## Wow (Benefit / Value, Need Addressed)

  - Improved throughput and performance, fewer job failures

Background

- Job Unallocation runs after the last step of the job completes, and is responsible for cleaning up after the job.

- Among other things, it is responsible for unloading tape volumes that were not already unloaded.
    - These are usually RETAINed tape volumes, or
    - Data sets on volumes that were PASSed from one of the steps in the job and no subsequent steps received the data set.

- Job Unallocation runs outside of the normal job step environment, and has to use serialization that is impactful to the rest of the system (and the sysplex.)
    - This includes the SYSIEFSD/Q4 ENQ, Allocation group locks, and marking the device "in use by system".

Changes

- In z/OS 2.4, we've redesigned several pieces of processing:
  - In Job Unallocation, we've significantly shrunk the amount of time that we need to hold SYSIEFSD/Q4 and Allocation group locks.
    - These used to be held over the entire process, including I/O to unload the volume from the tape drive. These are now held over a small piece of the process which does not perform any I/O.
    - This should allow other jobs and dynamic allocations to proceed on the local system and significantly reduce one source of SYSIEFSD/Q4 contention, which can show up in other ways such as VARY command contention.
  - We also changed to make "in use by system" to be "waitable" for tape devices.
    - This allows Allocation to test if a tape device is in the in use by system condition, and will wait (similar to how Allocation can wait for a device that is allocated.)
    - Allocation used to perform "point-in-time" checks for this condition, meaning that if a device is in use by system, the request would fail.
    - This should also eliminate most cases of IEF474I UNIT OR VOLUME IN USE BY SYSTEM FUNCTION – CANNOT BE ALLOCATED.

Usage & Invocation

- These changes should be transparent – no configuration changes or JCL updates are required.

Interactions & Dependencies

- To exploit this item, all systems in the Sysplex must be at the new z/OS level: No

- Software Dependencies
  - No dependencies

- Hardware Dependencies
  - No dependencies

- Exploiters
  - None

Migration & Coexistence Considerations

- No Migration or Coexistence APARs/PTFs.

- Autoswitchable tape devices shared between systems at z/OS 2.4 and prior releases should behave as expected.

  - Jobs on prior releases are not able to wait for a job that has a device in use by system, and this condition will still result in a job failure, even if the job that is using the device is at z/OS 2.4.

  - Jobs on z/OS 2.4 are able to wait for a job that has a device in use by system, even if the job that is using the device is at a prior release.

  - In other words, jobs on prior releases fail or succeed just like they used to, and jobs on z/OS 2.4 shouldn't have any ill effects due to tape devices that are shared with systems at prior releases.

Session Summary

- The changes described here should improve performance by reducing contention on the SYSIEFSD/Q4 ENQ and Allocation group locks.

- These changes should also eliminate most job failures due to message IEF474I.

- No changes to JCL or tape device configuration are necessary.

z/OS 2.4 IBM Education Assistance

TIOT High Water Mark

Element(s)/Component(s): MVS BCP Device Allocation

Agenda

- Trademarks

- Session Objectives

- Overview

- Usage & Invocation

- Interactions & Dependencies

- Session Summary

- Appendix

Trademarks

- See url http://www.ibm.com/legal/copytrade.shtml for a list of trademarks.

- Additional Trademarks: None

Session Objectives

- This session will describe the TIOT usage information that is available in z/OS 2.4.

Overview

- Who (Audience)
  - System Programmers

- What (Solution)
  - TIOT usage information will be available in SMF type 30 records and installation exits.

- Wow (Benefit / Value, Need Addressed)
  - Now have the ability to proactively track and monitor TIOT usage.

Usage & Invocation

- z/OS 2.4 will track TIOT usage information and externalize it in several places:
  - SMF type 30 records, including interfaces that can look at the contents of these records (such as the IEFU8x installation exits.)
  - IEFACTRT installation exit.

Usage & Invocation – SMF type 30

- New fields will be provided in the SMF type 30 record Storage and Paging Section (SMF30SPA):
  - SMF30TIH – High water mark of TIOT space used for TIOT entries for this job.
  - SMF30TIU – Current TIOT space used for TIOT entries.
    - This will only contain a value for interval records, since TIOT entries are freed at step end and job end. It will contain zero in other cases.
  - SMF30TIS – Size of the TIOT available for TIOT entries.
- All fields are in bytes.
- These fields only include space used for or available for TIOT entries.
  - The TIOT Prefix, Header, and Trailer are not included.
  - The TIOT size in bytes may not exactly match the TIOT size specified in kilobytes. In particular, a 64K TIOT has always been slightly smaller than 64K.

Usage & Invocation – SMF type 30

- Any processing that uses the new fields in the SMF type 30 needs to check that the fields are present, unless you know for sure that the record was written by a z/OS 2.4 system.
  - For example, if you are looking at these fields in an IEFU84 exit, you should check the length of the section. However, if you have a 2.4-only version of the exit, you can skip this check.

Usage & Invocation – IEFACTRT

- The IEFACTRT exit will also receive TIOT usage information as part of the exit parameters.
    - The parameter list is expanded to include a new parameter, "Word 14."
        - The high-order bit in the last used parameter is used as an end-of-list indicator.
        - In z/OS 2.4, Word 14 will always be present, and currently is the last parameter so the bit will be on.
    - Word 14 contains a pointer to a new 12-byte structure.
        - If TIOT information is not available, Word 14 will contain zeros (except for the end-of-list indicator bit.) This is typical at job end since the TIOT has already been freed by the time the exit is called.
        - The exit should check that Word 14 contains a non-zero value before referencing the storage.

Usage & Invocation – IEFACTRT

- New structure contents:
  - Word 1 contains the length of the new structure in bytes. Currently this is 12, but may expand in the future.
  - Word 2 contains the size of the TIOT that is usable for TIOT entries in bytes.
  - Word 3 contains the high water mark of the space used for TIOT entries for this job, also in bytes.
- Like the SMF type 30 fields, these do not include the space for the TIOT Prefix, Header, and Trailer.

Interactions & Dependencies

- To exploit this item, all systems in the Sysplex must be at the new z/OS level: No

- Software Dependencies
  - None.

- Hardware Dependencies
  - None.

- Exploiters
  - None.

Session Summary

- TIOT space usage will now be available in the SMF type 30 records as well as the IEFACTRT exit.

Appendix

- Reference material:
    - z/OS MVS Initialization and Tuning Reference SA23-1380
        - The ALLOCxx parmlib member describes TIOT size calculations.
    - z/OS MVS System Management Facilities (SMF) SA38-0667
        - Describes SMF type 30 fields.
    - z/OS MVS Installation Exits SA23-1381
        - Describes the IEFACTRT exit and parameters.