IBM Education Assistance for z/OS V2R2

Item: Logger allocate ahead log stream advanced-current offload datasets
Element/Component: BCP/Logger (System Logger)

Material current as of May 2015

Agenda

- Trademarks
- Presentation Objectives
- Overview
- Usage & Invocation
- Interactions & Dependencies
- Migration & Coexistence Considerations
- Installation
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Trademarks

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

Presentation Objectives

- Key purpose is to keep log stream interim/primary storage resources available to logger exploiters

- Enhance log stream offload process by managing resources in advance

Overview

- Problem Statement / Need Addressed
  - Log stream primary/interim storage fills up, means:
    - exploiter will not be able to write more log data
    - causes slow down or even stoppage for data/work flow...

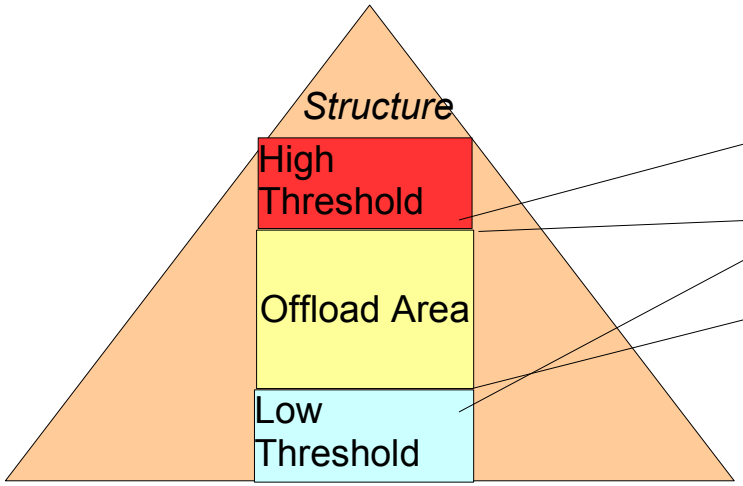
- Solution
  - Pro-actively allocating up to 3 “advanced-current” offload datasets
  - Make current offload dataset and 1st “advanced-current” offload dataset ready in advance
  - Earlier and better warning for problem cases
  - New messages

- Benefit / Value
  - Avoid or significantly reduce offload delay from space issues

Log stream offload processing (review)

For a given log stream, only one offload may occur at a time in the plex.
Most of offload processing runs under an SRB.
Data set allocation requests passed to an address space task.

The exploiting application can keep writing during the offload (until primary fills).



Offload Processing:

"Fast Delete" Phase:
- Remove data older than low valid point.

Movement Phase
- Move data to DASD until offload target met.
  - If a data set fills...
  - Allocate and prepare new one.

Data set Cleanup:
-Delete old offload data sets if data is no longer valid.

Problem statement:

- When log stream primary/interim storage fills up,
  - exploiter will not be able to write more log data
    - causes slow down
    - may lead to multi-system outage

Solution

- Logger provides:
  - A logger policy for definition option(keyword: LS_ALLOCAHEAD) to be pro-active in allocating up to 3 “advance-current” offload datasets (as a target) also open the current and 1st “advance-current” offload datasets in advance
  - A logger policy attribute option(keyword: Allocahead) to indicate whether the system will allow pro-active allocation/open offload datasets
  - Coexistence PTFs on z/OS V1R13 and z/OS V2R1 to allow the usage of “advance-current” offload datasets in a compatible way
  - Deallocation mechanism to close/unallocate current and/or “advance-current” offload datasets
  - New messages indicate pro-active activities, errors

Option to be pro-active in allocating up to 3 “advance-current” offload datasets (as a target) also open the current and 1st “advance-current” offload datasets in advance

- In the next couple pages,
  - DEFINE
  - CONNECT
  - OFFLOAD PROCESS
  - UPDATE

LOGSTREAM DEFINE

- When DEFINE a log stream with LS_ALLOCAHEAD specified:

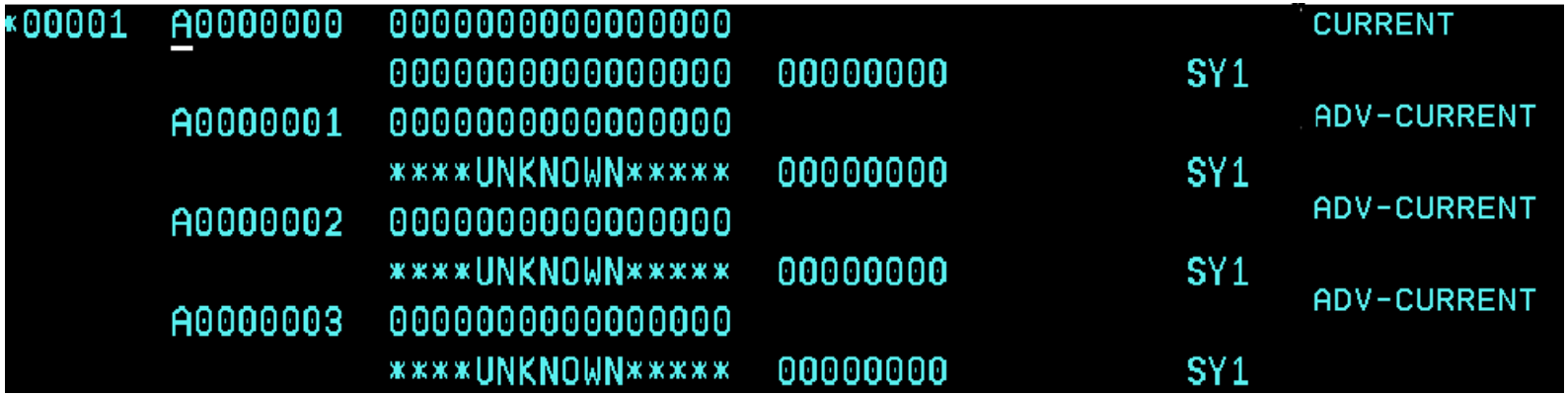
DEFINE LOGSTREAM

NAME(LOGGER.TEST1)

STRUCTNAME(LIST01) / DASD-ONLY(YES)

LS_ALLOCAHEAD(3)

If return = 0, logger will allocate 3 “advance-current” offload datasets and the current offload dataset in advance(result in IXCMIAPU list report)



LOGSTREAM CONNECT

- When CONNECT to the log stream:
  - Logger will open (make ready) the current offload dataset

```
IXG601I  19.03.17  LOGGER DISPLAY  FRAME  1    F     E   SYS=SY1
CONNECTION INFORMATION BY LOGSTREAM FOR SYSTEM SY1
LOGSTREAM              STRUCTURE       #CONN  STATUS
---------              ---------       ------ ------
LOGGER.TEST1           LIST01          000001 IN USE
  DUPLEXING: LOCAL BUFFERS
  GROUP: PRODUCTION
  OFFLOAD DSN FORMAT: IXGLOGR.LOGGER.TEST1.<SEQ#>
    CURRENT DSN OPEN: YES                    SEQ#: A0000000
    ADV-CURRENT DSN OPEN: NO                 SEQ#: -NONE-
```

DURING THE OFFLOAD PROCESS

- During the log stream offload:
  - 1st "advance-current" offload dataset will be opened when a data set switch is necessary from the actual offload dataset being written into for the log stream

```
IXG601I  19.03.17  LOGGER DISPLAY   FRAME  1    F     E   SYS=SY1
CONNECTION INFORMATION BY LOGSTREAM FOR SYSTEM SY1
LOGSTREAM              STRUCTURE       #CONN  STATUS
---------              ---------       ------ ------
LOGGER.TEST1           LIST01          000001 IN USE
  DUPLEXING: LOCAL BUFFERS
  GROUP: PRODUCTION
  OFFLOAD DSN FORMAT: IXGLOGR.LOGGER.TEST1.<SEQ#>
    CURRENT DSN OPEN: YES                    SEQ#: A0000000
    ADV-CURRENT DSN OPEN: YES                SEQ#: A0000001
```

  - When 1st "advance-current" offload dataset becomes the current one, logger will automatically trigger another allocation to get a new "advance-current" offload dataset to meet the target

LOGSTREAM UPDATE

- When UPDATE Logstream LS_ALLOCAHEAD value for log stream:
  - Pending update will be applied in log stream definition, if the logstream is connected
  - The update will take effect when:
    - the next log stream offload data set is allocated (data set switch event)
    - on the subsequent first connection to the log stream in the sysplex
    - For structure-based log stream, the change will also take effect during the next structure rebuild

A logger policy attribute option to indicate whether the system will allow pro-active allocation/open offload datasets

- Keyword in PARMLIB: ALLOCAHEAD(YES|NO) (yes is the default)
  - In PARMLIB display,

```
IXG607I   19.28.02  LOGGER DISPLAY   FRAME  2     F      E   SYS=SY1
...
MONITOR LSPRIMARY
        CONSUMPTIONALERT              DEFAULT              ALLOW
MANAGE OFFLOAD
        ALLOCAHEAD                    DEFAULT              YES
ZAI
        SERVER                        DEFAULT              NONE
 ...
```

- Command to enable|disable ALLOCAHEAD keyword in Logger policy
  - SETLOGR MANAGE,OFFLOAD,ALLOCAHEAD(YES|NO)

Coexistence PTFs on z/OS V1R13 and z/OS V2R1 to allow the usage of “advance-current” offload datasets in a compatible way

On z/OS V1R13 and z/OS V2R1:

- LS_ALLOCAHEAD attribute cannot be specified, but will appear in IXCMIAPU report and list output for log streams attributes.
- “Advanced-current” offload datasets NOT newly created or pro-actively used, but are used as needed
- The z/OS V2R2 logger messaging for DSEXTENT usage and offload data set related errors inhibiting offload progress is NOT available on pre-V2R2 systems. (see message for detail)
- New z/OS V2R2 IXGCNFxx parmlib specification is not recognized on pre-V2R2 systems. Inappropriate use can cause error during system logger initialization. Therefore, installation should use separate parmlib members with new V2R2 information.

Deallocation mechanism to close/unallocate current and/or “advance-current” offload datasets

- For resource management purpose, logger provides mechanism to close/unallocate current and/or “advance-current” offload datasets if there is no need of them
  -
  - Command: SETLOGR FORCE,DEALLOC,LSN=*logstreamname*

New messages indicate pro-active activities, errors

- IXG601I D LOGGER - display output (includes list of advanced-current offload data sets for commands indicated below)

IXG601I hh.mm.ss LOGGER DISPLAY [id]

CONNECTION INFORMATION BY LOGSTREAM FOR SYSTEM sysname

LOGSTREAM STRUCTURE #CONN STATUS

logstreamname strname num_conn status

DUPLEXING: duplexing-method

STGDSN: datasetname

VOLUME=volume SIZE=nnnnn % IN-USE=used

GROUP: groupname zai client info

OFFLOAD DSN FORMAT: offload-datasetname-format.<SEQ#>

CURRENT DSN OPEN: YES|NO SEQ#: sequence#

ADV-CURRENT DSN OPEN: YES|NO SEQ#: sequence#

DISCONNECT PENDING FOR xxxx MINUTES

… (the rest remains the same as before)

New messages indicate pro-active activities, errors..(cont.)

- ixg320i dsextent record assigned to logstream xyz
- ixg321i dsextent record unassigned from logstream xyz
- ixg322i dsextent record assigned to logstream xyz for group: test
- ixg323i dsextent record unassigned from logstream xyz for group: test
- ixg324i data set switch failure preventing offload progress
- ixg325i error obtaining advanced-current offload data set
- ixg326i LS_AllocAhead not in effect on system sysname
- ixg327i LS_AllocAhead is now in effect on system sysname

(note: messages are all upper-case)

Usage & Invocation

- IXGCNFxx
  - sys1.parmlib member, or command SETLOGR
    SETLOGR MANAGE,OFFLOAD,ALLOCAHEAD(YES|NO)
  - D LOGGER,IXGCNF:
    MANAGE OFFLOAD
    - ALLOCAHEAD DEFAULT YES
    - ALLOCAHEAD SETLOGR NO (When setlogr command is used)

- LOGSTREAM
  - sysplex basis
  - IXGINVNT API and IXCMIAPU utility define/update
    - LS_ALLOCAHEAD = 0|1|2|3 (0 is default)
  - Deallocation command
    SETLOGR FORCE,DEALLOC,LSN=*logStreamName*

Usage & Invocation(cont.)

- Example:

  Assuming

  - Str-based log stream: LOGGER.TEST1
  - LS_ALLOCAHEAD=3
  - CONNECT
  - Issue IXGWRITE to cause a dataset switch in next offload
  - UPDATE LS_ALLOCAHEAD=2
  - Issue IXGWRITE to cause a dataset switch in next offload
  - Issue SETLOGR FORCE,DEALLOC,LSN=LOGGER.TEST1

Usage & Invocation(cont.)

- Example:
  - Str-based log stream: LOGGER.TEST1
  - LS_ALLOCAHEAD=3

```
DEFINE LOGSTREAM
        NAME(LOGGER.TEST1)
        STRUCTNAME(LIST01)
        LS_ALLOCAHEAD(3)
```

```
LOGSTREAM NAME(LOGGER.TEST1) STRUCTNAME(LIST01) LS_DATACLAS()
          LS_MGMTCLAS() LS_STORCLAS() HLQ(IXGLOGR) MODEL(NO) LS_SIZE(16)
          STG_MGMTCLAS() STG_STORCLAS() STG_DATACLAS() STG_SIZE(0)
          LOWOFFLOAD(0) HIGHOFFLOAD(80) STG_DUPLEX(NO) DUPLEXMODE()
          RMNAME() DESCRIPTION() RETPD(0) AUTODELETE(NO) OFFLOADRECALL(YES)
          ZAI(NO) ZAIDATA('NO_ZAIDATA') WARNPRIMARY(NO) LS_ALLOCAHEAD(3)
```

```
*00001   A0000000   00000000000000000                                CURRENT
                    00000000000000000  00000000            SY1
         A0000001   00000000000000000                                ADV-CURRENT
                    ****UNKNOWN*****  00000000            SY1
         A0000002   00000000000000000                                ADV-CURRENT
                    ****UNKNOWN*****  00000000            SY1
         A0000003   00000000000000000                                ADV-CURRENT
                    ****UNKNOWN*****  00000000            SY1
```

Usage & Invocation(cont.)

- System log tells:

  - IXG283I OFFLOAD DATASET IXGLOGR.LOGGER.TEST1.A0000000
    ALLOCATED NEW FOR LOGSTREAM LOGGER.TEST1
    CISIZE=4K, SIZE=147456

  - IXG283I OFFLOAD DATASET IXGLOGR.LOGGER.TEST1.A0000001
    ALLOC ADV NEW FOR LOGSTREAM LOGGER.TEST1
    CISIZE=4K, SIZE=147456

  - IXG283I OFFLOAD DATASET IXGLOGR.LOGGER.TEST1.A0000002
    ALLOC ADV NEW FOR LOGSTREAM LOGGER.TEST1
    CISIZE=4K, SIZE=147456

  - IXG283I OFFLOAD DATASET IXGLOGR.LOGGER.TEST1.A0000003
    ALLOC ADV NEW FOR LOGSTREAM LOGGER.TEST1
    CISIZE=4K, SIZE=122880

Usage & Invocation(cont.)

- CONNECT:
  - Issue D LOGGER,C,LSN=*,D command to check connection

```
IXG601I  23.56.00  LOGGER DISPLAY  FRAME  1    F     E   SYS=SY1
CONNECTION INFORMATION BY LOGSTREAM FOR SYSTEM SY1
LOGSTREAM              STRUCTURE      #CONN  STATUS
---------              ---------      ------ ------
LOGGER.TEST1           LIST01         000001 IN USE
  DUPLEXING: LOCAL BUFFERS
  GROUP: PRODUCTION
  OFFLOAD DSN FORMAT: IXGLOGR.LOGGER.TEST1.<SEQ#>
    CURRENT DSN OPEN: YES                    SEQ#: A0000000
    ADV-CURRENT DSN OPEN: NO                 SEQ#: -NONE-

LOGSTREAM              STRUCTURE

JOBNAME: CONNECTD  ASID: 0028

R/W CONN: 000001 / 000000

RES MGR./CONNECTED: *NONE*   / NO

IMPORT CONNECT: NO

NUMBER OF LOGSTREAMS:  000001
```

Usage & Invocation(cont.)

- Now IXGWRITE to cause OFFLOAD:
  - Issue command D LOGGER,C,LSN=*,D

```
IXG601I  00.03.26  LOGGER DISPLAY  FRAME  1    F     E   SYS=SY1
CONNECTION INFORMATION BY LOGSTREAM FOR SYSTEM SY1
LOGSTREAM              STRUCTURE      #CONN  STATUS
---------              ---------      ------ ------
LOGGER.TEST1           LIST01         000001 IN USE
  DUPLEXING: LOCAL BUFFERS
  GROUP: PRODUCTION
  OFFLOAD DSN FORMAT: IXGLOGR.LOGGER.TEST1.<SEQ#>
    CURRENT DSN OPEN: YES                    SEQ#: A0000001

    ADV-CURRENT DSN OPEN: YES                SEQ#: A0000002
…
```

  - System log tells:

```
IXG283I OFFLOAD DATASET IXGLOGR.LOGGER.TEST1.A0000001
NOW NEW CURDS FOR LOGSTREAM LOGGER.TEST1
CISIZE=4K, SIZE=147456
```

Usage & Invocation(cont.)

- Now UPDATE LS_ALLOCAHEAD=1

```
UPDATE   LOGSTREAM NAME(LOGGER.TEST1)

         LS_ALLOCAHEAD(1)
```

  - In IXCMIAPU list report, LS_ALLOCAHEAD value remains 3, and the value 1 becomes a pending update

```
LOGSTREAM NAME(LOGGER.TEST1) STRUCTNAME(LIST01) LS_DATACLAS()
          LS_MGMTCLAS() LS_STORCLAS() HLQ(IXGLOGR) MODEL(NO) LS_SIZE(16)
          STG_MGMTCLAS() STG_STORCLAS() STG_DATACLAS() STG_SIZE(0)
          LOWOFFLOAD(0) HIGHOFFLOAD(80) STG_DUPLEX(NO) DUPLEXMODE()
          RMNAME() DESCRIPTION() RETPD(0) AUTODELETE(NO) OFFLOADRECALL(YES)
          ZAI(NO) ZAIDATA('NO_ZAIDATA') WARNPRIMARY(NO) LS_ALLOCAHEAD(3)
          DASDONLY(NO) DIAG(NO) LOGGERDUPLEX(UNCOND) EHLQ(NO_EHLQ) GROUP(PROD

      PENDING CHANGES:
          LS_ALLOCAHEAD(1)
```

Usage & Invocation(cont.)

- More IXGWRITE to cause offload
  - IXG327 message can be seen
    - IXG327I LS_ALLOCAHEAD IS NOW IN EFFECT ON SYSTEM SY1 FOR LOGSTREAM LOGGER.TEST1, IN STRUCTURE LIST01
  - LS_ALLOCAHEAD(1) will be applied

```
LOGSTREAM NAME(LOGGER.TEST1) STRUCTNAME(LIST01) LS_DATACLAS()
          LS_MGMTCLAS() LS_STORCLAS() HLQ(IXGLOGR) MODEL(NO) LS_SIZE(16)
          STG_MGMTCLAS() STG_STORCLAS() STG_DATACLAS() STG_SIZE(0)
          LOWOFFLOAD(0) HIGHOFFLOAD(80) STG_DUPLEX(NO) DUPLEXMODE()
          RMNAME() DESCRIPTION() RETPD(0) AUTODELETE(NO) OFFLOADRECALL(YES)
          ZAI(NO) ZAIDATA('NO_ZAIDATA') WARNPRIMARY(NO) LS_ALLOCAHEAD(1)
```

Usage & Invocation(cont.)

- Issue SETLOGR FORCE,DEALLOC,LSN=LOGGER.TEST1
  - All the allocated offload datasets(w/o log data) will be deallocated
    - IXG651i and IXG661i issued
  - Display logger connection: D LOGGER,C,LSN=*,D

```
IXG601I  00.43.37  LOGGER DISPLAY   FRAME  1     F      E   SYS=SY1
CONNECTION INFORMATION BY LOGSTREAM FOR SYSTEM SY1
LOGSTREAM                STRUCTURE       #CONN  STATUS
---------                ---------       ------ ------
LOGGER.TEST1             LIST01          000001 IN USE
  DUPLEXING: LOCAL BUFFERS
  GROUP: PRODUCTION
  OFFLOAD DSN FORMAT: IXGLOGR.LOGGER.TEST1.<SEQ#>
   CURRENT DSN OPEN: NO                          SEQ#: -NONE-
   ADV-CURRENT DSN OPEN: NO                      SEQ#: -NONE-
```

Interactions & Dependencies

- Software Dependencies
  - None

- Hardware Dependencies
  - None

- Exploiters
  - This support will benefit all (program and installation) log stream exploiters

Migration & Coexistence Considerations

- LOGR Couple Data Set formatted at HBB7705 Level to enable new log stream attribute support

- z/OS v2r2 log stream specifications are not recognized and have no effect on processing/behavior on earlier release levels.

- However, the new z/OS V2R2 IXGCNFxx parmlib specifications are not recognized on earlier release levels, and has effect on net behavior:
  - error during IPL results in defaults for parmlib options being used
  - so should use separate members with V2R2 info

Installation

- Included in z/OS V2R2 release
- See coexistence PTFs(APAR # OA44680)

New messages indicate pro-active activities, errors

- IXG283I DataSetType DATASET DataSetName alloctype FOR LOGSTREAM logstream CISIZE=cisize SIZE=size

In the message text:

- Alloctype is the type of logger allocation activity, where
  - **ALLOCATED NEW**: A log stream data set was newly allocated.
  - **ALLOC ADV NEW**: A log stream offload data set was newly allocated in advance of actual need to move log data.
  - **NOW NEW CURDS**: A log stream offload data set that was previously allocated in advance is now the current offload data set.

Presentation Summary

- You should now:
  - Understand how Logger keep log stream interim/primary storage resources available to exploiters
  - Understand how the log stream offload process is improved by managing resources in advance

Appendix

A: Related APARs

B: Other good stuff

C: Publications

Appendix

A: Related APARs

- APAR OA44680
  - Required to be installed when:
    - Multiple release levels are running in the same sysplex
    - Use of the LS_ALLOCAHEAD keyword (>0) on V2R2
  - IBM recommends that the APAR to be installed to avoid any complications if/when the installation's configuration changes (i.e. LS_ALLOCAHEAD > 0 on V2R2)

Appendix

B: Other good stuff

- New Commands
  - Displaying the System Logger and its Log Streams
    - D LOGGER[,IXGCNF[,MANAGE]]
      - - reveal system logger resource management settings
    - D LOGGER,L,SUMM
      - - only reveal count of logstreams and DSEXTENTs
    - D LOGGER,STR,SUMM
      - - only reveal count of structures

(please see more details in z/OS MVS System Commands Reference)

Appendix

B: Other good stuff (cont.)

- IXGINVNT API CheckDef logstream or structure name in inventory
  - Whether a log stream or structure is currently defined
    - REQUEST=CHECKDEF
      ,TYPE=LOGSTREAM
      ,STREAMNAME=*streamname*
      ,TYPE=STRUCTURE
      ,STRUCTNAME=*structname*
      ,EXTRACT=NO (required keyword)
      ,EXTRACT=YES (option not supported)
    - EXTRACT keyword specifies:
      - Whether the request is to only verify the resource name is defined in the LOGR CDS

Appendix

B: Other good stuff (cont.)

- Default LOGR CDS level
  - LOGR Couple Data Set format utility (IXCL1DSU) - default format level changed to HBB7705 in z/OS V2R2

- Plan DRXRC-type staging data sets for coupling faciility log streams
  - z/OS V2.2 is planned to be the last release to support the DRXRC log stream option for system logger. IBM recommends you use other available mirroring options with IBM z/OS Global Mirror (zGM), also known as Extended Remote Copy (XRC), or Geographically Dispersed Parallel Sysplex (GDPS) instead

Appendix

C: Publications

- z/OS MVS System Messages, Vol 10 (IXC-IZP) SA38-0677
- z/OS MVS Planning for Installation GA32-0890
- z/OS MVS Migration from z/OS V1R13 and z/OS V2R1 GA32-0889
- z/OS MVS Setting Up a Sysplex SA23-1399
- z/OS MVS Initialization and Tuning Reference SA23-1380
- z/OS MVS System Commands SA38-0666
- z/OS MVS Assembler Services Reference IAR-XCT SA23-1370
- z/OS MVS Assembler Services Guide SA23-1368
- z/OS MVS Diagnosis: Reference GA32-0904
- z/OS Summary of Message and Interface Changes SA23-2300