IBM Education Assistance for z/OS V2R1

Item: Log Stream Primary Storage Consumption Alert Messaging
Element/Component: BCP System Logger

Agenda

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

Trademarks

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

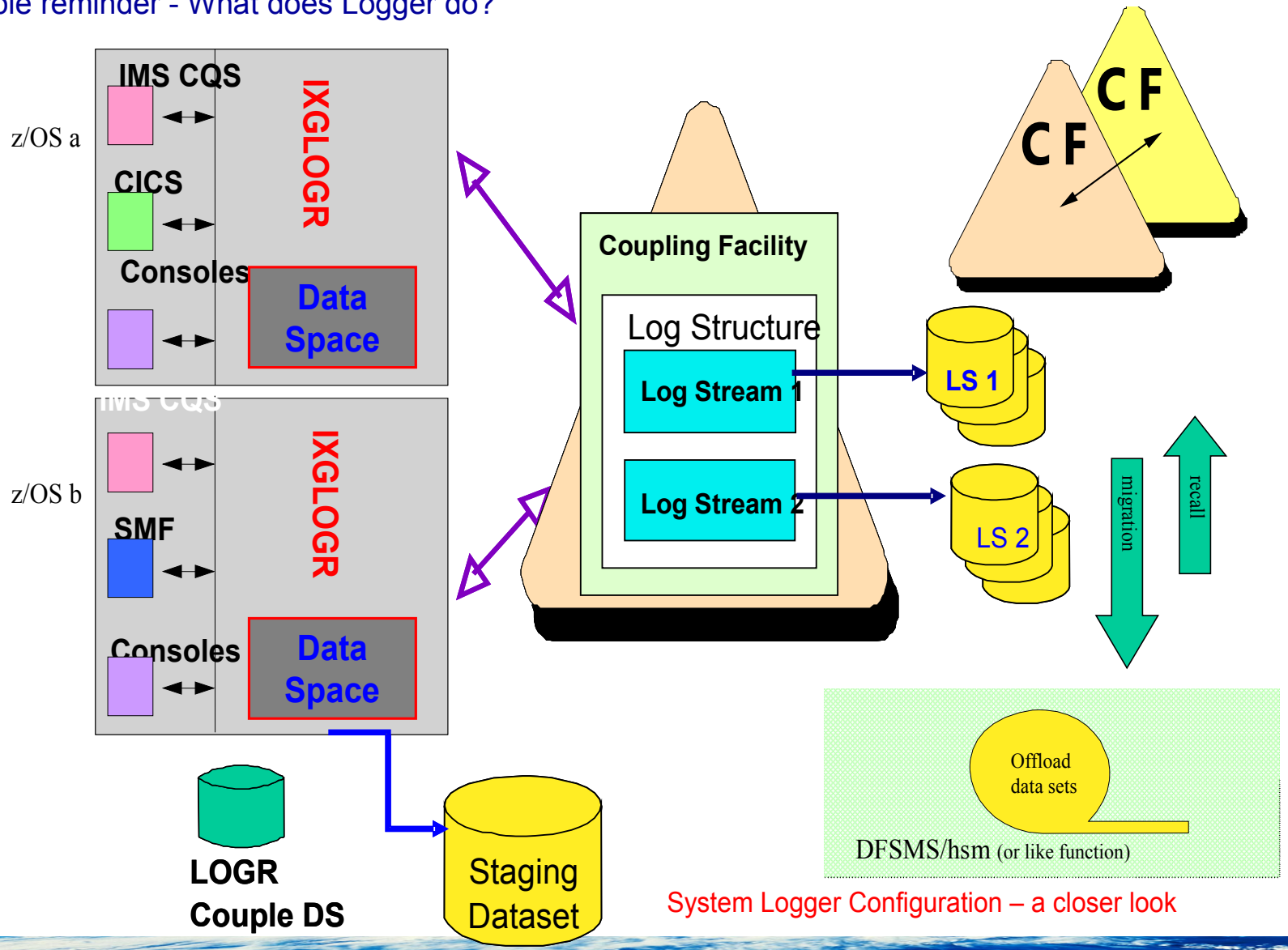
Presentation Objectives

- Impress upon you the key goal to keep resources available for all log stream writers
- Understand recent logger log stream primary/interim storage consumption alert messaging
- Understand when to use a “super-sized” CF structure

Overview

- Problem Statement / Need Addressed
  - Review: What does logger do?
  - 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 (what has been done about trouble spots?)
  - Provide operations alert messaging when log stream primary/interim storage consumption near or at full
  - Also refer to Logger log stream offload enhancements - OA38613
- Benefit / Value
  - Help avoid log stream exploiter outages!

Simple reminder - What does Logger do?

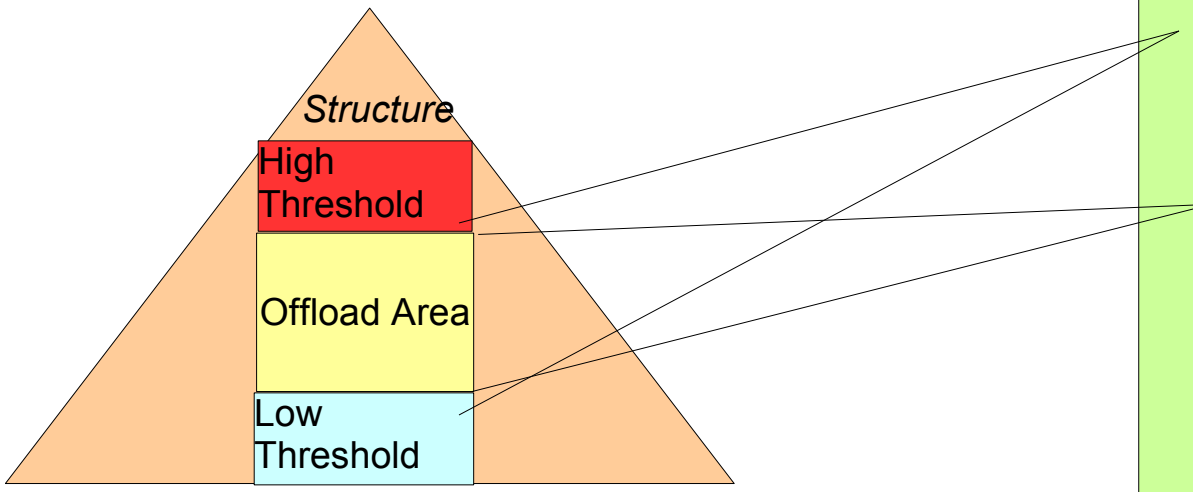


System Logger Configuration – a closer look

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-Delete old offload data sets if data is no longer valid.

Log stream offload processing (cont.)

- **Goal:**
  - Keep the log stream available for new IXGWRITEs.
    - By freeing space in the log stream primary storage medium (i.e. CF structure).

- **Two classic types of offload inhibitors:**
  - Problems or delays obtaining secondary storage (movement problems)
    - allocation issues obtaining an offload data set
    - the issues can impact other logstream offloads
  - Throughput (bandwidth) problems:
    - offload can't keep pace with incoming write rate.
      - Can't remove data from primary fast enough.
    - Logger is not particularly sensitive to this until a problem occurs.

Problem Statement:

- When log stream primary/interim storage fills up,
  - exploiter will not be able to write more log data
    - causes slow down or even stoppage for data/work flow...

- Logger does provide log stream primary/interim storage use info:
  - in Ansaa (ixgansaa) after each successful write
  - Allows exploiter chance to take action to potentially reduce needed log data that may still be in primary/interim media

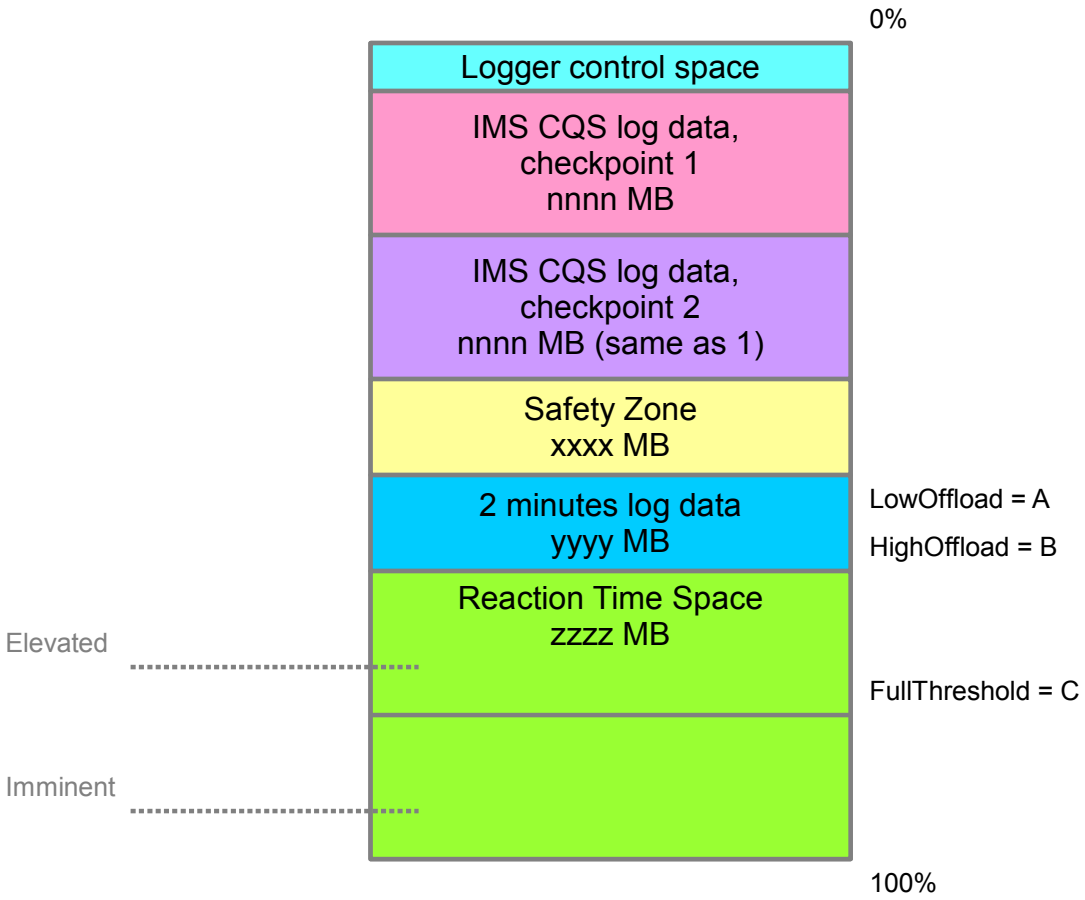
- Still need to notify operations of constrained log stream resources:
  - prior to being fully consumed
  - to allow for pro-active options when exploiter not programmatically reacting

Problem statement / Need addressed:

- **Goals:**
  - Describe more generic CF sizing approach (“super-sized”)
  - Provide operations reasonable warning when log stream primary storage resource is becoming full
  - Alert operations when log stream primary storage resource is full
  - Delete alert messages when conditions appropriately cleared
  - Allow tailoring of providing warnings/alerts on log stream and z/OS image basis

- Traditional approaches for “funnel-type” log streams is to tune them to be just big enough to handle data flow (into interim thru offloading)
- Consider “super-sizing” CF structure for log stream in GBs vs MBs
- Provides for larger buffer area for log data recording when offload inhibiters may arise
- Allows for certain exploiters, such as IMS CQS, a chance to programmatically react to primary/interim storage indicators of imminent and full conditions.
- Note, use when staging duplexing not required/used
  - As staging data sets are restricted to 4GB in size/logstream/system
- Can refer to *z/OS MVS Setting Up a Sysplex*
  - “Managing log data in interim storage to minimize movement to DASD” (in chapter 9)

- "super-sizing" CF structure approach



(Logger control space +
2 IMS Check Points of Data + Safety Zone + 2 minutes of data + Reaction Time Data)

- Provide operations reasonable warning when log stream primary storage resource is becoming full

- "*imminent*%" - so what is it?
  - Percentage of log stream primary (interim) storage consumption used as trigger for alert messaging.
  - The value is 2/3 between the HIGHOFFLOAD value and 100% (rounded down)

    i.e. (2*(100 - highoffload)/3 + highoffload)
  - e.g.
    - assume the default HIGHOFFLOAD value of 80 is used
    - *imminent*% value for this case would be 93, since

      (2*(100-80)/3 + 80) = **93**

- Provide operations reasonable warning when log stream primary storage resource is becoming full (cont.)

- New logger messages indicate when log stream primary storage consumption has reached threshold alert points:
  - IXG316E - CF logstreams
    - CF structure entries in-use at/above 90%
  - IXG317E - CF logstreams
    - CF structure elements in-use assigned to log stream at/above "*imminent*%"
  - IXG317E - DASDONLY logstreams
    - staging data set overall percent in-use at/above "*imminent*%"

- Alert operations when log stream primary storage resource is full

- New logger message highlights when log stream primary/interim storage consumption has filled:
  - IXG318E - CF logstreams
    - CF structure elements in-use assigned to log stream at/near full "100%"
    - or all entries for structure in-use "100%"
    - when staging data set duplex used, then can also be issued when overall percent in-use at/near full "100%"
  - IXG318E - DASDONLY logstreams
    - staging data set overall percent in-use at/near full "100%"

- Delete alert messages when conditions appropriately cleared

- when log stream primary/interim storage consumption warning messages deleted:

  - IXG316E - CF logstreams
    - in-use entries in CF structure at/below 85%

  - IXG317E - CF logstreams
    - in-use elements assigned to log stream at least 5% below "imminent%"

  - IXG317E - DASDONLY logstreams
    - staging data set overall percent in-use at least 5% below "imminent%"

  Both messages above are deleted if/when IXG318E is issued for log stream
  - for CF logstreams, for any log stream in structure

- Delete alert messages when conditions appropriately cleared (cont.)

- when log stream primary/interim storage full alert message deleted:
  - 1st, hardcopy message indicating when condition cleared:
    - IXG319I - CF logstreams and DASDONLY logstreams
      - Indicates full condition relieved for log stream
  - IXG318E - CF logstreams
    - in-use entries in CF structure at/below 95%
    - If staging data set duplex used, then will be deleted when above is true and staging data set no longer full
  - IXG318E - DASDONLY logstreams
    - staging data set overall percent in-use at/below 95%

Usage & Invocation

- IXGCNFxx
  - sys1.parmlib member, or commands SET and SETLOGR
  - z/OS image basis (see coexistence concern later on)

  - MONITOR LSPRIMARY
    CONSUMPTIONALERT
    - ALLOW (default)
    - SUPPRESS

- LOGSTREAM
  - sysplex basis
  - ixginvnt api and ixcmiapu utility define/update

  - WARNPRIMARY
    - NO (default)
    - YES

Usage & Invocation (cont.)

IXG316E STRUCTURE ENTRY CONSUMPTION OF *curusage*%
IS AT OR ABOVE THE ENTRY THRESHOLD OF 90%
FOR STRUCTURE *strname*

IXG317E LOGSTREAM PRIMARY STORAGE CONSUMPTION OF curusage%
IS AT OR ABOVE THE IMMINENT THRESHOLD OF imminentpct%
FOR LOGSTREAM logstream, IN STRUCTURE strname

IXG318E LOGSTREAM PRIMARY STORAGE CONSUMPTION HAS REACHED 100% IN USE
FOR LOGSTREAM logstream, IN STRUCTURE strname

IXG319I LOGSTREAM PRIMARY STORAGE FULL CONDITION RELIEVED
FOR LOGSTREAM *logstream*, IN STRUCTURE *strname*

Usage & Invocation (cont.)

(Sample case:)

*IXG316E STRUCTURE ENTRY CONSUMPTION OF **90%***
*IS AT OR ABOVE THE ENTRY THRESHOLD OF **90%***
FOR STRUCTURE STR_OPERLOG

*IXG317E LOGSTREAM PRIMARY STORAGE CONSUMPTION OF **93%***
*IS AT OR ABOVE THE IMMINENT THRESHOLD OF **93%***
FOR LOGSTREAM SYSPLEX.OPERLOG, IN STRUCTURE STR_OPERLOG

Usage & Invocation (cont.)

Message examples assuming FULLTHRESHOLD(90) is specified in CFRM policy for CF structure named *STR_OPERLOG*:

*IXC585E STRUCTURE *STR_OPERLOG* IN COUPLING FACILITY PLX8CF1, 316
PHYSICAL STRUCTURE VERSION CA685641 41A10945,
IS AT OR ABOVE STRUCTURE FULL MONITORING THRESHOLD OF 9**0**%.
ENTRIES: IN-USE: 597 TOTAL: 769, 77% FULL
ELEMENTS: IN-USE: 37030 TOTAL: 40771, **90**% FULL

IXC586I STRUCTURE *STR_OPERLOG* IN COUPLING FACILITY PLX8CF1, 751
PHYSICAL STRUCTURE VERSION CA685641 41A10945,
IS NOW BELOW STRUCTURE FULL MONITORING THRESHOLD.

Usage & Invocation (cont.)

D LOGGER,C,LSN=*,D

```
IXG601I 08.47.06 LOGGER DISPLAY 674
   CONNECTION INFORMATION BY LOGSTREAM FOR SYSTEM SY1
   LOGSTREAM                      STRUCTURE      #CONN   STATUS
   -------------------------------- ----------------- ---------- ----------
   SYSPLEX.OPERLOG          STR_OPERLOG   000001    IN USE
    DUPLEXING: STAGING DATA SET
     STGDSN: IXGLOGR.SYSPLEX.OPERLOG.PLEX1
     VOLUME=SMSVL6 SIZE=001000 (IN 4K) % IN-USE=084
    GROUP: PRODUCTION      ZAI CLIENT: YES – CONNECTED
     ZAIDATA: OPERLOG
     LOG BLOCKS SENT TO SERVER OK: 54266, FAILED: 0
    CURRENT OFFLOAD DSN: IXGLOGR.SYSPLEX.OPERLOG.A0000000
   JOBNAME: CONNECTW ASID: 001B
    R/W CONN: 000001 / 000000
    RES MGR./CONNECTED: *NONE* / NO
    IMPORT CONNECT: NO

   NUMBER OF LOGSTREAMS: 000001
```

Usage & Invocation (cont.)

D XCF,STR,STRNAME=STR_OPERLOG

```
IXC360I  16.11.35  DISPLAY XCF
  STRNAME: STR_OPERLOG
   STATUS: ALLOCATED
   EVENT MANAGEMENT: POLICY-BASED

 TYPE: LIST
   POLICY INFORMATION:
    . . .

   ACTIVE STRUCTURE
    ALLOCATION TIME: 12/17/2012 16:11:28
    CFNAME         : CF01N
    COUPLING FACILITY: SIMDEV.IBM.EN.CF0100000000
                       PARTITION: 00   CPCID: 00
    STORAGE CONFIGURATION     ALLOCATED          MAXIMUM      %
     ACTUAL SIZE:                     4 M              4 M  100

     SPACE USAGE     IN-USE       TOTAL    %
      ENTRIES:          839         895   93
      ELEMENTS:        5020        5375   93
  ...
```

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 V2R1 log stream specifications are not recognized and have no effect on processing/behavior on earlier release levels.
- However, the new z/OS V2R1 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 V2R1 information

Session Summary

You should now:

- Understand recent logger log stream primary/interim storage consumption alert messaging
- Understand when to use a “super-sized” CF structure

Appendix

A: Publications

B: Related D-type APARs

C: Logger Messages

- New:
  IXG316E, IXG317E, IXG318E, IXG319I
- Changed:
  IXG601I, IXG607I

Appendix A: Publications

z/OS MVS Setting Up a Sysplex SA22762520

chapter 9, Planning for system logger applications
+ Monitoring log stream interim storage consumption
+ Updating a Log Stream's Attributes

chapter 11, Administrative Data Utility
+ Define Logstream – Keywords and Parameters
+ Update Logstream – Keywords and Parameters

- *z/OS MVS Initialization and Tuning Reference* *SA22759222*

Chapter 65, IXGCNFxx (system logger initialization parameters)
+ *Syntax format of IXGCNFxx*
+ *Statements/parameters for IXGCNFxx*

Appendix A: Publications

z/OS MVS System Commands SA22762726

chapter 4, MVS System Commands Reference
+ Displaying the system logger and log streams
+ SETLOGR MONITOR

z/OS MVS System Messages: Vol 10 (IXC-IZP) SA22764024

→ see IXG- logger messages

z/OS MVS Diagnosis: Reference GA22758816

chapter 2, System Logger
+ Interpreting IXCMIAPU Output

Appendix A: Publications

- *z/OS MVS Programming: Assembler Services Reference* SA22760818
  Vol 2 (IARR2V - XCTLX)
  IXGINVNT – Managing the LOGR inventory couple data set
  + Syntax for REQUEST=DEFINE,TYPE=LOGSTREAM
  + Syntax for REQUEST=UPDATE,TYPE=LOGSTREAM
  + Parameters for REQUEST=DEFINE,TYPE=LOGSTREAM
  + Parameters for REQUEST=UPDATE,TYPE=LOGSTREAM

- *z/OS MVS Programming: Assembler Services Guide* SA22760514
  IXGINVNT – Managing the LOGR Policy
  + Updating a Log Stream's Attributes
  IXGWRITE – Writing to a log stream
  + Write Triggers
  + IXGQUERY – Get Information about a log stream

Appendix B: Related D-type APARs

- **OA38613** on z/OS V1R13:
  - ➔ Reduces interference between log stream offload instances
  - ➔ Multiple offload data set handling tasks (vs. previous single task)

Appendix B: Related D-type APARs

- **OA36172:** Logger returns primary usage indicators on IXGWRITE requests
  - ➔IMS CQS PM36659 to drive checkpoints based on these triggers.
  - ➔Enables “smarter” removal of data from CF structure (no I/O to offload data sets).
- **OA36175**: Smaller offload target on structure full conditions.
  - ➔No lower than 90% of structure size.
- **OA36662**: Authorized caller IXGWRITEs allowed when structure full.
  - ➔IMS CQS PM36652 to retry writes before ENF48 received.
  - ➔Logger bypasses internal flag, tries structure write.
- **OA37588:** Recognize log stream low valid point adjustments during offload processing.
  - ➔Logger will check for new log block deletes during an offload.
    - ➔If detected, movement phase will be short circuited and offload will go back to removing the data from primary.

Appendix C: Logger Messages - IXG316E and IXG319I

IXG316E STRUCTURE ENTRY CONSUMPTION OF *curusage*%
IS AT OR ABOVE THE ENTRY THRESHOLD OF 90%
FOR STRUCTURE *strname*

In the message text:

curusage
is the current percentage of the log stream primary storage medium in-use

strname
for coupling facility log stream, the name of the structure associated with log stream.
for Dasd-only log stream, the value will be *NOT APPLICABLE*.

- **RouteCode: 2** **DescriptorCode: 3**

Appendix C: Logger Messages - IXG316E and IXG319I

IXG317E LOGSTREAM PRIMARY STORAGE CONSUMPTION OF curusage%
IS AT OR ABOVE THE IMMINENT THRESHOLD OF imminentpct%
FOR LOGSTREAM logstream, IN STRUCTURE strname

In the message text:

curusage
is the current percentage of the log stream primary storage medium in-use

imminentpct
log stream alert threshold percentage

logstream
name of the log stream

strname
for coupling facility log stream, the name of the structure associated with log stream.
for Dasd-only log stream, the value will be *NOT APPLICABLE*.

- **RouteCode: 2** **DescriptorCode: 3**

Appendix C: Logger Messages - IXG316E and IXG319I

IXG318E LOGSTREAM PRIMARY STORAGE CONSUMPTION HAS REACHED 100% IN USE FOR LOGSTREAM logstream, IN STRUCTURE strname

In the message text:

logstream

is the name of the log stream

strname

for coupling facility log stream, the name of the structure associated with log stream.
for Dasd-only log stream, the value will be *NOT APPLICABLE*.

- **RouteCode: 2** **DescriptorCode: 11**

Appendix C: Logger Messages - IXG316E and IXG319I

IXG319I LOGSTREAM PRIMARY STORAGE FULL CONDITION RELIEVED
FOR LOGSTREAM logstream, IN STRUCTURE strname

In the message text:

logstream

is the name of the log stream

strname

for coupling facility log stream, the name of the structure associated with log stream.
for Dasd-only log stream, the value will be *NOT APPLICABLE*.

- **(hardcopy)**