z/OS SMF Logstream Mode: Update and User Experience

J.O.Skip Robinson
Southern California Edison Co.

7 February 2013
Session 13034
An Unmetered Ode to SMF

- System **Management** Facility
- A powerful function unique to z/OS
- Framework for collecting and manipulating structured data produced by system or user components
- Header data (type, date/time) prescribed for all types
- Remainder documented for each IBM record type
- User records defined at will by owner/installation
- No action required by applications or subsystems
- No allocations, no opening/closing of log/trace
- All we have to do is collect, massage, and archive
Your Daddy’s SMF

- For more or less ever, SMF recording was to VSAM
- Multiple MANx clusters sucked up records AFAP
- Periodically each MANx file would be dumped by IFASMFDP immediately or ultimately to tape
- Triggered by indication of MANx data set full
- IEE391A SMF ENTER DUMP FOR DATA SET ON VOLSER SMFC02, DSN=SYS1.MAN2.$SYSC0
- IEE388I SMF NOW RECORDING ON VOLSER SMFC01, DSN=SYS1.MAN1.$SYSC0 TIME=
- Data set emptied (ZEROed) after dumping
- Switched to next available MANx data set round robin
Daddy’s SMF Headaches

- Lots of problems
- MANx data sets filled up fast on a busy system
- Out of control tasks could swamp all MANx data sets
- Problems with tape could prevent normal dump/clear
- Even with emergency buffering, SMF data could be lost
- No prioritization of record types possible
- Records processed FIFO without regard to customer’s needs
- If any data lost, all data lost
System Logger Rides to the Rescue

- Solution in z/OS R9 was SMF Logger
- MANx replaced by system log stream
- Either supported by CF structure or DASD-only
- We use CF supported logstreams only (so far)
- Logstream solves many chronic problems
- Much faster than writing to MANx VSAM
- Less chance of losing data due to high rate
- Data directed to multiple log streams by SMF type
- But data must be managed somewhat differently
Managing SMF Data Gangnam Style

- New management program IFASMFDL
- Original design required start/end dates
- Now IFASMFDL provides ARCHIVE with no DATE parameter
- Simply dumps all records not previously ARCHIVEd
- Starts with oldest non-ARCHIVEd records
- Marks dumped records as ‘ARCHIVEd’
- Stops at current time plus…
- Includes 'SMART' keywords for moving end time
- Also adds diagnostic information for debugging
Gangnam Style - 2

• Management of data now similar to old MANx style
• But you still get logger speed and flexibility
• I recommend…
• One day retention (minimum allowed) in log stream definition
• Multiple ARCHIVE jobs per day (at least two)
• In sum: management of MANx data sets is driven by data
• Management of Logger data is driven by time
• Current implementation similar to old IFASMFDP
Gangnam Style - 3

- We run two dump jobs daily, midnight and noon
- Midnight job performs traditional SMF data processing
- Combines data from multiple systems, creates multiple outputs
- Produces reports for various subsystems, stakeholders
- Midday job just archives for next midnight job
- Purpose: make sure data is not deleted after extended outage
- Data marked as archived by SMF dump job
- Data retained/deleted by system logger
D SMF Old School Style

- IEE974I 15.22.16 SMF DATA SETS
- P-SYS1.MAN1.$SYSX0 SMFX01 67500 84 ACTIVE
- S-SYS1.MAN2.$SYSX0 SMFX02 67500 0 ALTERNATE

- Similar lines for each MANx data set
- Status changes as each one fills up or gets emptied
SMF Logstream Status

- IFA714I 15.22.48 SMF STATUS
- LOGSTREAM NAME BUFFERS STATUS
  - A-IFASMF.DEFAULT 21524 CONNECTED

- ISPF 3.4 for LOGR.IFASMF shows all offload data sets
  - LOGR.IFASMF.DEFAULT.A0096197 *VSAM*
  - LOGR.IFASMF.DEFAULT.A0096197.DATA ASMF01+

- Each data set is 2,745 tracks (183 cylinders)
- Size determined by logstream definitions
- Count rises and falls throughout the day
Set Recording Mode in PARMLIB

- PARMLIB SMFPRMxx
- ACTIVE
- DSNAME(SYS1.MAN1.$SYS&SYSCLONE,
  SYS1.MAN2.$SYS&SYSCLONE,
  SYS1.MAN3.$SYS&SYSCLONE)
- RECORDING(LOGSTREAM)
- /* RECORDING(DATASET) */
- DEFAULTLSNAME(IFASMF.DEFAULT)

- Note: SMFPRMxx members cannot be concatenated
Defining SMF Logstream - 1

- //LOGRSMF EXEC PGM=IXCMIAPU
- //SYSPRINT DD SYSOUT=* 
- //SYSIN  DD * 
- DATA TYPE(LOGR)
- DEFINE STRUCTURE
  - NAME(IFASMF_DEFAULT)
  - LOGSNUM(5)
  - AVGBUFSIZE(32767)
  - MAXBUFSIZE(65532)
Defining SMF Logstream - 2

- DEFINE LOGSTREAM
- NAME(IFASMF.DEFAULT)
- HLQ(LOGR)
- STRUCTNAME(IFASMF_DEFAULT)
- LS_SIZE(32768) ← Determines size of offload data set
- LS_DATAACLAS(SMFLOG)
- STG_DATAACLAS(SMFLOG)
- STG_DUPLEX(YES)
- DUPLEXMODE(UNCOND)
- AUTODELETE(YES)
- RETPD(1) ← Determines number of offload data sets
Logstream Archive Job

- //ARCHLOGR EXEC PGM=IFASMF
- //OUTSMF DD DSN=LOGR.SMFDATA(+1),
- // DISP=(CATLG,DELETE),UNIT=TAPE,
- // LRECL=32760,RECFM=VBS,BLKSIZE=4096,
- //SYSPRINT DD SYSOUT=* 
- //SYSIN  DD * 
- LSNAME(IFASMF.DEFAULT,OPTIONS(ARCHIVE)) 
- OUTDD(OUTSMF,TYPE(0:255)) 
- SMARTENDPOINT /* R13 AND UP */ 
- SMARTEPOVER(0100) /* TWICE THE VALUE OF MAXDORM */ 
- //PROCZMF EXEC … Process LOGR.SMFDATA() as before
Whither Offload Data Sets?

- Location of offload data sets determined by SMS rules
  1. **Restricted**: go only to defined pool (one or more specific volumes)
  2. **Contained**: go to defined pool but allow overflow elsewhere
  3. **Free range**: go to any available volume, i.e. SYSALLDA
- With (1), you risk losing data (see below)
- With (3), you risk flooding the whole DASD farm
- I recommend option (2) unless space problems occur
- When you're all done, you get back most of the old MANx space
- Keep a few smallish MANx guys for emergency fallback to DS
- If you do have to fall back temporarily, be sure to dump MANx
What Could Possibly Go Wrong?

• Early on, IFASMFDL would choke on 'bad data'
• Especially invalid time stamp, other errors possible
• IFASMFDL would end badly with no diagnostics
• SMF data continued to accumulate in offload data sets
• Eventually DASD would fill up, causing buffering
• Finally SMF disconnected from log stream ;-((((

IFA714I 15.22.48 SMF STATUS

LOGSTREAM NAME BUFFERS STATUS

A-IFASMF.DEFAULT 9999999 DISCONNECTED

• Try switching to MANx, then back to logstream
• SMF Logstream has been very reliable for some time
Questions?