SHARE   Winter 2013   San Francisco   IBM
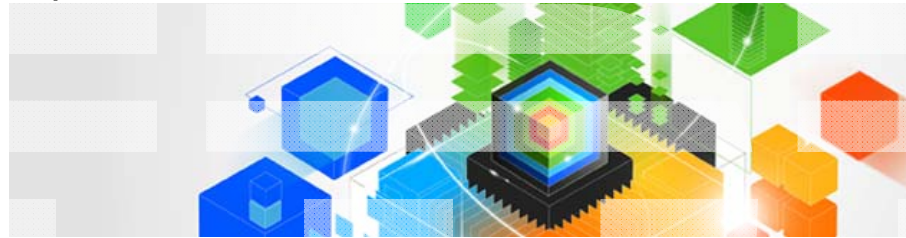
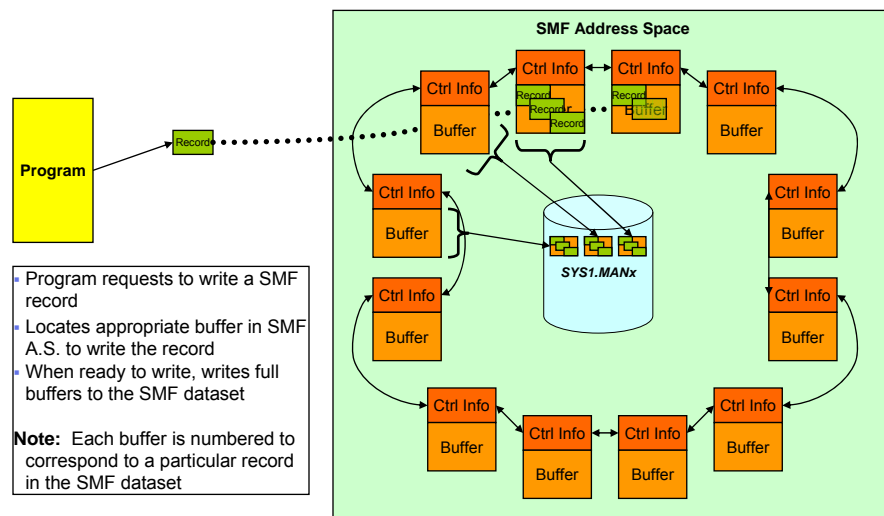# z/OS SMF Logstream Mode: Update and User Experience

Session 13034

Glenn Anderson, IBM Technical Training
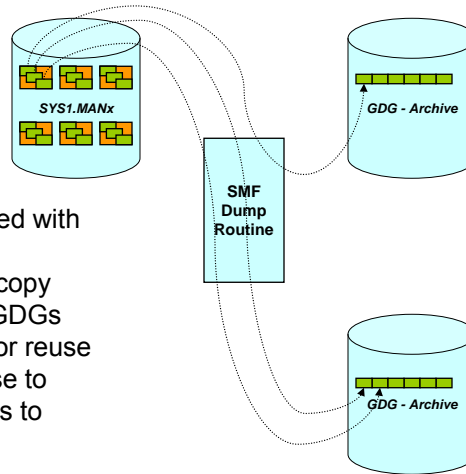
Skip Robinson, Southern California Edison

Overview: *Current SMF Data Flow*

SMF Address Space

Ctrl Info — Buffer (multiple, arranged around the diagram)

Record

Record

Program

Record

SYS1.MANx

- Program requests to write a SMF record
- Locates appropriate buffer in SMF A.S. to write the record
- When ready to write, writes full buffers to the SMF dataset

Note: Each buffer is numbered to correspond to a particular record in the SMF dataset

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Current SMF data flow

SYS1.MANx

GDG - Archive

SMF Dump Routine

GDG - Archive
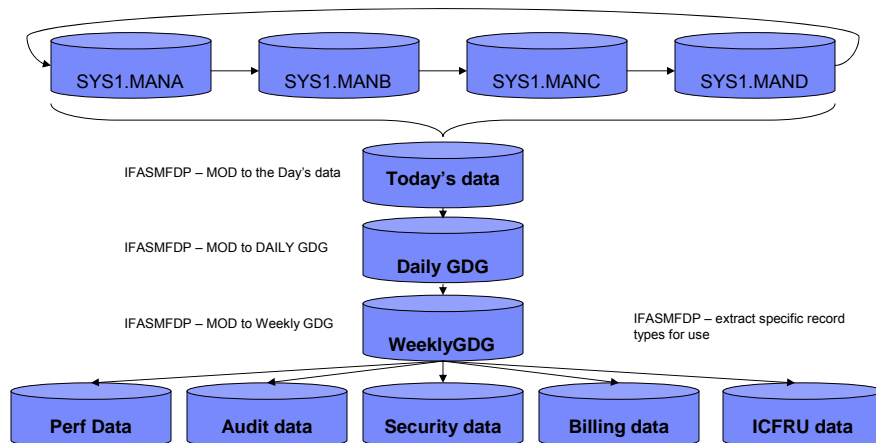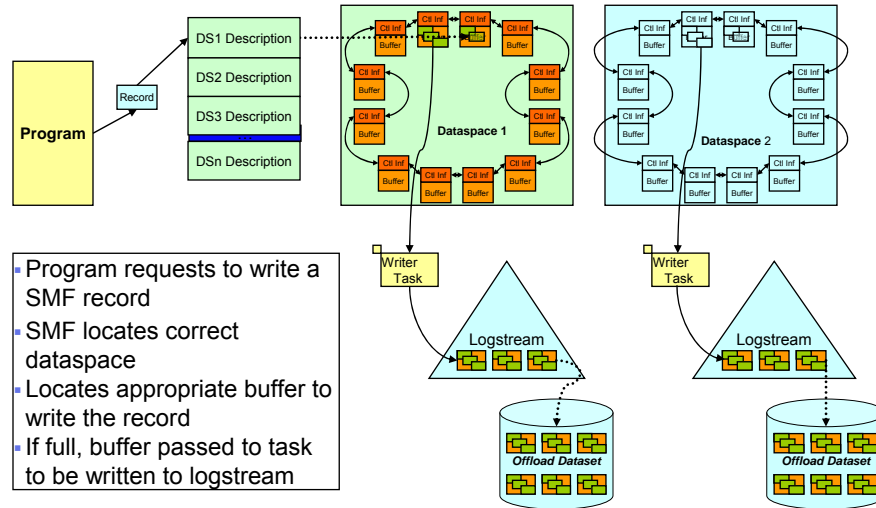
▪After full dataset switched with empty dataset:
- ▪Run dump routine to copy data for archiving to GDGs
- ▪Ready SYS1.MANx for reuse
- ▪Installation can choose to dump different records to different datasets
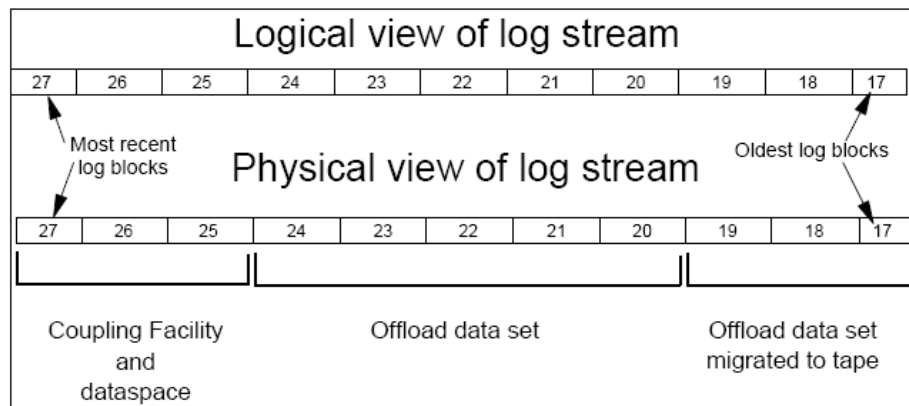
SMF Data Flow
Another view

| SYS1.MANA | SYS1.MANB | SYS1.MANC | SYS1.MAND |

IFASMFDP – MOD to the Day's data → **Today's data**

IFASMFDP – MOD to DAILY GDG → **Daily GDG**

IFASMFDP – MOD to Weekly GDG → **WeeklyGDG**

IFASMFDP – extract specific record types for use

| **Perf Data** | **Audit data** | **Security data** | **Billing data** | **ICFRU data** |

Overview: *SMF Data Flow using log streams*

- Program requests to write a SMF record
- SMF locates correct dataspace
- Locates appropriate buffer to write the record
- If full, buffer passed to task to be written to logstream

Logical and Physical View of Logstream

Relationship of SMF Records to Log Blocks
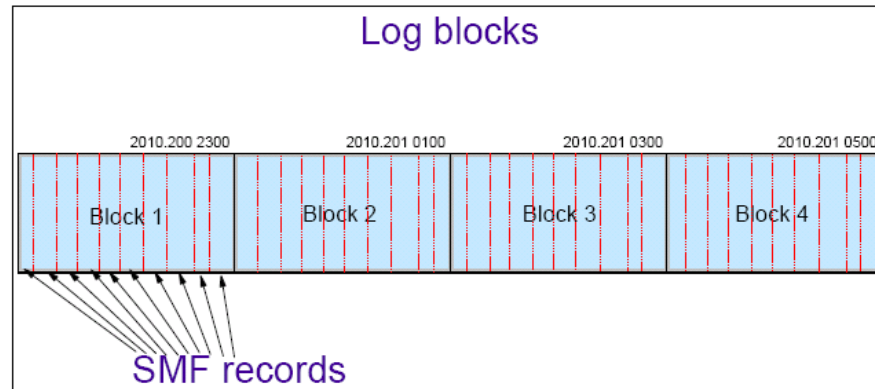
Log blocks

| | 2010.200 2300 | 2010.201 0100 | 2010.201 0300 | 2010.201 0500 |

Block 1   Block 2   Block 3   Block 4

SMF records

Usage & Invocation

- **The support is invoked by:**
  - Define new logstreams in system logger
    - See "*Setting up a Sysplex*" for documentation
  - Defining new keywords in SMFPRMxx:
    - LSNAME(IFASMF.q1.q2,TYPE(xx:yy))
    - DEFAULTLSNAME(IFASMF.q1.q2)
    - RECORDING(DATASET|LOGSTREAM)
      - SETSMF operator command can be used to toggle recording settings (for fallback, as an example)
  - Creating new JCL to use IFASMFDL with new logstreams
  - Update processes to use data from logstreams, if necessary
    - Ex. Automate periodic "Switch SMF" commands to drive new SMF Dump program
  - Activate PARMLIB changes via IPL or SET SMF=xx command

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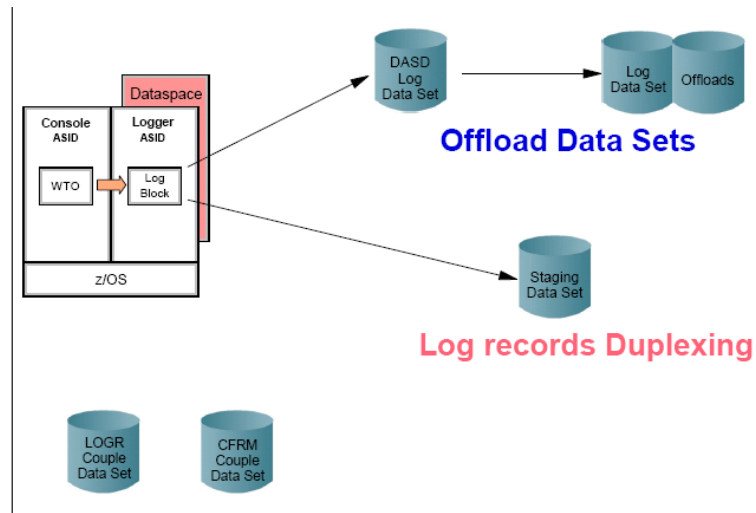 - Update processes to use data from logstreams, if necessary
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Log Stream in a Coupling Facility

DASD Only Log Stream

Offload Data Sets

Log records Duplexing
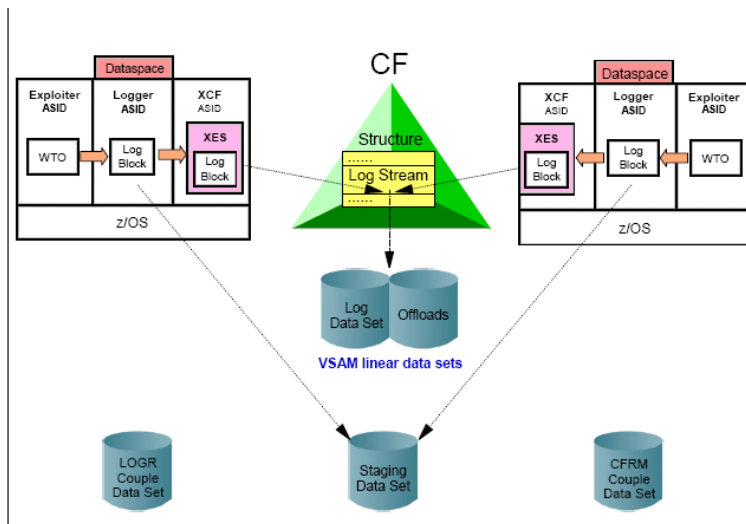
Installation

- **Prerequisites for installation**
  - Use IXCM2APU to create log streams for SMF
    - Decide on retention periods, CF vs DASDONLY, staging/offload dataset size, etc.
    - Recommend using staging data sets for early implementers
  - Use CFSIZER to plan size of CF Structures:
    - Consider data from recent IFASMFDP summaries to determine current data volume
    - Consider how long data should be retained in CF
      - If size too small, logger will have to offload frequently
    - Consider the Logger "HIGHOFFLOAD" specification
      - HIGHOFFLOAD(80) means 20% of structure space will be "white space", intended to hold records while offloading during peak recording
    - Future re-planning exercises can use SMF Type 88 record data

IXCMIAPU – Define CF Logstream

```
//STEP1    EXEC PGM=IXCMIAPU
//STEPLIB  DD   DSN=SYS1.MIGLIB,DISP=SHR
//SYSPRINT DD   SYSOUT=*
//SYSABEND DD   SYSOUT=*
//SYSIN    DD   *
   DATA TYPE(LOGR) REPORT(YES)
     DEFINE STRUCTURE NAME(LOGGER_SMF)   LOGSNUM(2)

     DEFINE LOGSTREAM NAME(IFASMF.ALLSYS.DATA)
         STRUCTNAME(LOGGER_SMF)
         LOGGERDUPLEX(UNCOND)
         DUPLEXMODE(UNCOND)
         STG_DUPLEX(YES)
         STG_DATACLAS(MVSLOGR)
         LS_DATACLAS(MVSLOGR)
         LS_SIZE(500000)
         HLQ(LOGGER)
         HIGHOFFLOAD(85)
         LOWOFFLOAD(0)
         AUTODELETE(YES)
         RETPD(2)
```
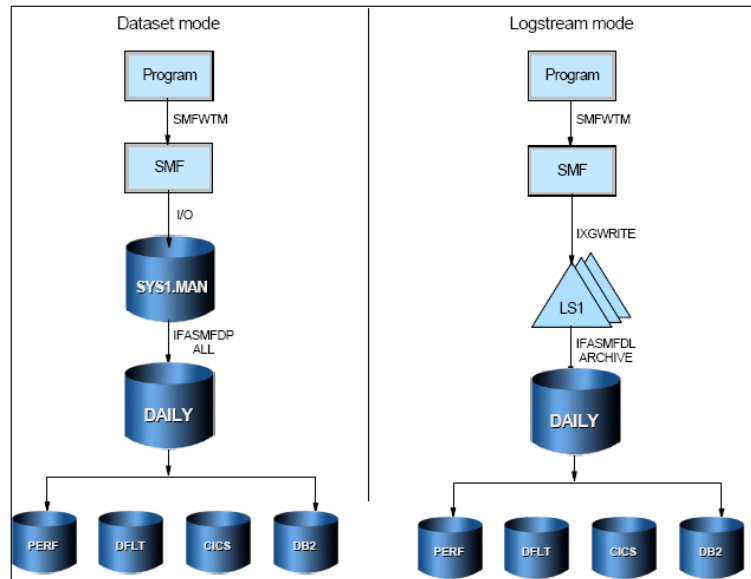
Usage & Invocation

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  - **Defining new keywords in SMFPRMxx:**

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Replace SYS1.MAN Datasets with Logstreams

Dataset mode

Program
↓ SMFWTM
SMF
↓ I/O
SYS1.MAN
↓ IFASMFDP ALL
DAILY
↓
PERF DFLT CICS DB2

Logstream mode

Program
↓ SMFWTM
SMF
↓ IXGWRITE
LS1
↓ IFASMFDL ARCHIVE
DAILY
↓
PERF DFLT CICS DB2

Usage & Invocation (examples)

- **Using logstreams, you can:**
  - Write data to a DASDONLY logstream, simply replacing SMF SYS1.MANx datasets
    - Use DEFAULTLSNAME(IFASMF.xxx) or LSNAME(IFASMF.xxx,TYPE(0:255)) to specify logstream
    - Run new SMF Dump Program to archive data
  - **Value**
    1. Simplest approach to using logstreams
    2. Better performance using logstream vs. SMF data sets

Usage & Invocation (examples)

- **A more sophisticated approach is also possible…**
  - Write data to a logstream on a 'task oriented' basis
    - Record Types (30,70:72,99) to one log stream
      (eg. IFASMF.PERF.DATA)
    - Record Types 30,80:81,83 to another log stream
      (eg. IFASMF.AUDIT.DATA)
    - Record DB2 data (Type 101) to a third stream
      (eg. IFASMF.DB2.DATA)
    - And use the DEFAULTLSNAME keyword to record all other record types.

SMFPRMxx – SYS1.PARMLIB

- **Be sure to plan for fallback to datasets in the event of problems !**
- **Add the LSNAME/DEFAULTLSNAME keywords**

```
    ACTIVE                      /*ACTIVE SMF RECORDING*/
    BUFSIZMAX(0800M)            /* MAXIMUM BUFFER SIZE */
    DSNAME(&SYSNAME..MAN1,&SYSNAME..MAN2,&SYSNAME..MAN3,&SYSNAME..MAN4)
    LISTDSN                     /* LIST DATA SET STATUS AT IPL*/
    NOPROMPT                    /*DON'T PROMPT THE OPERATOR  */
    DEFAULTLSNAME(IFASMF.ALLSYS.DEFAULT)
    LSNAME(IFASMF.ALLSYS.DATA,TYPE(100:255))
    RECORDING(LOGSTREAM)
    INTVAL(05)                  /* SMF GLOBAL RECORDING INTERVAL */
    MEMLIMIT(50G)               /* LIMIT ABOVE THE BAR        */
    SYNCVAL(45)                 /* GLOBAL SYNC VALUE          */
    REC(PERM)                   /*TYPE 17 PERM RECORDS ONLY*/
    MAXDORM(3000)               /* WRITE AN IDLE BUFFER AFTER 30 MIN*/
    STATUS(010000)              /* WRITE SMF STATS AFTER 1 HOUR*/
    JWT(0030)                   /* 522 AFTER 30 MINUTES*/
    SID(&SYSNAME(1:4))          /* USE SYSNAME AS SID      */
    SYS(NOTYPE(32,99),
        EXITS(IEFACTRT,IEFUTL,IEFUSI,IEFU83,IEFU84,IEFU29),
        INTERVAL(SMF,SYNC),NODETAIL)
    /* WRITE ALL RECORDS EXCEPT TYPE 32 (TSO RECORDS), TAKE THE
```

SMFPRMxx – SYS1.PARMLIB

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BUFSIZMAX(0800M)            /* MAXIMUM BUFFER SIZE */
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SMF Logstream Processing Enhancements

- Relative data processing in IFASMFDL intended to mirror typical GDG processing

- RELATIVEDATE keyword
  - ► Specify DAILY,WEEKLY,or MONTHLY range and number of units

- IFASMFDL LSNAME OPTIONS to dump and/or delete data from logstream (vs. waiting for retention period to expire)
  - ► DUMP
  - ► DELETE
  - ► ARCHIVE (DUMP and DELETE)

- SMFPRMxx MAXDORM applies to SMF log streams (in addition to dataset recording)

SMF Logstream Processing Enhancements

- This supports allows for:
  1. A new RELATIVEDATE option for selecting a date range of records from the logstream with IFASMFDL
  2. A new ARCHIVE and DELETE option in IFASMFDL
  3. Allow MAXDORM value in SMFPRMxx to be applied to logstream recording so that buffered data can be moved to the logstream at regular intervals.

- Value:
  1. Allows the user to remove SMF data from the logstream
  2. Allows for grouping SMF logstream data by generic date masks (daily, weekly, monthly), eliminating the need for secondary post processing handling of the data (perhaps by propagating it into GDGs).
  3. Prevents SMF records from stagnating in the buffer

Usage and Invocation

- The support for ARCHIVE, DELETE and RELATIVEDATE is invoked by the IFASMFDL program. The support for MAXDORM is invoked by updating your SMFPRMxx.

- RELATIVEDATE Parameter
  - ▸ Used to specify a date range based on the current day, week or month
    - RELATIVEDATE(u, x, y)
    - u – BYDAY, BYWEEK or BYMONTH
    - x – Number of units to move back
    - y – Number of units to gather

- DELETE/ARCHIVE Option
  - ▸ LSNAME(IFASMF.LS1,OPTIONS(**ARCHIVE**))
  - ▸ LSNAME(IFASMF.LS1,OPTIONS(**DELETE**))

Log Blocks in a Multi-System CF Logstream
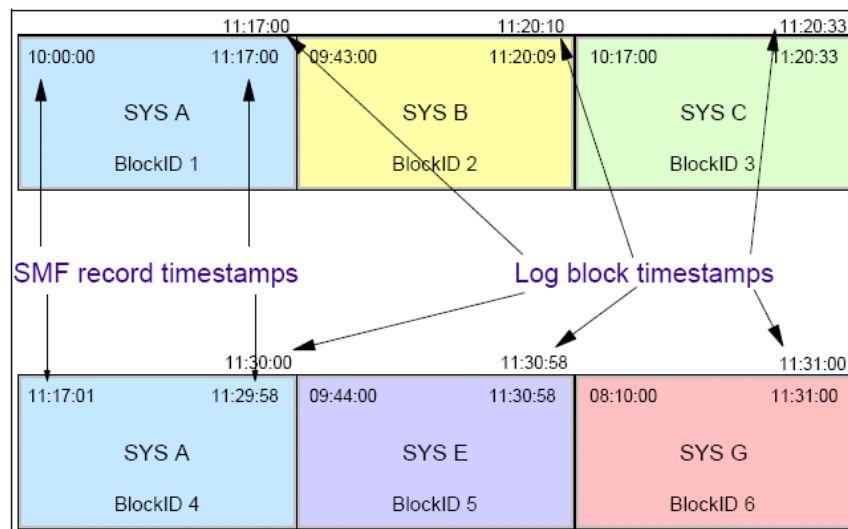
IFASMFDL Improvements in z/OS R13

- Avoid reading to end of logstream
  - ▶ IFASMFDL starts reading a logstream at a point (approximately) representing a specified time
  - ▶ New SMARTENDPOINT keyword to specify that IFASMFDL should stop reading a logstream before the end (APAR support for DUMP)
    - R13 adds support for ARCHIVE and DELETE
      - SMARTEPOVER specifies amount of time added to end date/time (default is two hours)
  - ▶ Avoids reading to end of logstream

- Allow entire logstream to be archived or deleted (rolled back to R11 and 12)

  - ▶ Treat logstreams as though they were SMF datasets
  - ▶ Will reset logstream starting point to next new block

SMF Logstream Mode Enhancements Availability

SMF logstream mode function	z/OS 1.9	z/OS 1.10	z/OS 1.11	z/OS 1.12
IFASMFDL DUMP	Base	Base	Base	Base
IFASMFDL ARCHIVE	OA27037	OA27037	Base	Base
IFASMFDL DELETE	OA27037	OA27037	Base	Base
MAXDORM support	OA27037	OA27037	Base	Base
NOBUFFS support	No	No	No	Base
BUFUSEWARN support	No	No	No	Base
SMARTENDPOINT	OA31737	OA31737	OA31737	Base
SMARTENDPOINT time control	No	OA34734	OA34734	OA34734
RELATIVEBYDATE	OA27037	OA27037	Base	Base
Support for ARCHIVE or DELETE to empty log stream	No	No	OA34589	OA34589

Performance

	Base run with SMF MANx data sets	Using 1 log stream	Split across 3 logstreams	Mult. Logstreams and type 30 duplicated	Mult. Logstreams and type 30, 100:102 duplicated
CPU%	86.56%	86.19%	87.05%	86.34%	86.95%
Tot dasd I/O rate	4643	3622	3387	3436	3256
SMFLOGR # of req		82769	90474	91879	149324
SMF data logging rate (rec/sec)	17355.19	17010.23	17221.54	17199.62	34472.71
SMF avg. rec length	298.12	298.12	298.12	298.12	298.3
SMF size in MB	1776.33	1741.02	1762.65	1760.40	3530.46

SMF Logger study using Trade6 on a z9 system with 16CPs (single image)

99.9% of the SMF records were type 102 records

Performance is in Internal Throughput Rate (ITR) ratio based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput that any user will experience will vary depending upon considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve throughput improvements equivalent to the performance ratios stated here.

Appendix

- **Publication References**
  - SA22-7630   MVS System Management Facilities (SMF)
  - SA22-7592   MVS Initialization and Tuning Reference
  - SA22-7625   MVS Setting Up a Sysplex
  - SA22-7593   MVS Installation Exits
  - SA22-7627   MVS System Commands
  - SA22-7637   MVS Messages, Volume 7 (IEE messages)
  - SA22-7638   MVS Messages, Volume 8 (IFA messages)
  - SQ24-6898   System Logger Redbook
- **IBM Washington Systems Center – White Papers**
  - z/OS SMF Recording with MVS Logger – WP101130
  - Migrating SMF from Data Set Recording to Log Stream Logging – WP101271
    - **Available at: www.ibm.com/support/techdocs**