Overview: Current SMF Data Flow

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
Current SMF data flow

- 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
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

Logical view of log stream

Physical view of log stream

Coupling Facility and dataspace
Offload data set
Offload data set migrated to tape
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
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))
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Log Stream in a Coupling Facility
**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

```plaintext
STEP1
EXEC PGM=IXCMIAPU
STEPLIB DD DSN=SYS1.MIGLIB,DISP=SHR
SYSPRINT DD SYSOUT=*  
SYSAEND DD SYSOUT=*  
SYSSIN 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(SWITCH) HLQ(LOGGER) HIGHOFFLOAD(85) LOWOFFLOAD(0)
AUTODELETE(YES) RETPD(2)
```

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)
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  - Activate PARMLIB changes via IPL or SET SMF=xx command
Replace SYS1.MAN Datasets with Logstreams

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 */
LISTDSN /* LIST DATA SET STATUS AT IPL */
NOPROMPT /* DON'T PROMPT THE OPERATOR */
RECORDING(LOGSTREAM)
INTVAL(05) /* SMF GLOBAL RECORDING INTERVAL */
MEMLIMIT(50G) /* LIMIT ABOVE THE BAR */
SYNCVAL(45) /* GLOBAL SYNC VALUE */
RECORDING (LOGSTREAM)
INTVAL(05) /* SMF GLOBAL RECORDING INTERVAL */
MEMLIMIT(50G) /* LIMIT ABOVE THE BAR */
SYNCVAL(45) /* GLOBAL SYNC VALUE */
```
SMFPRMxx – SYS1.PARMLIB

ACTIVE                      /*ACTIVE SMF RECORDING*/
BUFSIZEMAX(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(55G)                /* LIMIT ABOVE THE BAR */
SYNCVAL(45)                  /* GLOBAL SYNC VALUE */
REC(VERB)                    /*TYPE 17 VERB RECORDS ONLY*/
MAXDORM(3000)                /* WRITE AN IDLE BUFFER AFTER 30 MIN*/
STATUS(510000)               /* 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

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)
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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

<table>
<thead>
<tr>
<th>SMF logstream mode function</th>
<th>z/OS 1.9</th>
<th>z/OS 1.10</th>
<th>z/OS 1.11</th>
<th>z/OS 1.12</th>
</tr>
</thead>
<tbody>
<tr>
<td>IFASMFDL DUMP</td>
<td>Base</td>
<td>Base</td>
<td>Base</td>
<td>Base</td>
</tr>
<tr>
<td>IFASMFDL ARCHIVE</td>
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<td>OA27037</td>
<td>Base</td>
<td>Base</td>
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<tr>
<td>IFASMFDL DELETE</td>
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<td>OA27037</td>
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<td>Base</td>
</tr>
<tr>
<td>MAXDORM support</td>
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</tr>
<tr>
<td>NOBUFFS support</td>
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<td>No</td>
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<tr>
<td>BUFUSEWARN support</td>
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<tr>
<td>Support for ARCHIVE or DELETE to empty log stream</td>
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Performance

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

SMF Logger study using Tradell 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