Adabas SMF Records

All Adabas SMF records have a common structure, with some sections appearing in all records and others generated according to specific events and parameters specified through ADARUN or operator commands. The ASMFREC macro provides mapping DSECTs for all parts of the SMF record.

This chapter covers the following topics:

- Record Structure
- Record Size Limits
- Record Subtypes
- Statistical Recording
- Record Sections
- ASMFREC Mapping Macro
- SMF User Exit
- IBM Type 89 SMF Records

Record Structure

Adabas follows the modern convention for SMF record formats. A single record has:

- A standard IBM-type header
- A self-defining section that describes a variable number of detail sections
- A product ID detail section
- User-selected detail sections

Each detail section is described by an eight-byte entry in the self-defining section containing three fields. An entry is also called a *triplet*.

- A 4-byte offset from the beginning of the record to the detail section
- A 2-byte count of the number of instances of the detail section
- A 2-byte length of each detail section instance. If there are no detail section instances of a given type, the triplet is all zeros.

Field `ASNumD` in the product ID section specifies the number of triplets in the self-defining section.

Record Size Limits

SMF records are z/OS V-format records with a system-imposed maximum length of 32,756 bytes. Most Adabas SMF records fit within this limit for most reasonable types of ADARUN nucleus specifications. However, detail sections such as File Activity could potentially have several thousand detail section instances.

If the entire set of instances will not fit in the space remaining in the record, Adabas will include only as many as there are room for and write the record. The SMF record is reset by clearing the triplets for all detail sections except the product ID section and then adding as many of the remaining instances as will fit, repeating until all detail sections are processed. Field `ASSegNo` in the product ID section will start at 1 and be incremented with each additional record, and field `ASSegL` will be set to zero for the last (or only) record for an interval or event.

If any detail section is so large that even one instance would cause the record size limit to be exceeded after resetting the SMF record, that detail type is deactivated.

Record Subtypes

The header section field `ASSTy` identifies a record subtype.

- Subtype 1 (ASStI) - Adabas Nucleus Initialization
- Subtype 2 (ASStT) - Adabas Nucleus Termination
- Subtype 3 (ASStI) - Adabas Interval Statistics
- Subtype 4 (ASStP) - Adabas Parameter Change

Subtype 1 (ASStI) - Adabas Nucleus Initialization

A record of this subtype is generated during nucleus initialization. In addition to the header, self-defining and product ID sections, it contains ADARUN parameter and user sections if these have been selected by SMFDETAIL ADARUN parameter or operator commands.

Subtype 2 (ASStT) - Adabas Nucleus Termination

A record of this subtype is generated during nucleus termination. In addition to the header, self-defining and product ID sections, it contains all detail sections specified by the SMFDETAIL ADARUN parameter or operator commands except for the ADARUN parameter section. Statistics in Adabas detail sections reflect totals for the entire nucleus session.

Subtype 3 (ASStI) - Adabas Interval Statistics

If interval recording has been specified by the SMFINTERVAL ADARUN parameter or operator command, a record of this subtype is generated at the expiration of each interval. In addition to the header, self-defining and product ID sections, it contains all detail sections specified by the SMFDETAIL ADARUN parameter or operator commands except for the ADARUN parameter section. Statistics in Adabas detail sections reflect activity since the previous interval ended, except where noted. This is also called a delta value.

Subtype 4 (ASStP) - Adabas Parameter Change

If the Adabas ADARUN parameter detail section has been specified by the SMFDETAIL ADARUN parameter or operator commands, a record of this subtype is generated whenever an ADARUN parameter value is changed after nucleus initialization. In addition to the header, self-defining, product ID and ADARUN parameter sections, it may also contain a user section if that has been selected by SMFDETAIL ADARUN parameter or operator commands.

Statistical Recording

The nucleus accumulates usage statistics on the resources it uses to accomplish its tasks. These statistics may be recorded at user or system-defined intervals (see ADARUN parameter SMFINTERVAL) and at termination.

Interval recording (Adabas SMF record subtype 3) provides the usage since the last interval ended for each detail section. Adabas SMF record intervals may be synchronized with one of the system-level intervals specified by PARMLIB member SMFPRM*xx* entries. This allows straightforward analysis of the usage by allowing direct comparison with other record interval data. For example, you can compare the Adabas interval record with RMF data for the same interval to better understand system performance.

Statistics at termination (Adabas SMF record subtype 2) will have cumulative statistics that reflect activity for the entire nucleus session in each specified detail section.

Record Sections

Every Adabas SMF record contains header, self-defining and product ID sections. You can select additional detail sections through the SMFDETAIL ADARUN parameter or operator commands. Each section is mapped by a DSECT generated by the ASMFREC mapping macro.

The following table summarizes the Adabas SMF record sections:

Detail Section Description	ASMFREC Macro or ADARUN Parameter Specification	Self-Defining Section Triplet Label Base	ASMFREC DSECT Name Produced by the ASMFREC Macro
Header and self-defining section	---	---	ASBase
Adabas command activity	CMD	ASTCmd	ASCmd
Adabas global cache activity by block type [1]	CSHB	ASTChB	ASChB
Adabas global cache activity by Adabas file number [1]	CSHF	ASTChF	ASChF
Adabas global cache activity [1]	CSHG	ASTChG	ASChG
Adabas Parallel Services cache activity [2]	CSHP	ASTChP	ASChP
Adabas file activity	FILE	ASTFile	ASFile
Adabas global lock activity [1]	LOCK	ASTLok	ASLok
Adabas internucleus messaging control block activity	MSGB	ASTMsgB	ASMsgB
Adabas internucleus messaging counts	MSGC	ASTMsgC	ASMsgC
Adabas internucleus messaging service time histogram	MSGH	ASTMsgH	ASMsgH
ADARUN parameter values	PARM	ASTParm	ASParm
I/O by DD name	IODD	ASTIODD	ASIODD
Product ID [3]	ID	ASTPID	ASPID
Storage pool	STG	ASTStg	ASStg
Thread activity	THRD	ASTThrd	ASThrd
User-defined	USER	ASTUsr	user-defined

1. The detail section is available only in cluster environments when either Adabas Cluster Services or Adabas Parallel Services are installed.

2. The detail section is available only in cluster environments when Adabas Parallel Services is installed.

3. The product ID section is always included in every SMF record. It may not be specified in the SMFDETAIL ADARUN parameter or in operator commands.

This section describes the different detail record sections:

Note:
The DSECTs provided in the following sections may not be the most current. To see the most current versions of the DSECTs, generate them using the ASMFREC macro.

- Header Section
- Self-Defining Section
- Product ID Section: ID
- Adabas Command Activity Section: CMD
- Adabas File Activity Section: FILE
- Adabas Global Cache Activity by Block Type Section: CSHB
- Adabas Global Cache Activity by Adabas File Number Section: CSHF
- Adabas Global Cache Activity Section: CSHG
- Adabas Global Lock Activity Section: LOCK
- Adabas Internucleus Messaging Control Block Activity Section: MSGB
- Adabas Internucleus Messaging Counts Section: MSGC
- Adabas Internucleus Messaging Service Time Histogram Section: MSGH
- Adabas Parallel Services Cache Activity Section: CSHP
- ADARUN Parameter Value Section: PARM
- I/O by DD Name Section: IODD
- Storage Pool Section: STG
- Thread Activity Section: THRD

Header Section

IBM has defined a standard format for the initial part of all SMF records in *z/OS MVS System Management Facilities (SMF), IBM document SA22-7630*. This section begins every Adabas SMF record.

```
ASBase   DSect ,                  Base segment
*
*                      Standard SMF Header
*
ASRDW    DS    0Bl4               Record descriptor word
ASLen    DS     Bl2                Record length
ASSeg    DS     Bl2                Segment descriptor
ASFlg    DS    Bl.8               System indicator flags
```

```
ASFStV   Equ    x'40'              Subtypes are valid
ASFV4    Equ    x'10'              MVS/SP V4 and above
ASFV3    Equ    x'08'              MVS/SP V3 and above
ASFV2    Equ    x'04'              MVS/SP V2 and above
ASFVS2   Equ    x'02'              VS2
ASRTy    DS    Bl1                Adabas record type
ASTme    DS    Bl4                Time since midnight when record was +
                                    moved into SMF buffer in 1/100 sec
ASDte    DS    Pl4                Date when record was moved into SMF +
                                     buffer as 0cyydddF
ASSID    DS    Cl4                System identifier (SMFPRMxx SID)
ASSSI    DS    Cl4                Subsystem identifier
ASSty    DS    Bl2                Subtype
ASStI    Equ     1                 Adabas initialization
ASStT    Equ     2                 Adabas termination
ASStS    Equ     3                 Interval statistics
ASStP    Equ     4                 Parameter change
ASStA    Equ     9                 Ad hoc record
*
ASBaseL  Equ   *-ASBase           Length of standard header
```

Self-Defining Section

The self-defining section follows immediately after the header section. It is part of the header section DSECT.

Each detail section triplet is identified by a base label as shown in the table at the beginning of this section. The base label begins with the prefix specified in the ASMFREC invocation followed by the letter T (for triplet), and then followed by a mnemonic detail section identifier. The base label with suffix O is the offset, with suffix L is the length, and with suffix N is the number of instances.

Here is an example of some triplets.

```
*
*                     Self-Defining Section
*
ASSDS    DS    0B                 Self-defining section
*                                 Map of typical section triplet
ASSDSO   DS     Bl4                Offset to section from start of    +
                                     record
ASSDSL   DS     Bl2                Length of section
ASSDSN   DS     Bl2                Number of section(s)
         Org    ASSDS
*
ASTID    DS    0Bl8               ID Section (always present)
ASTIDO   DS     Bl4                Offset to ID section from start    +
                                     of record
ASTIDL   DS     Bl2                Length of ID section
ASTIDN   DS     Bl2                Number of ID section(s)
*
ASTUser  DS    0Bl8               User-Defined Section
ASTUserO DS     Bl4                Offset to User-Defined section from+
                                     start of record
ASTUserL DS     Bl2                Length of User-Defined section
ASTUserN DS     Bl2                Number of User-Defined section(s)
*
ASTParm  DS    0Bl8               ADARUN Parameter Section
ASTParmO DS     Bl4                Offset to detail section from start+
                                     of record
ASTParmL DS     Bl2                Length of each detail section
```

```
ASTParmN DS     Bl2                Number of detail section(s)
*
        . . .
*
ASSDSLn  Equ   *-ASSDS             Length of self-defining section
ASSDSNT  Equ   ASSDSLn/8           Number of triplets
```

Product ID Section: ID

The product ID section is always present in every Adabas SMF record with one instance. It describes the nucleus generating the SMF record and provides information about the record's contents.

The 2-byte version code consists of a major version and a minor version. A change, such as adding a new triplet or extending a detail section, will increment the minor version. All existing programs should continue to operate as no existing displacements have changed. A more disruptive change will increment the major version and require existing programs to (at least) be reassembled.

```
ASPID    DSect ,                  Product ID Detail Section          +
                                    (always present in SMF record)
ASSMFV   DS    0Bl2               SMF record version
ASSMFVM  DS     Bl1                SMF record major version
ASSMFVN  DS     Bl1                SMF record minor version
ASSMFVC  Equ    ASSMFV11           Current version: 1.1
ASSMFV11 Equ      x'0101'           Version 1.1 - Initial release
ASSegNo  DS    Bl1                Record segment number
ASSegL   DS    Bl1                Last segment when = 0
ASNumD   DS    Bl2                Number of detail type triplets
ASPNm    DS    Cl8                Product name (ADABAS)
ASVRSC   DS    Cl8                Product ver/rlse/SM/cum: vvrrsscc
ASSysN   DS    Cl8                System name
ASSypN   DS    Cl8                Sysplex name
ASVMN    DS    Cl8                Virtual machine name
ASJbN    DS    Cl8                Job name
ASStN    DS    Cl16               ProcStep/Step name
ASJNm    DS    Cl8                JES job identifier
ASPgm    DS    Cl8                Program name
ASGrp    DS    Cl8                Cluster messaging group name
ASST     DS    Bl8                Nucleus start time in STCK format
ASIST    DS    Bl8                Interval start time in STCK format
ASIET    DS    Bl8                Interval end time in STCK format
ASDBID   DS    Bl4                Database ID
ASNucX   DS    Bl2                External nucleus ID
ASNucI   DS    Bl1                Internal nucleus ID
ASSVC    DS    Bl1                Adabas SVC number
ASASID   DS    Bl2                Address space ID
ASASIDI  DS    Bl4                Reusable address space ID instance
ASComp   DS    Bl2                Completion code                    +
                                    x'0ccc' System ABEND code ccc     +
                                    x'8ccc' User ABEND code ccc
ASARC    DS    Bl4                ABEND reason code
*
ASPIDL   Equ    *-ASPID
```

Adabas Command Activity Section: CMD

This selectable detail section may appear in interval or termination records (subtypes 2 and 3). Adabas command activity data is derived from data presented at nucleus shutdown.

There is one instance for each command group: A1/4, BT, CL, ET, E1/4, L1/4, L2/5, L3/6, L9, LF, N1/2, OP, UC, RC, RE, REST, S1/4, S2, S5, S8, S9, YA, YB, YF, YP, YCAL, V1, V2, V3, V4, U0, U1, U2 and U3. There are 34 possible instances but this is subject to change in future releases.

```
ASCmd    DSect ,                  Adabas Command Activity
ASCmdNm  DS     Cl4               Command name
ASCmdCt  DS     Bl8               Number of times this command type   +
                                    was executed
ASCmdTm  DS     Bl8               Sum of this command type durations  +
                                    in microseconds
*
ASCmdL   Equ   *-ASCmd
```

Adabas File Activity Section: FILE

This selectable detail section may appear in interval or termination records (subtypes 2 and 3). Adabas file activity data is derived from data presented at nucleus shutdown or in response to a DFILUSE operator command. There is one instance for each file possible in the database as specified by ADADEF MAXFILES up to the highest file number with a non-zero use count. The file number is implied by the sequence number of the instance, starting with zero, which reflects commands such as OP that are not associated with a specific file.

```
ASFile   DSect ,                  Adabas File Activity
ASFileCt DS     Bl8               Number of commands executed against +
                                    this file
*
ASFileL  Equ   *-ASFile
```

Adabas Global Cache Activity by Block Type Section: CSHB

This selectable detail section may appear in interval or termination records (subtypes 2 and 3). Global cache statistics are available only for Adabas Cluster Services and Adabas Parallel Services nuclei. They are derived from the ones presented at nucleus shutdown or in response to a DXCACHE operator command. There is one detail section instance for each type of block. Users should examine the block type and not rely on any observed order of the instances. The following block types are reported:

- AC: Address Converter
- DS: Data Storage
- DSST: Data Storage Space Table
- FCB: File Control Block
- NI: Normal Index
- UI: Upper Index
- OTHR: Any other block type

```
AChB     DSect ,                  Global Cache Activity by Block
ASCBCN   DS    Bl2                Cache Number
ASCBRsv1 DS    Bl2                Unused
ASCBBT   DS    Cl4                Block type
ASCBRT   DS    Bl8                Reads - Total
ASCBRCS  DS    Bl8                Reads - Completed synchronous
```

```
ASCBRCA   DS    Bl8               Reads - Completed asynchronous
ASCBRIC   DS    Bl8               Reads - Data in cache
ASCBRNI   DS    Bl8               Reads - Data not in cache
ASCBRFS   DS    Bl8               Reads - Failed - Structure
ASCBRO    DS    Bl8               Reads - For cast-out
ASCBROS   DS    Bl8               Reads - For cast-out synchronous
ASCBROA   DS    Bl8               Reads - For cast-out asynchronous
ASCBWT    DS    Bl8               Writes - Total
ASCBWCS   DS    Bl8               Writes - Completed synchronous
ASCBWCA   DS    Bl8               Writes - Completed asynchronous
ASCBWDR   DS    Bl8               Writes - Data written
ASCBWNR   DS    Bl8               Writes - Data not written
ASCBWSF   DS    Bl8               Writes - Structure full
ASCBVI    DS    Bl8               Validates issued
ASCBVF    DS    Bl8               Validates failed
ASCBBD    DS    Bl8               Block deletes issued
ASCBDR    DS    Bl8               Deletes reissued due to timeout
ASCBUR    DS    Bl8               Number of times updates redone
*
ASChBL    Equ   *-AShB
```

Adabas Global Cache Activity by Adabas File Number Section: CSHF

This selectable detail section may appear in interval or termination records (subtypes 2 and 3). Global cache statistics are available only for Adabas Cluster Services and Adabas Parallel Services nuclei. They are derived from the ones presented at nucleus shutdown or in response to a DXCACHE operator command. There is potentially one instance for each file possible in the database as specified by ADADEF MAXFILES. The size of this detail section precludes the ability to generate it for every possible file, so there is one detail section instance for each file that has non-zero usage. Users should examine the file number and not rely on any observed order of the instances.

```
AShF      DSect ,                 Global Cache Activity by File
ASCFCn    DS    Bl2               Cache Number
ASCFRsv1  DS    Bl2               Unused
ASCFNum   DS    Bl4               File number
ASCFRT    DS    Bl8               Reads - Total
ASCFRCS   DS    Bl8               Reads - Completed synchronous
ASCFRCA   DS    Bl8               Reads - Completed a synchronous
ASCFRIC   DS    Bl8               Reads - Data in cache
ASCFRNI   DS    Bl8               Reads - Data not in cache
ASCFRFS   DS    Bl8               Reads - Failed - Structure
ASCFRO    DS    Bl8               Reads - For cast-out
ASCFROS   DS    Bl8               Reads - For cast-out synchronous
ASCFROA   DS    Bl8               Reads - For cast-out asynchronous
ASCFWT    DS    Bl8               Writes - Total
ASCFWCS   DS    Bl8               Writes - Completed synchronous
ASCFWCA   DS    Bl8               Writes - Completed a synchronous
ASCFWDR   DS    Bl8               Writes - Data written
ASCFWNR   DS    Bl8               Writes - Data not written
ASCFWSF   DS    Bl8               Writes - Structure full
ASCFVI    DS    Bl8               Validates issued
ASCFVF    DS    Bl8               Validates failed
ASCFBD    DS    Bl8               Block deletes issued
ASCFDR    DS    Bl8               Deletes reissued due to timeout
ASCFUR    DS    Bl8               Number of times updates redone
*
AShFL     Equ   *-AShF
```

Adabas Global Cache Activity Section: CSHG

This selectable detail section may appear in interval or termination records (subtypes 2 and 3). Global cache statistics are available only for Adabas Cluster Services and Adabas Parallel Services nuclei. They are derived from the ones presented at nucleus shutdown or in response to a DXCACHE operator command. This detail section appears with one instance.

```
ASChG     DSect ,                 Global Cache Activity Section
ASCGCN    DS    Bl2               Cache Number
ASCGRsv1  DS    Bl2               Unused
ASCGCOD   DS    Bl8               Cast-out directory reads issued
ASCGCODA  DS    Bl8               Cast-out directory - async
ASCGCODS  DS    Bl8               Cast-out directory - sync
ASCGCOU   DS    Bl8               Unlock cast-out locks issued
ASCGCOUA  DS    Bl8               Unlock cast-out locks - async
ASCGCOUS  DS    Bl8               Unlock cast-out locks - sync
ASCGDR    DS    Bl8               Directory reads issued
ASCGDRA   DS    Bl8               Directory reads issued - sync
ASCGDRS   DS    Bl8               Directory reads issued - async
ASCGPub   DS    (0*9)Bl8          Publishing requests
ASCGSync  DS     Bl8                Update sync
ASCGXEnd  DS     Bl8                BT/CL/ET transaction end
ASCGRedo  DS     Bl8                Redo threshold
ASCGFull  DS     Bl8                Full buffer pool
ASCGAll   DS     Bl8                All blocks
ASCGRABN  DS     Bl8                Specific RABN
ASCGDS    DS     Bl8                File DS blocks
ASCGDSST  DS     Bl8                DSST blocks
ASCGNI    DS     Bl8                File NI blocks
*
ASChGL    Equ  *-ASChG
```

Adabas Global Lock Activity Section: LOCK

This selectable detail section may appear in interval or termination records (subtypes 2 and 3). Global lock statistics are available only for Adabas Cluster Services and Adabas Parallel Services nuclei. They are derived from the ones presented at nucleus shutdown or in response to a DXLOCK operator command. There is one detail section instance for each lock type. The lock type is implied by the sequence number of the instance, starting with one.

```
ASLok     DSect ,                 Global Lock Section
*                                 Lock Types
ASLokGC   Equ     1                 GCB
ASLokSE   Equ     2                 Security
ASLokFS   Equ     3                 FST
ASLokUF   Equ     4                 UFT
ASLokSO   Equ     5                 Save Online
ASLokFL   Equ     6                 Flush
ASLokES   Equ     7                 Global ET Synchronization
ASLokRC   Equ     8                 Recovery
ASLokUT   Equ     9                 UFT-File
ASLokIU   Equ    10                 Index Update
ASLokHI   Equ    11                 Hold ISN
ASLokUD   Equ    12                 Unique DE
ASLokET   Equ    13                 ETID
ASLokLT   Equ    14                 LOB Tracker
ASLokCM   Equ    15                 Command Manager User
ASLokDI   Equ    16                 Data Increment
ASLokCP   Equ    17                 Checkpoint
```

```
ASLokDT   Equ    18                 Net-Work DBID Target Assignment
ASLokGU   Equ    19                 Global Update Commmand Sync
ASLokPM   Equ    20                 Parameter
ASLokDS   Equ    21                 DSF
ASLokRG   Equ    22                 RLOG
ASLokSP   Equ    23                 SPATS
ASLokCA   Equ    24                 Cancel
ASLokWR   Equ    25                 TBWK4A/E Table
ASLokWU   Equ    26                 PUTUA/E Table
ASLokXI   Equ    27                 XIDE
ASLokRH   Equ    28                 Replication Handshake
ASLokRI   Equ    29                 Read file/ISN
ASLokFA   Equ    30                 Format AC/AC1
ASLokOC   DS    Bl8               Obtains  - Conditional
ASLokOG   DS    Bl8               Obtains  - Granted
ASLokOR   DS    Bl8               Obtains  - Rejected
ASLokOU   DS    Bl8               Obtains  - Unconditional
ASLokOS   DS    Bl8               Obtains  - Synchronous
ASLokOA   DS    Bl8               Obtains  - Asynchronous
ASLokAC   DS    Bl8               Alters   - Conditional
ASLokAG   DS    Bl8               Alters   - Granted
ASLokAR   DS    Bl8               Alters   - Rejected
ASLokAU   DS    Bl8               Alters   - Unconditional
ASLokAD   DS    Bl8               Alters   - Deadlock/Rejected
ASLokAS   DS    Bl8               Alters   - Synchronous
ASLokAA   DS    Bl8               Alters   - Asynchronous
ASLokRL   DS    Bl8               Releases
ASLokRS   DS    Bl8               Releases - Synchronous
ASLokRA   DS    Bl8               Releases - Asynchronous
*
ASLokL    Equ   *-ASLok
```

Adabas Internucleus Messaging Control Block Activity Section: MSGB

This selectable detail section may appear in interval or termination records (subtypes 2 and 3). Internucleus messaging statistics are available only for Adabas Cluster Services and Adabas Parallel Services nuclei. They are derived from the ones presented at nucleus shutdown or in response to a DXMSG operator command. This detail section appears with one instance. The number of blocks allocated (ASMsgBBA) and the high water mark (ASMsgBBH) reflect the entire nucleus session in interval records.

```
ASMsgB    DSect ,                Inter-Nucleus Messaging Counts
ASMsgBBA  DS    Bl8              Message control blocks allocated
ASMsgBBH  DS    Bl8              Message control blocks used        +
                                  (high water mark)
ASMsgBBR  DS    Bl8              Message control block requests
*
ASMsgBL   Equ  *-ASMsgB
```

Adabas Internucleus Messaging Counts Section: MSGC

This selectable detail section may appear in interval or termination records (subtypes 2 and 3). Internucleus messaging statistics are available only for Adabas Cluster Services and Adabas Parallel Services nuclei. They are derived from the ones presented at nucleus shutdown or in response to a DXMSG operator command. This detail section appears with one instance. Adabas Parallel Services nuclei report only the count of messages sent.

```
ASMsgC    DSect ,                 Inter-Nucleus Messaging Counts
ASMsgCMT  DS    Cl4               Message type
ASMsgCMS  DS    Bl8               Messages sent
ASMsgCMI  DS    Bl8               Messages incoming (arrived)
ASMsgCMA  DS    Bl8               Messages accepted
ASMsgCRS  DS    Bl8               Replies sent
*
ASMsgCL   Equ  *-ASMsgC
```

Adabas Internucleus Messaging Service Time Histogram Section: MSGH

This selectable detail section may appear in interval or termination records (subtypes 2 and 3). Internucleus messaging statistics are available only for Adabas Cluster Services and Adabas Parallel Services nuclei. They are derived from the ones presented at nucleus shutdown or in response to a DXMSG operator command. This detail section appears with two instances:

1. The first represents messages subject to the MXMSG timeout parameter.
2. The second represents certain control messages not subject to MXMSG.

The two instances may be summed for a single representation of all messages. All message times are in microseconds. The minimum and maximum durations (`ASMsgHMn` and `ASMsgHMx`) reflect the entire nucleus session in interval records. Field `ASMsgMD2` is an extended (16-byte) floating point sum of the squares of all message durations. It may be used to compute a standard deviation.

```
ASMsgH    DSect ,                 Inter-Nucleus Messaging Histogram
ASMsgHXP  DS    Cl4               Transport service
ASMsgHMM  DS    Bl4               MXMSG or zero for messages not      +
                                   subject to MXMSG
ASMsgHMC  DS    Bl8               Message count
ASMsgHMD  DS    Bl8               Sum of all message durations
ASMsgHMS  DS    Bl16              Sum of squares, all msg durations   +
                                    (extended hex floating point)
ASMsgHMn  DS    Bl4               Minimum duration (us)
ASMsgHMx  DS    Bl4               Maximum duration (us)
ASMsgHCt  Equ   9                 Number of histogram buckets
ASMsgHG   DS    (0*ASMsgHCt)Bl8   Histogram buckets
ASMsgH10  DS     Bl8                > 1000  s
ASMsgH09  DS     Bl8                >  100  s, <= 1000  s
ASMsgH08  DS     Bl8                >   10  s, <=  100  s
ASMsgH07  DS     Bl8                >    1  s, <=   10  s
ASMsgH06  DS     Bl8                >  100 ms, <=    1  s
ASMsgH05  DS     Bl8                >   10 ms, <=  100 ms
ASMsgH04  DS     Bl8                >    1 ms, <=   10 ms
ASMsgH03  DS     Bl8                >  100 us, <=    1 ms
ASMsgH02  DS     Bl8                <= 100 us
*
ASMsgHL   Equ  *-ASMsgH
```

Adabas Parallel Services Cache Activity Section: CSHP

This selectable detail section may appear in interval or termination records (subtypes 2 and 3). Parallel services cache statistics are available only for Adabas Parallel Services nuclei. They are derived from the ones presented at nucleus shutdown or in response to a DXCACHE operator command. This detail section appears with one instance. The directory high water mark `ASCPDHiN` and in-use count `ASCPDirI` reflect the entire nucleus session in interval records.

```
ASChP     DSect ,                 Parallel Services Cache Activity
ASCPCN    DS    Bl2               Cache Number
ASCPRsv1  DS    Bl2               Unused
ASCPNDir  DS    Bl8               Number of directory elements
ASCPNDiI  DS    Bl8               Number of directory index elements
*                                 Directory Statistics
*                                   General
ASCPDHiN  DS    Bl8                 High-water mark, this nucleus
ASCPDirI  DS    Bl8                 In-use, this nucleus
*                                   Read
ASCPDRA   DS    Bl8                 Located active
ASCPDRF   DS    Bl8                 Obtained from free pool
ASCPDRC   DS    (0*4)Bl8            Reclaim criteria categories
ASCPDNN   DS     Bl8                  First choice criteria
ASCPDND   DS     Bl8                  Second choice criteria
ASCPDIN   DS     Bl8                  Third choice criteria
ASCPDID   DS     Bl8                  Fourth choice criteria
ASCPDCF   DS    Bl8                 Unable to obtain (cache full)
ASCPDRT   DS    Bl8                 Tested for reclaim
*                                   Write
ASCPDWF   DS    Bl8                 Obtained from free pool
*                                 Space Management Statistics
*                                    Request Statistics
ASCPSRP   DS    Bl8                   Sufficient preallocated space
ASCPSRF   DS    Bl8                   Free space allocated
ASCPSRN   DS    Bl8                   Reclaim space, first choice
ASCPSRI   DS    Bl8                   Reclaim space, second choice
ASCPSRU   DS    Bl8                   Space unavailable (cache full)
ASCPSSP   DS    Bl8                   Searched part of space chain
ASCPSSF   DS    Bl8                   Searched entire  space chain
ASCPSST   DS    Bl8                   Number of space seqs tested
*                                    Element Reclaim Statistics
ASCPSEN   DS    Bl8                   First choice criteria
ASCPSEI   DS    Bl8                   Second choice criteria
*                                    Latch management statistics
*                                     Cache Space Chain
ASCPSPGE  DS    Bl8                     Get     Exclusive
ASCPSPWF  DS    Bl8                     WaitFor Exclusive
ASCPSPRE  DS    Bl8                     Release Exclusive
*                                     Cache Directory Index
ASCPDIGE  DS    Bl8                     Get     Exclusive
ASCPDIGS  DS    Bl8                     Get     Shared
ASCPDIUE  DS    Bl8                     Upgrade Exclusive
ASCPDIWE  DS    Bl8                     WaitFor Exclusive
ASCPDIWS  DS    Bl8                     WaitFor Shared
ASCPDIWU  DS    Bl8                     WaitFor Upgrade
ASCPDIRE  DS    Bl8                     Release Exclusive
ASCPDIRS  DS    Bl8                     Release Shared
*                                     Cache Directory
ASCPDRGE  DS    Bl8                     Get     Exclusive
ASCPDRGS  DS    Bl8                     Get     Shared
ASCPDRUE  DS    Bl8                     Upgrade Exclusive
ASCPDRWE  DS    Bl8                     WaitFor Exclusive
ASCPDRWS  DS    Bl8                     WaitFor Shared
ASCPDRRE  DS    Bl8                     Release Exclusive
ASCPDRRS  DS    Bl8                     Release Shared
*                                     Cast-Out Class
ASCPCOGE  DS    Bl8                     Get     Exclusive
ASCPCOGS  DS    Bl8                     Get     Shared
ASCPCOWE  DS    Bl8                     WaitFor Exclusive
ASCPCOWS  DS    Bl8                     WaitFor Shared
```

```
ASCPCORE  DS    Bl8                     Release Exclusive
ASCPCORS  DS    Bl8                     Release Shared
*
ASChPL    Equ  *-ASChP
```

ADARUN Parameter Value Section: PARM

This selectable detail section may appear in initialization records or whenever an ADARUN parameter is changed while the nucleus is running (subtypes 1 and 4 in the header section). It will not be generated for interval or termination records (subtypes 2 and 3). This section has a fixed-length portion containing most parameters, followed by variable-length areas for parameters capable of multiple values or lists of values.

Where possible, the individual field names are formed by prefixing the shortest allowable form of the parameter with ASP. In general, the SMF record will report character parameters in EBCDIC and numeric parameters in binary.

Parameters with limited enumerated values (YES or NO, for example) are reported in 1-byte fields if the possible values are unambiguous. Otherwise, the field length is that used by the nucleus, usually 4 bytes.

Here are some sample entries:

```
ASParm    DSect ,
ASPAO      DS      Cl1       AOslog
ASPARE   DS        Bl4       ARExclude
                           Offset to file table
ASPARMN          DS        Cl16     ARMname
ASPASS   DS        Cl1       ASSocache
ASPASY   DS        Cl1       ASYtvs
         . . .
ASPVI      DS      Cl1       Vista
ASPV64B  DS        Cl1       V64Bit
ASPWO      DS      Cl1       Workcache
ASParmV  DS        0B         Begin variable part
ASParmL          Equ       *-ASParm      Length of ID section

ASParm   DSect ,                  ADARUN Parameters
*
*         Adabas Nucleus Parameters
*
ASPAO    DS    Cl1                AOslog
ASPARE   DS    Bl4                ARExclude       Offset to file table
ASPARMN  DS    Cl16               ARMname
ASPASS   DS    Cl1                ASSocache
ASPASY   DS    Cl1                ASYtvs
 . . .

ASPVI    DS    Cl1                VIsta
```

The ADARUN AREXCLUDE parameter is a variable length list of values. The base parameter entry will be an offset from the beginning of the detail section to the table of values. The table is a 4-byte inclusive field followed by 4-byte file numbers. A separate DSECT maps the AREXCLUDE file exclusion table:

```
ASPAFE   DSect ,                  ARM File Exclusion Table
ASPAFEN  DS    Bl4                Inclusive length of table
ASPAFEF  DS    0Bl4               First file number entry
```

I/O by DD Name Section: IODD

This selectable detail section may appear in interval or termination records (subtypes 2 and 3). I/O by DD data is derived from data presented at nucleus shutdown. There is one instance for each DD statement administered by the nucleus. You should examine the DD name and not rely on any observed order of the instances. An Adabas nucleus may open and close the same DD name multiple times. Multiple uses of a DD name are summed.

You might see this many DD statements in a single nucleus:

Statement Type	Number of DD Statements
ASSO	99
CLOG	8
DATA	99
ECS	1
PLOG	8
RLOG	1
WORK	2

```
ASIODD   DSect ,                  I/O Activity by DD
ASIODDNm DS    Cl8                DD Name
ASIODDRd DS    Bl8                Reads
ASIODDWt DS    Bl8                Writes
*
ASIODDL  Equ   *-ASIODD
```

Storage Pool Section: STG

This selectable detail section may appear in interval or termination records (subtypes 2 and 3). Storage pool statistics are derived from statistics presented at nucleus shutdown or in response to a DRES operator command. There is one instance for each storage pool with a non-zero size. Be sure to examine the pool name and not rely on any observed order of the instances.

Storage pool statistics are reported two ways: in bytes and also in units such as a user might specify as an ADARUN parameter, for example, NC. When the units are bytes, the two sets of statistics are the same.

Normally an interval record would show the change from the previous interval, but that isn’t meaningful for storage pools. Thus the interval and termination record subtypes all reflect total usage for the nucleus session.

```
ASStg    DSect ,                  Storage Pool Usage
ASStgNm  DS    Cl4                Storage pool name
ASStgBSz DS    Bl8                Size in bytes
ASStgBHW DS    Bl8                High water mark in bytes
ASStgUSz DS    Bl8                Size in units from ADARUN parameter
ASStgUHW DS    Bl8                High water mark in ADARUN units
*
ASStgL   Equ   *-ASStg             Length of Storage Pool section
```

These are the possible storage pools:

Storage Pools		
Pool Name	**ADARUN Parameter**	**Description**
AB	NAB	Attached buffers
CQ	NC	Command queue
DUQ	LDEUQP	Unique descriptor
FI	LFP	Internal format buffers
HQ	NH	Hold queue
PLIO	NPLOGBUFFERS	PLOG I/O buffers
REDO	LRDP	Deferred publishing
RPL	LRPL	Replication pool
SC	LCP	Security information
TBI	LI	ISN table
TBS	NQ	Sequential command table
UQ	NU	User queue element
UQF	NU	User queue file elements
WKIO	NWORK1BUFFERS	Work I/O buffers
WORK	LWP	Work
XID	NU	Transaction ID

Thread Activity Section: THRD

This selectable detail section may appear in interval or termination records (subtypes 2 and 3). Thread activity data is derived from data presented at nucleus shutdown or in response to a DTH operator command. The ADARUN parameter NTHREAD defines the number of user threads for the nucleus session. There is one instance for each defined user thread. The thread number is implied by the sequence number of the instance.

```
ASThrd   DSect ,                  Thread Activity
ASThrdCt DS     Bl8               Number of commands executed in this +
                                    thread
*
ASThrdL  Equ   *-ASThrd
```

ASMFREC Mapping Macro

Use the ASMFREC macro to generate the latest SMF record DSECTs. The ASMFREC macro will always generate the header and self-defining section DSECT. Detail section DSECTs will be generated as specified. The header and self-defining sections are mapped by a single DSECT. Each detail section is mapped by its own DSECT. The syntax of the ASMFREC macro is:

```
label    ASMFREC   Prefix={AS | prefix},
                                 Detail={All | (type [,type]...)},
                                 Title = {'Adabas SMF Records' | 'string'}
```

Prefix

Specify a character string to be used as the initial characters for all DSECT and field names. The default is Prefix=AS.

Detail

Identify which detail section DSECTs are to be included in the expansion. "All" is the default and will include all detail sections. Alternatively, a comma-delimited list of types (enclosed in parentheses) can be specified; only the types specified will be included. The valid types are shown in the following table. A null value (Detail=) will inhibit all detail section DSECTs.

ASMFREC Macro Specification	Detail Section Description	ASMFREC DSECT Name Produced by the ASMFREC Macro [1]
CMD	Adabas command activity	*xx*Cmd
CSHB	Adabas global cache activity by block type	*xx*ChB
CSHF	Adabas global cache activity by Adabas file number	*xx*ChF
CSHG	Adabas global cache activity	*xx*ChG
CSHP	Adabas Parallel Services cache activity	*xx*ChP
FILE	Adabas file activity	*xx*File
LOCK	Adabas global lock activity	*xx*Lok
MSGB	Adabas internucleus messaging control block activity	*xx*MsgB
MSGC	Adabas internucleus messaging counts	*xx*MsgC
MSGH	Adabas internucleus messaging service time histogram	*xx*MsgH
PARM	ADARUN parameter values	*xx*Parm
IODD	I/O by DD name	*xx*IODD
STG	Storage pool	*xx*Stg
THRD	Thread activity	*xx*Thrd
USER	User-defined	user-defined

1. Where *xx* is the prefix specified in the ASMFREC macro.

Title

If the Title default "Adabas SMF Record " or another quoted string is specified, an assembler Title statement is generated before the header section DSECT. A null value (Title=) for this operand will inhibit a title in the DSECT.

SMF User Exit

You can provide a user exit if you want to add a detail section to the Adabas SMF record. The user exit is a separate load module whose name must be provided in the ADARUN UEXSMF parameter. For complete information about the user exit, read *SMF User Exit*, in the *Adabas User, Hyperdescriptor, Collation Descriptor, and SMF Exits Manual*.

IBM Type 89 SMF Records

An Adabas nucleus can register with z/OS to have CPU usage statistics included in IBM type 89 SMF records. These records are described in *z/OS MVS System Management Facilities (SMF), IBM document SA22-7630*.

To activate type 89 recording for Adabas, specify ADARUN parameters SMF=YES and SMF89=YES. During initialization Adabas will register the nucleus address space with z/OS SMF and have its CPU statistics included in subtype 1 of the type 89 records. The address space is deregistered at nucleus termination. Each Adabas nucleus appears as a separate type 89 entry.

The type 89 entries include CPU usage and a number of descriptive registration parameters. Adabas nuclei use these descriptive fields in type 89 entries as follows:

SMF Type 89 Descriptive Fields				
Name	**Length**	**Format**	**Description**	**Value**
SMF89UPO	16	EBCDIC	Product owner or vendor name	SOFTWARE AG
SMF89UPN	16	EBCDIC	Product name	ADABAS
SMF89UPV	8	EBCDIC	Product version	The eight-byte product version has two-byte numeric values for the Adabas version, release, SM level, and cumulative level.
SMF89UPQ	8	Binary	Product qualifier	The product qualifier is a seven-byte string that may be used to distinguish among several nucleus instances. It contains a series of binary fields: **SVC** (1 byte) **DBID** (4 bytes) **NucID** (2 bytes) Use both the SVC and DBID to identify instances of Adabas Cluster or Parallel Service nuclei for the same database on any one system.
SMF89UPI	8	EBCDIC	Product ID	The product ID is a string of up to eight single characters to show what add-on products are being used. The characters may appear in any order: **C** (Adabas Cluster Services) **D** (Adabas Delta Save) **F** (Adabas Fastpath) **M** (Adabas Review **P** (Adabas Parallel Services) **R** (Event Replicator for Adabas) **S** (Adabas Cache Facility) **T** (Adabas Transaction Manager) **U** (Adabas Security) **V** (Adabas Vista) C, P, and R are mutually exclusive. D, F, M, T and V are exclusive with R.