

IBM Education Assist (IEA) for z/OS V2R3

Line Item Name: High Frequency Throughput Statistics (HFTS)
Element/Component: BCP SMF and Supervisor

Agenda

- Trademarks
- Session Objectives
- Overview
- Usage & Invocation
- Migration & Coexistence Considerations
- Installation
- Session Summary
- Appendix

Trademarks

- See url <http://www.ibm.com/legal/copytrade.shtml> for a list of trademarks.
- Additional Trademarks:
 - None

Session Objectives

- Understand the the need for HFTS
 - Collection interval minutes vs. seconds
- Understand the SMF changes (OA48570 & OA48741)
 - HFTSINTVL SMFPRMxx keyword
 - Messages IFA750, IFA751
- Understand the Supervisor changes (OA48571)
 - IHAHR098 – Type 98 SMF record
 - IHAHR981 – Type 98 sub type 1 SMF record

Overview

- Problem Statement / Need Addressed
 - z/OS lacks infrastructure to gather data and diagnose transient performance problems
 - SMF records can only be collected **minutes** apart (typically 5-30)
 - This can conceal performance issues
 - At the worst time (high / peak demand)
 - With big consequences (poor performance, outages)
 - Trace data is collected very frequently (**sub-seconds** apart)
 - Large amount of data (too much)
 - Buffer may wrap frequently
 - To diagnose transient performance issues, we need data that can be collected **seconds** apart

Overview

- Solution
 - Enhance SMF to allow for a set of records that can be collected with an intervals that are **seconds** apart
 - Enhance supervisor to gather performance data using the new infrastructure
- Benefit / Value
 - Transient performances problems will be easier to analyze with data collected at the right frequency
 - Changes to workload performance will be easier to validate

Usage & Invocation

- HFTSINTVL keyword in SMFPRMxx
 - Specifiable via SET SMF=xx, SETSMF HFTSINTVL..., IEASYS SMF=xx, and IPL SMF=xx prompt
 - HFTSINTVL(ss) | NOHFTSINTVL
 - ss – Length of time in seconds between recording intervals for SMF type 98 records
 - ex: HFTSINTVL(20) – 20 seconds between intervals
 - Supported values: 5, 10, 15, 20, 30, and 60 seconds
 - Default: NOHFTSINTVL
 - Need to specify HFTSINTVL and TYPE(98) to collect records

Usage & Invocation

- HFTSINTVL keyword in SMFPRMxx suggestions
 - There may be a large amount of data from type 98 records when HFTSINTVL is specified
 - Where to collect
 - Consider a separate log stream
 - Data sets could wrap more frequently
 - Shared log streams could encounter frequent full conditions
 - When to collect
 - Consider if type 98 collection is always needed
 - Change to NOHFTSINTVL to disable without having to re-do the TYPE specification
 - Change to HFTSINTVL(xx) to enable when desired

Usage & Invocation

- SMF Type 98 Records
 - Mapped by IHAHR098
 - Contains data collected on the HFTSINTVL
 - Generic header for sub type data that follows
 - Currently only one sub type (1) for supervisor data
- See Appendix E for details

Usage & Invocation

- SMF Type 98 sub type 1 Records
 - Mapped by IHAHR981
 - Contains supervisor performance data
 - Shared resource utilization
 - Concurrency
 - Efficiency
 - Contention
 - Queueing
 - Provides a running record (heart beat) of the system
 - Identifies resources performing exceptionally well or poor
- Environment section – system configuration details
- Utilization section – general information about CPU utilization

Usage & Invocation

- Spin lock sections
 - Summary of system spin lock contention
 - Identifies spin locks with the most contention
- Suspend lock sections
 - Summary of system suspend lock contention
 - CMS, Local, and CML locks
 - Identifies address spaces with the most contention
- Work unit priority bucket sections
 - How much work is getting processed by the system
 - By CPU type (CP, zIIP, zAAP)
 - By dispatch priority range (high → medium → low → discretionary)

Usage & Invocation

- Consumption sections
 - Separated by:
 - By CPU type (CP, zIIP, zAAP)
 - By dispatch priority range (high → medium → low → discretionary)
 - By CPU utilization range
 - Types of data:
 - Dispatch data by work unit type (dispatch times and counts)
 - Execution efficiency by thread density (instructions and cycles)
 - Spin lock data (not by processor class)
 - Each contain
 - Total data of the workload
 - Data identifying the top contributing address space
 - Data from the top contributing address space
- See Appendix F for details

Migration & Coexistence Considerations

- None, however:
- APAR OA48741 provides toleration for the HFTSINTVL SMFPRMxx keyword on z/OS V2R1 and z/OS V1R13
 - This APAR will allow but ignore a SMFPRMxx parmlib member that specifies SMFPRMxx at these release levels
- APAR OA48570 and OA48571 should be applied to V2R2 systems, and enables full functionality

Installation

- To Install
 - z/OS V2R1 & V1R13: Install SMF keyword toleration APAR OA48741
 - z/OS V2R2: Install new function APARs OA48570 and OA48571
 - z/OS V2R3: None

- To Exploit
 - Enable HIS profiling for some SMF type 98 sub type 1 data
 - Update SMFPRMxx to specify HFTSINTVL and TYPE(98) as desired

Session Summary

- While SMF records are traditionally collected minutes apart, a way to collect records seconds apart was needed to diagnose transient performance problems that were hidden by longer intervals
- HFTSINTVL is a SMF parameter that specifies when type 98 records are collected in seconds
- Supervisor produces SMF type 98 sub type 1 records with performance data
 - About shared resource
 - Utilization
 - Concurrency
 - Efficiency
 - Contention
 - Queueing
 - Provides a running record (heart beat) of the system
 - Identifies resources performing exceptionally well or poor

Appendix

- B - Publications
- C – IFA750I details
- D – IFA751I details
- E – SMF type 98 details
- F – SMF type 98 sub type 1 details

Appendix B - Publications

- z/OS MVS Diagnosis Reference
- z/OS MVS Initialization and Tuning Reference
- z/OS MVS System Codes
- z/OS MVS System Management Facilities (SMF)
- z/OS MVS System Messages Volume 8 (IEF-IGD)

Appendix C – IFA750I details

- IFA750I UNABLE TO ATTACH IFAHFTSK
- Explanation: An error was encountered when the HFTS task IFAHFTSK was attached by the SMF main task. IFAHFTSK is not attached.
- System Action: The HFTS task cannot be attached. Any SMF HFTS recording, if requested, cannot be initiated.
- Operator Response: Notify the system programmer.
- System Programmer Response: Search the problem reporting data bases for a fix for the problem. If no fix exists, contact the IBM Support Center.
- Source: System Management Facilities (SMF)
- Module: IFASMF
- Routing code: 2, 10
- Descriptor code: 4

Appendix D – IFA751I details

- IFA751I SMF *function* ERROR. SERVICE *service* REQUEST *request* FAILED WITH RC=*retcode* RSN=*rsncode*
- Explanation: An SMF function has encountered an error.
- In The message Text:
 - *function* – The SMF function that encountered an error
 - *service* – The service associated with the function that failed
 - *request* – The request of the service that encountered an error
 - *retcode* – The return code from the service
 - *rsncode* – The reason code from the service
- System Action: For a function of HFTS (High Frequency Throughput Statistics), and a service of CSVDYNEX: If the request was ADD, the exit routine will not get control. If the request was QUERY, the states of the exit routines associated with this exit are the same as they were before the QUERY failure. For all other requests, the exit routines associated with this exit no longer get control.

Appendix D – IFA751I details

- IFA751I SMF *function* ERROR. SERVICE *service* REQUEST *request* FAILED WITH RC=*retcode* RSN=*rsncode*
- Operator Response: Notify the system programmer.
- System Programmer Response: Search the problem reporting data bases for a fix for the problem. If no fix exists, contact the IBM Support Center.
- Source: System Management Facilities (SMF)
- Module: IFASMF
- Routing code: 2, 10
- Descriptor code: 4
- Example:
 - IFA751I SMF HFTS ERROR. SERVICE CSVDYNEX REQUEST CALL FAILED WITH RC=000000008 RSN=00000804

Appendix E – SMF type 98 record details

- Mapped by IHAHR098
- SMFR98 – maps the record header
 - Standard record header
 - SMF98LEN – record length
 - SMF98SEG – segment descriptor
 - SMF98FLG – flag byte
 - bit 0 -subsys ID follows sys ID
 - bit 1 – sub types are used
 - SMF98RTY – record type (set to 98, x'62')
 - SMF98TME – record written time
 - SMF98DTE – record written date
 - SMF98SID – system ID
 - SMF98SSI – sub system ID
 - SMF98STY – record sub type (1 for supervisor performance)
 - SMF98IND – Additional record flags
 - Bit 0 – MORE – There are more parts to this record and it is continued
 - Bit 1 – CONT – This is part of a continued record
 - Bit 2 – NoStorage – Unable to create storage for remaining buffer

Appendix E – SMF type 98 record details

- SMF98PartSeqNo – Record part sequence number starting at 0
 - SMF98SDSLen – Length of the self defining section
 - SMF98SDSTripletsNum – number of triplets in the self defining section
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- SMF98SDS – Self defining section
 - SMF98I(OF,LN,ON) – Identification section (offset, length, number)
 - SMF98CS(OF,LN,ON) – Context summary section
 - SMF98D(OF,LN,ON) – Data section (holds sub type specific data)
-
- SMF98ID – Identification Section
 - SMF98JBN – Job Name
 - SMF98RST – Reader start time
 - SMF98RSD – Reader start date
 - SMF98STP – Step Name
 - SMF98IntervalStart – Interval start time in local TOD format
 - SMF98IntervalEnd – Interval end time in local TOD format

Appendix E – SMF type 98 record details

- SMF98CSS – Context Summary Section
 - Record level identification:
 - SMF98_ReleaseIndex – Major change version
 - SMF98_WithinReleaseIndex – Minor change version
 - SMF98_PrototypeIndex – Temporary change version
 - SMF98_Prodlevel – Product level identification (CVTPROD)
 - SMF98_ExitSerialTOD – Time the exit held serialization (TOD)
 - SMF98_ExitTimeUsed – Time the exit used to write the record (TOD)
 - SMF98_CVTLDTO – Local time offset
- SMF98 Data sections
 - Each sub type has it's own data mapped in a separate macro
 - The sub type data sections can be found at SMF98PTR+SMF98DOF
 - Where SMF98PTR is the address of the SMF type 98 record

Appendix F – SMF type 98 sub type 1 details

- Sub type 1 records contain data about supervisor performance
- Mapped by IHAHR981
- All fields are prefixed by SMF98_1_
- Dat – is at offset SMF98DOF from the SMF record
 - DataTripletsNum – number of triplets in the data section
 - DataTripletsLen – length of the triplet area that follows
 - Environmental and Utilization data:
 - Env(OF,LN,ON) – Environmental data section (offset, length,number) mapped by SMF98_1_EnvInfo
 - ECCC(OF,LN,ON) – ECCC counter section mapped by IHAECCC structure ECCC_Data
 - UT(OF,LN,ON) – Utilization data mapped by SMF98_1_UT
 - Lock data
 - LockSpinSum(OF,LN,ON) – Spin lock summary data (for all locks) mapped by SMF98_1_SpinLock_Sum
 - LockSpinDet(OF,LN,ON) – Spin lock detail data (top contributing locks) mapped by SMF98_1_SpinLock_Det
 - LockSuspendSum(OF,LN,ON) – Suspend lock summary data mapped by SMF98_1_SuspLock_Sum
 - LockSuspendDet(OF,LN,ON) – Suspend lock detail data mapped by SMF98_1_SuspLock_Det
 - LockLocalCMLDet(OF,LN,ON) – Local and CML lock detail data mapped by SMF98_1_LockLocalCml_Det
 - Work Unit Priority Bucket data
 - PriorityBucket(OF,LN,ON) – Work unit priority bucket sections mapped by SMF98_1_PB_Data
 - Address space consumption data
 - Consume(OF,LN,ON) – Consumption sections mapped by SMF98_1_Consume

Appendix F – SMF type 98 sub type 1 details

- Environmental Information (SMF98_1_EnvInfo)
 - Most fields expected to remain the same
 - Prefixed by SMF98_1_ENV_
 - Flags – configuration flags
 - Bit 0 – HIPERDISPATCH setting 1=YES, 0=NO
 - Bit 1-2 – reserved
 - Bit 3 – A processor resource is viewed as a CPU Core (PROCVIEW=CORE)
 - Bit 4 – Multiple CPUs are defined within a CPU Core
 - Bit 5 – One or more CP core is in mixed mode state
 - Bit 6 – One or more zAAP core is in mixed mode state
 - Bit 7 – One or more zIIP core is in mixed mode state
 - Bit 8 – MT=1 forced because of an error
 - SvtCoreMode_Max – Maximum MT Mode
 - SvtCoreMode(_CP,_zAAP,_zIIP) – current MT Mode
 - AWMT(_CP,_zAAP,_zIIP) – Operational value of the Alternate Wait Management Time (see CCCAWMT, ZAAPAWMT, ZIIPAWMT IEAOPTxx parameters)
 - SVTMAXQL, SVT_zAAPMAXQL, SVT_zIIPMAXQL – Maximum number of work units, a CP/zAAP/zIIP can dispatch in a timely fashion
 - SVTMINHL, SVT_zAAPMINHL, SVT_zIIPMINHL – Minimum number of dispatches which will be done for help when a CP/zAAP/zIIP chooses another CPU for help.
 - OnlineCores_(CPs,zAAPs,zIIPs) – Number of online cores for CP/zAAP/zIIP

Appendix F – SMF type 98 sub type 1 details

- Environmental Information (SMF98_1_EnvInfo)
 - Num_VH_cores_(CP,zAAP,zIIP) – Number of vertical high CP/zAAP/zIIP cores online
 - Num_VM_cores_(CP,zAAP,zIIP) – Number of vertical medium CP/zAAP/zIIP cores online
 - Num_VL_Unparked_cores_(CP,zAAP,zIIP) – Number of vertical low unparked CP/zAAP/zIIP cores
 - Num_VL_Parked_cores_(CP,zAAP,zIIP) – Number of vertical low parked CP/zAAP/zIIP cores
 - Num_Excluded_cores_(CP,zAAP,zIIP) – Number of CP/zAAP/zIIPs excluded from delta calculations because of online TOD mismatches
 - SVT_CPEngineSpeed – Standard CP engine speed in cycles per microsecond. When 0, the speed is not available.
 - SVT_SpecialtyEngineSpeed – Specialty engine (zAAP, zIIP) speed in cycles per microsecond. When 0, the speed is not available.
 - SVT_Priority_Ranges – Array of the ending range for high, medium and low priorities.
 - VcmCPsPerNode – VCM option
 - QdepthAnalysisDelta – Number of times work unit queue depth analysis was done this HFTS interval.
 - Num_Core_Excluded_(CP,zAAP,zIIP) – Number of CP/zAAP/zIIP cores excluded from delta calculations because of online TOD mismatches
 - SMF98_1_ENV_SVT_SubBucket_Ranges – Ranges of CPU consumption percentages used to sub-divide HFTS priority bucket output into sub buckets. Values represent units of 0.5% CPU utilization, and range from 1 to 199 corresponding to 0.5% to 99.5%. For example 1 = 0.5%, 2 = 1.0%, 3 = 1.5%

Appendix F – SMF type 98 sub type 1 details

- Utilization Information (SMF98_1_UT)
 - Prefixed by SMF98_1_UT_
 - CPUs_Unparked_(CP,zAAP,zIIP) – Number of CP/zAAP/zIIP CPUs that are unparked.
 - Avg_Num_UnparkedVLs_(CP,zAAP,zIIP) – Average number of CP/zAAP/zIIP vertical low CPUs that are unparked
 - Avg_CpuBusy_(CP,zAAP,zIIP) – Average CPU busy percentage for overall CP/zAAP/zIIP
 - Avg_CpuBusy_VH_(CP,zAAP,zIIP) – Average busy percentage for vertical high CP/zAAP/zIIP CPUs
 - Avg_CpuBusy_VM_(CP,zAAP,zIIP) – Average busy percentage for vertical medium CP/zAAP/zIIP CPUs
 - Avg_CpuBusy_VL_(CP,zAAP,zIIP) – Average busy percentage for vertical low CP/zAAP/zIIP CPUs
 - Avg_CoreBusy_(CP,zAAP,zIIP) – Average busy percentage for overall CP/zAAP/zIIP cores
 - Avg_CoreBusy_VH_(CP,zAAP,zIIP) – Average busy percentage for vertical high CP/zAAP/zIIP cores
 - Avg_CoreBusy_VM_(CP,zAAP,zIIP) – Average busy percentage for vertical medium CP/zAAP/zIIP cores
 - Avg_CoreBusy_VL_(CP,zAAP,zIIP) – Average busy percentage for vertical low CP/zAAP/zIIP cores
 - Avg_MTTW_(CP,zAAP,zIIP)_TimeTOD – Average mean time to wait for CP/zIIP/zAAP cores in TOD units
 - Avg_TasksPerWakeUp_(CP,zAAP,zIIP) – Average TCB dispatches per wait for CP/zIIP/zAAP CPUs
 - Avg_SrbsPerWakeUp_(CP,zAAP,zIIP) – Average SRB dispatches per wait for CP/zIIP/zAAP CPUs

Appendix F – SMF type 98 sub type 1 details

- Spin Lock Summary (SMF98_1_SpinLock_Sum) (all spin locks)
 - SMF98_1_SpinLockSum_Count – Number of times a CPU spun for a lock
 - SMF98_1_SpinLockSum_TimeMics – number of microseconds spent spinning
 - SMF98_1_SpinLockSum_AvgTimeMics – Average spin time in microseconds

- Spin Lock Detail (SMF98_1_SpinLock_Det) (top spin locks)
 - SMF98_1_SpinLockDet_ID – Lock ID of the Spin lock
 - SMF98_1_SpinLockDet_Count – Number of times a cpu spun for the lock
 - SMF98_1_SpinLockDet_TimeMics – Number of microseconds spent spinning
 - SMF98_1_SpinLockDet_AvgTimeMics – Average spin time in microseconds

- Suspend Lock Summary (SMF98_1_SuspLock_Sum) (all address spaces)
 - SMF98_1_SuspLock_Sum_Type – Type of suspend lock
 - 1 - SMF, 2 - EQDQ, 3 - LATCH, 4 – CMS, 5 – LOCAL, 6 – CML, 7 - LOCAL + CML
 - SMF98_1_SuspLock_Sum_Stats – Suspend lock contention data mapped by SMF98_1_SuspLock_Info

Appendix F – SMF type 98 sub type 1 details

- Suspend Lock detail (SMF98_1_SuspLock_Det) (top address spaces)
 - This address space was a top holder of CMS lock (SMF, EQDQ, LATCH, CMS)
 - SMF98_1_SuspLock_Det_Type – Type of suspend lock
 - 1 - SMF, 2 - EQDQ, 3 - LATCH, 4 – CMS, 5 – LOCAL, 6 – CML
 - SMF98_1_SuspLock_Det_Pos – Position as a top address space for the lock type (1- first, 2-second...)
 - SMF98_1_SuspLock_Det_AsidInfo – Identification information about the top address space
 - SMF98_1_SuspLock_Det_AsidSum – Suspend lock contention data about the top address space mapped by SMF98_1_SuspLock_Info
- Suspend Lock detail (SMF98_1_LockLocalCML_Det) (top address spaces)
 - This address space was a top holder of a LOCAL or CML lock
 - SMF98_1_LockLocalCML_SuspLockCommon – Common lock contention data mapped by SMF98_1_SuspLock_Det
 - SMF98_1_LockLocalCml_Det_AssocStat – Associated lock statistics (CML data if top LOCAL, LOCAL data if top CML) mapped by SMF98_1_SuspLock_Info
 - SMF98_1_LockLocalCml_Det_All – Sum of local and CML statistics for this address space mapped by SMF98_1_SuspLock_Info
- Suspend Lock contention data (SMF98_1_SuspLock_Info)
 - SMF98_1_SuspLock_Info_Count – Number of times suspended on this lock
 - SMF98_1_SuspLock_Info_Already_Susp – number of suspend requests when already suspended
 - SMF98_1_SuspLock_Info_Cont_TimeTOD – time suspended in TOD format
 - SMF98_1_SuspLock_Info_AvgTimeTOD - average time suspended in TOD format

Appendix F – SMF type 98 sub type 1 details

- Address space information (SMF98_1_AsidInfo)
 - Fields prefixed by SMF98_1_AsidInfo_
 - ASID – Address space ID of the address space
 - DP – Dispatching priority of the address space
 - Flags -
 - Bit 0 – Address space is broken up
 - Seqnum – sequence number of the address space / instance number
 - Jobname – job name
 - AllTaskSRB_(CP,zIIP)_TimeTOD – Total cpu time used by this address space in TOD format by CP/zIIP CPUs
 - AsidInfo_(CP,zIIP)_All_TD1EQ_CPI – Thread density 1 equivalent cycles per 4096 instructions for CP/zIIP CPUs
- Work unit priority bucket data (SMF98_1_PB_Data)
 - Priority bucket = a collection of work aggregated by range of dispatch priorities determined by SMF98_1_ENV_SVT_Priority_Ranges
 - 1 - High = x'FF' – Ranges(1)
 - 2 - Medium = Ranges(1)-1 – Ranges(2)
 - 3 - Low = Ranges (2)-1 – Ranges(3)
 - 4 - Discretionary = Ranges(3)-1 – x'C0'
 - Fields are prefixed by SMF98_1_PB_

Appendix F – SMF type 98 sub type 1 details

- Work unit priority bucket data (SMF98_1_PB_Data)
 - ProcClass – Processor class of this output
 - 0 – CP, 2 – zAAP, 4 – zIIP
 - ContributingWUQs – Number of work unit queues that contributed to a non-zero delta (or a maximum) to the sum. Meaningful only in HIPERDISPATCH=YES mode
 - Each of the following fields are arrays indexed by priority bucket (1-4) for the (high, medium, low and discretionary) work priority ranges
 - MaxQDepth - Maximum number of work units queued in a single sample from a single work unit queue
 - QdepthDelta – Total number of work units queued from all samples for all work unit queues
 - AvgQDepthPerSample - Average queue depth per sample
 - AvgQDepthPerSamplePerWuq – Average queue depth per sample per work unit queue
 - MaxDispDelay – Maximum dispatch delay a work unit experienced in TOD units
 - TotDispDelayDelta – Dispatch delay for all work units in TOD units
 - WorkUnitDispDelta – Number of work units dispatched from all work unit queues
 - AvgDispDelay – Average dispatch delay per work unit in TOD units
 - MajorTimeSliceDelta – Number of work units preempted on a major time slice
 - MinorTimeSliceDelta – Number of work units preempted on a minor time slice

Appendix F – SMF type 98 sub type 1 details

- Consumption data (SMF98_1_Consume)
 - Provides work unit dispatch counts and times
 - For all address spaces and for the address space that spent the most time dispatched
 - For each processor class, priority bucket and sub bucket
 - For all tasks and SRBs, non-enclave tasks, enclave tasks and SRBs, non-enclave preemptible SRBs, and non-preemptible SRBs
 - Provides execution efficiency data (instructions and cycles)
 - For all address spaces and for the address space with the top execution efficiency
 - For each processor class, priority bucket and sub bucket
 - For thread densities 1, 2, and ALL (1 and 2 combined)
 - Provides spin lock data
 - For all address spaces and for the address space that spent the most time spinning
 - For each priority bucket and sub bucket
 - Sub bucket – a collection of address spaces that consume similar CPU time relative to the total CPU time for the processor class as determined by SMF98_1_ENV_SVT_SubBucket_Ranges.
 - FFFF – 0% to 100%
 - 1 – Ranges(1)% to 100%
 - 2 – Ranges(2)% to under Ranges(1)%
 - 3 – Ranges(3)% to under Ranges(2)%
 - 4 – Under Ranges(2)% - Under 0.5%

Appendix F – SMF type 98 sub type 1 details

- Consumption data (SMF98_1_Consume)
 - Prefixed by SMF98_1_Consume_
 - ProcClass – Processor class. Can be one of 0 – CP, 2 – zAAP, 4 – zIIP
 - PriorityBucket – Priority bucket. Can be one of FFFF – All, 1 – High, 2 – Medium, 3 – Low, 4 – Discretionary
 - SubBucket – Sub bucket. Can be FFFF for All or, 1 to 4 with ranges defined by SMF98_1_ENV_SVT_SubBucket_Ranges
 - The following are triplet fields to Consumption sub sections
 - ExEff(Offf,Len,Num) – Execution efficiency sections mapped by SMF98_1_ExEff
 - WorkUnit(Offf,Len,Num) – Work unit sections mapped by SMF98_1_WorkUnit
 - SpinLock(Offf,Len,Num) – Spin lock sections mapped by SMF98_1_AS_SpinLock

Appendix F – SMF type 98 sub type 1 details

- Execution efficiency sections (SMF98_1_ExEff)
 - Prefixed by SMF98_1_ExEff_
 - ThreadDensity – Thread density. Can be one of 0 – All Exeff data (TD=1+TD=2), 1 – TD=1, 2 – TD=2
 - NumAS_Contribute – Number of address spaces that contributed to this analysis
 - NumAS_BrokenUp – Number of address spaces that were broken up
 - Flags – Top fields are from an address space:
 - Top_As_SigWorse – last chosen as most significant, has a CPI that is significantly larger than the previous interval, and consumes a significant portion of the processor classes total CPU time.
 - Top_As_SigCpuHighCpi – has a CPI that is significantly larger than the processor class average and consumes a significant portion of the processor class total CPU time.
 - Total_ExEffInfo – Total instructions and cycles for all address spaces in this analysis. Mapped by SMF98_1_ExEffInfo
 - Top_AsidInfo – Identification information about the top address space. Mapped by SMF98_1_AsidInfo.
 - Top_ExEffInfo – Instructions and cycles executed by the top address space. Mapped by SMF98_1_ExEffInfo
- Execution efficiency information (SMF98_1_ExEffInfo)
 - Prefixed by SMF98_1_ExEffInfo_
 - Instr – Number of instructions executed
 - TD1EQ_Cycle – Number of thread density 1 equivalent cycles executed
 - TD1EQ_IPC – Instructions per 4096 TD=1 equivalent cycles executed
 - TD1EQ_CPI – TD=1 Equivalent cycles per 4096 instructions executed

Appendix F – SMF type 98 sub type 1 details

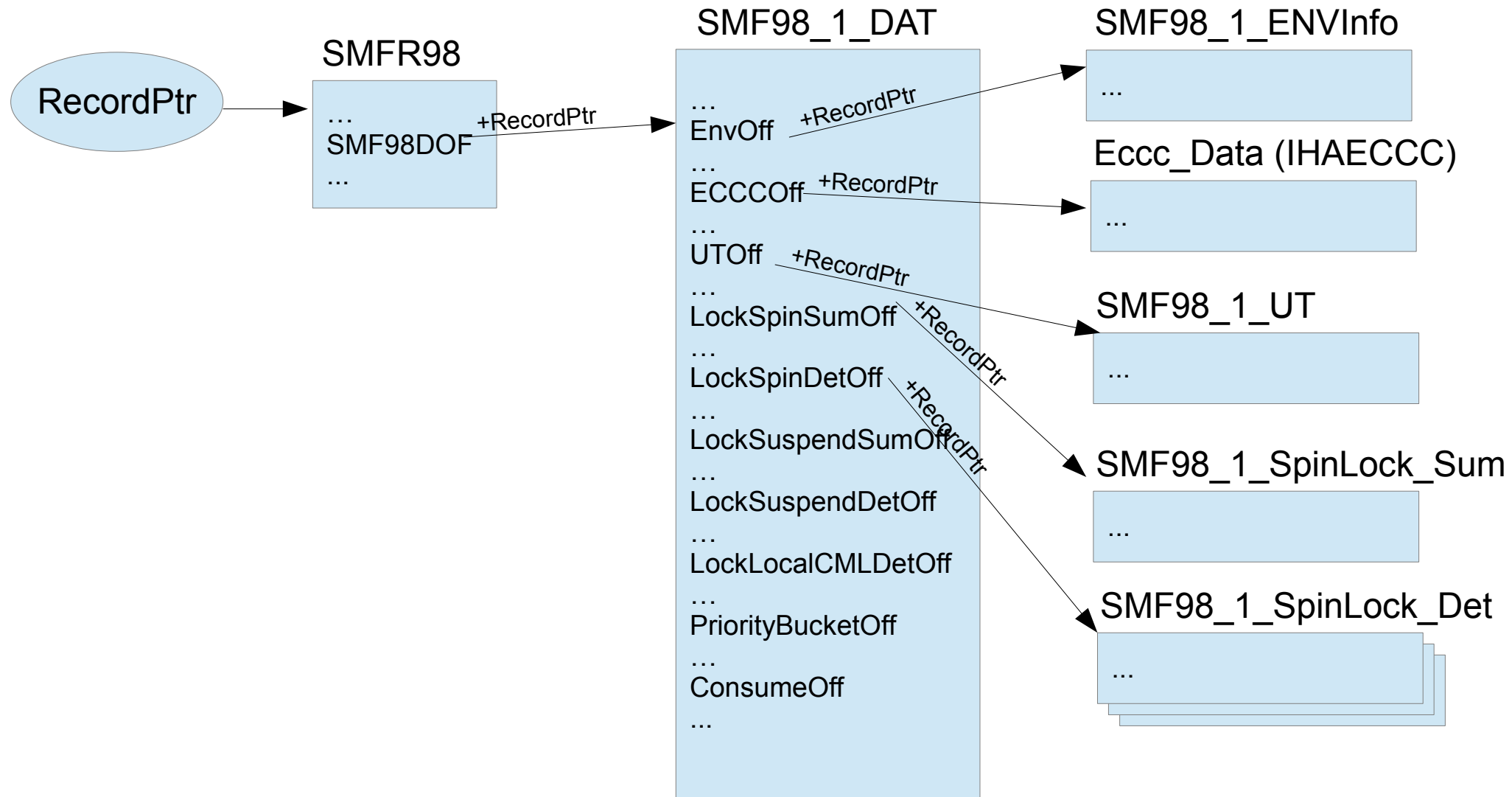
- Work unit sections (SMF98_1_WorkUnit)
 - Prefixed by SMF98_1_WorkUnit_
 - Type – Work unit type. Can be one of: 1 – all tasks and SRBs, 2 -- non-enclave tasks, 3 -- enclave tasks and SRBs, 4 – non-enclave preemptible SRBs, and 5 – non-preemptible SRBs
 - NumAS_Contribute – Number of address spaces that contributed to this analysis
 - NumAS_BrokenUp – Number of address spaces that were broken up
 - Total_DisplInfo – Total time and dispatch count for all address spaces in this analysis (processor class, priority bucket, sub bucket, and work unit type). Mapped by SMF98_1_DisplInfo
 - Top_AsidInfo – Identification information about the address space that spent the most time dispatched. Mapped by SMF98_1_AsidInfo.
 - Top_DisplInfo – Time and dispatch count of the address space identified by Top_AsidInfo. Mapped by SMF98_1_DisplInfo
- Dispatch information (SMF98_1_DisplInfo)
 - Prefixed by SMF98_1_DisplInfo_
 - TimeTOD – Total CPU time dispatched
 - Disps – Number of times dispatched
 - AvgTimeTOD – Average time dispatched

Appendix F – SMF type 98 sub type 1 details

- Address space spin lock sections (SMF98_1_AS_SpinLock)
 - Prefixed by SMF98_1_AS_SpinLock_
 - Although listed in the CP processor class, data is for all processor classes
 - May differ from global spin lock data (at offset SMF98_1_LockSpinSumOF) because
 - Data pulled from different control blocks, one global and one from address spaces
 - Address spaces that were reused during an interval may be ignored
 - NumAS_Contribute – Number of address spaces that contributed to this analysis
 - NumAS_BrokenUp – Number of address spaces that were broken up
 - Total_SpinInfo – Total time and spin count for all address spaces in this analysis (priority bucket, and sub bucket). Mapped by SMF98_1_SpinLock_Sum
 - Top_AsidInfo – Identification information about the address space that spent the most time spinning. Mapped by SMF98_1_AsidInfo.
 - Top_SpinInfo – Time and spin count of the address space identified by Top_AsidInfo. Mapped by SMF98_1_SpinLock_Sum

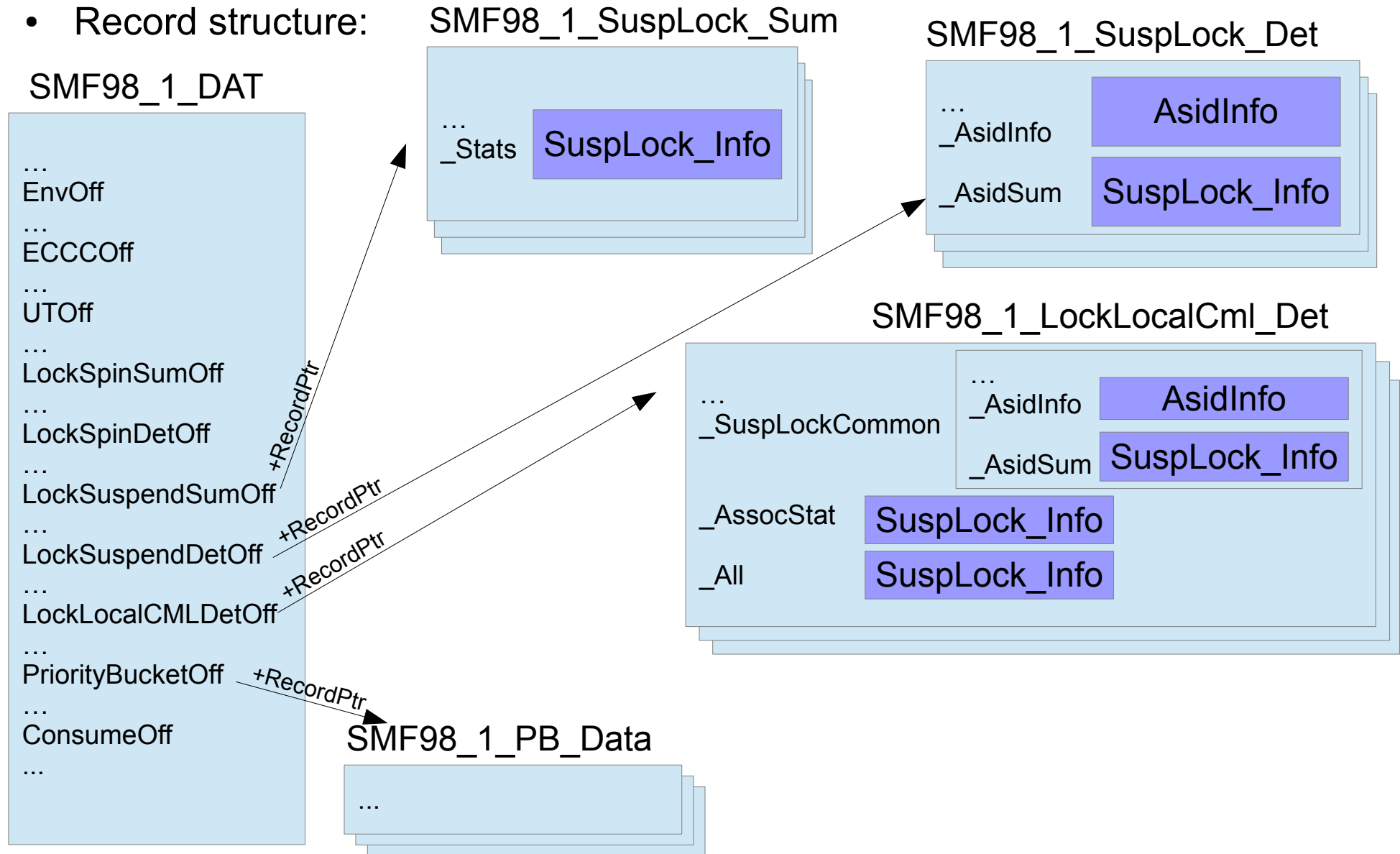
Appendix F – SMF type 98 sub type 1 details

- Record structure:



Appendix F – SMF type 98 sub type 1 details

- Record structure:



Appendix F – SMF type 98 sub type 1 details

- Record structure:

