

IBM Education Assistance for z/OS V2R1

Item: SMF 30 Instruction Counts
Element/Component: BCP SMF



Agenda

- Trademarks
- Presentation Objectives
- Overview
- Usage & Invocation
- Interactions & Dependencies
- Presentation Summary
- Appendix



Trademarks

- See url <http://www.ibm.com/legal/copytrade.shtml> for a list of trademarks.



Presentation Objectives

- Describe how to collect instruction counts in the new SMF 30 Counter Data Section (SMF30CDS mapped by IFASMFR)
- Explore the choices available to activate the basic counter set from the CPU Measurement Facility using Hardware Instrumentation Services (HIS)
- Identify common reasons the basic counter set deactivates and the effects on instruction counts in the SMF 30 Counter Data Section
- Show comparable CPU Times and Instruction Counts



Overview

- Problem Statement / Need Addressed
 - SMF30 CPU Accounting Section fields are based on CPU Time
 - With each machine generation, the meaning of CPU time is becoming less precise
 - Factors like machine utilization and cache (where data sourced, memory footprint of other jobs) are impacting CPU time
- Solution
 - Provide instruction counts (similar to SMF 30 CPU time fields) in new Counter Data Section (SMF30CDS mapped by IFASMFR)
 - Use SMF30CDO/SMF30CDL/SMF30CDN triplet to find SMF30CDS
- Benefit / Value
 - Provides a more consistent metric that is not impacted by the machine and workload to measure how much work is being done
 - IBM is investigating instruction count viability as an alternative to CPU Time for charge back



Usage & Invocation (Collecting SMF 30 Counter Data Section)

- Parmlib member SMFPRMxx supports the following new keywords:
 - SMF30COUNT => Produces SMF 30 Counter Data Section
 - NOSMF30COUNT => Default, no SMF 30 Counter Data Section
- Use SET SMF=xx or SETSMF commands to enable / disable creating the SMF 30 Counter Data Section
- To get instruction counts in Counter Data Section, the system must activate the basic counter set from the CPU Measurement Facility using HIS



Usage & Invocation (Activating Basic Counter Set Using HIS)

- Start the HIS Address Space and do one of the following:
 - Use HIS Profiler to activate basic counters
 - `MODIFY HIS,BEGIN,CTRONLY,CTRSET=(B)`
`MODIFY HIS,END` deactivates basic counter set, causes disruption to SMF 30 instruction counts until basic counter set reactivates
 - Use HISSERV to activate basic counters
 - `HISSERV REQUEST=PROFILE,`
`ACTION=START,`
`EXITRTN==CL8'IEFBR14', /* Ignore any callbacks */`
`NAME==CL8'xxxC4SMF', /* Profiler name. xxx = invoker owned prefix */`
`OUTPROFILETKN=MyToken, /* Output profiler token */`
`EVENT==A(HisEvnTyp_BasicCtrs) /* See HISYSERV macro */`
 - Less chance of disruption (unaffected by HIS profiler), but possible HIS Address Space could go down, a system state change could occur (CPU Speed change, HIS service parameter update)



Usage & Invocation (Disruptions and SMF 30 Instruction Counts)

- If the basic counter set deactivates, a disruption occurs and:
 - System continues processing while instruction counts are unavailable
 - Disruption flag (SMF30_InstCaptDisruption) is set on
 - Instructions during disruption missing from SMF 30 instruction counts
- SMF 30 Counter Data Section Fields:
 - SMF30_Inst_CP_Task
 - SMF30_Inst_CP_NonPreemptSRB
 - SMF30_Inst_CP_PreemptSRB
 - SMF30_Inst_Offload
 - SMF30_Inst_OffloadOnCP
 - SMF30_Inst_CP_Enclave
 - SMF30_Inst_Offload_Enclave
 - SMF30_Inst_OffloadOnCP_Enclave
 - SMF30_Inst_CP_DepEnc
 - SMF30_Inst_Offload_DepEnc
 - SMF30_Inst_OffloadOnCP_DepEnc
 - SMF30_InstCaptDisruption
 - SMF30_InstCaptLimited
(Missing some Enclave and DepEnc instruction counts)



Usage & Invocation (Comparable CPU Times & Instruction Counts)

- Time field SMF30CPT is comparable to the sum of
 - SMF30_Inst_CP_Task
 - SMF30_Inst_CP_PreemptSRB
 - SMF30_Inst_OffloadOnCP
 - SMF30_Inst_CP_Enclave
 - SMF30_Inst_OffloadOnCP_Enclave
 - SMF30_Inst_CP_DepEnc
 - SMF30_Inst_OffloadOnCP_DepEnc
- Time field SMF30ASR is comparable to SMF30_Inst_CP_PreemptSRB
- Time field SMF30CPS is comparable to SMF30_Inst_CP_NonPreemptSRB



Usage & Invocation (Comparable CPU Times & Instruction Counts)

- Time field SMF30ENC is comparable to the sum of
 - SMF30_Inst_CP_Enclave
 - SMF30_Inst_OffloadOnCP_Enclave
- Time field SMF30DET is comparable to the sum of
 - SMF30_Inst_CP_DepEnc
 - SMF30_Inst_OffloadOnCP_DepEnc
- Instruction field SMF30_Inst_Offload is comparable to the sum of
 - SMF30_TIME_ON_IFA
 - SMF30_TIME_ON_SUP



Interactions & Dependencies

- Software Dependencies
 - None
- Hardware Dependencies
 - Enterprise Class or Business Class z10 or later hardware
- Exploiters
 - None



Presentation Summary

- Instruction counts collected in SMF 30 Counter Data Section after:
 - Specifying SMF30COUNT keyword via SETSMF or SET SMF=xx and
 - Activating the CPU measurement Facility basic counter set using HIS



Appendix

- MVS System Commands (MODIFY HIS, SET SMF, SETSMF)
- MVS Assembler Services Reference (HISSERV)
- MVS System Management Facilities (SMF 30)

