

Recommendations for z/OS SMF 98 Records



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IBM recommends always collecting SMF 98.1 for transient performance problem diagnosis

When clients report a transient performance problem, traditional data captured on the SMF interval (e.g. 15 or 30 minutes) may be insufficient to help identify the underlying root cause. IBM strongly recommends SMF 98.1 records be collected on all IBM Z systems running z/OS V2R2 and above. Collecting these records may reduce the time required to diagnose the root cause of a transient performance problem.

z/OS V2R2 and above supports collecting SMF 98.1 records every 5 seconds via the High Frequency Throughput Statistics (HFTS) support. Collecting SMF 98.1 has no observable performance impact and enables transient anomaly detection for system resource consumption and consumers. Furthermore, no private or business data is collected.

Keep in mind the following:

1. IBM lab measurements cannot detect additional CPU cost from collecting HFTS data.
2. HFTS writes one SMF 98.1 record every 5 seconds per LPAR. Each SMF 98.1 record is approximately 32K, which is about 23 MB per hour or 550 MB per day. This translates to 12 records a minute. In a 24-hour period this results in 17,280 records.
3. In very large configurations the data needed to be collected may not fit in a single 32K record. In certain situations there may be two records written per interval and the MB written may be increased.

The SMF 98 documentation states consider writing SMF 98 data to a separate log stream. That guidance is incorrect. **The SMF 98 recording rate does not need to be written to a separate log stream.**

IBM strongly recommends collecting SMF 98.1 even if IBM z/OS Workload Interaction Correlator and IBM z/OS Workload Interaction Navigator are not being used.

To collect HFTS data, do the following:

1. Work towards applying [APAR OA57165 \(GAed in March 2020, PTFs UJ02279 and UJ02280\)](#) which is the IBM z/OS Workload Interaction Correlator support which also contains some HFTS data generation fixes. *If the PTFs are not applied, start collecting HFTS data anyway.*
2. [Collect Hardware Instrumentation Services \(HIS\) counters as IBM recommends.](#) Pairing the SMF98 data with the HIS data allows for the capture of Cycles per Instruction data to better evaluate the CPU profile of the work. Verify the hardware counter sets (e.g. Basic, Problem, Crypto, Extended, and MT diagnostic (when configured for SMT)) are authorized and enabled using the [DISPLAY HIS](#) command as follows:

```
SY1  D HIS
SY1  HIS015I 14.58.34 DISPLAY HIS 275
C
HIS      002E ACTIVE
COMMAND: MODIFY HISPROC,BEGIN,CTR=HDWR,CNTFILE=NO,CTRONLY
```

```

START TIME: 2015/09/03 14:58:10
END TIME: ----/--/-- --:--:--
COMPLETION STATUS: -----
COUNTER VERSION NUMBER 1: 1 COUNTER VERSION NUMBER 2: 4
COMMAND PARAMETER VALUES USED:
  TITLE=
  PATH= .
  DURATION= NOLIMIT
  DATALOSS= IGNORE
  STATECHANGE= SAVE
  SMP= NO
  CNT= YES
  COUNTER SET= BASIC, PROBLEM-STATE, CRYPTO-ACTIVITY, EXTENDED
  CNTINTVAL= 15 (MINUTES)
  CNTFILE= NO
  MAP= NO
HISSERV STATUS: ACTIVE
EVENT
  AUTHORIZED= BASIC, PROBLEM-STATE, CRYPTO-ACTIVITY, EXTENDED, ZOS
  ENABLED= BASIC, PROBLEM-STATE, CRYPTO-ACTIVITY, EXTENDED, MT-DIAGNOSTIC
SAMPLE
  AUTHORIZED= BASIC
  ENABLED= NONE
  BUFCNT= 4 (PAGES/PROCESSOR)
  SAMPFREQ= 800000 (SAMPLES/MINUTE)
PROFILER
  NAME START QUERY SAMPLE S F
  HISPROF 2015/09/03 14:58:10 00:00:00.000012 -----

```

3. Collect SMF 98's by specifying [SMFPRMxx TYPE\(98\)](#) and [HFTSINTVL\(5\)](#)

Summary

When clients report a transient performance problem, traditional data captured on the SMF interval (e.g. 15 or 30 minutes) may provide little help to identify the underlying root cause. HFTS data, captured as SMF 98.1 on a 5 second interval, can be used to pinpoint transient anomalies over a 15-minute interval. It is strongly recommended for IBM z/OS clients to capture the data so it can be analyzed when required.

SMF 98.1 records are consumed by the [IBM z/OS Workload Interaction Correlator](#) and [IBM z/OS Workload Interaction Navigator](#). However, IBM strongly recommends collecting SMF 98.1 even if the Correlator and Navigator are not enabled.

Acronyms used:

ATG: Advanced Technology Group

HFTS: High Frequency Throughput Statistics

CPU: Central processing unit

APAR: Authorized Problem Analysis Report

GA: General Availability

HIS: Hardware Instrumentation Services

MT: MultiThreading

SMT: Simultaneous MultiThreading

SMF: IBM Systems Management Facilities

zOS: IBM Z Operating systems