z/OS 3.2 IBM Education Assistant

Solution Name: Java Usage Instrumentation

Solution Element(s): Supervisor, SMF, Scheduler, WLM, Data Gatherer, SCRT

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Agenda

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Trademarks

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- Additional Trademarks:
  - None

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Objectives

- Learn about new Java and zIIP utilization metrics

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Overview

- Who (Audience)
  - z/OS installations
- What (Solution)
  - Can now gather zIIP and Java consumption data at system, address space, enclave levels
- Wow (Benefit / Value, Need Addressed)
  - Data on Java and zIIP consumption available in SMF records and SCRT reports

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Usage & Invocation

- Data on zIIP and Java utilization is now available at system, address space and enclave levels in SMF records and in SCRT reports
- SMF Records
  - SMF type 30 – capacity and accounting section (SMF30CAS)
  - SMF type 70 subtype 1 – CPU control data section
  - SMF type 99 subtype 1 – Software Licensing (SMF99_S1_SL_MAP)
- SCRT Report
  - New SCRT report section I8 reports, per CPC (zIIP usage data)
- Data is available on
  - Overall zIIP utilization
  - Java utilization on zIIP
  - zIIP eligible CP utilization
  - Java (zIIP eligible) utilization on CP

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SMF type 30 updates

- SMF30CAS mapped in IFASMFR3 has new fields in addition to existing fields

	Overall	Enclave	Dependent Enclave
Overall zIIP	SMF30_TIME_ON_zIIP	SMF30_ENCLAVE_TIME_ON_zIIP	SMF30_DEPENC_TIME_ON_zIIP
zIIP on CP	SMF30_TIME_zIIP_ON_CP	SMF30_ENCLAVE_TIME_zIIP_ON _CP	SMF30_DEPENC_TIME_zIIP_ON_CP
Java on zIIP	**SMF30_Time_Java_On_zIIP**	**SMF30_ENCLAVE_Time_Java_On_zIIP**	**SMF30_DEPENC_Time_Java_On_zIIP**
Java on CP	**SMF30_Time_Java_On_CP**	**SMF30_ENCLAVE_Time_Java_On_CP**	**SMF30_DEPENC_Time_Java_On_CP**

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SMF type 30 – Processor Accounting Section

- New bits, when on indicate the respective field has an invalid value due to a timer value calculation error
- `SMF30T32` (new bit meanings) (offset 85 x55, length 1, type binary)
  - Bit 6 `SMF30_Time_Java_On_zIIP_F`
  - Bit 7 `SMF30_ENCLAVE_Time_Java_On_zIIP_F`
- `SMF30T32` (new flag byte) (offset 86 x56, length 1, type binary)
  - Bits 0-3 reserved
  - Bit 4 `SMF30_DEPENC_Time_Java_On_zIIP_F`
  - Bit 5 `SMF30_Time_Java_On_CP_F`
  - Bit 6 `SMF30_ENCLAVE_Time_Java_On_CP_F`
  - Bit 7 `SMF30_DEPENC_Time_Java_On_CP_F`

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SMF type 30 – Processor Accounting Section (continued)

- New fields at the end of the record
- SMF30CAS_End_V1 (offset 192 xC0, length 0)
  - SMF30CAS_Len_V1 is the length from the start of SMF30CAS to here
- These fields are valid when the respective _F bit is 0b and SMF30CLN ≥ SMF30CAS_Len_V2.
  - SMF30_Time_Java_On_zIIP (offset 192 xC0, length 4, type binary)
    - Time spent in Java work on zIIP in hundredths of a second including enclave time.
  - SMF30_ENCLAVE_Time_Java_On_zIIP (offset 196 xC4, length 4, type binary)
    - Enclave time spent in Java work on zIIP in hundredths of a second.
  - SMF30_DEPENC_Time_Java_On_zIIP (offset 200 xC8, length 4, type binary)
    - Dependent enclave time spent in Java work on zIIP in hundredths of a second.
  - SMF30_Time_Java_On_CP (offset 204 xCC, length 4, type binary)
    - zIIP eligible time spent in Java work on CP in hundredths of a second including enclave time.
  - SMF30_ENCLAVE_Time_Java_On_CP (offset 208 xD0, length 4, type binary)
    - zIIP eligible enclave time spent in Java work on CP in hundredths of a second.
  - SMF30_DEPENC_Time_Java_On_CP (offset 214 xD4, length 4, type binary)
    - zIIP eligible dependent enclave time spent in Java work on CP in hundredths of a second.
- SMF30CAS_End_V2 (offset 216 xD8, length 0)
  - SMF30CAS_Len_V2 is the length from the start of SMF30CAS to here.

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SMF type 70 updates

- New fields for SMF type 70 subtype 1 CPU Control Data section

	Overall
Overall zIIP	**SMF70ZSU_on_zIIP**
zIIP on CP	**SMF70ZSU_on_CP**
Java on zIIP	**SMF70JSU_on_zIIP**
Java on CP	**SMF70JSU_on_CP**

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SMF type 70 – RMF Product Section

- Data availability indicator in SMF70SRL
  - `SMF70SRL` (updated field) (offset 51 x33, length 1, type binary)
    - SMF record level change number. This field enables processing of SMF record level changes in an existing release.
    - SMF type 70 record levels for the current z/OS release:
    - Subtypes Record level
    - 1 X'91' (APAR OA65494)
    - 2 X'8F' (APAR OA59330)
- New equate constant
  - `SMF701_SRL_Instrument_Java` = X’91’

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SMF type 70 subtype 1 – CPU Control Data Section

- New fields mapped after SMF70NVCR
- `SMF70ZSU_on_zIIP` (offset 368 x170, length 8, type binary)
  - Unweighted zIIP-eligible service units spent on zIIP for the entire system.
- `SMF70ZSU_on_CP` (offset 376 x178, length 8, type binary)
  - Unweighted zIIP-eligible service units spent on CP for the entire system.
- `SMF70JSU_on_zIIP` (offset 384 x180, length 8, type binary)
  - Unweighted zIIP-eligible Java service units spent on zIIP for the entire system.
- `SMF70JSU_on_CP` (offset 392 x188, length 8, type binary)
  - Unweighted zIIP-eligible Java service units spent on CP for the entire system.
- `SMF70CPE_LO` (offset 400 x190, length 2, type binary)
  - Low threshold value of OPT parameter CPENABLE.
- `SMF70CPE_HI` (offset 402 x192, length 2, type binary)
  - High threshold value of OPT parameter CPENABLE.

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SMF type 99 updates

- New fields for SMF type 70 subtype 1 CPU Control Data section

	Overall
Overall zIIP	**SMF99_SUs_zIIP**
zIIP on CP	**SMF99_SUs_zIIP_on_CP**
Java on zIIP	**SMF99_SUs_Java_on_zIIP**
Java on CP	**SMF99_SUs_Java_on_CP**

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SMF type 99 subtype 1 – Software Licensing

- New fields in IRASMF99 section SMF99_S1_SL_MAP
  - SMF99_zIIP_Info (offset 184 xB8, length 32 bytes, type binary)
    - System resource manager (SRM) system-wide view of zIIP consumption since IPL or policy change
    - SMF99_SUs_zIIP – (offset 184 xB8, length 8 bytes, type binary)
      - Total unweighted zIIP-eligible service units spent on zIIP
    - SMF99_SUs_zIIP_on_CP – (offset 192 xC0, length 8 bytes, type binary)
      - Total unweighted zIIP-eligible service units spent on CP
    - SMF99_SUs_Java_on_zIIP – (offset 200 xC8, length 8 bytes, type binary)
      - Total unweighted zIIP-eligible Java service units spent on zIIP
    - SMF99_SUs_Java_on_CP – (offset 208 xD0, length 8 bytes, type binary)
      - Total unweighted zIIP-eligible Java service units spent on CP
- New subversion SMF99V2_CURRENT_VER 40 which is stored in SMF99VN2
  - Equate named SMF99V2_VER40 available to verify if the fields are set in the record

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SCRT Updates

- New SCRT report section I8 reports, per CPC
  - Hourly service units for each of:
    - zIIP eligible service units that executed on CP
    - zIIP eligible service units that executed on zIIP
    - Java zIIP eligible service units that executed on CP
    - Java zIIP eligible service units that executed on zIIP
- Available in SCRT 30.1.0

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SCRT Section I8 sample

```
"==I8============================================================"
"zIIP USAGE DATA"
""
"","zIIP on CP","zIIP on zIIP","Java zIIP on CP","Java zIIP on zIIP","CPs","zIIPs","Model","Footnotes"
"2023-12-02T00:00:00","257135965","171493844","200566053","70312476","20","25","3931-720","(x)"
"2023-12-02T01:00:00","522727494","632546768","203378150","121506155","20","25","3931-720",""
"2023-12-02T02:00:00","247870542","824814384","197927179","285671806","20","25","3931-720",""
"2023-12-02T03:00:00","951978871","574180549","494398425","429068041","20","25","3931-720",""
""
"Footnotes:"
"x - Data incomplete for one or more systems during this interval"
""
```

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Interactions & Dependencies

- Software Dependencies
  - Support available in z/OS 3.2 or via PTFs on 3.1 and 2.5
    - APAR OA65055 – z/OS Supervisor, SMF and Scheduler
      - HBB77D0 – UJ94317
      - HBB77E0 – UJ94315
    - APAR OA65426 – z/OS WLM
      - HBB77D0 – UJ94336
      - HBB77E0 – UJ94324
    - APAR OA65494 – Data Gatherer
      - HGR77D0 – UJ94346
      - HGR77E0 – UJ94345
  - SCRT version 30.1.0 or greater is installed
    - Via download for z/OS, Windows, Linux
    - Via PTFs for APAR OA65754 or newer SCRT APAR version, or z/OS 3.2
      - HBB77C0 – UJ94294
      - HBB77D0 – UJ94295
      - HBB77E0 – UJ94291
- Hardware Dependencies
  - None
- Exploiters
  - None

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Upgrade & Coexistence Considerations

- To exploit this solution, all systems in the sysplex must be at the new z/OS level: No
- For SCRT:
  - SCRT section I8 is produced when both these conditions are met
    - SCRT version 30.1.0 or greater is installed
    - z/OS 3.2 or PTFs for OA65055, OA65423, and OA65494 installed
  - When partially applied across an enterprise, SCRT will produce I8 with a footnote indicating data collection is incomplete

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Installation & Configuration

- No changes

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Summary

- New utilization metrics for Java and zIIP are available in
  - SMF type 30 records (for address spaces)
  - SMF type 99 records (for enclaves)
  - SMF type 70 records (for a system level view)
  - SCRT reports (for a CPC level view)

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Publications

- z/OS MVS System Management Facilities (SMF), SA38-0667
  - New and changed fields in SMF type 30 record
  - New and changed fields in SMF type 70 record
  - New and changed fields in SMF type 99 record
- SCRT 30.1 Using the Sub-Capacity Reporting Tool, SC23-6845

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