Identifying SIIS Inefficiency by using CPU MF Counters

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Identifying Store Into Instruction Stream (SIIS) Inefficiency by Using CPU MF Counters

What is SIIS ?

- What is “Store Into Instruction Stream” (SIIS) ?
  - –Modern Processors require codependence between their design and the code it expects to execute including the following characteristics:
    - Separating data and instructions, localizing storage references, no self modifying code
    - Cache line today is 256 bytes
  - –Most modern compilers have been written with the microprocessor architecture in mind
  - –“Old” (usually Assembler) programs with poor program practices continue to run
  - –Updating these “SIIS” programs can result in significant CPU reductions

- DFSort APAR PI58848 corrects a SIIS programming error

CPU MF SIIS Indicator can help Identify potential SIIS

- CPU MF can be used to help identify potential SIIS timeframes
  - Based on % of certain I Writes / D Writes sourced
  - LPAR view, identifies when it happens, not who is causing it
    - Identify the program(s) running in the time period, e.g. via zBNA Top Programs
    - Use a hot spot analyzer to find the issue
    - Remediate the source code to correct the issue

Processor	SIIS Indicator %	Description
zEC12 / zBC12	E130 / B4 * 100%	D Writes sourced with L2 intervention / D Writes
z13 / z13s	E163 / B2 * 100%	I Writes sourced with L3 intervention / I Writes
z14 / ZR1	E164 / B2 * 100%	I Writes sourced with L3 intervention / I Writes
z15	E164 / B2 * 100%	I Writes sourced with L3 intervention / I Writes
z16	E170 / B2 * 100%	I Writes sourced with L2 intervention / I Writes
z17	E170 / B2 * 100%	I Writes sourced with L2 intervention / I Writes

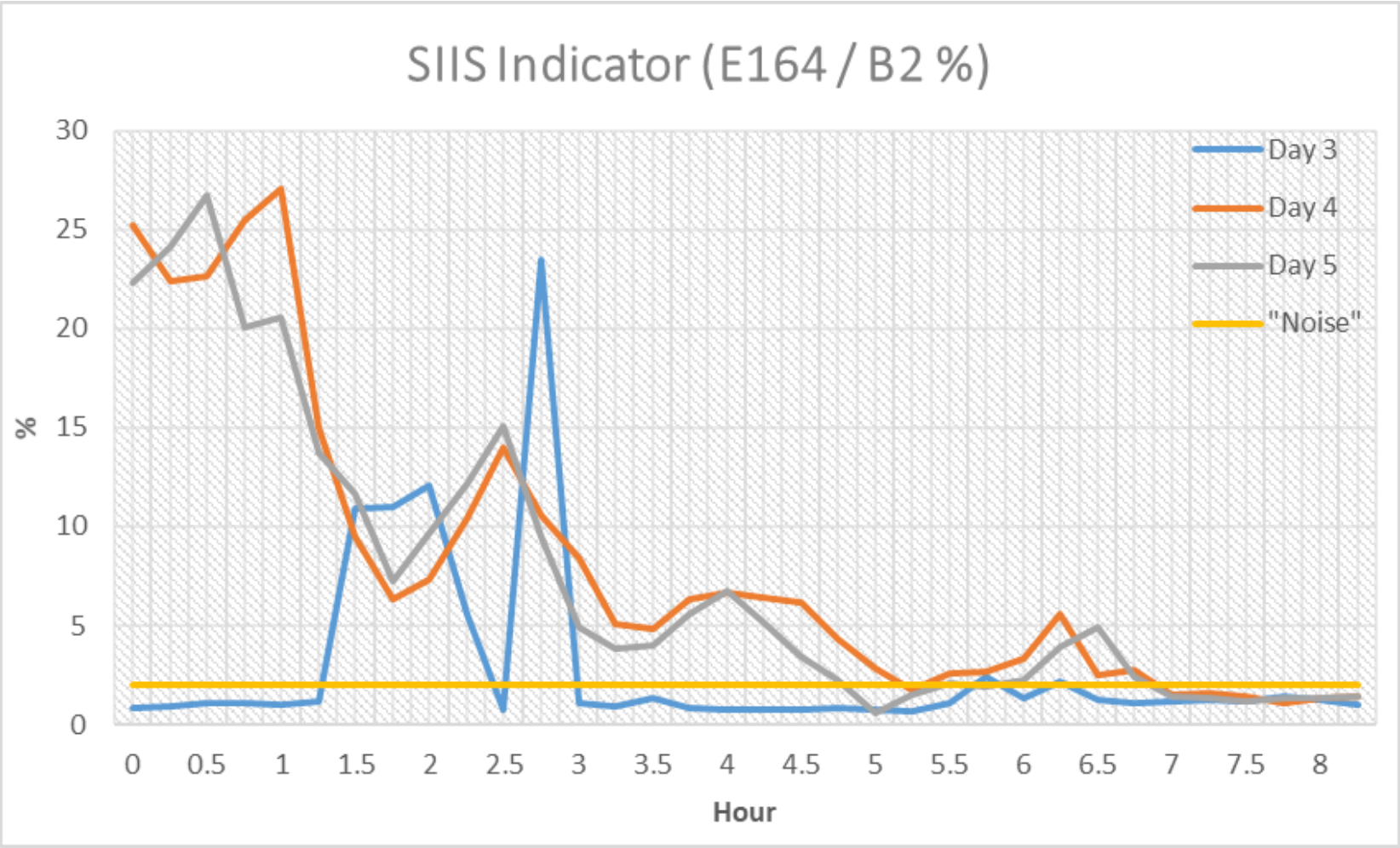
SIIS Indicator and Actions

- **Based on the SIIS Indicator %, the following actions are recommended**

SIIS Description	SIIS Indicator %	Action
Noise – it will never be 0%	< 2%	None
Minimal SIIS impact	2% < 5%	Low Priority but potential MSU savings
Noteworthy SIIS impact	5% < 10%	Medium Priority – Investigate and Remediate
Considerable SIIS impact	>= 10%	Top Priority – Investigate and Remediate

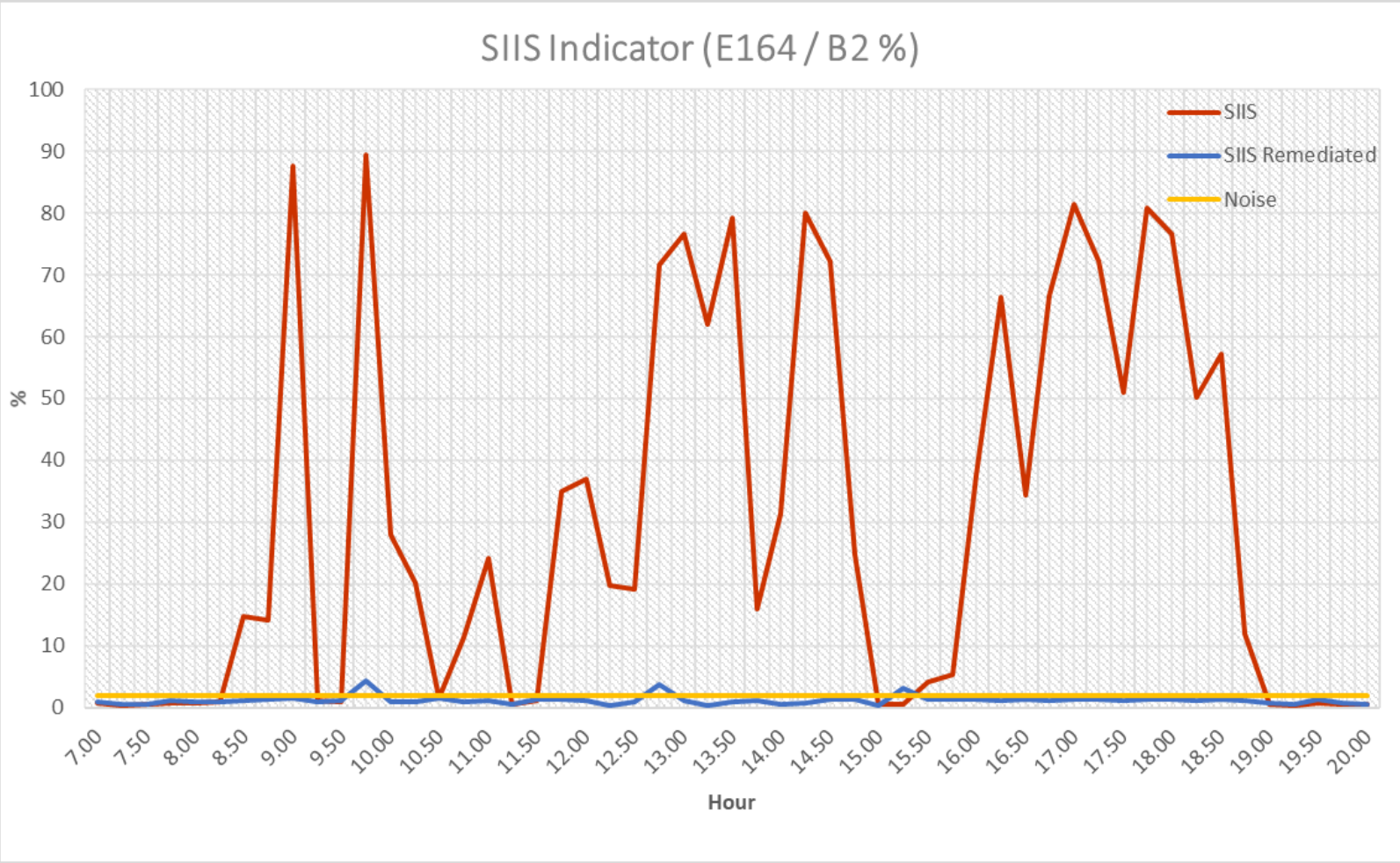
SIIS Customer Experience 1

- Customer z14 experience: SIIS activity detected consistently in Batch Window across 3 days



SIIS Customer Experience 2

- Customer z14 experience: Each Line represents the SIIS indicator for a day with “SIIS” and a day after the code was remediated “SIIS Remediated”
- Overall the customer saved ~3000 CPU seconds (top 15 jobs)



Summary

- Use CPU Counters “SIIS Indicator” to identify potential timeframes when inefficient “SIIS” programs may be running
- Look for repeating and high impact timeframes
  - Drill down to identify potential Jobs / Programs
  - Use Hot Spot analyzer / Examine / Remediate Source Code
  - Reduce CPU time and elapsed time
- With Tailored Pricing, all MIPS count
- 2006 TechDoc: IBM System z and eserver zSeries Processor Performance: Processor Design Considerations
  https://www.ibm.com/support/pages/system/files/inline-files/istream_flash_062606_v4.pdf

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Notes:
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