How to Get More MIPS Out of Your z13

April 28, 2016
Noon – Central Time
We are inspired by creating intelligence that illuminates the risks hiding inside your IT infrastructure.

“Any sufficiently advanced technology is indistinguishable from magic”

Arthur C. Clarke, 1962
Better Intelligence Enables Better Optimization
Agenda

You don’t know what you don’t know

You can influence the MIPS rate

Know the Metrics

Lower RNI = Lower software bill
You Don’t Know What You Don’t Know… But You Should Know

CPU Measurement Facility records have been around for years (SMF type 113). How you use them?

The z13 MIPS rate is more sensitive to cache effectiveness (RNI) than before z13 needs (and has) more cache

You can make smart choices when you order a new processor and when you assign your LPARs to machines.

z/OS features can help you to get more MIPS out of your processors, and how you can optimize your LPARs to squeeze even more MIPS out of them, too.
Z13 CPU Cache

- Metrics are available to show instruction efficiency
- When migrating to the z13, you need to use CPU cache efficiently
IntelliMagic Vision – Processor Hardware

Everything below the blue line is “tunable” to improve cache efficiency.
HiperDispatch

• Why?
  – Keep work dispatched close to physical processors in order to use processor cache optimally
  – z13 processors run the most efficient when physical processors are dedicated to an LPAR
  – The original focus was to Park processors efficiently. Right now, the core placement is at least as important

• How?
  – z/OS and PR/SM align work to logical processors (LPs) & align LPs to physical CPs
  – HiperDispatch knows about the z13 architecture, and will work to place the logical processors for one LPAR on the same chip if at all possible.
Logical CP Definitions

Vertical High CP
1 to 1 relationship with a physical CP

Vertical Medium CP
At least 50% share of a physical CP

Vertical Low CP
MIPS Rate Can be Tuned
Know the Metrics
Know the Metrics

**Relative Nest Intensity** – How deep into the shared cache and memory the processor must go to access the data.

Lower is Better
Know the Metrics

**Cycles per Instruction (CPI)** – This metric is another indicator of how efficient the processor is running. This metric would be used to identify and validate tuning opportunities and changes.
Know the Metrics

Understanding lifetime of data in cache helps you tune your processors

Cache Data Lifetime for all processors
for all Processor Hardware Counters by Processor Complex serial

- Estimated Lifetime in L1 cache (msec)
- Estimated Lifetime in L2 cache (msec)
- Estimated Lifetime in L3 cache (msec)
- Estimated Lifetime in L4 cache (msec)
Knowing the Metrics Allows You to Tune Your z13
Tuning Knobs

- Where possible, make your CP’s “vertical high”
- Do not over-initiate
- Consider combining LPARs or changing LPAR weights
- Sub-Capacity models will still get the full benefit of CPU cache
Level 1 Cache Miss (%) [rating: 0.08] for all Processor Hardware Counters by Processor Complex serial
Rating based on Processor Hardware Counters data using System Thresholds
**Tuning Dashboard for z13 Processors [rating: 0.34]**

for all Processor Hardware Counters by System

Rating based on Processor Hardware Counters data using System Thresholds

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<thead>
<tr>
<th>Level 1 Cache Mjs</th>
<th>L3 off-drawer time</th>
<th>L4 off-drawer time</th>
<th>TLB Data Miss contribution</th>
<th>TLB Miss CPU Time</th>
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With Knowledge Comes Great Responsibility...
And Savings

- Identify Tuning Opportunities
- Increase MIPS Rate
- Run More Efficiently
- Savings
User Experience - USAA

• zEC12-711 -> z13 711
  L1 cache miss down from 4.47 to 3.81% because of larger L1 caches
  RNI up from 1.41 to 1.56 because of higher cost in case of L1 cache miss -> MIPS down

• Upgrades within z13 range:
  711 -> 716 RNI down from 1.56 to 1.26

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<td>RNI</td>
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User Experience - USAA

- Conclusion:
  Better MIPS rate leads to better software cost

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<td>1.35 0.87 0.71</td>
<td>1.24 1.16 0.73</td>
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Get an Outside Perspective

- IntelliMagic experts can review your data to gauge potential potential
- Simple Process:
  - Use “RMF Pack” to FTP data to IntelliMagic Vision as a Service Platform
  - IntelliMagic experts review data
  - Presentation of results to your team
Thank you

We will email you the recording of today’s webinar.

Contact us with any questions or feedback:

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Email: sales@intellimagic.com