HS06 performance per watt and transition to SL6

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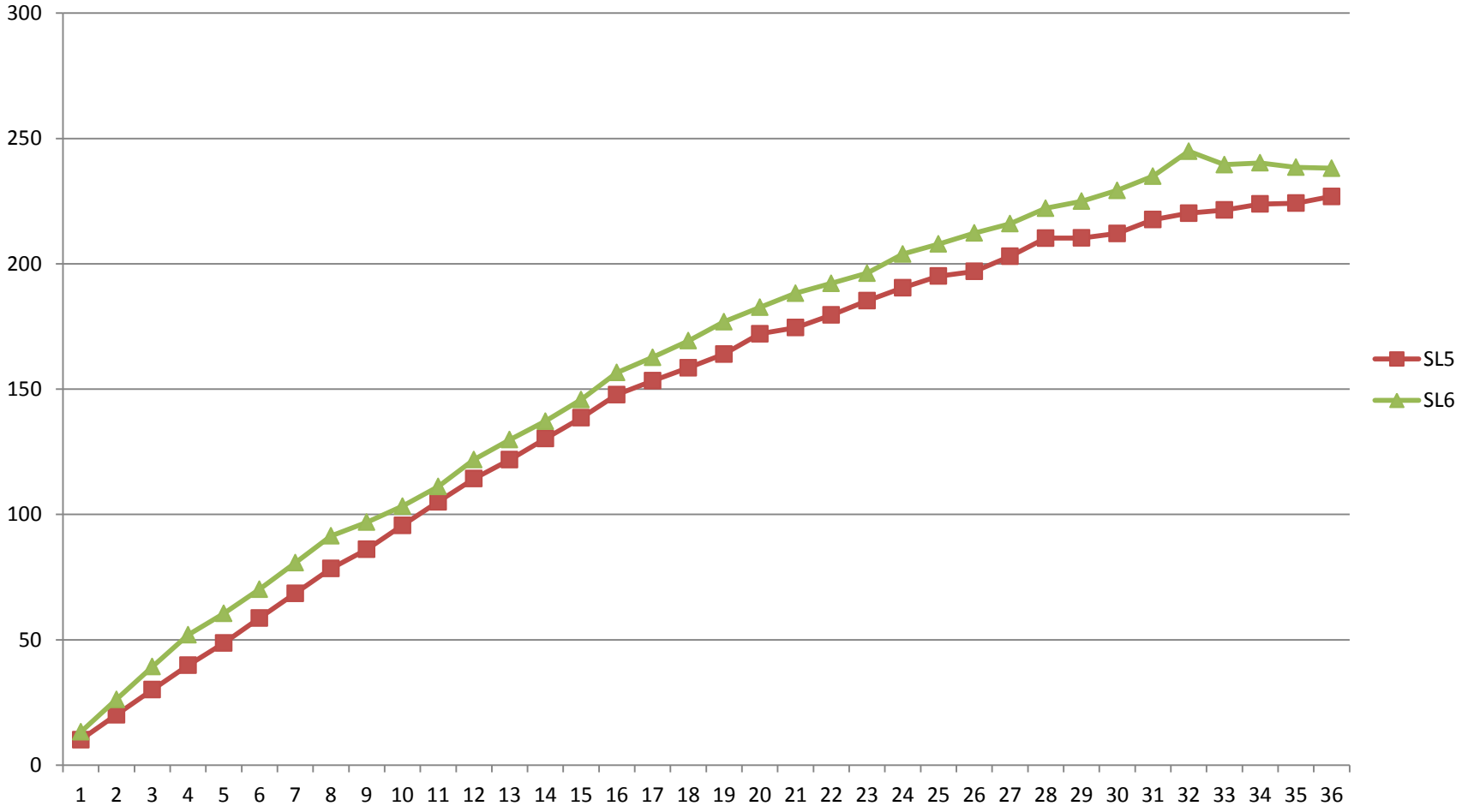
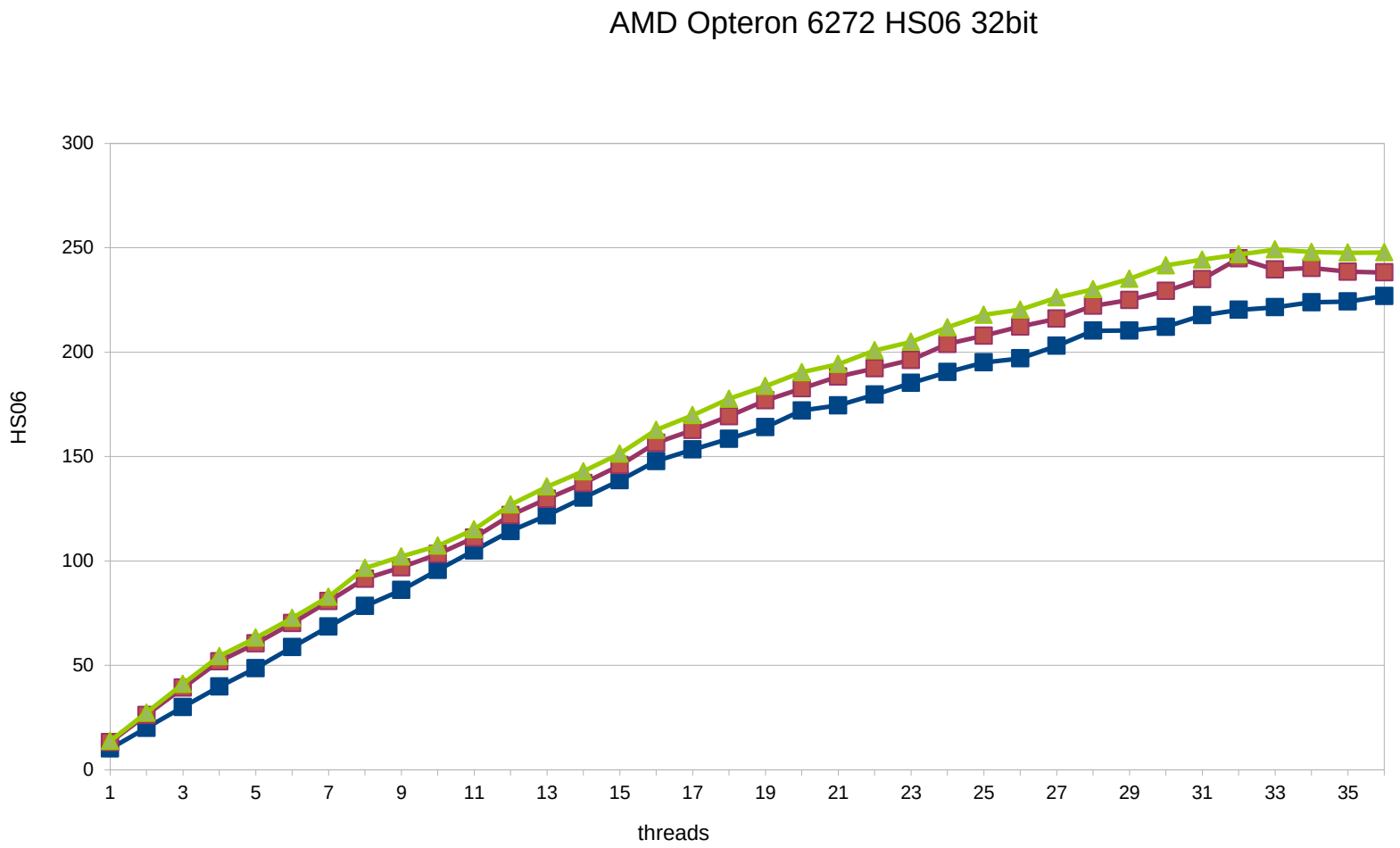
The SL6 transition

- Rumors of sizeable differences of HS06 across Scientific Linux distribution on same hardware
- I made detailed measurements on AMD Opteron 6272
  - SL5 with gcc 4.1.2
  - SL6 with gcc 4.4.0
  - SL6 with last compiler available at that time 4.7.0
- End of August
  - We started collecting SL6 results from WLCG sites
  - Alessandra Forti asked to send results to me and Manfred
  - Manfred created a new page on the HEPiX site.

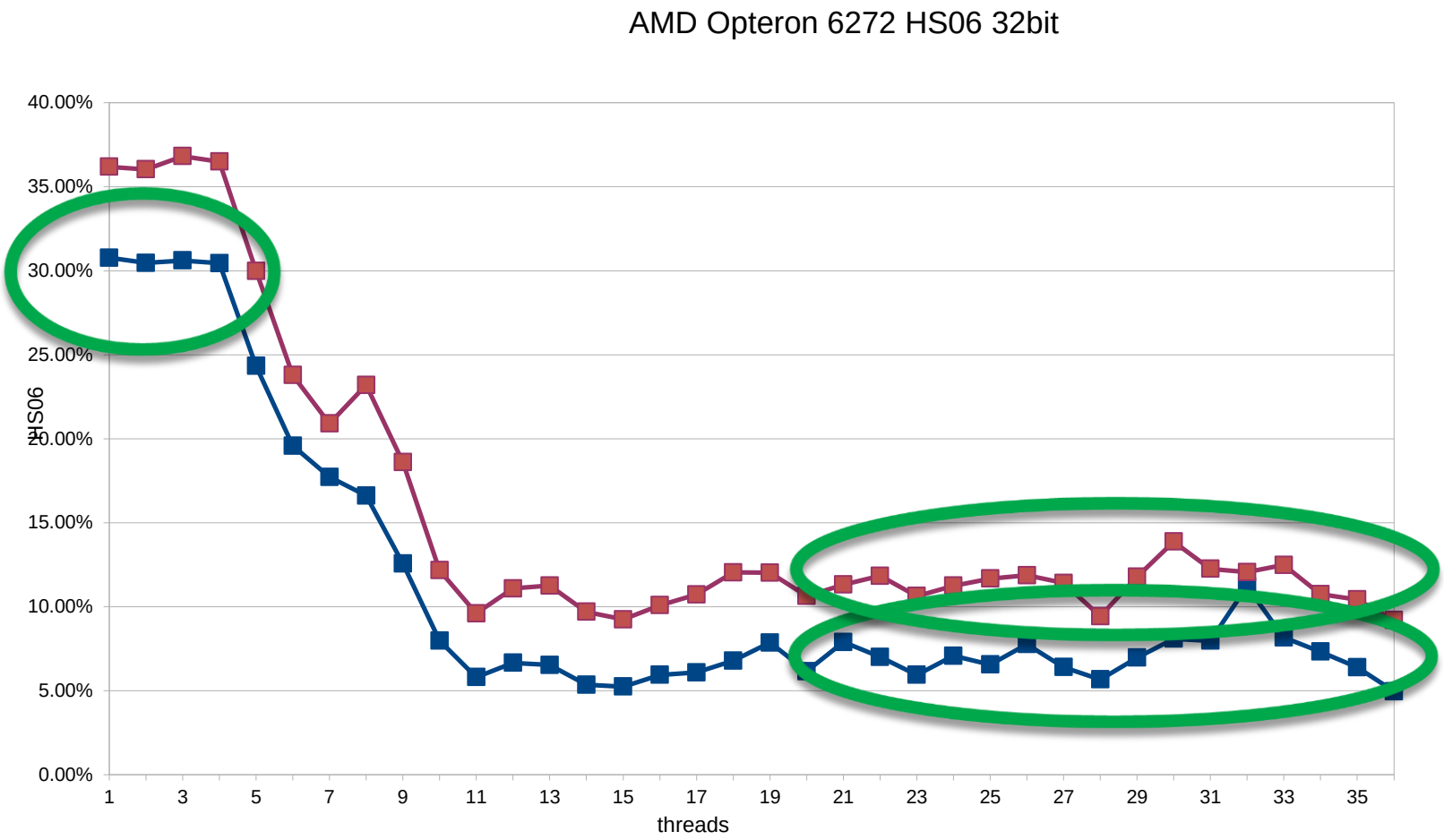
SL6 performance vs. SL5



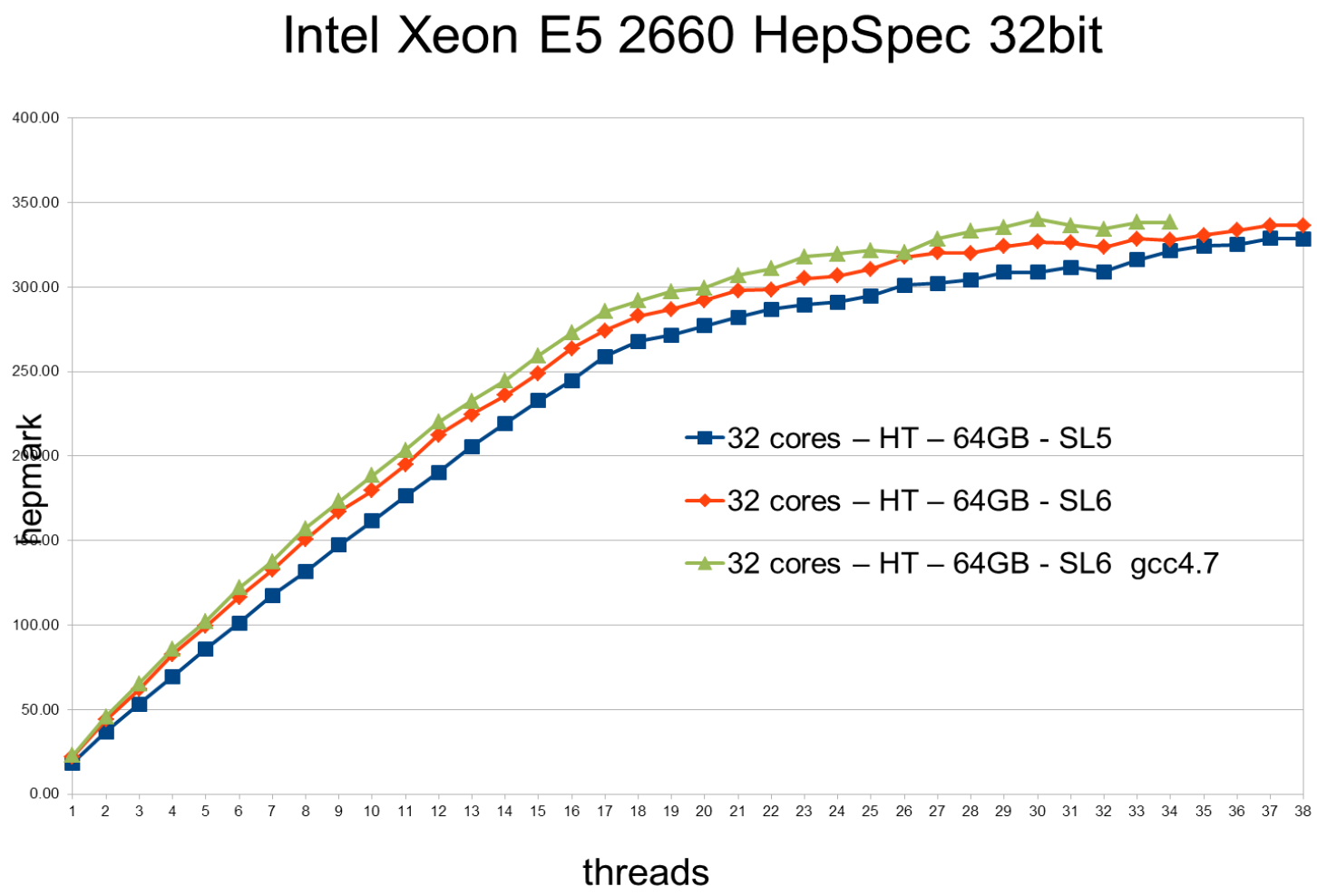
SL6+gcc4.7 vs. SL6 vs. SL5



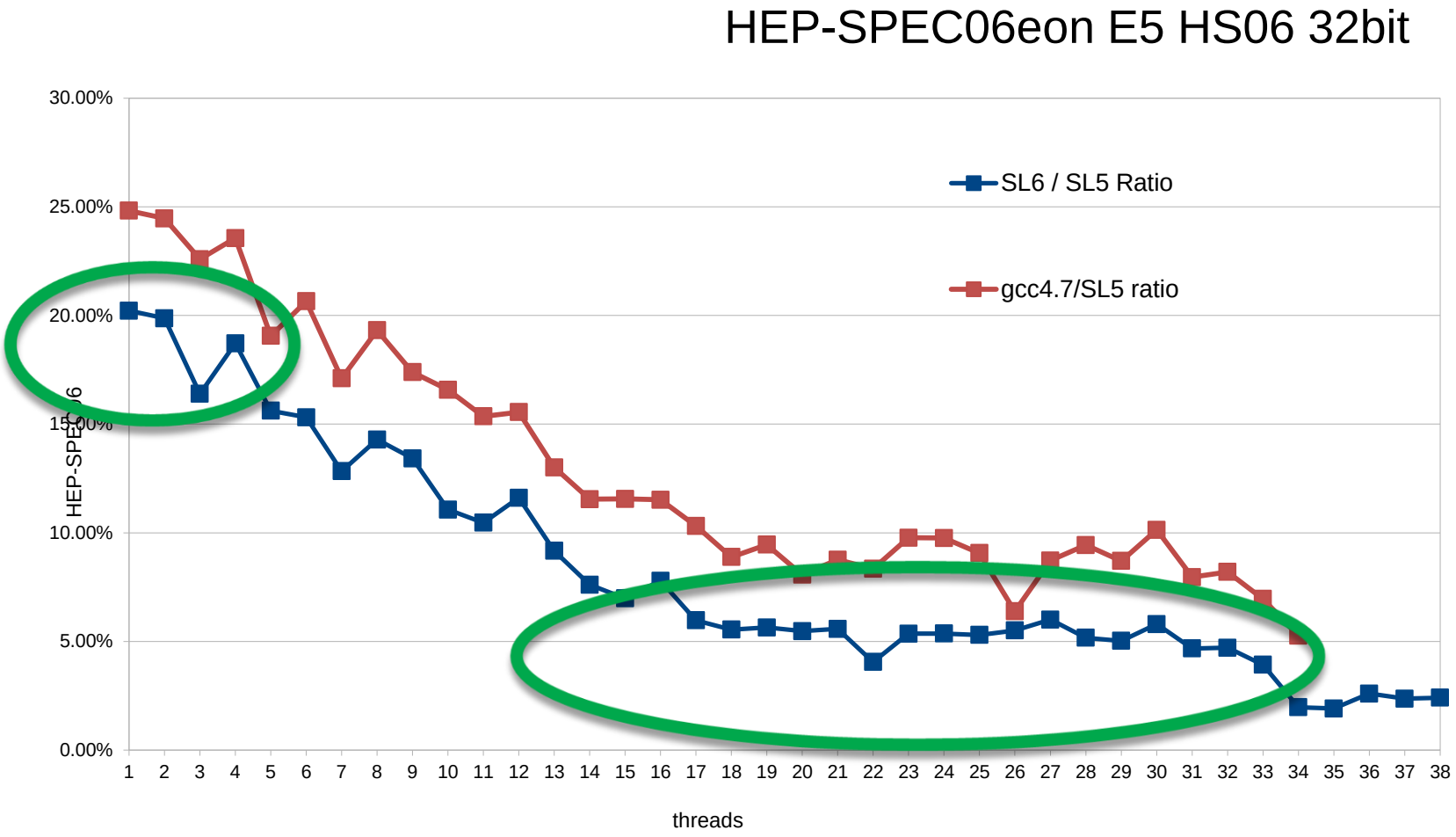
SL6+gcc4.7 and SL6 gcc 4.4 Diff with SL5 and gcc 4.1.2



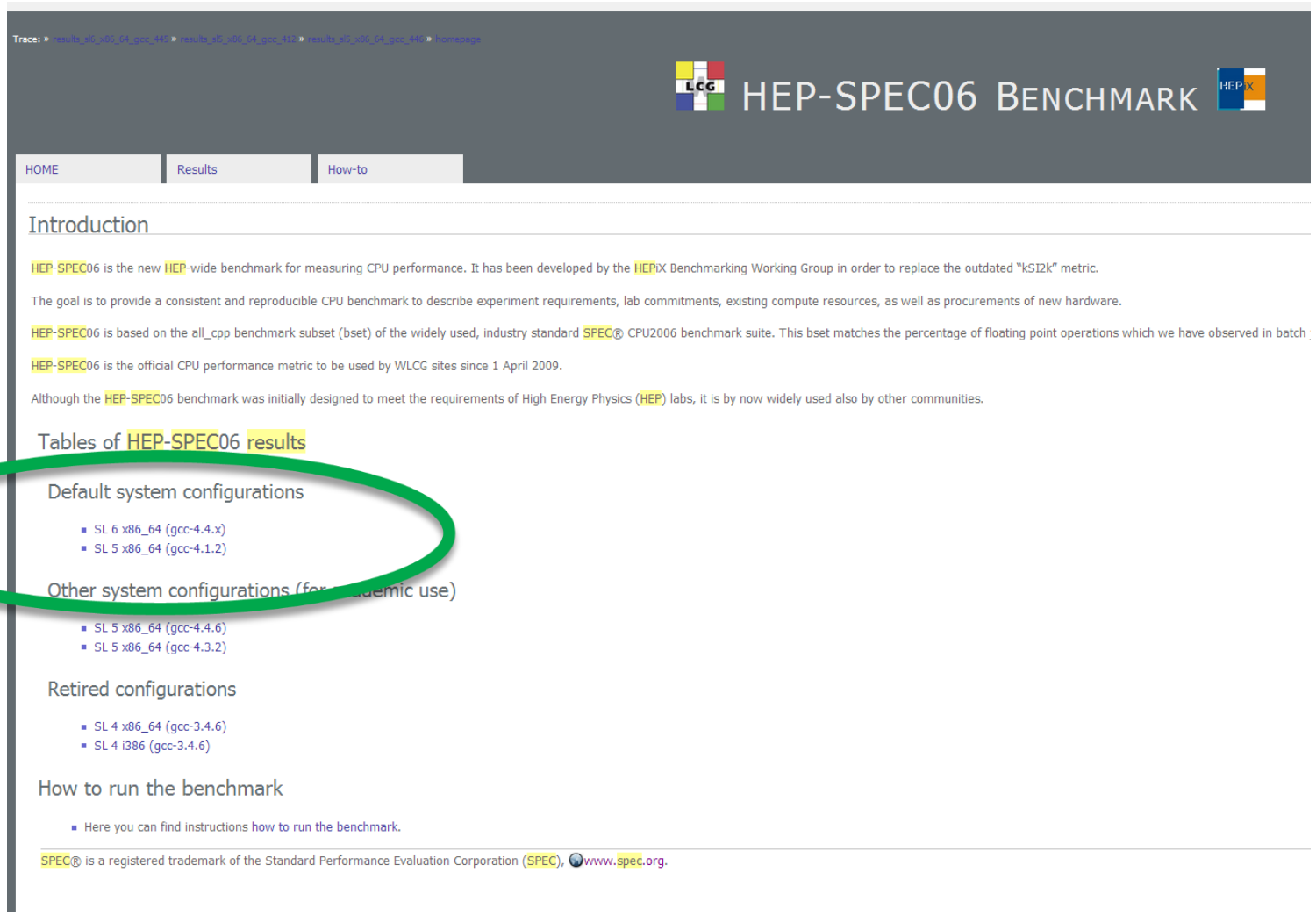
Let's do it on Intel Xeon



Differences SL6 gcc4.7 and SL6 gcc4.4 wrt SL5 gcc4.1



HEP-SPEC06 site maintained mainly by Manfred



Trace: » homepage

HEP-SPEC06 BENCHMARK

HOME | Results | How-to

Introduction

HEP-SPEC06 is the new HEP-wide benchmark for measuring CPU performance. It has been developed by the HEPiX Benchmarking Working Group in order to replace the outdated "kSI2k" metric.

The goal is to provide a consistent and reproducible CPU benchmark to describe experiment requirements, lab commitments, existing compute resources, as well as procurements of new hardware.

HEP-SPEC06 is based on the all_cpp benchmark subset (bset) of the widely used, industry standard SPEC® CPU2006 benchmark suite. This bset matches the percentage of floating point operations which we have observed in batch

HEP-SPEC06 is the official CPU performance metric to be used by WLCG sites since 1 April 2009.

Although the HEP-SPEC06 benchmark was initially designed to meet the requirements of High Energy Physics (HEP) labs, it is by now widely used also by other communities.

Tables of HEP-SPEC06 results

Default system configurations

- SL 6 x86_64 (gcc-4.4.x)
- SL 5 x86_64 (gcc-4.1.2)

Other system configurations (for demic use)

- SL 5 x86_64 (gcc-4.4.6)
- SL 5 x86_64 (gcc-4.3.2)

Retired configurations

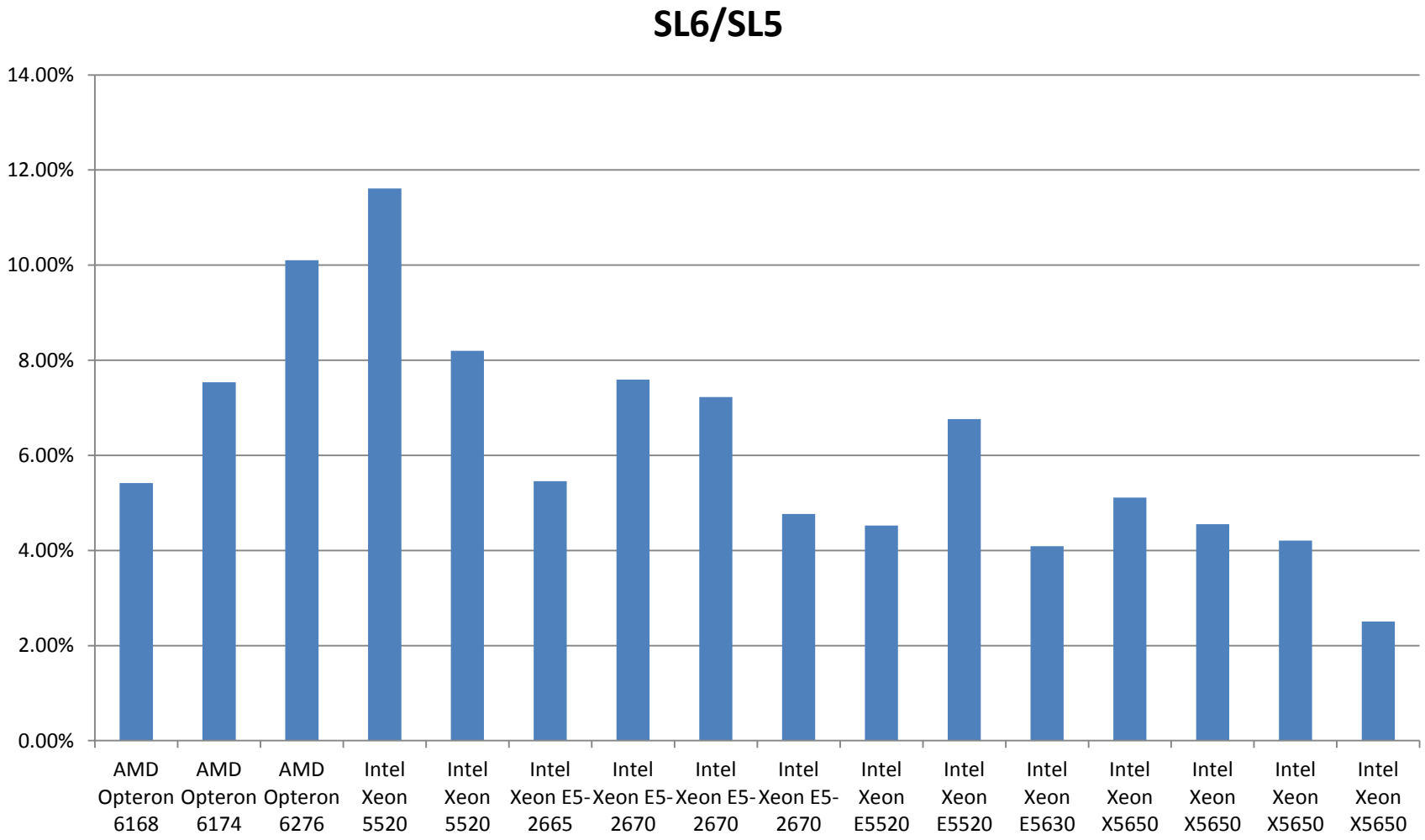
- SL 4 x86_64 (gcc-3.4.6)
- SL 4 i386 (gcc-3.4.6)

How to run the benchmark

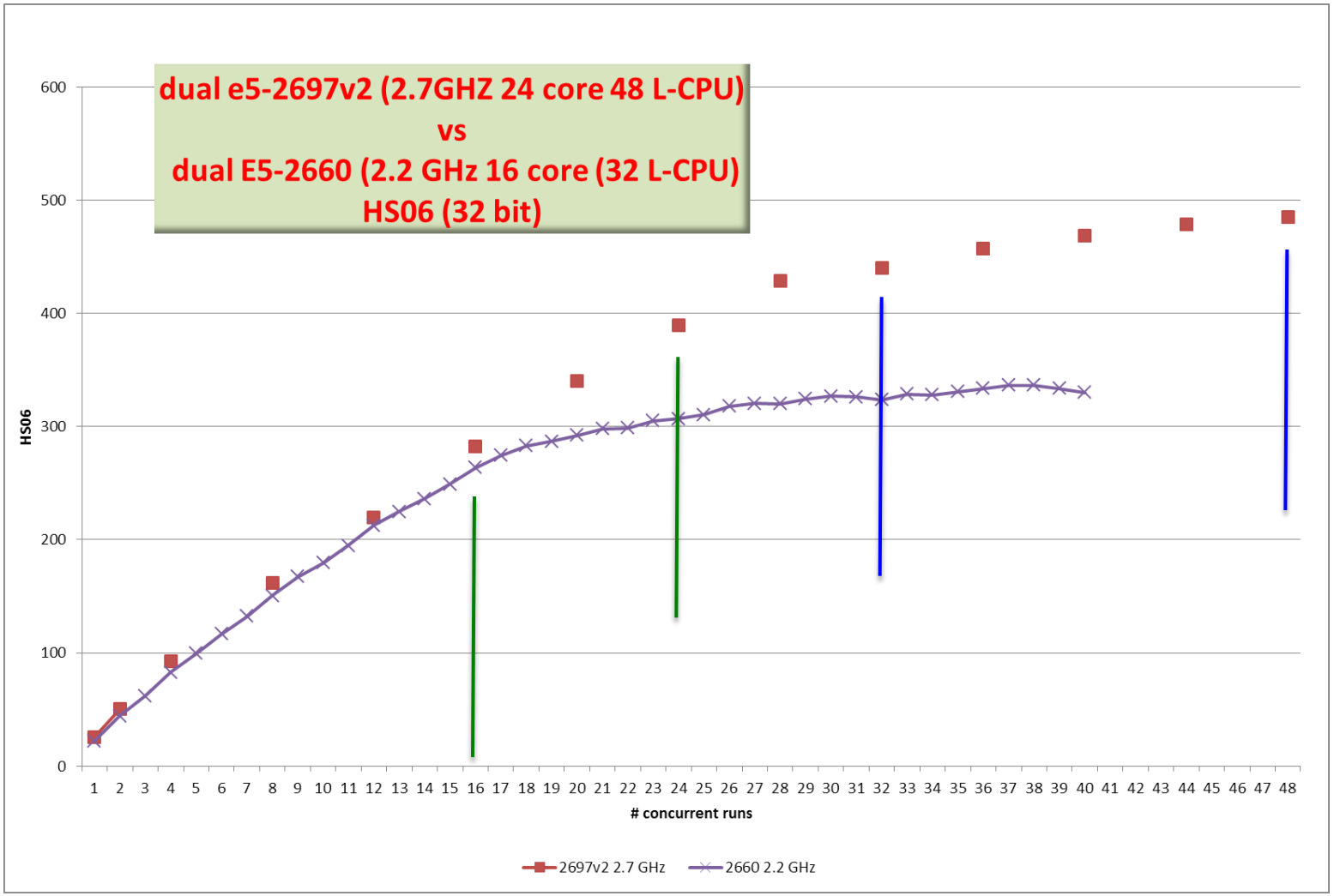
- Here you can find instructions how to run the benchmark.

SPEC® is a registered trademark of the Standard Performance Evaluation Corporation (SPEC), www.spec.org.

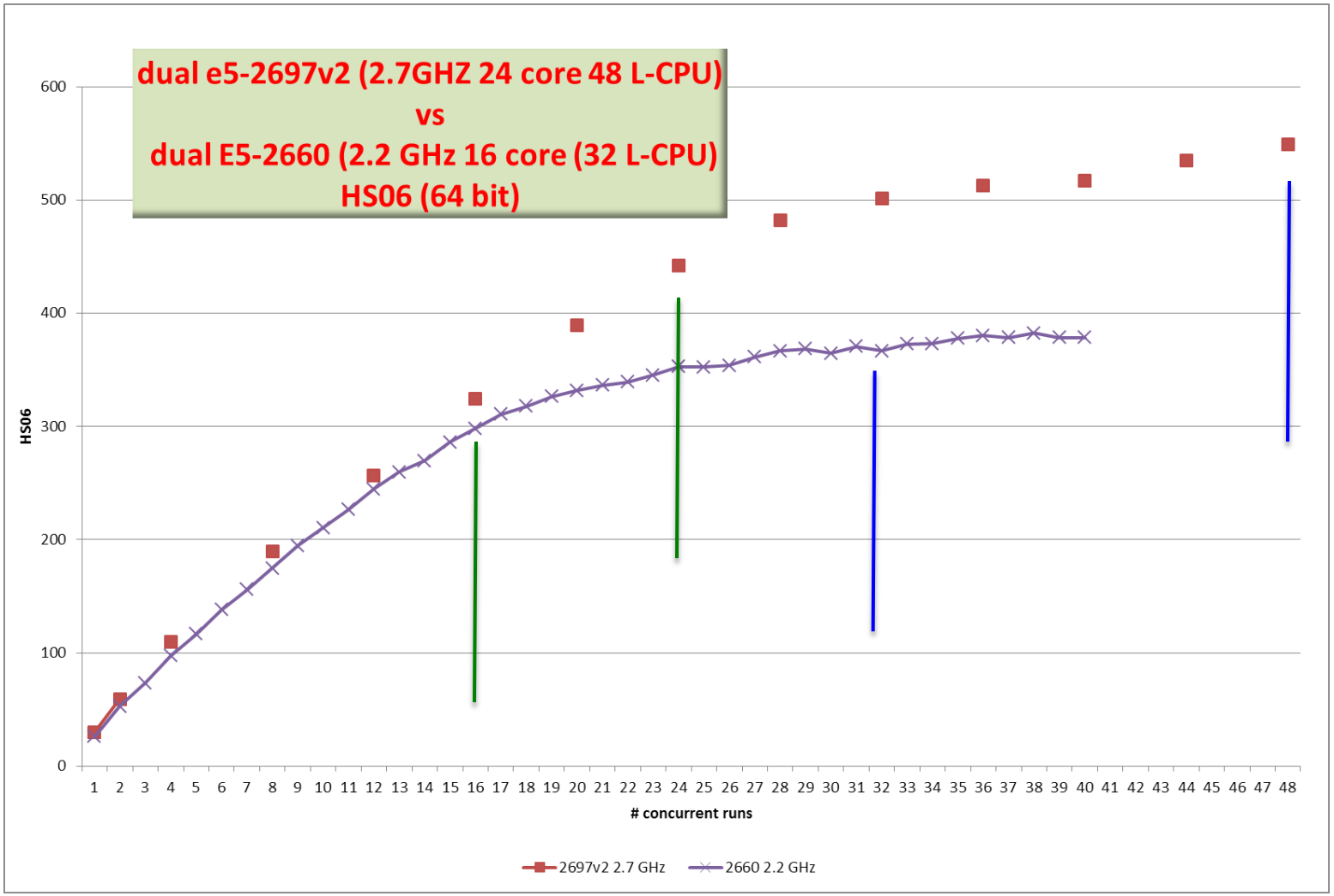
SL6 vs. SL5 from pair of similar worker node



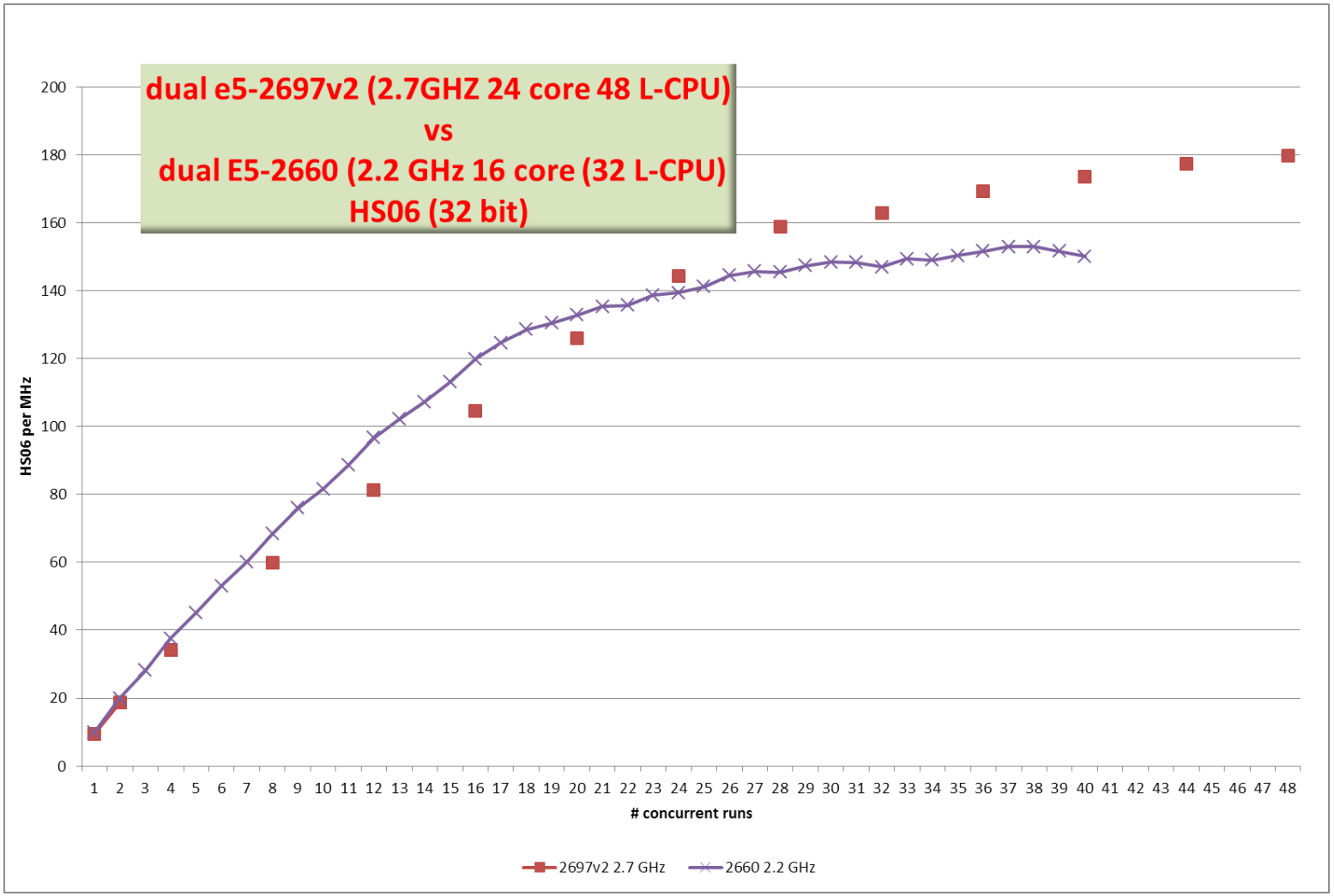
Ivy Bridge vs. Sandy Bridge



Ivy Bridge vs. Sandy Bridge 64 bit



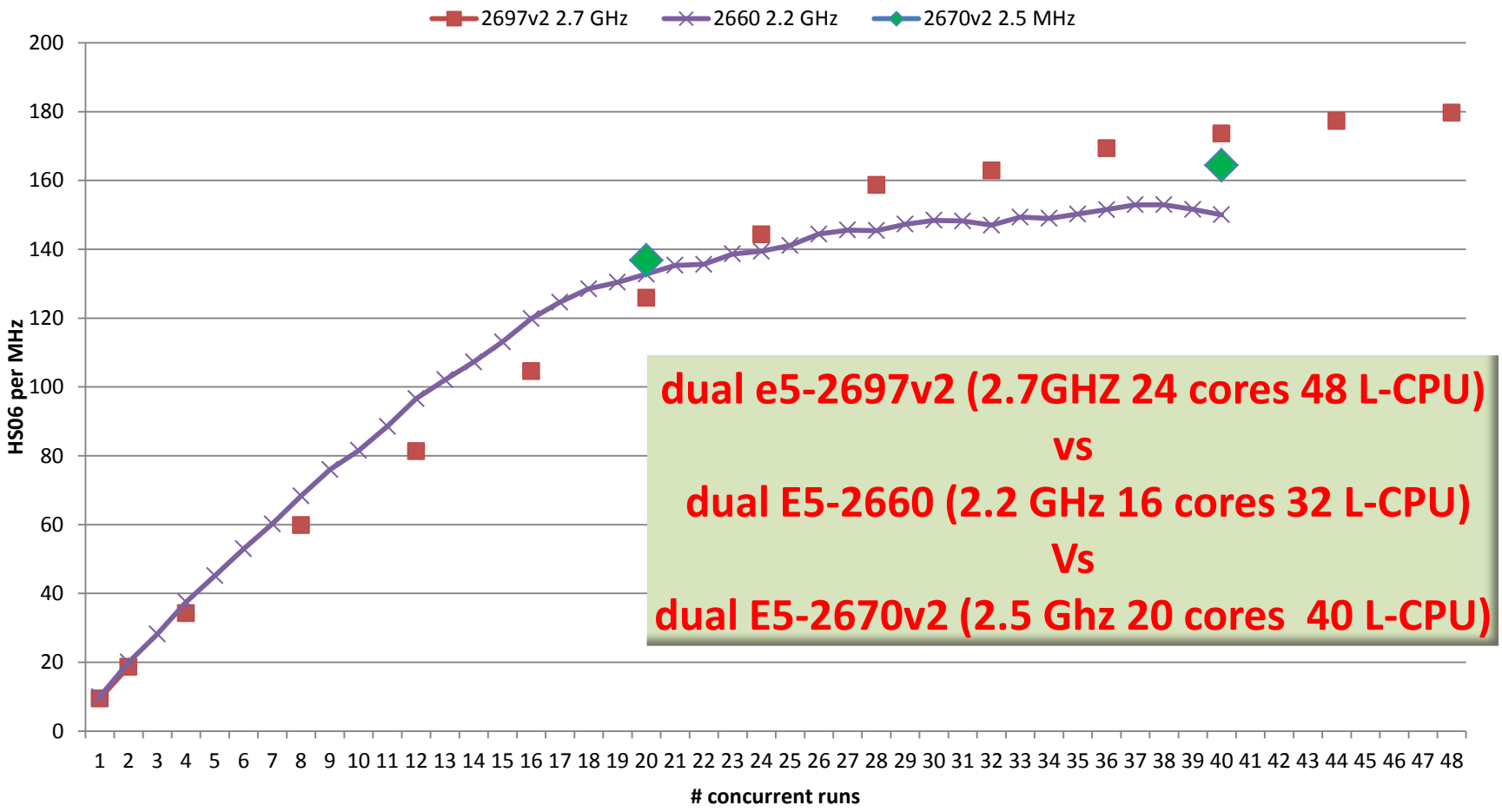
Performances per clock



Mail from Manfred on Friday 25th

- DELL C6620 (2U, 4nodes)
- Each node
  - 2 x Intel Xeon E5-2670 v2 – 10 cores (20 Logical cpu) @ 2.5 GHz
  - 64 GB (8x8 GB PC3-14900)
  - 6x900 GB SAS
- 342 HS06 (20 copies) - 411 HS06 (40 copies)

Adding Manfred new beast



A new architecture: ARM

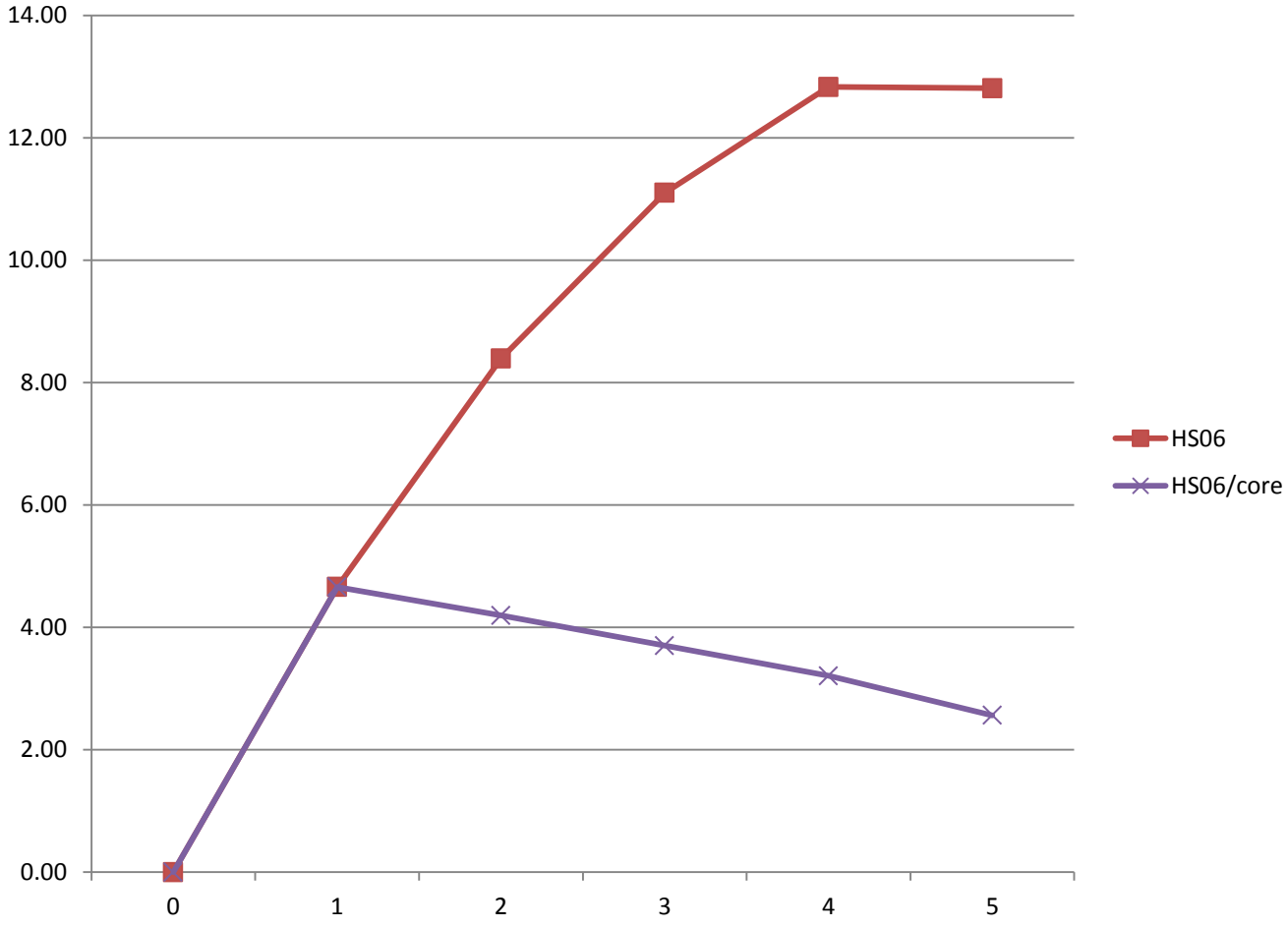
A new architecture

- Exynos4412 Prime CPU
- 1.7 GHz Cortex -A9 quad core
- 2GB LP-DDR2 memory (512MB/core)
- $89 each
- Fedora 18, armV7, gcc4.8, ODROID kernel

Courtesy of Peter Elmer, Princeton Univ.

Type	Cores	Power	Events/min /core	Events/min /Watt
Exynos4412 Prime @ 1.704GHz	4	4W?	1.14	1.14
Xeon L5520 @ 2.27GHz	2x4	120W?	3.50	0.23
Xeon E5-2630L @ 2.0GHz	2x6	190W?	3.33	0.21

HS06 measured on ARM

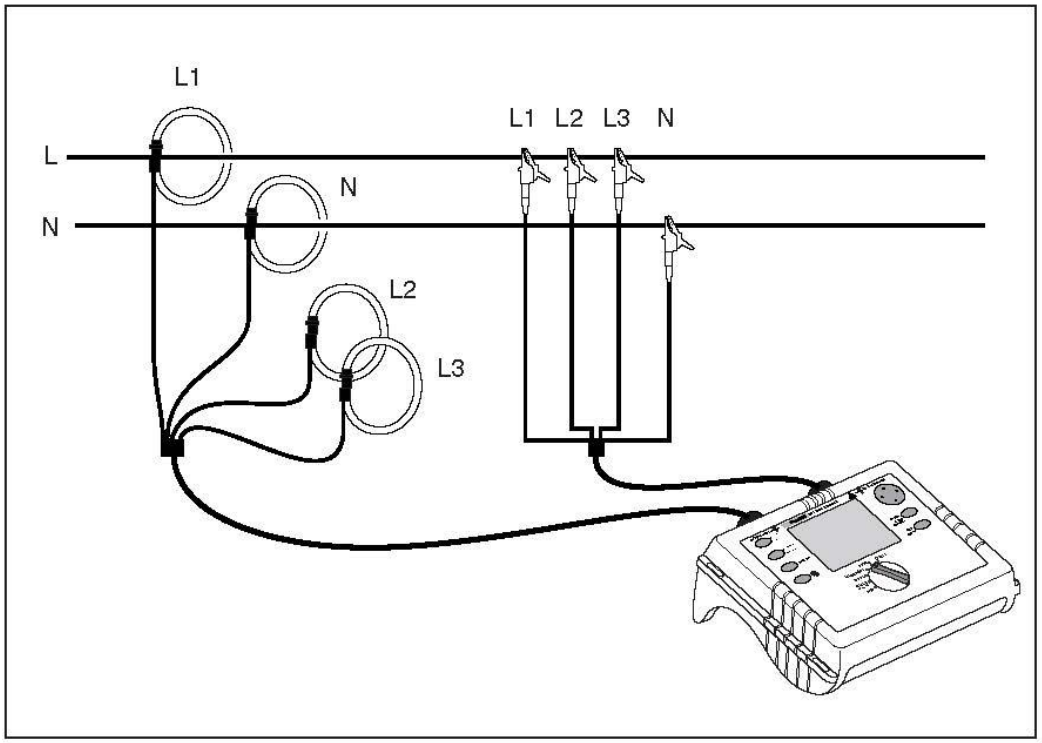


Measurements of power consumption

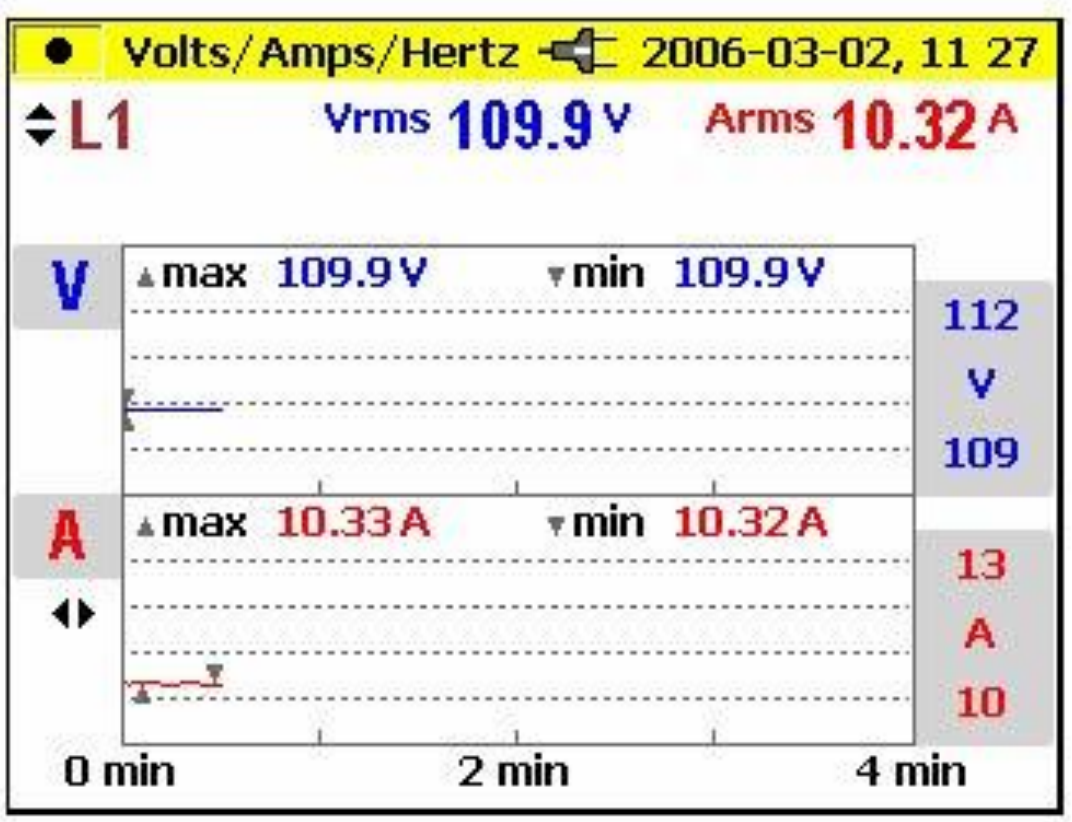
- Measurements of voltage, amperage and power consumption
- The power logger
- Measurements setup
- Single core
- Multicore
- 32 bit measurements.
- 64 bit measurements
- Collecting results from Manfred
- Measurements on ARM

Fluke 1735 Three-Phase Power Logger

Measurement setup for single phase



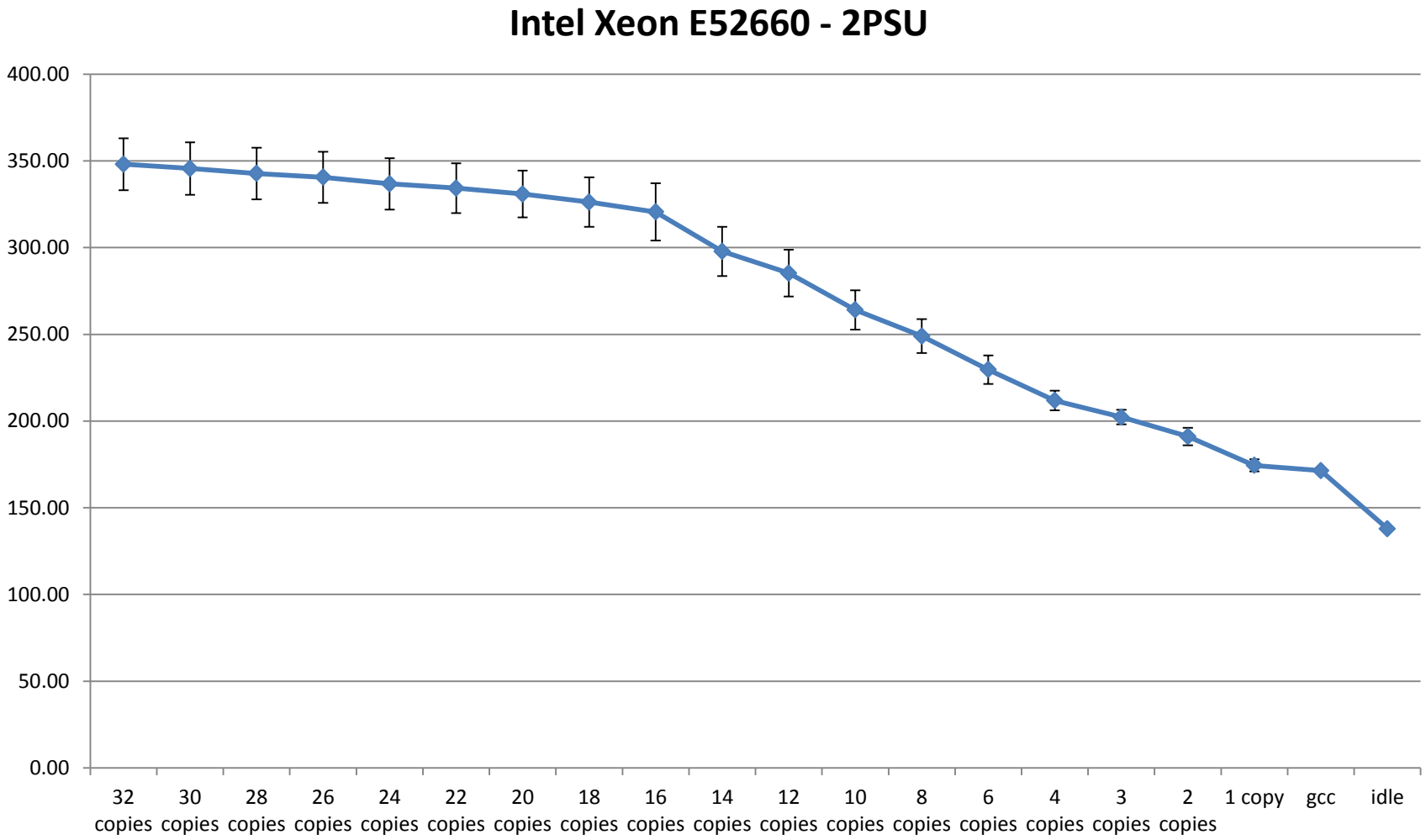
On display


Volts/Amps/Hertz
2006-03-02, 11 27
L1
Vrms 109.9 V
Arms 10.32 A
V
max 109.9 V
min 109.9 V
112
V
109
A
max 10.33 A
min 10.32 A
13
A
10
0 min
2 min
4 min

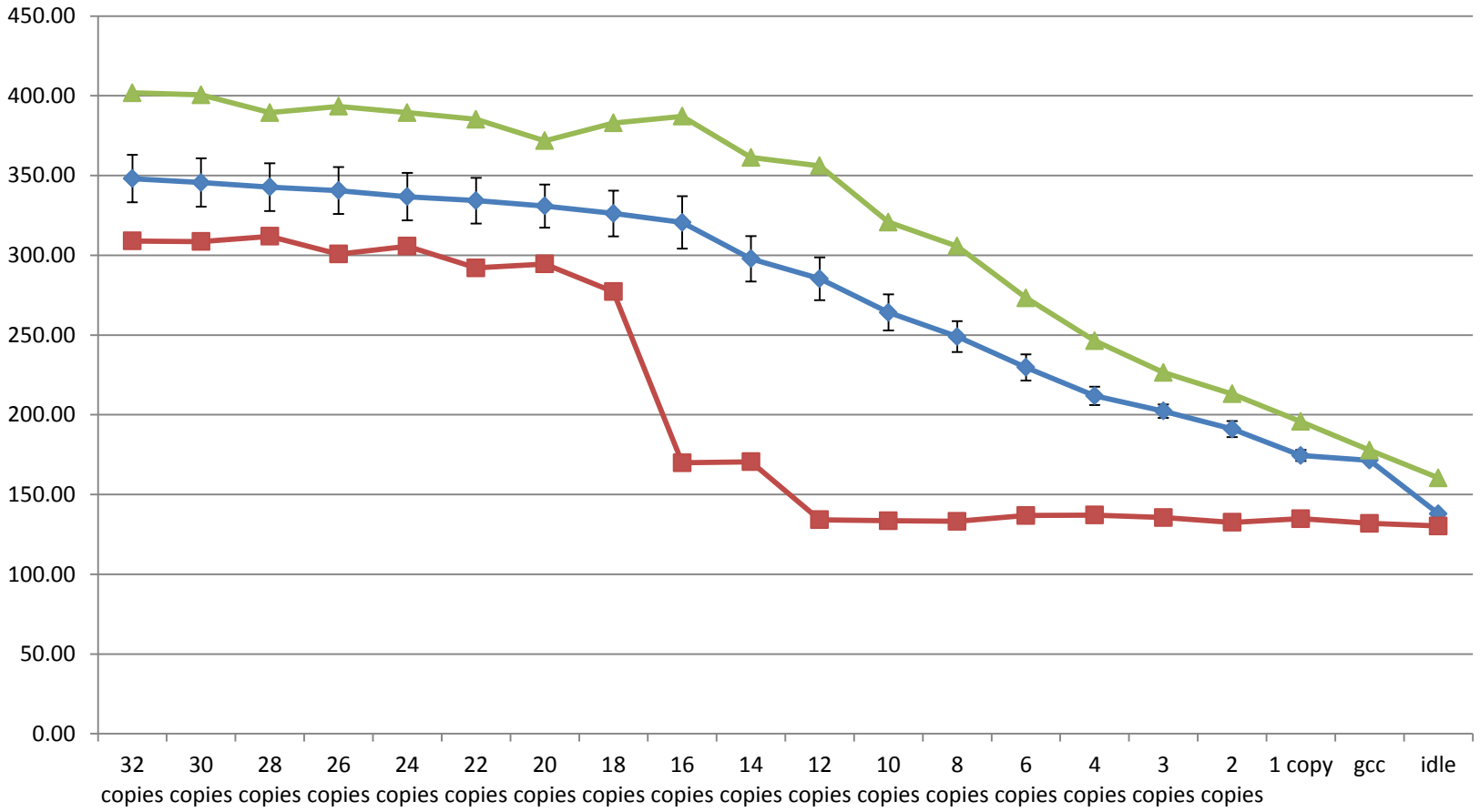
Power logger sw

Black average – Green min –Red Max

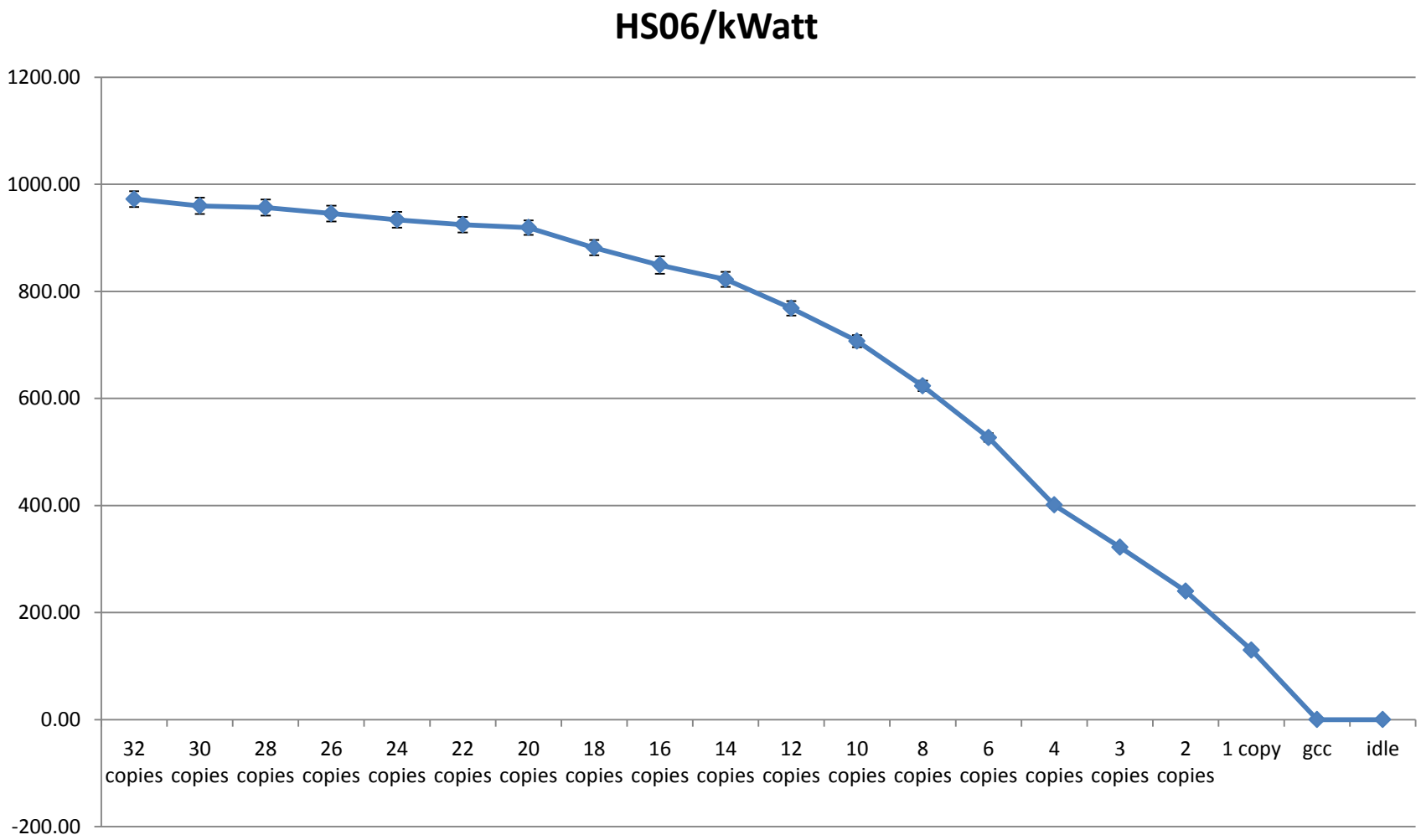
Power consumption (Watt) on Intel Xeon E5 2660



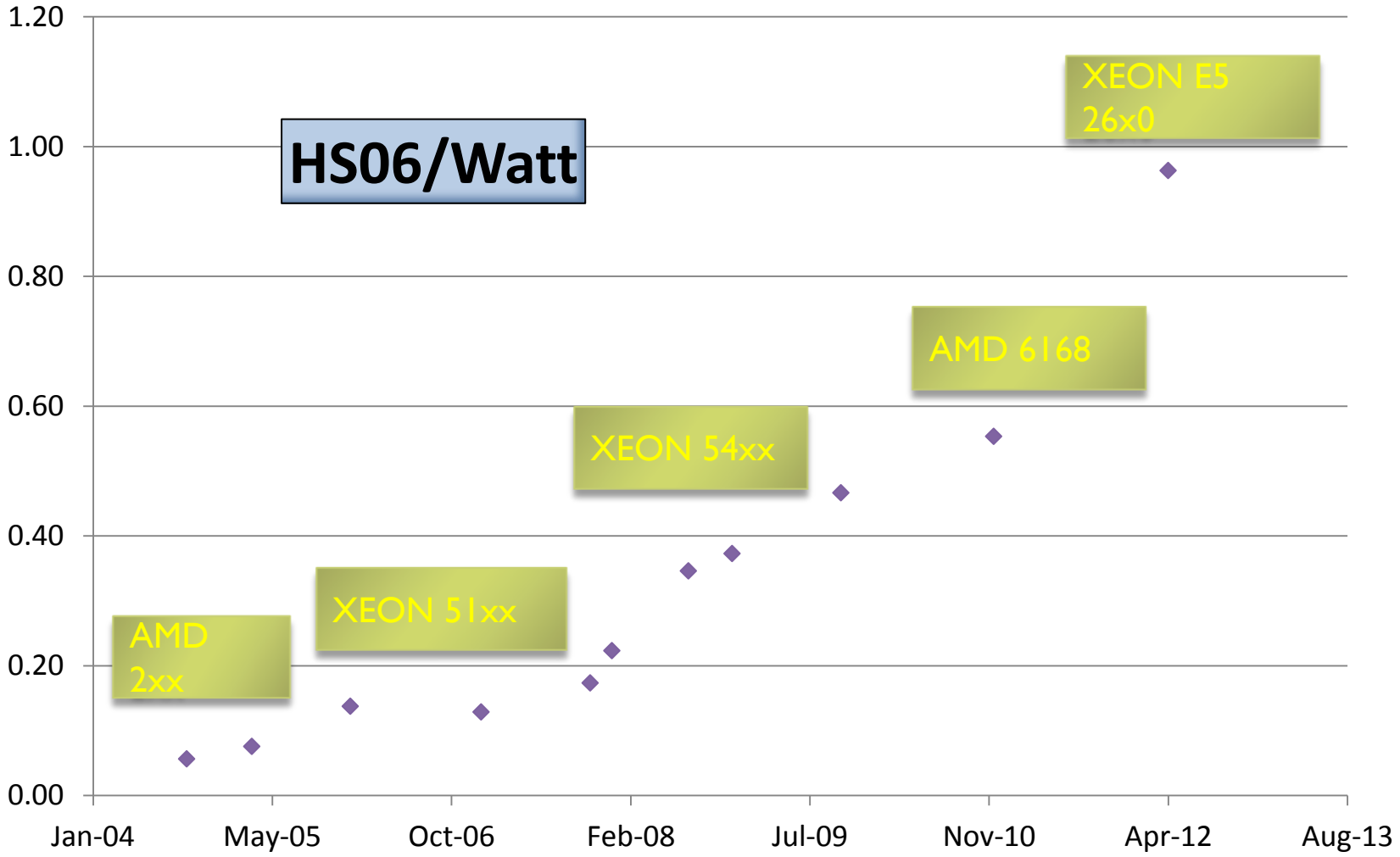
Min Average Max



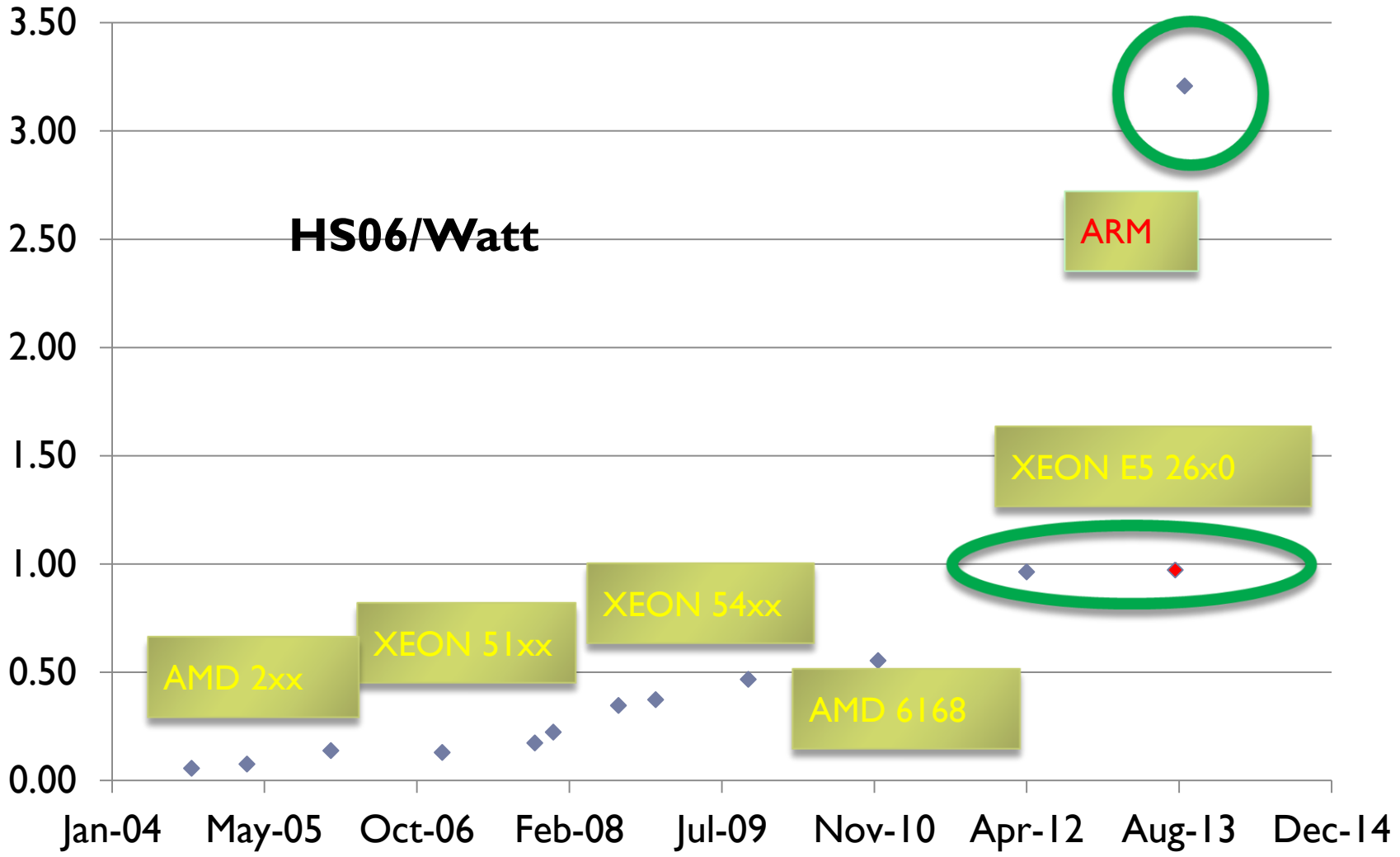
Efficiency HS06/Watt



Historical Trend from Manfred



HS06/Watt with ARM processor



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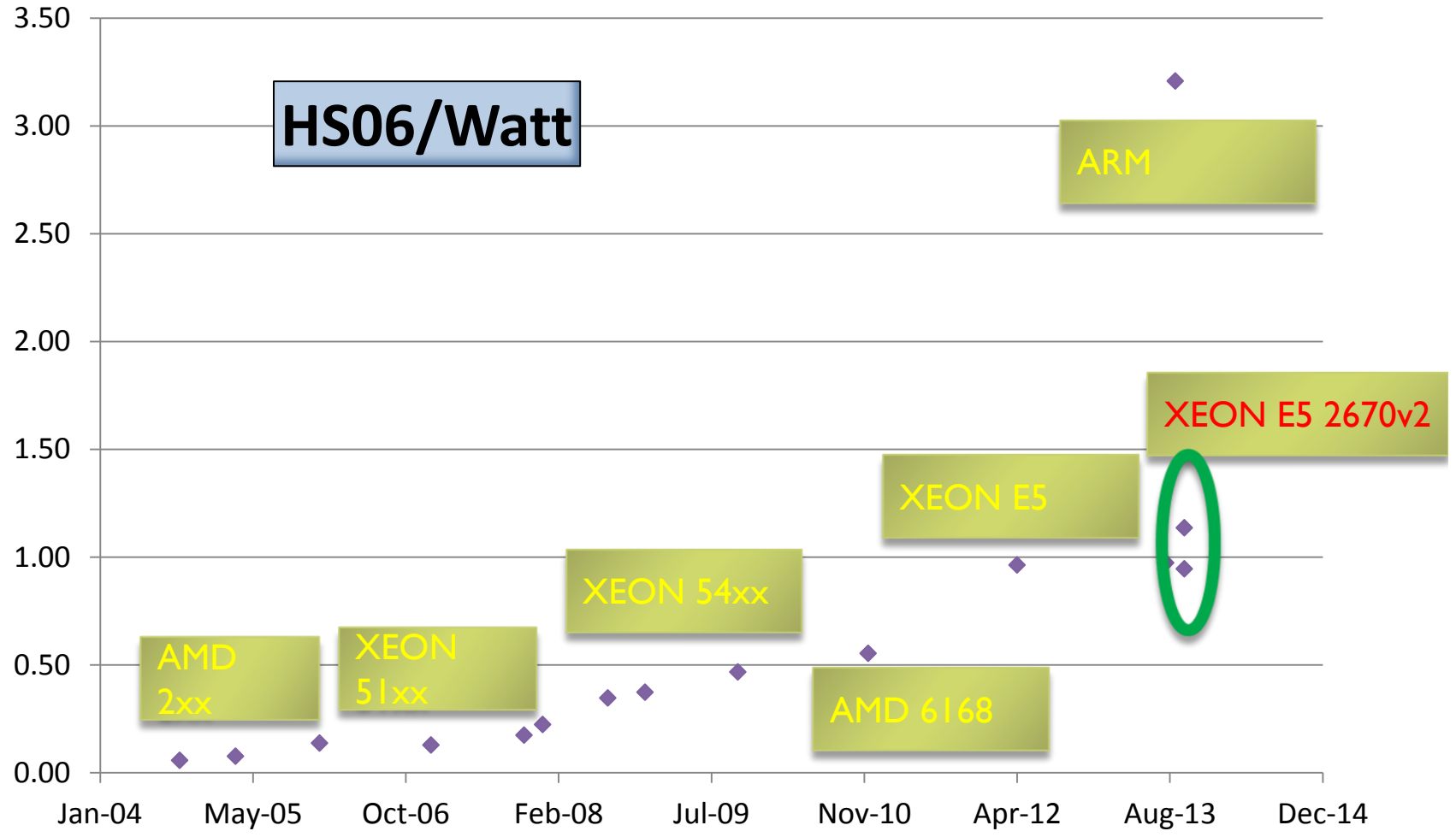
HS06/Watt +XeonE5v2670v2 (Manfred)



Future work

- New Xeon E5 v2 very good performances
  - Detailed measurements on Xeon E5 v2 in HS06/watt
- New Intel server processor
  - Avoton
- New ARM processors
  - 64bit processor will be available


TIME FOR QUESTIONS