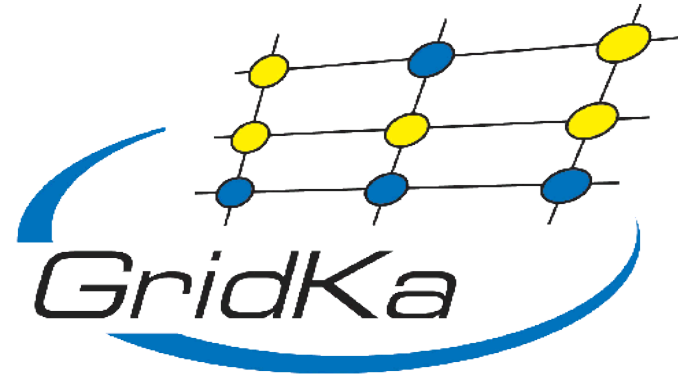


# Experiences with the Dual-Core Batch Nodes at



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## CPU Procurement:

→ New (#1):

- Sum total SPECint\_base2000 (not # of boxes!)
- Allowed CPUs:
  - Intel Xeon, AMD Opteron, Intel Pentium M
  - $\geq 1000$  SPECint\_base2000 per core
- Technical details (1 GB memory per core, disk, ...)
- Public, EU wide invitation for tenders  
(price estimation exceeded critical limit)

## CPU Procurements:

- New (#2):
  - Aspects of economy have been considered with the decision (# of rack units, # of boxes/network connections, electric power consumption)

## CPU Procurements:

- Tenders sorted by total cost estimation:
  - + Price
  - + Power consumption (3 EUR /  $W_{\max}$ )
  - + Space, racks (300 EUR / U)
  - + Network ports, administration, ...  
(200 EUR / system)

## CPU Procurement:

- Bidders had to prove the compute power by benchmarks
  - SPECint\_base2000
  - SL3
  - GCC-3.4.3, fixed set of optimizing flags
  - 1 benchmark run per core

## CPU Procurement:

### → Tenders:

- Many: dual-socket, dual-core AMD Opteron
- Some: single-socket, dual-core Opteron
- Some: dual-socket, mono-core Opteron
  
- One: 4x Pentium-M in a single 1U chassis
- One: dual-socket, dual-core Intel Sossaman  
(available 2<sup>nd</sup> quarter 2006, perf. < 1000)

## CPU Procurement:

→ Tenders:

- Best price:

Dual-socket, dual-core AMD Opteron 270 (2.0 GHz)  
Barebone: MSI MS-9245

## **Update of Benchmark results:**

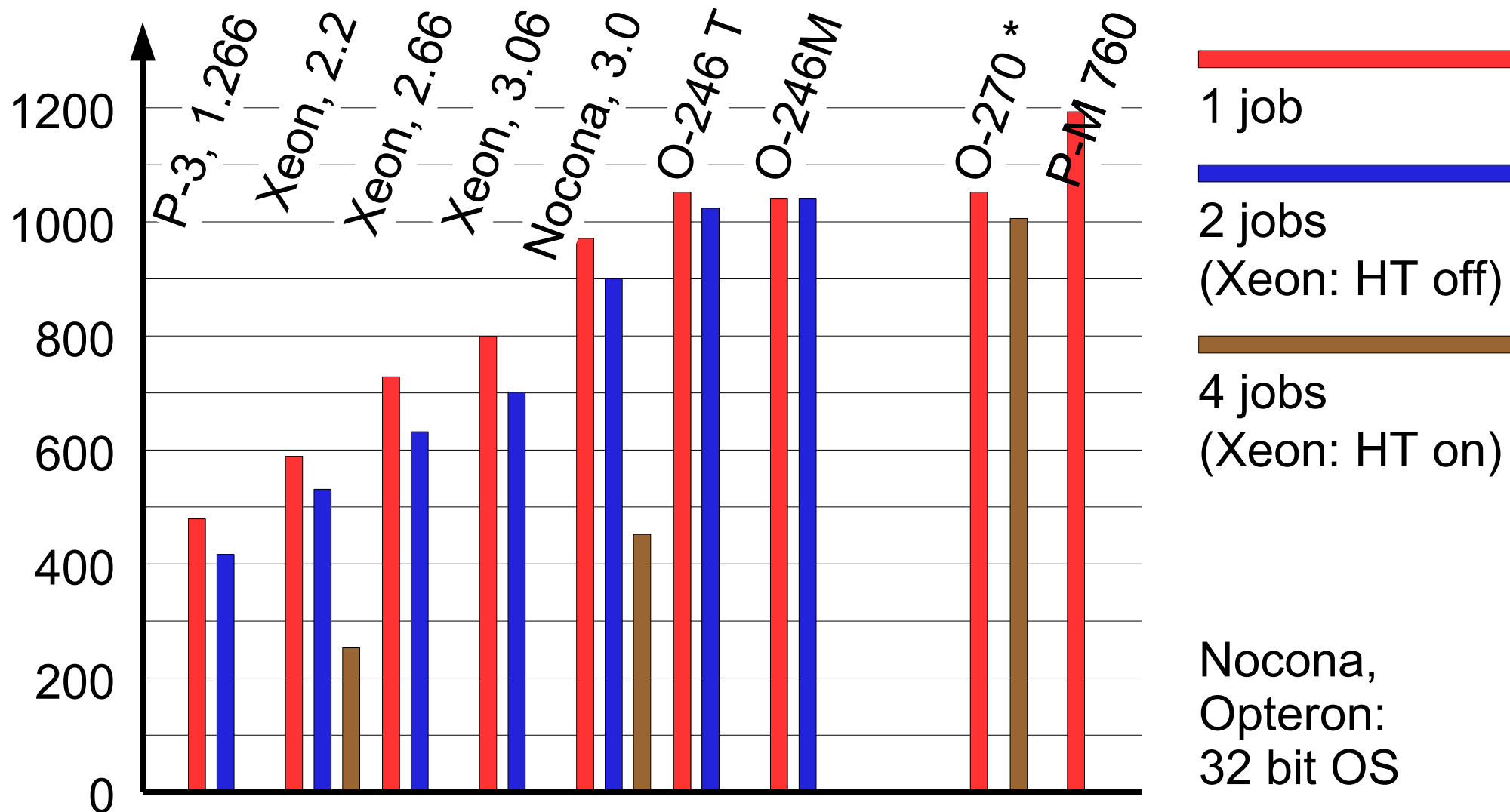
- **Basis:**  
[www.slac.stanford.edu/conf/hepixon5/talks/friday/alef.pdf](http://www.slac.stanford.edu/conf/hepixon5/talks/friday/alef.pdf)



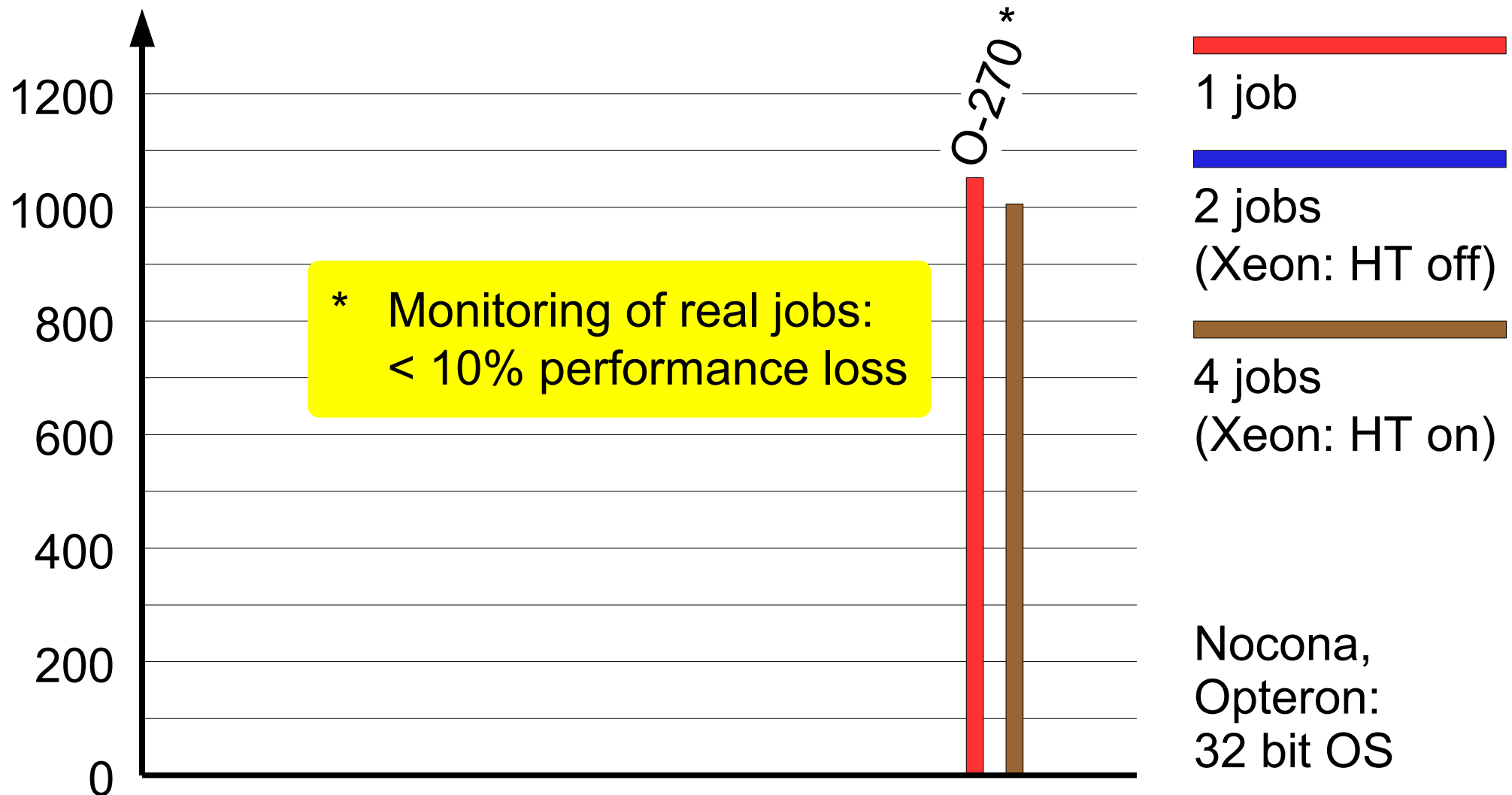
## Update of Benchmark results:

- Benchmark metrics:  
SPECint\_base2000 v1.3
- Operating system:  
Scientific Linux
- Compiler, optimizing options:  
gcc-3.4.3 -O3 -funroll\_loops -march=*CPU\_architecture*

### CPU Speed (SPECint\_base2000 per Job)

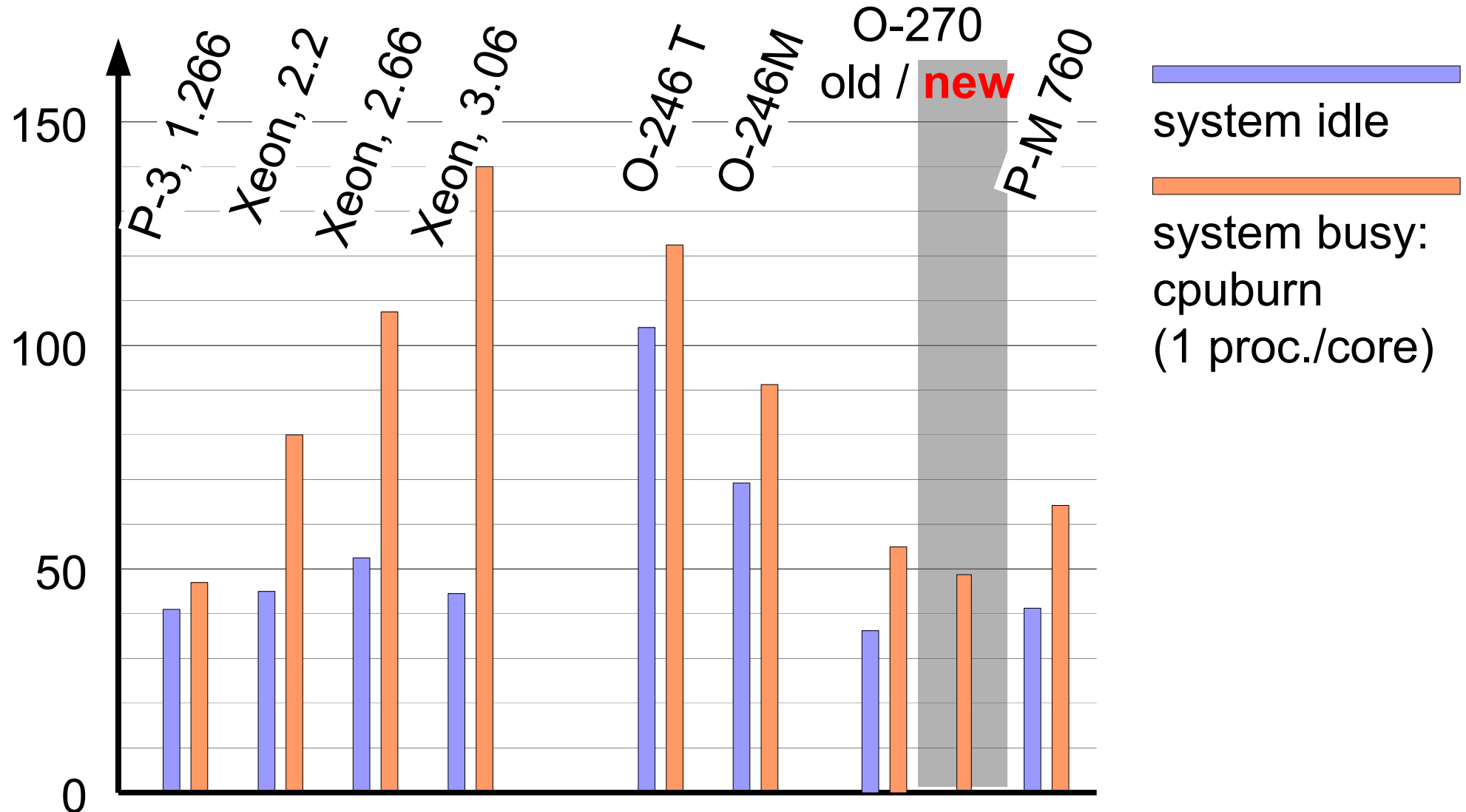


## CPU Speed (SPECint\_base2000 per Job)

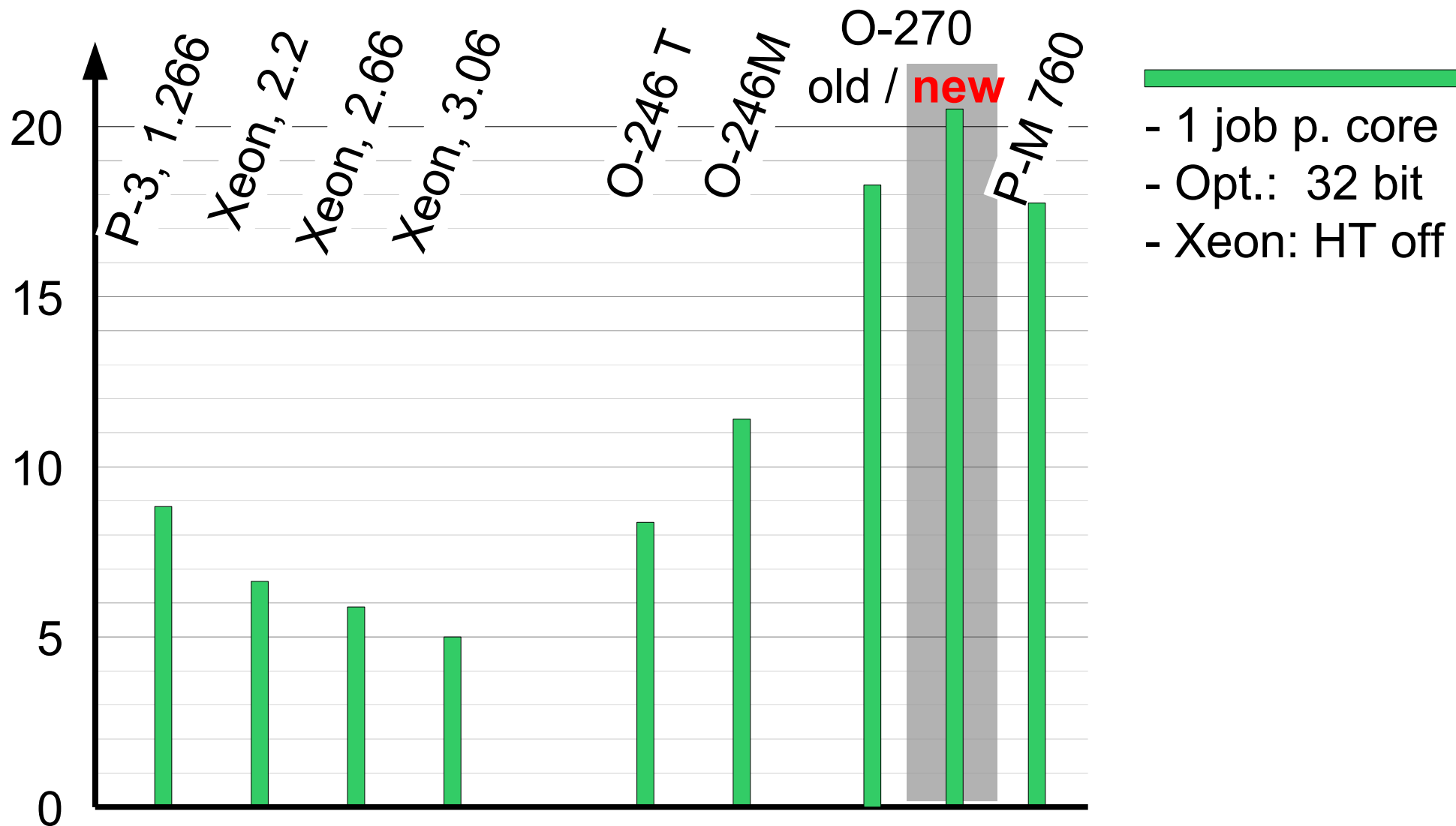


# **Power Consumption and Heat Dissipation:**

## Electric Power Consumption (Whole System, W per CPU Core)



### Thermic Efficiency (SPECint\_base2000 per W)



## **Conclusions:**

## Conclusions:

- Dual-core Opteron systems:
  - High performance,  
< 10% performance loss
  - Low electric power consumption



## **Comments, Questions?**