



High-Throughput Computing Collaboration

Platforms

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HTCC

- Members from Intel®, CERN LHCb and CERN IT
- Test Intel® technologies in the LHC computing environment
 - online computing
 - trigger and data acquisition (TDAQ) systems
 - accelerators for the High Level Trigger
- LHCb upgrade as use case, but applicable to all experiments



Intel® Xeon® and Xeon Phi™



- Remains the baseline for most of the computing
- Currently, strong interest in *Skylake*: AVX512, QAT...

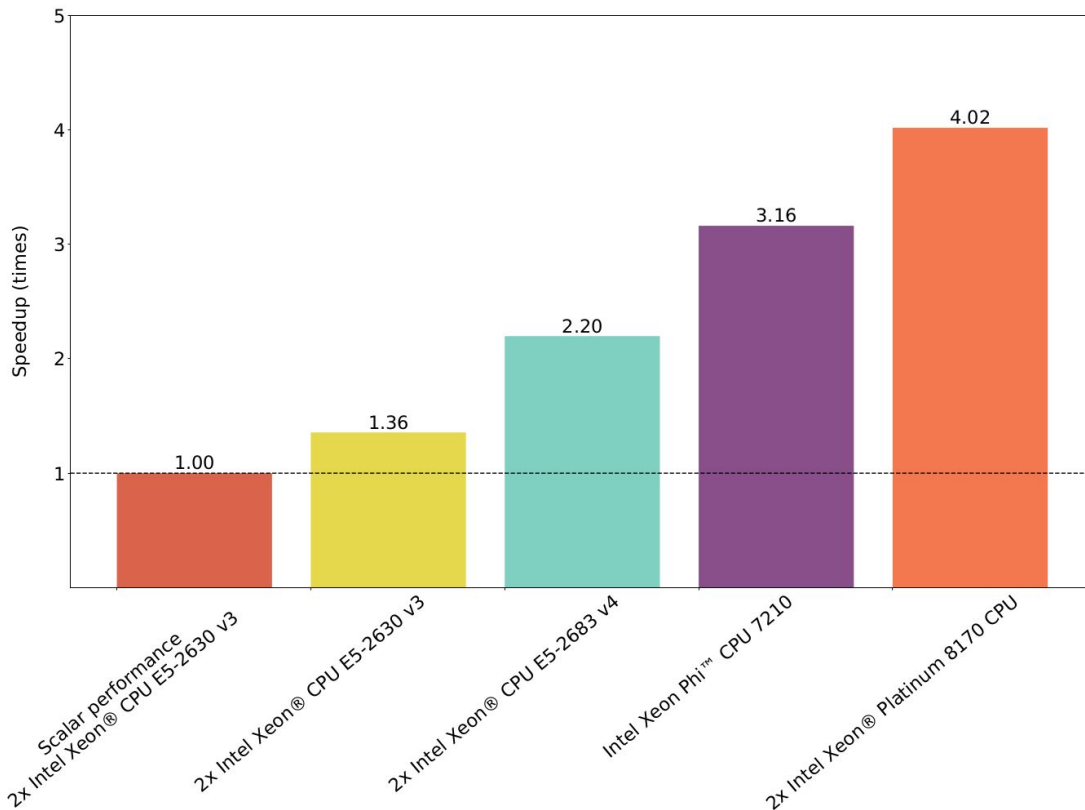


- Many-core platform suited for applications with high degree of parallelism
- Proven to be an alternative to Xeon® in terms of multi-threading speedups
- *Knights Landing*: up to 72 physical cores, 16 GB MCDRAM, self-bootable...

Use case: SIMD Kalman filter

Example: Cross Kalman

- Kalman filters are major contributors (~60%) to overall HLT execution time
- Cross Kalman is a cross-architecture Kalman filter, targeting SIMD architectures
- KNL shows >3x speedup over 2-socket HSW system
- SKL 8170 performs even better but other costs considerations apply



Intel® QuickAssist Technology

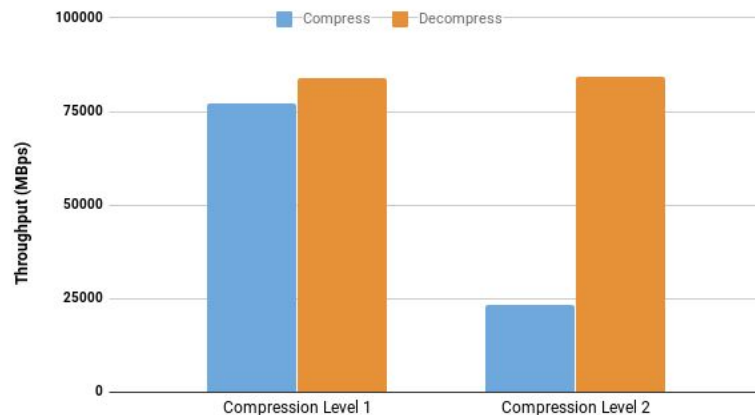
Intel®
QuickAssist
Technology

- Provides hardware acceleration for compression and cryptographic workloads
- Promising integration in the new Xeon® chipsets (currently PCIe adapters)
- Many other projects at CERN showed interest and asked for availability

Example: compression on LHCb sample data

- Preliminary result using 2 HW engines (up to 3), 8192 bytes buffer size, 824 MB of event data
- Throughput: 77 Gbps compression, 84 Gbps decompression
- Compression ratio 0.93

Stateless Static Deflate Static Compression / Decompression

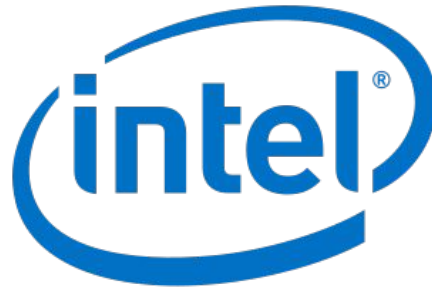


Thank you!

CERN openlab High Throughput Computing Collaboration

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