Analysis results of the current benchmark data

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(on behalf of the HEPiX Benchmark Working Group)
August 24 2022

Previous presentations:

Jan 19 2022	Results from the experiment workloads on the CERN tested
Mar 2 2022	HEPSpec06 (32/64) and SPEC2017 (CPP/INT) results
Apr 6 2022	Experiment workloads vs HEPSpec06 (32/64) and SPEC2017 (CPP/INT)
May 4 2022	Validation of the Gravity Wave (Ligo ..) benchmark Study of “workloads vs workloads”

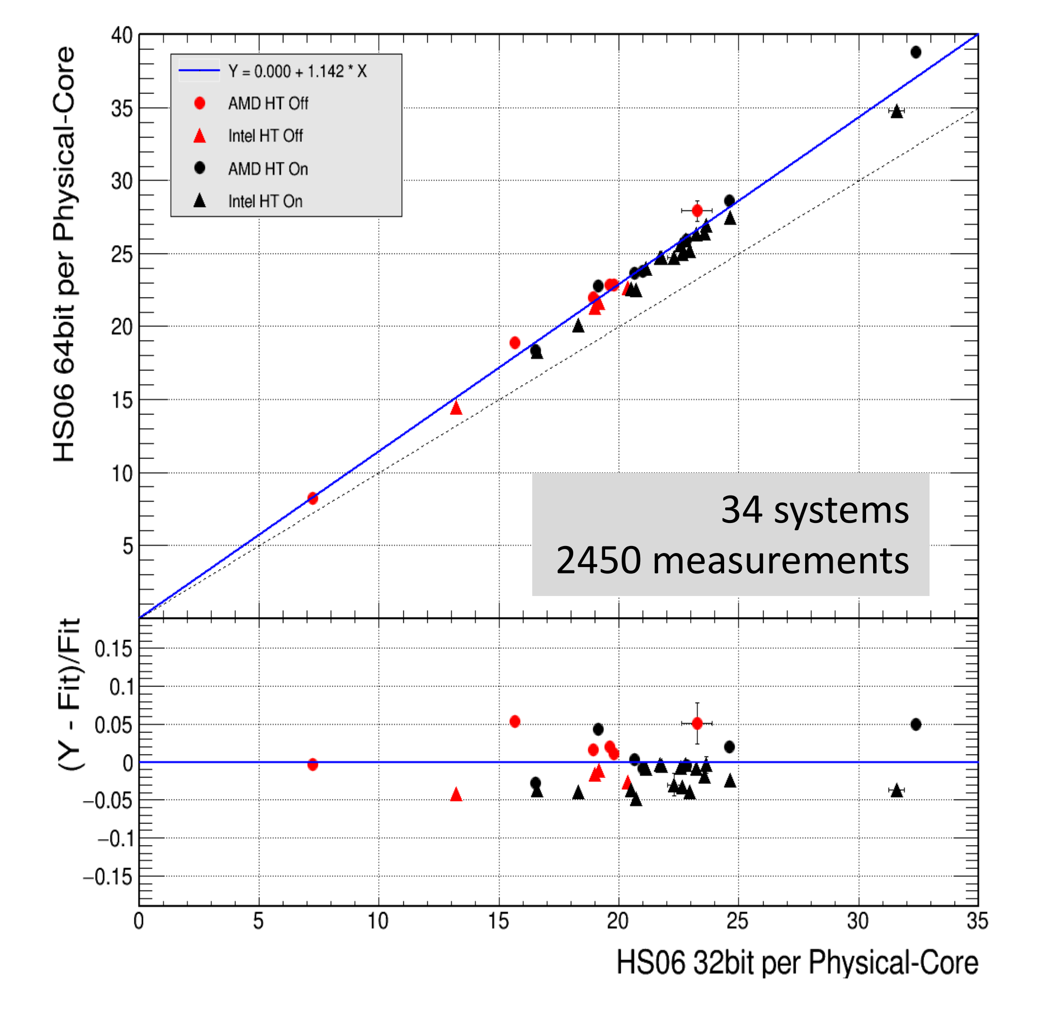
Aug 24 2022	Short recap

Analysis roadmap:

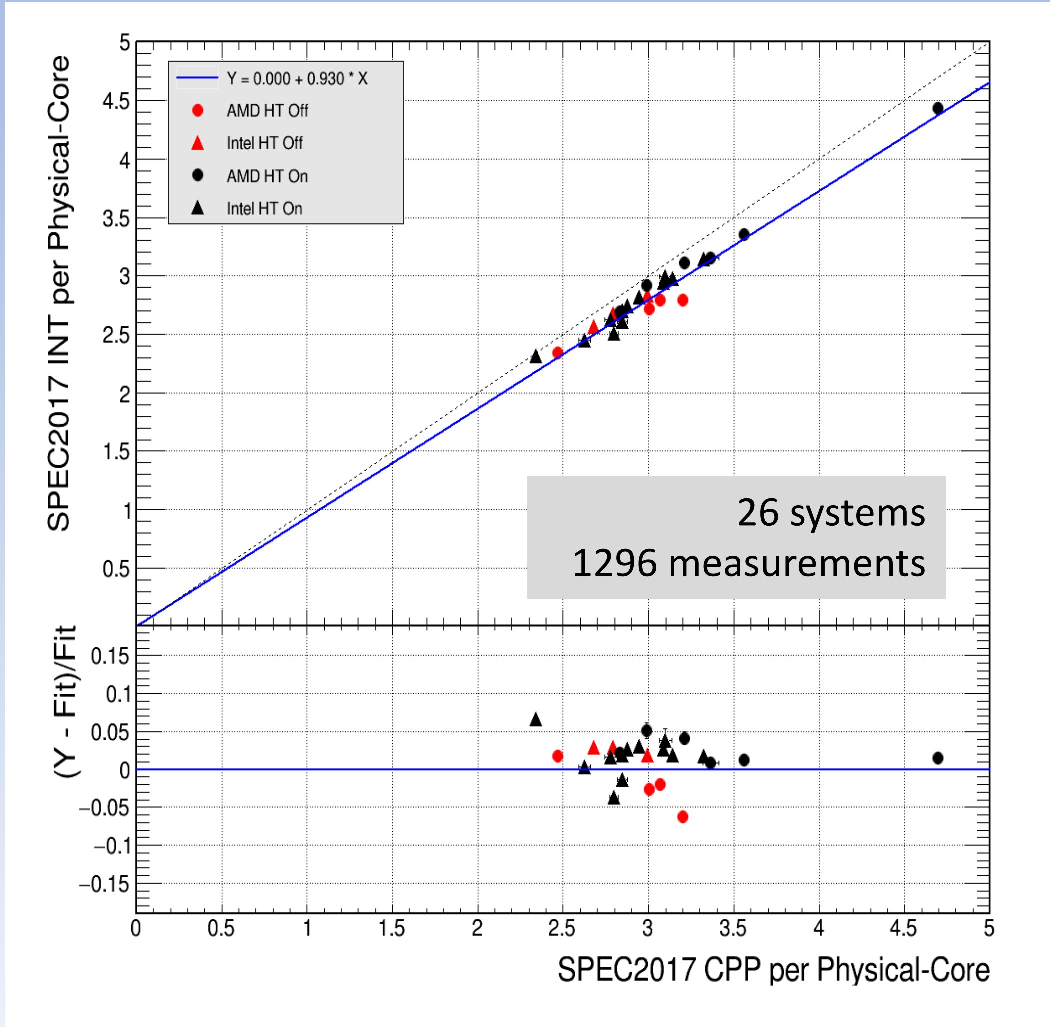
1. Reconfirm results of HEPSpec06 and SPEC2017
2. Validate workloads — *Other workloads?*
   - 9 Workloads validated on the CERN Testbed
3. Workloads vs HEPSpec06 and SPEC2017 — *No GW data*
4. Workloads vs Workloads — *May 4 2022*
5. Finalization of the measurements — *Today*
   - HEPSpec06/SPEC2017 and Workloads
6. Analysis of HEPScore Candidates — *September Workshop*

Reconfirm results of HEPSpec06 and SPEC2017

HEPSpec06 (HS) 64 vs 32 bit



SPEC2017 (SP) intrate vs cpp



Eleven Workloads

ALICE gen_sim

ATLAS (gen_sherpa, sim_mt, gen_sim)

Belle2 gen_sim_reco

CMS (reco, digi, gen_sim)

Gravity wave (LIGO et al)

Juno gen_sim_reco

LHCb gen_sim

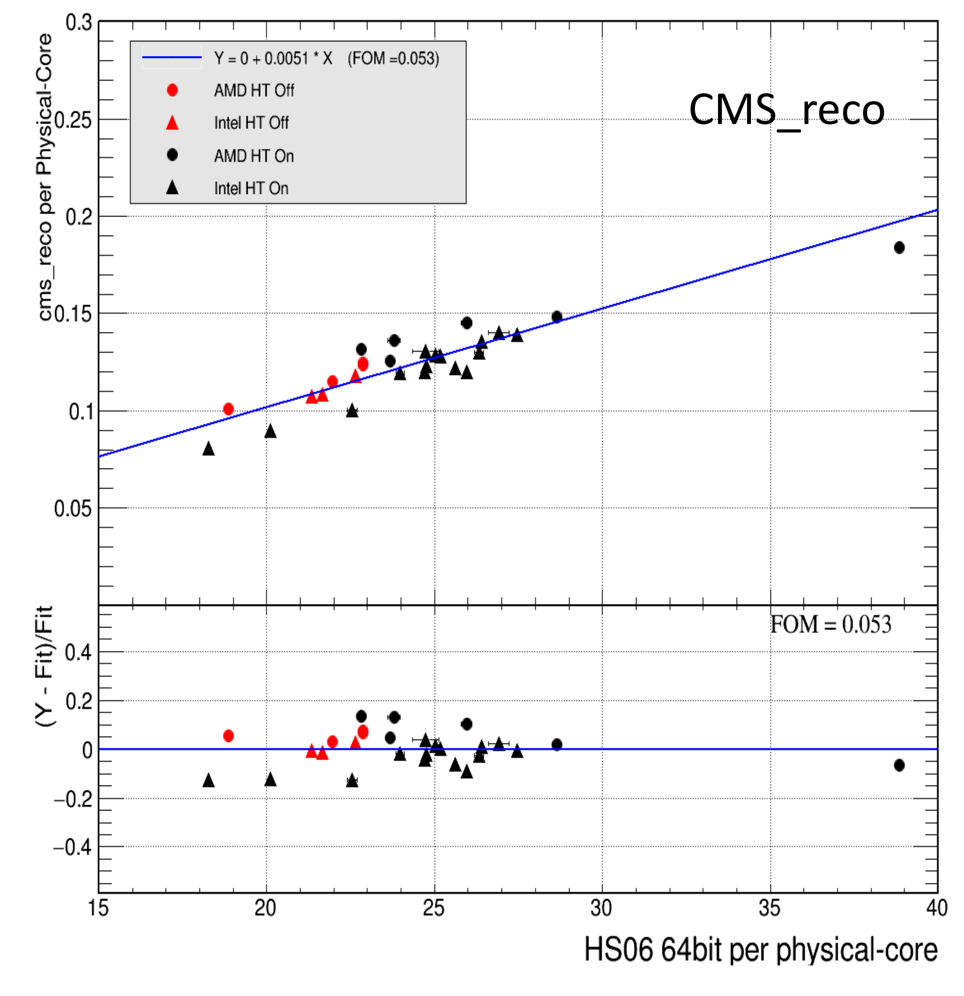
Many with measurements on 70+ systems, 3000 measurements
Others with 40 systems and 1200 measurements

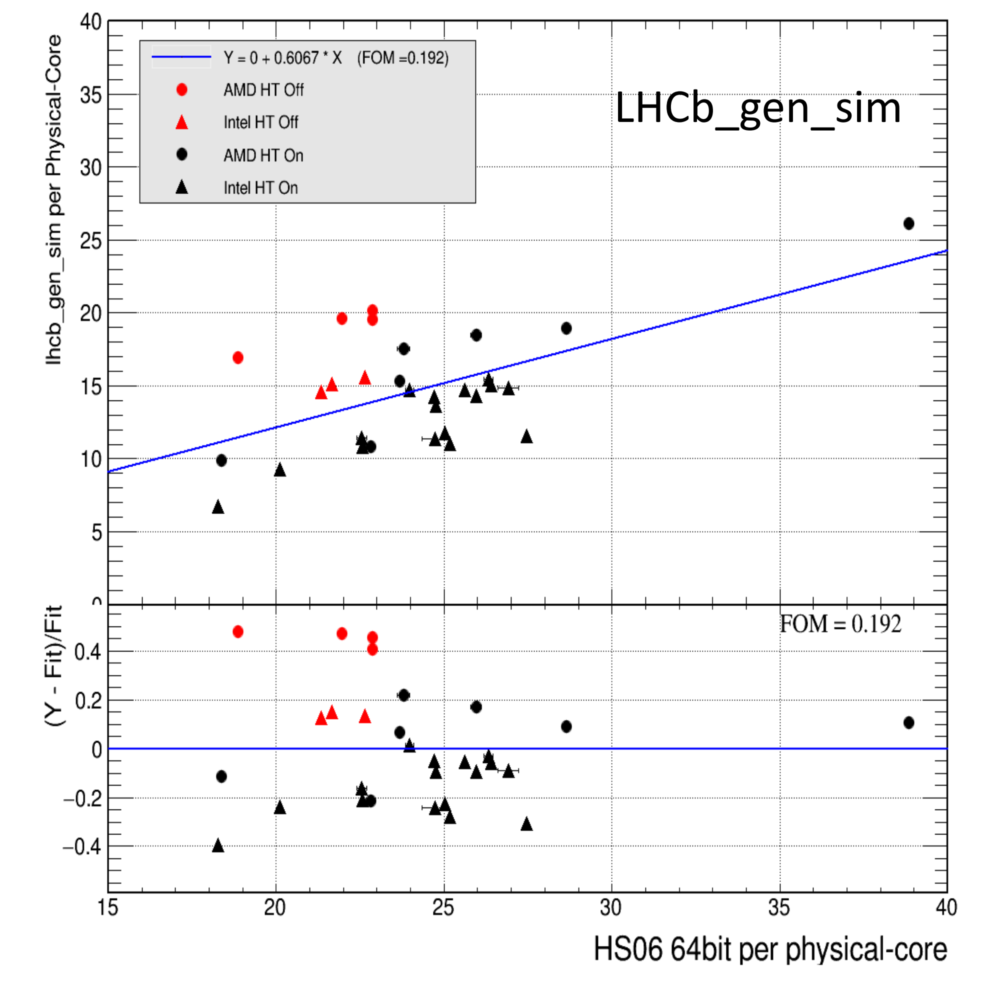
Workloads vs HEPSpec06 and SPEC2017

Each workload is compared with the 4 HS/SP benchmarks

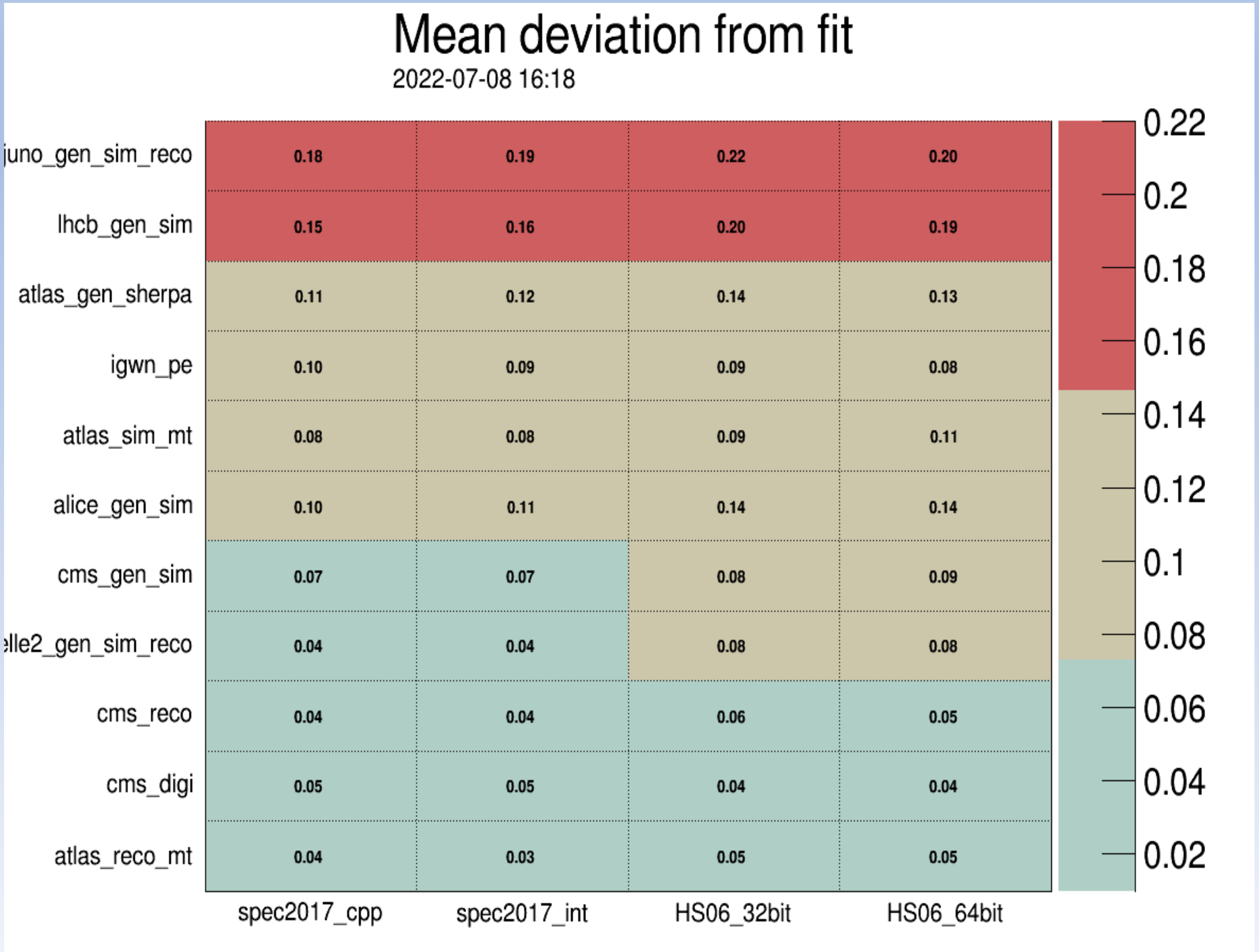
Upper plot: events/second VS HS-64 (normalized per physical core)

Lower plot: “residuals” – relative difference of Y-benchmark to the blue fit line





FOM for HEPSpec06/SPEC2017 vs Workloads



Workloads agree more with SPEC2017

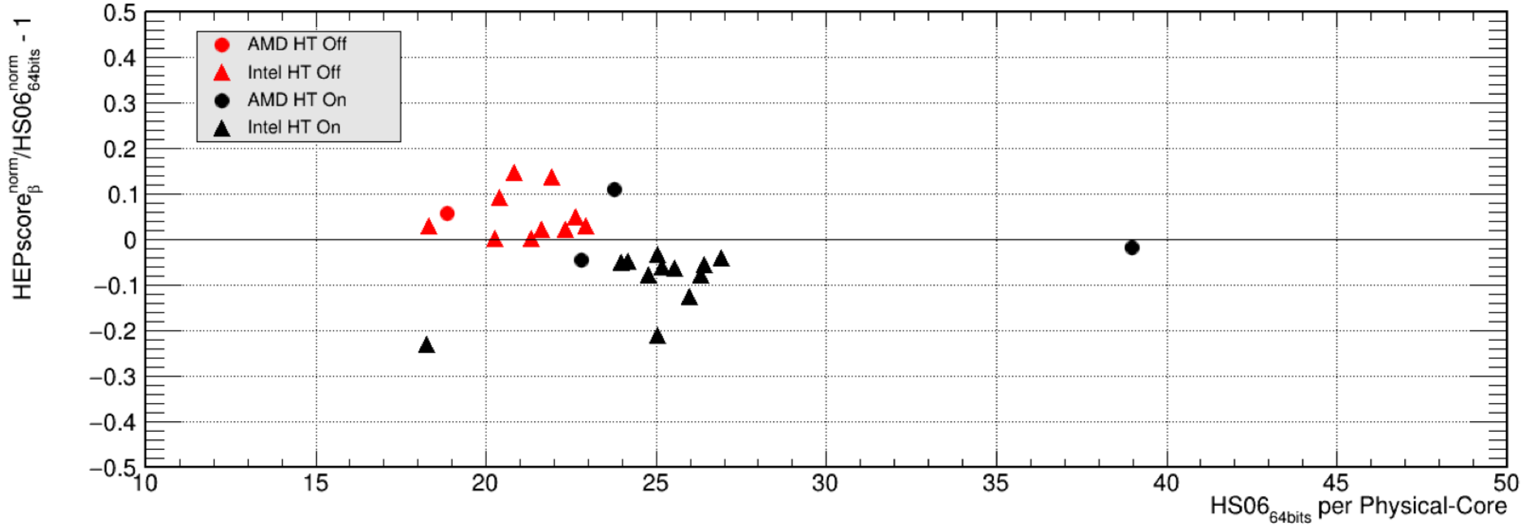
HEPScore candidate study

Requiring measurements from all workloads reduces the number of CPU-types to 20-30

Looking at combinations of the 11-workloads (equal wgt, Usage-wgt, expt-wgt, ..)

Other considerations (time to run the benchmark)

CPU	HS06	Deviation
AMD_EPYC_7551P_32-Core_Processor-32cores-HT1-Nikhef	18.87	0.06
Intel(R)_Xeon(R)_CPU_E5-2650_v4_@_2.20GHz-24cores-HT1-CERN	20.27	0.00
Intel(R)_Xeon(R)_CPU_E5-2680_v3_@_2.50GHz-24cores-HT1-Nikhef	21.34	0.00
Intel(R)_Xeon(R)_Gold_5218_CPU_@_2.30GHz-32cores-HT1-CERN	22.34	0.02
Intel(R)_Xeon(R)_Gold_6148_CPU_@_2.40GHz-40cores-HT1-Nikhef	22.65	0.05
Intel(R)_Xeon(R)_Gold_6238R_CPU_@_2.20GHz-56cores-HT1-IHEP	20.39	0.09
Intel(R)_Xeon(R)_Gold_6248_CPU_@_2.50GHz-40cores-HT1-IHEP	22.94	0.03
Intel(R)_Xeon(R)_Gold_6258R_CPU_@_2.70GHz-56cores-HT1-IHEP	20.82	0.15
Intel(R)_Xeon(R)_Gold_6338_CPU_@_2.00GHz-64cores-HT1-IHEP	21.95	0.14
Intel(R)_Xeon(R)_Silver_4216_CPU_@_2.10GHz-32cores-HT1-CERN	21.64	0.02
Intel_Core_Processor_(Haswell,_no_TSX,_IBRS)-24cores-HT1-NDGF-T1	18.33	0.03
AMD_EPYC_7302_16-Core_Processor-32cores-HT2-CC-IN2P3	38.97	-0.02
AMD_EPYC_7551P_32-Core_Processor-32cores-HT2-Nikhef	22.81	-0.04
AMD_EPYC_7702_64-Core_Processor-128cores-HT2-IJCLAB	23.79	0.11
Intel(R)_Xeon(R)_CPU_E5-2630_v3_@_2.40GHz-16cores-HT2-CERN	25.97	-0.13
Intel(R)_Xeon(R)_CPU_E5-2630_v4_@_2.20GHz-20cores-HT2-GridKa	23.98	-0.05
Intel(R)_Xeon(R)_CPU_E5-2640_v3_@_2.60GHz-16cores-HT2-PIC	26.32	-0.08
Intel(R)_Xeon(R)_CPU_E5-2650_v4_@_2.20GHz-24cores-HT2-Nikhef	24.76	-0.08
Intel(R)_Xeon(R)_CPU_E5-2650_v4_@_2.20GHz-24cores-HT2-CC-IN2P3	24.17	-0.05
Intel(R)_Xeon(R)_CPU_E5-2680_v2_@_2.80GHz-20cores-HT2-CC-IN2P3	25.05	-0.21
Intel(R)_Xeon(R)_CPU_E5-2680_v4_@_2.40GHz-28cores-HT2-PIC	26.91	-0.04
Intel(R)_Xeon(R)_CPU_E5-2680_v4_@_2.40GHz-28cores-HT2-CERN	26.41	-0.05
Intel(R)_Xeon(R)_CPU___________E5520__@_2.27GHz-8cores-HT2-CA-UVic-Cloud	18.26	-0.23
Intel(R)_Xeon(R)_Gold_6130_CPU_@_2.10GHz-32cores-HT2-CERN	25.19	-0.06
Intel(R)_Xeon(R)_Gold_6252_CPU_@_2.10GHz-48cores-HT2-BNL	25.03	-0.03
Intel(R)_Xeon(R)_Silver_4114_CPU_@_2.20GHz-20cores-HT2-CC-IN2P3	25.54	-0.06



Summary

We have a good set of measurements for studying the HEPScore candidates

Early results suggest the relative weighting of the workloads is not critical

Optimistic that we will find a number of HEPScore candidates that meet our criteria

Need to discuss results in the HEPiX working group over next few weeks

Plan to present our favoured candidates at the September Workshop