HPCG UPDATE: SC'16

Jack Dongarra

Michael Heroux

Piotr Luszczek

HPCG Status

HPCG Update: Agenda

5:15: 10 minute presentations:

Mike Heroux, HPCG Update.
Massimiliano Fatica, Nvidia Update.
Alexander Kleymenov, Intel Update.
Kiyoshi Kumahata, Riken/Fujitsu Update.
Bob Ciotti, NASA/SGI Update.
Costas Bekas, IBM Update.
Yutong Lu, NUDT Update.
Peter Kogge, HPCG Analysis.
Haohuan Fu, Wuxi Update.

Open discussion

6:55:   Awards Presentation for top 3 systems

HPCG 3.0 Release, Nov 11, 2015

- Available on GitHub.com
  - Using GitHub issues, pull requests, Wiki.
- Optimized 3.0 version:
  - Vendor or site developed.
  - Used for all results (AFAWK).
  - Intel, Nvidia, IBM: Available to their customers.
- All future results require HPCG 3.0 use.
- Quick Path option makes this easier.

Main HPCG 3.0 Features

See http://www.hpcg-benchmark.org/software/index.html for full discussion

- Problem generation is timed.

- Memory usage counting and reporting.

- Memory bandwidth measurement and reporting

- "Quick Path" option to make obtaining results on production systems easier.

- Provides 2.4 rating and 3.0 rating in output.

- Command line option (--rt=) to specify the run time.

Other Items

- Reference version on GitHub:
  - https://github.com/hpcg-benchmark/hpcg
  - Website: hpcg-benchark.org.
  - Mail list hpcg.benchmark@gmail.com
- HPCG & Student Cluster Competitions.
  - Used in SC15/16, ASC
  - SC15: HPCG replaced HPL, ranking matched overall cluster ranking.
- HPCG-optimized kernels going into vendor libraries.
- Next event: ISC'16:

Summary

- HPCG is
  - Addressing original goals.
  - Rewarding vendor investment in features we care about.
- HPCG has traction.
  - Original goal of top 50 systems is reachable, and more.
  - 101 entries SC16
  - 80 – ISC16, 61 – SC15, 42 – ISC15, 25 – SC14, 15 – ISC14
- Version 3.X is the final planned major version.
  - 3.1 (beta): Includes support for heterogeneous execution.

HPCG RANKINGS NOVEMBER 2016

HPCG Results, Nov 2016, 1-10

Rank	Site	Computer	Cores	Rmax Pflops	HPCG Pflops	HPCG /HPL	% of Peak
1	RIKEN Advanced Institute for Computational Science	K computer, SPARC64 VIIIfx 2.0GHz, Tofu interconnect	705,024	10.5	0.603	5.7%	5.3%
2	NSCC / Guangzhou	Tianhe-2 NUDT, Xeon 12C 2.2GHz + Intel Xeon Phi 57C + Custom	3,120,000	33.8	0.580	1.7%	1.1%
3	Joint Center for Advanced High Performance Computing Japan	Oakforest-PACS – PRIMERGY CX600 M1, Intel Xeon Phi 7250 68C 1.4GHz, Intel OmniPath, Fujitsu	557,056	24.9	0.385	2.8%	2.8%
4	National Supercomputing Center in Wuxi, China	Sunway TaihuLight – Sunway MPP, SW26010 260C 1.45GHz, Sunway, NRCPC	10,649,600	93.0	0.3712	0.4%	0.3%
5	DOE/SC/LBNL/NERSC USA	Cori – XC40, Intel Xeon Phi 7250 68C 1.4GHz, Cray Aries, Cray	632,400	13.8	0.355	2.6%	1.3%
6	DOE/NNSA/LLNL USA	Sequoia – IBM BlueGene/Q, PowerPC A2 16C 1.6GHz, 5D Torus, IBM	1,572,864	17.1	0.330	1.9%	1.6%
7	DOE/SC/Oak Ridge Nat Lab	Titan - Cray XK7 , Opteron 6274 16C 2.200GHz, Cray Gemini interconnect, NVIDIA K20x	560,640	17.5	0.322	1.8%	1.2%
8	DOE/NNSA/LANL/SNL	Trinity - Cray XC40, Intel E5-2698v3, Aries custom, Cray	301,056	8.10	0.182	2.3%	1.6%
9	NASA / Mountain View	Pleiades - SGI ICE X, Intel E5-2680, E5-2680v2, E5-2680v3, E5-2680v4, Infiniband FDR, HPE/SGI	243,008	5.9	0.175	2.9%	2.5%
10	DOE/SC/Argonne National Laboratory	Mira - BlueGene/Q, Power BQC 16C 1.60GHz, 5D Torus, IBM	786,432	8.58	0.167	1.9%	1.7%

Comparison Peak, HPL

Comparison Peak, HPL, & HPCG

HPCG BoF on Wednesday at 5:15pm in Room 355-E
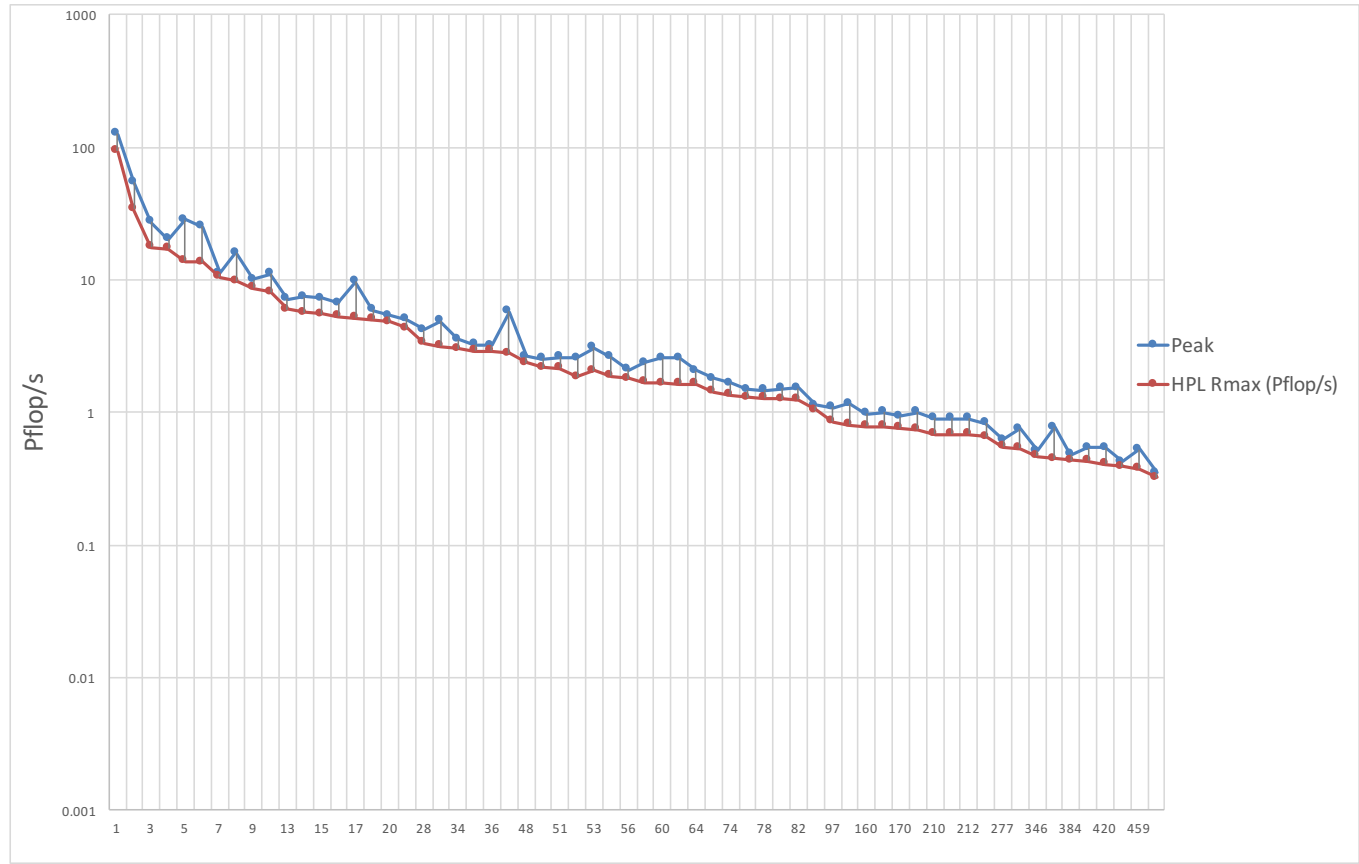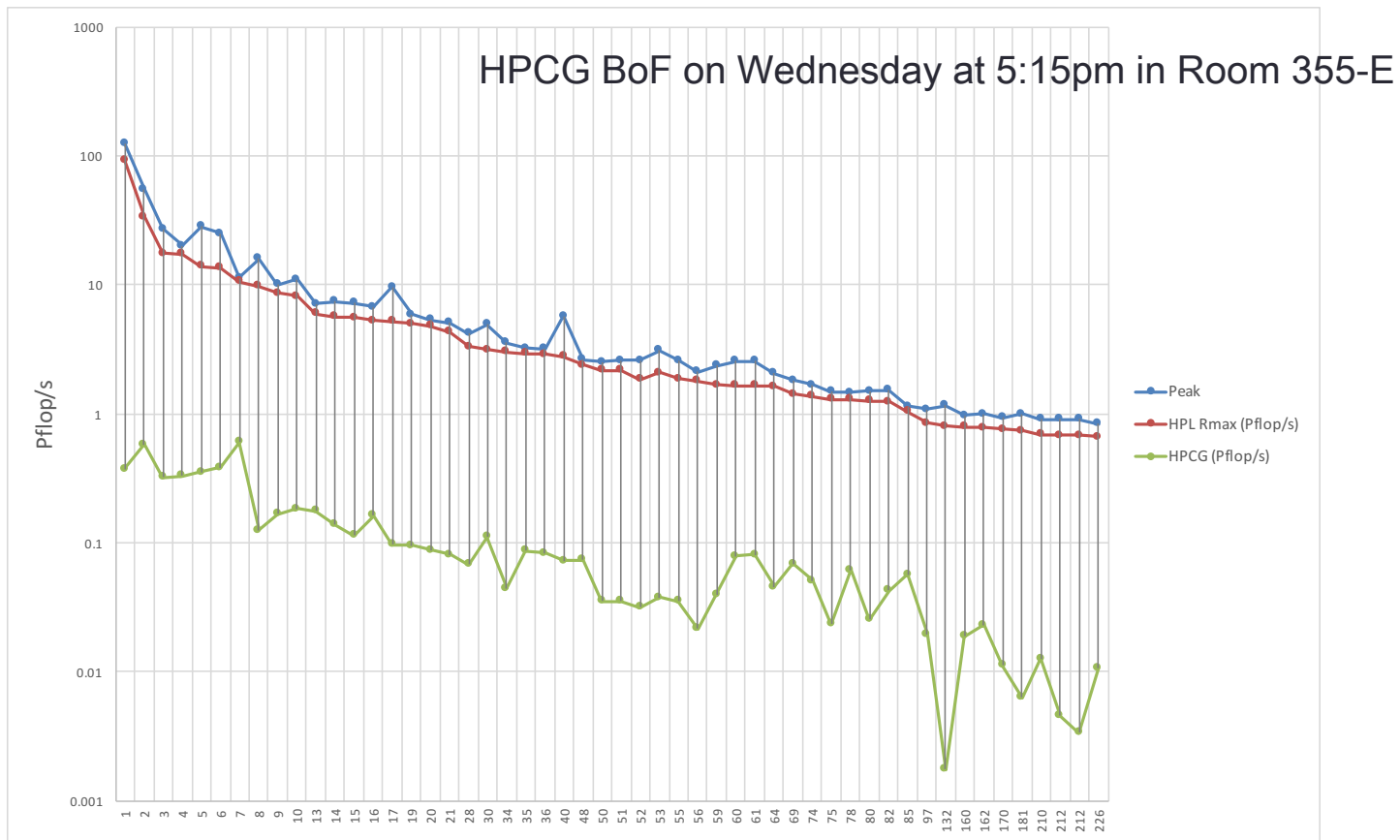
Rnk	Machine	Cores	HPL Res	HPL Rnk	HPCG PF/s	% Peak
1	**K computer**	705,024	10.510	7	0.6027	5.3%
2	**Tianhe-2**	3,120,000	33.863	2	0.5800	1.1%
3	**Oakforest**	557,056	13.555	6	0.3855	1.5%
4	**TaihuLight**	10,649,600	93.015	1	0.3712	0.3%
5	**Cori**	632,400	13.832	5	0.3554	1.3%
6	**Sequoia**	1,572,864	17.173	4	0.3304	1.6%
7	**Titan**	560,640	17.590	3	0.3223	1.2%
8	**Trinity**	301,056	8.101	10	0.1826	1.6%
9	**Pleiades**	243,008	5.952	13	0.1752	2.5%
10	**Mira**	786,432	8.587	9	0.1670	1.7%

Complete list on hpcg-benchmark.org:
http://www.hpcg-benchmark.org/custom/index.html?lid=155&slid=289