



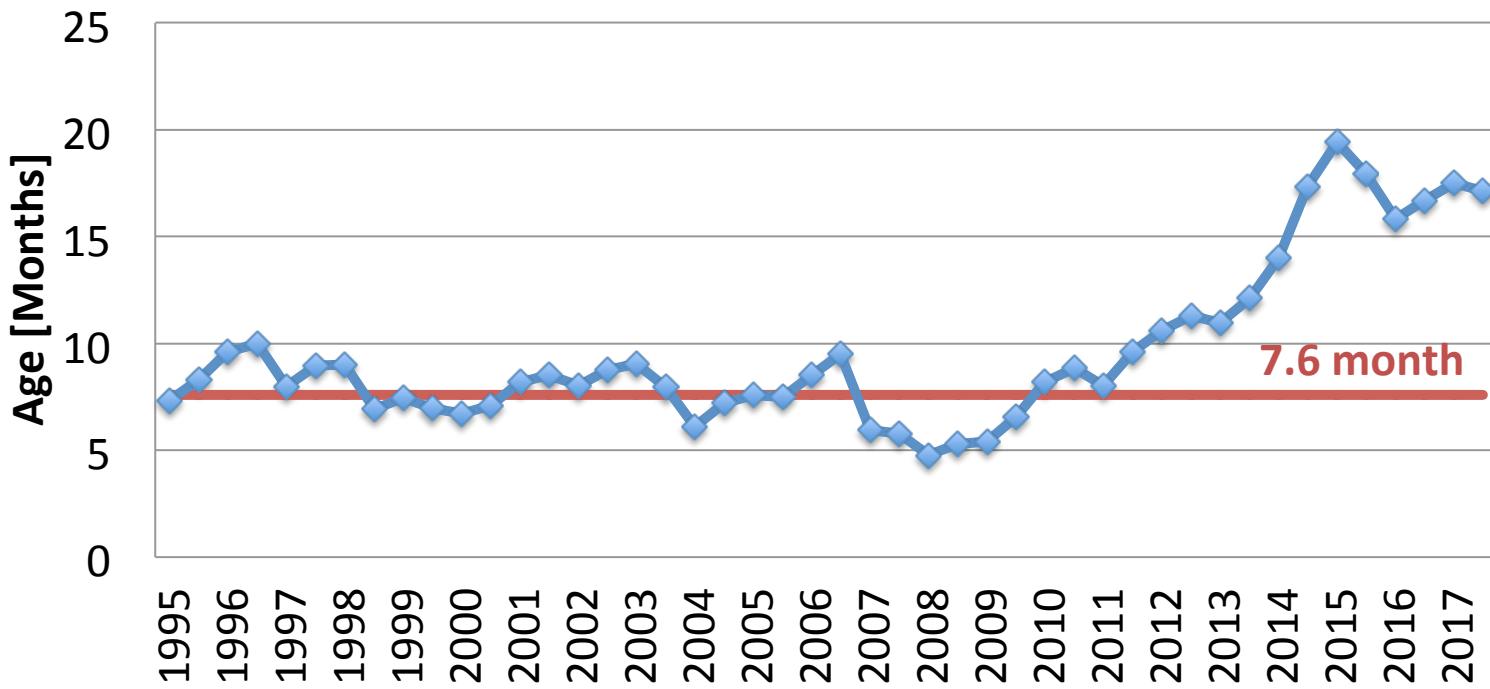
# Highlights of the 50<sup>th</sup> TOP500 List

SC17,  
Denver,  
November 14,  
2017

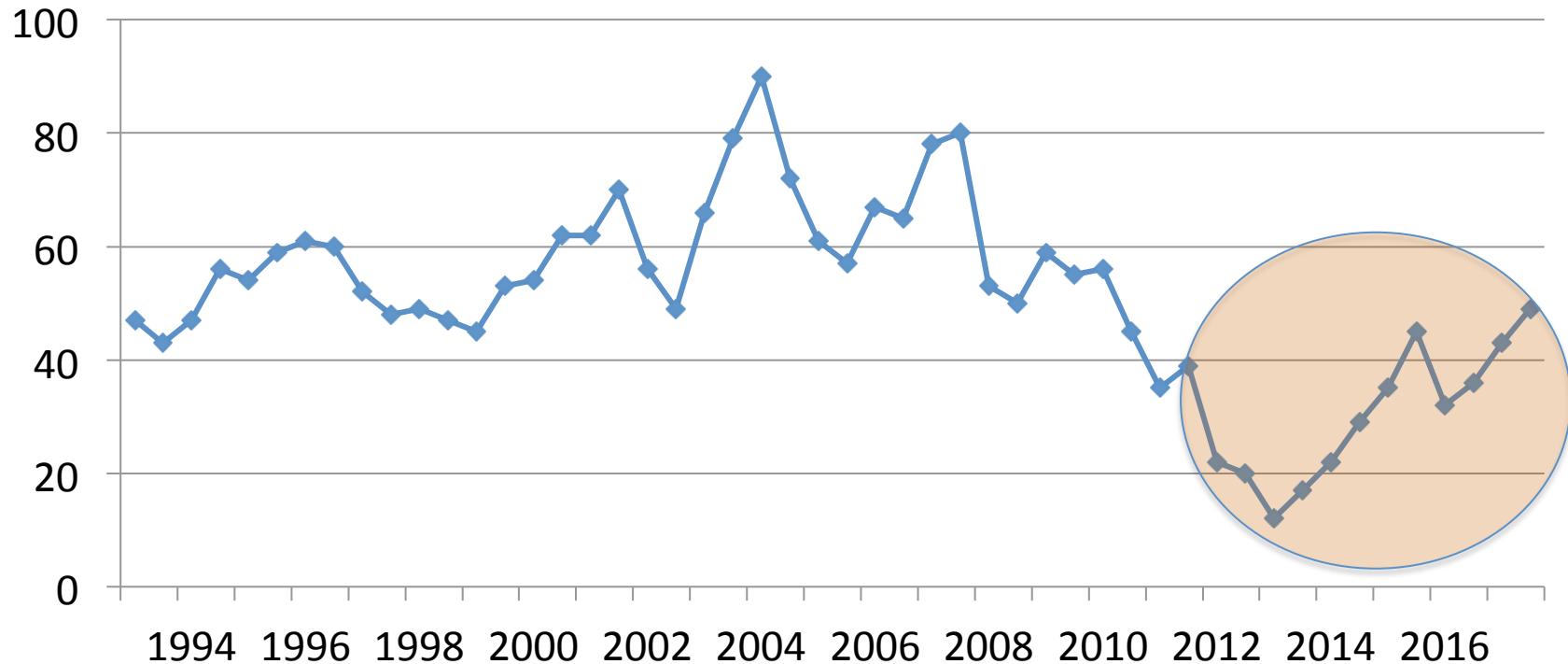
Erich  
Strohmaier

#	Site	Manufacturer	Computer	Country	Cores	Rmax [Pflops]	Power [MW]
1	National Supercomputing Center in Wuxi	NRCPC	<b>Sunway TaihuLight</b> NRCPC Sunway SW26010, 260C 1.45GHz	China	10,649,600	93.0	15.4
2	National University of Defense Technology	NUDT	<b>Tianhe-2</b> NUDT TH-IVB-FEP, Xeon 12C 2.2GHz, IntelXeon Phi	China	3,120,000	33.9	17.8
3	Swiss National Supercomputing Centre (CSCS)	Cray	<b>Piz Daint</b> Cray XC50, Xeon E5 12C 2.6GHz, Aries, NVIDIA Tesla P100	Switzerland	361,760	19.6	2.27
4	Japan Agency for Marine-Earth Science and Technology	ExaScaler	<b>Gyoukou</b> ZettaScaler-2.2 HPC System, Xeon 16C 1.3GHz, IB-EDR, PEZY-SC2 700Mhz	Japan	19,860,000	19.1	1.35
5	Oak Ridge National Laboratory	Cray	<b>Titan</b> Cray XK7, Opteron 16C 2.2GHz, Gemini, NVIDIA K20x	USA	560,640	17.6	8.21
6	Lawrence Livermore National Laboratory	IBM	<b>Sequoia</b> BlueGene/Q, Power BQC 16C 1.6GHz, Custom	USA	1,572,864	17.2	7.89
7	Los Alamos NL / Sandia NL	Cray	<b>Trinity</b> Cray XC40, Intel Xeon Phi 7250 68C 1.4GHz, Aries	USA	979,968	14.1	3.84
8	Lawrence Berkeley National Laboratory	Cray	<b>Cori</b> Cray XC40, Intel Xeons Phi 7250 68C 1.4 GHz, Aries	USA	622,336	14.0	3.94
9	JCAHPC Joint Center for Advanced HPC	Fujitsu	<b>Oakforest-PACS</b> PRIMERGY CX1640 M1, Intel Xeons Phi 7250 68C 1.4 GHz, OmniPath	Japan	556,104	13.6	2.72
10	RIKEN Advanced Institute for Computational Science	Fujitsu	<b>K Computer</b> SPARC64 VIIIfx 2.0GHz, Tofu Interconnect	Japan	795,024	10.5	12.7

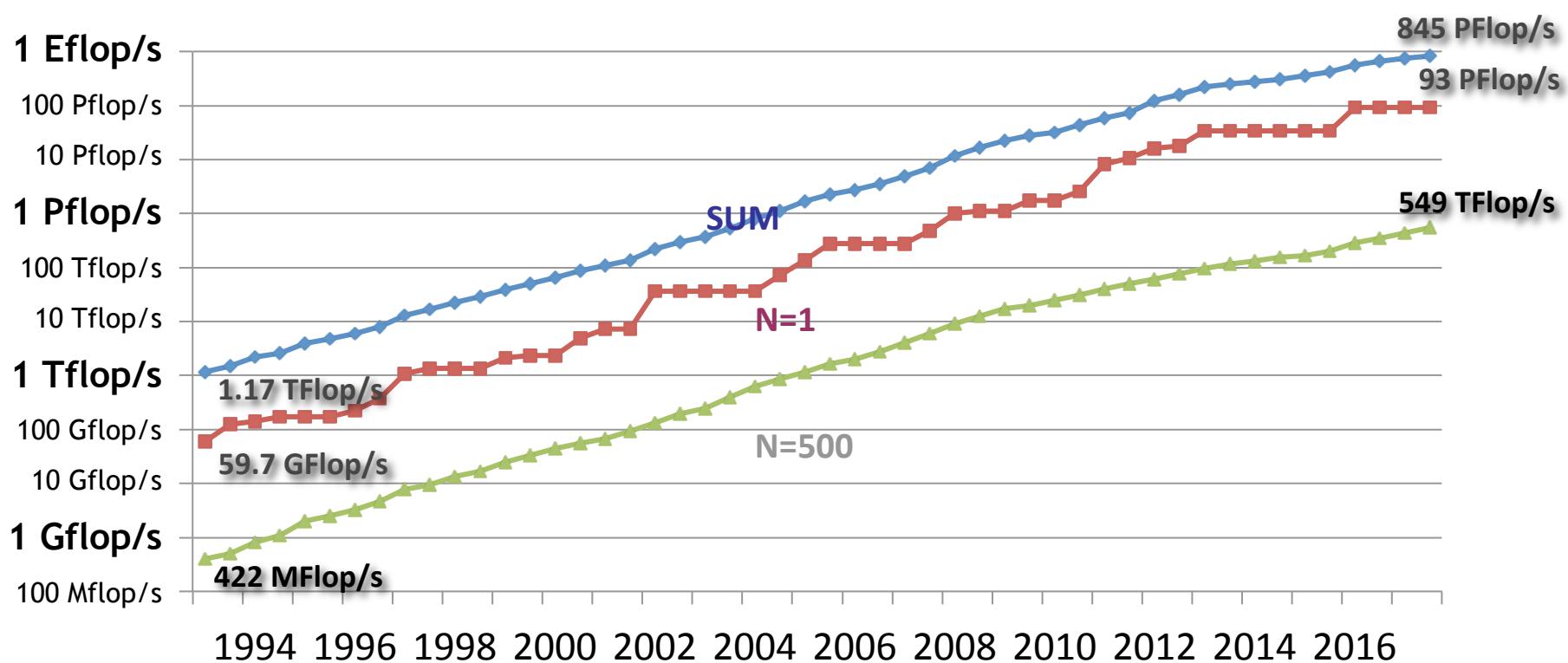
# AVERAGE SYSTEM AGE



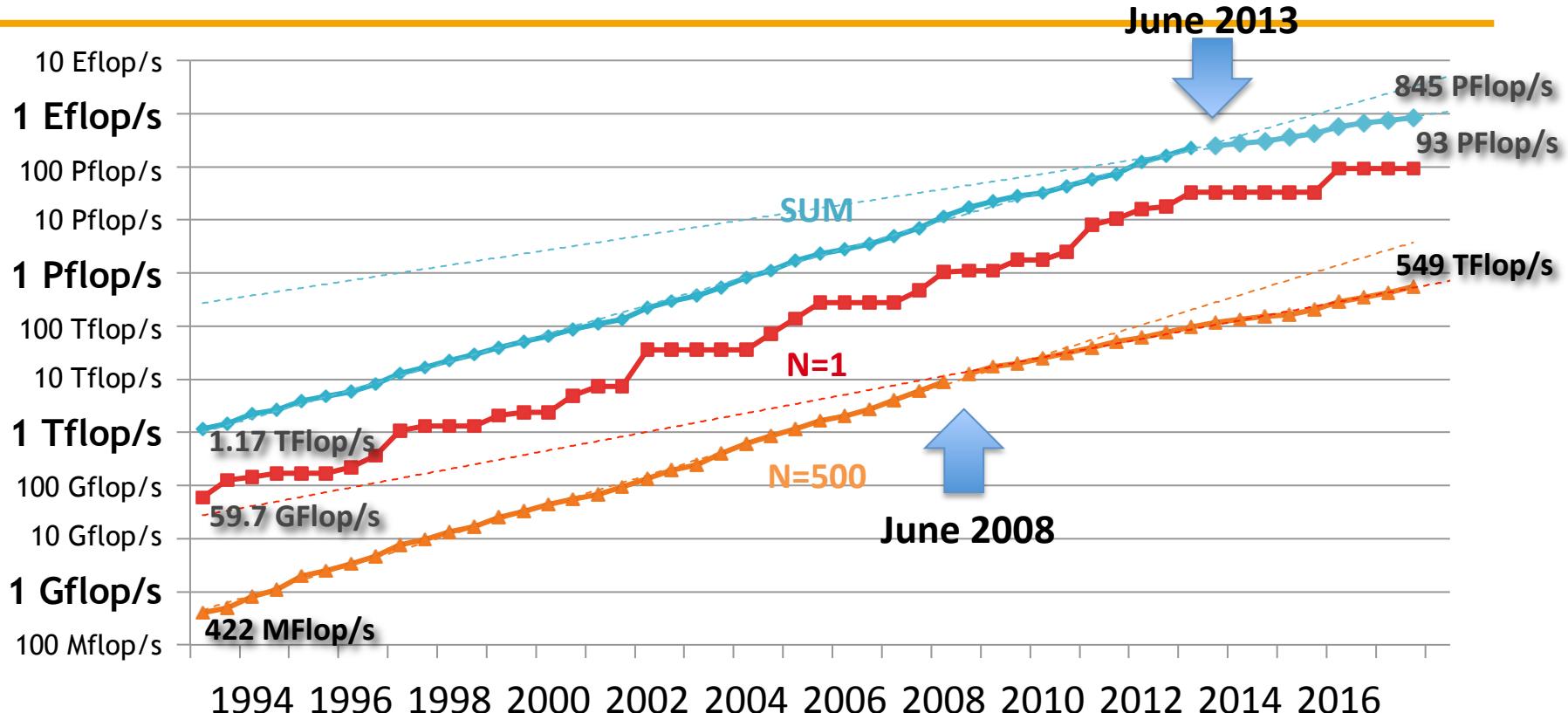
# RANK AT WHICH HALF OF TOTAL PERFORMANCE IS ACCUMULATED



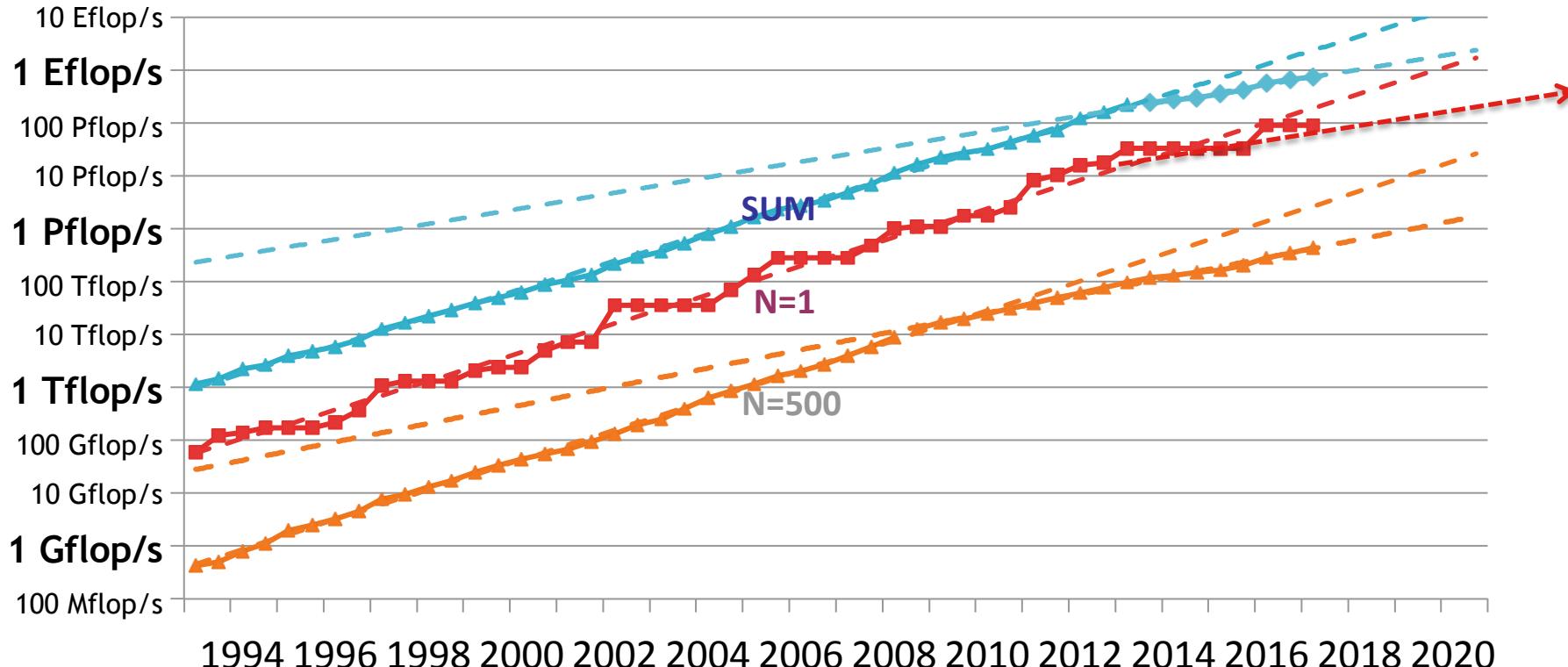
# PERFORMANCE DEVELOPMENT



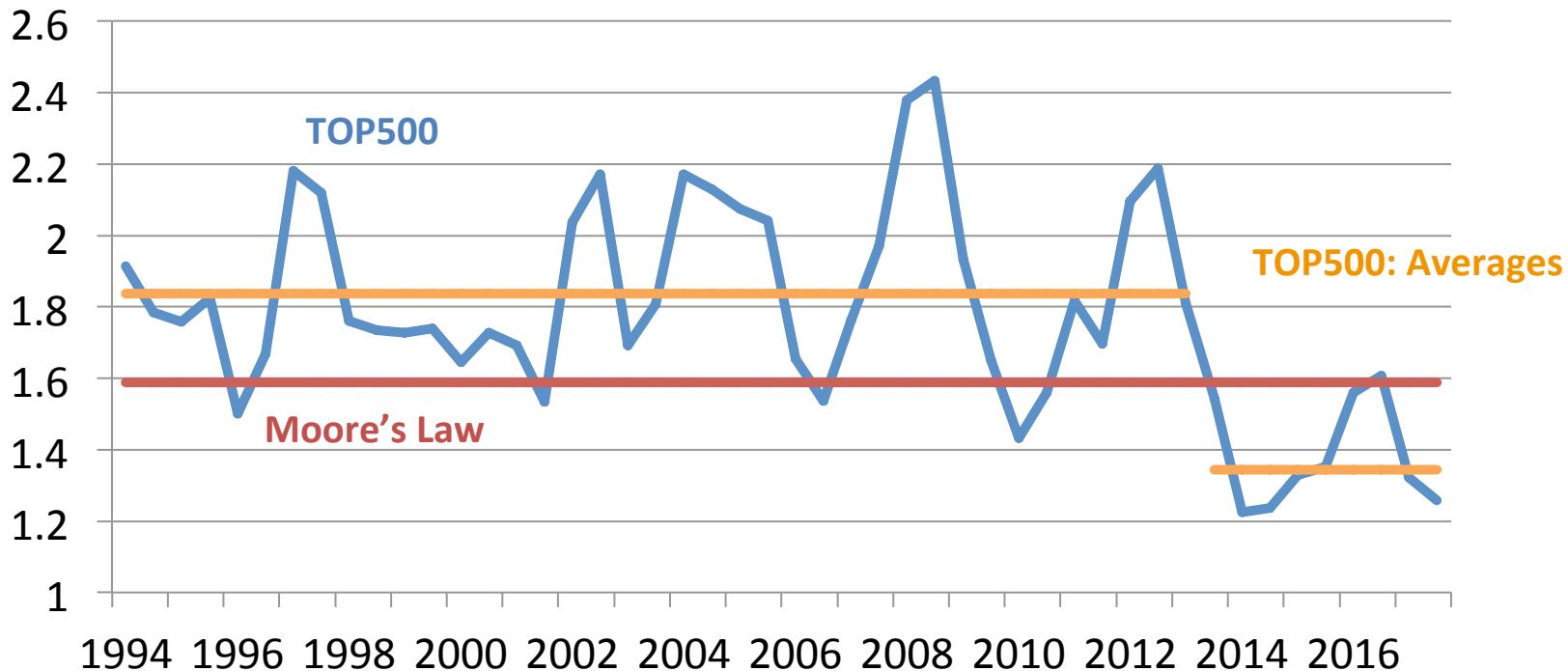
# PERFORMANCE DEVELOPMENT



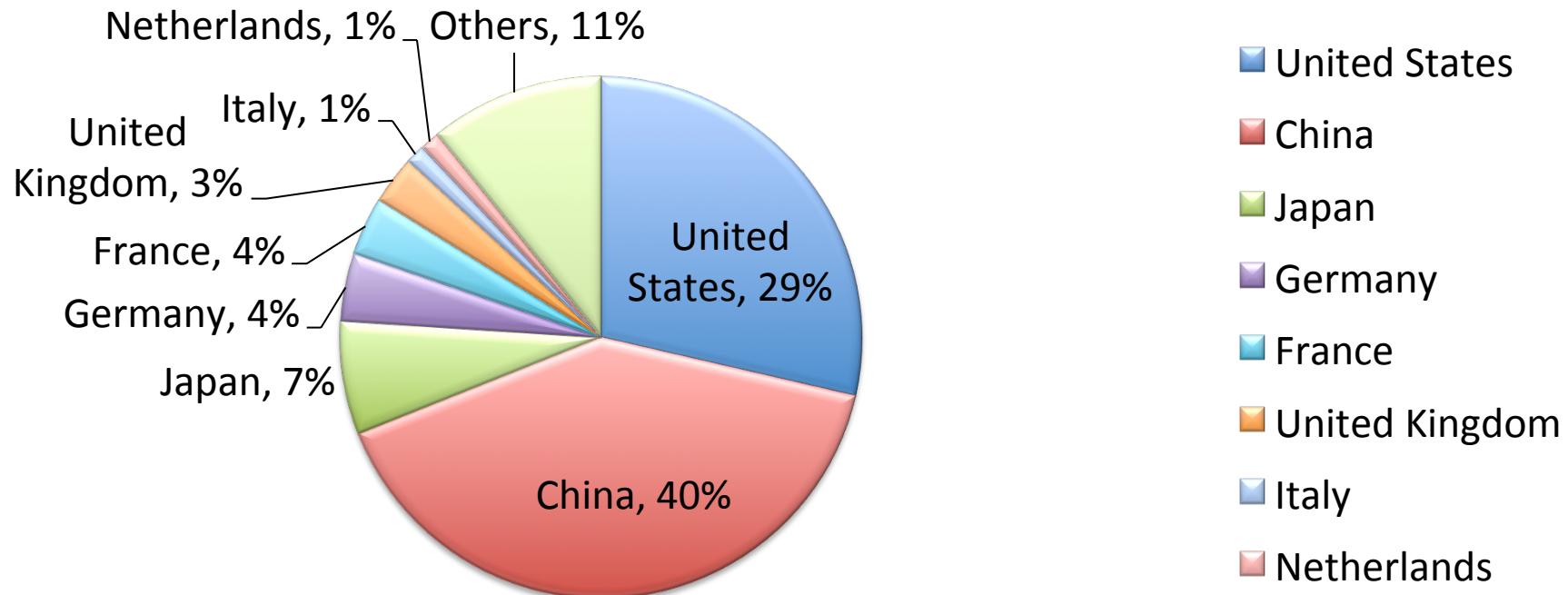
# PROJECTED PERFORMANCE DEVELOPMENT



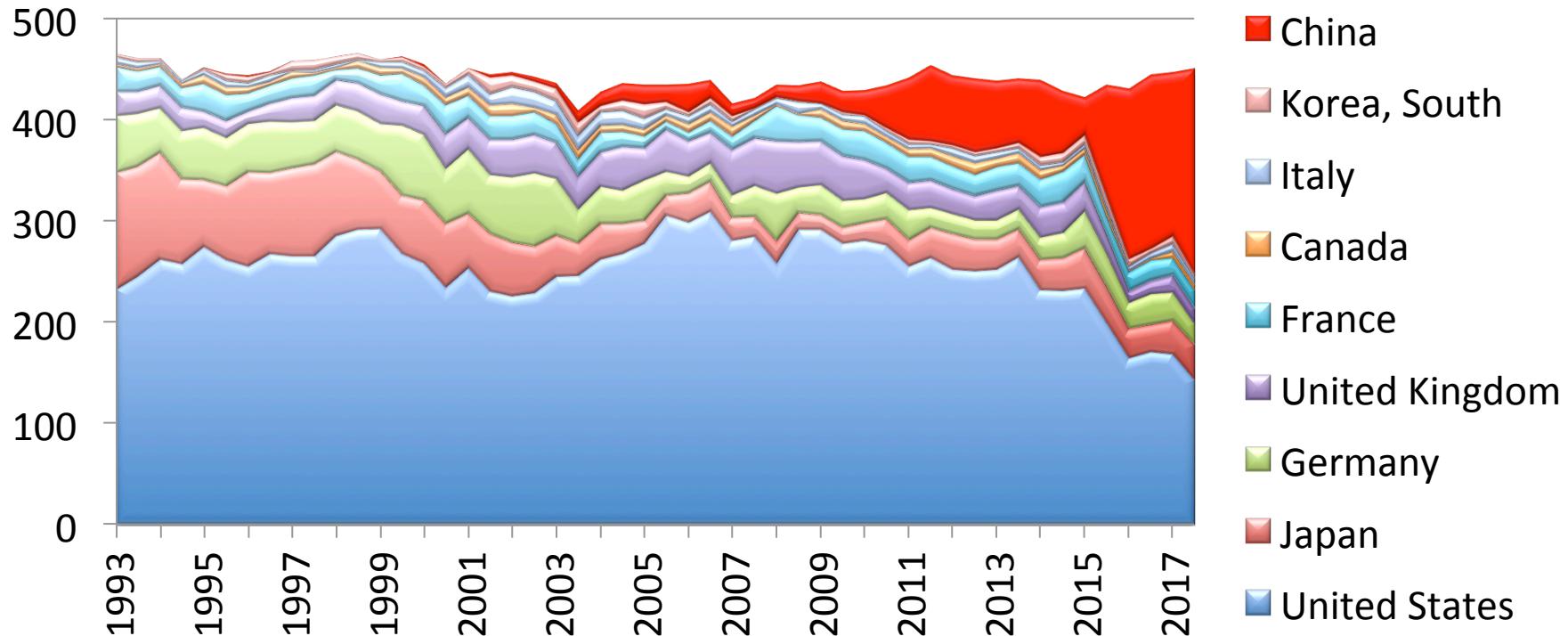
# ANNUAL PERFORMANCE INCREASE OF THE TOP500



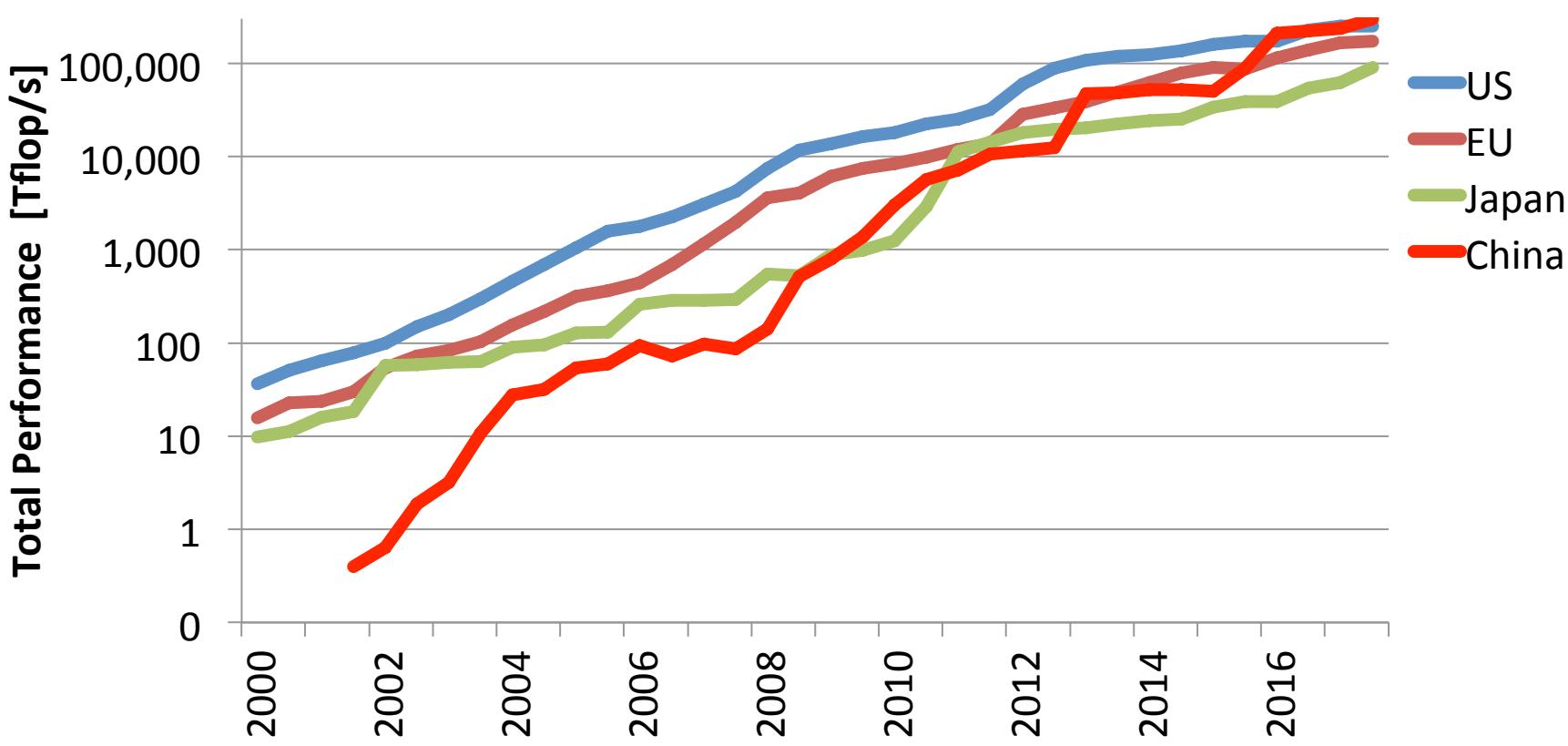
# COUNTRIES / SYSTEM SHARE



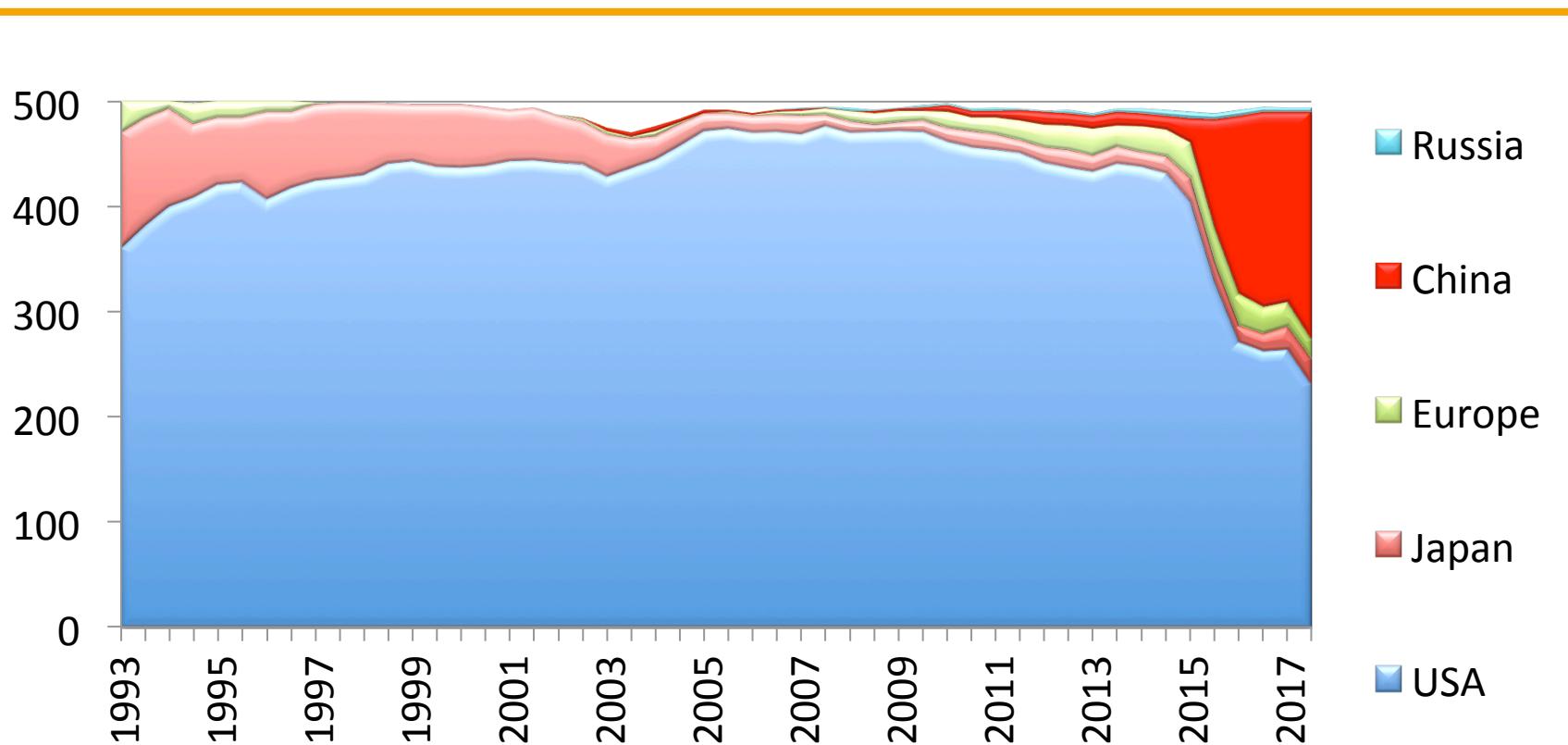
# COUNTRIES



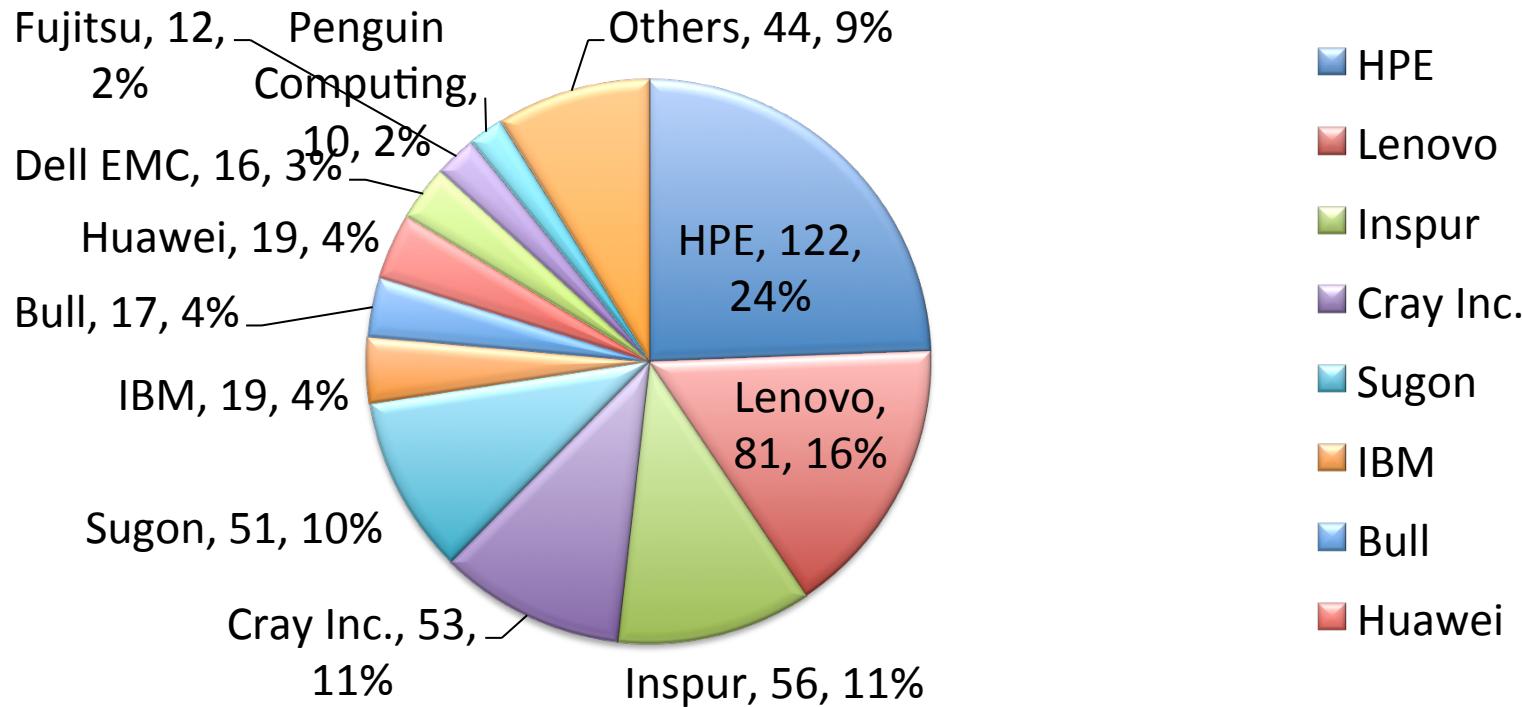
# PERFORMANCE OF COUNTRIES



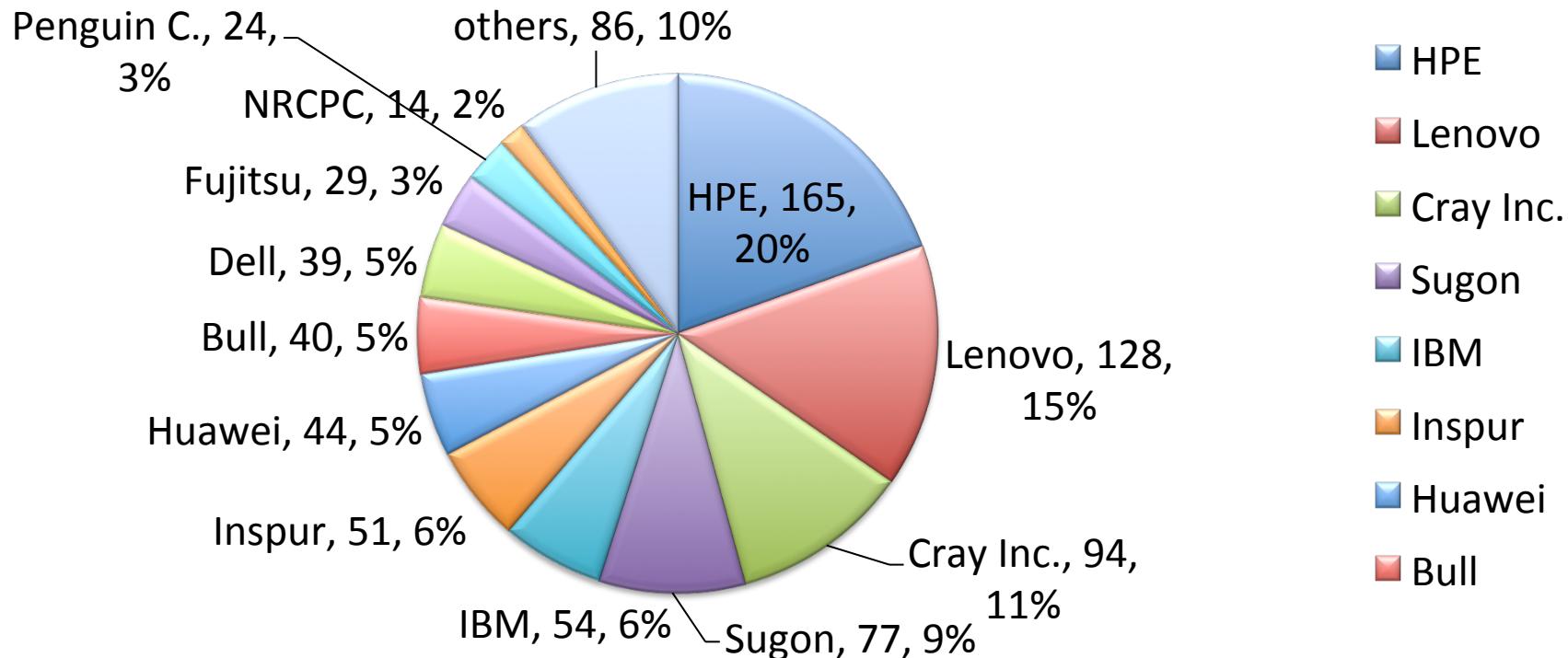
# PRODUCERS



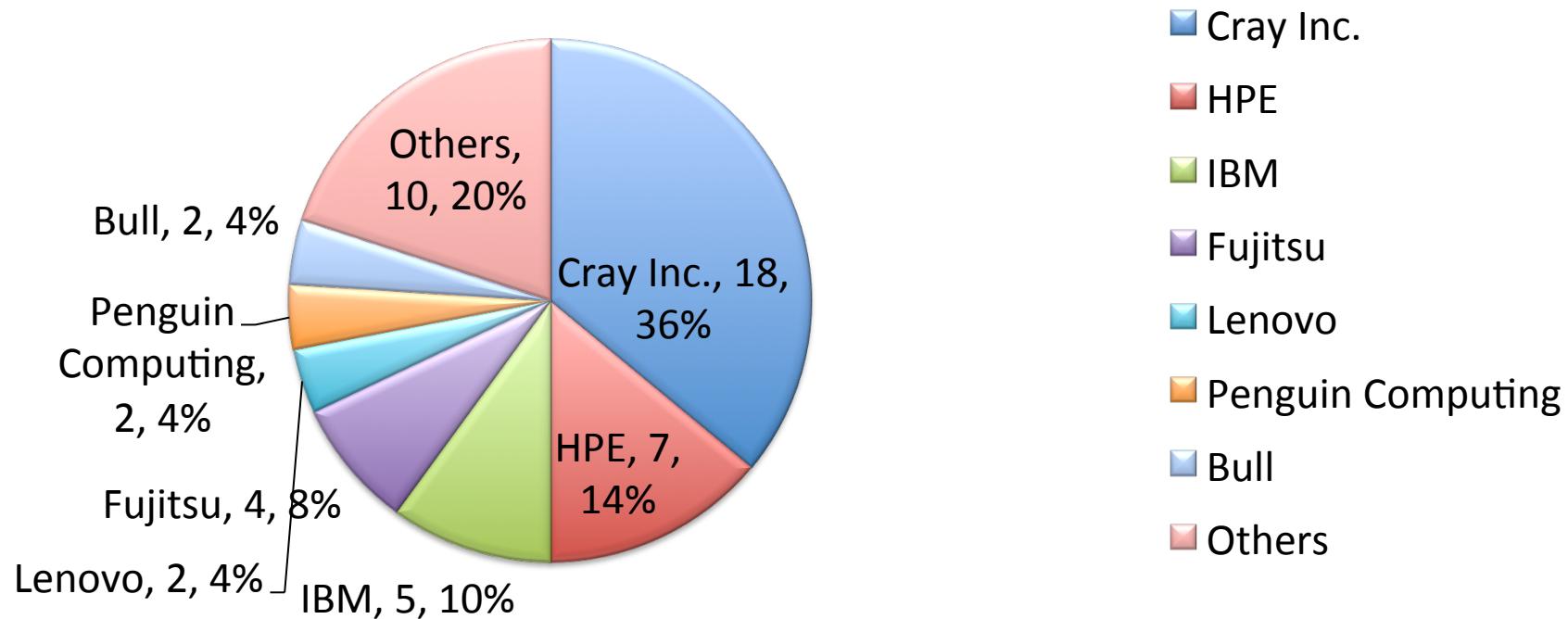
# VENDORS / SYSTEM SHARE



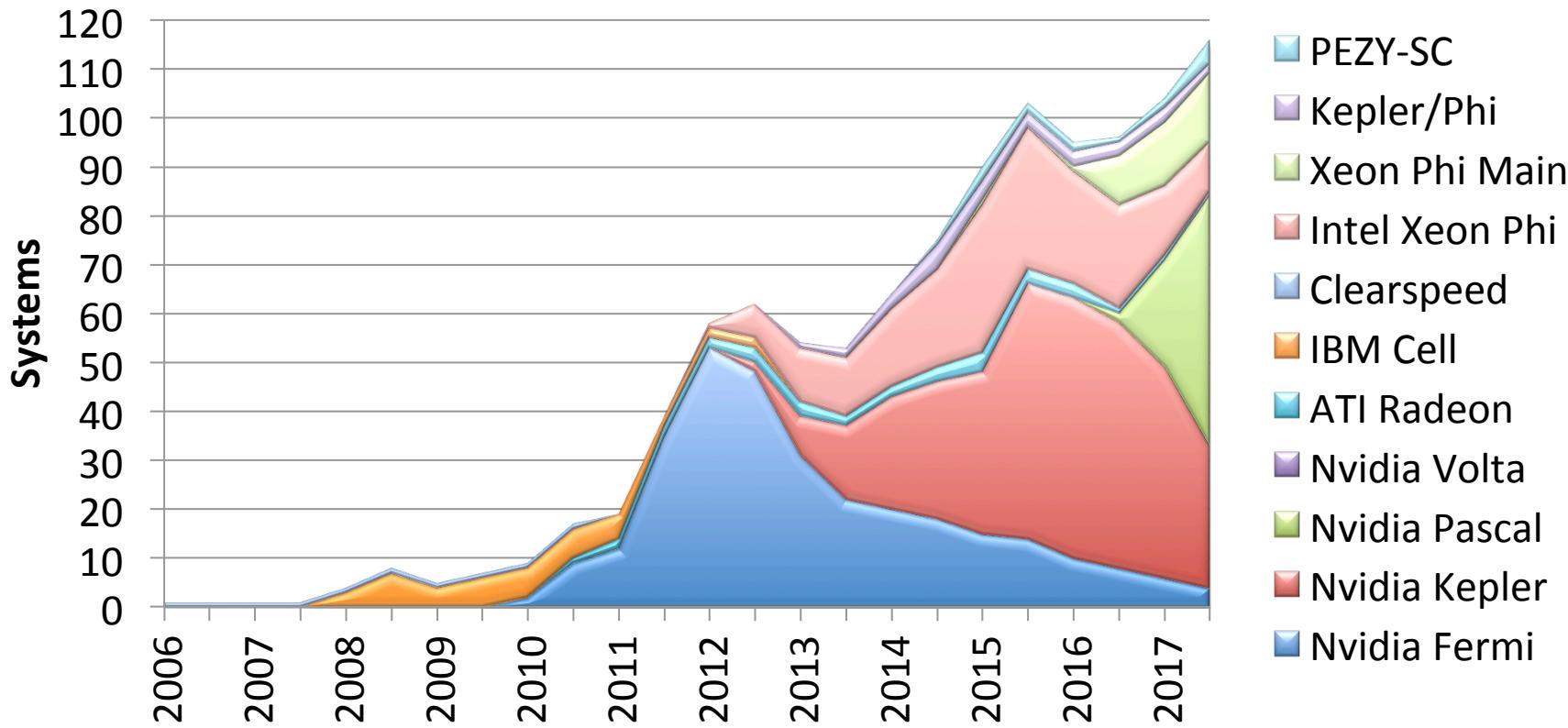
# VENDORS / PERFORMANCE SHARE



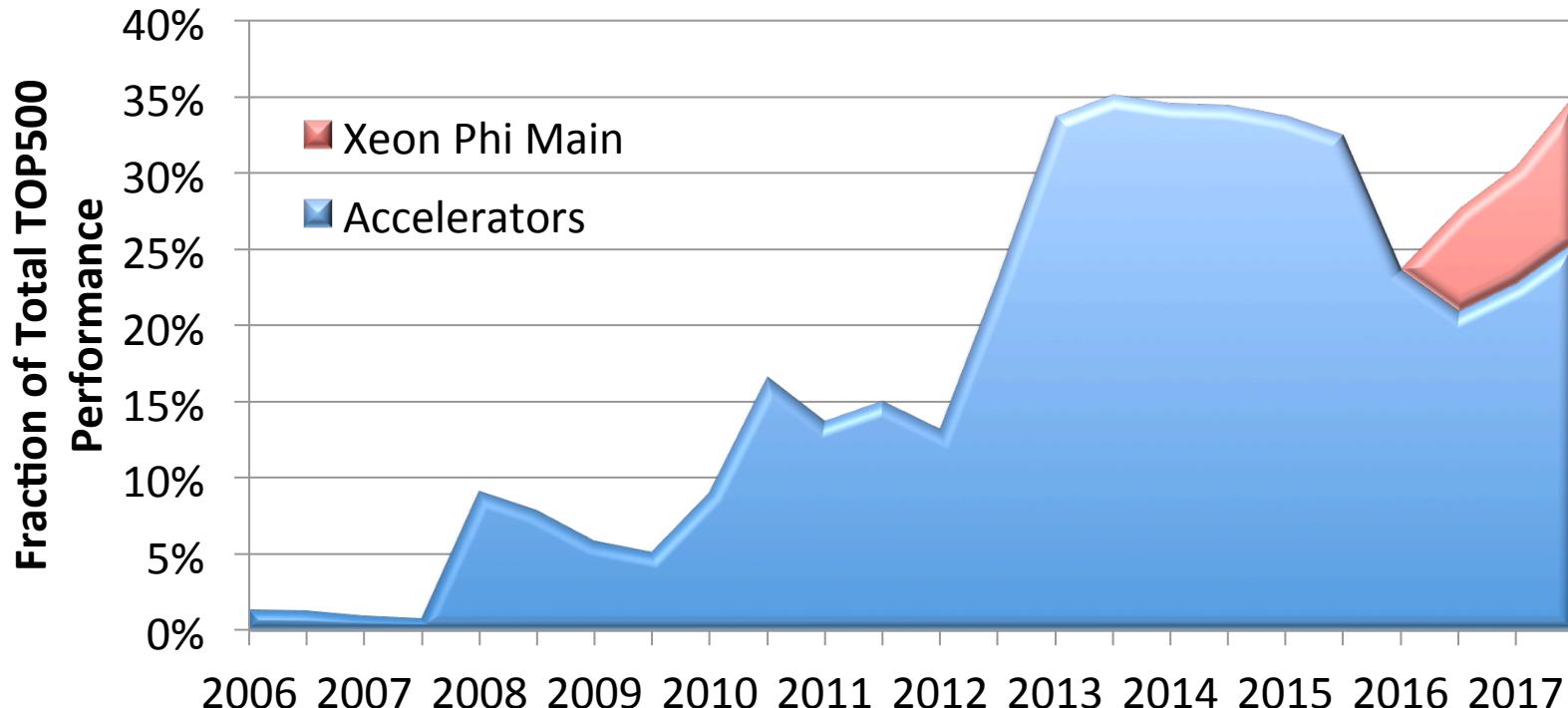
# VENDORS (TOP50) / SYSTEM SHARE



# ACCELERATORS



# PERFORMANCE SHARE OF ACCELERATORS





# TOP500 - GREEN500



- Both projects worked for several year to unify measurement and reporting approaches (EEHPC-WG: Energy-Efficient HPC Working Group ).
- Ultimately this lead us to combine data collection and curation in one site and system.
- Both lists will continue to be published at the same time (ISC and SC).
- We are working on combining past data-sets and sites.
- Both sites will be hosted and maintained by the ISC Group.

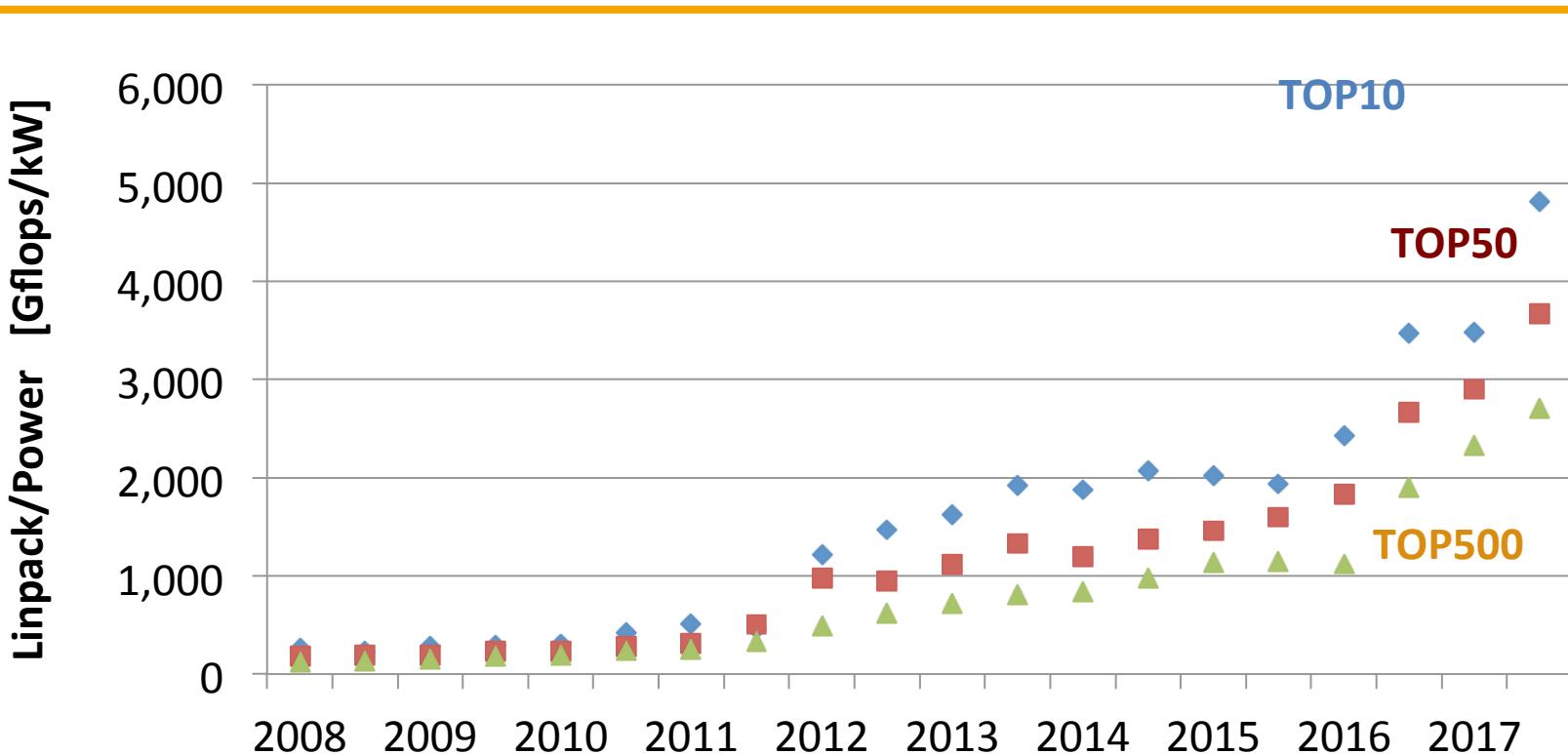
# MOST ENERGY EFFICIENT ARCHITECTURES

Computer				Rmax/ Power
<b>Shoubou system B</b> , ZettaScaler-2.2	Xeon 16C 1.3GHz	Infiniband EDR	PEZY-SC2	<b>17.0</b>
<b>Suiren2</b> , ZettaScaler-2.2	Xeon 16C 1.3GHz	Infiniband EDR	PEZY-SC2	<b>16.8</b>
<b>Sakura</b> , ZettaScaler-2.2	Xeon 8C 2.3GHz	Infiniband EDR	PEZY-SC2	<b>16.7</b>
<b>DGX Saturn V</b> , NVIDIA DGX-1 Volta36	Xeon 20C 2.2GHz	Infiniband EDR	Tesla V100	<b>15.1*</b>
<b>Gyoukou</b> , ZettaScaler-2	Xeon 16C 1.3GHz	Infiniband EDR	PEZY-SC2	<b>14.2</b>
<b>Tsubame 3.0</b> , SGI ICE XA	Xeon 14C 2.4GHz	Intel Omni-Path	Tesla P100 SXM2	<b>13.7*</b>
<b>AIST AI Cloud</b> , NEC 4U-8GPU	Xeon 10C 1.8GHz	Infiniband EDR	Tesla P100 SXM2	<b>12.7</b>
<b>RAIDEN GPU subsystem</b> , NVIDIA DGX-1	Xeon 20C 2.2GHz	Infiniband EDR	Tesla P100	<b>10.6</b>
<b>Wilkes-2</b> , Dell C4130	Xeon 12C 2.2GHz	Infiniband EDR	Tesla P100	<b>10.4</b>
<b>Piz Daint</b> , Cray XC50	Xeon 12C 2.6GHz	Aries interconnect	Tesla P100	<b>10.4*</b>

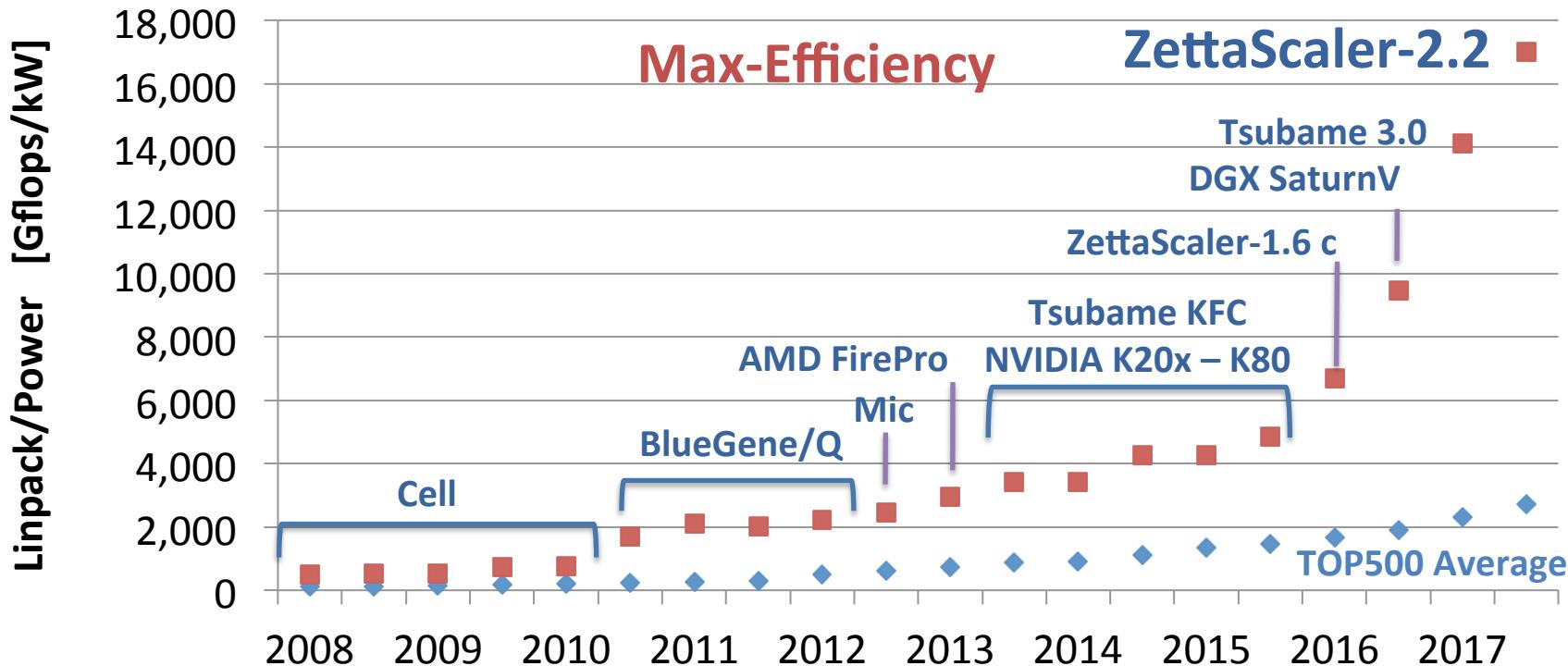
\* Efficiency based on Power optimized HPL runs of equal size to TOP500 run.

[Gflops/Watt]

# POWER EFFICIENCY



# ENERGY EFFICIENCY



# TOP500 - HPCG

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- Longstanding interest to augment HPL with other benchmarks.
- Publishing HPCG numbers together with the TOP500.
- Submission still go to Jack and Mike first.
- 61 HPCG entries which made the TOP500  
(not necessarily the top61 HPCG measurements!).
  - 47 last June
- Ability to resort and filter on our web-lists.
- Top10 ... Mike Heroux

#	T	Site	Manufacturer	Computer	Country	HPCG [Pflop/s]	Rmax [Pflop/s]	HPCG/ Peak	HPCG/ HPL
1	10	RIKEN Advanced Institute for Computational Science	Fujitsu	K Computer SPARC64 VIIIfx 2.0GHz, Tofu Interconnect	Japan	0.6027	10.5	5.3%	5.7%
2	2	National University of Defense Technology	NUDT	Tianhe-2 NUDT TH-IVB-FEP, Xeon 12C 2.2GHz, IntelXeon Phi	China	0.5801	33.9	1.1%	1.7%
3	7	Los Alamos NL / Sandia NL	Cray	Trinity Cray XC40, Intel Xeon Phi 7250 68C 1.4GHz, Aries	USA	0.5461	14.1	1.2%	3.9%
4	3	Swiss National Supercomputing Centre (CSCS)	Cray	Piz Daint Cray XC50, Xeon E5 12C 2.6GHz, Aries, NVIDIA Tesla P100	Switzerland	0.4864	19.6	1.9%	2.5%
5	1	National Supercomputing Center in Wuxi	NRCPC	Sunway TaihuLight NRCPC Sunway SW26010, 260C 1.45GHz	China	0.4808	93.0	0.4%	0.5%
6	9	JCAHPC Joint Center for Advanced HPC	Fujitsu	Oakforest-PACS PRIMERGY CX1640 M1, Intel Xeons Phi 7250 68C 1.4 GHz, OmniPath	Japan	0.3855	13.6	1.5%	2.8%
7	8	Lawrence Berkeley National Laboratory	Cray	Cori Cray XC40, Intel Xeons Phi 7250 68C 1.4 GHz, Aries	USA	0.3554	14.0	1.3%	2.5%
8	6	Lawrence Livermore National Laboratory	IBM	Sequoia BlueGene/Q, Power BQC 16C 1.6GHz, Custom	USA	0.3304	17.2	1.6%	1.9%
9	5	Oak Ridge National Laboratory	Cray	Titan Cray XK7, Opteron 16C 2.2GHz, Gemini, NVIDIA K20x	USA	0.3223	17.6	1.2%	1.8%
10	13	GSIC Center, Tokyo Institute of Technology	HPE	Tsubame 3.0 SGI ICE XA, Xeon E5 14C 2.4GHz, OmniPath, NVIDIA P100	Japan	0.1886	8.1	1.6%	2.3%

# SC17 HPCG HIGHLIGHTS

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- Top 10 machine experience a serious rearrangement.
- US returns to the Top 3 club.
- Trinity gets an upgrade and improves its HPCG score from 180 TF to 550 TF
- Piz Daint passes TaihuLight with improved result.
- TSUBAME 3.0 submits a new result with 4x improvement in performance.
- Mare Nostrum 4 shows HPCG performance on Intel Skylake cores.
- First Volta results from the recently released DGX-1V system.
- International Space Station computer by HPE submits HPCG result!