26A Top 500 Fastest System
CSC 230

Department of Computer Science
University of Victoria

The Top 5 Fastest Systems (2014) Data obtained from the Top 500 List at http://www.top500.org

flop =
floating point operation

Kilo = 10^3
Mega = 10^6
Giga = 10^9
Tera = 10^{12}
Peta = 10^{15}

Exa = 10^{18}
Zetta = 10^{21}
Yotta = 10^{24}

The Top 5 Fastest Systems (2014) Data obtained from the Top 500 List at http://www.top500.org

43rd List: The TOP10

#	Site	Manufacturer	Computer	Country	Cores	Rmax [Pflops]	Power [MW]
1	National University of Defense Technology	NUDT	Tianhe-2 NUDT TH-IVB-FEP, Xeon 12C 2.2GHz, IntelXeon Phi	China	3,120,000	33.9	17.8
2	Oak Ridge National Laboratory	Cray	Titan Cray XK7, Opteron 16C 2.2GHz, Gemini, NVIDIA K20x	USA	560,640	17.6	8.21
3	Lawrence Livermore National Laboratory	IBM	Sequoia BlueGene/Q, Power BQC 16C 1.6GHz, Custom	USA	1,572,864	17.2	7.89
4	RIKEN Advanced Institute for Computational Science	Fujitsu	K Computer SPARC64 VIIIfx 2.0GHz, Tofu Interconnect	Japan	795,024	10.5	12.7
5	Argonne National Laboratory	IBM	Mira BlueGene/Q, Power BQC 16C 1.6GHz, Custom	USA	786,432	8.59	3.95
6	Swiss National Supercomputing Centre (CSCS)	Cray	Piz Daint Cray XC30, Xeon E5 8C 2.6GHz, Aries, NVIDIA K20x	Switzer-land	115,984	6.27	2.33
7	Texas Advanced Computing Center/UT	Dell	Stampede PowerEdge C8220, Xeon E5 8C 2.7GHz, Intel Xeon Phi	USA	462,462	5.17	4.51
8	Forschungszentrum Juelich (FZJ)	IBM	JuQUEEN BlueGene/Q, Power BQC 16C 1.6GHz, Custom	Germany	458,752	5.01	2.30
9	Lawrence Livermore National Laboratory	IBM	Vulcan BlueGene/Q, Power BQC 16C 1.6GHz, Custom	USA	393,216	4.29	1.97
10	Government	Cray	Cray XC30, Xeon E5 12C 2.7GHz, Aries	USA	225,984	3.14	

The Top 5 Fastest Systems (2014) Data obtained from the Top 500 List at http://www.top500.org

Highlights: TOP10

- Titan, a Cray XK7 system installed at the Department of Energy's (DOE) Oak Ridge National Laboratory remains the No. 2 system. It achieved 17.59 Pflop/s on the Linpack benchmark using 261,632 of its NVIDIA K20x accelerator cores. Titan is one of the most energy efficient systems on the list consuming a total of 8.21 MW and delivering 2.143 Gflops/W.
- Sequoia, an IBM BlueGene/Q system installed at DOE's Lawrence Livermore National Laboratory, is again the No. 3 system. It was first delivered in 2011 and has achieved 17.17 Pflop/s on the Linpack benchmark using 1,572,864 cores.
- Fujitsu's K computer installed at the RIKEN Advanced Institute for Computational Science (AICS) in Kobe, Japan, is the No. 4 system with 10.51 Pflop/s on the Linpack benchmark using 705,024 SPARC64 processing cores.
- Mira, a BlueGene/Q system installed at DOE's Argonne National Laboratory, is No. 5 with 8.59 Pflop/s on the Linpack benchmark using 786,432 cores.

The Top 5 Fastest Systems (2014) Data obtained from the Top 500 List at http://www.top500.org

Highlights: TOP10

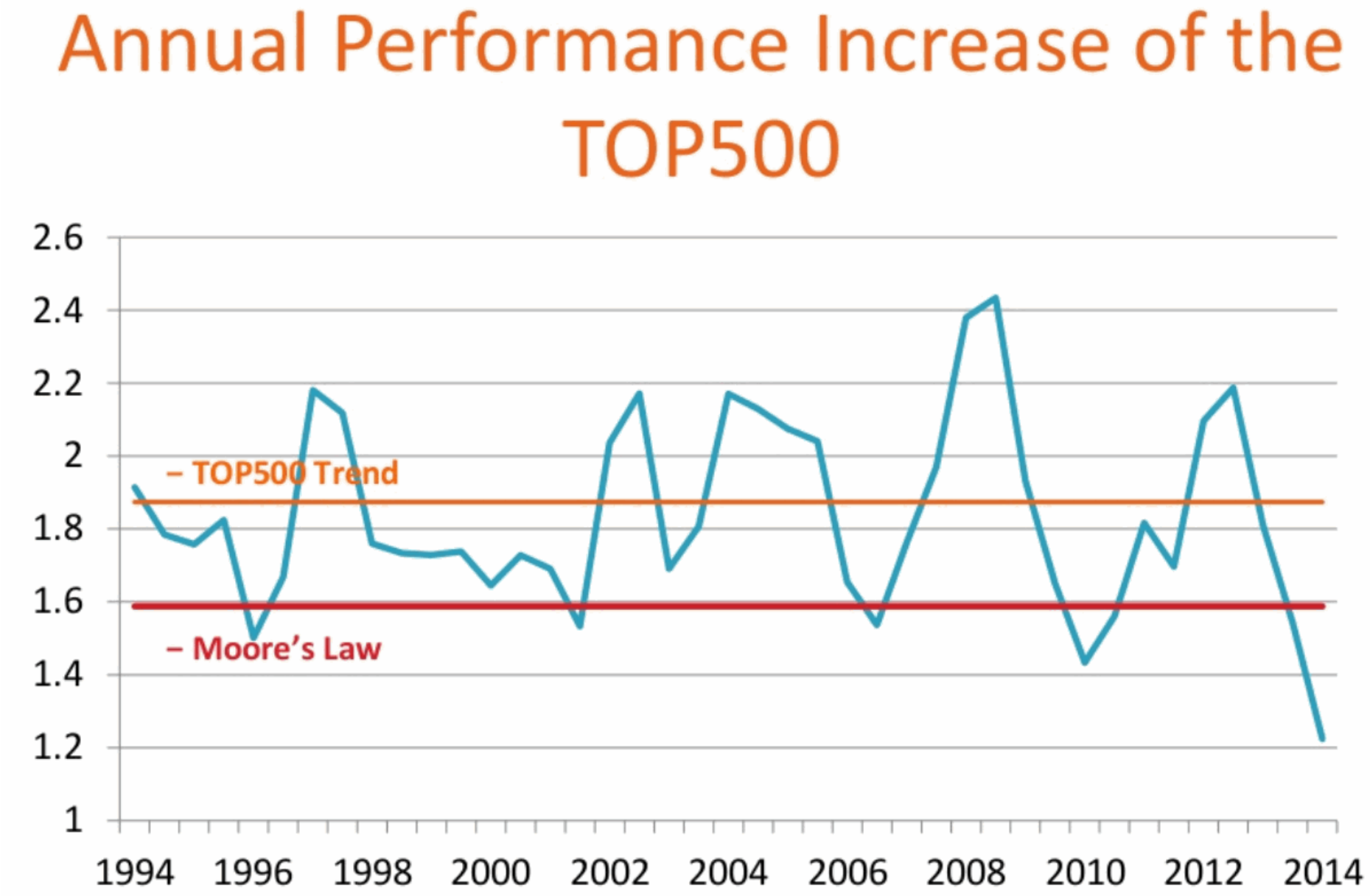
- At No. 6 is Piz Daint, a Cray XC30 system installed at the Swiss National Supercomputing Centre (CSCS) in Lugano, Switzerland and the most powerful system in Europe. Piz Daint achieved 6.27 Pflop/s on the Linpack benchmark using 73,808 NVIDIA K20x accelerator cores. Piz Daint is also the most energy efficient systems in the TOP10 consuming a total of 2.33 MW and delivering 2.7 Gflops/W.
- Stampede, a Dell PowerEdge C8220 system installed at the Texas Advanced Computing Center of the University of Texas, Austin, is at No. 7. It also uses Intel Xeon Phi processors (previously known as MIC) to achieve its 5.17 Pflop/s.
- The second system in Europe is at No. 8. It is also a BlueGene/Q system called JUQEEN installed at the Forschungszentrum Juelich in Germany and is listed with 5.01 Pflop/s.
- No. 9 is taken by Vulcan, another IBM BlueGene/Q system at Lawrence Livermore National Laboratory. It was temporarily combined with the No. 3 system but is now operated independently. It achieved 4.29 Pflop/s.
- At No. 10 is the only new system in the Top10, a Cray XC30 installed at a Government location in the USA with 3.14 Pflop/s.

The Top 5 Fastest Systems (2014) Data obtained from the Top 500 List at http://www.top500.org

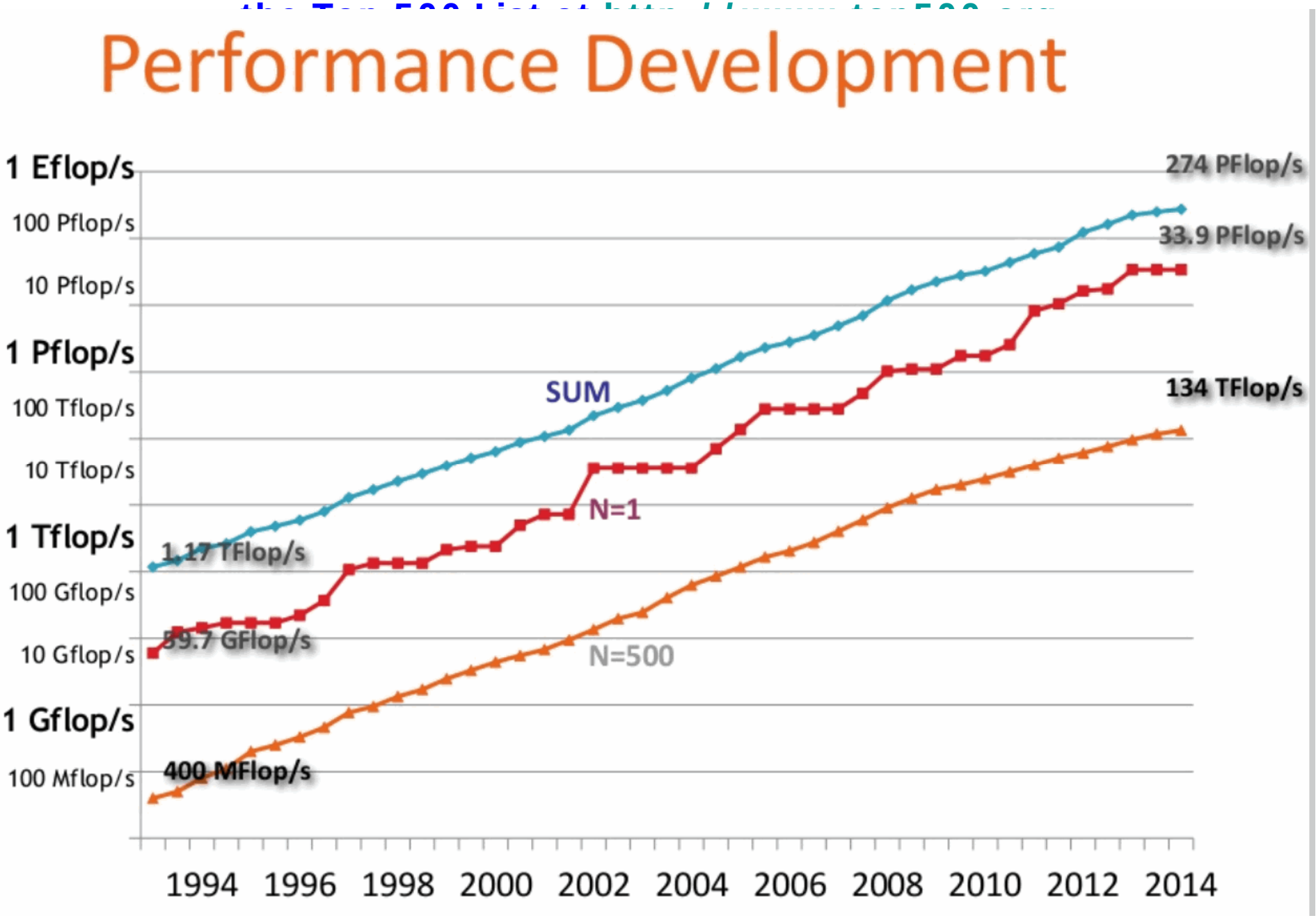
42nd List: The TOP10

#	Site	Manufacturer	Computer	Country	Cores	Rmax [Pflops]	Power [MW]
1	National University of Defense Technology	NUDT	Tianhe-2 NUDT TH-IVB-FEP, Xeon 12C 2.2GHz, IntelXeon Phi	China	3,120,000	33.9	17.8
2	Oak Ridge National Laboratory	Cray	Titan Cray XK7, Opteron 16C 2.2GHz, Gemini, NVIDIA K20x	USA	560,640	17.6	8.21
3	Lawrence Livermore National Laboratory	IBM	Sequoia BlueGene/Q, Power BQC 16C 1.6GHz, Custom	USA	1,572,864	17.2	7.89
4	RIKEN Advanced Institute for Computational Science	Fujitsu	K Computer SPARC64 VIIIfx 2.0GHz, Tofu Interconnect	Japan	795,024	10.5	12.7
5	Argonne National Laboratory	IBM	Mira BlueGene/Q, Power BQC 16C 1.6GHz, Custom	USA	786,432	8.59	3.95
6	Swiss National Supercomputing Centre (CSCS)	Cray	Piz Daint Cray XC30, Xeon E5 8C 2.6GHz, Aries, NVIDIA K20x	Switzer-land	115,984	6.27	2.33
7	Texas Advanced Computing Center/UT	Dell	Stampede PowerEdge C8220, Xeon E5 8C 2.7GHz, Intel Xeon Phi	USA	462,462	5.17	4.51
8	Forschungszentrum Juelich (FZJ)	IBM	JuQUEEN BlueGene/Q, Power BQC 16C 1.6GHz, Custom	Germany	458,752	5.01	2.30
9	Lawrence Livermore National Laboratory	IBM	Vulcan BlueGene/Q, Power BQC 16C 1.6GHz, Custom	USA	393,216	4.29	1.97
10	Leibniz Rechenzentrum	IBM	SuperMUC iDataPlex DX360M4, Xeon E5 8C 2.7GHz, Infiniband FDR	Germany	147,456	2.90	3.52

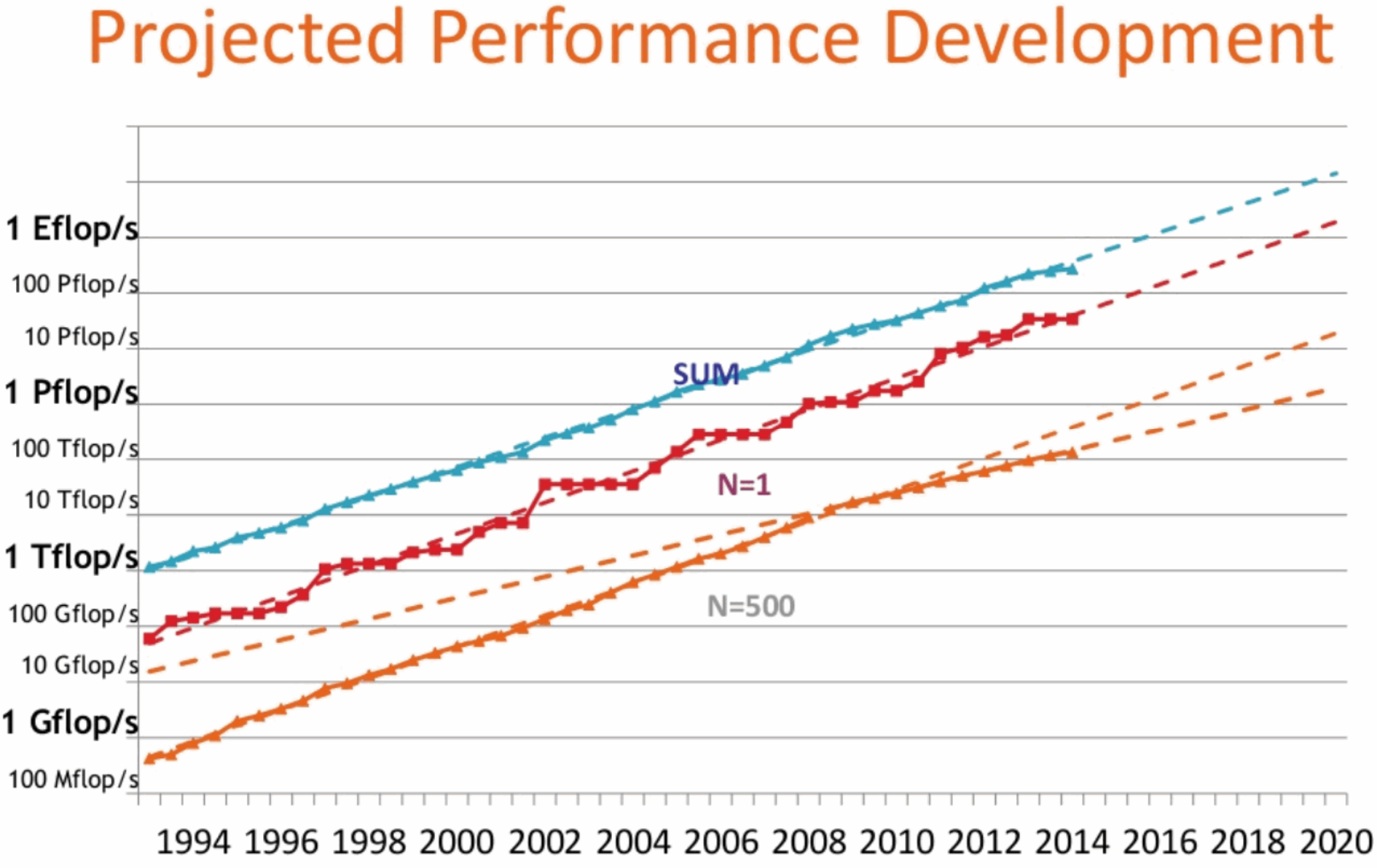
The Top 5 Fastest Systems (2014) Data obtained from the Top 500 List at http://www.top500.org



The Top 5 Fastest Systems (2014) Data obtained from the Top500 list at http://www.top500.org



The Top 5 Fastest Systems (2014) Data obtained from the Top 500 List at http://www.top500.org



The Top 5 Fastest Systems (2011)

Data obtained from the Top 500 List at
http://www.top500.org

Number one: K computer, Tofu interconnect

SPARC64 VIIIfx 2.0GHz

Manufacturer:	**Fujitsu**
Cores:	**705,024**
Power:	**12,659.89 Kw**
Memory:	**1,410,048 Gb**
Interconnect:	**Custom**
Operating System:	**Linux**

flop =
floating point operation

Kilo = 10^3
Mega = 10^6
Giga = 10^9
Tera = 10^{12}
Peta = 10^{15}

Exa = 10^{18}
Zetta = 10^{21}
Yotta = 10^{24}

The Top 5 Fastest Systems (2011)

Data obtained from the Top 500 List at
http://www.top500.org

Number two: **Tianhe-1A - NUDT YH MPP, Xeon X5670 6C 2.93 GHz, NVIDIA 2050**
(at National Supercomputing Center in Tianjin)

Manufacturer:	**NUDT**
Cores:	**186,368**
Power:	**4,040 Kw**
Memory:	**229,376 Gb**
Interconnect:	**Proprietary**
Operating System:	**Linux**

flop =
floating point operation

Kilo = 10^3
Mega = 10^6
Giga = 10^9
Tera = 10^{12}
Peta = 10^{15}

Exa = 10^{18}
Zetta = 10^{21}
Yotta = 10^{24}

The Top 5 Fastest Systems (2011)

Data obtained from the Top 500 List at
http://www.top500.org

Number three: Jaguar - Cray XT5-HE
Opteron 6-core 2.6 GHz
(at DOE/SC/Oak Ridge National Laboratory)

Manufacturer:	**Cray**
Cores:	**224,162**
Power:	**6,950 Kw**
Memory:	**229,376 Gb**
Interconnect:	**Proprietary**
Operating System:	**Linux**

flop =
floating point operation

Kilo = 10^3
Mega = 10^6
Giga = 10^9
Tera = 10^{12}
Peta = 10^{15}

Exa = 10^{18}
Zetta = 10^{21}
Yotta = 10^{24}

The Top 5 Fastest Systems (2008)

Data obtained from the Top 500 List at
http://www.top500.org

flop =
floating point operation

Kilo = 10^3
Mega = 10^6
Giga = 10^9
Tera = 10^{12}
Peta = 10^{15}

Exa = 10^{18}
Zetta = 10^{21}
Yotta = 10^{24}

Number one: Roadrunner (IBM)

- **located at the Los Alamos National Laboratory (LANL)**
- **achieves 1.026 petaflop/s**
- ***"The Roadrunner system is based on the IBM QS22 blades which are built with advanced versions of the processor in the Sony PlayStation 3."***

Fastest System of 2008 = Roadrunner (IBM)

Roadrunner is a cluster of approximately 3,250 compute nodes interconnected by an off-the-shelf parallel-computing network.

Each compute node consists of two AMD Opteron dual-core microprocessors, with each of the Opteron cores internally attached to one of four enhanced Cell microprocessors.

This enhanced Cell does double-precision arithmetic faster and can access more memory than can the original Cell in a PlayStation 3.

The entire machine will have almost 13,000 Cells and half as many dual-core Opterons.

The Top 5 Fastest Systems (2008)

Data obtained from the Top 500 List at http://www.top500.org

- **Number two: BlueGene/L (IBM)**
  - **DOE's Lawrence Livermore National Laboratory**
  - **Performance of 478.2 teraflop/s.**
- **Number three: the IBM BlueGene/P**
  - **DOE's Argonne National Laboratory**
  - **450.3 teraflop/s**
- **Number four: the Sun SunBlade x6420 "Ranger"**
  - **Texas Advanced Computing Center at the U. of Texas – Austin**
  - **326 teraflop/s**
- **Number five: the Cray XT4 "Jaguar"**
  - **DOE's Oak Ridge National Laboratory**
  - **205 teraflop/s**