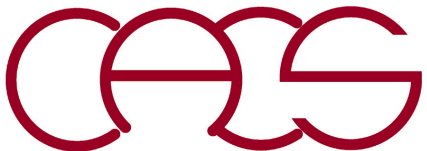


Exascaler Story


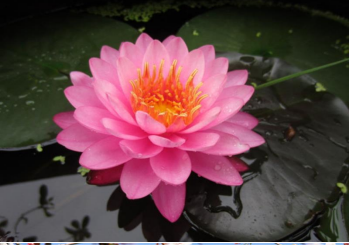

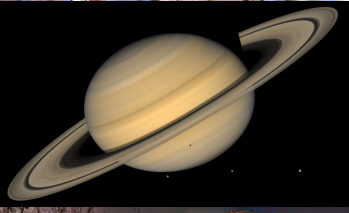

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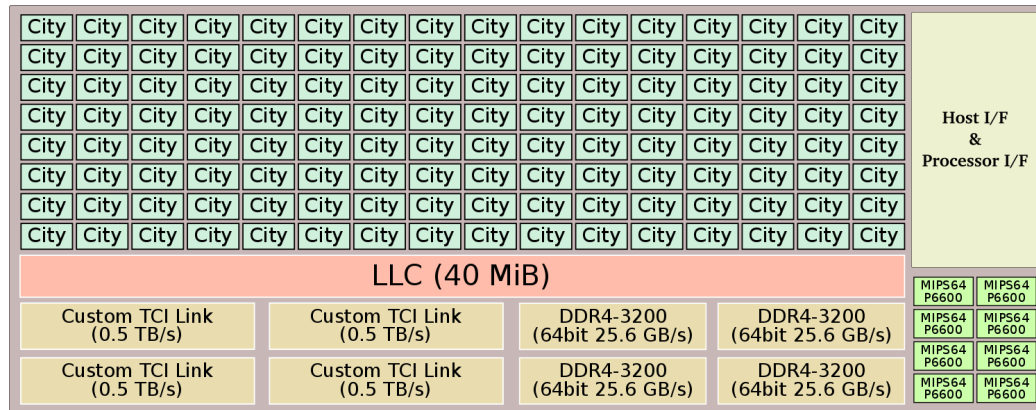
Green500

TOP500								
Rank	Rank	System	Cores	Rmax (TFlop/s)	Power (kW)	Power Efficiency (GFlops/watts)		
	1	259	Shoubu system B - ZettaScaler-2.2, Xeon D-1571 16C 1.3GHz, Infiniband EDR, PEZY-SC2 , PEZY Computing / Exascaler Inc. Advanced Center for Computing and Communication, RIKEN Japan	794,400	842.0	50	17.009	菖蒲
	2	307	Suiren2 - ZettaScaler-2.2, Xeon D-1571 16C 1.3GHz, Infiniband EDR, PEZY-SC2 , PEZY Computing / Exascaler Inc. High Energy Accelerator Research Organization /KEK Japan	762,624	788.2	47	16.759	睡蓮
	3	276	Sakura - ZettaScaler-2.2, Xeon E5-2618Lv3 8C 2.3GHz, Infiniband EDR, PEZY-SC2 , PEZY Computing / Exascaler Inc. PEZY Computing K.K. Japan	794,400	824.7	50	16.657	桜
	4	149	DGX SaturnV Volta - NVIDIA DGX-1 Volta36, Xeon E5-2698v4 20C 2.2GHz, Infiniband EDR, NVIDIA Tesla V100 , Nvidia NVIDIA Corporation United States	22,440	1,070.0	97	15.113	
	5	4	Gyokou - ZettaScaler-2.2 HPC system, Xeon D-1571 16C 1.3GHz, Infiniband EDR, PEZY-SC2 700Mhz , ExaScaler Japan Agency for Marine-Earth Science and Technology Japan	19,860,000	19,135.8	1,350	14.173	暁光

<http://www.top500.org/green500> (November 13, '17)

Motoaki Saito (齊藤 元章)

- 1992** MD from Niigata Univ. in Japan; fascinated by a fast (a few frames/sec) CT machine & broke it trying to find how it works
- 1992-97** Residency at Univ. of Tokyo medical school; developed real-time CT
- 1997** Told by Doug Boyd (Imatron) at a conference that a crazy guy like him should start a business in the US
- 1997** Founded a medical imaging company, TeraRecon, in Silicon Valley
- 2010** Founded PEZY Computing to develop many core processors (2012: 512-core PEZY-1; 2014: 1,024-core PEZY-SC; 2017: 2,048-core PEZY-SC2) & contribute to broader areas than medicine
- 2013** Founded UltraMemory to develop 3D DRAM stacks utilizing crosstalk coupling by Prof. Tadahiro Kuroda (Keio Univ.)



ThruChip Interface (TCI): Interchip communication through magnetic coupling

Based on *Wired Japan* interview: <https://wired.jp/special/2016/motoaki-saito>

Exascaler

- 2014** Told by Junichiro Makino (牧野 淳一郎, developer of GRAPE special-purpose computers & 7-time winner of Gordon Bell prize, a.k.a. Nobel prize of supercomputing) that a crazy guy like him should build a supercomputer in Japan
- 2014/4** Founded Exascaler to build power-efficient supercomputers based on liquid (fluorocarbon) immersion cooling
- 2014/11** Completed the first product, Sui ren (睡蓮), just in 7 months & with 10+ employees in Lockheed's skunkworks manner (*i.e.*, a small & loosely structured team researches & develops a radical innovation); top 2 in the Green500 list (4.95 Gflops/W)
- 2015/6** Top 1-3 in Green500 (up to 7.0 Gflops/W)
- 2017/11** Top 1-3, 5 in Green500 (Shoubu, 菖蒲, 17.0 Gflops/W *etc.*) & top 4 (Gyoukou, 暁光, 19.9 petaflop/s) in the Top500 list



<https://www.youtube.com/watch?v=dojXiMBMNHo>

Superneuromorphic Computing?

- 2016** Motoaki Saito founded Deep Insights with a vision to develop an artificial brain with the intelligence of one human brain (1 H), then a superbrain with the intelligence of the whole human brains combined (7.6 GH)
- 10^3 synapse/neuron by wireless 3D integration
 - Massive neurons by power-efficient liquid immersion cooling, *cf.* “More is different” (Phil Anderson)



<https://www.youtube.com/watch?v=97ieM6x5LVo>