

## **Fugaku: The first 'Exascale' Supercomputer with Real Application Performance as the Primary Target, and Towards the Future**

Satoshi Matsuoka  
Director, Riken-CCS /  
Professor, Tokyo Institute of Technology

### Abstract

Fugaku is the flagship next generation national supercomputer being developed by Riken R-CCS and Fujitsu in collaboration. Fugaku will have hyperscale datacenter class resource in a single exascale machine, with well more than 150,000 nodes of sever-class A64fx many-core Arm CPUs with the new SVE (Scalable Vector Extension) with low precision math for the first time in the world, accelerating both HPC and AI workloads, augmented with HBM2 memory paired with each CPU, exhibiting nearly a Terabyte/s memory bandwidth for both HPC and AI rapid data movements.

Fugaku's target performance is 100 times speedup on some key applications c.f. its predecessor, the K-Computer, realized through extensive co-design process involving the entire Japanese HPC community. It also will likely to be the premier big data and AI/ML infrastructure for Japan; currently, we are conducting research to scale deep learning to more than 100,000 nodes on Fugaku, where we expect to obtain near top GPU-class performance on each node. We are further conducting various simulation and performance modeling to investigate the next generation machines after Fugaku.