

## **Title: AI and (Traditional) HPC Divergence - Existential Crisis for HPC, or just a Myth?**

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### **Abstract:**

The notion that the rise of AI, particularly LLMs and transformers, signals a divergence from traditional HPC, potentially sacrificing scientific simulation, is a prevalent concern. This talk challenges this perception, arguing that recent hardware trends, especially GPU-centric architectures, are in fact synergistic with traditional HPC. We will demonstrate how RIKEN R-CCS, drawing from the success of Fugaku, is actively leveraging this convergence for FugakuNEXT, our next-generation supercomputer targeting "Zettascale" speedup by 2029-2030.

This presentation will explore how the computational demands of AI are driving advancements in critical HPC components, including interconnects, memory bandwidth, and on-chip parallelism. We will discuss our efforts in co-designing hardware and software ecosystems that seamlessly integrate AI and HPC workloads. Key areas of focus include unified memory architectures, scalable interconnects, software co-design, and hybrid precision computing. By providing concrete examples and future directions, we aim to illustrate that the perceived "existential crisis" is, in reality, a unique opportunity to redefine the landscape of HPC and propel us towards the next frontier of scientific discovery.

### **Bio:**

Satoshi Matsuoka from April 2018 has been the director of Riken Center for Computational Science (R-CCS), the top-tier national HPC center for Japan, developing and hosting Japan's flagship 'Fugaku' supercomputer which has become the fastest supercomputer in the world in all four major supercomputer rankings in 2020 and 2021 (Top500, HPCG, HPL-AI, Graph500), along with multitudes of ongoing cutting edge HPC research being conducted, including investigating Post-Moore era computing, Quantum-HPC hybrid, large-scale AI, etc. He was the leader of the TSUBAME series of supercomputers that had also received many international acclaims, at the Tokyo Institute of Technology, where he still holds a professor position, to continue his research activities in HPC as well as scalable Big Data and AI, in both institutions. His commendations include the Fellow positions in societies/conferences ACM, ISC, JSSST and IPSJ; the ACM Gordon Bell Prize in 2011 & 2021, the IEEE Sidney Fernbach Memorial Award in 2014 and

the IEEE Seymour Cray Engineering Award, all being one of the highest awards in the field of HPC. He has been commended with the Purple Ribbon Award from his Majesty Akishino, the Emperor of Japan, in 2022, for his longtime academic achievements, one of the highest accolades for an academic in Japan. He has served as the Technical Papers Chair and the Program Chair for ACM/IEEE Supercomputing 2009 and 2013 (SC09 and SC13) respectively as well as many other conference chairs, and the ACM Gordon Bell Prize selection committee chair in 2018. He has been chosen as one of the 35 'HPC Legends' by the HPCWire, the only individual from Japan.