

革新的コンピューティング技術の開拓
2020 年度採択研究者

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Parallel Programming Beyond Moore' s Law

§ 1. 研究成果の概要

In this fiscal year our investigations trailed different studies we published in the same fiscal year. Those studies are in the main direction of programmability of HPC systems, at different levels of abstraction, from applications down to hardware accelerators. We capitalized on those studies, by conducting a meta-investigation of the requirements of fine- and coarse-grained tasking, and a meta-analysis of the communication/computation breakdown. With this analysis, we improved our understanding of the main limitations of the off-load execution model and are now aware of the design considerations for the target autonomous execution model. We are thus well-positioned to enter the next fiscal year with the clear goal of formulating and implementing the desired execution environment.

【代表的な原著論文情報】

[1] "*Scaling Distributed Deep Learning Workloads beyond the Memory Capacity with KARMA*", ACM/IEEE SC '20: Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis, Article No.: 19, pp. 1-15, 2020

[2] "*An Allreduce Algorithm and Network Co-design for Large-Scale Training of Distributed Deep Learning*", IEEE/ACM CCGrid'21: The 21th IEEE/ACM International Symposium on Cluster, Cloud and Internet Computing 2021, Article No.: 32, pp. 64-73, 2021

[3] "*Matrix Engines for High Performance Computing: A Paragon of Performance or Grasping at Straws?*", IEEE IPDPS'21: IEEE International Parallel & Distributed Processing Symposium, pp. 12-22, 2021

[4] "*Performance Portable Back-projection Algorithms on CPUs: Agnostic Data Locality and Vectorization Optimizations*", ACM ICS'21: ACM International Conference on Supercomputing, pp. 111-13 2021

[5] "*An Oracle for Guiding Large-Scale Model/Hybrid Parallel Training of Convolutional Neural Networks*", ACM HPDC'21: The ACM International Symposium on High-Performance Parallel and Distributed Computing, pp. 35-47, 2021

[6] "*GTOPX Space Mission Benchmarks*", Elsevier SoftwareX, Volume 14, No 16, pp. 100666, June 2021

