

FIRST IEEE INTERNATIONAL WORKSHOP ON HIGH-PERFORMANCE STORAGE (HPS)

Introduction

Kathryn Mohror and Marc Snir, Workshop Chairs

Advances in storage are becoming increasingly critical because workloads on high performance computing (HPC) and cloud systems are producing and consuming more data than ever before, and the situation promises to only increase in future years. Additionally, the last decades have seen relatively few changes in the structure of parallel file systems, and limited interaction between the evolution of parallel file systems, e.g., Lustre, GPFS, and I/O support systems that take advantage of hierarchical storage layers, e.g., node local burst buffers. However, the last few years have seen an accelerated evolution of high-end storage systems, libraries, and services, due to several reasons:

Technology: The availability of an increasing number of non-volatile solid-state storage technologies that can replace either memory or disk has created new opportunities for the structure of storage systems.

Infrastructure evolution: HPC technology will not only be deployed in dedicated supercomputing centers in the future. “Embedded HPC”, “HPC in the box”, “HPC in the loop”, “HPC in the cloud”, “HPC as a service”, “near- to-real-time simulation” are concepts requiring new small-scale deployment environments for HPC. A federation of systems and functions with consistent mechanisms for managing I/O, storage and data processing across all participating systems will be required, to creating a “continuum” of computing.

Application Evolution: Data analysis applications, including graph analytics and machine learning, are becoming increasingly important for both scientific and commercial computing. I/O is often a major bottleneck for such applications, both in cloud environment and HPC environments – especially when fast turnaround or integration of heavy computation with heavy analysis are required.

Virtualization and disaggregation: As virtualization and disaggregation become broadly used in cloud and HPC computing, the issues of virtualized storage and storage disaggregation have increasing importance and efforts are needed to understand its implications for performance.

This accelerated evolution has led to an increasing amount of research on high-performance storage. Therefore, we decided to establish a new workshop, the Workshop on High Performance Storage (HPS), in order to bring together researchers and developers working on high-end storage systems, libraries and applications in HPC and clusters, and users of such systems.

The workshop received 10 papers and accepted 7 after careful review by the program committee members. Several of the papers address the use of non-volatile solid-state storage in HPC systems; others present studies of typical HPC I/O patterns, such as checkpointing and collective I/O.

Unfortunately, the COVID-19 pandemic caused the cancelation of the physical IPDPS Conference and of its co-located workshops, including HPS. Due to the novelty of HPS, we decided to not to pursue a virtual workshop. Instead, the papers, together with presentation slides, are available in the proceedings. We hope to have a less eventful second session of HPS at IPDPS 2021!

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- Franck Cappello, Argonne National Laboratory
- Toni Cortes, Barcelona Supercomputing Center
- Kathryn Mohror, Lawrence Livermore National Laboratory
- Kento Sato, RIKEN
- Marc Snir, University of Illinois at Urbana-Champaign
- Weikuan Yu, Florida State University

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- Maria Pérez, UPM, Spain
- Dana Petcu, University West Timisoara, Romania
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