Message from the PDSEC-14 Workshop Chairs

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Welcome to the 15th IEEE International Workshop on Parallel and Distributed Scientific and Engineering Computing (PDSEC-13), held on May 23, 2014 in Phoenix, USA, in conjunction with the 28th IEEE International Parallel and Distributed Processing Symposium (IPDPS 2014).

The field of high performance computing has earned prominence through advances in electronic and integrated technologies. Current times are very exciting and the years to come will witness a proliferation in the use of parallel and distributed systems. In particular, 2014 saw a continuation in the increase in the use of board-level massively parallel processors for scientific applications, with one third of the papers of PDSEC-14 utilizing GP-GPUs and manycore processors for this purpose. We also saw a continuation of an emphasis on the orientation to Exascale computing and related concerns from 2013. The scientific and engineering application domains have a key role in shaping future research and development activities in academia and industry, especially when the solution of large and complex problems must cope with tight timing schedules.

One of the most challenging issues facing scientific and engineering computing today is designing parallel applications to the meet ever-evolving systems expected over the coming decades. This year we were especially delighted to have John Shalf, Chief Technology Officer at NERSC and leader of the NERSC Advanced Technology Group, delivering the PDSEC-14 keynote speech: *Parallel Computing Trends for the Coming Decade: Adjusting to the New Normal for Computer Architecture*

For the past twenty-five years, a single model of parallel programming (largely bulk-synchronous MPI), has for the most part been sufficient to permit translation of this into reasonable parallel programs for more complex applications. In 2004, however, a confluence of events changed forever the architectural landscape that underpinned our current assumptions about what to optimize for when we design new algorithms and applications. We have been taught to prioritize and conserve things that were valuable 20 years ago, but the new technology trends have inverted the value of our former optimization targets. The time has come to examine the end result of our

extrapolated design trends and use them as a guide to re-prioritize what resources to conserve in order to derive performance for future applications. This talk will describe the challenges of programming future computing systems. It will then provide some highlights from the search for durable programming abstractions more closely track emerging computer technology trends so that when we convert our codes over, they will last through the next decade.

For this year's workshop we have received many high-quality submissions from Asia Pacific, Europe, and North and South America. In a peer-reviewing phase with at least 3 reviews per paper, the submissions were judged by originality, relevance, technical quality, and clarity of presentation. Based on the reviews, we decided to accept 16 high-quality papers for presentation in the technical program of PDSEC-14 out of 42 papers submitted.

This year, we have two candidates for the Best Paper Award:

- William A. Magato, Philip A. Wilsey. *llamaOS: A Solution for Virtualized High-Performance Computing Clusters.*
- Azzam Haidar, Piotr Luszczek, Jack Dongarra. *New Algorithm for Computing Eigenvectors of the Symmetric Eigenvalue Problem.*

The PDSEC attendees will choose between these at the PDSEC workshop.

The annual PDSEC workshop brings together researchers from computer science, applied mathematics and other application areas of high-performance computing to present, discuss and exchange ideas, results, work in progress and experiences in the area of parallel and distributed computing for problems in science and engineering applications.

For the contributed papers, application areas include nuclear physics, astrophysics, hydrodynamics, aeronautical engineering, medical physics, molecular physics, cryptography, big data analytics and materials engineering.

The papers also cover more fundamental work on parallel dense linear algebra and distributed search algorithms, cluster resource management, improving I/O performance for HPC clouds, techniques and middleware for fault recovery and mit-

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igation, and performance modeling and evaluation of scientific and engineering computing

The program for this workshop is the result of hard and excellent work of many others. We would like to express our sincere appreciation to all authors for their valuable contributions and to all program committee members and external reviewers for their cooperation and diligent work in completing the workshop program under a very tight schedule. Last but not least, we thank Umit Catalyurek from Ohio State University, USA, the IPDPS 2014 Workshops Chair, for helping and encouraging the inclusion of the PDSEC-14 in IPDPS 2014.

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