Fundamental & Computational Sciences

Advanced Computing, Mathematics and Data Division
Staff Awards & Honors

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PNNL HPC Staff Take on Energy Efficiency, Resilience in New Paper
Work accepted by IPDPS 2015 for conference technical program

Shuaiwen Leon Song, a research scientist with PNNL's High Performance Computing group, and Darren Kerbyson, the current HPC associate division director and PNNL Laboratory Fellow, are two co-authors of the paper, "Investigating the Interplay between Energy Efficiency and Resilience in High Performance Computing," which recently was accepted by the 29th IEEE International Parallel & Distributed Processing Symposium, or IPDPS 2015. The paper will be presented as part of the conference's technical program. Of the 496 papers submitted to IPDPS 2015, roughly 21 percent made the conference cut this year.

Most notably, the paper, describing work investigating the interplay between energy efficiency and resilience at large scale for HPC, features primary author, Li Tan, from the University of California, Riverside, who spent time at PNNL in 2014 as a research intern. Again, this demonstrates PNNL's commitment to cultivating beneficial partnerships between post-doctoral researchers and more senior scientists. Such research collaborations, resulting in papers being accepted at premier conferences with often low overall acceptance rates, are becoming a hallmark of PNNL's HPC group.

Li Tan, Shuaiwen Leon Song, and Darren Kerbyson (*left to right*) represent the best aspects of research collaborations between national laboratories and academia. Enlarge Image.

The paper, which features additional co-authors from UC Riverside, as well as Marquette University, presents an energy-saving undervolting approach, supplying a voltage to hardware components that is lower than one paired with a given frequency. Analytic models then capture the impact of undervolting and the interplay between energy efficiency and resilience—two crucial challenges that HPC systems must overcome to reach exascale (a billion billion calculations per second).

IPDPS is a well-established, premier international forum for engineers and scientists to present their latest research findings in all aspects of parallel and distributed computing. IPDPS 2015 is being held at the Hyderabad International Convention Centre, in Hyderabad, India, from May 25-29, 2015. The IPDPS 2015 Advance Program is available at: http://www.ipdps.org/ipdps2015/2015_advance_program.html.

Reference:
Tan L, SL Song, P Wu, Z Chen, R Ge, and DJ Kerbyson. 2015. "Investigating the Interplay between Energy Efficiency and Resilience in High Performance Computing." In: *29th IEEE International Parallel & Distributed Processing Symposium (IPDPS 2015)*. May 25-29, 2015, Hyderabad, India.