

Hands-on high performance computing (HPC): Filling the unmet need for skilled students in the design, development, and operation of HPC-based systems

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Abstract

High performance computing (HPC) refers to the use of computer clusters to solve complex computational problems across a diverse range of scientific, engineering, medical, and business fields. HPC represents a game-changing technology with strategic importance for global leadership in science and technology, innovation, economic competitiveness, and national security. Due to the exponential growth of the HPC markets, skilled HPC practitioners are in short demand. Currently, there are a couple of large-scale and some small-scale HPC clusters in the SIUC campus. However, none of these is used for teaching. Because hands-on learning is essential for students to acquire the HPC skills, it is necessary to have a HPC cluster dedicated to teaching. The specific objectives of this project are to: 1) purchase necessary computer hardware and accessory components for a small-scale HPC cluster; 2) train graduate students on how to build, test, operate, and maintain the HPC cluster; 3) with assistance from the graduate students, train undergraduate students to acquire the required HPC skills. Successful execution of the proposed plans will help the students to become more competitive in the job market in particular, and contribute to the nation's concerted efforts to maintain its leading position in HPC technologies in general. Because the instructional HPC cluster is re-buildable and scalable, it will not only continue its service for many years to come, but may also expand its capacity over time with the addition of more computers. This will benefit a large number of students in the long run.