Abstract:

As digital manufacturing and engineering design are becoming increasingly computationally intensive and geographically distributed, it is crucial to develop new methodologies that accelerate compute-intensive workloads in digital manufacturing as well as enhance communication and collaboration in engineering design. Over the past two decades, supercomputers have been playing an important role in solving large-scale and complex modeling and simulation problems. However, very few manufacturers have access to supercomputers due to extremely high initial and maintenance costs. In addition, while qualitative and empirical studies have been performed to explore the communication and collaboration mechanisms in large-scale collaborative design, little quantitative research has been conducted on measuring information sharing behaviors and investigating the pattern of information flows in collaborative design. Because cloud computing and social network analysis enable cost-effective, scalable high performance computing and visualization of complex networks, cloud computing and social network analysis are applied to accelerate compute-intensive workloads in digital manufacturing and enhance collaborative design processes. Specifically, a set of experiments to evaluate the performance of several public cloud computing platforms will be presented. Furthermore, a comparative study that compares the performance of the cloud computing platforms with that of a workstation and a supercomputer will be discussed. Finally, a case study that demonstrates a social network analysis-based approach to modeling and analyzing the pattern of complex information flow in collaborative design will be described.
BIOGRAPHY:

Dazhong Wu received his B.S. from Hunan University, M.S. from Shanghai Jiao Tong University in China, and Ph.D. from the Georgia Institute of Technology, all in Mechanical Engineering. He is currently a postdoctoral research fellow in the Harold & Inge Marcus Department of Industrial and Manufacturing Engineering at Penn State University and the NSF Center for e-Design. His research is focused on the investigation and development of digital design and manufacturing technologies using high performance cloud computing. Dr. Wu serves as co-PI on a $1.5 million research project funded by the Digital Manufacturing and Design Innovation Institute (DMDII). Dr. Wu has published papers in the Journal of Manufacturing Science and Engineering, Journal of Intelligent Manufacturing, Computer-Aided Design, Journal of Manufacturing Systems, and Journal of Computing and Information Science in Engineering. Dr. Wu is serving as co-chair of the High Performance Computing and Data Analytics in Manufacturing symposium scheduled for the 2016 ASME Manufacturing Science and Engineering Conference (MSEC). He has served as a reviewer for NSF grant proposals and several peer reviewed scholarly journals.