

The Colorado State University Computer Science Department presents:

Virtualization Performance and its Programming Support for the Next Generation HPC Systems

Lamia M. Youseff

Monday, March 2, 2009, 9:00, Computer Science Building 130

CS 692 students are not required to attend, but can receive a makeup credit for attendance

Abstract

High Performance Computing (HPC) is critical for the expansion of the horizons of knowledge as it enables research in key scientific problems that impact our lives and our future. Fortunately, HPC has acquired huge performance leaps in the last decade and half. The HPC community is furthermore embarking two contemporary technologies to sustain the performance growth for next generation systems, specifically multicore processors and heterogeneous architectures. As a result, the computational power available to scientific applications will be unprecedented. However, the adoption of these two technologies will tremendously complicate the programmability of these systems.

Addressing this challenge in my research, I have advocated virtualization as an alternative approach to the traditional over-featured OS kernel. In this talk, I present a summary of my work on virtualization aspects for HPC, which explores the performance ramifications of virtualization for HPC benchmarks. In addition, I detail our implementation of a language-level shared-memory support that simplifies the programmability of heterogeneous multicore virtualized HPC systems. My research further enhances a hybrid-programming model in which the programmer combines message-passing and shared-memory to both leverage the shared-memory performance of multicore systems while enabling the flexibility and potential for customization that virtualization makes possible for scalable HPC systems. Finally, I briefly discuss in this talk my future research agenda, which addresses novel interesting problems in HPC, scientific and parallel applications, as well as cloud computing.

Biography

Lamia M. Youseff is currently a Ph.D. candidate in computer science at the University of California, Santa Barbara (UCSB). Her general research interests include high performance computing, parallel and scientific applications and cloud computing. Her doctoral research is focused on language-level support for next-generation virtualized HPC system, under the supervision of Prof. Rich Wolski. Prior to joining UCSB, Lamia received her B.Sc. from the American University in Cairo (AUC) with Summa Cum Laude. During her graduate and undergraduate tenure, she received several awards including the international ACM-UPE Award in 2002, best-poster award at IPDPS08 and best-paper award at VHPC06. She is a member of both IEEE and ACM.