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**Colorado State University's
Information Science and Technology Center (ISTeC)
presents two lectures by**



David Abramson

Computer Science Department, Monash
University, Victoria, Australia

**ISTeC Distinguished Lecture
in conjunction with the
Electrical and Computer Engineering Department and
Computer Science Department Seminar Series**

“Debugging Techniques for Highly Parallel Software”

Friday, November 9, 2012

Reception: 10:30 a.m.

Lecture: 11:00 – 12:00 noon

Location: Computer Science 130



“Interaction in Scientific Workflows”

Friday, November 9, 2012

Electrical and Computer Engineering Dept. and Computer Science Dept. Special Seminar:

2:00 p.m. – 3:00 p.m.

Location: Lory Student Center, Grey Rock Room

ABSTRACTS

“Debugging Techniques for Highly Parallel Software”

Programming languages have advanced tremendously over the years, but program debuggers have hardly changed. Sequential debuggers do little more than allow a user to control the flow of a program and examine its state. Parallel ones support the same operations on multiple processes, and are adequate with a small number of cores, but become unwieldy and ineffective on very large machines. Typical scientific codes have enormous multi-dimensional data structures and it is impractical to expect a user to view the data using traditional display techniques. In this talk I will discuss the use of debug-time assertions (both within and across programs), and show that these can be used to debug parallel programs. The techniques reduce the debugging complexity because they reason about the state of large arrays without requiring the user to know the expected value of every element. When used across programs, the technique can help find errors that occur when a program is ported to a new platform. Whilst assertions can be expensive to evaluate, their performance can be improved by running them in parallel. We have implemented these ideas in a new debugger called Guard, and will illustrate its performance on tens of thousands of cores on a Cray XE6.

“Interaction in Scientific Workflows”

Modern in-silico science (or e-Science) is a complex process, often involving multiple steps conducted across different computing environments. Scientific workflow tools help scientists automate, manage and execute these steps, providing a robust and repeatable research environment. Increasingly workflows require human interaction, and generate data sets that require scientific visualization. Traditionally, these interactions are handled outside the workflow using ad-hoc techniques. In this seminar we present a solution that links scientific workflows with a variety of user interfaces, Web portals and display devices, including large tiled display walls. We demonstrate the feasibility of the system by a prototype implementation that leverages the Kepler workflow engine and the SAGE display software. We illustrate the use of the system with a case study in workflow driven microscopy.

SPEAKER BIOGRAPHY

Professor David Abramson (www.csse.monash.edu.au/~david/) has been involved in computer architecture and high performance computing research since 1979. Previous to joining Monash University in 1997, he has held appointments at Griffith University. At CSIRO he was the program leader of the Division of Information Technology High Performance Computing Program, and was also an adjunct Associate Professor at RMIT in Melbourne. He was also a program manager in the Co-operative Research Centre for Intelligent Decisions Systems and the Co-operative Research Centre for Enterprise Distributed Systems. From 2007 to 2011, Prof. Abramson was an ARC Professorial Fellow. Currently Abramson is a Professor of Computer Science, Director of the Monash e-Education Centre and Science Director of the Monash e-Research Centre. His current interests are in high performance computer systems design and software engineering tools for programming parallel, distributed supercomputers and stained glass windows. He is a Fellow of the Association for Computing Machinery (ACM) and the Academy of Science and Technological Engineering (ATSE), and a member of the IEEE. Prof. Abramson has served on committees for many conferences and workshops, and has published over 200 papers and technical documents. He has given seminars and received awards around Australia and internationally and has received over \$8.8 million in research funding. He also has a keen interest in R&D commercialization and consults for Axceleon Inc., which produces an industry strength version of Nimrod, and Guardsoft, a company focused on commercialising the Guard relative debugger.

To arrange a meeting with the speaker, please contact **Prof. H. J. Siegel** at HJ@colostate.edu.

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