The Information Science & Technology Center

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Colorado State University's
Information Science and Technology Center (ISTeC)
presents <u>two</u> lectures by

Dr. Laxmi Bhuyan

University of California, Riverside
Distinguished Professor and Chair,
Department of Computer Science and Engineering

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

"Application-Oriented Networking (AON): Adding Intelligence in the Next-Generation Internet Routers"

Monday, November 8, 2010
Reception: 10:30 a.m.
Lecture: 11:00 – 12:00 noon
Location: Lory Student Center Room 205

Joint Electrical and Computer Engineering Department and Computer Science Department Special Seminar

sponsored by ISTeC

"I/O Acceleration in Server Architectures"

Monday, November 8, 2010
Lecture: 4:00 p.m.
Location: Engineering Room B103

ABSTRACTS

"Application-Oriented Networking (AON): Adding Intelligence in the Next-Generation Internet Routers"

Application Oriented Networking (AON) transforms the traditional network from pure packet-level routing to application-level processing by performing several customized computations at different nodes or routers. We study the operation of a Cisco AON system as a motivating example for our research. Many examples of networking applications requiring intensive computations are presented. We develop multiprocessor scheduling algorithms for networking applications that consider increased throughput and reduced execution times while keeping packet locality and underlying architecture in mind. The results for a multimedia transcoding application, which dynamically transforms video streams to different output patterns to satisfy the bit rate and bandwidth requirements of a variety of clients, is presented. When a transcoding operation is performed by multiple processors in the cluster, it produces out-of-order departure of media units and high jitter. The aim is to maximize the throughput and satisfy the QoS requirement while scheduling. The proposed scheduling algorithms are tested in a workstation cluster and commercially available multicore servers. Results are obtained through real implementation and compared to existing scheduling techniques to show the superiority of our algorithms.

"I/O Acceleration in Server Architectures"

The faster growth of network bandwidth compared to that of the CPU performance has led to a growing mismatch between the transmission bandwidth and packet processing speed. To make things worse, the memory system performance improves at an even slower pace than that of the CPU. It is known that network protocol stack in the operating system is the major bottleneck in processing I/O requests in servers. This talk presents detailed timing behavior and architectural characteristics of the TCP/IP protocol while executing in the CPU. We investigate various architectural techniques for incorporation in the server architectures to enhance I/O processing speed. They consist of instruction and data cache optimization, Direct Cache Access (DCA), Integrated NIC and design of hardware copy engines among others. We show that the I/O bandwidth can be raised tremendously by incorporating these techniques into a CPU architecture.

SPEAKER BIOGRAPHY

Laxmi Narayan Bhuyan (http://www.cs.ucr.edu/~bhuyan) is Distinguished Professor and Chairman of Computer Science and Engineering Department at the University of California, Riverside (UCR). His current research interests are in the areas of computer architecture, network processors, Internet routers, and parallel and distributed processing. He has published more than 150 papers in related areas in reputed journals and conference proceedings. Dr. Bhuyan is a Fellow of the IEEE, a Fellow of the ACM, and a Fellow of the AAAS. His brief biography and recent publications can be found at his web page at http://www.cs.ucr.edu/~bhuyan/.

To arrange a meeting with the speaker, please contact Dr. Anura Jayasumana at (970) 491-7855 or Anura.Jayasumana@colostate.edu.

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