

Seminar Series

P2P-based Intelligent Resource Discovery in Internet-based Distributed Systems

Haiying (Helen) Shen, Ph.D.

Computer Science and Computer Engineering
University of Arkansas

Abstract

Internet-based distributed systems enable globally scattered resources to be collectively pooled and used in a cooperative manner to achieve unprecedented petascale supercomputing capabilities. Numerous resource discovery approaches have been proposed to help achieve this goal. To report or discover a multi-attribute resource, most approaches use multiple messages with one message for each attribute, leading to high overhead. Another approach can reduce multi-attribute to one index, but is not practically effective in an environment with a large number of different resource attributes. Furthermore, few approaches are able to locate resources geographically close to the requesters, which is critical to system performance. This talk will present a P2P-based intelligent resource discovery mechanism (PIRD). It weaves all attributes into a set of indices using locality sensitive hashing, and then maps the indices to a structured P2P overlay. It further incorporates Lempel-Ziv-Welch algorithm to compress attribute information for higher efficiency. In addition, it helps to search resources geographically close to requesters by relying on a hierarchical P2P structure. PIRD significantly reduces overhead and improves the efficiency and effectiveness of resource discovery in Internet-based distributed systems. Theoretical analysis and simulation results demonstrate the efficiency and effectiveness of PIRD in comparison with other approaches. It dramatically reduces overhead and yields significant improvements on the efficiency and effectiveness of resource discovery.

Biography

Dr. Haiying (Helen) Shen is a faculty candidate in the Department of Electrical and Computer Engineering. She received the BS degree in Computer Science and Engineering from Tongji University, China in 2000, and the MS and Ph.D. degrees in Computer Engineering from Wayne State University in 2004 and 2006, respectively. She is currently an Assistant Professor in the Department of Computer Science and Computer Engineering, and the Director of the Pervasive Communications Laboratory of the University of Arkansas. Her research interests include distributed and parallel computer systems and computer networks, with an emphasis on P2P and content delivery networks, publish/subscribe systems, wireless networks, wireless sensor networks, high performance cluster and grid computing, data mining and RFID. She has published about 60 research papers in referred journals and conferences in these areas, including the most recent IEEE Transactions on Parallel and Distributed System (TPDS), Journal of Parallel and Distributed Computing (JPDC), and the International Conference on Distributed Computing Systems (ICDCS). Her paper received the best paper award at the IEEE International Conference on Networking, Architecture, and Storage (NAS'08). Dr. Shen is the PI of two NSF grants in 2008. She has been the Program Co-Chair for a number of international conferences and member of the Program Committees of many leading conferences. She is a member of the IEEE and ACM. She is now advising four Ph.D. students and five MS students.