

Collaborative Resource Sharing with Intelligent Networking

Isaac D. Scherson

Department Computer Science – Systems
The Bren School of Information and Computer Sciences
University of California, Irvine
Irvine, CA 92697-3425
USA

isaac@ics.uci.edu, www.ics.uci.edu/~isaac

Abstract

Modern distributed computing installations typically consist of large numbers of interconnected autonomous workstations. The spectrum of coupling ranges from switch-interconnected computing clusters to loosely coupled GRID-like systems (over the Internet), and includes organizational installations where fast (say Gigabit Ethernet or Optical) Local Area Networks are used. We consider the problem of federating resources over this spectrum to effectively provide some degree of concurrent processing to speed up specific tasks. In addition to decomposition and deployment, the degree of coupling imposes different constraints and challenges on the management of the available networked resources. To alleviate the burden imposed by the distributed resource management tasks, novel ideas are proposed for the effective use and management of resources over the network fabric. In this seminar, Intelligent Networks, Virtualization at the Process and Device levels, and Adaptability in Heterogeneous systems will be discussed.

In the case of very tightly coupled switch-interconnected clusters, Service Address Routing emerged as the solution of choice. It uses a novel paradigm where computing nodes call services by name, in a location independent manner, rather than by network address. An application would be oblivious to where services are rendered and the intelligent network finds and routes service requests to nodes registering as servers.

For fast LANs, Process Level Remote Execution and Device Virtualization were developed as environments to harness the power of nodes participating in a cluster-set, also known as a LAN computer federation. In addition to dedicated computers participating in the federation, these paradigms allow lightly loaded nodes to contribute available resources to the overall computational power of the resulting federated system.

In the case of heterogeneous systems, the problem of node/device selection based on workload requirements is presented together with an adaptability mechanism that allows changing the workload requirements based on resource availability.

Brief Biography

Professor Isaac D. Scherson is currently stationed in Santiago (Chile) as Study Center Director of the Education Abroad Program of the University of California. He continues his research activity with Yahoo! Chile at the University of Chile's Department of Computer Science.

Isaac D. Scherson is Professor in the Department of Computer Science (The Bren School of Information and Computer Sciences) and the Department of Electrical Engineering and Computer Science (The Henry Samueli School of Engineering) at the University of California, Irvine. He received BSEE and MSEE degrees from the National University of Mexico (UNAM) and a Ph.D. in Computer Science from the Dept. of Applied Mathematics of the Weizmann Institute of Science, Rehovot, Israel. He held faculty positions in the Dept. of Electrical and Computer Engineering of the University of California at Santa Barbara (1983-1987), and in the Dept. of Electrical Engineering at Princeton University (1987-1991). He is a Senior Member of the IEEE Computer Society and a member of the ACM. Dr. Scherson has contributed to numerous professional workshops and conferences as chair, co-chair and/or member of the Technical Program Committee. Since 1992, he also serves as a member of the IEEE Technical Committee on Computer Architecture (TCCA), the IEEE Technical Committee on Parallel Processing (TCPP) and as Associate Editor for IEEE Computer Architecture Letters and The Journal of Interconnection Networks. Dr. Scherson was Visiting Scientist/Professor at the University of Paris VI (Pierre et Marie Curie, 1997-2004), Visiting Scientist/Professor at the University of Lille 1 (Lille, France, 2003), Visiting Scientist with the INRIA (Rennes, France, 2004), Conseiller Scientifique to France Telecom Research and Development (Paris, France, 2005-2009), distinguished guest lecturer at Ulm University (Germany, 2005), in addition to giving numerous Invited Distinguished Lectures in academic and research institutions in various countries such as Germany, France, Romania, Poland, Mexico, Brazil, Argentina, and Chile.

His research interests include concurrent computing systems, web server parallel architectures, interconnection networks for embedded and cluster systems, resource management in embedded and cluster systems, operating systems for concurrent computers, massively parallel computer architectures, switching and permutation networks, computer graphics, algorithms and their complexity and VLSI. His research has been sponsored/funded by the Jet Propulsion Laboratory (JPL), NASA, the NSF, the AFOSR, the state of California MICRO program and other industrial sources.