THE INCREASINGLY IMPORTANT INTERCONNECT

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This special issue of *IEEE Micro* features five articles drawn from presentations at the sixth annual Hot Interconnects Symposium held at Stanford University in August 1998. The symposium accepts both presentations and full papers, and attracts significant involvement from both industry and academia.

Originally organized as a companion to the popular Hot Chips Symposium also held at Stanford, Hot Interconnects' primary goal is to present innovative new technologies, be they intrachip, between chips, between boards, between systems, or between countries. The symposium covers electrical and optical interconnects, network interconnects, switches and routers, networked file systems, and the Internet itself.

Interconnects are becoming increasingly important: many highly complex chips today are limited in area, power, and delay by the available interconnect technology. The size and power of computer and network systems are often limited by the speed and power of interconnects between board, subsystems, and equipment shelves. In addition, the Internet is built around interconnects between enterprises, data exchanges, and carriers. As interconnects have grown to great significance in chip, boards, system, and network design, so has the Hot Interconnects Symposium grown to include members of the semiconductor, computer, networking, and research communities.

In this issue we feature articles that represent the diverse nature of this field. We begin with three articles about fast switching. The first describes a 26.8-Gbyte/s crossbar switch developed by Hitachi. Note that the bidirectional transceiver design permits simultaneous transfer of data in both directions of a single link. This technology is of particular interest in systems with dense interconnects and a short supply of packaging and connector pin counts.

Next is an implementation of a crossbar scheduling algorithm for the Tiny Tera switch at Stanford. The initial system architecture was first described at Hot Interconnects in 1996 and appeared in *IEEE Micro* in January 1997. Our current article considers how to implement a fast, fair, and efficient arbitration algorithm for a single-stage 320-Gbps crossbar switch.

The third article also completes work introduced earlier at Hot Interconnects. Atlas I is a single-chip ATM switch developed by university researchers in Greece. Earlier descriptions presented the original architecture through the implementation process, and now we see the results of this work. In the competitive field of networking, detailed and rigorous evaluations of the engineering trade-offs required to build real network switches are rare. The authors provide a unique glimpse into the process; it is a must read for anyone contemplating building a network switch or router, or a multiprocessor interconnect.

Then, we move to articles on system-level interconnects, starting with the implementation of highly available file server appliances. By examining a technology approach to minimize disruption of service due to hardware faults, the authors address reliability, availability, and serviceability (RAS) in a server-based network. The architecture and technology use a clustered failover approach to the design of the network.

Finally, we look at a much larger problem by addressing some of the issues of perfor-

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mance in the Internet. An ongoing research program at the University of Washington examined the networks' ability to exploit computational resources in the network to reduce congestion and latency, and improve routing. This article is a very good representation of the symposium's approach to promoting new and very interesting ways to introduce leading-edge research on algorithms for interconnects at the very highest scale.

We hope that you find these articles as exciting as we have; they represent the state of the art as well as a cross-section of this growing field.

Hot Interconnects will be held once again at Stanford in 1999, and we encourage you to participate. For more details, visit http://www.hoti.org. MICRO

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