
Introduction

Computer Architecture Issue

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Although great progress has been made with regard to increasing the computing power available to users, it has been quite some time since the last major architectural change. Researchers in computer architecture, the subject of this issue, are actively trying to change this by viewing computing from fresh perspectives.

Computer architecture is a field that encompasses both practical and theoretical aspects of designing the hardware components of computer systems. The goal of computer architecture research is almost always to decrease the cost and increase the power of computing hardware. It would be difficult to argue that researchers have been unsuccessful in meeting this goal: for the last 25 years computing power has doubled every 18 months and prices have been constantly declining. The miniturization of computing hardware is also an important goal because it enables the development of portable or even wearable computers. It is amazing to think that the computing power that now fits in a pocket-sized device would have occupied several rooms 20 years ago.

While it is tempting to view advances in computer architecture in terms of new desktop computer technologies, such as Intel's Pentium Xeon processor or 2X AGP ports, researchers in this exciting field are looking for more substantial changes in computer architectures. The promise of effectively using multiple processors to solve problems efficiently, bringing the power of RISC architectures to the desktop, and exploiting the potential of reconfigurable computers push these engineers to explore topics such as cache architectures, instruction sets, and bus design.

Computer architecture research provides many challenges and opportunities. One of the most challenging aspects is designing interfaces to systems that can be implemented in hardware and targeted by software. That is, the architecture needs to be feasible to build, but also must be conducive to the development of software applications. This task poses unique difficulties to designers since the specification must support evolving support software and hardware, such as operating systems, compilers, expansion slots, and the like.

We hope that this issue will convey some of the unique challenges encountered by computer scientists working with architecture and that it will generate some of the excitement shared by those involved in this field.