

Call for Position Papers

Advancing Computer Architecture Research

Computing Community Consortium (CCC)

<http://www.cra.org/ccc/acar.php>

Overview

Discontinuity-inducing trends such as the arrival of multi/many-cores, the reduced reliability of semiconductors, and the ever-presence of power constraints, are transforming the field of computer architecture. In particular, the ubiquity of multi-cores and the fact that much of the IT industry is relying on main-streaming parallel processing for survival is a truly seismic event. Momentous changes are about to happen in all domains, including portable clients, home and business computing, and datacenter/petascale computing. Multi/many-cores will have to evolve to enable and support high-productivity parallel software development and execution. At the same time, there remains a huge gap between the theoretical limits of instruction-level parallelism (ILP) and what processors actually attain. One has to wonder about the sequential execution model, is this really as good as it gets? While it may appear that way, novel robust techniques that effectively push ILP further may yet be invented. In this environment, we ask ourselves:

- What will be the computing platforms in 2020-2025?
- What are the major research challenges that must be overcome to create these platforms?
- What will be the impacts to and from the broader society at large?

To answer these questions, it is appropriate to organize a sequence of workshops that, building on the 2005 CRA workshop on Revitalizing Computer Architecture Research, focus on what role computer architecture research plays going forward. The goals of these workshops are:

- Clearly articulate an agenda and roadmap for computer architecture research. Such an agenda must be broadly endorsed by the research and industrial communities as well as be an effective vehicle for communicating to technical and non-technical national leaders.
- Create excitement and community building for computer architecture research and form lasting research partnerships between multiple computer architecture researchers.
- Unlock the potential of the many junior researchers in our community and ensure the continuous leadership of our nation in this area.
- Suggest how to structure funding and research programs in a way that is commensurate with computer architecture's central role in computer science, the IT industry, and the US economy.

Failure is not an Option: Popular Parallel Programming

This Call for Position Papers is for the first of two workshops and focuses on **Popular Parallel Programming**; the second workshop will focus on Extending the Current Sequential Programming Model. For this first workshop, members of the computer architecture community are invited to submit a 1-page position paper outlining their thoughts on the following Questions:

- How can computer architecture help enable ubiquitous parallel software development?
- How does the architecture most-effectively interact with the different layers of the software stack in parallel systems?
- What are the key parallel programming models requiring support; how to support multimodal parallelism?
- What is the role of re-configurability and heterogeneity in parallel systems: GPUs and other special-purpose parallel systems versus general-purpose parallel systems?
- How to effectively support continuous run-time optimization in parallel systems?
- What is the proper role of academic and state-sponsored research in parallel systems?
- How and whether to support parallel system building and prototyping efforts?

Potential contributors are encouraged to be brief, and keep the following in mind:

- The position paper should not be about what you are working on currently; it should be about a vision for parallel computing platforms available 10-15 years from now.
- Focus the paper on one of the following three areas: (1) Portable clients, (2) Home and business computing, and (3) Datacenter and peta-scale. Do not try and cover all three in one brief position statement.
- Keep the challenges of parallel computing central.
- The position paper should include: (1) Name, position and organization; (2) Area of focus among the three, and (3) Answer to the workshop Questions.
- The steering committee will select the workshop invitees based on the responses. The committee is looking for a wide range of insightful views.

Submit a 1-page PDF file to acar@cs.uiuc.edu by 6pm CST, Monday November 30, 2009.

Workshop Format, Dates and Location

The workshop will focus on the topic of Popular Parallel Programming, allowing the participants ample time for discussion. Attendees will be both academic researchers and representatives of industry and funding agencies. The workshop will be February 22-23, 2010 in San Diego, CA.

Organizing Committee

Organizers:

Josep Torrellas (Univ. of Illinois) and Mark Oskin (Univ. of Washington).

Steering Committee:

Chita Das (NSF), Bill Harrod (DARPA), Mark Hill (Univ. of Wisconsin), James Larus (Microsoft), Margaret Martonosi (Princeton), Jose Moreira (IBM), Kunle Olukotun (Stanford), Mark Oskin (Univ. of Washington) and Josep Torrellas (Univ. of Illinois).