ARNOLD ROSENBERG, University of Massachusetts Amherst, Amherst, MA, 01003, USA
IC-Scheduling Theory: A New Scheduling Paradigm for Internet-Based Computing

Technological and economic developments have made the Internet a viable platform for a new, "collaborative" modality of *Internet-based computing* (*IC*, for short). Within this modality, the owner of a large, typically compute-intensive, computation enlists remote clients to "collaborate" in performing the computation. When the computation's tasks have interdependencies that prioritize their execution, then the *temporal unpredictability* of IC—communication is over the Internet; computing is by clients who arrive at unpredictable times and who are typically not dedicated to the computation—can confute attempts to benefit from "parallel" execution of tasks and can cause a computation to stall for lack of tasks that are eligible for allocation.

In recent papers, we have proposed a new scheduling paradigm that aims to respond to the new challenges of IC. Faced with the impossibility (due to temporal unpredictability) of scheduling to accommodate "critical paths" in a computation, we seek to schedule in a way that always renders as many tasks as possible *eligible for allocation* (to remote clients). This has the dual goal of maximizing the utilization of available clients and minimizing the likelihood of a computation's stalling for lack of eligible tasks. We have formalized this scheduling problem and, under idealized assumptions, have developed the rudiments of an algorithmic theory of how to schedule complex computations for IC.

We begin this talk with the concepts underlying the theory and the algorithms that emerge from them. We then describe several familiar computations and computational paradigms that the nascent theory can schedule optimally. We finally describe simulation experiments whose results suggest that the theory's schedules have a measurable benign effect on "real" Internet-based computing.