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Authors

AuYoung, Alvin
Chun, Brent
Ng, Chaki
[et al.](#)

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Practical Market-Based Resource Allocation

Alvin AuYoung^{*}, Brent N. Chun[†], Chaki Ng[‡], David Parkes[‡],
Amin Vahdat^{*}, and Alex C. Snoeren^{*}

^{*}UC San Diego [†]Intel Research Berkeley [‡]Harvard University

Abstract

Resource allocation continues to be one of the primary challenges in federated computing systems. Currently, users are forced to either suffer the delays inherent to batch scheduling used by the supercomputing community or the tragedy of the commons that befalls proportional share allocation as employed on PlanetLab. Market-based schemes have repeatedly been proposed as a possible solution but none have yet to see wide deployment.

We present our initial experience with two operational auction-based schedulers—one for PlanetLab, the other for a large SensorNet testbed—and propose two key mechanisms to combat the challenges faced by real-world use of economic schedulers. Our experience shows that some users are unwilling or unable to accept the uncertainty of an auction; hence, we develop a buy-it-now mechanism that allows risk-averse users to instantly acquire resources at a price premium. Further, we describe how intelligent monetary policy, in particular the judicious use of a savings tax, ameliorates the budget disparities induced by the 90/10 usage patterns common in these environments.

1 Introduction

A copy of this technical report can be obtained by sending a request to any of {alvina, snoeren, vahdat}@cs.ucsd.edu.