Coordinated Volunteer Computing

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Abstract

Volunteer computing lets consumers donate the unused capacity of their computing devices (desktop, laptop, mobile) to science research projects. It can provide Exa-scale high-throughput computing, and it offers an economical, scalable and sustainable alternative to data-center computing. Since its start in 2004, BOINC-based volunteer computing has used a “free-market” model in which scientists create and promote projects, and volunteers choose from among these projects. Problems inherent in this model – notably the risk to scientists in creating projects – have limited the adoption of volunteer computing.

To move beyond these limits, we propose a new “coordinated” model. In this model, volunteers register for science areas rather than for projects, and a central coordinator allocates computing resources to projects. This allows a prospective project to be guaranteed a level of computing throughput before it exists, thus reducing the risk in creating a project. It also eliminates the need for scientists to create web sites and publicize their projects.

The coordinated model has been implemented as “Science United” (https://scienceunited.org). We describe how Science United works, with an emphasis on its mechanisms for dividing computing power among competing projects.