Prototyping a hybrid P2P computational framework: challenges and benefits

Filep Levente

Babeş-Bolyai University, Faculty of Mathematics and Computer Science

f.levi@cs.ubbcluj.ro

Distributed computational frameworks, especially volunteer-based ones [2], become popular over the past decades due to the cheap access to hardware resources, BOINC [1] being the flagship example of success with its number of volunteer participant and the size of some its projects. However, all of these frameworks being based on the client-server architecture, the size of the network is bottlenecked by the supervising servers. With the increase of scientific data generated daily and the increasing demand for computational resources a multitude of improvement ware proposed in the literature. While the majority of these proposals focuses on the server-side there is little effort dedicated to prototyping a hybrid P2P framework.

This paper explores some of the early challenges and benefits of prototyping such a hybrid P2P computational framework. In such network, the server-side responsibilities are offloaded to the network nodes themself, while the former servers solely act as a gateway through which applications and data are injected into- and computed data is extracted from the network. Prototype model for such a framework with some simulation results regarding the load balancing and scalability of such model is also presented.

To benefit from such framework requires special distributed application design. Beside theoretical application designs, this paper explores a particular case of running single population Genetic Algorithm in a distributed manner and present some experimental results and comparison with the traditional Island Model [3].

References

[1] D. P. Anderson, BOINC: A System for Public-Resource Computing and Storage, in: *Proceedings of the 5th IEEE/ACM International Workshop on Grid Computing*. GRID. IEEE, 2004, pages 4–10. doi: 10.1109/GRID.2004.14.

[2] E. Lavoie, L. J. Hendren, Personal Volunteer Computing, in: *The Computing Research Repository*, 2018. arXiv:1804.01482v1

[3] T. C. Belding, The distributed genetic algorithm revisited, In: *Proc. of the 6th Int'l. Conf. on GAs*, 1995, pages 114–121.