SORS: Advancing Numerical Simulations Through Load Balancing and Scalable Data Visualization

Abstract

Understanding the need, effects and implications of load-balancing in large-scale numerical simulations is crucial for optimizing performance and resource utilization. As computer simulations are scaling up, effective load-balancing distributes computational work equally across available resources, reducing bottlenecks and enhancing runtime performance. But as these simulations become more complex, it becomes difficult to monitor, analyze, and optimize task distribution.

In this talk, I will present the DARMA-tasking ecosystem, focusing on its *Virtual Transport* (vt) runtime component, which facilitates dynamic load balancing, and it's task visualization tool (vt-tv), which helps to assess the intricacies of distributed applications and the effectiveness of load-balancing strategies. Additionally, I will discuss the WorkVisualizer, a new interactive performance analysis tool that provides similar insights into High-Performance Computing (HPC) applications, outside of the DARMA-tasking framework.

Short Bio

Pierre Pebay is a computer science engineer specialized in Mathematical Modeling, Optimization, and Machine Learning, having recently received his masters degree at ISIMA, France. At NexGen Analytics, Pierre has worked on the DARMA task-based programming ecosystem, developing in particular the vt-tv task visualization tool and novel load-balancing strategies using machine learning. Pierre also has experience working with numerical simulation codes, and as a result participated in the creation of the WorkVisualizer, a high-level, interactive, visual performance analysis tool for High-Performance Computing. Through his work, Pierre seeks to make complex HPC workflows more accessible and efficient, enabling users to better understand and optimize their simulations.

Speakers

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