

General-purpose coordinator–master–worker model for efficient large-scale simulation over heterogeneous infrastructure

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2

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Abstract

In this work, we propose a general-purpose coordinator–master–worker (GP-CMW) model to enable efficient and scalable simulation. The model supports distributed and parallel simulation over a heterogeneous computing node architecture with both multi-core CPUs and GPUs. The model aims at maximizing the hardware activity rate while reducing the overall management overhead. The proposed model includes five components: coordinator, priority abstraction layer, master, hardware abstraction layer, and worker. The proposed model is mainly optimized for large-scale simulation that relies on massive parallelizable events. Extensive set of experimental results shows that GP-CMW provides a significant gain from medium to intensive simulation load by exploiting heterogeneous computing resources including CPU and GPU. Regarding simulation runtime, the proposed GP-CMW model delivers a speedup that is 3.6 times faster than the CMW model.

Keywords

heterogeneous computing large-scale simulation master–worker
model GPGPU CUDA PADS

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