Abstract

Graphics Processing Units (GPUs) are being heavily used in various graphics and non-graphics applications. Many practical problems in computing can be represented as graphs to arrive at a particular solution. These graphs contain a very large number, up to millions pairs of vertices and edges. In this paper, we present performance analysis of Dijkstra's single source shortest path algorithm over multiple GPU devices in a single machine as well as over a network of workstations using OpenCL and MPI. Experimental results prove that parallel execution of Dijkstra's algorithm has good performance when algorithm is run over multi-GPU devices in a single workstation as opposed to multi-GPU devices over a network of workstations. For our experimentation, we have used workstation having Intel Xeon 6-core Processor; supporting hyper-threading and a total of 24 threads with NVIDIA Quadro FX 3800 GPU device. The two GPU devices are connected by SLI Bridge. Overall, on average we achieved performance improvement up to an order of 10-15x.

- OpenCL, http://www.khronos.org/registry/cl/
- Parallel Boost Graph Library, http://osl.iu.edu/research/pbgl/


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Performance Analysis of Single Source Shortest Path Algorithm over Multiple GPUs in a Network of Workstations using OpenCL and MPI


- The OpenCL specifications www.khronos.org/registry/cl/specs/opencl-1.1.pdf

Index Terms

Computer Science
Algorithms

Keywords

GPU Computing; OpenCL; Multi-node GPU Cluster; Dijkstra's algorithm; Single source shortest path