**Image Compositing on GPU-Accelerated Supercomputers**

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Modern supercomputers have very powerful multi-core CPUs. The programming model on these supercomputer is switching from pure MPI to MPI for inter-node communication, and shared memory and threads for intra-node communication. Consequently the bottleneck in most systems is no longer computation but communication between nodes. In this paper, we present a new compositing algorithm for hybrid MPI parallelism that focuses on communication avoidance and overlapping communication with computation at the expense of evenly balancing the workload. The algorithm has three stages: a direct send stage where nodes are arranged in groups and exchange regions of an image, followed by a tree compositing stage and a gather stage. We compare our algorithm with radix-k and binary-swap from the IceT library in a hybrid OpenMP/MPI setting, show strong scaling results and explain how we generally achieve better performance than these two algorithms.