High Performance Computing Over Geo-Spatial Data

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1:00 p.m., Monday, February 15, 2016

Abstract

Scalable spatio-temporal data computation and data mining has been a challenge in Geographic Information Systems (GIS). While geospatial data collection reaches unprecedented levels, and high performance computing architectures, like computer clusters, cloud computing platforms, and recently massively parallel GPU, become increasingly available, there is still a lack of parallel GIS algorithms, application libraries and toolkits on these architectures. This presentation will delve into the challenges and benefits of using high performance computing in the spatial domain.

As multi-core CPUs and many-core GPUs become widely used, research into parallel techniques and systems on these architectures has become important. However, some of the underlying problems are hard to scale because of non-uniform data distribution, irregular computations, and communication in spatial analysis algorithms causing a load imbalance. This presentation will delve into multi-core and many-core algorithms for polygon overlay and polygon clipping. The presentation will then cover two distributed systems namely (1) MPI-GIS using Message Passing Interface and (2) Hadoop Topology Suite for distributed polygon overlay using a cluster of nodes.