

Presents the Fall 2013 EECS Seminar Series

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“Computations over Geo-Spatial and Temporal Datasets”
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ABSTRACT

There is a flood of Geospatial and temporal data ranging from periodic satellite imagery of vegetation cover in Africa, to dynamic hurricane evolution and tracking over USA, to traffic patterns and road networks over large metros. Parallel and distributed processing is, therefore, imperative for data-and-compute-intensive Geospatial computations, such as polygonal overlay (also utilized over medical images, VLSI CAD, graphics), evacuation routing, and interesting interval/region discovery. The computer architecture now is massively parallel and hybrid, with a pair of multi-core CPU and many-core GPGPU (with dozens of cores on a CPU and hundreds of cores on a GPGPU) now commonplace in laptops to computer nodes of high-performance machines and clouds. Beyond the usual concerns of distribution of data and computation across compute nodes of clusters and clouds, an efficient utilization of the CPU-GPGPU pair is critical, else the Geospatial programs will remain inefficient, incurring loss of one to two orders of magnitude in speedup. The existing parallel algorithms and data structures port reasonably well to multi-core CPUs, but poorly to GPGPUs because of latter's atypical architecture and delicate CPU-GPU coordination. We have undertaken GPGPU-based parallelization of two key tree-based data structures, namely R-tree and Heap, have employed parallel R-tree in polygon overlay system (implemented using Azure cloud APIs, Hadoop, and MPI), and have parallelized interesting interval discovery problem. This talk will discuss these and introduce some interesting open problems. We foresee significant opportunities for Computer Science research while enabling discoveries in domain sciences and impacting society at large.

BIOGRAPHY

Sushil K. Prasad (B.Tech.'85 IIT Kharagpur, MS'86 Washington State; PhD'90 Central Florida - all in Computer Science/Engineering) is a Professor of Computer Science at Georgia State University. He is currently establishing a \$1.5M NSF-funded Center for Parallel and Distributed Computing Education and Research. Email: spasad@gsu.edu