SHARP\textsuperscript{1}: Software Toolkit for Accelerating Graph Algorithms on HIVE Processors

Partition-centric Graph Processing

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SHARP: Software Toolkit for Accelerating Graph Algorithms on HIVE Processors

• Graph Analytics is ubiquitous ...

• ... and challenging
  ▪ Irregular memory accesses
  ▪ Communication volume

• DARPA HIVE: Hierarchical Identify Verify Exploit
  ▪ Graph analytics at the “edge” of the Internet
  ▪ End-to-end graph processing system

• SHARP Framework
  ▪ High performance graph primitives
  ▪ Dataflow tools for parallel task scheduling
  ▪ Optimized Data Layouts
Partition-Centric Graph Processing

- Unit of computation → vertex, edge, partition (*Cacheable* set of vertices)
  - Graph abstraction → set of links between nodes and partitions
  - Vertex data cached; edges and updates streamed from main memory

- Partitions communicate data using bins
  - *Asynchronous* parallel computation and communication
  - Send updates to neighboring nodes partitions → less traffic

- Only 1 bin is written by a thread at any time
  - Streaming memory accesses; SIMD (accelerators)
References


Thank you!

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