A Scalable Processing-in-Memory Accelerator for Parallel Graph Processing

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Large-Scale Graph Processing

• Large graphs are everywhere

36 Million Wikipedia Pages
1.4 Billion Facebook Users
300 Million Twitter Users
30 Billion Instagram Photos

• Scalable large-scale graph processing is challenging

32 Cores
128 Cores +42%

Speedup
Tesseract

- Tesseract: processing-in-memory for graph processing
  - 3D-stacked DRAM with specialized in-order cores
  - Latency-tolerant programming model
  - Two prefetchers specialized for graph processing

- Evaluation highlight
  - 14x speedup and 87% energy reduction over traditional high-performance servers
  - Memory-capacity-proportional performance: 8GB → 128GB (16x) main memory achieves 13x speedup