Uli Meyer - Projekt: Big-Data-DynAmO

Dynamic, Approximate, and Online Methods for Big Data

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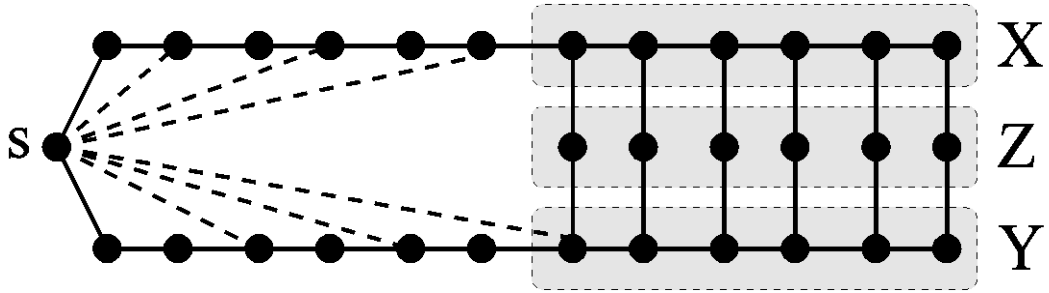
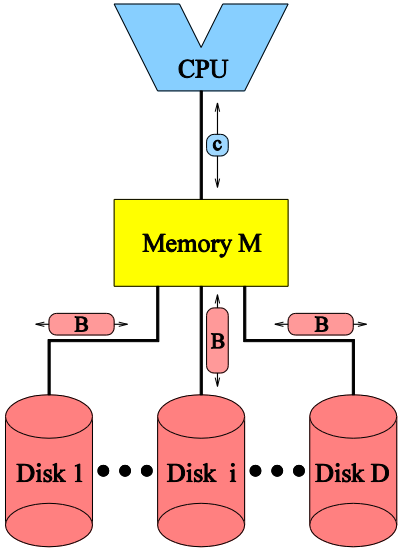
Focus on core algorithms for big graphs in the context of:

- Dynamic updates
- Approximate solutions
- Online aspects

Example: Dynamic BFS





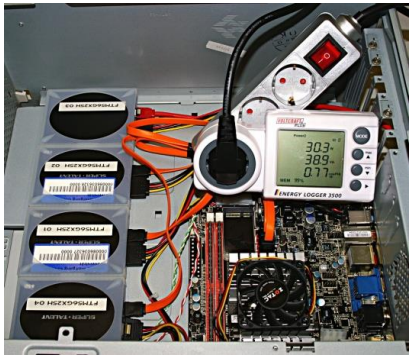
No worst-case benefit in RAM setting.
But improved algorithms for adavanced models of computation:
External memory: N/B^{1/2} I/O static vs. N/B^{2/3} I/O dynamic

Several open problems for the currently best EM dyn BFS solution

- only amortized analysis
- only for monotone update sequences
- only for undirected unweighted graphs
- result does not seem to be tight
- similar gaps for other models of computation?

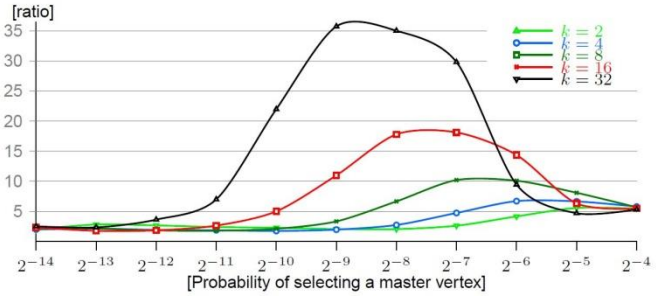
Machine models to consider:

- Memory hierarchies (Cache, Disk, Flash)
- Parallelism (Multicores, GPU)
- Energy-Efficiency
- Combinations of these



Algorithm Engineering Methodology:

- Modelling
- Algorithm Design
- Theoretical Analysis
- Implementation / Experiments
- Feedback
- Libraries (e.g. STXXL)



Sample Approximation Problems

- Diameter Approximation
- Betweeness Centrality Approximation

Sample Online Problems

- Main memory distribution btw. several EM algorithms (including game theory)
- Data structures for online graph queries

Cooperations:

- We would like to test on your graph data
- We would like to help you solve EM graph problems

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