Simultaneous Pipelining in QPipe: Exploiting Work Sharing Opportunities Across Queries

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Conventional Query Engines

- Conventional model: "one-query many-operators"
- Queries may exhibit data & computation overlap
- Run-time sharing only applies to the storage engine
- Storage engine sees uncoordinated page requests

QPipe: a Staged Query Execution Engine

- New philosophy: "one-query many-queries"
- Relational operators become micro-Engines
- Queries break in packets, queue up in μEngines
- Exposes sharing opportunities at run time
- OSP: On-demand Simultaneous Pipelining
  - μEngines detect overlap at run time
  - Results simultaneously pipelined to consumers

Data & Work Sharing Limitations

- High concurrency increases sharing opportunity
  - However:
    - Queries are evaluated independently
    - Existing mechanisms for sharing are opportunistic

Demonstration

- QPipe is built on top of BerkeleyDB
- Experiment with a subset of TPC-H queries
- Demonstration features:
  - Introduction to QPipe
  - Resource utilization and query progress
  - Demonstration of OSP
    - Simultaneously pipelined query execution
    - Interactive mode: submission of ad-hoc packets

http://www.cs.cmu.edu/~StagedDB