Seminar: Implementation Techniques for Main Memory Database Systems

Organizational Meeting

Michael Freitag, M.Sc., Prof. Alfons Kemper, Ph.D.
Garching, June 28, 2018
Overview

Weekly Meeting

- Monday, 16:00 - 17:30, starting October 22, 2018
- Room MI 02.09.014
- 2 presentations per meeting
- There will be an attendance log

Required Work

- Seminar paper (≤ 5 pages)
- Sample implementation (C++)
- Presentation (20 minutes + 10 minutes discussion)
- Moderate one discussion (act as the "devil’s advocate", you should pair up for this)
Organization & Due Dates

Check in via email (freitagm@in.tum.de) or personally (room MI 02.11.034)

1. Check in **soon after matching** for paper recommendations (preferences considered FCFS)
2. Check in when rough structure is planned
3. Check in when first draft is ready

Due Dates

- Structure: ca. 4 weeks prior to presentation date
- Presentation slides: 1 week prior to presentation date
- Seminar paper and sample implementation: 2 weeks after presentation date
Topics

Block 1: Cardinality & Frequent Item Estimation
  • Flajolet-Martin Sketches
  • Index-Based Join Sampling
  • Count and Count-Min Sketches

Block 2: SIMD-Acceleration & Parallelization
  • SIMD-Accelerated Regular Expression Matching
  • SIMD-Accelerated Hash Tables: Linear Probing and Double Hashing
  • SIMD-Accelerated Hash Tables: Cuckoo Hashing
  • Main Memory Hash Join Algorithms for Multi-Core CPUs
  • Parallel Array-Based Single- and Multi-Source Breath First Search
Topics

Block 3: Storage

• SLACID: Sparse Linear Algebra in a Column-Oriented In-Memory Database System
• ArrayStore: A Storage Manager for Complex Parallel Array Processing
• Data Blocks: Hybrid OLTP and OLAP on Compressed Storage

Block 4: Compression

• Database Compression on Graphics Processors (requires NVIDIA GPU)
• MILC: Inverted List Compression in Memory
• BitWeaving: Fast Scans for Main Memory Data Processing

Block 5: Other Topics

• Column Imprints: A Secondary Index Structure
• Result Set Serialization
https://db.in.tum.de/teaching/ws1819/seminarHauptspeicherds/

Michael Freitag
freitagm@in.tum.de
MI 02.11.034

Have fun!