Topics for thesis

GPU-accelerated database optimization

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For over three decades, research investigates how databases can be optimized, e.g., by identifying better query execution plans. Currently, the system architecture is changing from single to multi-core CPU systems supported by co-processors (e.g., GPUs). Existing optimization approaches do not benefit from the increased performance because mainly rely sequential algorithms we proposed to solve optimization problems.

Therefore, database optimization should be adapted to the changed architecture in order to improve the performance of database systems. Our goal is to decrease optimizer runtimes leading to better solutions in the same time (e.g., a more efficient query plan) and hence, to better performance of query processing.

Survey of database optimization approaches

In database optimization different types of optimization problems exist. Query optimization, for example, performs different optimization steps to transform declarative queries into efficient execution plans. In this thesis one optimization problem should be selected. Based on the selected optimization problem, a literature search should be conducted to identify existing algorithms solving the optimization problems. After identifying algorithms, an analysis needs to be performed comparing the algorithms to determine the advantages and disadvantages of the different algorithms. Possible optimization problems are:

- Join order optimization
- Selectivity estimation
- Physical database design
- Self-Tuning