Architectural optimizations in databases

Data Morhing: An Adaptive, Cache-Conscious Storage Technique

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Outline

Database Storage Methods.

The Order Matters

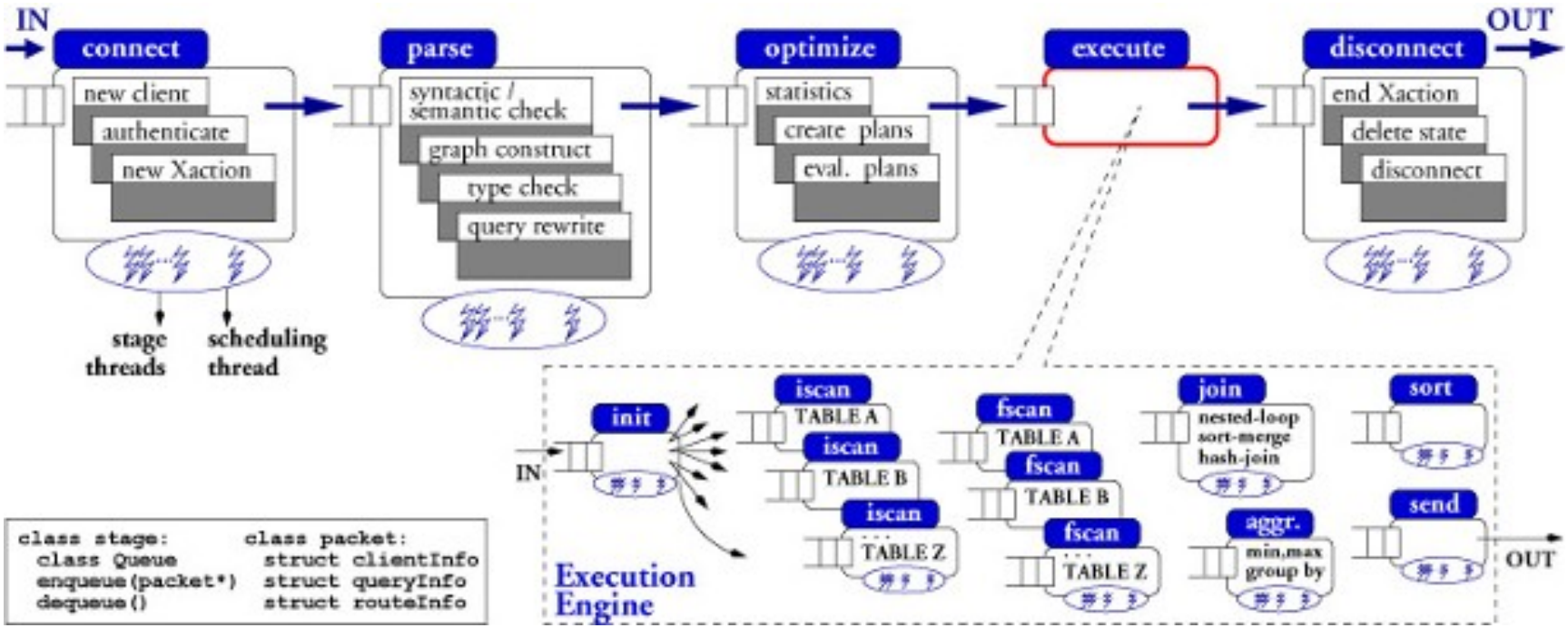
- Traditional Row Based, Space Oriended Storage
- Column based, New Trend. Search Oriented Storage.
- Both has advantages and disadvantages

Row Based Storage.

- Focused on keeping data of a related entry close to each other
- Common implementation N-ary storage model
-

1	2	3
4	5	6

Row Based Storage Engine.



Column Based Storage

- Focused on allowing fast search on attributes
- PAX storage model used.
1	3	5
2	4	6

Definitions

- *group:* Set of attributes that are writting to consecutive memory addresses
- *partition:* Set of groups that uniquely defines the position of every attrbute in a relation
- *zone:* Area of a page where all instances of a particular group are written
- *zone-record:* defines a instance of the attrbutes in a particular group

The Algoritm

1. Calculating cache-effient storage template.
2. Re-organizing the data into a cache-effient organization.
    1. Static evaluation, based on heuristics
    2. Dynamic restructuring based a request recognition.

Conclusions and Future Work

- Speed-up made, but only on specific well-defined datasets.
- Finding a general optimalisation algoritm is hard.
- Experiments did only cover memory based databases.

Summary

- Data Morphing is a Promising Method.
- Combining both Row Based Storage and Column Based Storage could lead to nice speeds-up.
- Depending which method to choose how-ever is really hard.

- Outlook
  - Make it scale so it also take the variable 'disk access' into count.
  - Build a framework to allow easy and proper testing for various combinations.

For Further Reading I


Richard A. Hankins
Data Morphing: An Adaptive, Cache-Conscious Storage Technique
Proceedings of the 29th VLDB Conference, Berlin, Germany, 2003.