NoDB: Efficient Query Processing on Raw Data Files

Ioannis Alagiannis, Renata Borovica, Miguel Branco, Stratos Idreos, Anastasia Ailamaki

In the Era of Data Deluge

Data collections become larger and larger

Many applications avoid using DBMS
e.g. social networks, scientific experiments

Problem: DBMS startup cost

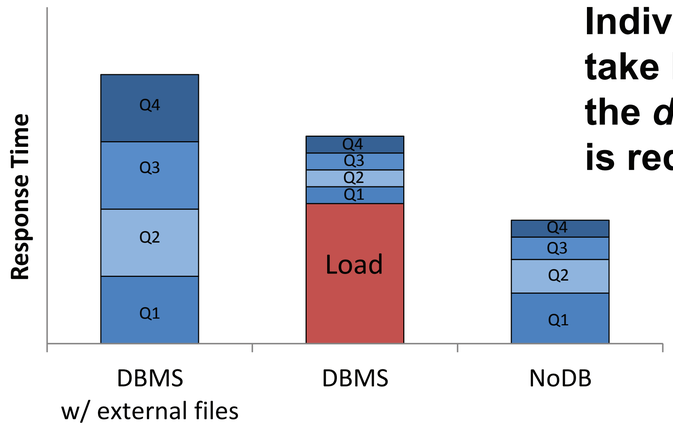
- Why wait for loading and tuning?
- Why load the entire data set?
- Column Vs. row-store?
- Hire DB expert?

Challenges

- Make DBMS more accessible to the user
- Eliminate major bottlenecks i.e. data loading

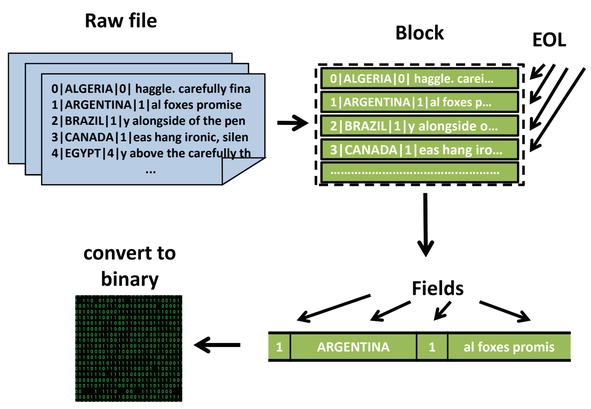
NoDB Philosophy

- No a priori data loading
- Raw data files as a first-class citizen
- Query processing *in situ*
- Maintain the whole feature set of a modern DBMS



Individual queries may take longer; however, the *data-to-query* time is reduced

Querying Raw Data Files



Accessing raw data files is expensive
- Parsing & tokenizing
- Data type conversion

Positional Map

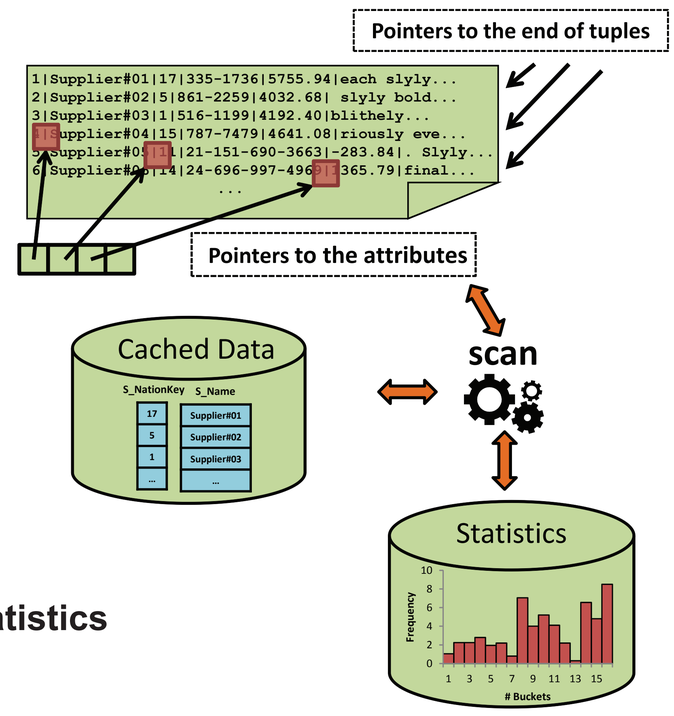
- Reduce parsing and tokenizing
- Maintain low level metadata
- Create on-the-fly
- Adapt to queries

Caching

- Complementary to positional map
- Avoid raw file accesses
- Populated during query execution

Statistics

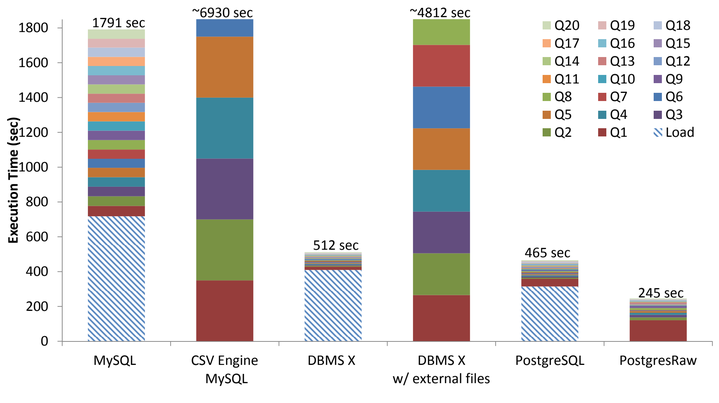
- Extend the *scan* operator to create statistics
- Generate in an adaptive way



PostgresRaw in Action

Evaluation

- Applying the NoDB philosophy to PostgreSQL without altering the internals of the query engine
- PostgresRaw vs. other DBMS



Micro Benchmark

- Data exploration scenario
- Tuples: 7.5 millions - Attributes: 150
- Epoch 1: access c1-c30
- Epoch 2: access c100-c130
- 20 aggregation queries in each epoch
- Vary selectivity

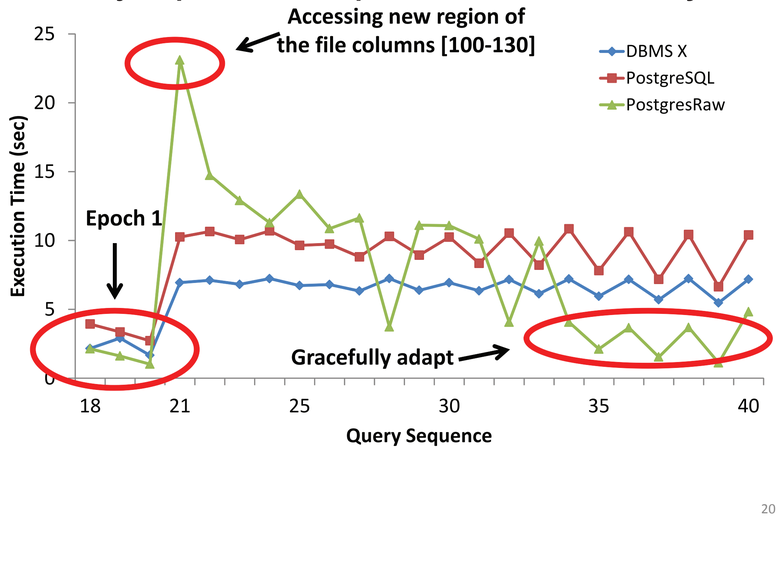
PostgresRaw is competitive with DBMS that have already loaded the data

Significant gains over external files

***In situ* query processing overhead is amortized across a sequence of queries**

Adaptation to workload changes

- Exploring a new region of the file
- Adjust positional map and cache automatically



ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

DATA-INTENSIVE APPLICATIONS AND SYSTEMS

CWI