PECARI
Pig Engineers Care About R Improvements

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Outline

1. Introduction
2. Our Goal
3. Implementation
4. Future Work

What is Pig Latin?

Set-oriented data transformation language in which:

- Primitives filter, combine, split, and order data
- Users describe a sequence of transformations
- Set transformations are stateless

The Pig Environment

Advantages include:

- Set transformations massively parallel (Hadoop)
- Familiar programming style
- Support for semi-structured data
- Ad-hoc data analysis and manipulation

An Opportunity

Pig currently performs no optimizations.

- "the user knows best" philosophy
- Minimal knowledge of dataset
- Computing costs is hard

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Join Order Optimizations

Why these?

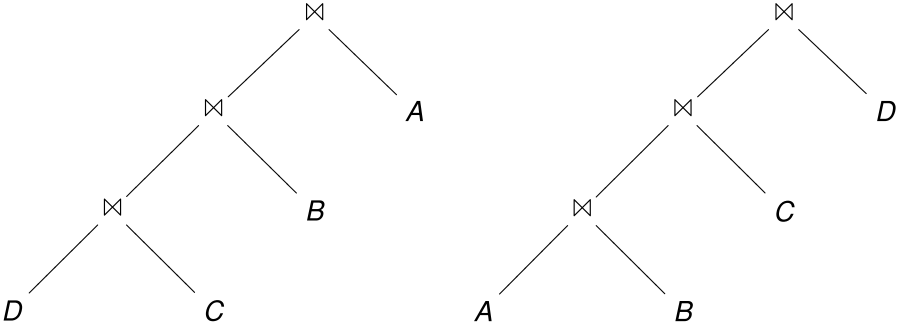
- High cost operations
- Non-trivial implementation
- Users adopt Pig to make joins simple

Example Query

```
a = LOAD ’input_A.txt’ USING PigStorage(’\t’)
      AS (a_key, a_data);
-- ...
x = JOIN d BY d_key, c BY c_key;
y = JOIN x BY c_key, b BY b_key;
z = JOIN y BY b_key, a BY a_key;
STORE z INTO ’results.txt’ USING PigStorage();
```

Logical Dataflow Reordering

$$|A| = 5K, |B| = 50K, |C| = 500K, |D| = 5M$$



Smallest → largest vs. largest → smallest can significantly differ in execution speed

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Necessary Components

- A method to pick the best join order
- A method to compute join costs
- Relation cardinalities and key distributions

Distributed Sampling

- Hadoop stores data in HDFS
- Plenty of bandwidth and spare cycles

Each sampling daemon takes:

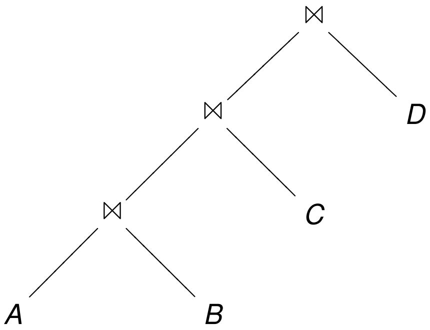
Inputs: filename, join attribute

Output: histograms

Estimating Join Cost

Examine *logical* plans by walking through the operator tree

- Gauge cardinality of inputs at load nodes
- Combine equidepth histograms at join nodes



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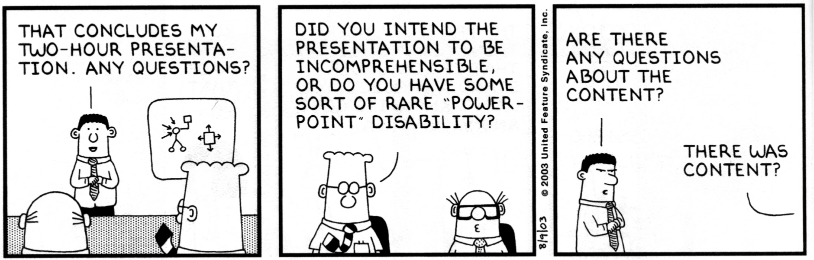
What’s next?

- Performance numbers:
  - Time savings for various workloads
  - Overhead of sampling and optimization
- Evaluate bushy plans

Future Work

- Re-optimize on-the-fly
- Project early, rejoin later
- Informed DFS
- Distribute plan searches using MapReduce

Questions?


THAT CONCLUDES MY TWO-HOUR PRESENTATION. ANY QUESTIONS?
DID YOU INTEND THE PRESENTATION TO BE INCOMPREHENSIBLE, OR DO YOU HAVE SOME SORT OF RARE "POWERPOINT" DISABILITY?
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ARE THERE ANY QUESTIONS ABOUT THE CONTENT?
THERE WAS CONTENT?