Predicting Query Execution time for JIT Compiled Database Engines

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Motivation & Problem

Use Cases

- Query admission
- Improve query scheduling
- Better resource allocation

JIT Analytical Engines

- Typically, majority spent on memory access and branch misprediction for in-memory systems

Prior Works

Training Time

- High

Accuracy

- High
- Low

Analytical Models*

Machine Learning Models

Quick and near accurate prediction of execution time is highly desirable

* Manegold et al. Generic database cost models for hierarchical memory systems
Baseline Analytical Model (Manegold et al)

Analytical models have low accuracy for runtime parameters

Manegold et al. Generic database cost models for hierarchical memory systems
JIT Prediction: Analytical models + JIT Calibration

Low overhead calibration can significantly improve accuracy
Experimental Results

**Setup**

Intel(R) Xeon(R) Gold 5118  
L1: 32KB  
L2: 1MB  
L3: 16MB (non-inclusive)  
RAM: 360 GB  
Database: SSBM SF100  
Proteus – engine based on JIT compilation

Accuracy: Improves over Analytical Model by 93%
Training Time: < 10% of the batch execution time
Analytical Model

JIT Calibration

Workload

Hardware Parameters

Analytical Model

JIT Prediction

Low Training + Near Accurate Prediction

Thank You!