Smooth Scan: Statistics-oblivious Access Paths
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Need for Intra-Query Adaptivity

State of Affairs in Database Systems
Setting: TPC-H, SF10, DBMS-X, Tuning tool 5GB space

- Degradation due to sub-optimal access path choices
- Cardinality misestimates
- Statistics: unreliable advisor

Adaptivity in Access Path Operators

Mid-query re-optimization
Re-optimization in action
Quest for Robust Execution

- Re-optimization risky
- Violate user expectation
- Near-optimal for all inputs

Smooth Scan in Nutshell

SMOOTH SCAN
Ignore optimizer’s estimates
Learn result distribution at run-time
Adapt as you go

DESIGN GOALS
Avoid performance cliffs & risk
Continuous, gradual and smooth adaptation

- Adaptive, but smooth

Statistics-oblivious access paths

Adaptivity with Smooth Scan

INSIGHT: Morph between Index and Sequential Scan

HOW?
1. Index Access
2. Entire Page Probe
3. Gradual Flattening Access

WHEN?
Selectivity increase -> Mode Increase
Selectivity decrease -> Mode Decrease

- Data driven adaptation
- Avoid repeated access
- Less random I/O

Smooth Scan in Action

Setting: 400M tuples, 25GB, Index(c2)
Query: select * from R where c2 < X;

Smooth Scan Summary

Operator morphing from one form to another
+ Data driven adaptation
= Robust query execution