

Online Monitoring of Database Structural Deterioration

**Takashi HOSHINO, Kazuo GODA,
Masaru KITSUREGAWA**
University of Tokyo

Background and proposal

- One of database performance problems:
 - Occurrence of Structural Deterioration (SD)
 - Data update is a substantial activity of DBMS
 - Necessity of database reorganization at times



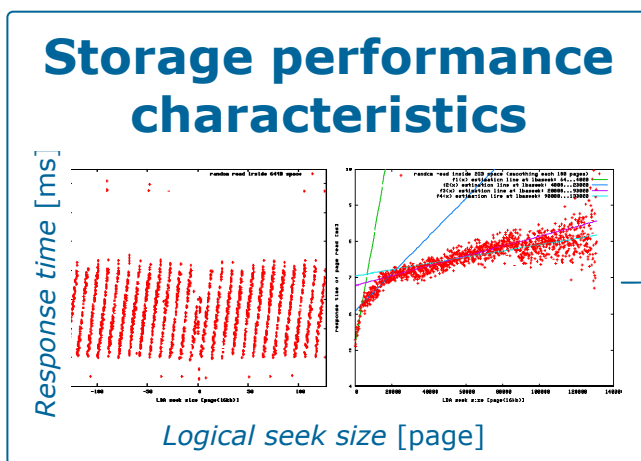
- Issue: difficulty of reorganization management
 - How to measure SD?
 - When to measure SD?
- Goal: autonomic database reorganization
 1. Monitor SD online
 2. Schedule Reorganization
 3. Execute Reorganization

Measurement of structural deterioration

■ SD degree is

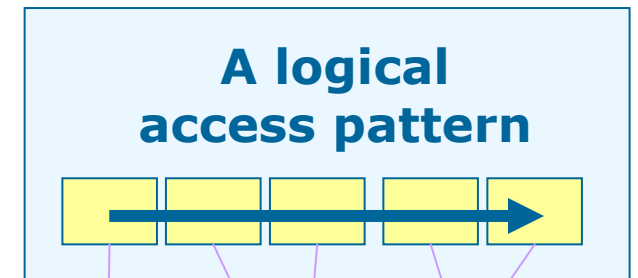
$$\frac{\text{Access cost under the current state of the structure}}{\text{Access cost under the best-organized structure}}$$

– For given access pattern and database state

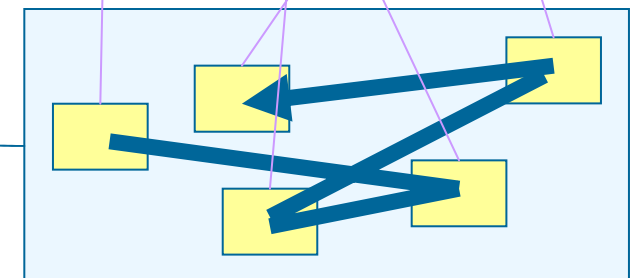


Access cost

Logical database view



Physical storage view

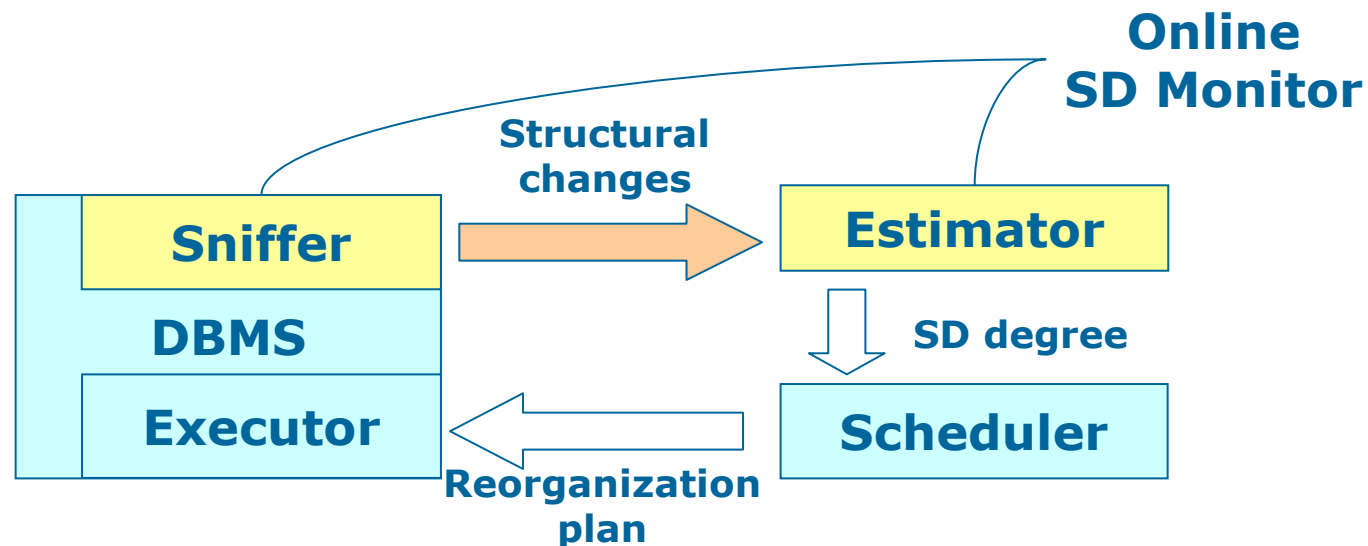


Online SD Monitor

- Sniffs database structural changes at run-time
- Estimates the degree of deterioration
 - Piecewise and incrementally

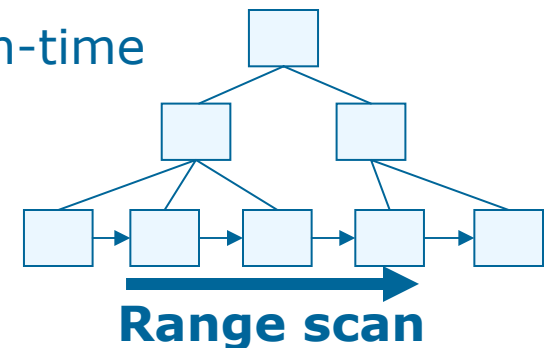


- Realizes online monitoring of structural deterioration



Demo movie with Online SD Monitor prototype

- Prototype of online SD Monitor using MySQL 5.0
 - The sniffer in the InnoDB storage engine
 - B+tree structure
 - The estimator as a GUI tool
 - Assumes range scan with primary key
 - Visualizes SD degree distribution at run-time
- Demo setting
 - Schema: a synthetic cluster table
 - With integer primary key
 - 150MB after data load
 - Workload: mixed bulk deletes and inserts
 - Skewed



Demo

Conclusion

- Online structural deterioration (SD) monitor
 - An essential facility to realize autonomic database reorganization

- Future work
 - Mechanism for scheduling reorganization

Thank you!