Online Monitoring of Database Structural Deterioration

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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

Access cost under the current state of the structure
Access cost under the best-organized structure

- For given access pattern and database state

Storage performance characteristics

Physical storage view

Logical database view

Access cost
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!