# Database System Implementation

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# Course Overview

- ## File & System Structure
  Records in blocks, cache, memory hierarchy,...

- ## Indexing & Hashing
  B-Trees, hashing,...

- ## Query Processing
  Query costs, join strategies,...

- ## Query Optimization
  SQL server 2000 as an example...

# Course Overview

- Crash Recovery
  - Failures, stable storage,...
- Concurrency Control
  - Correctness, locks,...
- Transaction Processing
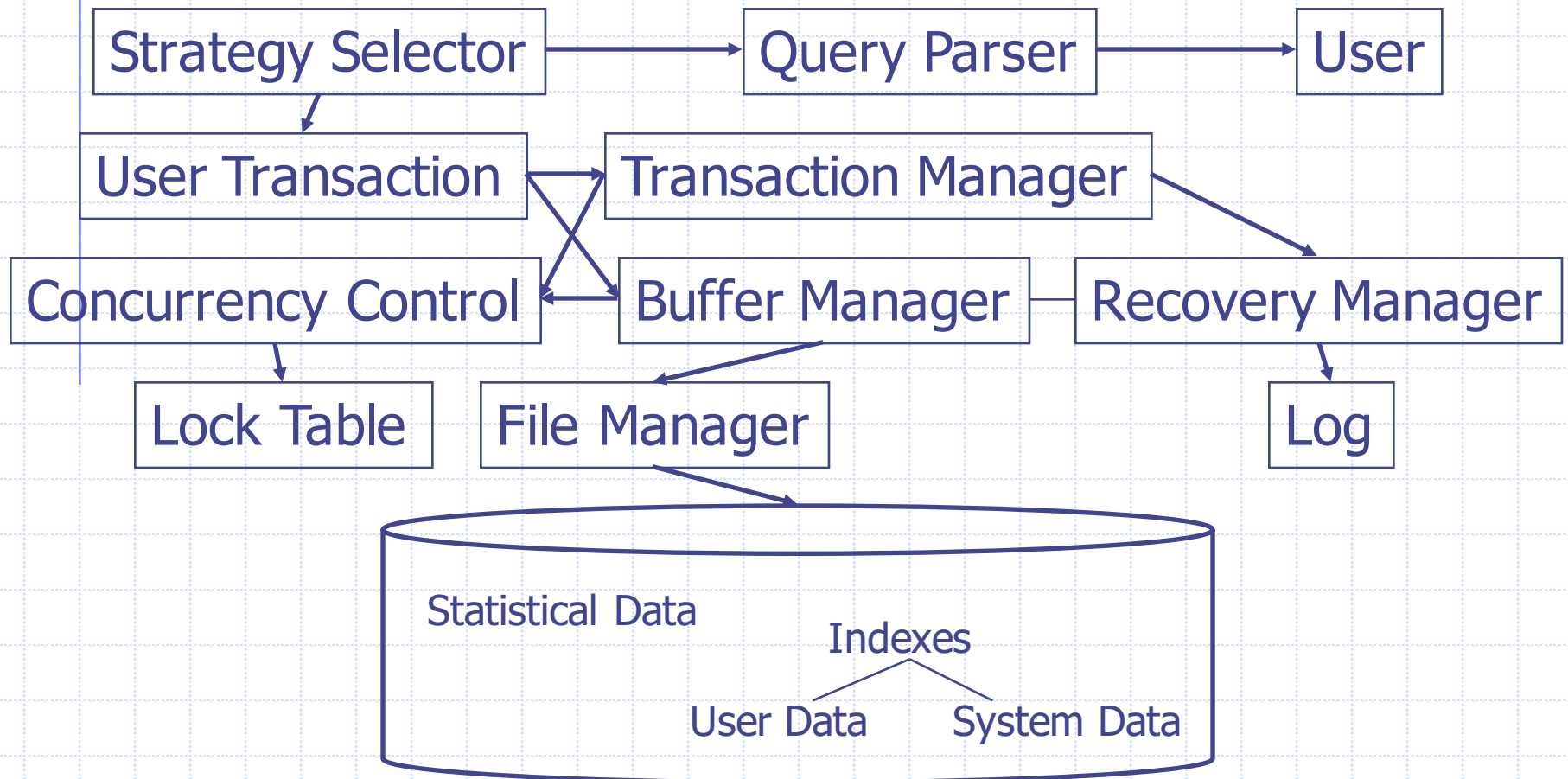  - Logs, deadlocks,...
- Distributed databases
- Data Mining and Data Analysis
- Database System and Internet
- Advanced Topics:
  - 新型应用带给数据库哪些新需求？
  - Hadoop; ML; AI

# System Structure

| Strategy Selector | → | Query Parser | → | User |

Strategy Selector → User Transaction

User Transaction ⇄ Transaction Manager

Transaction Manager → Recovery Manager

User Transaction / Transaction Manager ⇄ Concurrency Control / Buffer Manager

Concurrency Control — Buffer Manager

Buffer Manager — Recovery Manager

Concurrency Control → Lock Table

Buffer Manager → File Manager

Recovery Manager → Log

File Manager → (database)

Statistical Data

Indexes

User Data    System Data

# Course information

TEXTBOOK: Garcia-Molina, Ullman, Widom;
            either "DATABASE SYSTEM IMPLEMENTATION"
            or   "DATABASE SYSTEMS, THE COMPLETE BOOK"

参考书：Greenplum 白皮书

ASSIGNMENTS:

- Homework: Exercise, reading papers and presentation.
- Projects: based on postgreSQL or Greenplum
  - Query processing
  - Indexing
  - Optimization
  - Distributed data
  - etc

GRADING: Projects: 50%, Presentation: 50%

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You are all welcome!