CS422 Principles of Database Systems
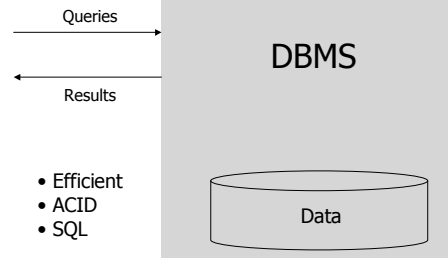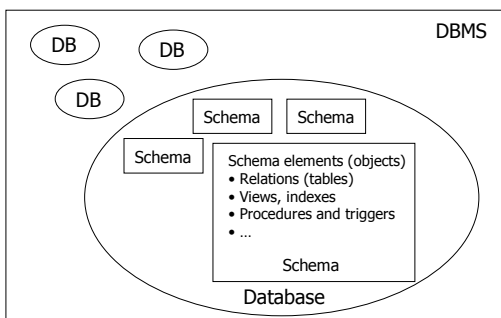Course Overview

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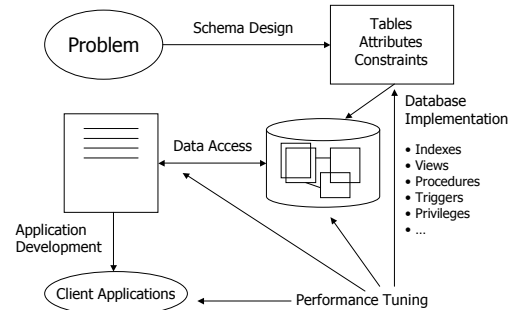

Database Management Systems (DBMS)

Queries →

← Results

DBMS

• Efficient
• ACID
• SQL

Data

Databases

DBMS

DB   DB

DB

Schema   Schema

Schema

Schema elements (objects)
• Relations (tables)
• Views, indexes
• Procedures and triggers
• ...

Schema

Database

Database Development

Problem → Schema Design → Tables Attributes Constraints

Data Access

Database Implementation
• Indexes
• Views
• Procedures
• Triggers
• Privileges
• ...

Application Development

Client Applications ← Performance Tuning

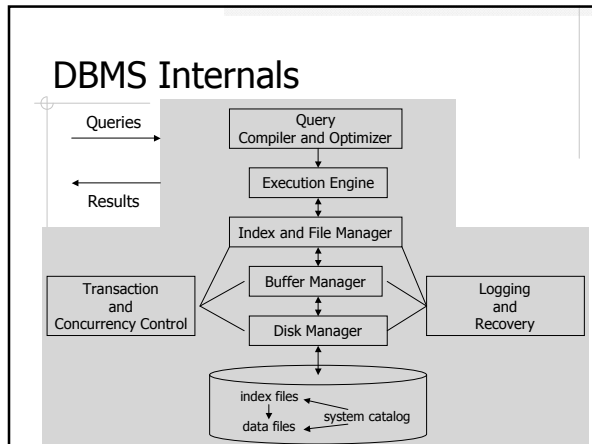## Schema Design

◆ Entity-Relationship (ER) model
◆ Relational model
◆ ER → Relational conversion
◆ Normalization

Implementation and Access

◆ SQL
◆ Transactions
◆ Stored procedures and triggers
◆ Improve query efficiency

DBMS Internals

Queries →

← Results

Query Compiler and Optimizer

↕

Execution Engine

↕

Index and File Manager

| Transaction and Concurrency Control |

| Buffer Manager |

| Logging and Recovery |

↕

| Disk Manager |

index files
↓
data files ← system catalog

Database Internals

◆ Disk access
◆ Record organization
◆ Memory management
◆ Concurrency control
◆ Failure recovery
◆ Query processing
◆ Indexes