CS422 Principles of Database Systems
Course Overview

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The Big Picture

Database Management System (DBMS)

Database Objects
- Tables, views
- Indexes
- Functions and Stored procedures

Database

<table>
<thead>
<tr>
<th>students</th>
<th>id</th>
<th>name</th>
<th>address</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>John</td>
<td>123 Main St.</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Jane</td>
<td>456 State St.</td>
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<table>
<thead>
<tr>
<th>departments</th>
<th>name</th>
<th>acronym</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Computer Science</td>
<td>cs</td>
</tr>
<tr>
<td></td>
<td>Mathematics</td>
<td>math</td>
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</tbody>
</table>

Schema

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Other
- Views
- Indexes
- Functions/procedures
Database Development

- Problem
- SQL
- Application Development
- Client Applications

Application Development

- Data Access
- Database Implementation
- Tables
- Attributes
- Constraints

Implementation and Access

- SQL
- Transactions
- Stored procedures and triggers

Database Internals

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

Schema Design

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

DBMS Internals

- Query
- Compiler and Optimizer
- Execution Engine
- Index and Table Manager
- Transaction and Concurrency Control
- Buffer Manager
- Disk Manager
- Logging and Recovery
- Index files
- Data files
- System catalog