

CS422 Principles of Database Systems
Course Overview

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Database Management Systems (DBMS)

- Efficient
- ACID
- Standard

Database Management Systems (DBMS)

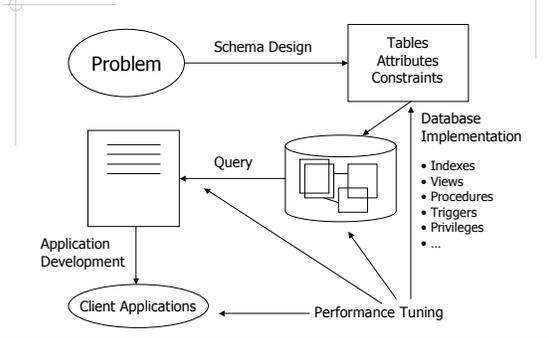
Databases

Database on CS3 Server

Database Courses

Course	Audience	Coverage
CS122	Database Users	SQL
CS422	Database Developers	<ul style="list-style-type: none"> ◆ Design ◆ Implementation ◆ Query ◆ Application development ◆ Performance Tuning
CS522	DBMS Developers	DBMS implementation

Database Development



Schema Design

- ◆ Data modeling
 - Entity-Relationship (ER) model
 - Relational model
 - Object-oriented model
- ◆ Conversion between models
 - ER diagram relational model
 - Object-Relational Mapping (ORM)
- ◆ Normalization

Data Modeling Example

```

Some Restaurant
Terminal ID: NC2HHRY
Merchant ID: 4492414532566624

VISA                                srv:1
*****1234

SALE                                inv:000032
Batch: 000244
Date: JUN 17, 06   Time: 18:44
                                AUTH:00559B

Base: $36.70
Tip:
Total:                                Chengyu Sun
    
```

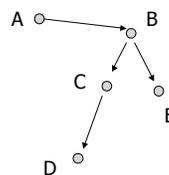
Database Implementation

- ◆ Data Definition Language (DDL)
 - CREATE, DROP, ALTER
- ◆ Authorization
 - GRANT, REVOKE
- ◆ PL/SQL and Java
 - Functions
 - Procedures
 - Triggers

Query Languages

- ◆ Relational Algebra
- ◆ Datalog
- ◆ Data Manipulation Language (DML)
 - SELECT ... FROM ... WHERE
 - Conditional queries
 - Subqueries
 - Transactions
 - ...

Recursion Example



Edges

P1	P2
A	B
B	C
C	D
B	E

- ◆ Is there a path from C to E?

Application Development

- ◆ Embedded SQL
- ◆ JDBC
- ◆ Hibernate

Query Tuning

- ◆ Background knowledge
- ◆ Execution plan
 - View
 - Interpret
 - Control
- ◆ Common tips and techniques