

Database Systems Management

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On Campus and Distance Learning

What is CS430 / CS430dl?

- ▶ Instructor (Russ) and GTA (Shivani)
- ▶ Homework assignments
- ▶ 4-5 Lab assignments
- ▶ Computer Systems / Labs
- ▶ Quizzes (on-line)
- ▶ 1 Midterm & Final
- ▶ Course Objectives
- ▶ Syllabus

Objectives

Ch. 1 - Overview of Database Systems

- Purpose of Database Systems
- View of Data
- Database Languages
- Relational Databases
- Database Design
- Data Storage and Querying
- Transaction Management
- Database Architecture

Objectives

Ch. 2 - Introduction to Relational Model

- Structure of Relational Databases
- Database Schema
- Keys
- Schema Diagrams
- Relational Query Languages
- Relational Operations

Objectives

Ch. 3 - Introduction to SQL

- Overview of the SQL Query Language
- SQL Data Definition
- Basic Structure of SQL Queries
- Set Operations
- Null Values
- Aggregate Functions
- Nested Subqueries
- Modification of the Database

Objectives

Ch. 4 – Intermediate SQL

- Join Expressions
- Views
- Transactions
- Integrity Constraints
- SQL Data Types and Schemas
- Authorization

Objectives

Ch. 5 - Advanced SQL

- Accessing SQL From a Programming Language
- Functions and Procedures
- Triggers
- Recursive Queries
- Advanced Aggregation Features

Objectives

Ch. 6 - Formal Relational Query Languages

- Relational algebra
- Relational calculus (maybe)

Objectives

Ch. 7 - Database design and the ER model

- Overview of the Design Process
- The Entity-Relationship Model
- Constraints
- Removing Redundant Attributes in Entity Sets
- Entity-Relationship Diagrams
- Reduction to Relational Schemas
- Entity-Relationship Design Issues

Objectives

Ch. 8 - Relational Database Design

- Features of Good Relational Designs
- Atomic Domains and First Normal Form
- Decomposition Using Functional Dependencies
- Functional-Dependency Theory
- Algorithms for Decomposition

Objectives

Ch. 9 - Application Design

- Application Programs
- Web Fundamentals
- Servlets and JSP
- Application Architectures
- Rapid Application Development
- Application Performance
- Application Security
- Encryption and Its Applications

Objectives

Ch. 10 - Storage and File Structure

- Overview of Physical Storage Media
- Magnetic Disk and Flash Storage
- RAID
- Tertiary Storage
- File Organization
- Organization of Records in Files
- Data-Dictionary Storage
- Database Buffer

Objectives

Ch. 11 - Indexing and Hashing

- Basic Concepts
- Ordered Indices
- B+-Tree Index Files
- B+-Tree Extensions
- Multiple-Key Access
- Static Hashing
- Dynamic Hashing
- Comparison of Ordered Indexing and Hashing
- Bitmap Indices
- Index Definition in SQL

Objectives

Ch. 12 - Query processing

- Overview
- Measures of Query Cost
- Selection Operation
- Sorting
- Join Operation
- Other Operations
- Evaluation of Expressions

Objectives

Ch. 14 - Transaction Management

- Transaction Concepts
- A Simple Transaction Model
- Storage Structure
- Transaction Atomicity and Durability
- Transaction Isolation
- Serializability
- Transaction Isolation and Atomicity
- Transaction Isolation Levels
- Implementation of Isolation Levels
- Transactions as SQL Statements

Objectives

Ch. 17 - Concurrency Control

- Lock-Based Protocols
- Deadlock Handling
- Multiple Granularity
- Timestamp-Based Protocols
- Validation-Based Protocols
- Multiversion Schemes 689 15.7
- Snapshot Isolation
- Insert Operations, Delete Operations, and Predicate Reads

Objectives

Ch. 18 - Recovery

- To show what steps are taken in the ARIES method to recover from DBMS crashes
- To describe how logs are maintained and how they are used to recover from a crash
- To identify the concepts behind checkpoints and show how they are used.
- To show how recovery interacts with concurrency control

Computer Systems / Labs

- ▶ Assignments done using computer systems in C120 (Linux based, multi-core boxes)
- ▶ May use home equipment - but GTA will grade using the state capital boxes.
 - ▶ If it doesn't run in that environment, it will be graded accordingly
 - ▶ Department policy
- ▶ Every student enrolled in a CS class is given an account in the CS environment
- ▶ Our MySQL server is faure.cs.colostate.edu

Homework / Programming Assignments

- ▶ Homework assignments every 1-2 weeks
- ▶ 4-5 lab assignments
 - ▶ Done using the state capital machines
 - ▶ SQL, design and build database
 - ▶ Java program using the JDBC interface
 - ▶ XML parser

Late Policy

- ▶ Assignments are due class time on Tuesdays (both homework and lab)
- ▶ Assignments have a 48 hour late period.
- ▶ Assignments turned in during the late period will be assessed a 20% late penalty
- ▶ All assignments will be submitted through Canvas
- ▶ Questions about grading should first be discussed with Shivani

Quizzes

- ▶ Weekly quizzes over the reading material
- ▶ 3 attempts
- ▶ Only highest attempt counts for grade
- ▶ Open book, open notes
- ▶ NOT open person

Exams

- ▶ Midterm exam during week 7
- ▶ Final exam during week 16
- ▶ Series of timed online quizzes
- ▶ 72 hours
 - ▶ Sunday, Monday, Tuesday
- ▶ Study guide will be published in advance

Syllabus

- ▶ <http://www.cs.colostate.edu/~cs430dl>

Where do I get help ?

- ▶ The book - reading is a good thing.
- ▶ Your classmates - this is a large class, find allies.
 - ▶ Not TOO good of allies - cheating will be dealt with harshly..
- ▶ The Instructor and GTA
 - ▶ We have office hours, use them. Our salaries are paid by your tuition - you are entitled to our time.
 - ▶ If our office hours are not timely - set up an appt. Like all geeks, we live glued to computer screens.

Where do I get help?

- ▶ Discussion Board
 - ▶ If you have a question, odds are 20 other people have the same question.
 - ▶ The TA will check the boards regularly
- ▶ Google / Stack Overflow
 - ▶ Again - not TOO much of Google, see above re: cheating
 - ▶ Sharing code, posting code is considered cheating!!
