Database Management Systems

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Introduction

Instructor Details

- Instructor: Sumayyea Salahuddin
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Text Book Details

- Text Book: Modern Database Management
  - By McFadden, Hoffer, & Prescott/ Hoffer, Venkataraman & Topi
  - Edition: 10th
  - Publisher: Prentice Hall. ISBN: 0-13-033969-5.

Recommended Books

- Recommended Reading
  - Ricardo & Macmillan, Database Systems: Principles, Design, and Implementation
  - Ramarkrishnan & Gehrke, Database Management Systems
  - Elmasri & Navathe, Fundamentals of Database Systems, 3rd Edition, Addison Wesley Longman
  - Mannino, Database Application Development & Design, McGraw-Hill.
  - PDF books and other material, which will be provided by Instructor.

Course Basic Objectives

- Understand the fundamental concepts of database systems
- Understand Relational Database Management System in particular to analyze, design, and implement the Relational Database Application.
- Determine the user requirements for data of given problem and develop Conceptual Data Model
- Transform Conceptual Data Model into Logical and Physical Specifications to guide database implementation.
- Efficiently use Structure Query Language (SQL).

Tentative Course Outline

Week	Topics
01	**Introduction to the Database and Database Management System** Database definitions, Databases & Conventional File Processing Systems, Advantages of Database Approach, Functions of DBMS, and Components of Database Environment
02	**Data Models** Logical, Physical, and Conceptual view of Data; Types of Data Models, Types of Database Design; System Development Life Cycle, The Database Life Cycle; Front-end and Back-end Databases
03	**Entity-Relationship Modeling** ER Model Constructs, Classification of Entity Types, Attributes, and Relationships
04	**Entity-Relationship Modeling (Cont.)** Super & Subtype Entities, Relationships and Cardinalities between Entities, Conceptual & Logical Database Design
05	**Relational Data Model** Converting E-R to Relations, Relational Algebra, and Relational Calculus
06	**Functional Dependency and Normalization** Functional Dependency, Second Normal Form, Third Normal Form, Boyce-Codd Normal Form, Higher Normal Form, and Normalization Summary
07	**Structured Query Language** Basic Commands and Functions of SQL, Data Definition Language, and Data Manipulation Language
08	**Structured Query Language (Cont.)** SQL Queries, Characteristics/Types of Views, Relational Operators, and SQL Join

Tentative Course Outline (Cont…)

Week	Topics
09	**Structured Query Language (Cont.)** Integrity Constraints, Updating Multiple Tables, SQL Sub-Queries, and SQL Built-in Functions
10	**Advanced Structured Query Language** Stored Programs, Stored Procedures, Stored Functions, and Triggers
11	**Advanced Structured Query Language (Cont.)** Prepared Statement, General-Purpose Stored Procedures, Cursors, Transactions, Locks, and Security
12	**Transaction Processing Concepts** The Concept of Transaction, Transaction & Schedules, Concurrent Execution of Transactions, Lock-based Concurrency Control, Recovery Management, and Security
13	**File Organization and Indexing** Data Storage Principles, Alternative File Organization, Indexes, Index Classification, Tree-Structured Indexes, Range Searches, ISAM, B+-Trees, Bulk Loading
14	**Query Execution** Query Processor: Architecture, Query Parser, External Sorting, Hash Join, Query Optimization
15	**Database Architectures** Client/Server, Distributed Databases **NOSQL Databases** **The Database Warehouse** Concept of Data Warehouse, Its Architecture & Characteristics
16	**Project Presentations**

Grading Criteria

- Grading
  - Final Exam 60%
  - Midterm Exam 20%
  - Sessionals 20%
    - Homework + Quizzes 10%
    - Project 10%

Course Policy – Attendance

- Students need to work hard and put extra efforts in the course to achieve as much as possible.
- Attendance Policy
  - It is extremely important for department and for student grading
  - You must watch all the shared videos and contribute to live in-class discussions
  - Your in-class performance can raise your grade

Course Policy – Homework

- Homework Policy (05% Marks)
  - There will be six homework, three before midterm and three after
  - The solution of homework is expected to be submitted in one week after it is assigned, before the start of the class
  - **Late homework will not be accepted and will be awarded zero marks**
  - In case homework problem require soft copy submission, online link will be shared on Google Classroom.
  - Homework will be graded with the help of a quiz taken on the date of submission.
  - **Submission of homework on deadline and its quiz both is compulsory for grading, only homework/quiz will not be graded and will be awarded zero marks**

Course Policy – Quizzes & Exam

- Quiz Policy (05% Marks)
  - Quizzes are lovely when they are pop quizzes
  - Six in total, three before midterm and three after
  - **Makeup of no quiz will be taken**
- Exam (80% Marks)
  - Subject to circumstances and according to shared University-wide guidelines

Course Policy – Project

- Project (10%)
  - Driven by Project, very important and critical
  - Project to be done in group of two/three students
  - Individuals are not allowed
  - Project Milestone Distribution as following:

• Project Proposal	1.0%
• Initial Business Rules (BR) & Entity Description	1.0%
• Initial Entity-Relationship Diagram (ERD)	1.0%
• Conceptual Schema	1.5%
• Relational Schema	1.0%
• 3NF Relational Schema	1.0%
• Physical Specifications of Entities & Initial SQL	1.0%
• Advanced SQL	1.5%
• Presentation Submission	1.0%


KEEP
CALM
AND
LET THE
PARTY BEGIN