



TRIBHUVAN UNIVERSITY
SAMRIDDHI COLLEGE
Lokanthali-16, Bhaktapur, Nepal

Bachelor of Science in
Computer Science & Information Technology
(B.Sc. CSIT)
Fourth Semester

Database Management System (DBMS)
[Subject Code: CSC 260]
Course Introduction

by:

Er. Bikal Adhikari
(B.E., M.Sc. Engg., M.Sc. ISE)

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COURSE STRUCTURE

Database Management System (DBMS)

Course No.: CSC260

Full Marks: 60+20+20

Nature of the Course: Theory + Lab

Pass Marks: 24+8+8

Semester: IV

Credit Hrs: 3

Course Description:

- ✓ The course covers the basic concepts of databases, database system concepts and architecture, data modeling using ER diagram, relational model, SQL, relational algebra and calculus, normalization, transaction processing, concurrency control, and database recovery.

Course Objectives:

- ✓ The main objective of this course is to introduce the basic concepts of database, data modeling techniques using entity relationship diagram, relational algebra and calculus, basic and advanced features SQL, normalization, transaction processing, concurrency control, and recovery techniques.

Unit 1. Database and Database Users

2 hours

Introduction; Characteristics of the Database Approach; Actors on the Scene; Workers behind the Scene; Advantages of Using the DBMS Approach

Unit 2. Database System-Concepts and Architecture

3 hours

Data Models, Schemas, and Instances; Three-Schema Architecture and Data Independence; Database Languages and Interfaces; the Database System Environment; Centralized and Client/Server Architectures for DBMSs; Classification of Database Management Systems

Unit 3. Data Modeling using the Entity-Relational Model

6 hours

Using High-Level Conceptual Data Models for Database Design; Entity Types, Entity Sets, Attributes, and Keys; Relationship Types, Relationship Sets, Roles, and Structural Constraints; Weak Entity Types; ER Diagrams, Naming Conventions, and Design Issues; Relationship Types of Degree Higher Than Two; Subclasses, Super Classes, and Inheritance; Specialization and Generalization; Constraints and Characteristics of Specialization and Generalization

Unit 4. The Relational Data Model and Relational Database Constraints

3 hours

Relational Model Concepts; Relational Model Constraints and
Relational Database Schemas; Update Operations, Transactions,
and Dealing with Constraint Violations

Unit 5. The Relational Algebra and Relational Calculus

5 hours

Unary Relational Operations: SELECT and PROJECT; Relational Algebra Operations from Set Theory; Binary Relational Operations: JOIN and DIVISION; Additional Relational Operations; the Tuple Relational Calculus; the Domain Relational Calculus

Unit 6. SQL

8 hours

Data Definition and Data Types; Specifying Constraints; Basic Retrieval Queries; Complex Retrieval Queries; INSERT, DELETE, and UPDATE Statements; Views

Unit 7. Relational Database Design

7 hours

Relational Database Design Using ER-to-Relational Mapping; Informal Design Guidelines for Relational Schemas; Functional Dependencies; Normal Forms Based on Primary Keys; General Definitions of Second and Third Normal Forms; Boyce-Codd Normal Form; Multivalued Dependency and Fourth Normal Form; Properties of Relational Decomposition

Unit 8. Introduction to Transaction Processing Concepts and Theory

4 hours

Introduction to Transaction Processing; Transaction and System Concepts; Desirable Properties of Transactions; Characterizing Schedules Based on Recoverability; Characterizing Schedules Based on Serializability

Unit 9. Concurrency Control Techniques

4 hours

Two-Phase Locking Technique; Timestamp Ordering;
Multiversion Concurrency Control; Validation (Optimistic)
Techniques and Snapshot Isolation Concurrency Control

Unit 10. Database Recovery Techniques

4 hours

Recovery Concepts; NO-UNDO/REDO Recovery Based on Deferred Update; Recovery Technique Based on Immediate Update; Shadow Paging; Database Backup and Recovery from Catastrophic Failures

Laboratory Works

The laboratory work includes writing database programs to create and query databases using basic and advanced features of structured query language (SQL).

RECOMMENDED BOOKS

Text Books:

1. Fundamentals of Database Systems; Seventh Edition; Ramez Elmasri, Shamkant B. Navathe; Pearson Education
2. Database System Concepts; Sixth Edition; Avi Silberschatz, Henry F Korth, S Sudarshan; McGraw-Hill

Reference Books:

1. Database Management Systems; Third Edition; Raghu Ramakrishnan, Johannes Gehrke; McGraw-Hill
2. A First Course in Database Systems; Jaffrey D. Ullman, Jennifer Widom; Third Edition; Pearson Education Limited

