



# Database Management System

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SCOPE

**CSE2004**

# **Database Management System**

- **L-T-P-J-C**

**2- 0- 2-4-4**

# Course Objectives

- Advantages of using a DBMS rather than a file system.
- Designing an Entity-Relationship model for a real life application.
- Mapping a database schema from ER model.
- Evaluating relational schemas for design qualities
- Optimize a query.
- Basic concepts on transaction processing, concurrency control and recovery.
- Fundamental view on unstructured data and its management.
- Storage of databases and techniques to access them using various algorithms.

# Course Outcome

After successfully completing the course the student should be able to

- **CO1:** Comprehend the role of a database management system in an organization.
- **CO2:** Design the structure and operation of the relational data model.
- **CO3:** Develop a database project depending on the business requirements, considering various design issues.
- **CO4:** Explain the concept of a database transaction processing
- **CO5:** Comprehend the concept of database facilities including concurrency control, backup and recovery.
- **CO6:** List the concepts of indexing and accessing methods
- **CO7:** Review the fundamental view on unstructured data and its management

# Module I

## DATABASE SYSTEMS CONCEPTS AND ARCHITECTURE

- History and motivation for database systems – characteristics of database approach – Actors on the scene – Workers behind the scene – Advantages of using DBMS approach, Data Models, Schemas, and Instances, Three- Schema Architecture and Data Independence, The Database System Environment, Centralized and Client/Server Architectures for DBMSs, Classification of database management systems.

# Module II

## DATA MODELING

- Entity Relationship Model : Types of Attributes, Relationship, Structural Constraints
- Relational Model, Relational model Constraints – Mapping ER model to a relational schema – Integrity constraints

# Module III

## SCHEMA REFINEMENT

- Guidelines for Relational Schema - Functional dependency; Normalization, Boyce Codd Normal Form, Multi-valued dependency and Fourth Normal form; Join dependency and Fifth Normal form.

# Module IV

## QUERY PROCESSING AND TRANSACTION PROCESSING

Translating SQL Queries into Relational Algebra – heuristic query optimization – Introduction to Transaction Processing – Transaction and System concepts - Desirable properties of Transactions – Characterizing schedules based on recoverability – Characterizing schedules based on serializability

# Module V

## CONCURRENCY CONTROL AND RECOVERY TECHNIQUES

Two-Phase Locking Techniques for Concurrency Control based on time stamp – Recovery concepts – Recovery based on deferred update – Recovery techniques based on immediate update – Shadow paging.

# Module VI

## PHYSICAL DATABASE DESIGN

- Indexing: Single level indexing, multi-level indexing, dynamic multilevel indexing.

# Module VII

## RECENT TRENDS - NOSQL DATABASE MANAGEMENT

Introduction, Need of NoSQL, CAP Theorem, different NoSQL data models: Key-value stores, Column families, Document databases, Graph databases.



# Text Books

1. R. Elmasri & S. B. Navathe, Fundamentals of Database Systems, Addison Wesley, 7th Edition, 2015
2. Raghu Ramakrishnan, Database Management Systems, Mcgraw-Hill, 4th edition, 2015

# Reference Books

1. Silberschatz, H. F. Korth & S. Sudershan, Database System Concepts, McGraw Hill, 6th Edition 2010
2. Thomas Connolly, Carolyn Begg, Database Systems : A Practical Approach to Design, Implementation and Management, 6th Edition, 2012
3. Pramod J. Sadalage and Martin Fowler, NoSQL Distilled: A brief guide to merging world of Polyglot persistence, Addison Wesley, 2012.
4. Shashank Tiwari ,—Professional NoSQL, Wiley , 2011

# Your Grade - Theory

- CAT1 (15%)
- CAT2 (15%)
- Digital assignments & Quiz (30%)
- FAT (40%)