Database Management System
(MDS505)
Course Overview

Course Description

- The course covers on the fundamentals of knowledgebase and relational database management systems, and the current developments in database theory and their practice.

Course Objective

- After the completion of this course, the students should be able to
  - Familiarize the students to the fundamentals of Database Management Systems.
  - Understand the relational model, ER diagrams and SQL.
  - Understand the fundamentals of Transaction Processing and Query Processing.
  - Familiarize the different types of database.
  - Understand the Security Issues in Databases

Course Contents

- **Unit 1: Fundamental Concept of DBMS [6 Hrs.]**
  - Database and Database Management System,
  - Data Abstraction and Data Independence,
  - Schema and Instances,
  - Concepts of DDL, DML and DCL,
  - Purpose of Database System,
  - Database System Terminologies, Database Characteristics,
  - Data Models,
  - Types of data Models,
  - Components of DBMS,
  - Relational Algebra.
  - Relational DBMS –Codd's Rule – Entity- Relationship Model

Course Contents

- **Unit 2: Relational Languages and Relational Model [7Hrs.]**
  - Introduction to SQL,
  - Features of SQL,
  - Queries and Sub-Queries, Set Operations,
  - Relations (Joined, Derived),
  - Queries under DDL and DML Commands,
  - Embedded SQL,
  - Views,
  - Relational Algebra,
  - Database Modification,
  - QBE and Domain Relational Calculus

Course Contents

- **Unit 3: Database Constraints and Normalization [6 Hrs.]**
  - Integrity Constraints and Domain Constraints,
  - Assertions and Triggering,
  - Functional Dependencies,
  - Different Normal Forms (1st, 2nd, 3rd, BCNF, DKNF)

Course Contents

- **Unit 4: SQL & Query Optimization [6 Hrs.]**
  - SQL Standards, Data Types,
  - Database Objects- DDL-DML-DCL-TCL,
  - Embedded SQL,
  - Static Vs Dynamic SQL,
  - Query Optimization: Query Processing and Optimization,
  - Heuristics and Cost Estimates in Query Optimization

Course Contents

- **Unit 5: Transaction Processing and Concurrency Control [6 Hrs.]**
  - Properties of Transaction,
  - Serializability,
  - Concurrency Control,
  - Locking Mechanisms,
  - Two Phase Commit Protocol,
  - Deadlock Handling and Prevention

Course Contents

- **Unit 6: Trends in Database Technology [9Hrs.]**
  - Overview of Physical Storage Media, RAID, Tertiary Storage ,
  - File Organization, Organization of Records in Files,
  - Indexing and Hashing, Ordered Indices, B+ Tree Index, Files, B Tree Index Files, Static Hashing, Dynamic Hashing,
  - Introduction to Distributed Databases,
  - Client Server Technology,
  - Multidimensional and Parallel Databases,
  - Spatial and Multimedia Databases,
  - Mobile and Web Databases,
  - Data Warehouse, Data Mining, Data marts

Course Contents

- **Unit 7: Advanced Topic [8Hrs.]**
  - Concept of Object-Oriented and Distributed Database Model,
  - Properties of Parallel and Distributed Databases,
  - Threats and Risks, Database Access Control, Types of Privileges, Cryptography,
  - Statistical Databases, Distributed Databases Architecture, Transaction Processing,
  - Data Warehousing and Mining, Classification, Association Rules-Clustering,
  - Information Retrieval,
  - Relevance Ranking, Crawling and Indexing the Web,
  - Object Oriented Databases,
  - XML Databases.

Laboratory Work

- Modeling ER using CASE TOOLS
- Writing SQL Queries, Stored Procedures, Triggers
- Group Project

References

- Ramez Elmasri & Shamkant B. Navathe (2015). *Fundamentals of Database Systems*, Seventh Edition, Pearson Education.
- Korth, H. F. &Silberschatz, A. (2010).*Database system concepts*, McGraw Hill.
- Majumdar, K.&Bhattacharaya, P. (2004).*Database Management Systems*, Tata McGraw Hill, India.
- Abraham Silberschatz, Henry F. Korth& S. Sudharshan (2011).*Database System Concepts*, Sixth Edition, Tata McGraw Hill.
- Date, C.J., Kannan, A.&Swamynathan, S. (2006).*An Introduction to Database Systems*, Eighth Edition, Pearson Education.
- Atul Kahate (2006) .*Introduction to Database Management Systems*, Pearson Education, New Delhi.
- Alexis Leon & Mathews Leon(2003).*Database Management Systems*, Vikas Publishing House Private Limited, New Delhi.
- Raghu Ramakrishnan (2010).*Database Management Systems*, Fourth Edition, Tata McGraw Hill.
- Gupta, G.K.(2011).*Database Management Systems*, Tata McGraw Hill.
- Web tutorials on SQL