Advanced Database Management Systems

Purpose and Scope:

The course deals with various aspects of database design, data storage and retrieval. It also focuses on issues pertaining to concurrency in transaction management and database security. Current developments in database systems such as Distributed, Parallel, Object-Oriented and Mobile databases along with their application are discussed. It is intended to cover several case studies relating to database design and implementation for different real-life application scenarios.

Prerequisite: Basic database concepts & exposure to any database package.

Contents :

Module-A : Review of DBMS concepts & Relational Data Model :

Review of database concepts, Normal Forms, DBMS architecture, data modeling using ER and extended ER, data base access methods, static and dynamic hashing, indexing technique for files including B-Tree and B + tree data structures.

The Relational model and Relational DBMS: integrity constraints, updation operations, operations of relational algebra, overview of the SQL language, Relational schema design Relational calculus and an overview of the QBE language, Case study: Oracle/DB2/MS-SQL.

Module-B : Data Base Design :

Formalisms, normalization including functional and other types of dependencies and normal forms for relations, Multi-valued and join dependencies, physical database design issues. DBMS system architecture; centralized and client server architecture; Techniques used for processing and optimizing queries specified in HL database log SQL query option.

Module-C : Transaction Management & Security :

Serialisability, recoverability, Concurrency Control, lock-based time-stamp and validationbased protocols, database failures and recovery, log-based, shadow paging, buffer management. Database Security issues, access control, Security mechanisms; multilevel database security; confidentiality and integrity requirements.

Module-D : Distributed Data Base :

Distributed database concepts, distributed DBMS architecture, distributed database design, top-down and bottom design, fragmentation, fragment allocation, distributed query processing, transaction management in distributed database, distributed concurrency control, reliability issues in distributed DBMS.

Module-E : Parallel, Object-Oriented and Mobile Data Base Systems :
Parallel database systems: database servers, parallel architecture, parallel DBMS techniques,
query parallelism, query optimization, load balancing. Object-oriented database: object-oriented data
model, object-relational database, nested relations, complex types. Mobile database: directory
management, caching, broadcast data, query processing and optimization, transaction management.

References
1. Database System Concepts – Abraham Silberschatz, H F Korth and S Sudarshan, McGraw Hill.
2. An Introduction to Database Systems – Date, C.J., Addison-Wesley
3. Principles of Distributed database systems- M. tamer Ozsu, P Valduriez, Prentice Hall
4. A First Course in Database Systems – Ullman, Jeffrey D.; Widom, Jennifer, Prentice Hall
International, Inc.
5. Models and languages of Object-oriented databases- G lausen, G. Vossen, Addison-Wesley.