

Advanced Database Management System (3:0:1)

Course Outcome

- Understand the significance of databases, types of databases, merits and limitations of different DBMS.
- Explain and apply the concept of normalization for database design.
- Understand and apply concurrency control and transaction processing mechanisms.
- Learn the characteristics implementation of object oriented and distributed database management systems and their architecture.
- Understand the design techniques used in RDBMS, extension techniques in RDBMS, standards for OODBMS, products and applications.

Course Content

Unit-1:

Introduction: Comparison between different databases: Significance of Databases, Database System Applications, Advantages and Disadvantages of different Database Management systems, Comparison between DBMS, RDBMS, Distributed and Centralized DB.

Normalization: Functional Dependency, Anomalies in a Database, The normalization process: Conversion to first normal form, Conversion to second normal form, Conversion to third normal form, The boyce-code normal form (BCNF), Fourth Normal form and fifth normal form, normalization and database design, Denormalization

Unit-2:

Concurrency Control Serializability: Enforcing, Serializability by Locks, Locking Systems With Several, Lock Modes, Architecture for a Locking Scheduler Managing Hierarchies of Database Elements, Concurrency Control by Timestamps, Concurrency Control by Validation, Database recovery management

Transaction processing: Introduction of transaction processing, advantages and disadvantages of transaction processing system, online transaction processing system, serializability and recoverability, view serializability, resolving deadlock, distributed locking. Transaction management in multi-database system, long duration transaction, high-performance transaction system.

Unit-3:

Object Oriented DBMS Overview of object: oriented paradigm, OODBMS architectural approaches, Object identity, procedures and encapsulation, Object oriented data model: relationship, identifiers, Basic OODBMS terminology, Inheritance , Basic interface and class structure, Type hierarchies and inheritance, Type extents and persistent programming languages, OODBMS storage issues.

Distributed Database: Introduction of DDB, DDBMS architectures, Homogeneous and Heterogeneous databases, Distributed data storage, Advantages of Data Distribution, Disadvantages of Data Distribution Distributed transactions, Commit protocols, Availability, Concurrency control & recovery in distributed databases, Directory systems, Data Replication, Data Fragmentation. Distributed database transparency features, distribution transparency.

Unit-4

Object Relational and Extended Relational Databases: design techniques used in RDBMS, extension techniques in RDBMS, standards for OODBMS

Products and applications: ODMG-93 standards, ODMG Smalltalk binding, SQL3, Nested relations and collections, Storage and access methods , Implementation issues for extended type , Comparing RDBMS, OODBMS & ORDBMS.

Database application: Active database: starburst, oracle, DB2, chimera, Applications of active database, design principles for active rules, Temporal database, special, text and multimedia database. Video database management: storage management for video, video preprocessing for content representation and indexing, image and semantic-based query processing, real time buffer management.

Reference Books

1. Henry F Korth, Abraham Silberschatz and S. Sudharshan, "Database System Concepts", Sixth Edition, McGraw Hill, 2011.
2. C.J.Date, A.Kannan and S.Swamynathan,"An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006.
3. R. Elmasri, S.B. Navathe, "Fundamentals of Database Systems", Fifth Edition, Pearson Education/Addison Wesley, 2007.

4. Thomas Cannolly and Carolyn Begg, "Database Systems, A Practical Approach to Design, Implementation and Management", Third Edition, Pearson Education, 2007.
5. Subramaniam, "Multimedia Databases", Morgan Kauffman Publishers, 2008.