

# Advanced Database Management System

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## Session 1: Object Oriented and Object Relational Database

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1. Modeling Complex Data Semantics, Specialization, Generalization, Aggregation and Association.
2. Objects, Object Identity and its implementation, Clustering, Equality and Object Reference.
3. Architecture of Object Oriented and Object Relational databases.
4. Persistent Programming Languages, Cache Coherence.
5. Case Studies: Gemstone, O2, Object Store, SQL3, Oracle xxi, DB2.

## Session 2: Parallel and Distributed Databases

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1. **Deductive Databases** Data log and Recursion, Evaluation of Data log program, Recursive queries with negation.
2. **Parallel and Distributed Databases** Parallel architectures, shared nothing/shared disk/shared memory based architectures.
3. Data partitioning, Intra-operator parallelism, pipelining.
4. Distributed Data Storage – Fragmentation & Replication, Location and Fragment Transparency Distributed Query Processing and Optimization.
5. Distributed Transaction Modeling and concurrency Control.
6. Distributed Deadlock, Commit Protocols, Design of Parallel Databases, and Parallel Query Evaluation.

## Session 3: Advanced Transaction Processing

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1. Advanced transaction models: Savepoints, Nested and Multilevel Transactions.
2. Compensating Transactions and Saga, Long Duration Transactions.
3. Weak Levels of Consistency, Transaction Work Flows.
4. Transaction Processing Monitors, Shared disk systems.

## Session 4: Active Database and Real-time Database

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1. Triggers in SQL.
2. Event Constraint and Action: ECA Rules, Query Processing and Concurrency Control.
3. Recursive query processing, Compensation and Databases Recovery, multi-level recovery.

## Session 5: Image and Multimedia Database

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1. Modeling and Storage of Image and Multimedia Data.
2. Data Structures – R-tree, k-d tree, Quad trees.
3. Content Based Retrieval: Color Histograms, Textures, etc., Image Features, Spatial and Topological Relationships.
4. Multimedia Data Formats, Video Data Model, Audio & Handwritten Data, Geographic Information Systems (GIS).
5. **WEB Database** Accessing Databases through WEB, WEB Servers, XML Databases, Commercial Systems – Oracle xxi,DB2.

## Book References

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1. Elmarsi, “Fundamentals of Database Systems”, 4 th Edition, Pearson Education.
2. R. Ramakrishnan, “Database Management Systems”, 1998, McGraw Hill International Editions.
3. Elmagarmid.A.K. “Database transaction models for advanced applications”, Morgan Kaufman.