CMP 401
Advanced Database Systems

Computer Engineering Department
Faculty of Engineering
Cairo University

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Requirements for this Class

- Introduction to Database Management Systems.
- You want to learn more about the advanced aspects of database systems.

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Overall Aims of Course

- Learn the aspects of physical database design; data storage, indexing, query processing and optimization.
- Understand the transaction processing concepts; transaction processing theory, concurrency control and database recovery techniques.
- Understand the basic concept of distributed database, database security and data mining
- Know enhanced data models for advanced applications

Intended Learning Outcomes

a. Knowledge and Understanding:

a1- Understand the transaction processing concept
a2- Understand the basic concept of distributed database.
a3- Understand the databases security mechanism

b. Intellectual Skills

b1- Evaluate the performance of database queries.
b2- Evaluate the indexing usage
b3- Differentiate between database recovery techniques
b4- Differentiate between concurrency control techniques

c. Professional and Practical Skills

c1- Tune the database design for performance
c2- Tune the database query for performance.
c3- Develop data reports using data mining techniques
c4- Develop enhanced data models

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ILOs – cont.

d. General and Transferable Skills

- **d1-** Report Writing
- **d2-** Presentations & Communication skills
- **d3-** Problem Tackling
- **d4-** Team work
- **d5-** Time management
- **d6-** Leadership

Readings

- **TEXTBOOK**

  [1] Ramez Elmasri and Shamkant B. Navathe, **Fundamentals of Database Systems**, 5th Edition, 2007, Addison-Wesley, ISBN 0-321-36957-2.

- **REFERENCES**

  [1] C. J. Date, **An Introduction to Database Systems**, 8th Edition, 2003, Addison-Wesley, ISBN 0-321-19784-4.

  [2] Thomas Connolly and Carolyn Begg, **Database Systems**, 4th Edition, 2005, Pearson Education, ISBN 0-273-70413-3.

Additional books may be recommended during individuals lectures

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Topics We Will Cover

1. File Organization, Indexing and Hashing
2. Indexing Structures for Files
3. Query Processing and Optimization
4. Physical Database Design and Tuning
5. Enhanced Data Models for Advanced Applications
6. Data Mining
7. Transaction Processing Concepts and Theory
8. Concurrency Control
9. Database Recovery
10. Database Security
11. Distributed Databases

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Grading

Final-term Examination	20%
Mid-Term Examination	10%
Assignments & mini-project	70%

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Schedule

Week	Lecture	Textbook	Section	Project
1	Introduction File Organization, Indexing and Hashing	ch13		
2	Indexing Structures for Files	ch14	ch13 & 14	
3	Query Processing and Optimization	ch15		Case Study Proposal
4	Physical Database Design and Tuning	ch16	ch15 & 16	
5	Enhanced Data Models for Advanced Applications	ch24		
6	Data Mining	ch28	ch 24 & 28	
7	Transaction Processing Concepts and Theory	ch17		
8	Transaction Processing Concepts and Theory	ch17	ch17	
9	**Midterm**			
10	Concurrency Control	ch18		
11	Database Recovery	ch19	ch18 & 19	
12	Database Security	ch23		
13	Distributed Databases	ch25	ch23 & 25	Case Study Report
14	NoSQL			
15, 16	**Final**			

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