



Course Specification

Course Name: [Distributed Database]
Course Code: [IS416]

I. Basic Course Information

Major or minor element of program: Major
Department offering the course: [Information Systems Department]

Academic level: [400 Level]
Semester in which course is offered: [Second (Spring) Semester]

Course pre-requisite(s): [Database Systems - 2 IS312]

Credit Hours: 3
Contact Hours Through:

Lecture	Tutorial *	Practical *	Total
2.5	0.0	1.5	4.0

* 1.5 hours for **either** Tutorial or Practical

Approval date of course specification: [January 2015]

II. Overall Aims of Course

[The aim of the course is to provide the students with knowledge needed to understand distributed database management systems (DDBMSs). Students acquire knowledge about distributed databases and components of a DDBMS including Distributed Database Design, Transaction Management (Concurrency Control and Recovery), Query Processing and Optimization in DDBMSs.]

III. Program ILOs covered by course

Program Intended Learning Outcomes (By Code)			
Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
[K17,K20,K21]	[I14,I15,I18]	[P13,P16,P18,P22]	[G2,G6]



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IV. Intended Learning Outcomes of Course (ILOs)

a. Knowledge and Understanding

On completing the course, students should be able to:

- K.1 Distinguish between horizontal or vertical fragmentation for a distributed database.
- K.2 Explain the purpose of query optimization and the steps involved in generating efficient query plans, and how distributed query evaluation differs than centralized databases.
- K.3 Explain the transaction concept in databases and the properties of transactions. Describe the concurrency control problems and how data inconsistency may arise due to concurrent execution of transactions. Understand the notion of distributed schedules and the serialisability in distributed databases. Understand the distributed two-phase locking protocol and its variants. Understand how deadlocks are handled in distributed databases.
- K.4 Discuss different distributed database recovery and the three phase commit protocol.]

b. Intellectual/Cognitive Skills

On completing the course, students should be able to:

- I.1 Compute the cost of different plans to process a distributed join query.
- I.2 Discover problems in a distributed nonserialisable schedule.
- I.3 Generate Serialisable Schedules using the D2PL.
- I.4 Generate plans for processing distributed queries.

c. Practical/Professional Skills

On completing the course, students should be able to:

- P.1 Investigate the data distribution features in a commercial DBMS.
- P.2 Develop a program to do horizontal fragmentation.
- P.3 Maintain and recover distributed databases.
- P.4 Apply distributed queries to generate reports.]

d. General and Transferable Skills

On completing the course, students should be able to:

- G.1 Work effectively as a part of a team to apply skills gained throughout the course to implement some of the techniques studied in the course.
- G.2 Acquire communication skills.]



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V. Course Matrix Contents

	Main Topics / Chapters	Duration (Weeks)	Course ILOs Covered by Topic (By ILO Code)			
			K & U	I.S.	P.S.	G.S.
1-	[The Need for Distributed Databases. What is a Distributed Database System and DDBS Architecture.]	[1]	[K1,K2]	[All]	[P1]	[]
2-	[Distributed Database Design: Fragmentation]	[2]	[K1,K2]	[I1,I3]	[]	[]
3-	[Distributed Database Design: Allocation]	[1]	[K3,K4]	[I2]	[P1]	[]
4-	[Overview Database Query Processing]	[1]	[All]	[]	[P4]	[G1,G2]
5-	[Query Decomposition and Data Localization]	[1]	[]	[I4]	[P1,P4]	[]
6-	[Optimization of Distributed Queries: Join Processing and the R* Algorithm]	[1]	[]	[I5]	[All]	[G2]
7-	[Optimization of Distributed Queries: Semi-Joins and SDD-1 Algorithm]	[1]	[All]	[I4,I5]	[P3,P4]	[G1,G2]
8-	[Distributed Transactions: Basic Concepts and Serializability]	[2]	[]	[All]	[P1,P2,P3]	[G1,G2]
9-	[Distributed Transactions: Locking-based Concurrency Control]	[2]	[All]	[I1,I2,I4]	[P1,P2,P3]	[G1,G2]
10-	[Distributed Transactions: Distributed Deadlock]	[1]	[All]	[All]	[]	[]
	Net Teaching Weeks	13				

VI. Course Weekly Detailed Topics / hours / ILOs

Week No.	Sub-Topics	Total Hours	Contact Hours	
			Theoretical Hours	Practical Hours *
1	[The Need for Distributed Databases. What is a Distributed Database System and DDBS Architecture.]	[2.5]	[2.5]	
2	[Distributed Database Design: Fragmentation]	[4]	[2.5]	[1.5]
3	[Distributed Database Design: Fragmentation]	[4]	[2.5]	[1.5]
4	[Distributed Database Design: Allocation]	[4]	[2.5]	[1.5]
5	[Overview Database Query Processing]	[4]	[2.5]	[1.5]
6	[Query Decomposition and Data Localization]	[4]	[2.5]	[1.5]



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7	Midterm Exam			
8	[Optimization of Distributed Queries: Join Processing and the R* Algorithm]	[4]	[2.5]	[1.5]
9	[Optimization of Distributed Queries: Semi-Joins and SDD-1 Algorithm]	[4]	[2.5]	[1.5]
10	[Distributed Transactions: Basic Concepts and Serializability]	[4]	[2.5]	[1.5]
11	[Distributed Transactions: Basic Concepts and Serializability]	[4]	[2.5]	[1.5]
12	[Distributed Transactions: Locking-based Concurrency Control]	[4]	[2.5]	[1.5]
13	[Distributed Transactions: Locking-based Concurrency Control]	[4]	[2.5]	[1.5]
14	[Distributed Transactions: Distributed Deadlock]	[4]	[2.5]	[1.5]
15	Final Exam			
Total Teaching Hours		51	33	18

* No Practical/Tutorial during the first week of the semester

VII. Teaching and Learning Methods

Teaching/Learning Method	Selected Method	Course ILOs Covered by Method (By ILO Code)			
		K & U	Intellectual Skills	Professional Skills	General Skills
Lectures & Seminars	[X]	[All]	[All]	[]	[]
Tutorials	[X]	[]	[All]	[]	[]
Computer lab Sessions	[X]	[]	[]	[P1,P3,P4]	[]
Practical lab Work	[X]	[]	[]	[All]	[]
Reading Materials	[X]	[K1]	[]	[]	[]
Web-site Searches	[X]	[]	[]	[P1]	[G1]
Research & Reporting	[]	[]	[]	[]	[]
Problem Solving / Problem-based Learning	[]	[]	[]	[]	[]
Projects	[]	[]	[]	[]	[]
Independent Work	[]	[]	[]	[]	[]
Group Work	[X]	[]	[]	[P2,P4]	[G1,G2]
Case Studies	[]	[]	[]	[]	[]
Presentations	[X]	[]	[]	[]	[G1,G2]
Simulation Analysis	[]	[]	[]	[]	[]
Others (Specify):	[]	[]	[]	[]	[]



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VIII. Assessment Methods, Schedule and Grade Distribution

Assessment Method	Selected Method	Course ILOs Covered by Method (By ILO Code)				Assessment Weight / Percentage	Week No.
		K & U	I.S.	P.S.	G.S.		
Midterm Exam	X	All	All			20%	7
Final Exam	X	All	All			60%	15
Quizzes	X	All				5%	5,9
Course Work							
Report Writing							
Case Study Analysis							
Oral Presentations							
Practical	X			All		5%	All weeks
Group Project	X			P2		10%	12
Individual Project							
Others (Specify):							

IX. List of References

Essential Text Books	<ul style="list-style-type: none"> M. T. Ozsu and P. Valduriez Principles of Distributed Database Systems, Prentice-Hall, 2nd Edition 1999.
Course notes	<ul style="list-style-type: none"> None
Recommended books	<ul style="list-style-type: none"> Ramakrishnan, R., and Gehrke, J., Database Management Systems, 3rd ed, McGraw-Hill 2003. Silberschatz, A., Korth, H., and Sudarshan, S. Database Systems Concepts, 3rd ed., McGraw-Hill 2006.
Periodicals, Web sites, etc ...	<ul style="list-style-type: none"> IEEE ACM Science Direct

X. Facilities required for teaching and learning

<p>List the facilities required</p> <ul style="list-style-type: none"> Data show White Board DBMS
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Course coordinator: Dr. Neamat El Tazi

Head of Department: Ass. Prof. Ehab Ezzat

Date: January 2015