



The course code:
ECS4120

This course intend the following iLOS according to (NARS 2009):
a (6, 8, 11, 16, 17, 18) - b (9, 12, 13) - c (2, 15, 17, 19) - d (2, 6, 7, 8)

Answer the following three question: (In two Pages)

Question 1 (30 Marks)

- (a) What is meant by "business rules" in database? What is its importance in database? Mention types of business rules in database.
- (b) Mention the two main kinds of Database server architecture. Draw Common logic distribution of each of them.
- (c) *i*) What are the Middleware and its importance in database?
ii) Explain the database-oriented middleware. Give examples for this middleware.
- (d) Discuss some of the languages that are associated with Internet application development. Classify these languages according to the functionality they provide for each application.
- (e) Two types of pages are used in processing 3-Tier Applications. Discuss them with drawing. Mention the application languages that support these pages.
- (f) What is the relation between XML and Web Services? Mention the main component of the *Web Service Protocol Stack*.

Question 2 (30 Marks)

- (a) What is the importance of Data Quality? Mention the steps for improving poor data quality.
- (b) Why is master data management important in an organization?
- (c) *In data integration*, reconciled data are referred to as the result of the ETL process. Mention the main steps of reconciled data. Explain briefly by drawing model for these steps.
- (d) List and discuss *five* areas where threats to data security may occur.
- (e) List the *four* common types of database failure. Write the database response for each failures when occur.
- (f) To prevent failure of database system, the following terms must be considered: *Deadlock, Data Availability, Versioning, Cost of Downtime, and Backward Recovery*.
Talk briefly about them showing: *i*) the meaning, and *ii*) the role of each.

Question 3 (30 Marks)

- (a) Mention *all the factors* that must be considered to design the Star schema.
- (b) In Data warehousing, normalizing dimension tables is important. Explain the methods to normalize the dimension tables. Give an example for each method.
- (c) Why using OLAP tools are important in Warehousing? Mention the main OLAP operations used.
- (d) To overcome the problems in Fact table, some variations are performed in the star schema.
 - i) Mention the main problem found in the Fact table.
 - ii) Mention the variations considered to maintain that problem.
- (e) Millennium College wants you to help design a star schema to record grades for courses completed by students. There are four dimension tables, with attributes as follows:

CourseSection	<u>Attributes:</u> <i>CourseID, SectionNumber, CourseName, Units, RoomID, and RoomCapacity.</i> During a given semester, the college offers an average of 500 course sections.
Professor	<u>Attributes:</u> <i>ProfID, ProfName, Title, DepartmentID, and DepartmentName.</i> There are typically 200 professors at Millennium at any given time.
Student	<u>Attributes:</u> <i>StudentID, StudentName, and Major.</i> Each course section has an average of 40 students, and students typically take five courses per period.
Period	<u>Attributes:</u> <i>SemesterID, and Year.</i> The database will contain data for 30 periods (a total of 10 years).

The only fact that is to be recorded in the fact table is *CourseGrade*.

- a. Design a star schema for this problem.
- b. Estimate the number of rows in the fact table, using the assumptions stated previously.
- c. Estimate the total size of the fact table (in bytes), assuming that each field has an average of (5 bytes).
- d. Various characteristics of sections, professors, and students change over time. How do you propose designing the star schema to allow for these changes? Why?

With my best wishes

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