COLLEGE
Tanta Engineering

كمبيوتر
شبتر 5
الشيت الرسمي

Databases and Decision Making

1. What is a database? Mention five database applications.

A database is a collection of related, logically coherent data which can be used alone, or combined / related to other data to provide answers to the user's question.

Database Applications

Databases touch all aspects of our lives

Examples:

- Banking: all transactions

- Airlines: reservations, schedules

- Universities: registration, grades

- Sales: customers, products, purchases

- Manufacturing: production, inventory, orders, supply chain

2. What are the merits and drawbacks (if any) of Database systems?

Advantages of databases
1. **Less redundancy**
   In a flat-file system there is a lot of redundancy. For example, in the flat file system for a university, the names of professors and students are stored in more than one file.
2. **Inconsistency avoidance**
   If the same piece of information is stored in more than one place, then any changes in the data need to occur in all places that data is stored.
3. **Efficiency**

A database is usually more efficient than a flat file system, because a piece of information is stored in fewer locations

4. **Data integrity**

In a database system it is easier to maintain data integrity, because a piece of data is stored in fewer locations.

5. **Confidentiality**

It is easier to maintain the confidentiality of the information if the storage of data is centralized in one location.

Disadvantages of databases

1.**Increased costs**.
Database systems require sophisticated hardware and software and highly skilled personnel. The cost of maintaining the hardware, software, and personnel required to operate and manage a database system can be substantial. Training, licensing, and regulation compliance costs are often overlooked when database systems are implemented.

2. **Management complexity.**
Database systems interface with many different technologies and have a significant impact on a company's resources and culture. The changes introduced by the adoption of a database system must be properly managed to ensure that they help advance the company's objectives. Given the fact that database systems hold crucial company data that are accessed from multiple sources, security issues must be assessed constantly.

3. **Maintaining currency.**
To maximize the efficiency of the database system, you must keep your system current. Therefore, you must perform frequent updates and apply the latest patches and security measures to all components. Because database technology advances rapidly, personnel training costs tend to be significant. Vendor dependence. Given the heavy investment in technology and personnel training, companies might be reluctant to change database vendors. As a consequence, vendors are less likely to offer pricing point advantages to existing customers, and those customers might be limited in their choice of database system components.

4. **Frequent upgrade/replacement cycles.**
DBMS vendors frequently upgrade their products by adding new functionality. Such new features often come bundled in new upgrade versions of the software. Some of these versions require hardware upgrades. Not only do the upgrades themselves cost money, but it also costs money to train database users and administrators to properly use and manage the new features.

3. Give a definition for the database management system (DBMS). What are the components of DBMSs?

A Database Management System is a software package/system that defines, creates and manipulates a database. The DBMS also allows controlled access to data in the database.

A DBMS is a combination of five components: hardware, software, data, users and procedures (Figure 5.1).
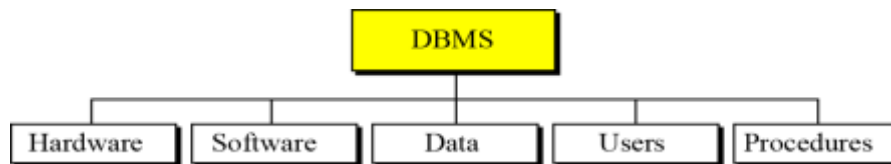

Figure 5.1 DBMS components

4. Discuss in details the three-level architecture of a DBMS?

The American National Standards Institute/Standards Planning and Requirements Committee (ANSI/SPARC) has established a three-level architecture for a DBMS: internal, conceptual and external (Figure 5.2).
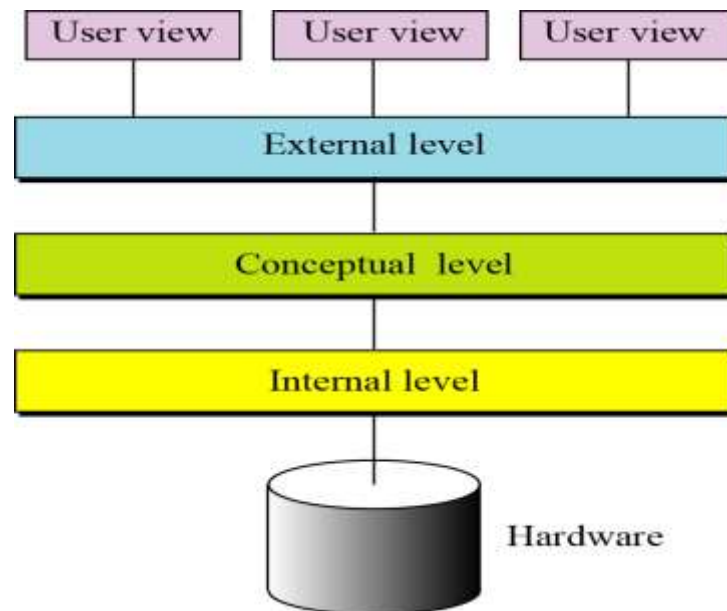
Figure 5.2 Database architecture

- The **internal level** determines where data is actually stored on the storage devices. This level deals with low-level access methods and how bytes are transferred to and from storage devices. In other words, the internal level interacts directly with the hardware.

- The **conceptual level** defines the logical view of the data. The data model is defined on this level, and the main functions of the DBMS, such as queries, are also on this level. The DBMS changes the internal view of data to the external view that

users need to see. The conceptual level frees users from dealing with the internal level.

- The **external level** interacts directly with the user (end users or application programs). It changes the data coming from the conceptual level to a format and view that is familiar to the users.

5. Mention the most popular database models. How the data is organized in each of them?

Hierarchical database model

- In the hierarchical model, data is organized as an <u>upside down tree</u>.
- Each entity has <u>only one parent</u> but can have <u>several children</u>.
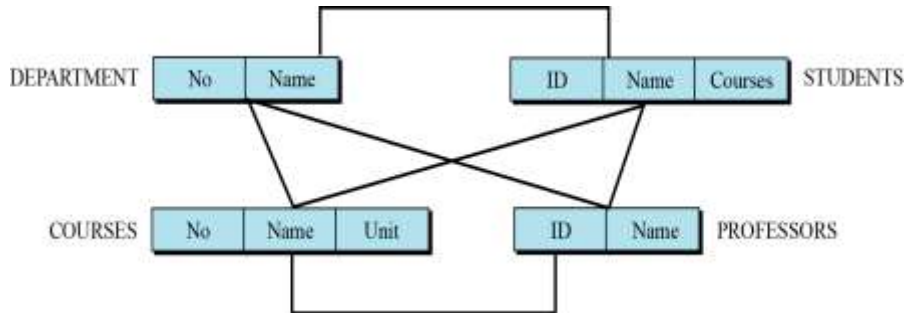- At the top of the hierarchy, there is one entity, which is called the root.
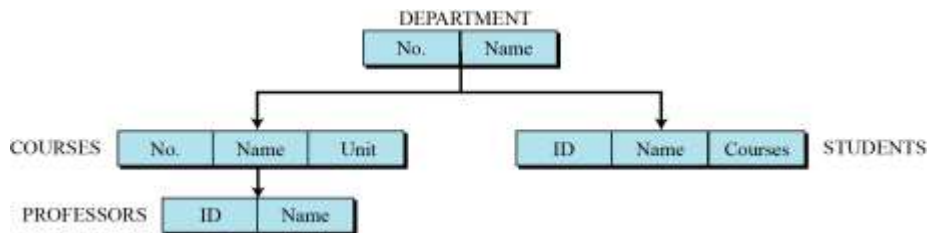
An example of the hierarchical model representing a university

Network database model

- In the network model, the entities are organized in a graph.
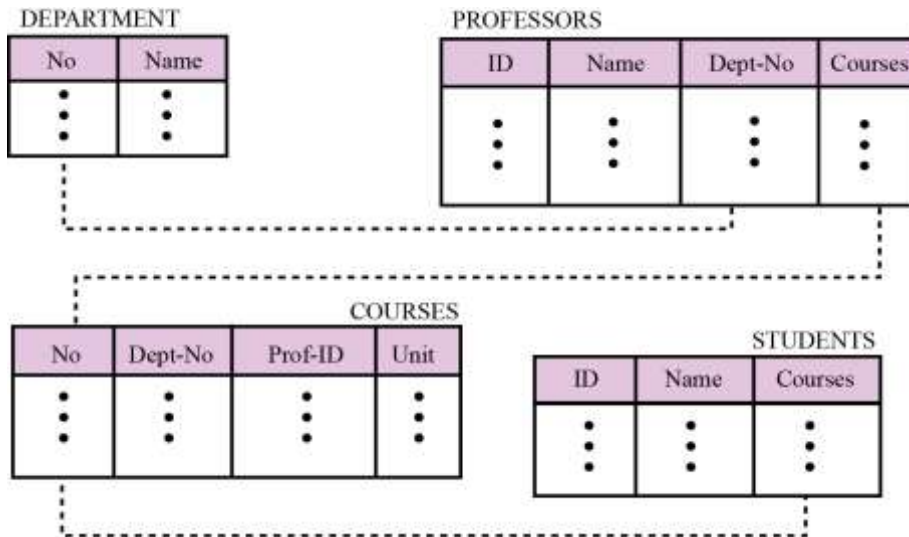- Some entities can be accessed through several paths.

An example of the network model representing a university

Relational database model

- In the relational model, data is organized in two-dimensional tables called relations. It is the most popular model.

- The tables or relations are related to each other.

An example of the relational model representing a university

Distributed database model

- It is not a new model. It is based on relational model.

- ■ The data are stored on several computers that communicate through the Internet or some private WAN.
- ■ Data are either fragmented, with each fragment stored at one site, or data are replicated at each site.
  - ☐ Fragmented distributed databases
  - ☐ Replicated distributed databases

Object-Oriented database model

- ■ Some application like to see data as a structure such as a record made of fields.
- ■ Tries to keep the advantage of the relational model and allows applications to access structured data.
- ■ In an OODB, objects and their relations are defined. In addition, each object can have attributes that can be expressed as fields.

6. Write short notes about:

a) Distributed database model.

- o It is not a new model. It is based on relational model.
- o The data are stored on several computers that communicate through the Internet or some private WAN.
- o Data are either fragmented, with each fragment stored at one site, or data are replicated at each site.
  - ▪ Fragmented distributed databases
  - ▪ Replicated distributed databases

b) **Object-oriented database model.**

■ Some application like to see data as a structure such as a record made of fields.

■ Tries to keep the adv. of the relational model and allows applications to access structured data.

In an OODB, objects and their relations are defined. In addition, each object can have attributes that can be expressed as fields.

c) **SQL.**

Structured Query Language(SQL):is the language standardized by the American National Standards Institute (ANSI) and the International Organization for Standardization (ISO) for use on relational databases.

d) **Relational database model.**

• In the relational model, data is organized in two-dimensional tables called relations. It is the most popular model.

• The tables or relations are related to each other.

7. **What is decision making? Illustrate the main components involved in decision making.**

Decision making is usually defined as a mental process, which involves judging multiple options or alternatives, in order to

select one, so as to best achieve the aims or goals of the decision maker.

There are two main components involved in decision making:

☐ The set of alternatives, judged by the decision maker.

☐ The goals to be satisfied with the choice of one alternative.

The output of this process can be an action or an opinion of choice.

8. Mention four examples of Decision making programming statements.

1. if statement
2. switch statement
3. ? conditional operator statement
4. goto statement

9. **For each of the following, please circle the letter introducing the best answer.**

i. You can add a row using SQL in a database with which of the following?

A. ADD
B. CREATE
C. INSERT
D. MAKE

ii.   The command to remove rows from a table 'CUSTOMER' is:

A.   REMOVE FROM CUSTOMER ...
B.   DROP FROM CUSTOMER ...
C.   DELETE FROM CUSTOMER WHERE ...
D.   UPDATE FROM CUSTOMER ...

iii.   The SQL WHERE clause:

A.   limits the column data that are returned.
B.   limits the row data are returned.
C.   Both A and B are correct.
D.   Neither A nor B are correct.

iv.   Which of the following is the original purpose of SQL?

A.   To specify the syntax and semantics of SQL data definition language
B.   To specify the syntax and semantics of SQL manipulation language
C.   To define the data structures
D.   All of the above.

v.   Which of the following is the correct order of keywords for SQL SELECT statements?

A. SELECT, FROM, WHERE
B. FROM, WHERE, SELECT
C. WHERE, FROM,SELECT

D. SELECT,WHERE,FROM

vi. The result of a SQL SELECT statement is a(n) _____ .

A. report
B. form
C. file
D. <mark>table</mark>

vii. In an SQL SELECT statement querying a single table, the asterisk (*) means that:

A. <mark>all columns of the table are to be returned.</mark>

B. all records meeting the full criteria are to be returned.

C. all records with even partial criteria met are to be returned.

D. None of the above is correct.

viii. To define what columns should be displayed in an SQL SELECT statement:

A. <mark>use FROM to name the source table(s) and list the columns to be shown after SELECT.</mark>

B. use USING to name the source table(s) and list the columns to be shown after SELECT.

C. use SELECT to name the source table(s) and list the columns to be shown after USING.

D. use USING to name the source table(s) and list the columns to be shown after WHERE.

ix.   SQL can be used to:

      A. create database structures only.

      B. query database data only.

      C. modify database data only.

      D. All of the above can be done by SQL.

x.   The SQL statement that queries or reads data from a table is _____ .

      A. SELECT

      B. READ

      C. QUERY

      D. None of the above is correct.

xi.   _____ was adopted as a national standard by ANSI in 1992.

    A.   Oracle

    B.   SQL

    C.   Microsoft Access

    D.   Dbase

xii.   SQL is:

    A.   a programming language.

    B.   an operating system.

    C.   a data sublanguage.

    D.   a DBMS.

xiii.   Data Model is collection of conceptual tools for describing -

A. Data scheme.

B. Data.

C. Programs.

D. All of these.

xiv.   Data Models in DBMS are classified into _____ categories.

A. 3.

B. 4.

C. 2.

D. 5.

xv.   logical model(s) are used to describe data at - [Select Appropriate Option(s)]

A. View level

B. None of these

C. Physical level

D. Logical level

xvi.   Which of the following is example of Object based logical model?

A. Hierarchical Model.

B. Relational Model.

C. Network Model.

D. <mark>Entity Relationship Model.</mark>

xvii. Database is collection of ____.

A. None of these

B. <mark>Data</mark>

C. Modules

D. Programs

xviii. _____ is collection of interrelated data and set of program to access them.

A. Programming language

B. <mark>Database Management System</mark>

C. Data Structure

D. Database

xix. Before use of DBMS information was stored using _____.

A. <mark>File Management System</mark>

B. Cloud Storage

C. Data System

D. None of these

xx. The DBMS acts as an interface between what two components of an database system ?

A. Database Application and Database

B. Database and SQL

C. Data and Database

D. <mark>Database and User</mark>

xxi. DBMS stands for _____.

A. <mark>Database Management System</mark>

B. Database Basic Management System

C. Database Administrator System

D. None of these