

1. List out the advantages of using a database management system (DBMS)?

⇒ Advantages of using DBMS are:

- Data independence: DBMS provides abstract view of data. Application programs are independent from details of data representation and storage.
- Efficient data access: DBMS provides variety of sophisticated techniques to store and retrieve data efficiently
- Data integrity and security: DBMS allows to enforce integrity constraints on data like not allowing to enter more salary than the department's budget and DBMS allows to enforce access control and limit data to only users with access
- Data administration: DBMS provides centralized administration of data. It is appropriate when several no. of database user shares data. It improves the overall performance of database system.
- Concurrent access and crash recovery: DBMS has a capacity manage concurrent access. It schedules concurrent access to the data in such a manner that user feel data is being accessed by only one user at a time. It also saves user from system crashes.

2. Define the term Data and list out the characteristics of data in database.

⇒ Data are the raw facts that can be found after some experiments, observations or experience. The properties of data in DBMS are:

- Atomicity: A successful transaction occurs or it does not occur at all.
- Consistency: The database must be consistent before and after the transaction.
- Isolation: Multiple transactions occur independent to each other.
- Durability: The changes of a successful transaction occurs even after system failure.

3. What is database management system? Discuss the advantages of using database management system over file system.

⇒ DBMS is a general purpose software that enables user to create, maintain and manipulate databases. It provides fast and convenient access to information from data stored in databases.

Advantages of DBMS are:

- Reduced Data redundancy and inconsistency
- Ease in accessing data
- Data isolation
- Less integrity problem

- Allows concurrent data access
- More secure

4. What are different types of Database users and their roles?

Explain the Data independence with example.

⇒Types of database users are:

- Naive Users: They are the unsophisticated users to interact with the system by invoking one of the application programs that are already written.
- Application Programmers: They are the computer professionals who write the application programs and may choose any programming tools to develop the application programs.
- Sophisticated Users: They interact with system without using programming tool but by writing queries in databases using Dml query languages.
- Specialized Users: They are responsible to write special database application programs. It could be computer-aided design systems, knowledge based systems or any complex database.

Data independence is an ability to modify a schema definition in one level without affecting schema definition in higher level. There are two types of data independence:

- Physical data independence: to be able to modify physical schema without causing application programs to be rewritten
- Logical data independence: to be able to modify logical/conceptual schema without causing application programs to be rewritten

5. Who is data administrator? What are the main function of database administrator?

⇒ The database administrator is a person having central control over data and programs accessing that data. The main function of data admin are:

- Schema definition: responsible for the creation of original database schema. So DBA is responsible to write data definition statements in DDL
- Storage structure and access method definition: DBA is responsible to write a set of definitions to define storage and access method using storage and access.
- Schema and physical organization modification: DBA is responsible for modification of schema and to reflect the

changes in schema or to improve the performance physical organization may need to be change

- Granting authorization: DBA is responsible to grant different types of authorization for data access to various users.
- Routine maintenance:
  - Periodically backing up the database ensuring enough free disk space available for normal operations and upgrading disk space as required
  - Monitoring jobs running on the database and ensuring that performance is not degraded too much.

6. Differentiate between two-tier and three-tier client/server architecture.

| Two-tier Architecture   | Three-tier Architecture   |
|---|---|
| It is a Client-Server Architecture.   | It is a Web-based application.  |
| In two-tier, the application logic is either buried inside the user interface on the client or within the database on the server (or both). | In three-tier, the application logic or process resides in the middle-tier, it is separated from the data and the user interface. |
| Two-tier architecture consists of two layers : Client Tier and Database (Data Tier).  | Three-tier architecture consists of three layers : Client Layer, Business Layer and Data Layer.                                   |
| It is easy to build and maintain.   | It is complex to build and maintain.  |
| Two-tier architecture runs slower.  | Three-tier architecture runs faster.  |
| It is less secured as client can communicate with database directly.  | It is secured as client is not allowed to communicate with database directly.   |
| It results in performance loss whenever the users increase rapidly.   | It results in performance loss whenever the system is run on Internet but gives more performance than two-tier architecture.      |
| Example - Contact Management System created using MS-Access or Railway Reservation System, etc.   | Example - Designing registration form which contains text box, label, button or a large website                                   |

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|  | on the Internet, etc. |
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7. What is data abstraction? Discuss three levels of this abstraction.

⇒ Data abstraction in database system is a mechanism to hide complexity of database. It allow database system to provides abstract view to database user. It hides how data are actually stored and maintain in database. Data abstraction simplifies users' interactions with the system. Three levels of abstraction are:

- Physical Level: It is a lowest level of abstraction. It describes how data are actually stored in database. It describes complex low level data structures in detail.
- Logical Level: This is a next highest level of abstraction. It describes what data are stored in database and what relationship exists among them. It describes entire database relatively in a simple structure. The user in logical level needs not to aware the complexity of physical level structure.
- View Level: It is the highest level of abstraction. It describes only part of the entire database. It simplifies interaction with the system. It allows database system to provide many views for the same database. That is it allows each user/application to get different perspective of the database.