Database

Assignment Questions

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1.**What is a Database? Explain with an example on why should we need a database**.

A database is a structured collection of data organised in such a way that information can be stored, retrieved, and managed efficiently. Data is often stored and organised using tables, rows, and columns.

2.**Write a short note on file base storage system.Explain the major challenges of a file-based storage system.**

A file-based storage system stores data as individual files rather than organising and managing it like a database. Each application usually controls its own files.

Challenges of a File-Based Storage System:

1. **Data Redundancy**: Data may be replicated across many files, resulting in redundancy and inconsistency.
2. **Data Dependence**: Applications are inextricably linked to file structures, making it difficult to modify or extend without disrupting existing programmes.
3. **Data Inconsistency**: Changes to data in one file may not be mirrored in another, resulting in discrepancies.
4. **Limited Query Capabilities**: Query flexibility is reduced because retrieving specific data necessitates the use of bespoke code.
5. **Concurrency Control**: It is difficult to coordinate several users

who are simultaneously accessing and updating data.
6. **Security Concerns**: File-based systems lack centralised security mechanisms, making them.

3.What is DBMS? What was the need for DBMS?

The acronym DBMS stands for Database Management System. It is software that provides an interface for communicating with databases, managing and controlling data access, and assuring the integrity and security of stored information.

Need for DBMS:
1. **Data Organisation**: A database management system (DBMS) helps to structure data, making it easier to store, retrieve, and manage.
2. **Data Integrity:** The DBMS imposes rules and restrictions to ensure that data is accurate and consistent.
3. **Efficient Retrieval**: DBMS offers efficient techniques for retrieving specified information, which reduces the complexity of bespoke data access code.
4. **Concurrency Control**: A database management system (DBMS) controls numerous users who access and alter data at the same time to avoid disputes.
5. **Scalability**: DBMS can manage massive amounts of data and user interactions while scaling to meet expanding demands.

4.Explain 5 challenges of file-based storage system which was tackled by DBMS.

1. **Data Redundancy:** File-based systems frequently resulted in redundant data storage across numerous files, which was inefficient and inconsistent. DBMS tackles this issue by centralising data storage and reducing redundancy through normalisation.

2) **Data Dependence:** Applications in file-based systems were

inextricably linked to file structures, making it difficult to change or expand without disrupting existing programmes. DBMS introduces data independence, allowing changes to the database structure without affecting application code.

3. **Data Inconsistency:** Changes to one file in a file-based system may not be reflected in another, resulting in inconsistencies. DBMS applies data integrity constraints to ensure that data is consistent and accurate throughout the database.

4. **Limited Query Capabilities**: In file-based systems, retrieving specific data required implementing specialised code, which resulted.

5.list out the different types of classification in DBMS and explain them in depth.

In Database Management Systems (DBMS), classification can be done using a variety of criteria. There are three primary forms of classification:

1. **Based on Data Model**: - Relational DBMS (RDBMS): Organises data into rows and columns. It employs a schema to define the structure and relationships among tables.
- Hierarchical DBMS (HDBMS): Stores data in a tree-like form with parent-child relationships. It is appropriate for one-to-many partnerships.
- Network DBMS (NDBMS): Similar to hierarchical DBMS, but supports more complicated relationships by allowing each record to have many parent and child records.

2. **Based on the number of users**: - Single-user DBMS:** Designed for a single or small group of users. Examples include personal databases and small-scale applications.
- Multi-user DBMS: Allows several users to access and manipulate data simultaneously.

6.What is the significance of Data Modelling and explain the types of data modeling.

1.The importance of data modelling lies in its ability to organise and structure data, offering a clear blueprint for how pieces connect to one another.
2. Communication: It acts as a communication tool for stakeholders, such as developers, designers, and business users, to ensure a shared understanding of data structures.
3. Complexity Management: Data modelling reduces the complexity of huge datasets by breaking them down into manageable components, making databases easier to build and maintain.
4. Efficient Database build: It helps to build databases efficiently by identifying relationships, constraints, and entities, resulting in optimised database architectures.
5. Data Integrity: Data modelling ensures data integrity by specifying linkages and restrictions that assist keep data accurate and consistent.

Types of Data Modelling
1. Conceptual Data
2. Logical Data Model
3. Physical Data Model
4. Entity-Relationship Diagram (ERD)

7.Explain 3 schema architecture along with its advantages.

Third Schema Architecture:

1. User Schema (External Schema): - Definition: Describes how specific user groups interpret data.
- Advantages: - Data Independence: Users are unaffected by changes in the logical or physical schema.
- Security: Different user groups can have bespoke views, which

improves security.
- Customisation: Provides customisable views for individual user requirements.

2. Logical Schema (Conceptual Schema): - Definition: Outlines the database structure and relationships.
Advantages: - Centralised Control: Provides centralised control over the entire database structure.
- Consistency: Maintains consistent data definitions and relationships.
- Design Guidance: Provides guidelines for table, relationship, and constraint design.

3. Physical Schema: - Definition: Defines physical storage and access mechanisms.
Advantages: - Performance Optimisation: Enables optimisation of storage structures and retrieval processes.
- DBMS Independence: Changes in the database or storage do not

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