

8. DATABASE MANAGEMENT SYSTEM

1. What is a database?

Data base is an organized collection of data related to a particular enterprise. It may contain different types files each one containing many records.

2. What is DBMS?

Database Management System is a collection of inter related data and a set of programs to store, modify and access those data.

3. What are the advantages of DBMS ?

a). **Controlling Data redundancy**:- Duplication of data is known as data redundancy. It causes higher cost for data storage and data access. In DBMS data is kept in one place in centralized manner and the users can access this centrally maintained date for their purpose. So data redundancy can control.

b). **Data consistency** :- Data redundancy leads data inconsistency (different copies of same data hold different values because the updation of data may not occur in all the copies. In DBMS it avoided by eliminating redundancy.

c). **Efficient data access**: DBMS utilizes a variety of techniques to store and retrieve data efficiently.

d). **Data can be shared**:- The data stored in the Database can be shared among many users and new programs can be developed to share the existing data.

e). **Data Integrity**: Integrity refers to the overall completeness, accuracy and consistency of data in the database. It can be achieved by use of error checking , validation, avoiding duplication etc.

f). **Security** :- Information inside a Database is very valuable for a company. Security refers to accidental or intentional disclosure or unauthorized access, modification or destruction. Through the use of passwords, information in the database is made available only to authorized person. Access to specific information can be limited to selected users by using access rights.

g). **Sharing of data** : The data stored in the database can be shared among several users or programs even simultaneously and each may use it for different purposes.

h). **Enforcement of Standards**:- The database Administrator defines standards like display formats, report structure, update procedures, access rules etc.. for the DBMS. It is helpful when data transfer occurs between systems.

i). **Crash recovery** : If the system crashes data in the database may become unusable. DBMS provides some mechanism to recover data from the crashes.

4. What are the components of a database?

The components of a database are,

a). **Hardware** : It include actual computer system used for storage and retrieval of Database. It include computers, storage devices, network devices, and other supporting devices.

b). **Software** : It consists of DBMS, application programs and utilities. DBMS consists of different components that handles tasks like data definition, data manipulation,

c). **Data** : It is the most important component of DBMS. The data base should contain all the data needed by the organization. For effective storage and retrieval of information , data is organized as fields, records and files.

1) **Field** : A field is a smallest unit of stored data. Each field has a specific type.(eg. Name,- Char, Mark,-num etc).

2) **Record** : A record is a collection of related fields. A record store an instant of the relation or the table.

3) **File** : A file is a collection of all occurrence of one type of record.

d). **Users** : The users of database can be classified depending on the mode of their interactions with DBMS. The different categories of users are Database Administrator, Application Programmer, Sophisticated users, and naïve users.

e). **Procedures** : Procedures refers to the instructions and rules that govern the design and use of the database.

5. **Data about data is called**

Meta-data

8. **What is database abstraction?**

Designers of DBMS use complex data structures to represent data for getting better efficiency. But the users may not be computer trained. So the developers In a database system hide the complexity from users through different levels of abstraction.

There are three types of abstraction

a). **Physical Level Abstraction**-It is the lowest level of abstraction. Physical level describes how data is actually stored in the storage medium like disk, tape etc.. The DBMS hide its details from the programmers.

b). **Logical (conceptual) Level Abstraction**- It is the next high level of abstraction. Logical level this describes what data are stored in the data base and what relationship among them. In this level the records and its types are defined. The logical level abstraction is done by the Data Base Administrator(DBA).

c). **View Level Abstraction**- This is the highest level of abstraction. It concerned with the way in which the individual users view the data. Most of the users may not need all the data stored in the database. They need only a part of it. So all other data are hide from the user

9. **What is schema?**

The description or structure of a database is called database schema.

10. **What is mean by data independence?.What are different types of data independence?**

The ability to modify a scheme definition at one level (Physical, Logical, View levels) without affecting the scheme definition at the next higher level is called data independence. The two types of data independence are ,

a). **Physical data independence**: It is the ability to modify the physical schema without affecting the conceptual(logical) schema. So the application programs remain same even though the physical schema get modified

b). **Logical data independence:** It is the ability to modify the logical schema without affecting the view level. So the application programs remains same.. It is more difficult to achieve because the application programs are heavily depend on logical structure.

11. . Who are the users of database?

Users of the database can be classified in to the following groups,

a) Database administrator (DBA): The person has control over the centralized and shared data in a DBMS. He is the in charge of creating, modifying and maintaining 3 levels of DBMS.

b) Application Programmer: They are computer professionals and interacts the DBMS through application programs. Application programs are programs written in any host languages like Java, C++ etc.. and interact with DBMS through Data Manipulation Language (DML).

c). Sophisticated Users : The users are familiar with DBMS like scientist, business analyst etc. The interact with DBMS by their own Query or request

d) Naive Users/ End users: The uses don't know about the physical and logical structures of DBMS like clerical staff in an office.

12.What are the duties of a DBA?

The person has control over the centralized and shared data in a DBMS. He is responsible for,

a). Design of the physical and conceptual Schemas.

b). Security and authorization.

c). Data availability and recovery from failures.

13. What is Relational Data Model ?

The relational data model represents database as a collection of tables called relations with unique name

14. Expansion of RDBMS is ??

Relational Data Base Management System.

15. The person who interacts with database through query language is called

Sophisticated user

16.The billing clerk in a super market is a user

Naïve User

17.Who provide data security in a database?

Data Base Administrator

18. Who changes the structure of a database ?

Data Base Administrator

19.... interacts with the database through the prewritten application program.

Naïve User

20. Categorize the following components of DBMS environment .

- a). Hard Disk b). Switch c). DBA d). Payroll System e). End User f). Railway reservation System

Hard Disk, Switch :- **Hardware**
 Pay Roll System, Railway Reservation System :- **Software**
 End User, DBA :- **Users**

21. What are the advantages of RDBMS over other data models?

- a). Simple data representation
 b). Complex query can be expressed with easiness

22. Explain the following

- a). Entity b). Relation c). Tuple d). Attribute e). Degree f). Cardinality g). Domain h). Instance

a). **Entity** : An entity is a person or a thing that can be distinguishable from others.

Eg. Student, Book etc..

b). **Relation** : Relation is a collection of data elements organized in rows and columns. It is also called a **table**.

c). **Tuple** : A row in a relation is called a tuple. It consists of a complete set of values used to represent a particular entity. Values of each attribute are taken from its domain.

d). **Attribute** : The columns of a relation are called attributes.

Eg. Ad.no, name, age etc are the attributes of the relation Student.

e). **Degree** : The no of attributes(columns) in a relation is called degree of that relation.

f). **Cardinality** : The no of rows (tuples) in a relation is called cardinality of that relation

g). **Domain** : Domain is a range of values from which a particular value of an attribute for a can be drawn.

Eg. 0 to 100 may be domain of values for the attribute mark in student relation.

h). **Instance** : An instance of a relation is a set of tuples has the same number of fields as the relational scheme.

22. What are the different Keys in a relation?

Tuples in a relation must be distinct. That means no two tuples in a relation have same combination of values for all the attributes. So there should be a way to identify each tuples in a relation. Keys allow us to make such distinctions.

a). **Candidate Key**:-Candidate key for a relation is the minimal set of attributes that uniquely identifies each tuple(row) of the relation. There may more than one candidate key in a relation.

Eg. Student(adno,name,cl_no,batch,year,mark). Here adno and (Cl-no,batch,year) are candidate keys.

b). **Primary Key**:-It is one of the candidate keys chosen to be unique identifier of the relation by the database designer. If there is more than one candidate key, then key with least no. Of attributes is chosen as Primary key

Eg. **Student**(adno,name,cl_no,batch,year,mark). Here adno and (Cl-no,batch,year) are candidate keys.

Then adno can be chosen as the Primary key.

c). **Alternate Key**:-The candidate keys that are not chosen as primary key is known as alternate keys.

In the above eg. (Cl-no,batch,year) is the alternate key.

d). **Foreign key**:-An attribute or set of attributes in a table which is a primary key in another table is called a foreign key. It helps to link two or more tables. So it is also called **Reference key**.

Eg. **Student**(adno,name,cl_no,batch,year,mark) and **Library**(Mem_id,adno, book_no)

If the ad_no in the Library relation is primary key in school table then, it is a foreign key based on student table.

23. What is a Predicate?

Predicate is a user defined condition to select rows of user's choice.

24. What is mean by relational algebra?

Relational algebra operations take one or two relations as input and produces a new relation as a result. If it operates on only one relation it is known as a unary operation . If it operates on two relations it is known as a binary operation.

26. Explain different relational operations?

1) **Select operation**: Select operation is a unary operation used to select tuples in a relation those satisfy a selection predicate (condition). It is denoted by the symbol σ

Eg.

Student

Roll_No	Name	Year	Batch
1	Biju	2014	Commerce
1	Manu	2015	Humanities
2	Raju	2015	Commerce
2	Mini	2014	Humanities
3	Sindhu	2015	Commerce
3	Jinu	2014	Humanities

σ Year="2015" and Batch="Commerce" (Student)

Roll_No	Name	Year	Batch
2	Raju	2015	Commerce
3	Sindhu	2015	Commerce

2) **Project operation**: Project operation is a unary operation used to select of the columns from a table to form a new relation. It is denoted by the symbol Π .

Eg.

Student

Roll_No	Name	Year	Batch
1	Biju	2014	Commerce
1	Manu	2015	Humanities
2	Raju	2015	Commerce
2	Mini	2014	Humanities
3	Sindhu	2015	Commerce

3	Jinu	2014	Humanities
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[[Roll_No, Name, Batch (Employee)

Roll_No	Name	Batch
1	Biju	Commerce
1	Manu	Humanities
2	Raju	Commerce
2	Mini	Humanities
3	Sindhu	Commerce
3	Jinu	Humanities

3) **Union Operation:** It is the concatenation operation between compactable (same type) where all the tuples appearing in either or both the relations.. It is denoted by U. Duplication of tuples are eliminated.

Eg.

School A

School code	School name	subject
111	Abc hss	Commerce
112	Pqr hss	Humanities

School B

School code	School name	subject
211	xyz hss	Commerce
212	Cdf hss	Humanities

School A U School B

School code	School name	subject
111	Abc hss	Commerce
112	Pqr hss	Humanities
211	xyz hss	Commerce
212	Cdf hss	Humanities

4). **Intersection Operation:** This binary operation done between compactable relations. It returns a relation consisting of all tuples appearing I both of the two specified relations. It is denoted by the symbol $\cap$.

Eg.

Foot Ball

Name	Age
Biju	16
Siju	15
Riju	17
Liju	16
Aji	15

Biji	16
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Cricket

Name	Age
Saji	16
Siju	15
Raju	16
Liju	16
Binu	17
Biji	16

Foot Ball $\cap$ Cricket

Name	Age
Siju	15
Liju	16
Biji	16

- 5) **Set Difference Operation:** This binary operation done between compactable relations. It returns a relation consisting of all tuples appearing in the first relation and not in the second relation. It is denoted by the symbol $-$.

Eg.

Foot Ball

Name	Age
Biju	16
Siju	15
Riju	17
Liju	16
Aji	15
Biji	16

Cricket

Name	Age
Saji	16
Siju	15
Raju	16
Liju	16
Binu	17
Biji	16

Foot Ball $-$ Cricket

Name	Age
Biju	16
Riju	17
Aji	15

6) **Cartesian Product(Cross Product):** This operation returns a relation consisting of all possible combinations of tuples from two relations. It is a binary operation on two relations which has **degree equal to the sum of the degrees of the two relations** and **cardinality is the product of the cardinalities of the two relations**. It is denoted by $\times$.

Eg.

Student

Roll No	Name
1	Biju
2	Riju
3	Siju

School

School code	School name	subject
111	Abc hss	Commerce
112	Pqr hss	Humanities

Student X School

Roll No	Name	School code	School name	subject
1	Biju	111	Abc hss	Commerce
1	Biju	112	Pqr hss	Humanities
2	Riju	111	Abc hss	Commerce
2	Riju	112	Pqr hss	Humanities
3	Siju	111	Abc hss	Commerce
3	Siju	112	Pqr hss	Humanities

27. How many primary keys possible in a relation?

One

28. If a key contains more than one attribute is known as?

Composite Key