DATABASE MANAGEMENT SYSTEM

Topic to be discussed

- Database
- Data vs Information
- Database management system
- Approaches to Access Data
- Database Characteristics
- Database Architecture
- Database Application
- Database Terminology
- 12 Code rules for RDBMS
- Normalization

What is Database?

Definition:- Database is organised collection of related data. Database can be consist of any type of data such as text, images, videos and audios etc. When whole data is stored at one place it become database.



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Data vs Information

- Data:- It is unorganised collection of raw facts and figures in form of characters, symbols, words etc. It does not convey any meaning to user so difficult to understand.
- For eg:- 50 is data, it can be marks, rupees, weight, length etc that anything which does not convey any meaning to user.

Data vs Information

Information:- It is organised form of data which convey some meaning to user that is processed form of data. It help to take meaningful decision. For example:- marks 50, it is a information because it

convey some meaning to user if i write only 50 then it is data only.



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Database management system(DBMS)

It is software tool which allow to define, create and manipulate the database, their structure and provide controlled access to the user.

DBMS tools:-For example-

SQL Server(Microsoft Product) MY SQL ORACLE



Approaches to Access Data

There are two approaches

- Traditional file approach system
- Database Approach

Traditional file approach system

- In this approach all data records are stored in form of files.
- Various application programme are written to access appropriate files that is to add and fetch data from files.
- Every application programme define and manage its own data.



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Limitations of traditional file approach

- **Data redundancy:-** it refer to data duplication means when same data is stored in more than one files which consume more space and data inconsistency.
- **Data inconsistency:-**means due to data redundancy when same data is stored in two or more files and data updated in one file is not reflected in other files which cause data inconsistency.
- Lack of data integrity:- integrity means accuracy and correctness. For example if user storing phone number, it must be consist of 10 digit and only numbers so in application programme need to apply integrity constraint which are difficult to change at later stage in application programme to access data in files.

Limitations of traditional file approach

- Lack of flexibility:- it is difficult to add more and more function in existing file processing system.
- Limited data sharing:-In this approach each application programme has it own sharing capabilities and private files can not be shared outside.
- Security issues:- security means to provide authorisation and authentication to data. For example when user want to access the student record through application programme then he should not able to access teacher data in file processing system. So this type of security constraints are difficult to apply. Another issues are atomicity, isolation and concurrent control.

Advantages of database approach

- **Minimization of data redundancy**:- data duplication is removed by normalization and data is centralised by database administrator.
- **Data integrity:-** means accuracy and correctness. It always store correct data in database by applying integrity constraints such primary key. For example phone field in database will always accept numeric value with length 10 digit which ensure data integrity.
- Data consistency:- means when same data is stored in more than one table then updating in one table should be reflected in all other table containing same data which ensure data consistency. Data inconsistency is removed by minimization of data redundancy.

Advantages of database approach

- **Sharing of data:-** data can be shared to multiple application or user at same time. It means data is accessible to multiple user at same time.
- **Data security and privacy:-** it protect data from unauthorised user and provide controlled access to user. Such as authentication(username and password) and authorisation(read and write permission).
- **Increase concurrency control:-** it means multiple user can access same data at same time that is simultaneously execution of transactions at same time.
- **Recovery and backup:-** it is easy to create a backup of existing database and recover them at later stage.



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Database Disadvantages

- **Expensive hardware and software**:-High quality hardware and software are required for high performance. For example SQL SERVER
- **Complexity of recovery and backup:-** due to increase volume of data in terms of tera bytes, zetta bytes it is more complex to create a backup and to recover them.
- Large size of DBMS:- Due to high performance and large functionality it require more space to run and large space to store large volume of data.
- **Conversion cost**:- The conversion cost of traditional file processing system to modern DBMS is very high in term of time and money.
- **Technical trained staff is required:** Normal or common user can not operate easily so training of user is required which involve more cost.

Component of DBMS

- Data
- DBMS User
- Software
- Hardware



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Component of DBMS

- Data:- it is raw collection of facts and figures.
- **Software:** DBMS is software tool which lies between hardware and user, installed over a operating system. It create an interface between user and database. For example:- SQL SERVER, MYSQL, MS ACCESS,ORACLE
- **Hardware**:- it refer to computer system to store the database such as hard disk and database server used to permanently handle the database queries and to store large volume of data.

Component of DBMS

- **DBMS User:** DBMS user can be of any type who can access the data such as
 - Naive user:-These are those user who are not aware about the presence of database. These are end user who use the data through the application programme. For example:- ATM user
 - Online user:- these are those user who communicate with database through internet application or internet terminal point such as social networking sites, web ports and online registration form etc.
 - Sophisticated user:- These are those user who deal directly with system database. They use database language such as SQL (Structured Query Language) to access the database for eq. to view the data, to delete the data or to upgrade the data. Engineer, scientist, system analyst are example of sophisticated user.
 - Database Administrator(DBA):- DBA has all access(permission) to manipulate the database. It has all power of DBMS.

- It is developed by Dr. E.F. Codd at IBM Laboratory.
- It is also known as three level architecture or ANSI/SPARC(American National Standard Institute/Standard Planning and Requirement committee) architecture.
- It consist of three level such as
 - External level
 - Conceptual level
 - Internal level



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• External level or external view (user view):-

• This is also known as **user view** of database and it is closer to end user. This level show only that part of database which is relevant to each user.

• Each user can have its own view for same data.

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Conceptual level:-

- It is also known as logical view of database.
- It hides the internal details of physical storage.
- It describes "what data is to be stored" and relationship between them.
- It represent all entities, attributes and relationships.

Name	Roll no.	Class		Name	Emp ID	Phone No	
Student Entity			Employee Entity				
Attribute:- Name, Roll no.,			Attribute:- Name, Emp ID,				
Class				Phone No.			

Internal level:-

- It is lowest level of architecture.
- It is also known as physical level of architecture which is very close to physical storage of data.
- It deals with physical representation of data.
- It describes " how data is to be stored".
- It includes data structure allocation techniques such as indexing, hashing and pointer etc.
- It includes various physical storage device such CD, HDD, DVD or other secondary storage device.

Data independence

- Logical data independence
- Physical data independence

The ability to change the logical schema of database without changing the external schema is known as logical data independence. For example addition or removal of new attribute in the table.

The ability to change the physical schema without changing the logical schema is known as physical data independence. For example change in file allocation techniques.