**DBMS architecture**

Q1 What is DBMS?

* Database management system
* Use to manage the data that we stores in databases like MySQL, Oracle

Q2 Why do we need DBMS?

* Although we can stores the data in Excel but there generally we do have a lot of redundancy chances this is one of the main reason to use DBMS.
* Accuracy
* Easy to perform different operations (insert, delete, update, select)
* To research the data we use DQL

Q3 What is Data?

* Raw, unstructured, it could be numbers, text, audio, video

Q4 What is information?

* When data is processed that becomes information
* When we have just numbers like

21, 23,46 this is raw nothing is mentioned if these are weight, marks?

But when we mention test1=21, test2=23 now it has become information

* The information or we say structured data helps us to make decisions

**Database:**

Students data

* RollNo., Name, StudentId, Address
* These are collection of relatable data
* If we think to store the data in word file , Notepad, Spreadsheets. In that case in order to show particular data then we don’t have anything like query to show only specific data to a person in case for word file
* Database helps us with good accessibility, to reduce redundancy

Q5 What is DBMS?

* Software that manages the data in database
* With the help of DBMS Users can perform certain operations on the data which is present in database.
* Helps to modify, retrieve , add data
* DBMS helps to do all required manipulation with the data in Database.

Q6 What is RDBMS?

* Relational database management system
* Its for the structured data
* Here we use Tables to store data and we call it a Relation.
* **Rows= Tuple or Record**
* **Column= Field or Attribute**
* **Schema= Design of database (it doesn’t shows the data but only the structure) or Blueprint**
* **Instance= Data stored at particular instance of time**

**# DBMS**: It is a collection of interrelated data and a set to programs to access that data.

DBMS helps us to organize the data in an efficient way

Its primary work is to store the information in database and retrieve it in an efficient way.

**Database + Management system = DBMS**

Database- collection of interrelated data

Management System- Helps us to:

* + - * Access
      * Add
      * Update
      * Delete

These are the set of programs

Application Database

DBMS

* It can also act as an interface b/w the application and OS to access and manipulate database
* Any info from application if we want to store then first it goes to DBMS then OS then in database
* It’s a software that we use to manage database – MYSQL, Oracle

**Charachterstics and Application of DBMS**

* It creates a digital repository on a server to store and retrieve the data
* It contains automatic backups and recovery process
* It contains ACID properties which we generally use in banking (Transactions)
* ACID we use in case of any failure we will have rollback
* ACID- Atomicity, Consistency, Isolation, Durability

**Application of DBMS:**

* **Banking**: for maintaining customer information- account, transaction
* **University**- Students details - Course registration
* Airlines- For reservations and schedule
* **Railway Reservation** – For checking availability, trains , reservations

**Advantages and Disadvantages**

**Advantages:**

* Controls redundancy (repetition) – it maintains the data in a single repository of data which will be accessed by many users.
* Data Sharing: Any authorized user in an organization can share the data with multiple users
* Backup: Automatic backup on any hardware and software failure
* Multiple user interface- two user interface ----GUI and Command interface

**Disadvantage:**

* Costing – for maintaining hardware and software
* Space- It occupies large space in disk and memory to run efficiently
* Higher impact of failure- As data is getting is store in single database if any damage cause to database all info will be lost
* Redundancy
* Data accessability

Filesystem – Let say if we need to save population data now that will be huge still it can be save but accessibility is difficult

Example

Here we plan to work on banking application

Banking: using file system

Features we need in Saving account;

Account details

Debit and Credit

Balance

Monthly statements

Now in saving account we get interest also yearly

Now after 10 years bank wants to introduce new type of account and hire another programmer

Now there is no functionality of Interest in current account and programmer needs to write new programs to add this feature of current account

Current Account:

Account Details

Yearly statement

Debit and credit

**Now Redundancy problem will be here**



Now person A earlier opened a saving account and his information is still there with the bank

Now in same bank he opened current account

Now same information will be added again

Same information will be there in two account and stored same data in two different places



This leads to **redundancy**

And if person A update address in saving account now he forgot to update in his current account this create data **inconsistency**

**2. Difficulty in accessing the data**

Let say we have data of some state

And some authority asks to show data of person belongs to particular pincode now programmer needs to write another program for it this is a problem of file system

Now in case of banking example different programmers are writing the code for saving account and current account both might have stored or made file of different formats such as .dat and .txt now when retrieve process is there that will cause difficulty and because of this **data isolation** won’t take place.

**3. Integritiy constant ;**

Lets say programmer ne checks use kiya hae that balance of acc should not be less than 5000 now later on if limits gets change again programmer need to come again and write another programmer

**4. Atomicity Problem;**

It says transaction hogi ya cancle hogi but in between nhi stuck hogi

It is difficult to achieve atomicity in file system but in DBMS it is very easy

**5. Concurrent access:** if person A withdraw amount from online mode and another person withdrawing cash from debit card now to handle this ki ek bar mae ek hi withdraw ho for that again program likhiye

And all of these are advantages in DBMS

DBMS Architecture:

Abstraction:

System hides certain details so that user interaction becomes easy

**Example** Car driving when to turn you don’t need to worry about excel

**Example** Tally software (business software) similiarly user just worry about balance sheets and calculation but not about how data structure has used for this tally or behind it what is happening

DBMS DBMS

User1

User2

Database

Now there are many users accessing the database and there will be different views for each user

Now let’s say AMAZON is there

It stores a lot of information of yours

Name

Address

Phone No.

Liking / Dislike

Credit Card

Debit Card

UPI details

Product Bought

Now there are different departments working in amazon but amazon is not going to share all of the information of single user with all the departments but only that info that is let say required by logistic department.

Here **for logistic department** view will be

Name , Address, Phone No.

And for **Customer care department** view will be

Name, ADDRESS, Phne No, Product bought

Now this is happening by abstraction that multiple users accessing same database but views are different

Now Abstraction is working but it is getting achieved by 3 Schema architecture

**Physical Level (Lowest level abstraction)**

It tells in actual how data is stored

In FB you profile pic is there so in disk where it is getting stored that is what physical level abstraction tells

It happens with physical schema/ Blueprint

Logical Level (Conceptual level)

Logically data dick kesar ha hae and whats the relationship in that data

In students data

Name, Phone No, Address, batch no.

Lets say we have maintained data of multiple students in a file

In case of physical level



After storing if you open the file you see name, address, phone no, but if you see name ram is stored as 012 sita 267 so you cant predict which data is it by seeing the numbers only but say this is just the data

Physical level states data is stored byt, separated or after ,,,, comas next information starts this happens in physical level

Logical level: This data when converted in logical level you see proper table and details of students

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