Database:-

Database can be defined as an organized collection of interrelated data.

e.g. Consider a bank database, the tables are customer table, account table & depositer table

cust_id	name	address	City
1567	Noshaq	Angur	Fzd
1569	Nayan	Kaushal	Ksp
1578	Riya	Mainst.	Knp

CUSTOMER TABLE

Acc.No	Balnc
A-101	3000
A-102	4000
A-103	5.000

ACCOUNTTABLE

→ Attriblites

Cust_id	Acc.No
1567	A-101
1569	A-102
1578	A-103

→ Tupples

DEPOSITER TABLE

* Database Management System:

DBMS is a collection of interrelated files and set of programs that allow users to access & modify these files. The primary goal of DBMS is to provide a convenient & efficient way to store, retreive & modify information.

The DBS are designed-
efines structures for storage of data.
nechanics for manipulation of data.
nsure the safety & security of data stored even in the cases of system crashes or attempts unauthorized ccess.
hare data among the different users.

Purpose of Database System / Drawback of File System:

n the traditional file approach data is stored in flat files (having no structure) which are maintained by file system under the operating system control.
The Users use application program to perform the ecific Task.

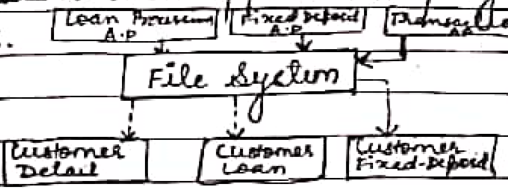


fig. Conventional Method of Data Storage

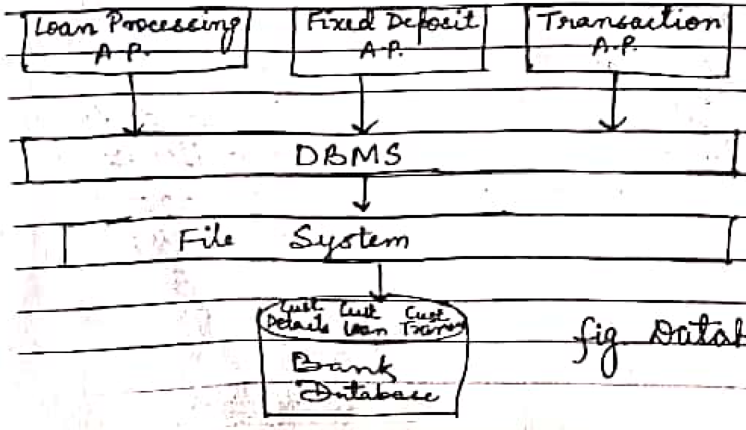


fig. Database Interface

Data Redundancy & Inconsistency -

Cust Id	Cust. name	age	Address	MobNo.
123	Ram	23	Kup	9339

CUSTOMER TABLE

Cust. Id	Cust name	Branch	Loan amt	Mob No.
123	Ram	SBI	10,000	9339

LOAN TABLE

E.g. of Data Redundancy
where in loan table attributes cust. name & Mob. no are redundant & not necessary. and it will cause data inconsistent i.e. change any tuple of Mob. No we have to change it in loan table also.

If the same information is duplicated in two or more files it may cause data redundancy. This duplication of data (redundancy) leads to higher storage & access cost. In addition it may lead to data inconsistency.

E.g. Assume same data is repeated in two or more file If a change is made to data in one file. It is required that change will made to data in other file. For maintaining the consistency.

Isolation :-

Data isolation means that all the d data is not available in one file. Generally ata is scattered in various files and files may be fferent format. Therefore writing new app. program etreive data is difficult.

am / Data dependence :

Under the traditional file ach, application program are data dependent. s impossible to change physical representation & ss technique without affecting app. program. es in physical format of file such as addition data field requires that change be made in all cation program.

.g. if we have to add new field then we have to modify the whole application program or write it new again which is very difficult.

of flexibility :

The traditional system are able to eive info. for predetermined request of data. If management need unanticipated data, the o. can be provided if it is in the files of system. But the problem is that application gram for this purpose may not exist.

Concurrent access Anamoly:

Many traditional system allows multiple users to access & update the same piece of data simultaneously. But the interaction of concurrent updates result in inconsistent data. e.g. In a file the cust. id is 25 at a time two user is reading it & then one user have change it to 30 then other user will see it 30, this is an anamoly Therefore at same time reading & writing can't be done

Data security:

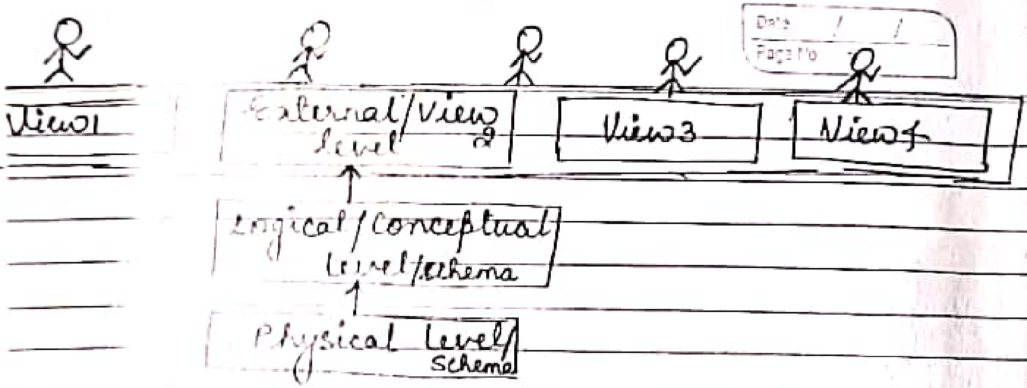
The data maintained in flat file is easily accessible and therefore not secure.

* Data Abstraction:

The major purpose of database system is to provide users with an abstract view of data. That is the system hides certain details of how the data are stored & maintain. The developers hide the complexity of database system from users through several levels of abstraction

There are three levels of abstraction

(1) Physical Level: This is lowest level of abstraction, describes how the data are actually stored. The physical level describes complex low level data structure in details.

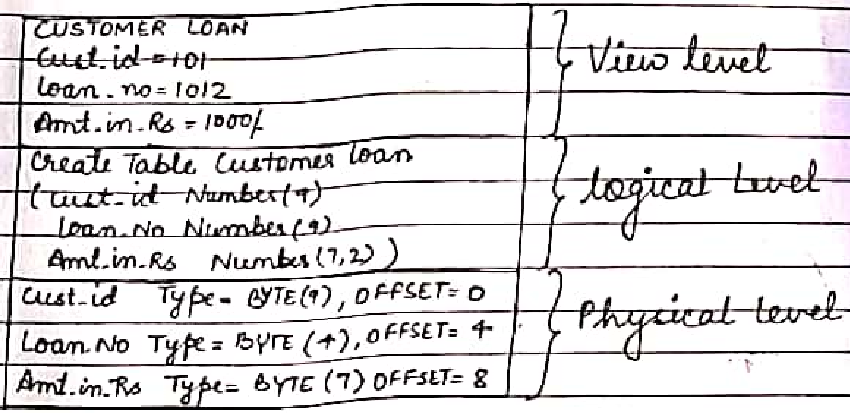


9 Levels of Abstraction/Three Level Architecture

Logical level: The next higher level of abstraction describes what data are stored in the database & t relationship exists among those data. Therefore, it cribes the entire database in terms of a small no. of atively simple structure. Database administrator must decide what information ceep in the database, use the logical level of abstraction.

iew level: This is the highest level of abstraction, describes only part of the entire database. any users of the database system are not concerned th all info in the database instead they need to ess only a portion of the database. This level simplifies the end user interaction with the user. The stem may provide many views for the same database.

Instances & Schema: Database change over time as fo. is inserted & deleted. The collection of info. store in the database at a particular moment is called an stance of the database.


CUSTOMER LOAN
~~Cust.id = 101~~
loan.no = 1012
Amt.in.Rs = 1000/
Create Table Customer loan
(~~cust-id Number(4)~~
~~loan.No Number(4)~~
Amt.in.Rs Number(7,2))
Cust.id Type = BYTE(4), OFFSET = 0
Loan.No Type = BYTE (4), OFFSET = 4
Amt.in.Rs Type = BYTE (7) OFFSET = 8

* Instances & Schema:

The overall design of database is called the database schema. It response to variable declaration (along with type defintion) in a program. Database system have several shema according levels of abstraction

25/07/17

Physical schema describes the database design at physical level, logical schema describes database design at logical level. A database may also have several schema's at view level k/as subschema

* Database Users:

(i) Naive Users: are unsophisticated users who interact (End) with the system by invoking one of the application programs that have been written previously. e.g. Bank teller who needs to transfer 50Rs from acc. A to B invokes a program called transfer.

tion Programmer: They are computer professionals who write application program. They can choose many tools to develop UI. Rapid Application elopment (RAD) tools enable programmer to construct s & reports without writing a program.

ticated Users: They interact with the system thout writing programs. Instead they form their in a database query lang. They submit each to query processor whose func. is to break DML nent into instruction.

Online Analytic Processing (OLAP) tools simplify nalyst task by giving them view summaries of in different ways.

se Administrator:

na definition: DBA creates the original database ma by executing a set of data definition statem- DDL (Data definition Language)

ting of Authorisation for Data Access:

By granting nt types of authorisation DBA can regulate which of database various users can access. The ~~organi-~~ thorisation info is kept in a special structure the database system concerts whenever someone s to access the data in the system.

• Integrity Constraints Specification:

Integrity constraints are kept in a special system structure that is consulted by DBA, whenever an update takes place in the system.

• Routine Maintenance:

→ periodically backing of the database

→ ensuring that enough free disk is available

→ Monitoring jobs running on the database & ensuring that performance is not degraded by expansive task submitted by some users.

• Security Administration

* Data Independence :

Three schema architecture can be used for explaining the concept of data independence which can be defined as capacity to change schema at one level of database system without having to change schema at next higher level. We can define two types of data independence.

(1) Logical Data Independence :- It is the capacity to change conceptual schema without having to change external schema's or application program.

We may change conceptual schema to expand database or to reduce the database. Application Programs that

eference the external schema constructs, must work as
efore & after the conceptual schema undergoes the logical
reorganisation. Changes to constraints can also be applied
to conceptual schema without affecting the external schemas.

Physical Data Independence:

It is the capacity to change
e internal schema without having to change conceptu-
 schema Changes to the internal schema may be
eded being [illegible] physical files have to be reorganised.
.g. by creating additional access structures in order to
prove the performance of retreival of update. If the
me data itself remains in the database we should
ot have to change conceptual schema.

Database Language:

Languages used in database-

DL (Data definition language)
ML (Data Manipulation —)
CL (— Control —)

DL : We specified database schema by set of definition
expressed by special language k/as DDL.
e.g. create table account(ac-no varchar(20),
balance integer(20));
Execution of DDL statement creates the account table.
DL also provides to specify the constraints. like ~~check~~ Not Null,
unique.

The database system checks constraints everytime the database is updated. In general, constraints is predicate related to database

constraints- (1) Domain
(11) Refrential integriety
(111) Assertion
(1V) Authorization

DDL commands - Create, Alter, Drop, Truncate.

DML [Data Manipulation Language]: DML is-
(1) retreival of info. stored in database.
(2). Insertion of new info. into database.
(3). Deletion of information from database.
(4) Modification of info stored in database.

DML is a language that enables users to access or manipulate data as organized by data model. There ar basically two types-

(a). Procedural DML : require a user to specify what data are needed & how to get those data.

(b). Declarative DML: also referred as non-procedural DML Requires the user to specify what data needed without specifying how to get those data.

DML commands- Select, insert into, update, delete

Teacher's Sign

{in order to give permission or grant}

Data Control Language]: DCL statements are used to trol access to the database & the data in it. It is to enforce data security.

CL commands: Grant, Revoke

(to give authority)

ng Privilages: The grant statement is used to grant ility privilages on database object to specific users. ly the grant statement is used by owner of the table or give other users access to data

Grant select/ insert/ delete/ all privilages on table name To username/ Public

g Privilages:

authority) The revoke statement is used to revoke ges previously granted with the grant statement.

c

VOKE select/ update/ Insert/ delete/ all privilages from username/ public

ansaction Control Language]:

CL commands- commit, rollback

[reflect the permanent changes]

- The commit command is transactional command used to save changes invoke by transaction to ase.

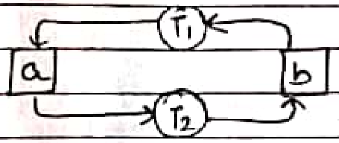
ves all transactions to the database since last it or rollback command.

ntax- commit

(to free the data Object)

ROLLBACK - This command is also transactional command used to undo transaction that have not already been in the database. It can only be used to undo transactions since last commit or rollback command was issued.

Syntax - rollback



Needs to be Rollback.

* Data Models :

is collection of tools for describing data, data relationship, data semantics & consistency constraints.

(I) Object based Logical Model

(II) Record based Logical Model

Object Based Logical Model: These are used in describing data at conceptual & view level. It provide flexible structure capabilities & allow data constraints to be specified explicitly. Models under this-

(I) Entity relationship Model

(II) Object Oriented Model - It is based on collection of objects. An object contains values & also body of code that operate on the object. These bodies of code called methods. Objects that contain same type of values &

...me methods are grouped together into class.
E.g. Class diagram or object/instance diagram.

...ord ... Logical Model: are used in describing data at conceptual & view level. There are 3 most accepted categories of it.

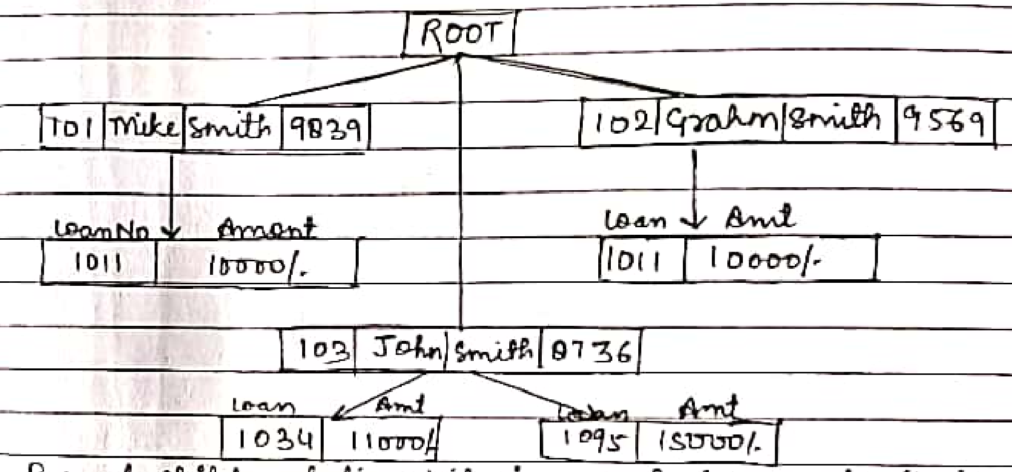
Relational Model
Network Model
Hierarchical Model

Relational Model: It uses collection of tables to represent both data & relationships among those data. Each table has multiple columns k/as attributes. The no. of attributes/columns/fields are known as degree of relation while the no. of rows/records/tuples k/as cardinality of relation.

Advantages:
supports many to many relationship
data independence is achieved as tables can be change without affecting the application.

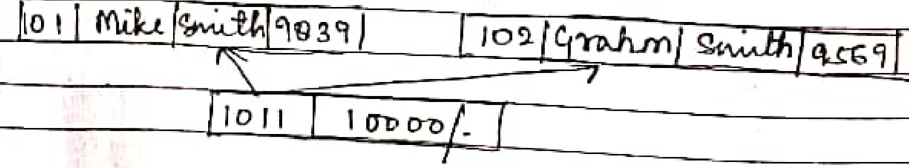
Hierarchical Model: In this data organised in a tree like structure. In this model, data & relationship among data are represented by records & links resp. In A hierarchical database consist of collection of records which are connected to one another through links. A record is collection of field each of which contains only data value

A link is an association b/w two records.
e.g. Suppose ~~Loan~~ no. 1011 is jointly taken by Mike smith & Grahm smith.



Parent-Child relationship is used to create links ~~with~~ b/w records. ~~The parent chi~~. In heirarchical relⁿ is ~~many~~ one to many

Network Model: It permits many to many relⁿ in data. Data in n/w model represented by collection of records and the relationships among data are represented links (pointers). The records in the database are organised as collection of graphs.
e.g.

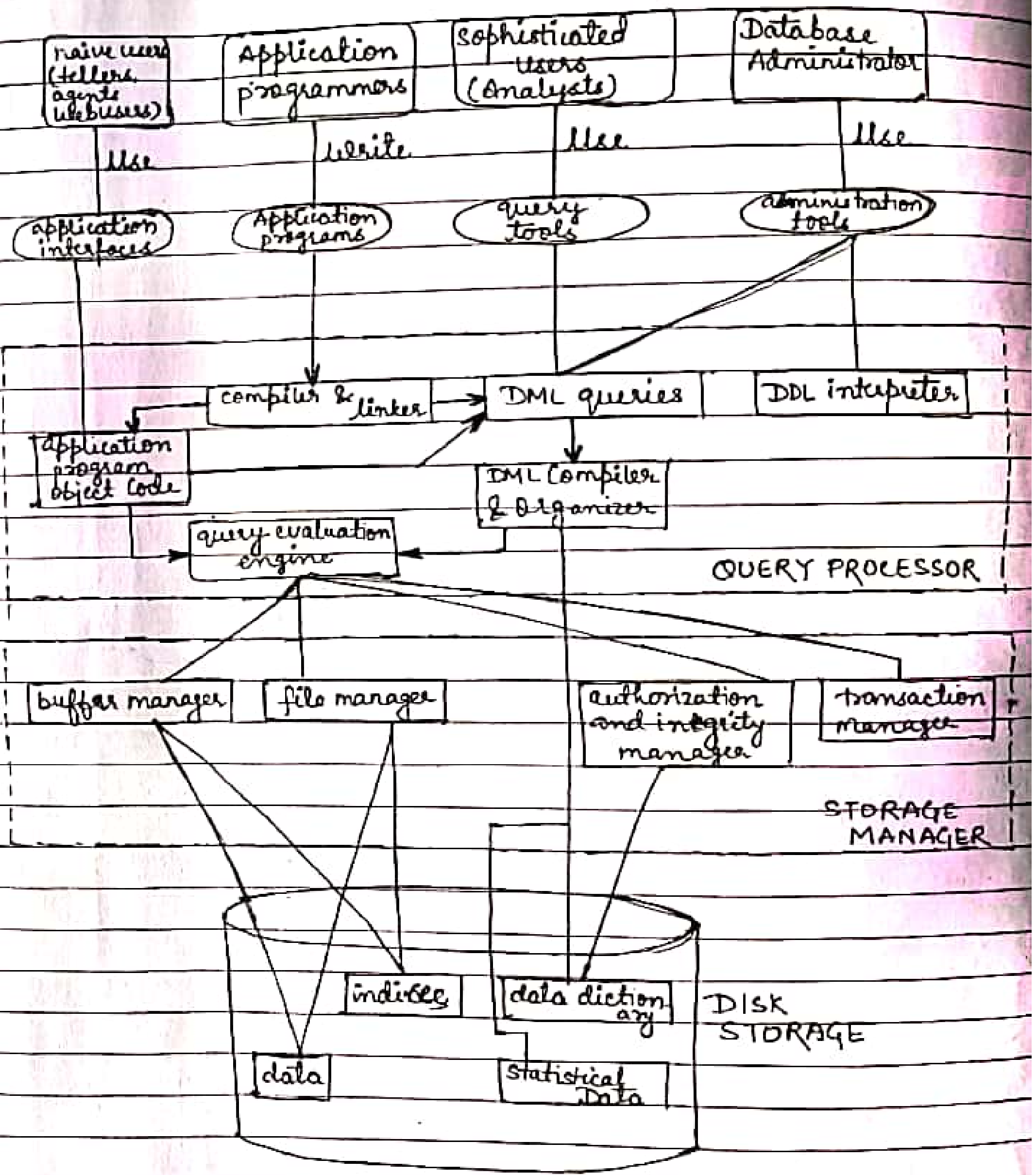


DM

ocedural & Non-Procedural Language: There are
o main types of DML-
) Procedural
) Non-Procedural

n-Procedural: High level or Non-procedural DML can
losed on its own to specify complex database
ration. Many DBMS allows high level DML statement
her to be entered interactively from a display monitor
terminal or to be embedded in general purpose
rogramming language.

ocedural: Or Low level must be embedded in general
urpose programming Lang. This type of DML typically
etreats individual records or object from the database
. processes separately. Therefore it needs to use PL
nstructs such as looping to retrieve & process each
cord from a set of records.



Database Architecture