

Database Management System.

MICI *Q. Define dbms. Discuss Role of DBA

Database Management System

- collection of software or program which helps user in creation and maintenance of a database (set of information).
- software system that helps in the process of defining, constructing and manipulating the database.
- It has become an integral part of the information system of many organizations as it is used to handle a huge amount of data.
- Computer-based Information system is capable of serving many complex tasks in a coordinated manner.
- Such systems handle a large volume of data, multiple users and several applications in a centralized database environment.
- Heart of IS : database management system. bc those systems have to handle a huge amount of data.
- Core module of IS called dbms.
- Examples :
 - Oracle by Oracle corp
 - SQL Server by Microsoft
 - Ingres, DB2 by IBM.

Q. Explain various advantages of DBMS.

- DB has approach has many important characteristics due to which db has become an integral part of the software industry.
- Characteristics of DBMS:
 - 1 - Data integrity
 - 2 - Data security
 - 3 - Data independence
 - 4 - Transaction control - Roll back.
 - 5 - Concurrency control
 - 6 - Data recovery - back up and restore.

1. Data integrity:

- Integrity constraints give a way to make sure that changes in db by authorized users don't result in the loss of data consistency and correctness.
- Db integrity concerned with correctness and completeness of data in db.
- However this objective cannot be guaranteed as one cannot ensure that every entry made is accurate.

2. Data security

- DBMS has a system for security which responsible for protecting db against accidental or intentional loss, destruction or misuse.

- Database Data in db should be only given to authorized users and only them should be allowed to modify the data.
- AU can access the data anytime.

3. Data Independence

- The capacity to change data kept at one place without changing data kept at other location.

4. Transaction Control

- changes made in db can be reverted back with the help of rollback command.
- changes can be saved successfully with commit command.

5. Concurrency Control.

- data can be accessed by multiple users at same time.
- such operations are allowed by sharing some data between users.

6. Data recovery.

- process of restoring db to original (correct) state after db failure.
- main element is recent db backup
- if backup maintained efficiently, recovery is straight forward process.

* Q. Discuss advantages of DBMS over file system

1. Redundancy can be reduced.

- As we are using relational approach for data organization, data is not stored in more than one location.
- Repetition of info can be avoided and save storage space.

2. Inconsistency can be avoided.

- DB ensures that all users access actual or true data present.

3. Data can be shared.

- Multiple users can login at at time into db to access information.
- They can manipulate data in controlled environment.

4. Centralized control of data.

- it may designed for an overall optimal performance for entire organisation.

5. Standards can be enforced.

- Standards (rules and regulations for coding and designing) can be enforced on the db to regulate the access.

- Primary key constraint or foreign key constraint can be enforced which will be helpful to access data.

6. Security restrictions

- limiting access of db user to db server itself
- data access most important aspect of security.

7. Integrity

- only accurate data is stored in db

8. Data Independence

- no user need to know technical aspects of db to access it.
- they are physically as well as logically independent to access db.

* a. Difference btw file processing and dbms.

DBMS

File processing System

- | | |
|--|--|
| - computerized record - keeping system used. | - collection of individual files by application programs |
| - flexible data access | - allow predetermined access to data |
| - multiple users interface | - data isolated |
| - redundancy can be controlled | - redundancy not controlled |
| - unauthorized access is restricted | - unauthorized access is possible. |

* Q. Explain types of users of the db's with suitable example & responsibilities of DBA.

1. Native Users.

- Native users are users who interact with the system using application programs that have been developed previously.
- graphical interface for those users is a kind of form where the user can fill in the field of form.
- given end user can access db via one of the applications or can use an interface provided as an integral part of db's software
- they can read reports generated from db.

2. Application programmers.

- They are responsible for writing application prgms that use the db.
- They are developers or computer prgmr who write prgms
- They develop user interface using any preferred languages.
- Rapid Application Development (RAD) tools are available that enable an application prgmr to construct app without writing code
- Some programming languages combine control structures with db language statements.
Such languages are called fourth-generation languages.

3. Sophisticated users

- They interact with application without writing program by using a database query language
- Query is solved by query processor.
- Online Analytical Processing tools is used to view summaries of data in 7 ways which will help analyst with OLAP.
- With this tool, analysts can use data mining tools, which help them find certain kind of pattern of data.

4. Specialized users

- Creates the actual db and implements technical controls needed to enforce various policy decisions
- They are sophisticated users who develop db app.
- DBA is also responsible for ensuring that the system operates with adequate performance and for providing a variety of other related technical services.

MTC2 * Define data independence.

- It can be defined as the capacity to change one level of schema without changing the schema at the higher level.
- Two types of DI
 - Logical
 - Physical

1- Logical D.I.

- It is the capacity to change the conceptual schema without having any external changes in the external schema.
- Ex: remove a data item and it should not affect the remaining data.

2- Physical D.I.

- It is the capacity to change the internal schema without having any changes to the conceptual schema.
- Separation of the conceptual view from the internal view allows us to provide a logical description of the database without the physical structures.
- Called Physical D.I
- Due to P.D.I., all these changes will not affect the conceptual level of DB.
 - using a new storage device
 - changing the access methods
 - modifying the indexes
 - modifying the file techniques.

* Q. Define DBA.

- DBA is responsible for overall planning of the company's data resources, for the design of data and for day to day operational aspects of the data.
- Also responsible for installation, configuration, upgradation, maintenance and monitoring db.
- Strategic aspect of db administration function:
 - overall planning of corporate data
 - ↳ company wide planning of existing data.
 - ↳ assessment of organisation-wise standards

* Q. Roles of DBA.

1- System Administrator : need to manage software and server.

- to decide on the storage & access methods
- perform data field updates or adding new field

2- DB developer/ programmer.

- write prgm to design db and means for reorganisation of db.
- implement db searching strategies.

3- System analyst.

- analyses the system performance.
- need to take care of system crashes by planning proper recovery procedures.
- specify techniques for monitoring the DBMS

*Q. Write on Responsibilities of DBA.

1. Designing overall Database Schema

- responsible for designing overall db schema
- responsible for deciding on the storage & access methods

2. Selecting and installing db software & hardware

- select the suitable S/W like ORACLE, SQL Server.

3. Designing authorization / Access control.

- decide the user access levels and security checks for access and data manipulation

4. Designing recovery procedures:

- design the system performance recovery procedure
- specify techniques for monitoring db performance

5 Operations Management.

- investigation of error found in the data
- supervision of restart and recovery procedure in the event of a failure
- supervision of reorganization of db
- initiation and control of all periodic dumps of data.

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* Q Explain Overall architecture of DBMS in detail.

- Architecture of DBMS is greatly influenced by the underlying computer system on which the db is running :

1. centralized
2. Client-server
3. Parallel
4. distributed

- DB Users:

Users are differentiated by the way they expect to interact with db.

1. Application programmers:

- computer professional who write app progs.
- choose from many tool to develop user interfaces.
- Rapid app development tools are tools that allow a programmer to construct forms and reports without writing a program.

2. Sophisticated users. Specialized users

- users who write specialized db app that do not fit in the traditional data processing framework.
- Among these app are computer-aided design system, knowledge base and expert systems.

3. Sophisticated users.

- user that interact with the system without writing programs.
- instead they form queries in a db query language
- submit each query to a query processor, whose function is to break down dml statement into instructions that storage manager understands

4. Naive users:

- unsophisticated users who interact with the system by invoking the application programs that have been written.

- Database Administrator:

- coordinates all activities of dbs.
- has a good understanding of the enterprise's information resources and needs
- Duties of DBA refers DBA.

- Database System can be separated into 2 modules: that deals operations of the overall system.

- Components of DBS are:

- 1 - Query processor components
- 2 - Storage management
- 3 - Transaction management,

1. Query Processor:

- It will accept query from user and solves it by accessing db.
- 3 parts of query processor:
 - DDL interpreter
 - DML compiler
 - Query Evaluation engine:

• DDL interpreter:

- it will interpret DDL (Data definition language) statements and fetches the definitions in the data dictionary.

• DML compiler:

- it will translate DML statements in a query language into a low level instruction that the query evaluation engine understands.
- A query can usually be translated into any number of alternative evaluation plans, for same query result DML will select best plan for query optimization.

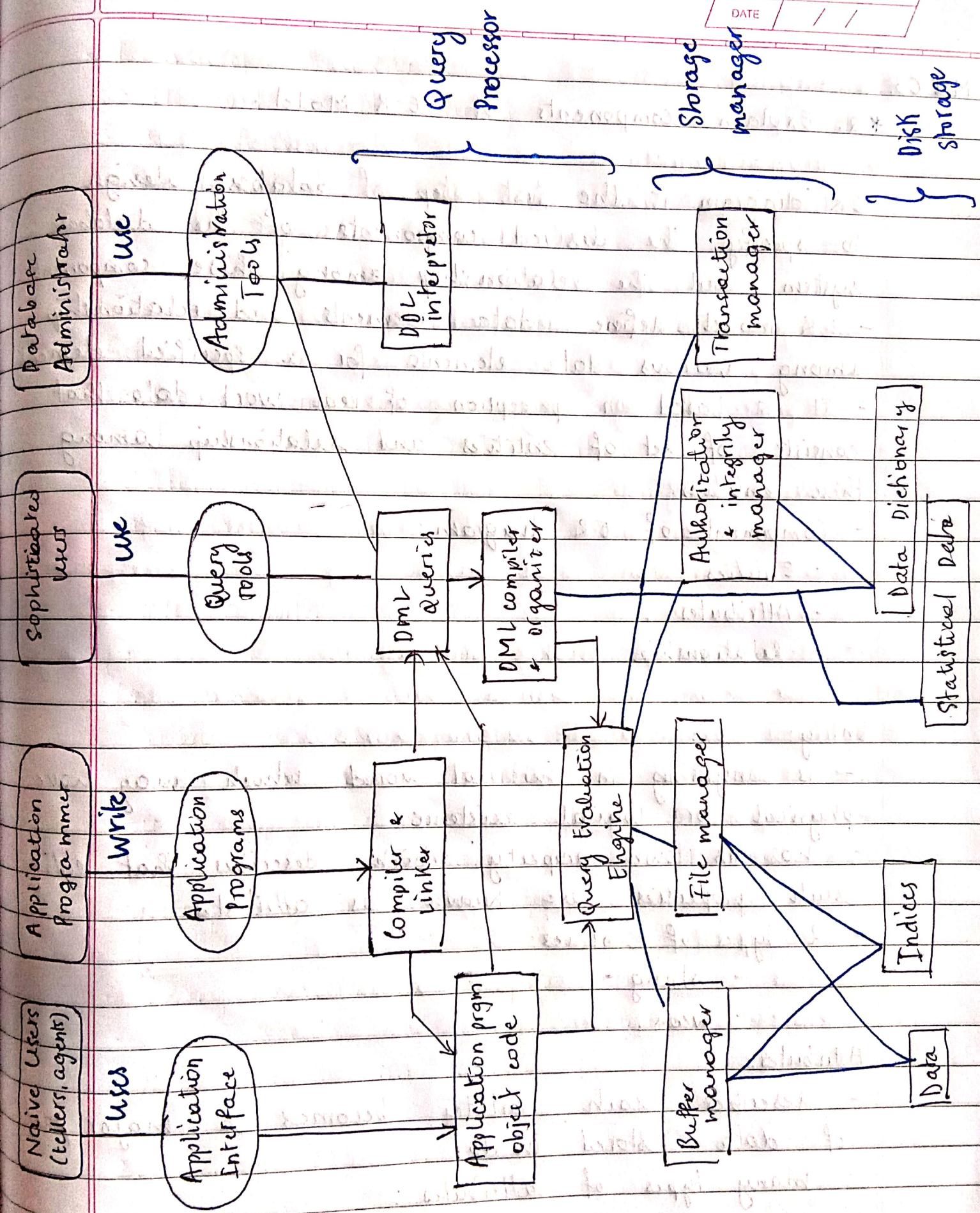
• Query evaluation engine

- will execute low level instructions generated by DML compiler on DBMS.

2. Storage Manager.

- program module which acts like interface b/w data stored in db and app prgms and queries submitted to system.

- Thus, the storage manager is responsible for storing, retrieving, and updating data in db.
- The storage manager translates the various db languages in to low level file system commands.
- Storage manager components include:
 - 1 - Authorization & integrity manager: check for integrity constraints and authority of users to access data.
 - 2 - Transaction manager: ensures that the db remains in a consistent state although there is system failure.
 - 3 - File manager: manages the allocation of space on disk storage and the data structures used to represent information stored on the disk.
 - 4 - Buffer manager: is responsible for retrieving data from disk storage into main memory, is also important part of dbms as it enables the db to handle data sizes that are much larger than the size of the main memory.
- Data structures implemented by storage manager:
 - data files: stored in db itself.
 - data dictionary: stores metadata about structure of db
 - indices: provide fast access to data items



Components of OBMS