

Q.1) what are main types of actions involve database ? briefly discuss each .

Ans:

The DBMS is a software system that explains the four types of actions, which are defining, constructing, manipulating and sharing of databases among various users & applications.

Following are the four main types of actions involve database :-

i) Defining a database :- It includes the datatypes, structures, constraints of data have to store in databases. the database descriptive information is also stored by DBMS in the form of a database catalog or dictionary it is called as meta-data .

for defining or creating database or table. following command is used.

Syntax :- CREATE table Table-Name (colname1 datatype , colname2 datatype);

E.g:- CREATE table employee ("emp-name",
varchar2(20)", "emp-ID varchar2(10)") ;

2) Constructing the database :- It is the process of data storing on some storage medium that is maintained by DBMS.

In this type, database get created with the help of create table command, & drop or delete for removing table from database.

3) Manipulating a database :- It includes functions such as retrieve the data from database.

by using queries, updating the database to reflect changes in the system, & generate reports from the data.

In this type the data get manipulate by following SQL queries or we can say commands as :

1) Insert command :-

Syntax :- Insert into tablename values ("columndata (size)", "columndata (size)".....);

Eg:- insert into emp values ("emp-id E01", "Somay".....);

2) Update command :-

Syntax : update tablename set (expression) where (expression 2);

E.g:- Update emp set emp-name = "Nagesh" where emp-id = "E01";

3) Delete Command:-

Syntax :- delete tablename;

Syntax :- drop tablename;

E.g :- delete emp;

E.g :- delete emp;

The delete command is delete complete table & data with structure. but the drop command can only delete or remove data & structure of table will remain in database.

4) Sharing database :- It allows multiple users & programs to access the database simultaneously.

For sharing database this privilege belongs to only super user, or admin. Admin will assign some constraints on database & then share the database.

The admin controls all the users which are comes under admin. & he have the two types of constraints which are help to share database i.e. Read only & read-write.

When the database file open by user in the read-only mode then user cannot be manipulate data such as deletion, updation & alteration etc.

When the database file open by user in the write mode then user can manipulate data with the help of DML statements (insert, update, delete, alter) etc.

Q.3) Explain Query processing stages.

Ans.

Query processing is the activity performed in extracting data from the database. In query processing, it takes various steps for fetching the data from the database. The steps involved are:

1) Parsing and translation :- When a user executes any query, for generating the internal form of the query, the parser in the system checks the syntax of the query, verifies the name of the relation in database, the tuple & finally the required attribute value. The parser creates a tree of the query, known as 'parse-tree'. Further translate it into form of relational algebra. With this, it evenly replaces all the use of the views when used in the query.

2) Evaluation :- For this, with addition to the relational algebra translation, it is required to annotate the translated relational algebra expression with the instructions used for specifying & evaluating each operation.

* Query evaluation plan :-

- 1) In order to fully evaluate a query, the system needs to construct a query evaluation plan.
- 2) The annotations in the evaluation plan may refer to the algorithms to be used the particular index

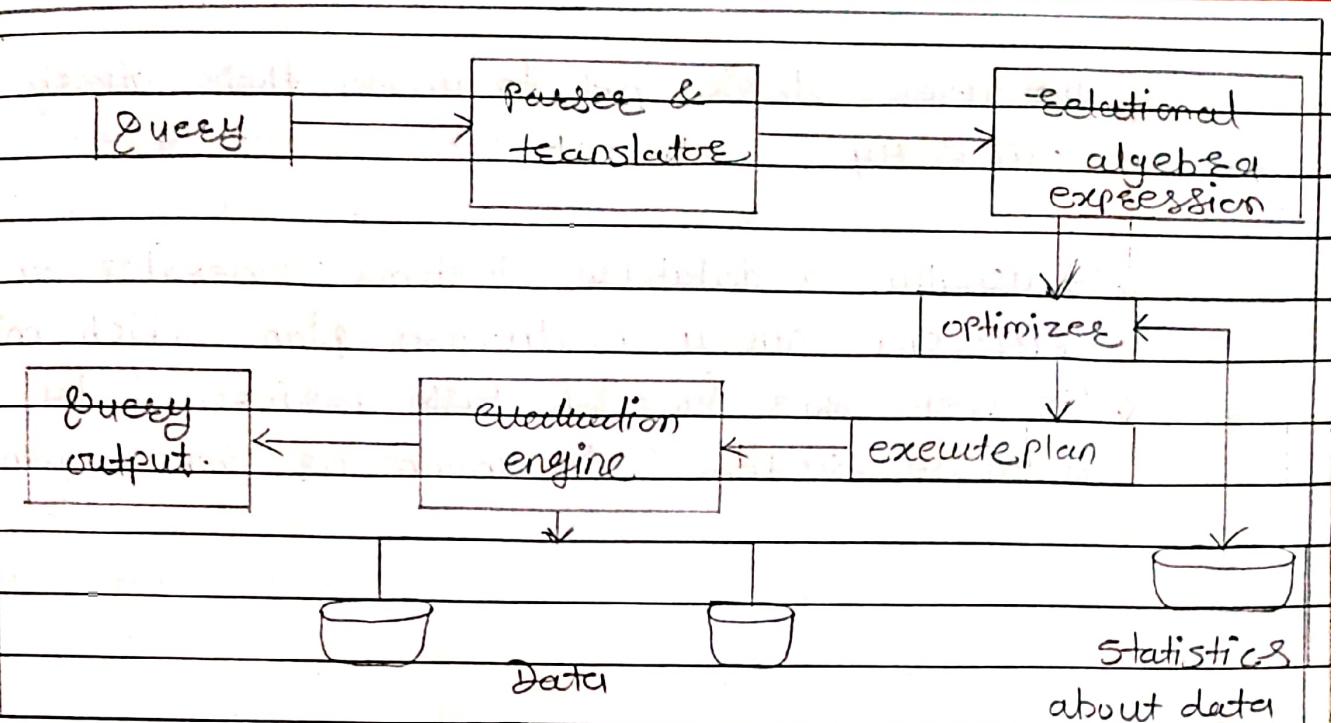


fig: steps in query processing.

or the specific operations.

- 3) Such relational algebra with annotations is referred to as Evaluation primitives. The evaluation of a query. The query evaluation plan is also referred to as query execution plan.
- 4) A query execution engine is responsible for generating the output of the given query. It takes the query execution plan. executes it & finally makes the output for the user query.

3) Optimization :-

- 1) The cost of query evaluation can vary for different types of queries. although the system is responsible for constructing evaluation plan,

the user does not write their query efficiently.

- 2) usually, a database system generates an efficient query evaluation plan, which minimizes its cost. this type of task performed by database system & is known as query optimization.

Q.3) Define following terms: data, database, DBMS, database system, user, view, DBA, end-user, meta-data & transaction-processing.

Ans.

1) Data:- In computing, the data is information that has been translated into the form that is efficient for movement or processing. Raw data is a term used to describe data in its most basic digital form.

In the purest of knowledge, data is collection of discrete values that convey information, describing quantity, quality, fact, statistics, other basic units of meaning or simply sequences of symbols that may be further interpreted.

2) Database:- A database is an organized collection of structured information, or data, typically stored electronically in a computer system. A database is usually controlled by a database management system. Together, the data & DBMS, along with the applications that are associated with them, are referred as database system.

Data within the most common types of database in operation today is typically modeled in rows & columns in a series of tables to make processing & data querying efficient. The data can be easily accessed, modified, updated, controlled & organized.

3) DBMS :- DBMS is a abbreviation of Database Management System. DBMS is a collection of interrelated data & a set of programs to access & manipulate those data.

features of data in database like:-

- 1) shared
- 2) persistence
- 3) validity
- 4) security
- 5) consistency
- 6) Non-redundant
- 7) independence.

DBMS provides storage, retrieval, updation, deletion of data in an organized manner.

4) Database system :- Database system or DBMS is a software that caters to the collection of electronic & digital records to extract useful information & store that information is known as database systems. The purpose of a standard database is to stored & retrieve data.

In computing, a database is an organized collection of data stored & accessed electronically. Small databases can be stored on a file system, while large databases are hosted on computer clusters or cloud storage.

5) User :- A user is a real world entity and a person who utilizes a computer or network services. A user often has a user account & is identified to the system by username. Other terms for username include login name, screenname, account name, nickname & handle which is derived from the identical citizen & handles them.

A user's account allows a user to authenticate to a system & potentially do receive authorization to access resources provided by or connected to that system.

- 6) View :- In database, a view is a result set of stored query on the data, which the database users can query just as they would in a persistent database collection object.

View is a subset of data obtained or contained in table. Views can join & simplify multiple tables into a single virtual table. View can hide the complexity of table data. Views occupy very less space for storage.

Syntax :- Create VIEW view-name AS SELECT column1, column2 FROM table-name WHERE condition ;

E.g :- CREATE VIEW empinfo AS SELECT emp-id, emp-name, emp-address FROM emp WHERE Country = "INDIA" ;

- 7) DBA :- DBA is a abbreviation for Database administrator (DBA). is an individual or person responsible for controlling, maintaining, co-ordinating, & operating database management system.

* Importance of DBA :- DBA manages & controls three levels of database internal, conceptual, external levels of database management system architecture & in discussion with the comprehensive

user community, gives a definitions of the world view of database. it then provides an external view of different users & applications.

- 8) End-user :- An end-user is a person for whom a product development team designs their product. the term "end-user" is used in the product development process in software engineering, information technology & other technology - Selected fields.

In computer sector, an end-user is a person who ultimately uses or is intended the product - the end-user stands in contrast to user who support or maintain the product.

- 9) Meta-data :- Meta data is "data that provides information about other data". metadata is not strictly bounded to one of these categories, as it can describe a piece of paper data in many other ways.

E.g:- Index page of book, advertisement etc.

Until the Data will exist till meta-data will exist. means it will remain forever. meta-data can help users find relevant information.

10) Transaction Processing :- In Computer science, transaction processing is information processing that is divided into individual, indivisible operations called transactions. Each transaction must succeed or fail as a complete unit.

Transaction is set of logically related operation. It contains a group of tasks. A transaction is an action or series of actions. It performed by single user to perform operations for accessing the contents of database.

Q.4) what are the responsibilities of DBA & database designer?

Ans.

1) DBA :- DBA is a short form for Database Administrator. DBA is a challenging role that requires focus, logic & an enthusiastic personality that can cope under pressure, the job necessitates a variety of skills. DBA must work within an organization to monitor, repair & develop database.

* Responsibilities of DBA :-

- 1) Software installation & maintenance :- A DBA is frequently involved in the initial installation & configuration of new Oracle, SQL Server, or other databases.
- 2) Managing Data integrity :- DBA's primarily handle the overall integrity of company's database. They make sure that the data integrity is carefully managed because it provides security data from unauthorized user.
- 3) Monitoring performance :- Only implementing a database is not the task of DBA. Once the database is created, they are required to monitor database for performance issues.

2) Database designer :- The database designer role defines the tables, indexes, views, constraints, triggers, stored procedures, tablespaces, storage parameters, & other database specific constructs needed to stage, retrieve, & delete, update persistent object.

* Responsibilities of database designer:-

- 1) Understand the organisation's data to skillfully carry out the company's database design projects.
- 2) Install and Configure relational database management system on the company's servers
- 3) Design database schemas & create databases for varied projects of the company.
- 4) Assist application development teams to easily connect to the database.
- 5) Handle the creation of new users, define roles & privileges & grant access to them.

Q.5) what are ACID properties? what is deadlock?

Ans.

1) ACID properties :- DBMS is management of data that should remain integrated when any changes are done in it. It is because if the integrity of data is affected, whole data will get disturbed & corrupted.

* The expansion of ACID term as :-

ACID Properties

Atomicity	Consistency	Isolation	Durability
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1) Atomicity :- The term atomicity defines that the data remains atomic. It means if any operation is performed on the data, either it should be performed or executed completely or should not be executed at all.

2) Consistency :- The word consistency means that the value should remain preserved always. In DBMS, the integrity of data should be maintained, which means if a change in database is made, it should remain preserved always.

3) Isolation :- The term isolation means separation. In DBMS isolations is the property of database where no data should affect the other one & may occur concurrently. In short, the operations on one database should begin when the operation on first database gets completed.

4) Durability :- Durability ensures the permanency of something. In DBMS, the term durability ensures that the data after the successful execution of operation become permanent in the database. The COMMIT command is used to maintain durability.

2) Deadlock :- A deadlock is a condition where two or more transactions are waiting indefinitely for one another to give up locks. Deadlock is said to be one of most feared complications in DBMS as no task ever gets finished & is in waiting state forever.

When database is stuck in a deadlock state, then it is better to avoid the database rather than shooting the database.

Deadlock prevention method is suitable for a large database. If the resources are allocated in such a way that deadlock never occurs, then deadlock can be prevent.

The database management system analyze the operations of the transactions whether they can create a deadlock situation or not. If they do, then the DBMS never allowed that transaction to be executed.

Q.6) Explain locking properties in detail?

Ans.

Locking protocols are used in database management system as a means of concurrency control. Multiple transaction may request a lock on a data item simultaneously made by transactions. Such a mechanism is called as Lock manager.

In this type of protocol, any transaction cannot read or write data until it acquires appropriate lock on it. There are two types of locks.

- 1) Shared lock :- It is also known as Read-only lock. In shared lock, the data item can only be read by the transaction. It can be shared b/w transactions because when the transaction holds a lock, then it can not update the data on the data item.
- 2) Exclusive lock :- In the exclusive lock, the data item can be both read as well as written by the transaction. This lock is exclusive & in this lock, multiple transactions do not modify the same data simultaneously.

There are four types of lock protocols available in DBMS as :

- 1) Simplistic lock :- it is the simplest way of locking the data while transactions. Simplistic lock-based protocols allow all the transactions to get the lock on the data before insert or delete or update. It will unlock data item after completing transaction.
- 2) Pre-claiming lock :- this lock evaluates the transaction to list all the data items on which they need locks. Before initiating an execution of the transaction, it request DBMS for all the lock on all those data items. If all locks are granted then this protocol allows the transaction to begin. When the transaction is completed then it release all the lock.
- 3) Two-phase-lock :- this lock divides the execution phase of transactions into three parts. In the first part, when execution of the transaction starts, it seeks permissions for the lock it requires. In the second part, the transaction acquires all the locks. The third part is started as soon as transaction released its first lock. In the third phase, the transaction can not demand any new locks. It only releases acquired locks.
- 4) Strict-two phase lock :- The first phase of this lock is similar to 2PL. In the first phase, after acquiring all locks the transaction continues to execute normally. The only difference b/w 2PL & strict 2PL is that 2PL-strict doesn't release a lock after using it.

Q.7) Define the terms:

1) Data Model :- Data models describes how a database's logical structure is represented. In a database management system, data models are essential for introducing abstraction. Data models specifies how data is linked to one another, as well as how it is handled & stored within the system.

* Types of data models in DBMS :-

1) Hierarchical model :- This concept uses a hierarchical tree structure to organize the data. The hierarchy begins at the root, which contains root data, & then grows into a tree as child are added to the parent node.

2) Network model :- The main difference b/w this model and hierarchical model is that any record can have several parents in the network model. It uses graph instead of hierarchical tree.

3) Entity-relationship model :- The real-world problem is depicted in visual form in this model to make it easier for stakeholders to comprehend. The ER diagram also makes it very simple for developers to comprehend the system.

- 4) Relational model :- The data in this model is kept in the form of table that is two-dimensional all of the data is kept in the form of rows & columns . tables are foundation of relational paradigm model.
- 5) Object-oriented model :- Both data & relationship are contained in single structure that called an object-oriented model . we can now store audio , video , picture & other type of data in databases , which was previously impossible with relational approach .
- 6) Object-Relational data model :- It is hybrid of relational & object oriented data model . this model was developed to bridge the gap b/w the object-oriented & relational models .
- 7) Flat data model :- its a straightforward model in which the DB is depicted as a table with rows & columns .
- 8) Semi-structured data model :- The relational model has evolved into the semi-structured model . in this model , we can't tell the difference between data & schema .
- 9) Associative data model :- it is model in which data is separated into two sections . everything that has its own existence is referred to as an entity . & the relation b/w entity is known as association .

~~(Q.7) 2)~~ Database Schema :- A database schema defines how data is organized within a relational database. This is inclusive of logical constraint such as, table names, fields, datatypes, & the relationship b/w these entities. Schemas commonly use visual representations to communicate the architecture of the database becoming the foundation for an organization's data management discipline.

A database schema is the skeleton structure that represents the logical view of the entire database. It defines how the data is organized & how the relation among them are associated.

A database schema defines its entities & relationship among them. It contains a descriptive detail of the database, which can be depicted by means of schema diagrams.

A database schema can be divided broadly into two categories:

1) physical database schema :- This schema pertaining to the actual storage of data & its form of storage like files, indices etc. It defines how data stored in secondary storage.

2) logical database schema :- This schema defines all the logical constraints that need to be applied on the data stored. It defines tables, views, constraints.

3) Data independence :- Data independence is the ability to modify the schema without affecting the programs and the application to be written. data is separated from the programs, so that the changes made to the data will not affect program execution & the application.

There are two levels of data independence based on the three levels of abstraction. there are as follows :-

1) physical data independence :- physical data independence means changing the physical level without affecting the logical level or conceptual level. using we can change storage device of the database without affecting logical data.

2) Logical data independence :- (logical view) of data is user view of the data. in the form that can be accessed by end-users.

The data independence provides the database in simple structure. it is based on application domain entities to provide functional requirement. it provides abstractions of system functional requirement.

4) DDL, DML :-

I) DDL :- DDL stands for Data Definition language. It is a type of SQL query. This type consists of defining commands of the DBMS or we can say SQL.

DDL in DBMS is used to create or modify the database objects like tables, views etc. These commands deal with defining a schema & adding a table description to it.

DDL in DBMS is a language that allows users to define the database components & their relationship with each other. These commands work with structure of tables like creating a table, deleting table, & altering table.

II) Create command :- This is DDL command that is used to create tables or database. If there are any integrity constraints or key constraints of the table like primary, foreign key, unique key, Not null etc.

E.g:- create table student (
Roll-no int primary key,
Name varchar(20),
Age int,
Address varchar(30)
);

2) ALTER Command :- Alter is DDL command used to change the structure of existing database table. Using this command we perform operations like adding a new column, removing any column, adding or removing integrity constraints or changing the datatype of the existing column on the existing table.

Syntax :- ALTER TABLE table-name ADD Column-name
Column-definition ;

E.g :- ALTER TABLE Student ADD Date-of-birth -
DATE ;

3) Truncate command :- This is DDL command used to delete all records from the table while keeping its structure intact.

Syntax :- TRUNCATE TABLE table-name ;

Eg :- Truncate table Student ;

4) Drop command :- This command is used for deleting the existing table completely from the database. This command deletes table records along with their structure.

Syntax :- DROP TABLE table-name ;

E.g :- DROP TABLE Student ;

2) DML :- The structure query language Commands deals with the manipulation of data present in the database that belongs to the DML. DML Stands for Data Manipulation language.

1) Insert :- Insert command is used to insert data into table.

Syntax :- `insert into tb-name (column list)
values (column values);`

E.g : `insert into emp (emp-id, emp-name) values
(001, "bharu");`

2) Select :- Select command is used to retrieve data from database.

Syntax :- `Select * from tablename;`

E.g : `Select * from emp;`

3) Delete :- Delete command is used to delete records from a database table.

Syntax :- `Delete from tablename where
expression;`

E.g : `Delete from emp where emp-id = 001;`

4) Update :- Update command is used to update existing data within a table.

Syntax :- `update tablename set columnname = value
where condition;`

E.g :- `update emp set Emp-name = Ram
where Emp-id = 001;`

Q.8) what is the difference b/w two-tier & three-tier client/server architecture.

Ans-

In two-tier architecture logic is either buried inside the user interface or the client or within database on the server or both.

In three-tier architecture the application logic or process lives in the middle-tier, it is separated from the data & the user-interface.

Two-Tier	Three-Tier
1) It is client-server architecture.	It is web-based application.
2) In two-tier, the application logic is either buried inside the user interface on the client or within the database on the server.	In three-tier, the application logic or process resides in the middle-tier. it is separated from data & the user interface.
3) Two-tier architecture consists of two layers: client tier & server tier.	three-tier architecture consist of three layers: client layer, Business layer, data-layer.
4) It is easy to build & maintain.	It is complex to build and maintain.

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|---|--|
| 5) Two-tier architecture
- sun flower. | three-tier architecture
- runs faster. |
| 6) It is less secured as client can communicate with database directly. | It is secured as client not allowed to communicate with database directly. |
| 7) It results in performance loss whenever the users increase rapidly. | It results in performance loss whenever the system is run on internet but gives more performance than two-tier architecture. |
| 8) E.g:- contact management system created using MS-Access or Railway Reservation system etc. | Designing registration form which contains textbox, labels, buttons or large website on internet etc. |

Q.9) Discuss insertion, deletion, modification anomalies why are they considered bad? explain with example.

Ans.

Anomaly means inconsistency in the pattern from the normal form. In database management system, anomaly means the inconsistency occurred in relational table during operations performed on relational database.

There can be three types of an anomaly in database.

- I) Insertion :- If there is a new row inserted in the table & it creates inconsistency in the table then it is called insertion anomaly. For e.g. if in the below table, we create new row of worker, & if it is not allocated by to any department then we cannot insert it in table so, it will create an insertion anomaly.

worker-id	worker-name	worker-dept	worker-address
65	Ramesh	ECT001	Jaipur
65	Ramesh	ECT002	Jaipur
73	Amit	ECT002	Delhi
76	Nikas	ECT501	Pune
76	Nikas	ECT502	Pune
79	Rajesh	ECT669	Mumbai

- 2) updation / update :- when we update some row in the table, & if it leads to the inconsistency of the table then this anomaly occurs. This type of anomaly is known as an updation anomaly. In the above table, if we want to update the address of Ramesh then we will have update all rows where Ramesh is present.
- 3) Deletion :- If we delete some rows from table & if any other information or data which is required is also deleted from the database, this called deletion anomaly. In the above table, if we want to delete the department number ECT669 then the details of Rajesh will also be deleted since Rajesh's details are dependent on the row of ECT669.

Q.10) why should NULL in relation be avoided as much as possible? discuss the problem of spurious tuples & how we can prevent it.

Ans:

Although Null values represent "nothing" or "no" value. they are treated as value by database. As such, they take up space on the hard drive. So if you think that you are saving hard drive space by employing NULL values, you would be mistaken.

Another deficit affects your database stored procedures. While most database provide functions to detect NULL values, special care must be taken to distinguish NULL's from other values.

In the DBMS, data is represented in a tabular form through attributes & tuples. i.e. columns & rows there are various operations that we can perform on tables.

* ~~Spurious tuples~~: Spurious tuples are those rows in a table, which occurs as a result of joining 2 tables in wrong manner. They are extra tuples which might be required.

If the relation is denoted by R, & its decomposed relation are denoted by R1, R2, R3 ... Rn then, condition for not getting any spurious tuples is denoted by, where as condition for getting spurious tuples is denoted by,

Example :-

Example to check if given relation contains spurious tuples.

Let R be Relation, & R_1, R_2 be relations which we get after decomposing R .

After performing join operation of relation R_1 & R_2 , we get back original relation R .

It means that R_1 & R_2 are disjoint relations. If they are not disjoint then there will be some common tuples in both relations. So, if we perform join operation on them then it will give us spurious tuples.

Q.1) what is the use of Rollback Statement & how manage it while data recovery.

Ans.

A transaction is nothing but a logical unit of work that made changes inside the database. When a transaction execution is completed then we have two options either to make changes to the database using the Commit Command or rollback to restore the previous values of the database using the Rollback Command.

Syntax : Rollback;

E.g:- For use rollback we need to manipulate any entity of table as :

E.g:- update emp set fname = "John" where id = 101;

After executing this update statement if user doesn't want to update that record then it will use Rollback Statement.

The data recovery is method of restoring database to its correct state in the event of a failure at the time of the transaction or after the end of process. The storage of data usually includes five types of media, with an increasing account of reliability.

Due to hardware or software errors the system crashes, which ultimately resulting in loss of main memory.

If the transaction crashes, then the recovery manager may undo transaction.

Deadlock: A situation where two or more processes have been waiting for each other to release resources.

Condition that's responsible for deadlock is:

1. Mutual Exclusion

2. Hold and Wait Condition

3. No Preemption

4. Circular Wait Condition

Q.12) How to manage user by assigning different privileges?

Ans.

Confidentiality, integrity & availability are the stamps of database security, authorized is the allowance to the user or process to access the set of objects, the types of access granted can be any like read-only, read, & write. privilege means different DML operations which can be performed by the user on data like Insert, update & delete, Select etc.

There are two methods by which access control is performed is done by using the following.

i) Privileges :- The authority or permission to access a named object in advised manner, for e.g. permission to access a table. privileges can allow permitive a particular user to connect to database. in other words privileges are the allowance to database by database object. In the privileges there are five subtypes as follows:

i) Database privileges:- A privilege is permission to execute one particular type of SQL Statement or access a second person's object.

2) System privilege :- A system privilege is the right to perform an activity on a specific type of object.

3) Object privilege :- An object privilege is a rule to perform specific action on particular table, function or package.

2) Role :- A role is mechanism that can be used to allow authorization. A person or a group of people can be allowed a role or group role.

1) properties :-

1) Reduced privilege administration :- The user can grant the privilege for a group of users who are related instead of granting the same set of privileges to the user explicitly.

2) Dynamic privilege management :- If the privilege of the group changes then, only the right of role needs to be changed.

3) Application specific security :- The user can also protect the use of role by using password. Application can be created allow a role when entering the correct & best password.