Database Administrator (DBA)

- One of the reasons of having a DBMS is to have control of both <u>data</u> and <u>programs accessing that data.</u>

- The person having such control over the system is called the DBA, who administers the three levels of database and defines the conceptual level of the database.

The Major responsibilities of a DBA are as follows:

(a) **Schema Definition** – Creation of the original database schema is accomplished by <u>writing set of definitions</u> which are translated by the DDL compilers to a set of tables that are permanently stored in data dictionary.

(b) **Storage structure and access method definition** – accomplished by writing a set of definitions which are translated by the data storage and DDL compilers.

(c) **Schema and Physical organization modification**

(d) **Granting of authorization for data access** – allows the granting of different types of authorization for data access to various users of the database.

(e) **Integrity constraint specification** – The DBA specifies the constraints, which are kept in a special system structure called the data dictionary that is consulted by the database manager prior to any data manipulation.

Data file indices and Data Dictionary

- The data are stored in the data files and the indices are stored in the index files which provide fast access to the data items.

- A Data Dictionary stores information about the structure of the database and information concerning the external, conceptual and internal levels of the database.

- An ideal data dictionary should include everything a DBA wants to know about the database.

    o External, Conceptual and Internal database description

    o Description of entities (record types), attributes (fields) as well as cross references, origin and the meaning of data elements.

    o Authorization and security codes

    o Statistics about database and its usage including number of records etc.

Data Models

The basic structures that exist in a database system that defines how data is organized in a database are called database models.

A database model defines:

- The logical data structure
- Data relationships
- Data consistency constraints

There are three types of Basic Data Models

(1) Object – Oriented Model

(2) Record Based Logical Model

(3) Hierarchical Data Representation Model

1. Object Oriented Model

This model use objects as key data representation components.

Examples:

  (a) <u>Entity – Relationship Model</u>: It is a collection of real world objects called <u>Entities</u>, and their relationships. Usually represented in graphical form using E-R diagram.

  (b) <u>Object – Oriented Model</u>: Defines the database as a collection of objects that contains both <u>data members/values</u> and <u>the operations</u> that are allowed on the data.
  The inter-relationships and constraints are implemented through objects, links and message passing mechanism.

2. Record Based Logical Model

This model use records as the key data representation model.

Examples:

  (a) <u>Relational Model</u>: It represents <u>data as well as relationship</u> among data in the <u>form of tables</u>. Constraints are stored in a meta-data table. This is

the <u>most widely used</u> and <u>simple</u> data base model, based on a proven mathematical theory.

(b) <u>Network Model:</u> In this model, data is represented as <u>records and relationships as links</u>. It is a good model as far as conceptual framework is concerned, but now a days, not used in database models.

3. Hierarchical Data Representation Model:

It defines data and relationships through hierarchy of data values. Now it is not used in commercial DBMS products.

Structured Query Language (SQL)

SQL is a standard query language, commonly used with relational databases for <u>data definition</u> and <u>manipulation</u>.

ANSI has designed the first standard version of SQL in 1986, called SQL-86 or SQL-1.

This was revised and enhanced later and SQL-92 or SQL-2 was released. A newer version of SQL IS SQL-3, also called SQL-99.

Some important features of SQL

- It is non-procedural language (It just specifies what is to be done rather than how it is to be done).

- It is English like language.

- It can process a single record or a group of records at a time.

- It is different from 3rd generation language.

- SQL is a data sub-language consisting of three built-in languages – DDL, DML and DCL.

- It insulates the user from the underlying structure and algorithm.

- It has facilities for defining database views, security, integrity constraints, transaction control etc.

SQL *Plus is a superset of SQL which is used in Oracle.

SQL	SQL *Plus
1. SQL is a language	SQL *Plus is an environment
2. Based on ANSI standard SQL	Oracle proprietary interface for executing SQL statements.
3. Cannot be abbreviated	Can be abbreviated
4. Requires a termination character	Requires no termination character

Data Definition Language (DDL)

- DDL defines a set of commands used in the <u>creation and modification</u> of schema objects such as tables, indices, views etc.

- These commands can <u>Create</u>, <u>Alter</u> and <u>Drop</u> the objects.

- These commands are related to the <u>management</u> and <u>administration</u> of the database.

- Before and after each DDL statements, the current transactions are implicitly committed, i.e. the changes made by these commands are permanently stored in the database.

CREATE TABLE Command

SYNTAX

CREATE TABLE <Table name>

(

   col_name1 data_type (Col width) [Constraints],

   col_name2 data_type (Col width) [Constraints],

);

Column Constraints are: NOT NULL, UNIQUE, PRIMARY KEY, CHECK, DEFAULT, REFERENCES.

Example 1:

```
CREATE TABLE product
(
   pno       number   (4)   PRIMARY KEY,
   pname  char       (20) NOT NULL,
   qoh      number   (5)   DEFAULT (100),
   class   char       (1)   NOT NULL,
   rate     number   (8,2) NOT NULL,
   CHECK ((class='A' AND rate<1000) OR
              (class='B' AND rate<4500) OR
              (class='C' AND rate>=4500))
);
```

- The **PRIMARY KEY** constraint ensures that product number (pno) is <u>not null</u> and <u>unique</u>.
- The **CHECK** constraint co-relates two different attribute values.

Example 2

```
CREATE TABLE prodtrans
(
        pno        number  (4),
        ptype      char    (1) CHECK(ptype in ('I','R','S')),
        qty        number  (5)

FOREIGN KEY pno REFERENCES product (pno) ON DELETE
CASCADE);
```

- Note that referential constraint on Foreign Key pno in prodtrans table to product table.

- Any product record if deleted from the product table will trigger deletion of all the related records (ON DELETE CASCADE) in the prodtrans table.

ALTER TABLE command

This command is used for modification of existing structure of the table in the following situation:

- When a new column is added to the table structure.

- When an existing col definition has to be changed i.e. changing the width of the data type or the data type itself.

- When integrity constrains have to be included or dropped.

- When a constraint has to be enabled or disabled.

Syntax:

- ALTER TABLE <table name> ADD (<col name> <data type>....);

- ALTER TABLE <table name> MODIFY (<col name> <data type>....);

- ALTER TABLE <table name> ADD CONSTRAINTS <constraint name> <constraint type> (field name);

- ALTER TABLE <table name> DROP <constraint name> (field name);

- ALTER TABLE <table name> ENABLE/DISABLE <constraint name>

Example:

ALTER TABLE emp MODIFY (empno NUMBER (7));

DROP TABLE command

When an existing object is not required for further use, it is always better to eliminate it from the database.

To delete the existing object from the database, the following command is used

Syntax:

DROP TABLE <table name>

Example:

DROP TABLE emp;