



Data Base Management System(DBMS)

DATA

- ▶ It can be defined as a set of isolated and unrelated raw facts with an implicit meaning. Data can be anything such as ,name of a person, a number ,images etc.

“

INFORMATION

WHEN THE DATA IS PROCESSED AND
CONVERTED INTO A MEANINGFUL AND USEFUL
FORM IT IS KNOWN AS **INFORMATION.**

”

DBMS

- ▶ DBMS is an integrated set of programs used to create and maintain a database.
- ▶ Provide a convenient and effective method of defining , storing, retrieving and manipulating the data contained in the database.
- ▶ The database and DBMS software are collectively known as **database system**.



- APPLICATIONS

Airlines & railways.
Banking
Education
Telecommunication
Credit card transactions.
E-commerce
Finance
Sales



ADVANTAGE OF DATABASE SYSTEM.

CONTROLLED DATA REDUNDANCY.

ENFORCING DATA INTEGRITY.

DATA SHARING

EASE OF APPLICATION DEVELOPMENT.

DATA SECURITY.

MULTIPLE USER INTERFACE.

BACKUP AND RECOVERY.

PROGRAM DATA INDEPENDENCE.

DATA ABSTRACTION.

SUPPORT MULTIPLE VIEWS OF THE DATA.

Database Users

- ▶ Database users are those who interact with the database in order to query and update the database , and generates reports.

1:Naïve Users -By invoking some already written application programs.

2.Sophisticated Users: -The users such as business analyst,scientist, etc.Have to know most of the DBMS facilities to fulfill their complex requirements.

3.Specialized Users :

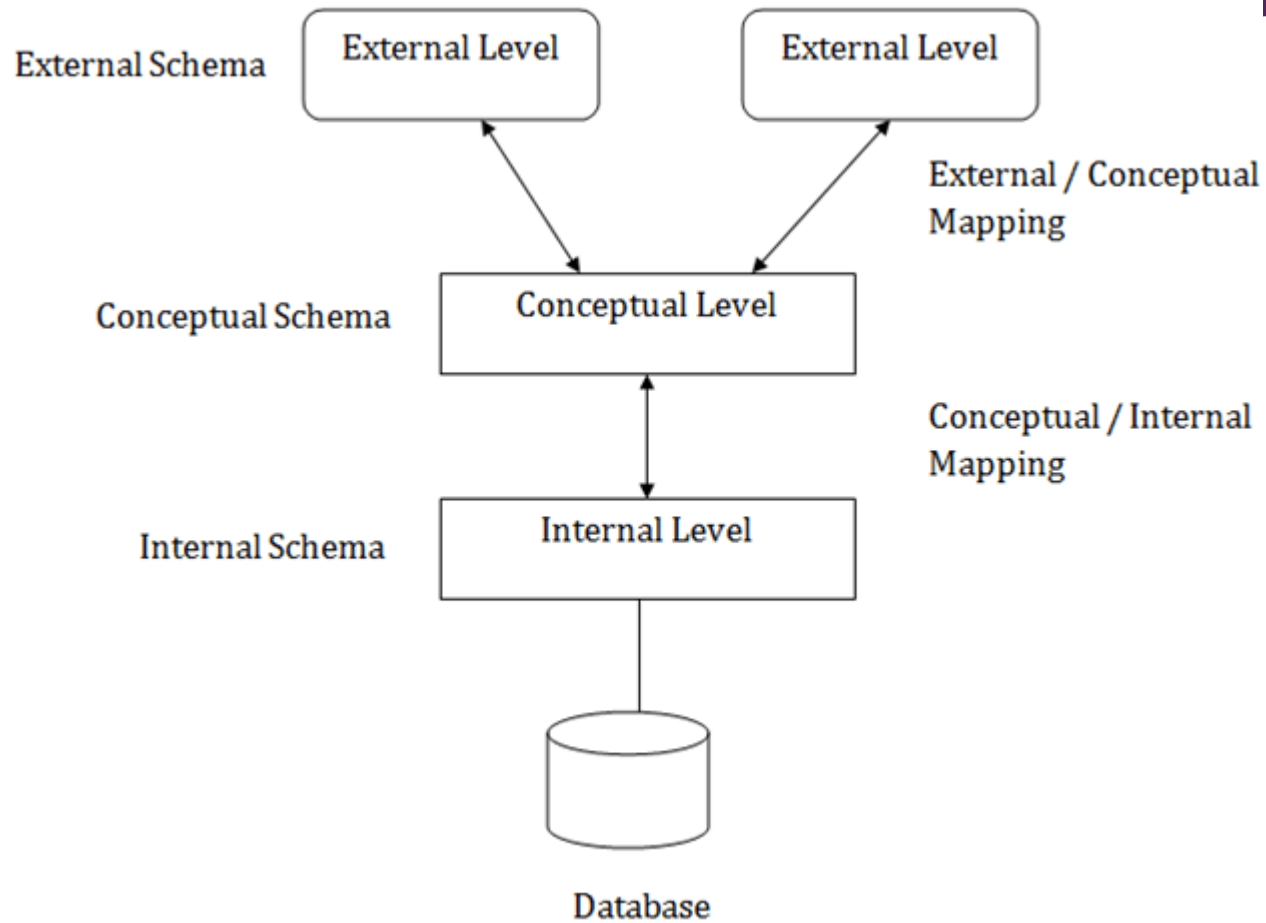
4.System analyst :

5.Database administrator(DBA)

Responsibilities of DBA

- ▶ **Schema definition and modification**
- ▶ **New software installation**
- ▶ **Security enforcement and administration**
- ▶ **Data analysis**
- ▶ **Preliminary database design**
- ▶ **Physical organization modification**
- ▶ **Routine maintenance check**

3 SCHEMA ARCHITECTURE [ANSI/SPARC/3 LEVEL ARCHITECTURE]





▶ **Physical level [internal level]:**

The lowest level of abstraction describes *how the data are actually is stored*.

▶ **Logical level[conceptual level]**

The next-higher level of abstraction describes *what data are stored* in the database, and what relationships exists among those data.

▶ **View level[external level]**

The highest level of abstraction describes only part of the entire database.

Mapping

- ▶ Whenever user specifies a request ,DBMS must transform the request specified at external level into request at conceptual level,and the into a request at physical level.This process of transforming the request and result between various levels of DBMS architecture is known as **mapping**.

Mapping is the key for proving **data independence**.

- ✓ Data independence is the capacity to change the schema at one level without having to change the schema at the higher level.

2Types of data independence are

- 1.Logical data independence
- 2.Physical data independence.

Logical data independence (Provided by external/conceptual mapping)

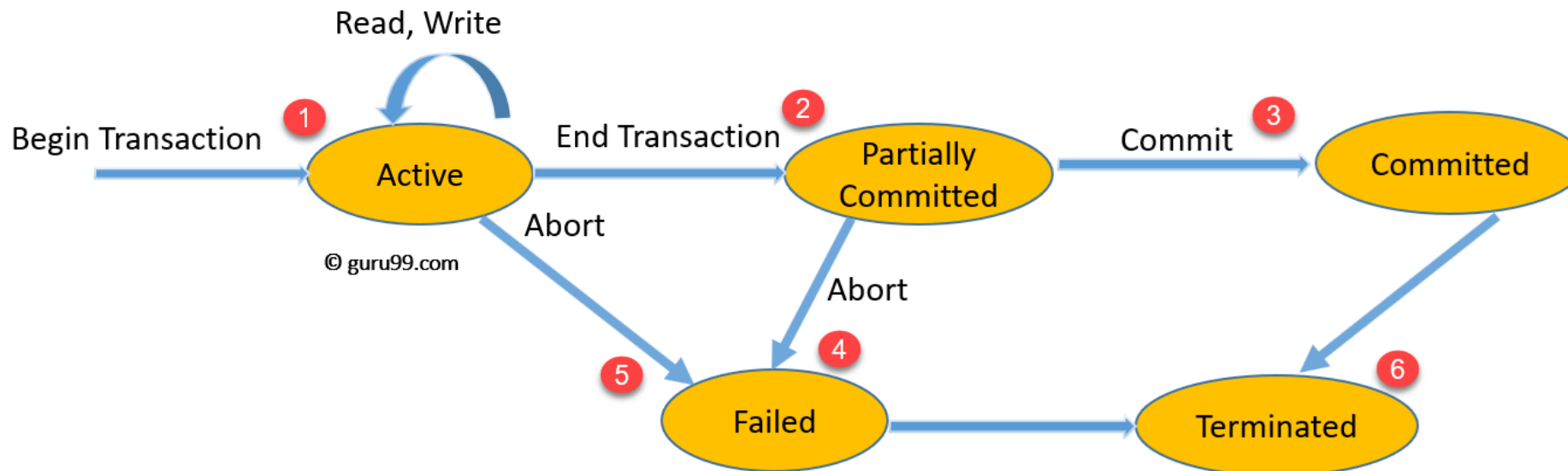
- ▶ Ability to modify conceptual schema without changing
 - External view
 - Application programs
- ▶ Changes to conceptual schema may be necessary
 - Whenever logical structure of the database changes.

Physical data independence (Provided by conceptual/internal mapping)

- ▶ Ability to modify internal or physical schema without changing
 - Conceptual or view level schema
 - Application programs
- ▶ Changes to physical schema may be necessary to
 - Improve performance of retrieval or update.

TRANSACTION MANAGEMENT

A transaction can be defined as a logical unit of work on the database.



□ ACID PROPERTIES

- ▶ Atomicity: a transaction is a processing unit .The DBMS guarantees that the transaction is performed as a whole
- ▶ Consistency: If the database was in a consistent state before the execution of a transaction, it must remain consistent after the execution of the transaction as well.
- ▶ Isolation :In a database system where more than one transaction are being executed simultaneously and in parallel, the property of isolation states that all the transactions will be carried out and executed as if it is the only transaction in the system. No transaction will affect the existence of any other transaction.
- ▶ Durability: effects of a correctly terminated transaction should persist over time The DBMS protects the DB against failures

Data Models

- ▶ It is an abstract model that describes how the data is represented and used .
- ▶ It not only describes the structure of the data ,it also defines a set of operations that can be performed on the data.

PURPOSE OF DATA MODEL

- To represent data
- To make the data understandable

Categorized into 3 types

1. High level or conceptual data model
2. Representational or implementation(logical) data model
3. Low level or physical data model

1. Conceptual Data Model

- ▶ This data model defines **WHAT** the system contains. This model is used by business stakeholders and data architects.

2. Representational Data Model

Defines HOW the system should be implemented regardless of the DBMS. Created by data architects and system analysts.

3. Physical Data Model

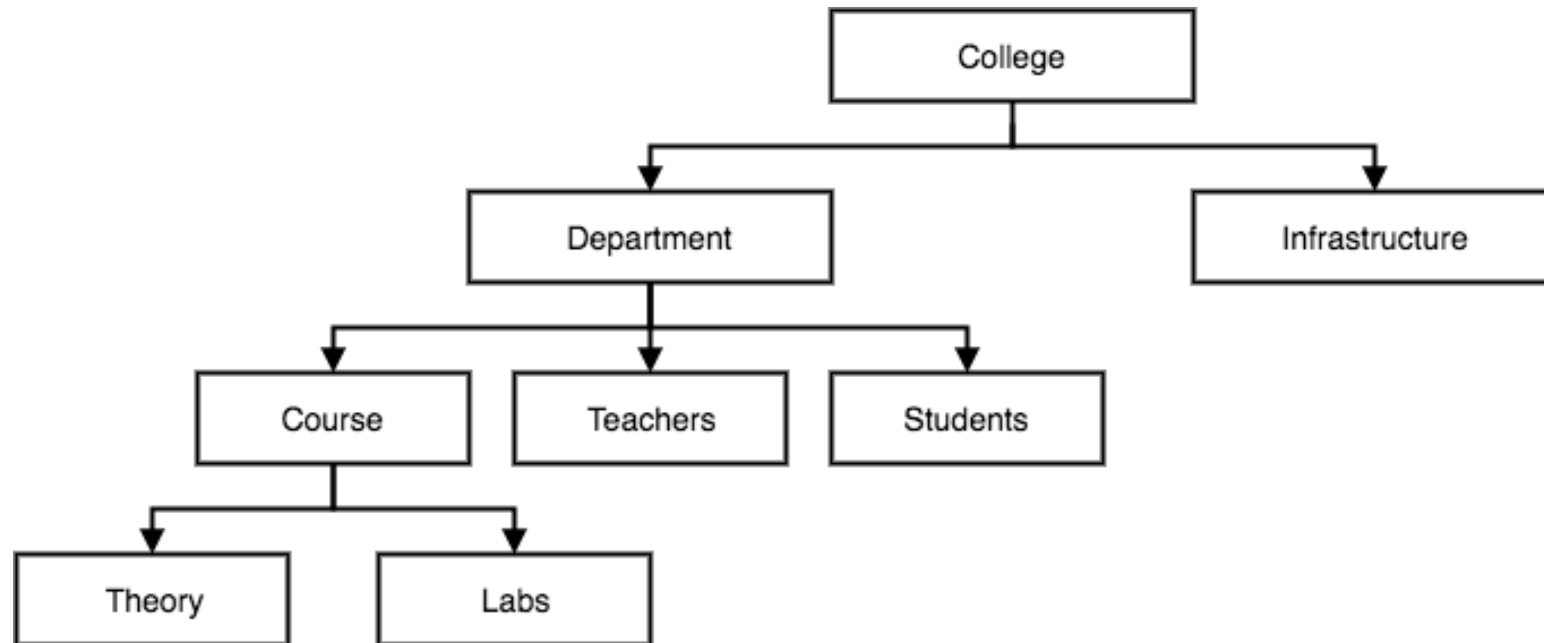
This model describes how the system will be implemented using a specific DBMS system. This model is created by DBAs and system developers. Describes how the database will be executed in a particular DBMS software.

VARIOUS REPRESENTATIONAL DATA MODELS

1. Hierarchical data model
2. Network data model
3. Relational data model
4. Object based data model

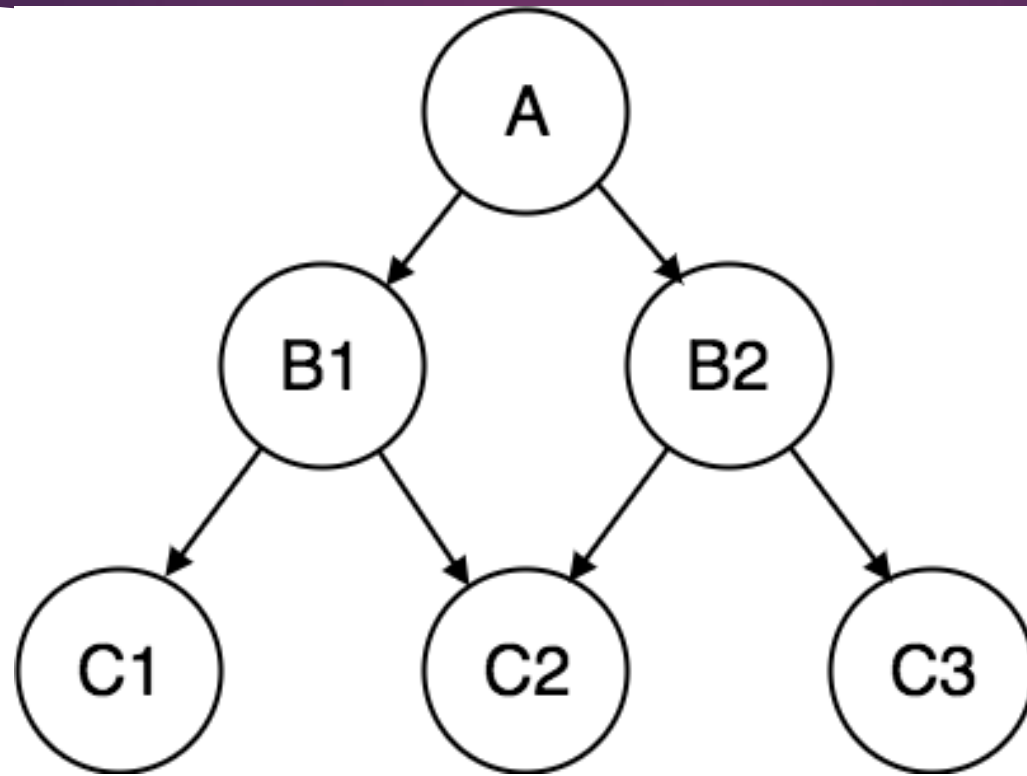
1. Hierarchical Data model

- ▶ Organize data in tree like structure.
- ▶ Top of the tree is called root node.
- ▶ Each child can have only one parent node.
- ▶ Parent node can have any number of child.
- ▶ One to one & one to many relationship
- ▶ Records connected to one another through links.



2. Network data model

- ▶ Extension of hierarchical model.
- ▶ Data is organized like a graph.
- ▶ Data is more related hence accessing data is easier.
- ▶ Many to many relationship.



3.Relational Data model

- ▶ Data is organized in tables.
- ▶ Information is stored in rows of table.
- ▶ Tables are also known as relations in relational data model.

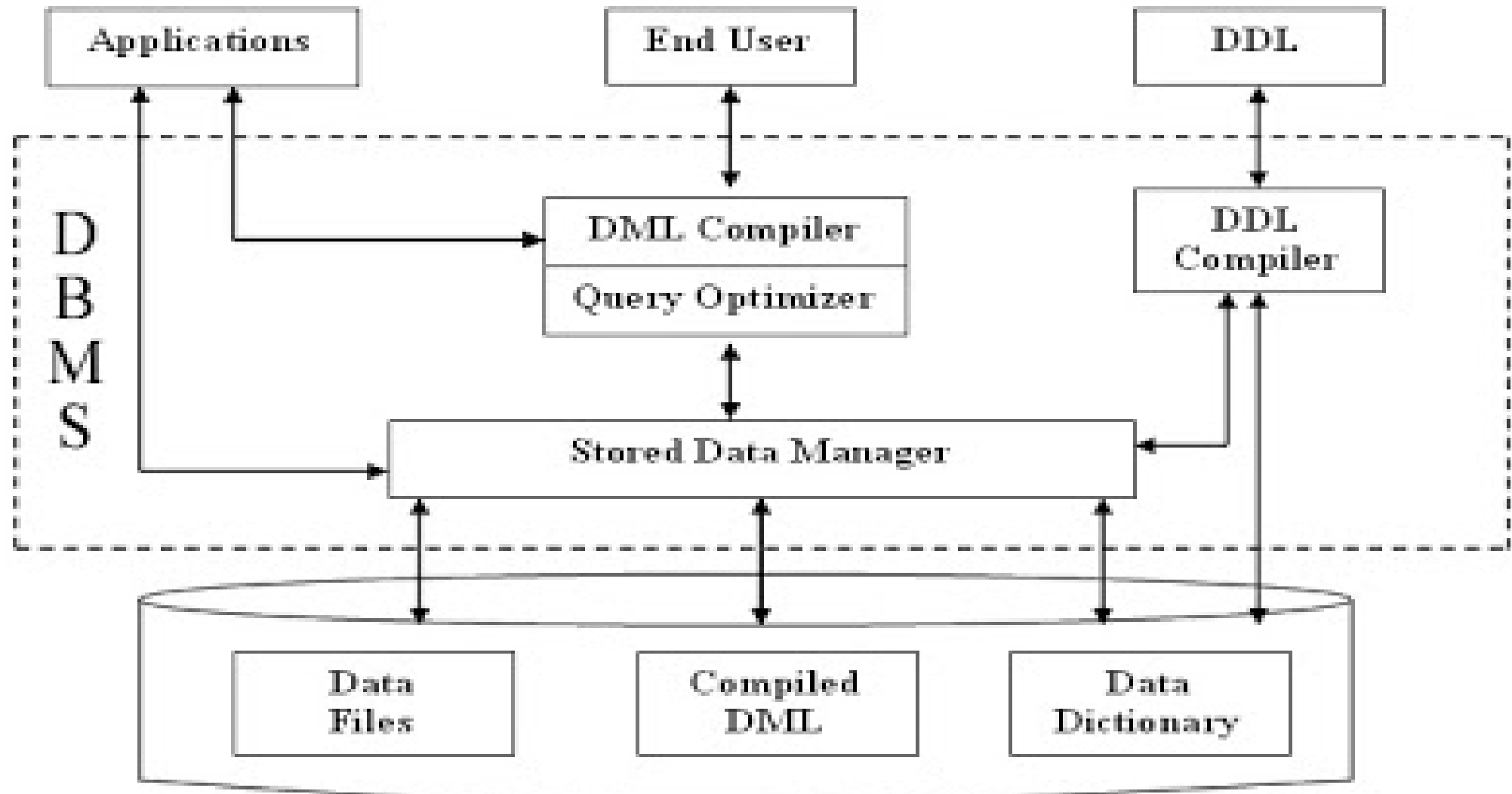
4.Object based (object relational) data model

- ▶ Extension of relational data model.
- ▶ Network, hierarchical and relational data models are known as record based data models.

DATABASE STRUCTURE

- ▶ These are the components responsible for maintaining the structure of DBMS

- 1.APPLICATION
- 2.END USER
- 3.DDL
- 4.DDL COMPILER
- 5.DML COMPILER
- 6.QUERY OPTIMIZER
- 7.DATA FILES
- 8.DATA DICTIONARY
- 9.DATA MANAGER



1:Applications

- ▶ User friendly web page where the user enters the requests.

2.End User

They can be developers ,designers ,administrators or the actual users of the database.

3.DDL (Data Defenition Language)

- ▶ Create structure of the database.

4.DDL Compiler

Breaks the commands into machine understandable codes.

5.DML Compiler

- ▶ When the user inserts ,deletes,updates or retrieve the record from the database , breaks the commands into machine understandable codes.

6. Query optimizer

Decides the best way to execute the user request which is received from the DML Compiler.

7.Data Files

- ▶ Real data stored in it. It can be stored as magnetic tapes, magnetic disk or optical disks.

8.Data Dictionary

It contains all the information about the database. It is the dictionary of all the data items.It contains description of all the tables, views etc.

8.1.Functions of data dictionary

- ▶ Defines the data element.
- ▶ Helps in the scheduling
- ▶ Helps in the control
- ▶ Act as very essential data management tool.
- ▶ Provides the report facility, control facility.
- ▶ Permits the various users who know which data is available and how can it be obtained.

9. Stored Data Manager

- ▶ Also known as database control system.
- ▶ Converts request received from query optimizer to machine understandable form.
- ▶ Controls concurrent access.
- ▶ If there is multiple users accessing the database at the same time ,it makes sure,all of them see correct data.
- ▶ It guarantees that there is no data loss or data mismatch happens between the transaction of multiple users.
- ▶ It helps to backup the database and recover data whenever required.
- ▶ It doesn't allow entering duplicate value into database table.



THANK YOU.....