COCSIT

RDBMS

Introduction to Database Management System (DBMS)

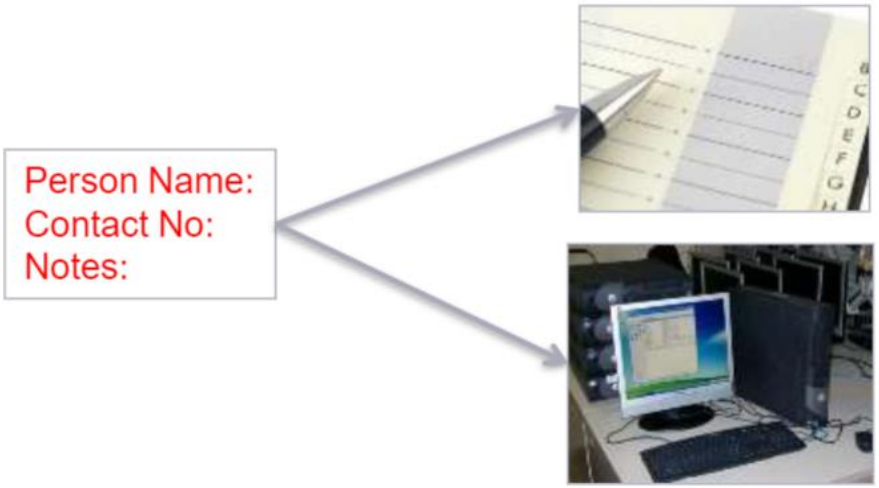
Objectives

By the end of this module we will learn:

- Define File Management System
- Drawbacks of File Management System
- Define Database Management System (DBMS)
- Benefits of DBMS
- Functionalities of DBMS
- Data Models

What is a Database?

- Data: Is nothing but known facts which is recorded with implicit meaning
- Database: It is a collection of logically related data at one place



File Management System

- File Management System (FMS) is a set of computer programs that maintains data stored by File System
- It is one of the initial method used to maintain data storage and retrieval on computers
- FMS is used to access one file or a single set of related data at one point in time
- It is very simple to use and less expensive

Drawbacks of File Management System

- Data is separated for every individual program
- Data can be duplicated
- No uniformity can be found in the data
- All the data would have been arranged as per the need of the specific program
- No security control

DBMS

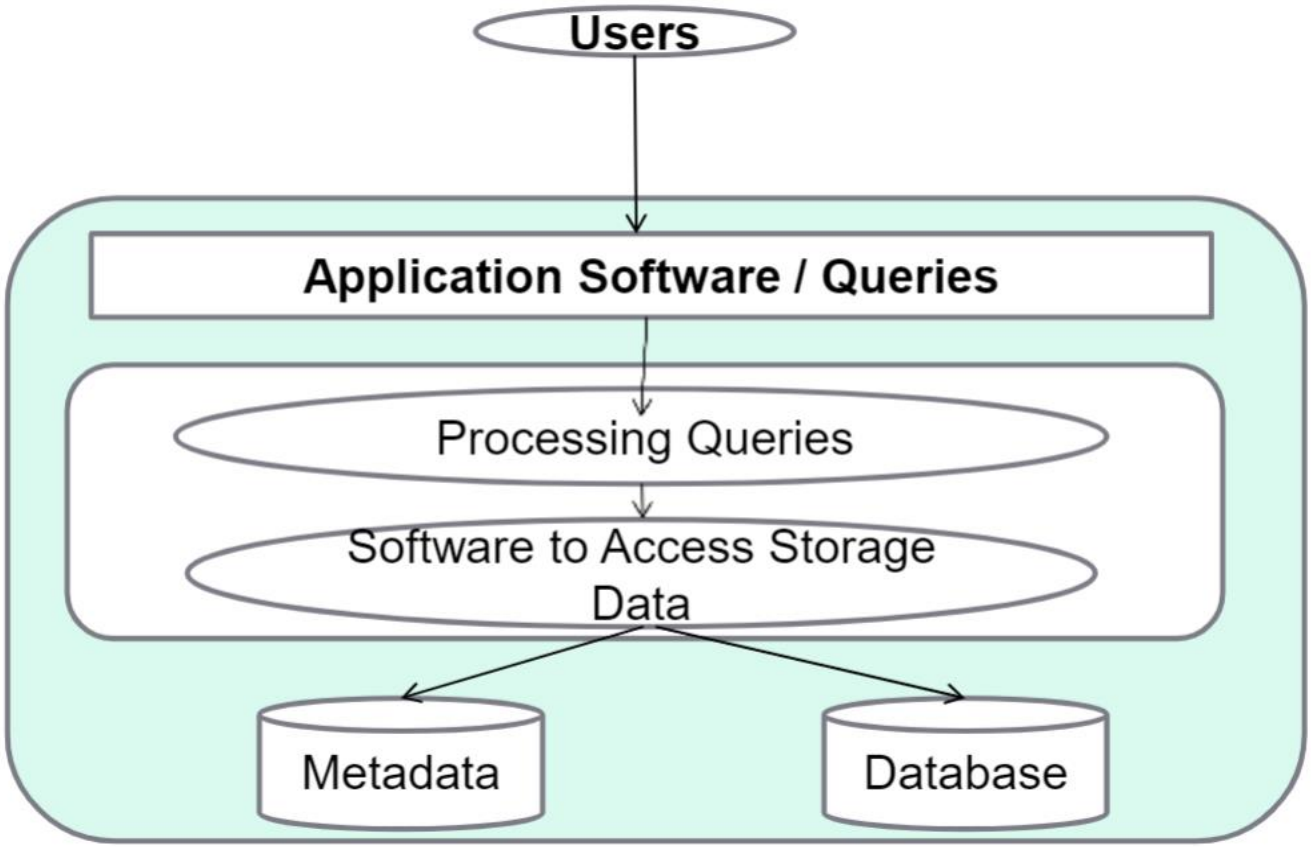
- Database Management System: is a collection of programs that facilitates the management of databases. It acts as an interface between user and database

- Management activities of a DBMS is to:
  - To provide an efficient environment to access the data in database
  - To provide methods for adding or modifying the data content
  - Defining structure for storing new data
  - Implement security, concurrency control and recovery from crash

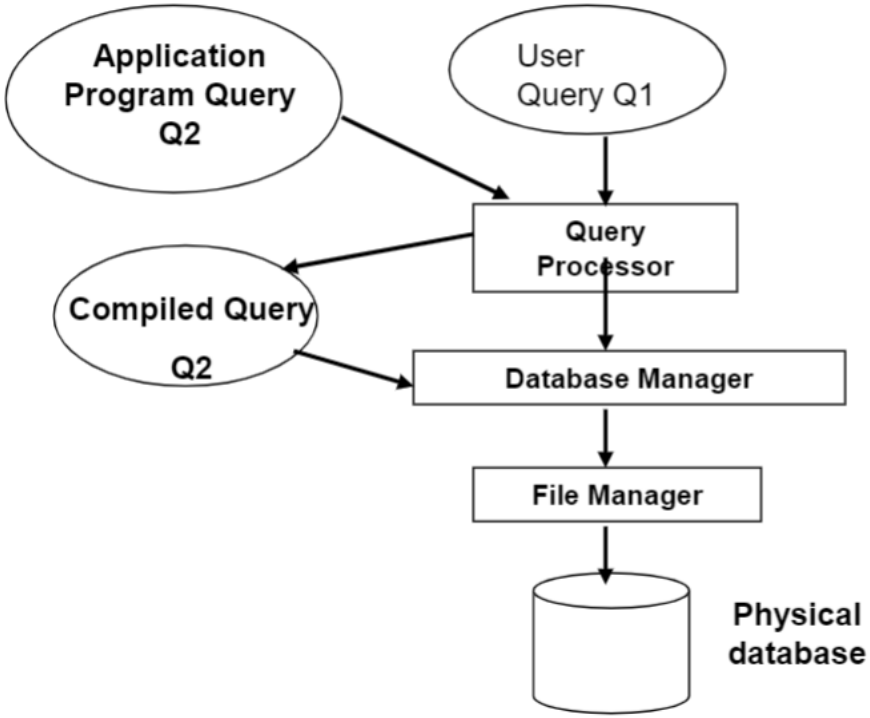
Benefits of DBMS

- Redundancy is reduced
- Inconsistency is avoided
- Data is shared
- Standard is enforced
- Security is applied
- Integrity is maintained
- Data Independency is provided

Database System



Database System (Contd.).

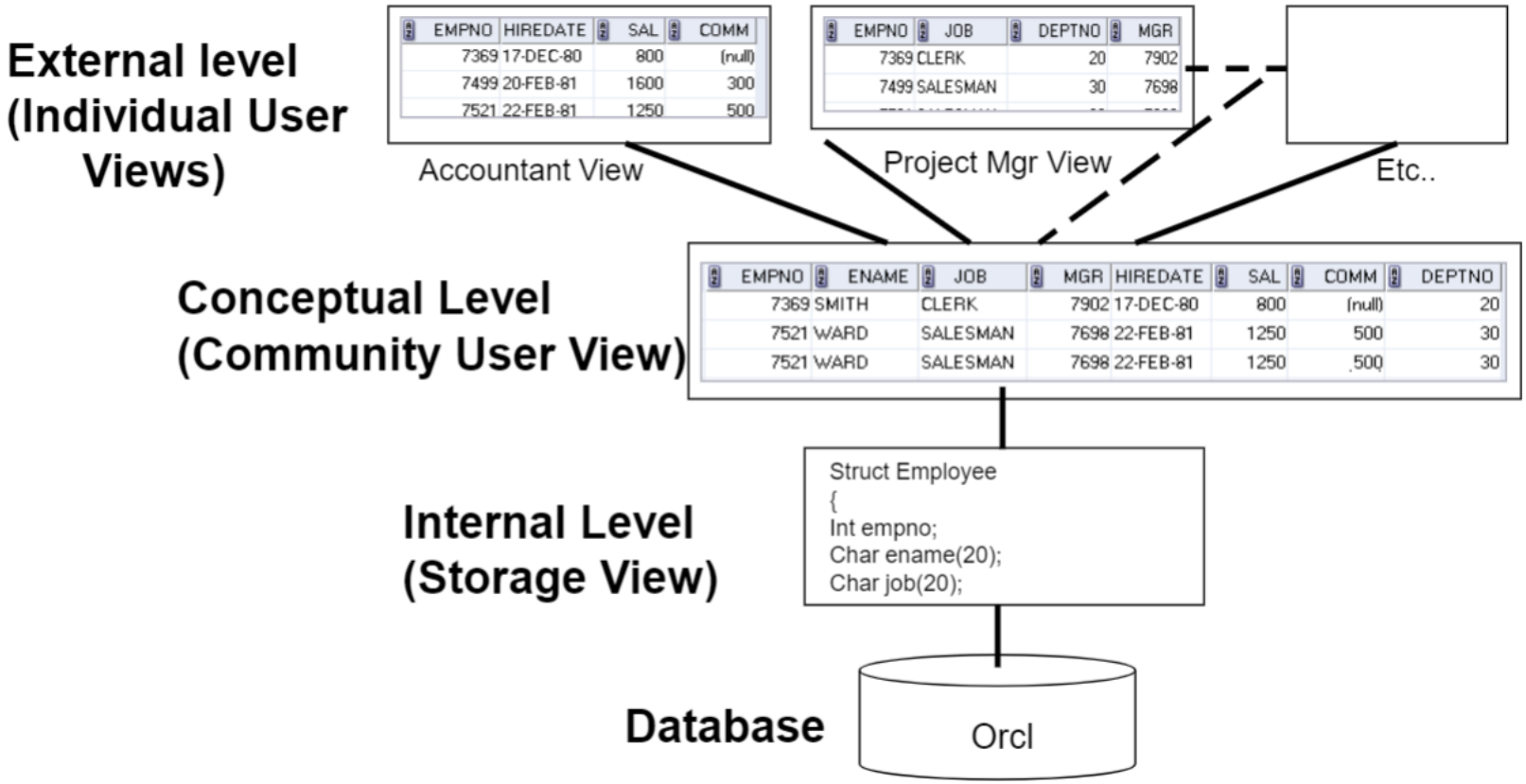


Database Architecture

Database Architecture can be seen in three levels of abstraction

- External Level
- Conceptual Level
- Internal Level (or Physical Level)

Database Architecture (Contd.).



An Example of Three levels

External View

ENO	NAME	F-NAME	AGE

ENO	SALARY	DEPTNO

Conceptual View

ENO	NAME	F-NAME	AGE	SALARY	DEPTNO

Internal View

```
Struct Employee
{int eno;
char name[20];
char F-name[20];
float salary;
int deno;struct employee *ptr ;};
```

Difference between FMS and DBMS

FMS	DBMS
In FMS, programmer is forced to code the placing / retrieval of data from physical files using OS functions.	DBMS removes the overhead of manually handling the data, user has to give the logical structure and operate based on this structure.
It is a very simple system	It is a complex System
Less Expensive	High initial investment in hardware, software and training on DBMS.
Data is separated for every individual program	Data is Shared
Redundancy could be high	Redundancy is reduced
There is no standard	Standard is enforced
No security control	Security and integrity is applied
There is no utilization of resources.	It is multiuser and supports utilization of resources.
Best when used for very simple, well defined application, with no much changes expected and no multiuser access required.	Best when it is a centralized system for multiuser access and huge data manipulation is anticipated.

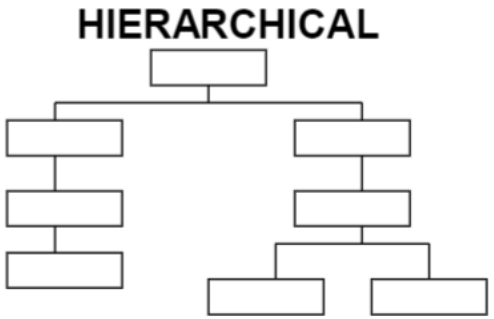
Data Model

- Data Model provides structure to the data of the Database System
- It is used to achieve compatibility across systems and applications

- Three types of common data model instance are:
  - Conceptual Model – otherwise called Logical model Eg: Entity –Relationship Diagram
  - Physical Model or Database Record based Model like Hierarchical, Network, Relational or Object Oriented Model
  - Representational Model

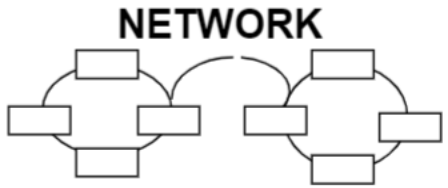
Types of Database Models

- The most well-known record-based models are the Hierarchical Model, the Network Model, the Relational Model, the Object Oriented Model.
- Hierarchical Model
  - Represents data as hierarchical tree
  - Very efficient model in case of searching
  - But had issues when a data element is associated with more than one group



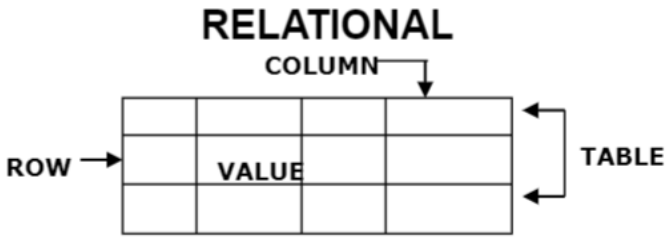
Types of Database Models (Contd.).

- **Network Model**
  - This overcomes Hierarchical Model issue
  - This represents data as record types
  - Each record has a link field corresponding to every relationship which it participates in(Circular Linked List)
  - It is a general and powerful model
  - But still it had high system complexity and very less structural data independence



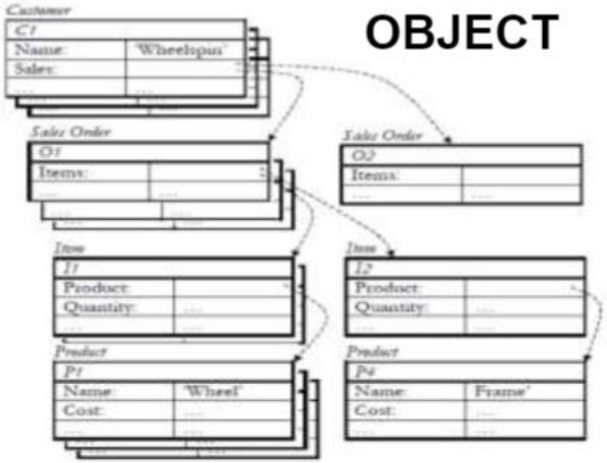
Types of Database Models (Contd.).

- **Relational Model**
  - Network model is replaced with relational model
  - Represents data as record types in table format
  - Relationship between records are maintained using logical data



Types of Database Models (Contd.).

- **Object Oriented Model**
  - Here information is organized in graphs of objects, where each object has a number of attributes(Columns).
  - Attributes can be simple values, complex values like references to other objects.
  - Relationship is maintained through inheritance(like hierarchical).



Quiz

- One live database system for each of these models
  - Hierarchical model
  - Network Model
  - Relational Model
  - Object Oriented Model

Introduction to RDBMS




Objectives

By the end of this module we will learn:

- Definition: RDBMS
- Features of an RDBMS
- Some Important Terms
- Properties of Table
- Key and Type of Keys
- Referential Integrity

Definition of RDBMS

- Drawbacks of DBMS
  - DBMS models are complex
  - It is very difficult for new programmers and users to understand thus training is required
  - Requires a costly system set up
- These drawbacks gave way for the new Relational Model
- Relational Model
  - Dr. Database in which all the data is represented in form of Tables.

Benefits of an RDBMS

- The ability to create multiple relations (tables) and enter data into them
- An interactive query language
- Retrieval of information stored in more than one table
- Provides a Catalog or Dictionary, which itself consists of tables (called system tables)

Some Important Terms

- **Relation :** A table
- **Tuple :** A row in a table
- **Attribute :** A Column in a table
- **Degree :** Number of attributes
- **Cardinality** : Number of tuples
- **Primary Key :** A unique identifier for the table
- **Domain :** Pool of values from which specific attributes of specific relations draw their values

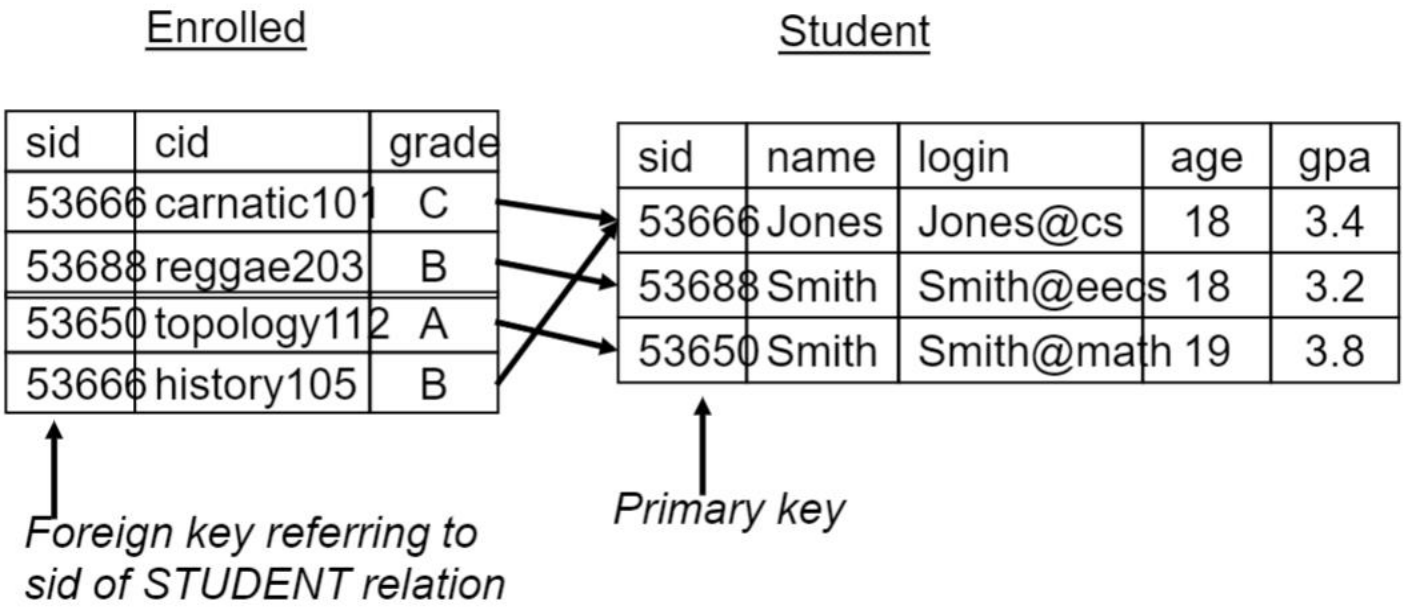
Table or Relation Properties

- There are no duplicate rows (Tuples)
- Tuples are unordered, top to bottom
- Attributes are unordered, left to right
- All attribute values are atomic (or scalar)
- Relational databases do not allow repeating groups

Key and Types of Keys

- **Key**
  - An attribute or a set of attributes whose values uniquely identify each entity in an entity set
- **Super Key**
  - A key whose values uniquely identify each entity in an entity set, which is generally all combination subsets of the table.
- **Candidate Keys** – smallest subsets are identified as candidate keys
  - Primary Key: Chosen key to uniquely identify a table
  - Alternate Key: other candidate keys are termed as alternate keys
- **Secondary Keys**
  - Keys that classify the entity set

Referential Integrity



Quiz

Stock				
Stock Code	Stock Description	UOM	Quantity on Hand	Average Cost
PM2000	Plastic Wrap	Rolls	8.50	20.54
PM2005	Labels	1000	-	-
PM2015	Boxes	Units	18.00	1.02
RM1000	Meat	Kg	600.00	46.47

Movement						
Transaction Date	Transaction Type	Supplier Name	Document Number	Stock Code	Transaction Quantity	Invoice Amount
7/7/2015	Purchase	XY Packaging	IN0009	PM2000	5.00	105.00
7/7/2015	Purchase	QS Printers	76868	PM2005	2.00	750.00
7/7/2015	Purchase	WW Butchery	5765765	RM1000	400.00	21,760.00
7/16/2015	Usage	None	None	PM2000	-2.00	-
7/16/2015	Usage	None	None	PM2005	-1.00	-

Identify the following from above tables

- Primary Keys of both the tables
- Foreign Key
- Degree of ta ble 1 and 2
- Cardinality of table 1 and 2
- Nullable columns of table 1 and 2

Thank You