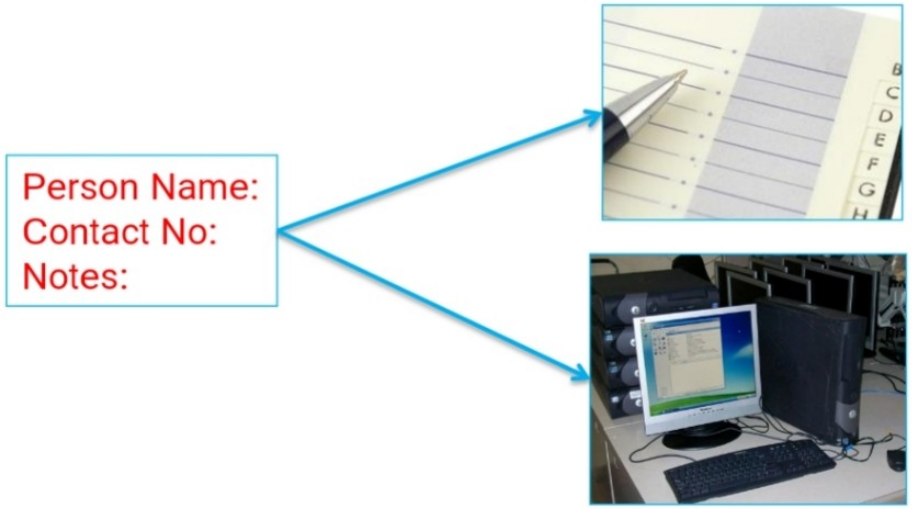
Objectives

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



Relational Database Management Systems

RDBMS Concepts

TM_SQL_001

Agenda

1. Introduction to Database Management System (DBMS)
2. Introduction to Relational Database Management System (RDBMS)

Introduction to Database Management System (DBMS)

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

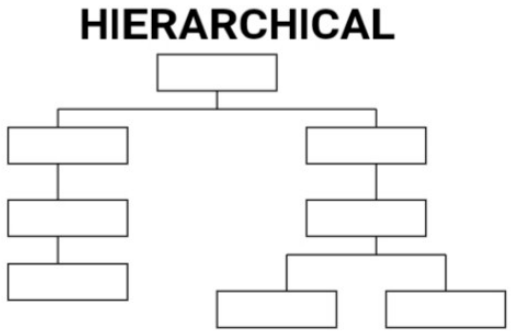
Data Model

- 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

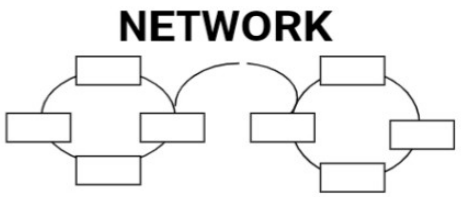
Types of Database Models

- 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



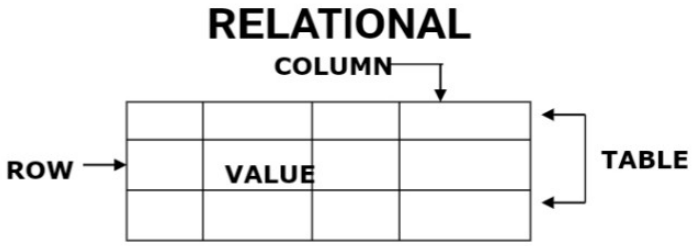
Types of Database Models (Contd.).

- 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



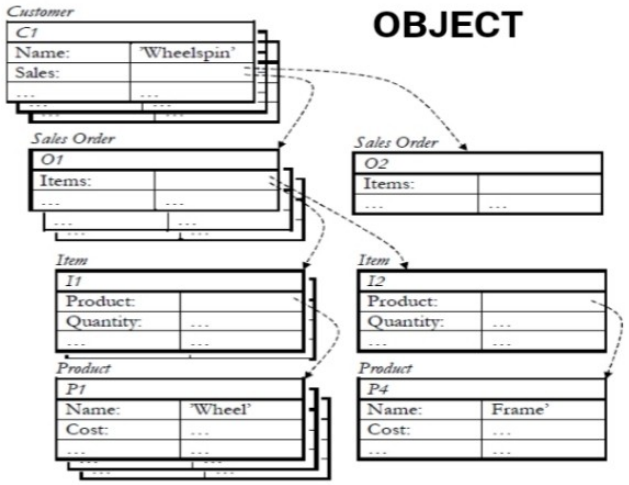
Types of Database Models (Contd.).

- 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

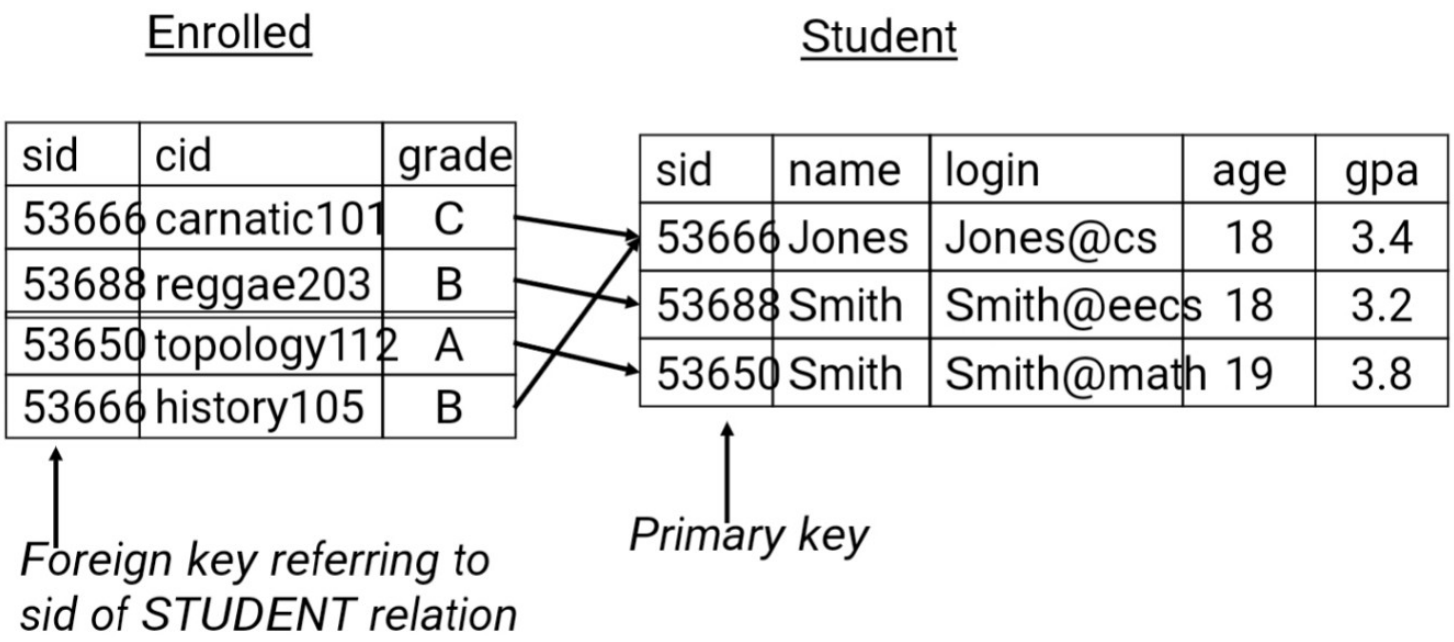
Table or Relation Properties

- 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 table 1 and 2
- Cardinality of table 1 and 2
- Nullable columns of table 1 and 2

Thank You