AIM OF THE SESSION

To familiarize students with the basic concept Database Management Systems

INSTRUCTIONAL OBJECTIVES

This Session is designed to: Characteristics of DBMS

LEARNING OUTCOMES

At the end of this session, you should be able to: basic knowledge of DBMS

Data Models

- A data model is a collection of high-level data description constructs that hide many low-level storage details. A DBMS allows a user to define the data to be stored in terms of a data model.

- The data models can be classified into different categories:

  - Hierarchical Model

  - Network Model

  - Entity-Relationship Model

  - Relational Model

  - Object-Based Data Model

  - Semi-structured Data model

HIERARCHICAL MODEL

- This database model organizes data into a tree-like-structure, with a single root, to which all the other data is linked.

- The hierarchy starts from the **Root** data, and expands like a tree, adding child nodes to the parent nodes.

- In this model, a child node will only have a single parent node.

- This model efficiently describes many real-world relationships like index of a book, recipes etc.

- In hierarchical model, data is organized into tree-like structure with one one-to-many relationship between two different types of data, for example, one department can have many courses, many professors and of-course many students.
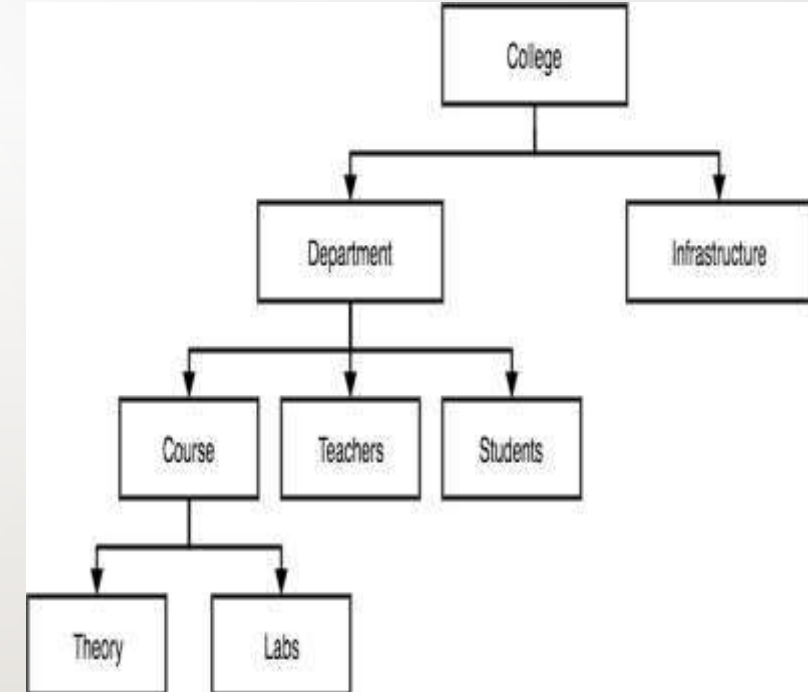
NETWORK MODEL

- This is an extension of the Hierarchical model. In this model data is organized more like a graph, and are allowed to have more than one parent node.

- In this database model data is more related as more relationships are established in this database model. Also, as the data is more related, hence accessing the data is also easier and fast.

- This database model was used to map many-to-many data relationships.

- This was the most widely used database model, before Relational Model was introduced.
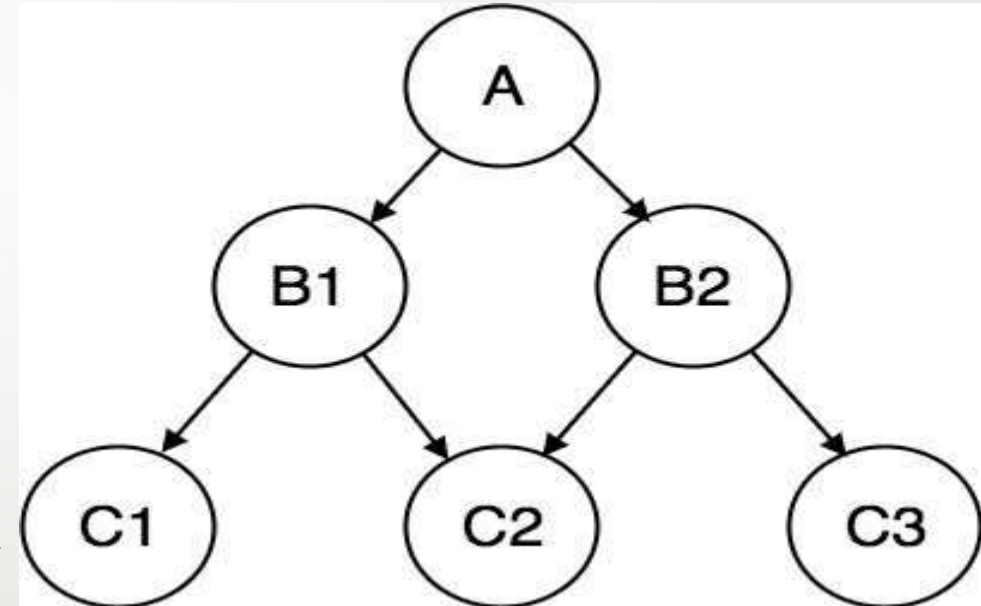
THE ENTITY-RELATIONSHIP MODEL

- The entity-relationship (E-R) data model is based on a perception of a *real world* that consists of a collection of basic objects, called *entities, and of relationships among these* objects.

- An *entity* is a "thing" or "object" in the real world that is distinguishable from other objects.

- For example, each person is an entity, and bank accounts can be considered as entities.

THE ENTITY-RELATIONSHIP MODEL

- Entities are described in a database by a set of **attributes.**

- For example, the attributes account-number and balance may describe one particular account in a bank, and they form attributes of the account entity set.

- Similarly, attributes customer-name, customer-street address and customer-city may describe a customer entity.

ENTITY-RELATIONSHIP MODEL

- The overall logical structure (schema) of a database can be expressed graphically by an E-R diagram, which is built up from the following components

- Rectangles, which represent entity

- Ellipses, which represent attributes

- Diamonds, which represent relationships among entity sets

- Lines, which link attributes to entity sets and entity sets to relationships

ENTITY-RELATIONSHIP MODEL

- Each component is labeled with the entity or relationship that it represents

- consider part of a database banking system consisting of customers and of the accounts that these customers have

Object-Based Data Model

- The complex real world problems are represented as objects with different attributes.

- In Object Oriented Data Model, data and their relationships are contained in a single structure which is referred as object. All objects have multiple relationships between them

- Components of Object Oriented Data Model

- Objects

- Attribute

- Methods

- Class

- Inheritance

Semi-structured Data model

- The semi-structured data model permits the specification of data where individual data items of same type may have different sets of attributes.

- The Extensible Markup Language (XML) is widely used to represent semistructured data model.

1. Data is

(a) Used in decision making

(b) Raw facts or events

(c) Transformed facts

(d) Information

2. What is a database?

(a) Organized collection of information that cannot be accessed, updated, and managed

b) Collection of data or information without organizing

c) Organized collection of data or information that can be accessed, updated, and managed

d) Organized collection of data that cannot be updated

- The session also emphasizes the key differences between data and information. While data is a collection of individual facts, information contextualizes and organizes those facts, providing comprehension and understanding. Information is dependent on data, and it relies on data for its foundation.

- In the file-based approach, data is stored and organized using file systems. However, this approach came with inherent problems such as data security issues, data redundancy, and difficulties in data isolation and concurrent access.

- In a database management system, data models are often used to show how data is connected, stored, accessed, and changed.

1. Describe the history of DBMS.

2. List out the application areas of DBMS.

3. Analyze DBMS and file systems.

4. Summarize the characteristics of database approach.

5. List out the different datamodels in DBMS.

Reference Books:

1. 1. Database System Concepts, Sixth Edition, Abraham Silberschatz, Yale University Henry, F. Korth Lehigh University, S. Sudarshan Indian Institute of Technology, Bombay.
2. Fundamentals of Database Systems, 7th Edition, RamezElmasri, University of Texas at Arlington, Shamkant B. Navathe, University of Texas at Arlington.

Web Link:

1. https://nptel.ac.in/courses/106105175

THANK YOU

Team – DBMS