- The basic design or the structure of the database is the data model.
- It is a collection of conceptual tools for describing data, data relationships, data semantics, and consistency constraints.
- The basic structure of the database that organizes data, defines how the data are stored and accessed, and the relationships between the data, is the data model.

Data Model

1) Object-Based Logical Models

a) Entity-Relationship(E-R) Model

b) Object-Oriented Model

c) The Binary Model

d) The Semantic Data Model

e) The Infological Data Model

f) The functional Data Model

2) Record-Based Logical Models

a) Relational Model

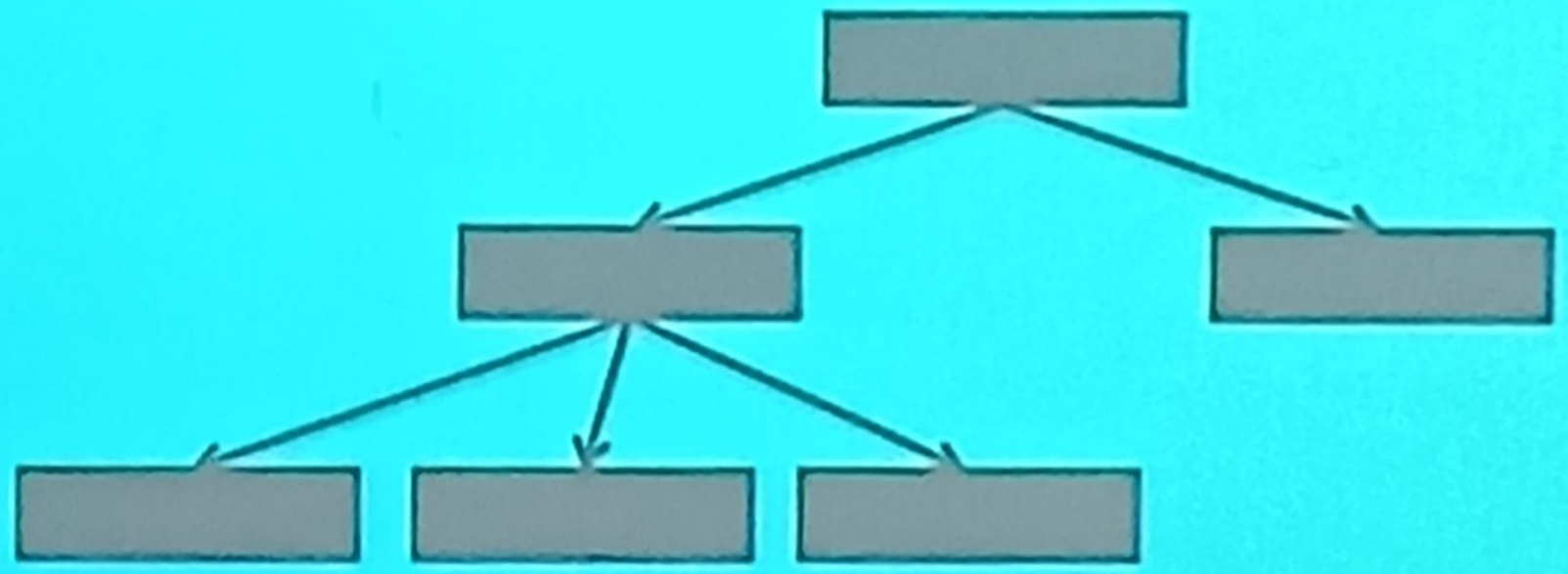
b) Network Model

c) Hierarchical Model

3) Physical Data Model

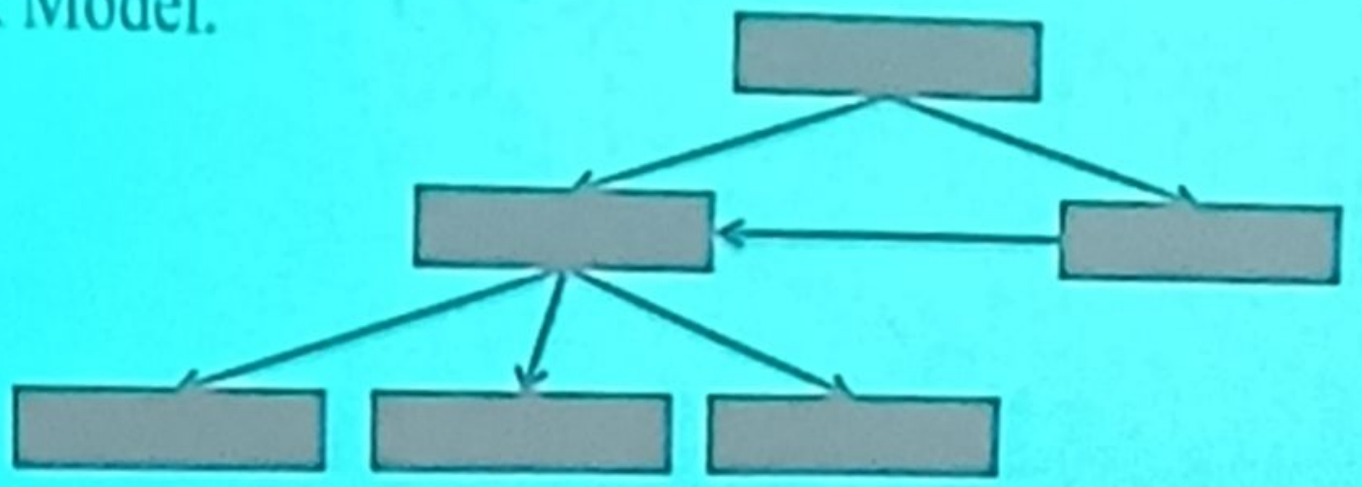
Types of database models

- The Hierarchical Data Model is used to organize and structure data in a hierarchical manner. In this model, data is organized into a tree-like structure, where each record has a single parent record and zero or more child records, creating a parent-child relationship. Example: A classic example of a hierarchical data model is an organization chart where each employee (child record) reports to a single manager (parent record), and managers themselves may report to higher-level managers, forming a hierarchical structure.



Hierarchical Data Model

- The Network Data Model is a database model that extends the Hierarchical Data Model by allowing many-to-many relationships between records. It was developed to address some of the limitations of the Hierarchical Model, particularly its inability to represent complex relationships efficiently. The Network Model represents data as a graph, where records (nodes) are connected through relationships (edges). A common example of the Network Model is a university database where students can enroll in multiple courses, and courses can have multiple students enrolled. This many-to-many relationship between students and courses is represented using the Network Model.



Network Data Model

- The Relational Model is a database model that organizes data into one or more tables (relations) consisting of rows (tuples) and columns (attributes). Proposed by Edgar F. Codd in 1970, it has become the dominant data model for database management systems (DBMS).
- It uses a collection of tables to represent both data and relationships among those data.
- Each table has multiple columns, depending on the number of attributes, and each column has a unique name.

Student

R. No	Name	Class
A-101	Ramesh	11
A-102	Kirti	10
A-103	Laxmi	12

Book Issue

R. No	B.Id	A.Name
A-101	b112	x
A-102	b243	y
A-103	b345	z
A-103	b765	p

Relational Model

ER Diagrams