DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING-IOT Including CS&BCT

UNIT-I

DATA MODELS

The data model is a collection of conceptual tools for describing data, data relationships, data semantics, and consistency constraints. A data model provides a way to describe the design of a data base at the physical, logical and view level. The purpose of a data model is to represent data and to make the data understandable. According to the types of concepts used to describe the database structure, there are three data models:

1. An external data model, to represent each user's view of the organization.

2 .A conceptual data model, to represent the logical view that is DBMS independent

3. An internal data model, to represent the conceptual schema in such a way that it can be understood by the DBMS.

Categories of data model:

1.Record-based data models

2.Object-based data models

3.Physical-data models.

The first two are used to describe data at the conceptual and external levels, the latter is used to describe data at the internal level.

1.Record -Based data models

In a record-based model, the database consists of a number of fixed format records possibly of differing types. Each record type defines a fixed number of fields, each typically of a fixed length.

There are three types of record-based logical data model.

- ✓ Hierarchical data model.
- ✓ Network data model
- ✓ Relational data model

Hierarchical data model

In the hierarchical model, data is represented as collections of records and relationships are represented by sets. The hierarchical model allows a node to have only one parent. A hierarchical model can be represented as a tree graph, with records appearing as nodes, also called segments, and sets as edges.

Network data model

In the network model, data is represented as collections of records and relationships are represented by sets. Each set is composed of at least two record types:

- ✓ An owner record that is equivalent to the hierarchical model's parent
- ✓ A member record that is equivalent to the hierarchical model's child

A set represents a 1 :M relationship between the owner and the member.

Relational data model

The relational data model is based on the concept of mathematical relations. Relational model stores data in the form of a table. Each table corresponds to an entity, and each row represents an instance of that entity. Tables, also called relations are related to each other through the sharing of a common entity characteristic.

Example

Relational DBMS DB2, oracle, MS SQLserver.

2. Object -Based Data Models

Object-based data models use concepts such as entities, attributes, and relationships.An entity is a distinct object in the organization that is to be represents in the database. An attribute is a property that describes some aspect of the object, and a relationship is an association between entities. Common types of object-based data model are:

- ✓ Entity -Relationship model
- ✓ Object -oriented model
- ✓ Semantic model

Entity Relationship Model:

The ER model is based on the following components:

Entity: An entity was defined as anything about which data are to be collected and stored. Each row in the relational table is known as an entity instance or entity occurrence in the ER model. Each entity is described by a set of attributes that describes particular characteristics of the entity.

Object oriented model:

In the object-oriented data model (OODM) both data and their relationships are contained in a single structure known as an object. An object is described by its factual content. An object includes information about relationships between the facts within the object, as well as information about its relationships with other objects. Therefore, the facts within the object are given greater meaning. The OODM is said to be a semantic data model because semantic indicates meaning. The OO data model is based on the following components:

- ✓ An object is an abstraction of a real-world entity.

- ✓ Attributes describe the properties of an object.