Data Modeling

Content

- Data Models
- Types of Data Models

Data Models

- Data models define how data is connected to each other and how they are processed and stored inside the system.
- The data model is a collection of conceptual tools for describing data, data relationships, data semantics, and consistency constraints.
- The purpose of a data model is to represent data, and, to make the data understandable.

Categories of Data Model

The data models can be classified into four different categories:

1. Relational Model
2. Entity Relationship Model
3. Object-Based Data Model
4. Semistructured Data Model

Categories of data models

Relational Model:

- The relational model uses a collection of tables to represent both data and the relationships among those data.
- Each table has multiple columns, and each column has a unique name.
- Tables are also known as **relations**.

Categories of data models

Example of Relational Model:

- Consider a database for a university.
- You might have a "Students" table with columns like StudentID, Name, and Department.
- Another table could be "Courses" with columns CourseID, CourseName, and Instructor.
- The relationship between these tables could be expressed by a "Registrations" table, linking students to the courses they are enrolled in.

Categories of data models

Entity Relationship Model:

- It is a high-level data model. This model is used to define the data elements and relationship for a specified system.
- The entity-relationship (E-R) data model uses a collection of basic objects, called entities, and relationships among these objects.
- An entity is a “thing” or “object” in the real world that is distinguishable from other objects.

Categories of data models

Example of Entity Relationship Model:

- In a library system, you might have entities like "Book," "Author," and "Publisher."
- The relationships could be defined as follows:

  A book is written by an author, an author can write multiple books, and a book is published by a publisher. This can be represented in an entity-relationship diagram.

Categories of data models

Object-Based Data Model:

- Object-oriented programming has become the dominant software-development methodology.
- This led to the development of an object-oriented data model that can be seen as extending the E-R model with notions of encapsulation, methods (functions), and object identity.
- The object-relational data model combines features of the object-oriented data model and relational data model.

Categories of data models

Example of Object-Based Data Model:

- In an object-based data model, consider a system managing a zoo.
- You might have objects like "Animal" with methods like "Feed" and attributes like "Species" and "Age."
- Each animal is an instance of the "Animal" class, and you can perform operations on them using the defined methods.

Categories of data models

Semistructured Data Model:

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

Categories of data models

Example of Semistructured Data Model:

- XML (eXtensible Markup Language) is often considered a representation of semistructured data.
- In an XML document representing a collection of books, individual books may have different sets of attributes.
- For example, one book may have an additional attribute for "Genre," while another might have a different attribute for "Publication Year."

THANK YOU