

DATABASE MODELS

Underlying the structure of a database is the data model: 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 database at the physical, logical, and view levels.

The data models can be classified into four different categories:

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. The relational model is an example of a record-based model. Record-based models are so named because the database is structured in fixed-format records of several types. Each table contains records of a particular type. Each record type defines a fixed number of fields, or attributes. The columns of the table correspond to the attributes of the record type. The relational data model is the most widely used data model, and a vast majority of current database systems are based on the relational model.

Entity-Relationship Model: 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. The entity relationship model is widely used in database design.

Object-Based Data Model: Object-oriented programming (especially in Java, C++, or C#) 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.

Semi-structured Data Model: The semi-structured data model permits the specification of data where individual data items of the same type may have different sets of attributes. This is in contrast to the data models mentioned earlier, where every data item of a particular type must have the same set of attributes. The Extensible Markup Language (XML) is widely used to represent semi-structured data. Historically, the network data model and the hierarchical data model preceded the relational data model.

These models were tied closely to the underlying implementation, and complicated the task of modeling data.

As a result they are used little now, except in old database code that is still in service in some places.