Data Models

A model is a representation of reality, 'real world' objects and events, associations. It is an abstraction that concentrates on the essential, inherent aspects an organization and ignores the accidental properties. A data model represents the organization itself. It should provide the basic concepts and notations that will allow database designers and end users unambiguously and accurately to communicate their understanding of the organizational data.

Data Model can be defined as an integrated collection of concepts for describing and manipulating data, relationships between data, and constraints on the data in an organization.

 A data model comprises of three components:

 • A structural part, consisting of a set of rules according to which databases can be constructed.

• A manipulative part, defining the types of operation that are allowed on the data (this includes the operations that are used for updating or retrieving data from the database and for changing the structure of the database).

• Possibly a set of integrity rules, which ensures that the data is accurate.

 The purpose of a data model is to represent data and to make the data understandable. There have been many data models proposed in the literature. They fall into three broad categories:

* Object Based Data Models
* Physical Data Models
* Record Based Data Models

The object based and record based data models are used to describe data at the conceptual and external levels, the physical data model is used to· describe data at the internal level.

**Object Based Data Models**

Object based data models use concepts such as entities, attributes, and relationships. An entity is a distinct object (a person, place, concept, and event) in the organization that is to be represented in the database. An attribute is a property that describes some aspect of the object that we wish to record, and a relationship is an association between entities.

Some of the more common types of object based data model are:

 • Entity-Relationship

• Object Oriented

• Semantic

• Functional

 The Entity-Relationship model has emerged as one of the main techniques for modeling database design and forms the basis for the database design methodology. The object oriented data model extends the definition of an entity to include, not only the attributes that describe the state of the object but also the actions that are associated with the object, that is, its behavior. The object is said to encapsulate both state and behavior. Entities in semantic systems represent the equivalent of a record in a relational system or an object in an OO system but they do not include behaviour (methods). They are abstractions 'used to represent real world (e.g. customer) or conceptual (e.g. bank account) objects. The functional data model is now almost twenty years old. The original idea was to' view the database as a collection of extensionally defined functions and to use a functional language for querying the database.

**Physical Data Models**

Physical data models describe how data is stored in the [computer](http://ecomputernotes.com/fundamental/introduction-to-computer/what-is-computer), representing information such as record structures, record ordering, and access paths. There are not as many physical data models as logical data models, the most common one being the Unifying Model.

**Record Based Logical Models**

Record based logical models are used in describing data at the logical and view levels. In contrast to object based data models, they are used to specify the overall logical structure of the database and to provide a higher-level description of the implementation. Record based models are so named because the database is structured in fixed format records of several types. Each record type defines a fixed number of fields, or attributes, and each field is usually of a fixed length.

The three most widely accepted record based data models are:

• Hierarchical Model

• Network Model

• Relational Model

The relational model has gained favor over the other two in recent years. The network and hierarchical models are still used in a large number of older databases.