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Data Model- Building Web Applications

Engineering

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Shilpa Rani

M.Tech Student, Department of Computer Science & Engineering,
M/S aggarwal agencies, Renuka ji (dadahu), Himachal Pradesh-173022, India

ABSTRACT

A data model describes the structure of a database, data relationships, data semantics and consistency constraints. In data model, an entity is defines as a type of object, and is simply an aggregate of named attributes, where each attribute is a primitive data element such as a number, string or date. Object database management systems add database functionality to object programming languages. The network model may have many different records containing unique identifiers, each of which acts as an entry point into the record structure. Record types are grouped into sets of two, one or both of which can in turn be part of another set of two record types. There is a hierarchy of parent and child data segments in hierarchical model.

Introduction
A data model is a collection of concepts that can be used to describe the structure of a database, data relationships, data semantics and consistency constraints.

A strong database model will also enable various ways to manage, control, and organize the stored information to effectively execute multiple key tasks. In the design phase, database diagrams will provide needed documentation of the data links that facilitate database functionality.

There are some common databases modeling methods.

I. Object-based Logical Models

- The E-R Model
- The Object-Oriented Model

II. Record-based Logical Models

- The Relational Model
- The Network Model

The Hierarchical Model

III. Physical Data Models
Depending on the type of data and end user needs when accessing the database, it is possible to employ multiple models to create a more sophisticated database design.

I. Object-based Logical Models
It describes at the conceptual and view levels. It provides fairly flexible structuring capabilities. Under this model we have 30 such models which include entity-relationship model, object oriented model, binary model, semantic data model, info logical model and functional data model. But at this point we talk about the two E-R models and object oriented models.

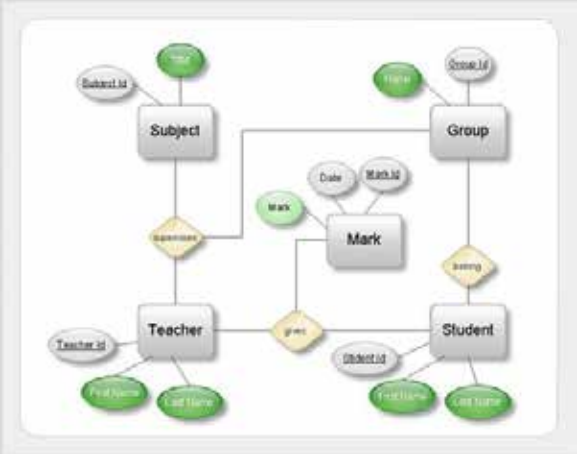
- **The E-R or entity relationship Model**

It is the graphical representation of the entities and the relationships between those entities. An entity defines a type of object, and is simply an aggregate of named attributes, where each attribute is a primitive data element such as a number, string or date. We require that all instances of an entity type have the same set of attributes.

In data modeling, an entity-relationship model (ERM) is a representation of structured data; entity-relationship modeling is the process of generating these models. The end-product of the modeling process is an entity-relationship diagram (ERD), a type of Conceptual Data Model or Semantic Data Model as shown in figure 1.

In this fig. student, group, teacher and subject are the entities and the one shown within a circle are the attributes of that particular entity and the diamond shape called as relation between the two entities.

Entity- relationship model
Figure 1



- **The Object-Oriented Model**

Object database management systems add database functionality to object programming languages. This model bring much more than persistent storage of programming language objects. One-to-one mapping of object programming language objects to database objects has two benefits over other storage approaches: it provides higher performance management of objects, and it enables better management of the complex interrelationships between objects.

II. Record-based Logical Models
The record version of the data model is used to assist the implementation team by providing a series of schematics of the file that will contain the data that must be built to support the business processing procedures. These record data model schematics may be extended to include the physical parameters of file implementation, although this is not a prerequisite activity. These data models have much the same relationship to the building of the physical files and program specifications have to the program code produced by the programmers. In these cases, the data analysis activities are all focused on developing the requirements for and specifications of those files.

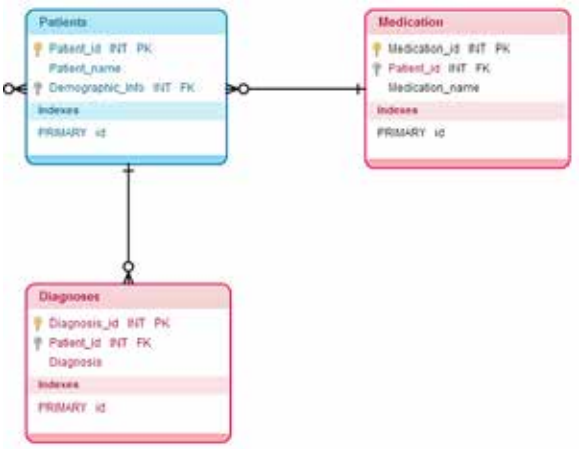
These models are developed for the express purpose of describing the "structure of data".

- **The Relational Model**

The relational model is the best known and in today's DBMS most often implemented database model. It defines a database as a collection of tables (relations) which contain all data.

This module deals predominantly with the relational database model and the database systems based on it.

Relational model
Figure 2



As shown in figure 2. There are showing a relationship between patient and medication and diagnoses.

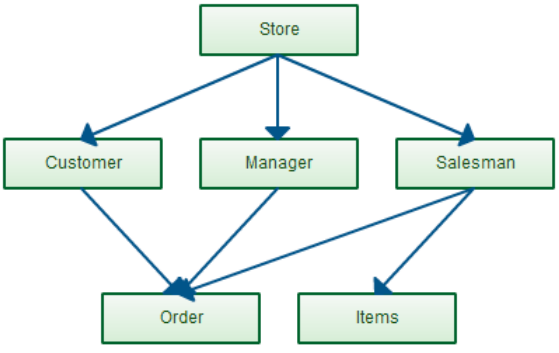
- **The Network Model**

The network data model (figure 3) has no implicit hierarchic relationship between the various records and in many cases no implicit structure at all, with the records seemingly placed at random. The network model does not make a clear distinction between subjects mingling all record types in an overall schematic.

The network model may have many different records containing unique identifiers, each of which acts as an entry point into the record structure. Record types are grouped into sets of two, one or both of which can in turn be part of another set of two record types. Within a given set, one record type is said to be the owner record and one is said to be the member record. Access to a set is always accomplished by first locating the specific owner record and then following the chain of pointers to the member records of the set.

The network can be traversed or navigated by moving from set to set. Various different data structures can be constructed by selecting sets of records and excluding others.

Network model
Figure 3



- **The Hierarchical Model**

The hierarchical data model (figure 4) organizes data in a tree structure. There is a hierarchy of parent and child data segments. This structure implies that a record can have repeating information, generally in the child data segments. In this, the data is in a series of records, which have a set of field values attached to it. It collects all the instances of a specific record together as a record type.

Hierarchical model
Figure 4

IV. Physical Data Models-
This model is used to describe data at the lowest level.

Very few models are
- Unifying model.
- Frame memory.

Comparison of Data Models
Insert operation
Hierarchical data model- We cannot insert the information of a child who does not have any parent.

Network data model-Network model does not suffer from any insert anomaly.

Relational data model- Relational model does not suffer from any insert anomaly.

Update operation
Hierarchical data model- There is multiple occurrences of child records, which lead to problem of inconsistency during the update operation.

An entity Relationship model is modelled as a collection of entities and relationship between these entities. Network data model-

Network model is free from update anomalie**s** because there is only a single occurrence for each record set.

Relational data model - Relational model is free from update anomalies because it removes the redundancy of data by proper designing.

Delete Operation
Network data model- It is based upon many to many relationship which make it free from delete anomalies

Relational data model- Relational model is also free from delete anomalies because information is stored in different tables.

Retrieve Operation
Retrieve algorithms are complex and asymmetric for Hierarchical, as well as Network and Relational data model.

Conclusion
Data model are of many types and they all are used for making structure of a program. Firstly create the structure and then form a model is become easy to develop. In data model we have many operations like insertions, deletion, and update and retrieve operation and each model having different movements for each operation and having different rules.

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