COMPARISON OF GENERATION OF DATABASES

Gayathiri Shriram (ms5754)

CSU Eastbay

Abstract

This research paper looks at various database models. The purpose of this paper is to study Hierarchical/Network, Relational and Object-Oriented databases. The idea is to present these database implementations and designs. We start with an overview of each model then proceed to the comparisons between these models and finally present the advantage and uniqueness of each model in detail.

GENERATION OF DATABASES

Overview

Hierarchical/ Network Database Model:

Hierarchical database model is a data model in which the data are stored in a tree like structure. The data is stored as records and the records are connected to one another through links. The records are identified through its entity types as these entity types correspond to the fields the record contains. In this model each child record can have only one parent where as a parent can have more than one child record. In other words this database models confides to one- many relationship. This database model was very famous in early dataset design**.**

While the hierarchical model allows a child to have only one parent, the network model allows each record to have multiple parents and child. In short this model can be seen as a upside down tree and follows many-many relationship. Networks such as IDS, IDMS, RDM Embedded RDM server, Univac use network model designs.

Relational Database Model:

In a relational database model the data's are organized as tuples and the tuples are connected together through relations. This model provided a declarative method of data representation where the data's are represented with logic irrespective of the control flow. The relational database model used SQL queries for accessing the data in the database. When talking about tuples the data are represented as mathematical n-ary relationships, this paves way for logical representation of information. Constraints are given importance in this model. Following constraints in a database design provides consistency.

We said the tuples are connected to each other through relation and this relation is visually represented in the form of tables where row corresponds to the tuples. In short, table is visual representation of relation, tuples corresponds to the rows and attributes correspond to columns. The data in the table is accessed through SQL queries.

Object Oriented Database Model:

Object oriented database model is a DBMS system where the information is stored as objects. This model combines object oriented programming language concepts along with database capabilities. In this model the database is integrated with programming language hence the programmer can maintain one environment that provides consistency in the data base design. It is best to use this model when the data or the relation between data is complex.

The object database model also has some query language to access the data. One such query language by ODGM is object query language. The objects are identified with state and behavior and unique object identifier is used to identify the object. Also various OOPS concepts are used in the database design. The most basic OOPS concept is abstraction, encapsulation and inheritance.

Database Model Similarities

All the database models deal with data representation and ways to access the stored the data. The data's are arranged either records, tuples or objects and connected to each other through relation be it tables, nodes.

Comparison between database models

	Hierarchical/Network	Relational	Object Oriented
DataModel Representation	Data is organised in a tree structure	Data is organised in forms of predicate logic and set theory	Data is organised as executable code as well as data
Storage Structure	Data is stored as records and they are connected to each other through links	Data is stored as attributes, relation and domain	Data is stored as objects
Integrity Constraints	One to many relationship	Follows some key constraints for consistency also normalized so the data's are not repeated	The data needs to be represented as simple string, integer or real data number
Data Languages	Data can be easily accessed because of the linkage between the data	SQL is main query language used to access the data	ObjectQueryLanguage is used to access the data

Advantages of object database over RDBMS

The data model of object database is based on the real world. It works well for distributed architecture and also easy navigation. Access to data is faster as joins are not required. When massive amounts of data about a single item are required then this model is the best. This model can be programmed with small procedural

Difference without affecting the entire system.

Disadvantage of object database over RDBMS

The efficiency is low when data is small and relation between is simple. At present object database is not so popular hence the tools available are very less. The standards used by RDBMS are stable. Relational tables are simpler and user friendly.

Advantages of relational data model over hierarchical model

The structure of relational data model is very flexible and satisfies almost all basic rules. Different data from different locations can be viewed simultaneously. The addition and deletion of data is also very easy without changing the entire table structure.

Disadvantages of relational database model over hierarchical model

When an operation involves sequential search relational model is not such a good model. The time consumption is very high during sequential search. Also they are expensive. The relational model is not adequate to represent the real world and its relationship.

Reference List

1. http://en.wikipedia.org/wiki/Database_model
2. E.F. Codd (1970). "A relational model of data for large shared data banks"
3. http://en.wikibooks.org/wiki/Relational_Database_Design
4. An Introduction to Database Systems, 8th Edition, C J Date
5. Eor.berkeley.edu/.../215-OODB.pp