

Unit VIII

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Data modeling

Data modeling is **the process of creating a simplified diagram of a software system and the data elements it contains, using text and symbols to represent the data and how it flows.**

Data models provide a blueprint for designing a new database or reengineering a legacy application.

This popular data model example **arranges the data into tables.** The tables have columns and rows, each cataloging an attribute present in the entity. It makes relationships between data points easy to identify. For example, e-commerce websites can process purchases and track inventory using the relational model.

The process of logical Data Modeling

A logical data model is like **a graphical representation of the information requirements of a business area.**

It is not a database or database management system itself.

A logical data model is independent of any physical data storage device, such as a file system.

Strategic-data-modeling

Strategic data modeling is the process of designing data models that support the long-term goals of an organization.

It involves identifying the data assets that are most critical to the organization and determining how they can be structured and integrated to support the organization's goals. This typically involves developing a comprehensive view of the organization's data landscape, including both internal data sources and external data sources.

The goal of strategic data modeling is to create a data architecture that is flexible, scalable, and able to support the organization's evolving needs.

Strategic-data-modeling

Many organizations select application development projects based on the strategic information system plans and strategic planning is separate component is most of the organization.

Strategic planning produces an information system strategy plan defines the overall vision and architecture for information systems. Most strategic data modeling approach includes the enterprise data model . Information engineering is the methodology that uses this approach.

The enterprise data models identifies only the fundamental entities but are not defined in terms of their key attributes and even the relationships may not be defined. The enterprise data model is stored in the stored in the corporate repository and user whenever the application development project is started.

An enterprise data model is **a type of integration model that covers all (well, probably most in practice) of the data of an enterprise**. Your Enterprise Architecture may include enterprise-wide data models that are also conceptual, logical, or physical data models.

Data Model During System Analysis

During the system analysis phase of the software development process, a data model is a conceptual representation of the data structures that are required by a proposed system.

It is used to define and analyze the data requirements for a system, and to communicate the results of this analysis to stakeholders such as system designers, developers, and users.

The data model represents the data structures that will be required to store, retrieve, and manipulate the data needed by the system, and the relationships between different data elements.

It can be expressed using a variety of modeling techniques, such as entity-relationship diagrams (ERDs), class diagrams, and data flow diagrams (DFDs). The data model is an important part of the system analysis process because it helps to ensure that the system is designed to meet the data requirements of the organization and to support the business processes that it will be used for.

Data Modeling During System Design

During the system design process, **the logical model is transformed into a physical data model call the database schema.** This model **represents the technical capabilities and limitations of that database technology as well as the performance control for the database administrator.**

Automated Tools For Data Modeling

Data modeling can be performed by using the automated tools as well

Various tools like **CASE and CAD can be used to store the information and the detailed descriptions of the data model** .Most of the automated tools support the data modeling and the database design for a system development.

Using the automated tools, we can create professional data models without use of the templated and other conventional tools ,The models can be easily modified can be started over again. They also provide analytical tools to check for mechanical errors, completeness and consistency.

How to construct Data Model

1. Entity Discovery
2. The Context Data Model
3. The Key-Based Data Model
4. Generalize Hierarchies
5. Develop A fully Attributed Data Model

Entity Discovery

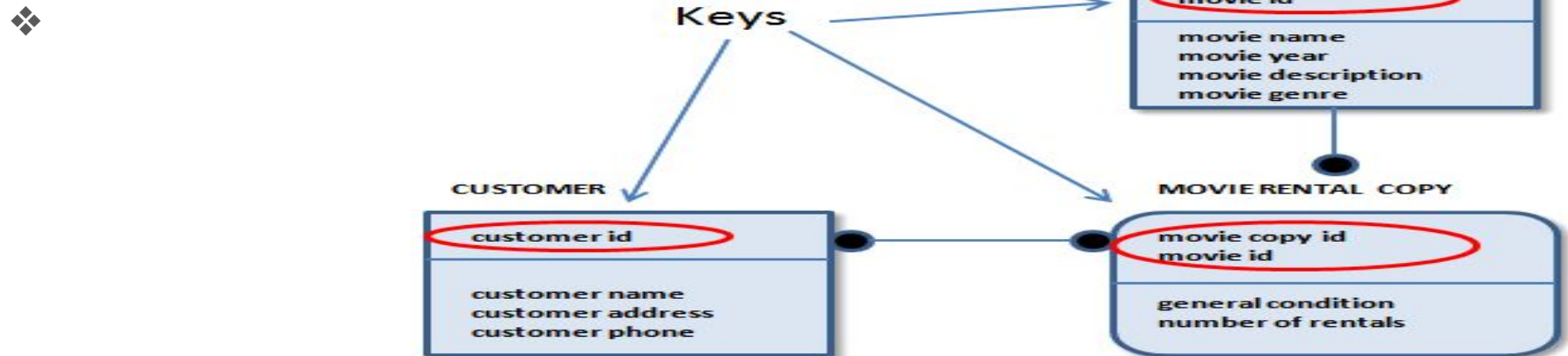
- ❖ The first task in data modeling is relatively easy. We need to discover the fundamental entities in the system that are or might be described by data. As entities are discovered give them simple, meaningful, business-oriented names.
- ❖ Entities should be names with nouns that describe the person, event, place, object, or thing about which we want to store data. Names should be singular so as to distinguish the logical concept of the entity from the actual instances of the entity.
- ❖ Entity names and definitions should establish an initial glossary of business terminology that will serve both current and future analysts and users for years.

The Context Data Model

- ❖ The next task in data modeling is to construct the context data model. The context data model should include the fundamental business entities that were previously discovered as well as their natural relationships.
- ❖ Relationships should be named with verb phrases that, when combined with the entity names, form simple business sentences or assertions. Some CASE tools, such as SYSTEM ARCHITECT, let the system analyst name the relationships in both directions. Otherwise, always name the relationship from parent to child.

The Key-Based Data Model

- ❖ The next task is to identify the keys of each entity. While developing this model, we have to care for a couple of things. If we are unable to define keys for any entity, it may not really exist.
- ❖ Also if two or more entities have identical key, they are in all likelihood the same entity. Assigning keys is a good quality check before fully attributing the data model.



Generalize Hierarchies

- ❖ At this time, it would be useful to identify any generalization hierarchies in the business domain. Subsequent discussions did uncover a generalization hierarchy. Thus, our key-based model was revised.
- ❖ We had to lay out the model somewhat differently because of the hierarchy; however, the relationships and keys that were previously defined have been retained.

Develop A fully Attributed Data Model

To accomplish this task, we must have a thorough understanding of the data attributes for the system. These facts can be discovered using top-down approaches or bottom-up approaches. If an enterprise data model exists, some of the attributes may have already been identified and recorded in a repository.

Analyzing the Data Model

1. What is a Good Data Model ?

A good data model is simple. The data attributes that describes any given entity should describe only the entity

A good model is non redundant

A Good model should be flexible and adaptable to future needs

2. Data Analysis

Data analysis is a technique **to improve a data model** in preparation for the database designing process. It is a process that **prepares a data model** for implementation as a **simple, non redundant , flexible and adaptable** database. This techniques is also as **normalization**

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