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Lecture: (2)

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Data Model

Is a relatively simple representation, usually graphical, abstraction of a more complex real world object event. a data model represents data structures and their characteristics, relations, constraints, transformations, and other constructs with purpose of supporting a specific problem domain.

The Importance of Data Models

Data models can facilitate interaction among the designer, the applications programmer, and the end user, a well- developed data model can even faster improved understanding of the organization for which the database design is developed.

Data Model Basic Building Blokes

Entity: is anything (a person, a please, a thing, or an event) about which data are to be collected and stored. An entity represents a particular type of object in the real-world entities are "distinguishable" that is each entity occurrence is unique and distinct. For example, a CUSTOMER entity would have many distinguishable customer occurrences such as Ahmed, Ali, etc.

Attribute: is a characteristic of an entity. For example, a CUSTOMER entity would be described by a attribute such as customer last name, customer first name, its equivalent of fields in the file systems

Relationship: describes an association among entities for example a relationship exists between customers and agents that can be described as follows: an agent can serve many customers, and each customer may be served by one agent.

Data models use three types of relationships:

- one-to-one(1:1 OR 1..1) relationship
A retail company's management structure may require that each of its stores be managed by a single employee. In turn, each store manager, who is an employee, managed only a single store.

- one-to-many (1:M or 1..*)relationships
  A painter paints many different paintings, but each one of them is painted by only one painter.
- Many-to-many (M: N or *..*) relationship
  employees may learn many job skills many be learned by many.

Constraint: is a restriction placed on the data. Constraints are important because they help to ensure data integrity. And it's normally expressed in the form of rules.

- An employee's salary must have values that are between 6000 and 350000
- Each class must have one and only one teacher.

Business Rules

From a database point of view, the collection of data becomes meaningful only when it reflects properly defined business rules. It's a brief, precise, and ambiguous description of a policy, procedure, or principle within a specific organization.

Business rules, derived from a detailed description of organizations operations, help to create and enforce actions within that organizations environment, business rules must be rendered in writing and updated to reflect any change in the organizations operational environment, and it must be easy to understand, for example:

- A customer may generate many invoices.
- An invoice is generated by only one customer.
- A training session can not be scheduled for fewer than 10 employees or for more than 30 employees.

Business rules is essential to db design for several reasons:

- They help standardize the company's view of data.
- They can be a communications tool between users and designers.
- They allow the designer to understand the nature, role, and scope of the data.
- They allow the designer to understand business processes.

- They allow the designer to develop appropriate relationship participation rules and constraints and to create an accurate data model.

Translating Business Rules into Data Model

- A noun in business rule will translate into an entity in the model.
- Verb associating nouns will translate into a relationship among the entities.

Example: "a customer may generate many invoices"

- Customer and invoice are objects of interest for the environment and should be represented by their respective entities.
- There is a "generate" relationship between customer and invoice.