Topic 2.1: The Importance of Data Models

What is a Data Model?

A model is an abstraction of a more complex real-world object or event. A data model is the relatively simple representation, usually graphical, of complex real-world data structures.

The model's main function is to help us understand the complexities of the real-world environment.

Within the database environment, a data model represents data structures and their characteristics, relations, constraints, and transformations. Good database design uses an appropriate data model as its foundation.

A data model provides a blueprint of the data that is required for a functional system.

Why Data Model?

The database designer uses data models to facilitate the interaction among designers, application programmers, and end users. In short, a good data model is a communications device that helps eliminate (or at least substantially reduce) discrepancies between the database design's components and the real world data environment. The development of data models, reinforced by powerful database design tools, has made it possible to substantially reduce the potential for database design errors.

The importance of data modeling cannot be overemphasized. Data constitute the most basic information units employed by a system. Applications are created to manage data and to help transform data into information. But data are viewed in different ways by different people. Even different managers in the same organizations would tend to view data differently.

Example: A company president is likely to take a universal view of the data because he must be able to tie the company’s divisions to a common (database) vision. A purchasing manager on the other hand would have a much more restricted view of the data, as is the company’s inventory manager. In effect, each department manager works with a subset of the company’s data. An inventory manager will be more concerned with inventory levels, while the purchasing manager will be more concerned with item costs and personal/business relations with the suppliers of those items.

The different users and producers of data and information often reflect the “blind person and the elephant” analogy: The blind person who felt the elephant’s trunk
had quite different view of the elephant from those who felt the elephant’s leg or tail. What we need is the ability to see the whole elephant. If we are going to build a house, we should first have the overall view provided by its blueprint. Likewise, a sound data environment requires overall database blueprint based on an appropriate data model.

We need to remember that the blueprint is only an abstraction and not a reality; we cannot live in the blueprint. Similarly, the data model is also an abstraction; we cannot draw the required data out of the data model. Just, as we are not likely to build a good house without a blueprint, we are equally unlikely to create a good database without first selecting an appropriate data model.

**Concept Check**

What is a data model?

Why do we need to do data modeling?