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Week #6: Data Modeling

Problem Statement

Data modeling is the process of creating a data model by using some techniques.[1] This article will evaluate 4 different methods of data modeling and then try to state the differences between them.

References

[1] Wikipedia. Data modeling - wikipedia. `https://en.wikipedia.org/wiki/Data_modeling`. Accessed April 3, 2018.

[2] David C. Hay. A comparison of data modeling techniques. `http://www.essentialstrategies.com/publications/modeling/compare.htm`. Accessed April 5, 2018.

Overview of Data Modeling

As stated before, data modeling is the process of creating a data model. Data modeling is a very helpful scratch when people from different fields want to understand or share the design and concepts of the database.

There are various techniques that can be used in data modeling. And IE[1], IDEF1X[2], UML[3], and E-R Diagram[4] are the most commonly used among those techniques.

Critical Thinking

Table 1: The Differences Between IE, IDEF1X, UML, and E-R Diagram

Method	*Entities*	*Attributes*	*Relationships*
IE	square-cornered rectangles	null	solid lines; no FKs
IDEF1X	sqaure-cornered or round-cornered rectangles	null	solid or dashed lines
UML	square-cornered rectangles	inside entity boxes	solid lines
E-R Diagram	squared-cornered rectangle	in circles outside entity boxes	rhombus symbol

[1] Information Engineering
[2] Integration DEFinition for information modeling
[3] Unified Modeling Language
[4] Entiy-Relation Diagram

Question

When I looked up for the information of data modeling, I found there are 3 types of data models, namely conceptual data models, logical data models, and physical data models.[1].

What are these three kinds of data models and under what circumstances should we use each of them?

Method

Describe how you are going to answer your own question stated above.

Analysis and Discussion

Among the three kinds of data models, the conceptual data models are the most high-level one. It hides the detailed information of database that users want. They usually include the important entities and the relationships among them. But in a conceptual data model, neither attribute nor primary key is specified.

While for a logical data model, things are getting more detailed. A logical data model will describe the data in the database as exhaustively as possible but do not care how to implement. It contains all entities and relationships among the entities. Compared with the conceptual data model, a logical data model will specify all the attributes primary keys, foreign keys, and so on.

A physical data model will not only describe the data in the database in detail, but also will show how the database will be built. Apart from all the information that a logical data model provides, a physical data model will specify all table names, column names, and column types. It is the most detailed among the three kinds data models above.

When we only need to have a general understanding of the concept and structure of the database, we can use the conceptual data model. A conceptual data model is usually the draft of the design of database. Usually we need a more detailed design so that we can evaluate and analyze the rationality and correctness of our design. That's we we should use a logical data model. And before we impelment our design, we should get a physical data model.