DATA MODELING

BY

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Introduction

- Process of creating a data model for an information system by applying formal data modeling techniques.
- Process used to define and analyze data requirements needed to support the business processes.
- Therefore, the process of data modeling involves professional data modelers working closely with business stakeholders, as well as potential users of the information system.

What is Data Model

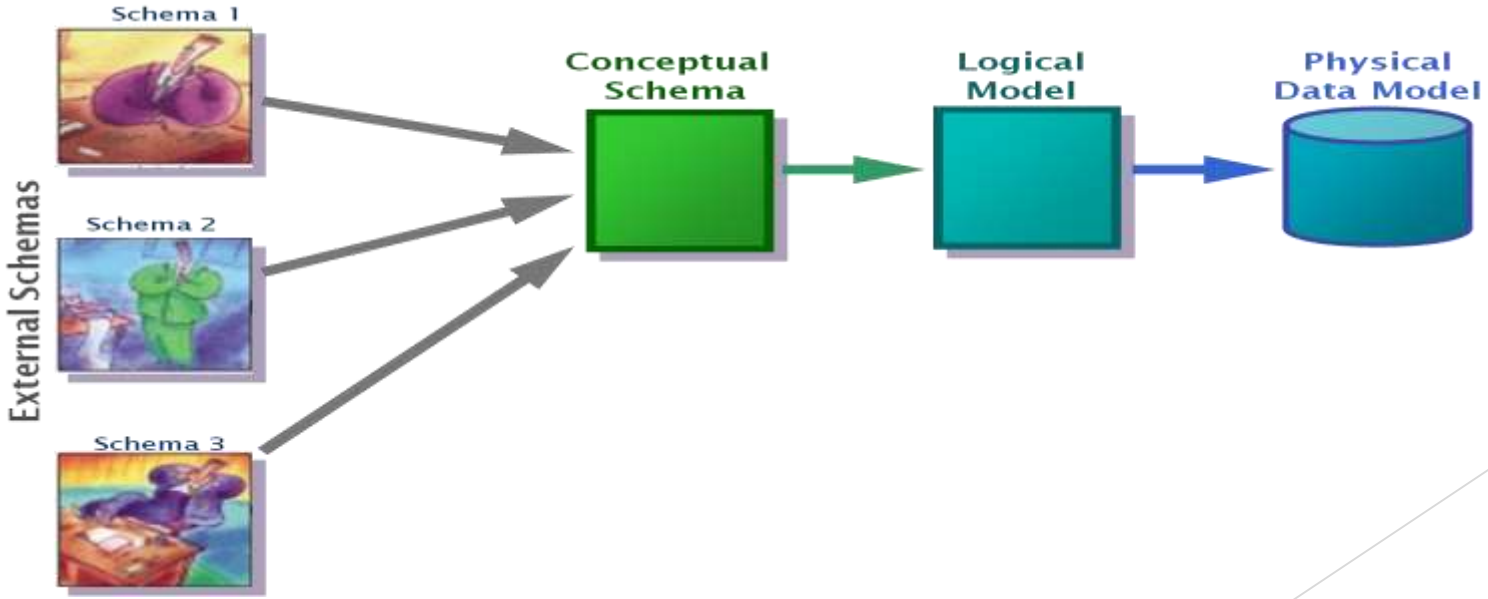
- Data Model is a collection of conceptual tools for describing data, data relationships, data semantics and consistency constraint.
- A data model is a conceptual representation of data structures required for data base and is very powerful in expressing and communicating the business requirements.
- A data model visually represents the nature of data, business rules governing the data, and how it will be organized in the database.

- A data model provides a way to describe the design of a database at the physical, logical and view levels.

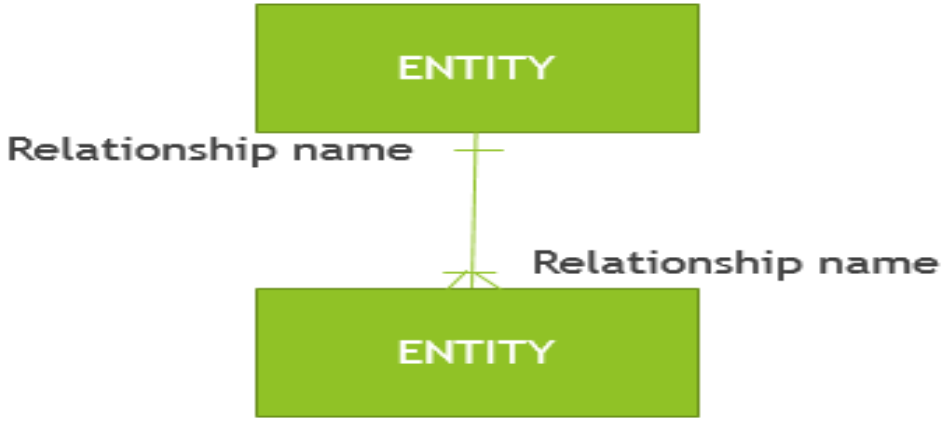
- There are three different types of data models produced while progressing from requirements to the actual database to be used for the information system

Different Data Models

- Conceptual: describes WHAT the system contains.
- Logical: describes HOW the system will be implemented, regardless of the DBMS.
- Physical: describes HOW the system will be implemented using a specific DBMS.



A data model consists of entities related to each other on a diagram:



Data Model Element	Definition
Entity	A real world thing or an interaction between 2 or more real world things.
Attribute	The atomic pieces of information that we need to know about entities.
Relationship	How entities depend on each other in terms of why the entities depend on each other (the relationship) and what that relationship is (the cardinality of the relationship).

Example:

Given that …

- “Customer” is an entity.
- “Product” is an entity.
- For a “Customer” we need to know their “customer number” attribute and “name” attribute.
- For a “Product” we need to know the “product name” attribute and “price” attribute.
- “Sale” is an entity that is used to record the interaction of “Customer” and “Product”.

Here is the diagram that encapsulates these rules:

Notes

- By convention, entities are named in the singular.
- The attributes of “Customer” are “Customer No” (which is the unique identifier or primary key of the “Customer” entity and is shown by the # symbol) and “Customer Name”.
- “Sale” has a composite primary key made up of the primary key of “Customer”, the primary key of “Product” and the date of the sale.
- Think of entities as tables, think of attributes as columns on the table and think of instances as rows on that table:

Customer *(entity)*

No *(attribute)*	Name *(attribute)*	
10	Fred Bloggs	*(instance)*
67	Freda Jones	*(instance)*

Sale

Customer No	Product Code	Date
10	101	21/2/2020
67	452	22/2/2020

Product

Code	Name	Price
101	Flange	£123.00
452	Blitwort	£34.50

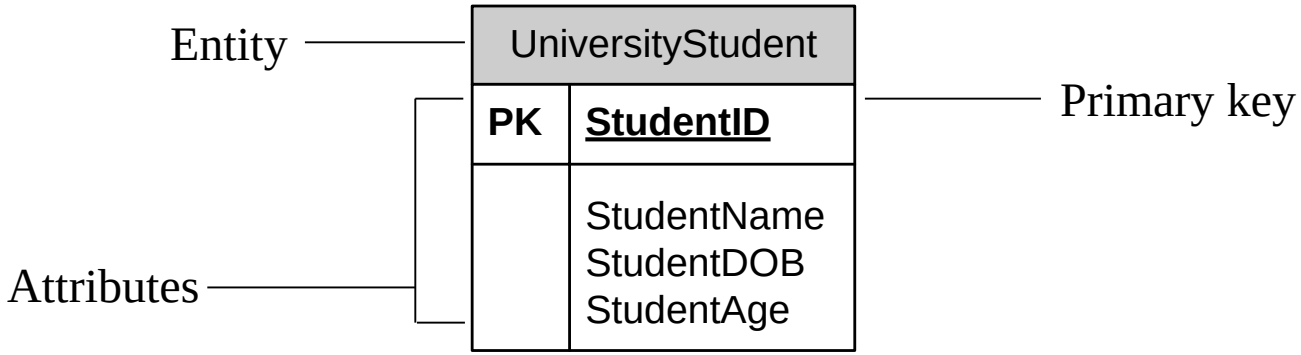
- If we want to know the price of a Sale, we can 'find' it by using the "Product Code" on the instance of "Sale" we are interested in and look up the corresponding "Price" on the "Product" entity with the matching "Product Code".

Types of Data Models

- Entity-Relationship (E-R) Models
- UML (unified modeling language)

Entity-Relationship Model

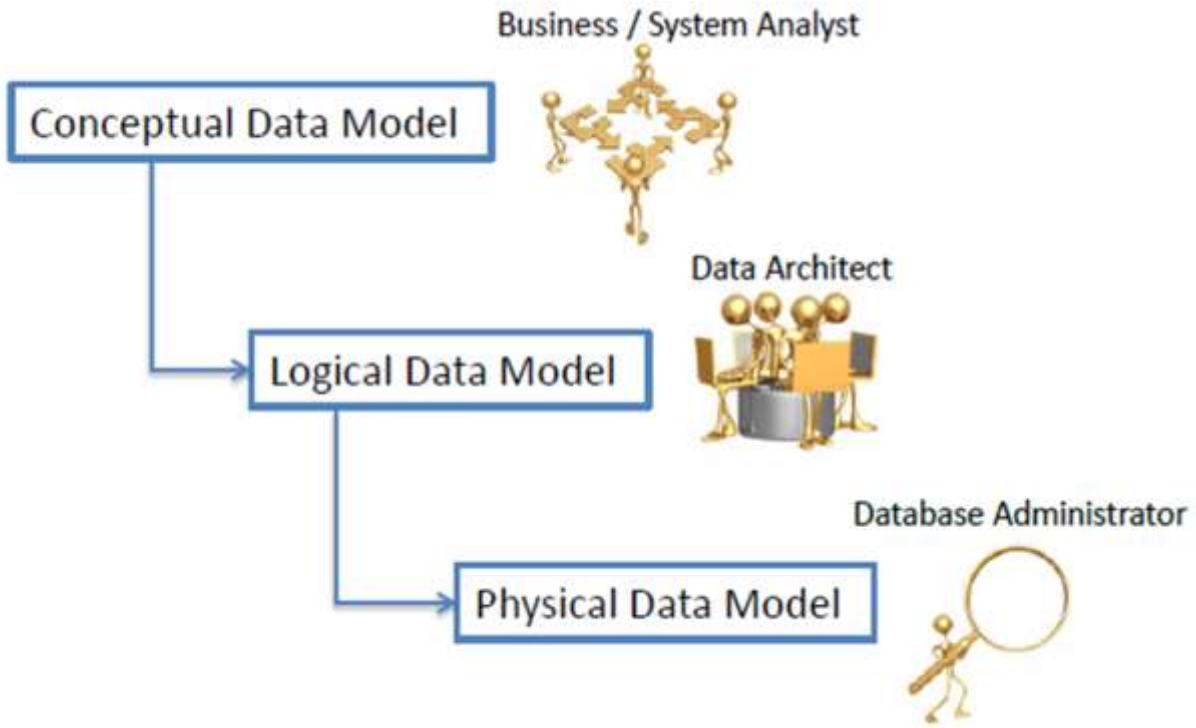
- Entity Relationship Diagrams (ERD) as this is the most widely used
- ERDs have an advantage in that they are capable of being normalized



- Represent entities as rectangles
- List attributes within the rectangle

Why and When

- The purpose of a data model is to describe the concepts relevant to a domain, the relationships between those concepts, and information associated with them.



- Used to model data in a standard, consistent, predictable manner in order to manage it as a resource.
- To have a clear picture of the base data that your business needs.
- To identify missing and redundant base data.

- To Establish a baseline for communication across functional boundaries within your organization.
- Provides a basis for defining business rules.
- Makes it cheaper, easier, and faster to upgrade your IT solutions.


THANK
YOU