SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

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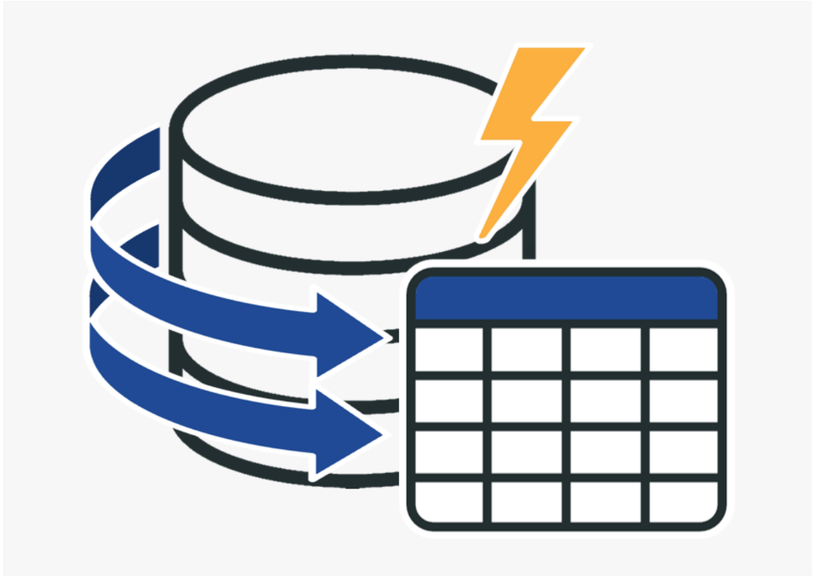


DATA MODELS

COURSE : 23CAT- Database Management System

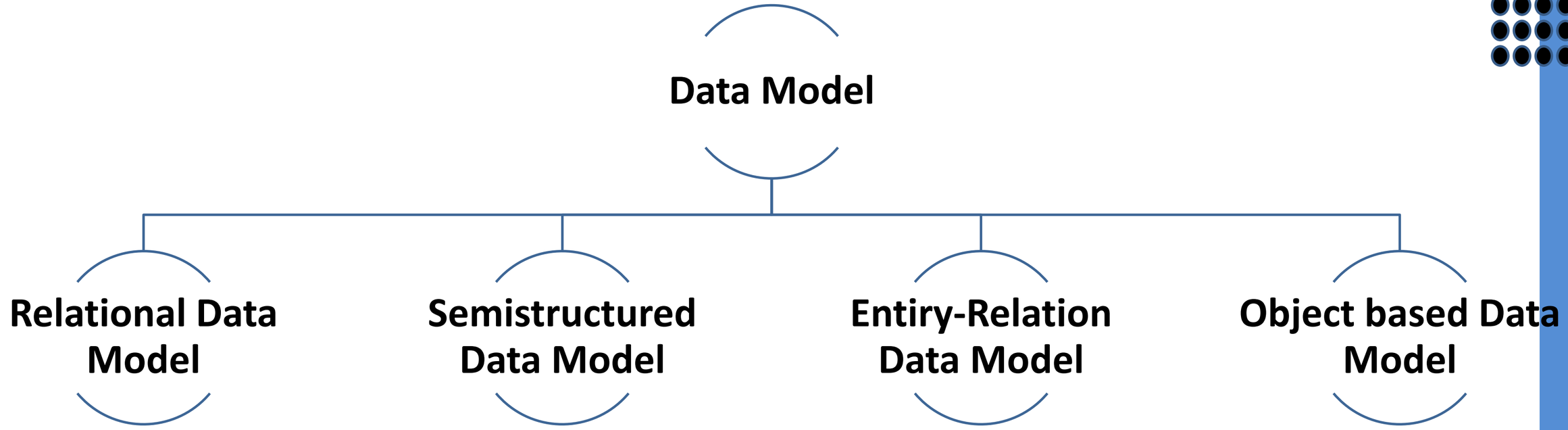
UNIT I : Introduction

CLASS : I Semester / I MCA

Data Model

- A data model is a collection of high-level data description constructs that hide many low-level storage details
- It contains data description, data semantics, and consistency constraints of the data.
- A semantic data model is a more abstract, high-level data model that makes it easier for a user to come up with a good initial description of the data in an enterprise
- It provides the conceptual tools for describing the design of a database at each level of data abstraction.

Data Models


Data Model
Relational Data Model
Semistructured Data Model
Entiry-Relation Data Model
Object based Data Model

Relational Model

- It designs the data in the form of rows and columns within a table.
- A Relational model uses tables for representing data and in-between relationships, described by Edgar F. Codd, in 1969
- Used by commercial data processing applications.

A description of data in terms of a data model is called a **schema**

Example: *Students(sid: string, name: string, login: string, age: integer, gpa: real)*

Tables are also called R**elations**

sid	*name*	*login*	*age*	*gpa*
53666	Jones	jones@cs	18	3.4
53688	Smith	smith@ee	18	3.2
53650	Smith	smith@math	19	3.8
53831	Madayan	madayan@music	11	1.8
53832	Guldu	guldu@music	12	2.0

Integrity Constraints, which are conditions that the records in a relation must satisfy

Relational Model Example

Table also called Relation

Primary Key

Domain
Ex: NOT NULL

CustomerID	CustomerName	Status
1	Google	Active
2	Amazon	Active
3	Apple	Inactive

Tuple OR Row

Total # of rows is Cardinality

Column OR Attributes

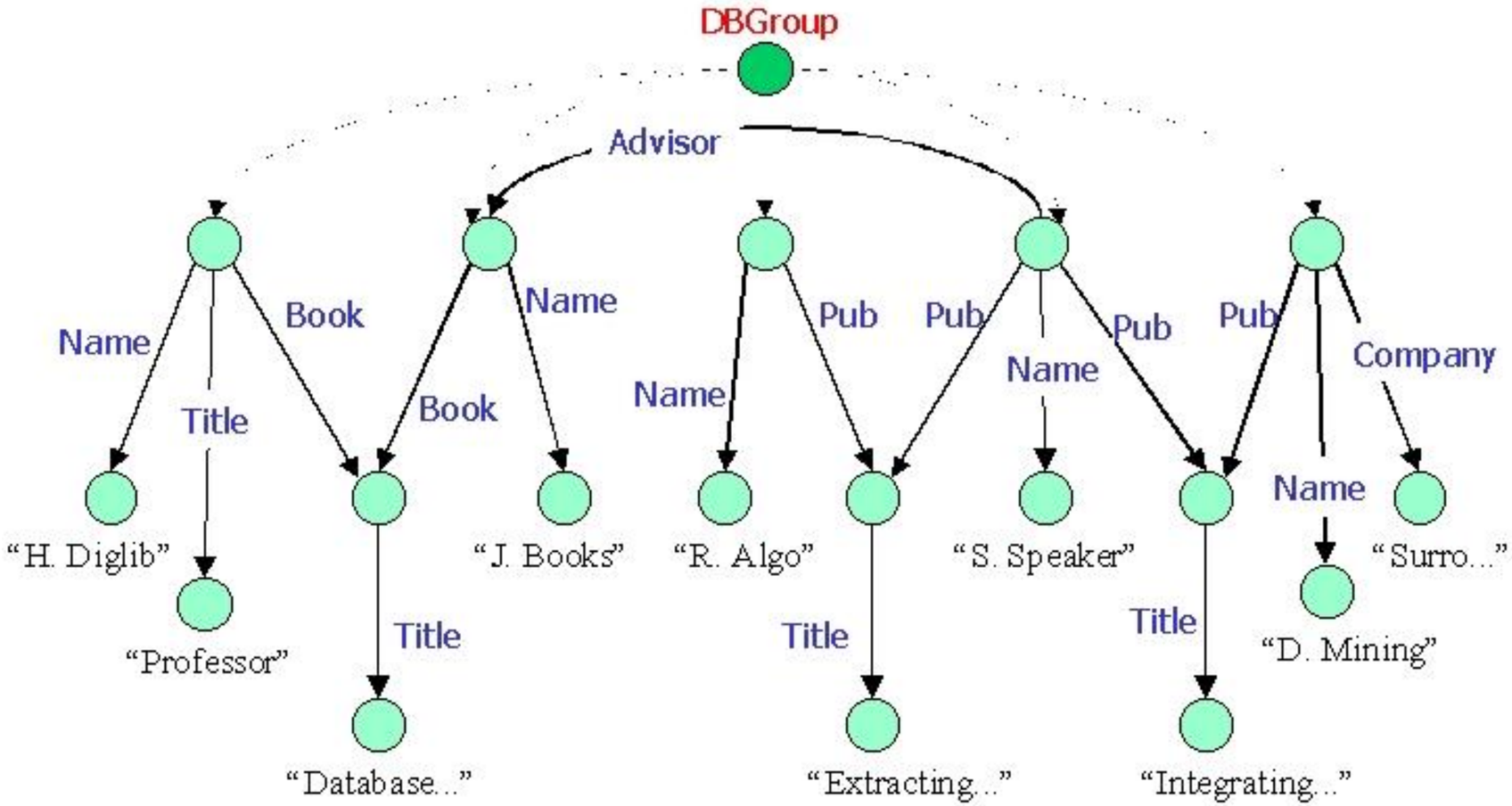
Total # of column is Degree

Semi Structured Data Model

- It allows the data specifications at places where the individual data items of the same type may have different attributes sets.
- The Extensible Markup Language (XML) is widely used for representing the semistructured data.
- Although XML was initially designed for including the markup information to the text document, it gains importance because of its application in the exchange of data.

Semi Structured Data Model

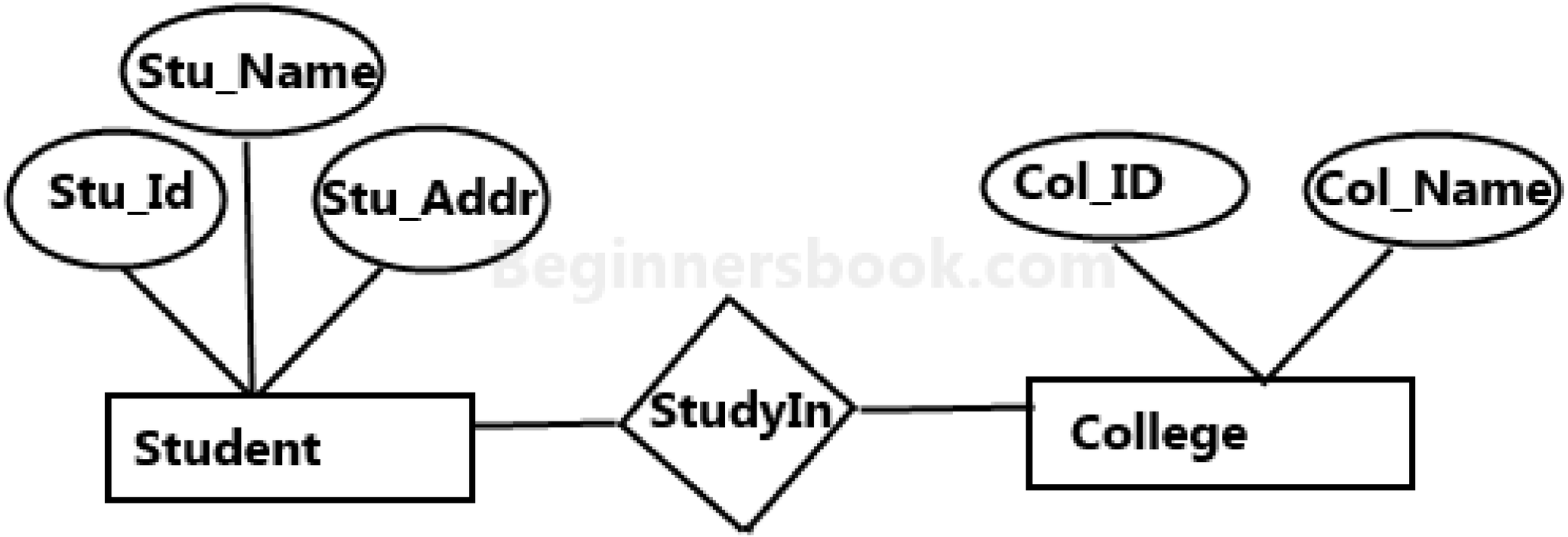
Semistructured Data: Example



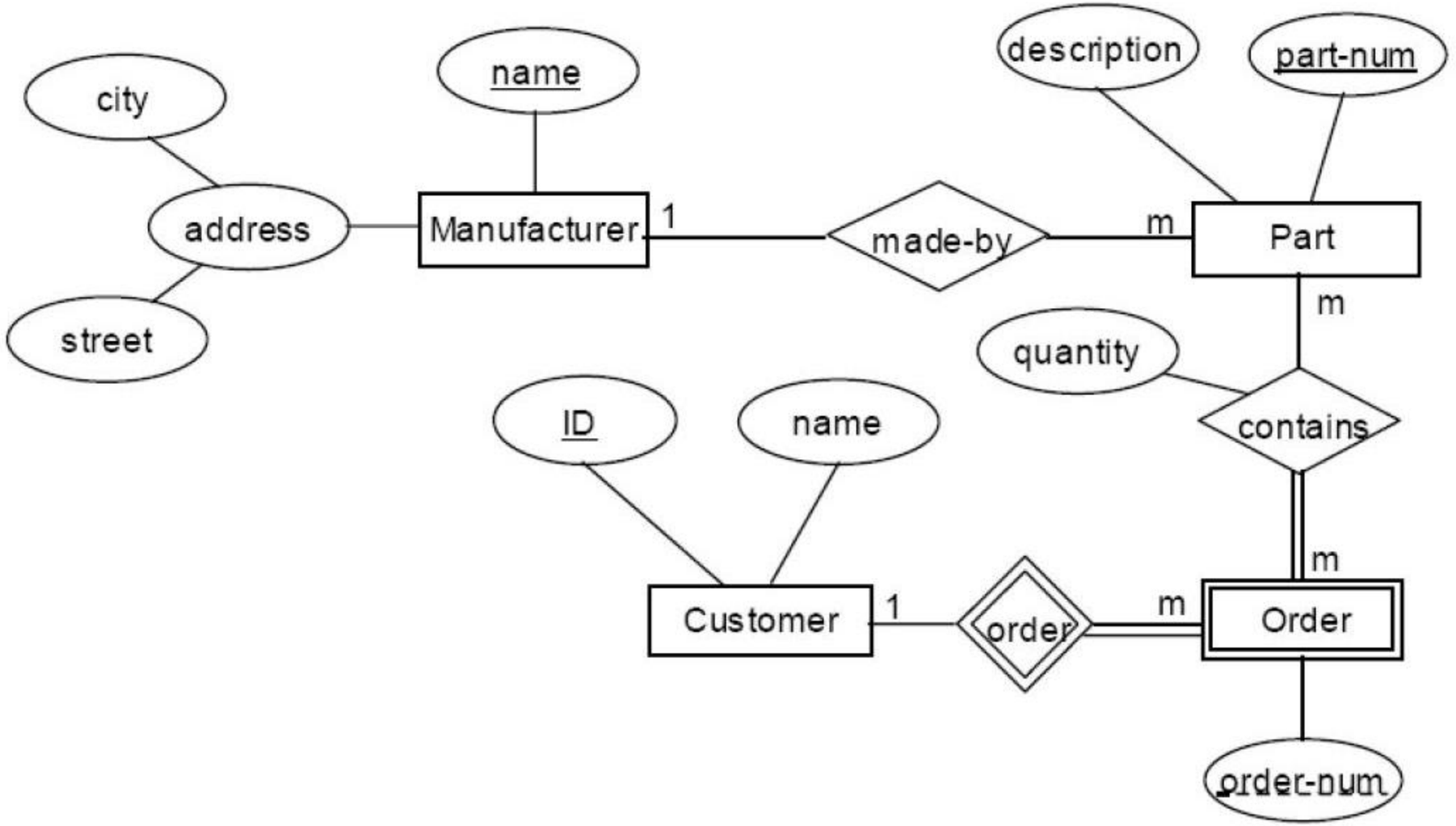
Entity Relationship Model

- An ER model is the logical representation of data as objects and relationships among them.
- These objects are known as entities, and relationship is an association among these entities.
- This model was designed by Peter Chen.
- It was widely used in database designing.
- For example, student_name, student_id describes the 'student' entity.
- A set of the same type of entities is known as an 'Entity set', and the set of the same type of relationships is known as 'relationship set'

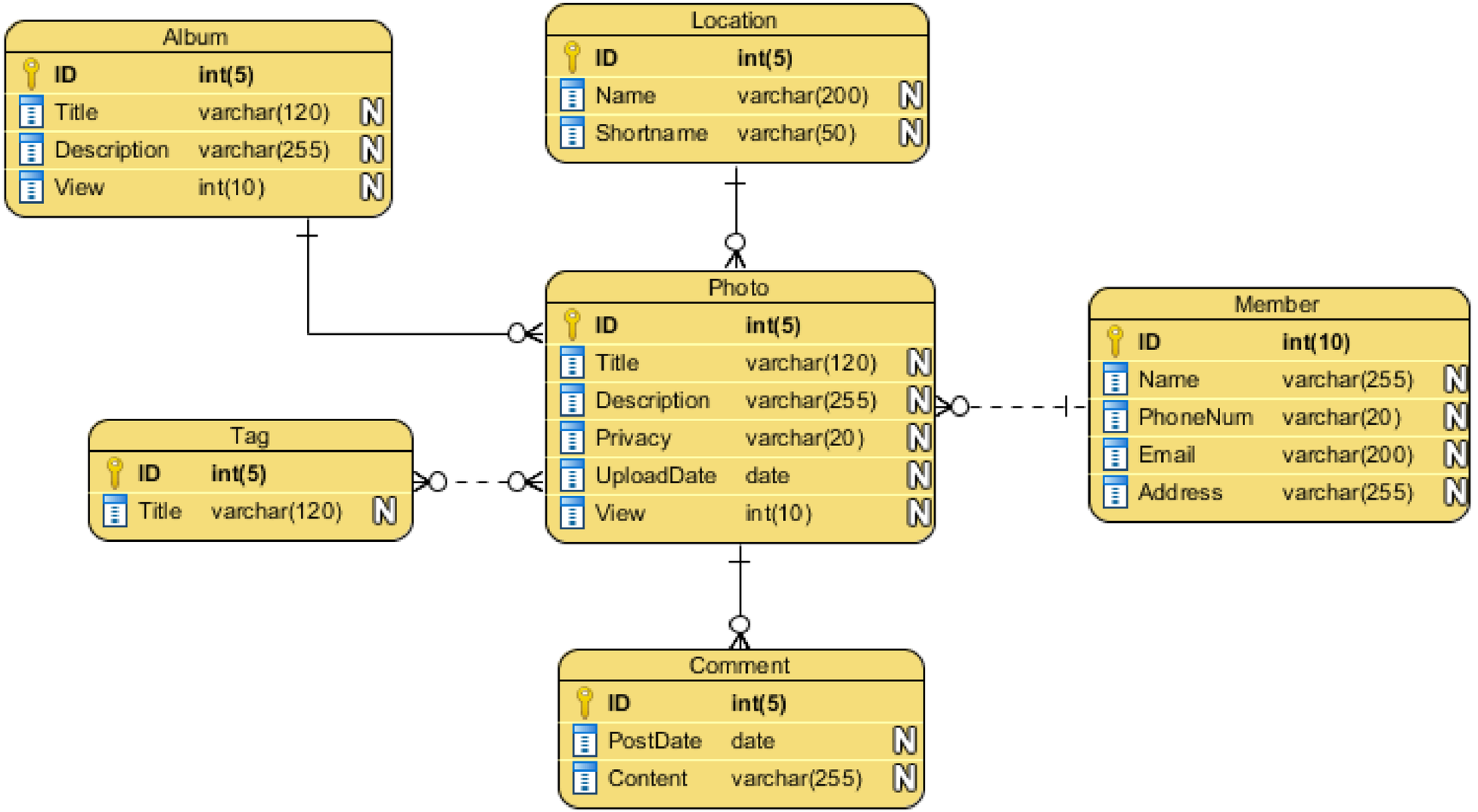
Entity Relationship Model



Entity Relationship Model



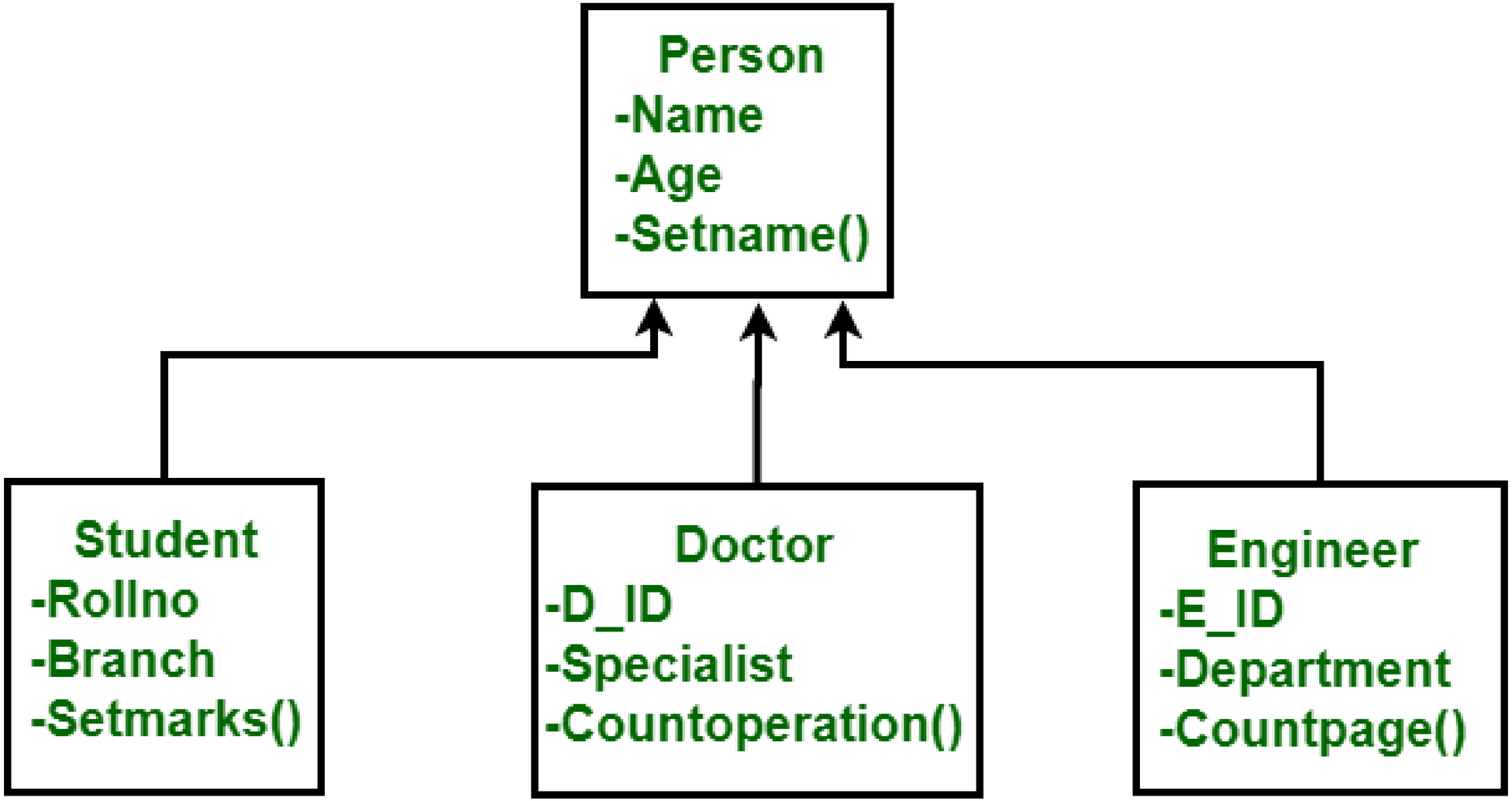
Entity Relationship Model



Object Based Data Model

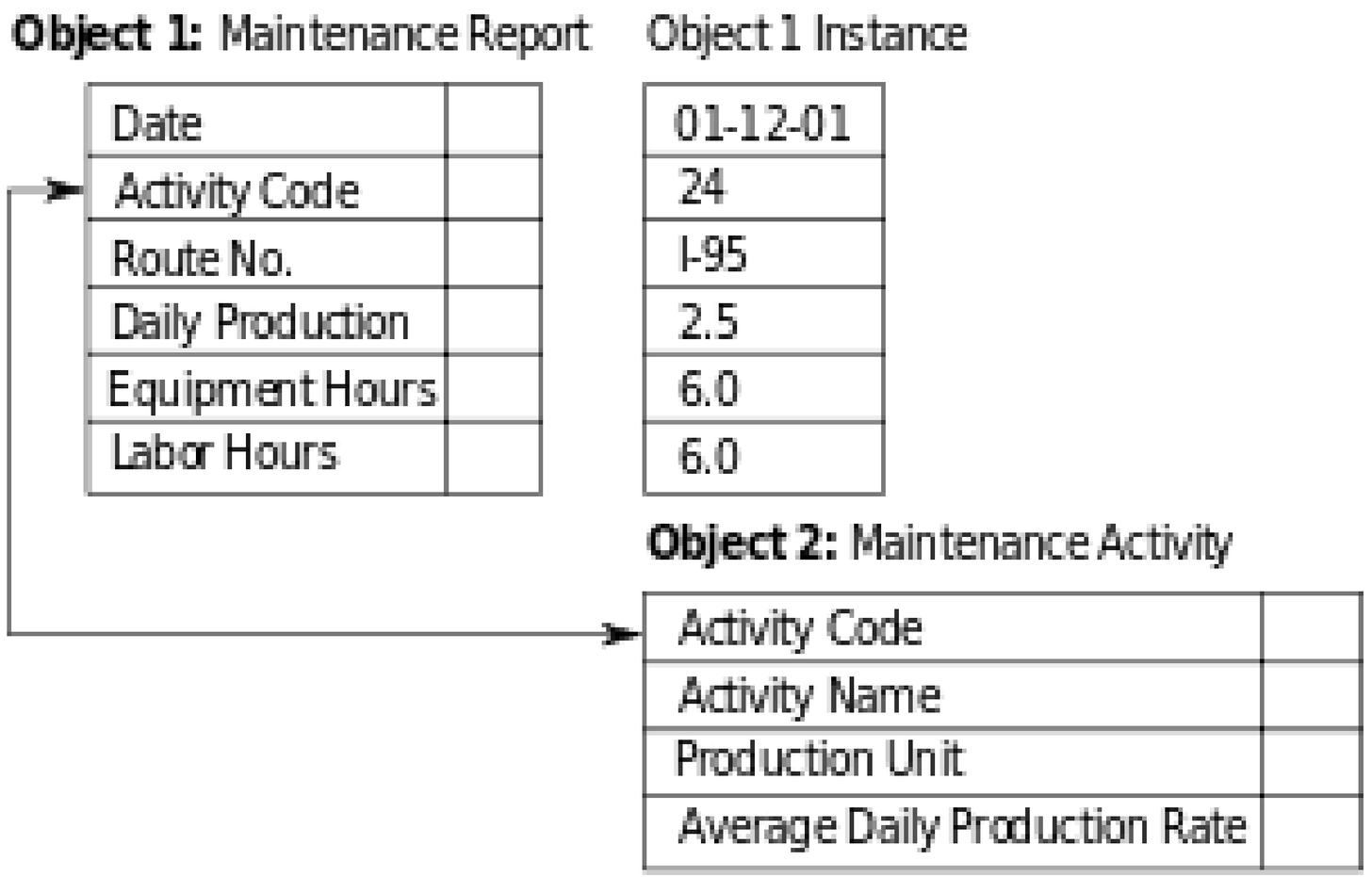
- An extension of the ER model with notions of functions, encapsulation, and object identity, as well.
- This model supports a rich type system that includes structured and collection types.
- Thus, in 1980s, various database systems following the object-oriented approach were developed.
- Here, the objects are nothing but the data carrying its properties.

Object Based Data Model

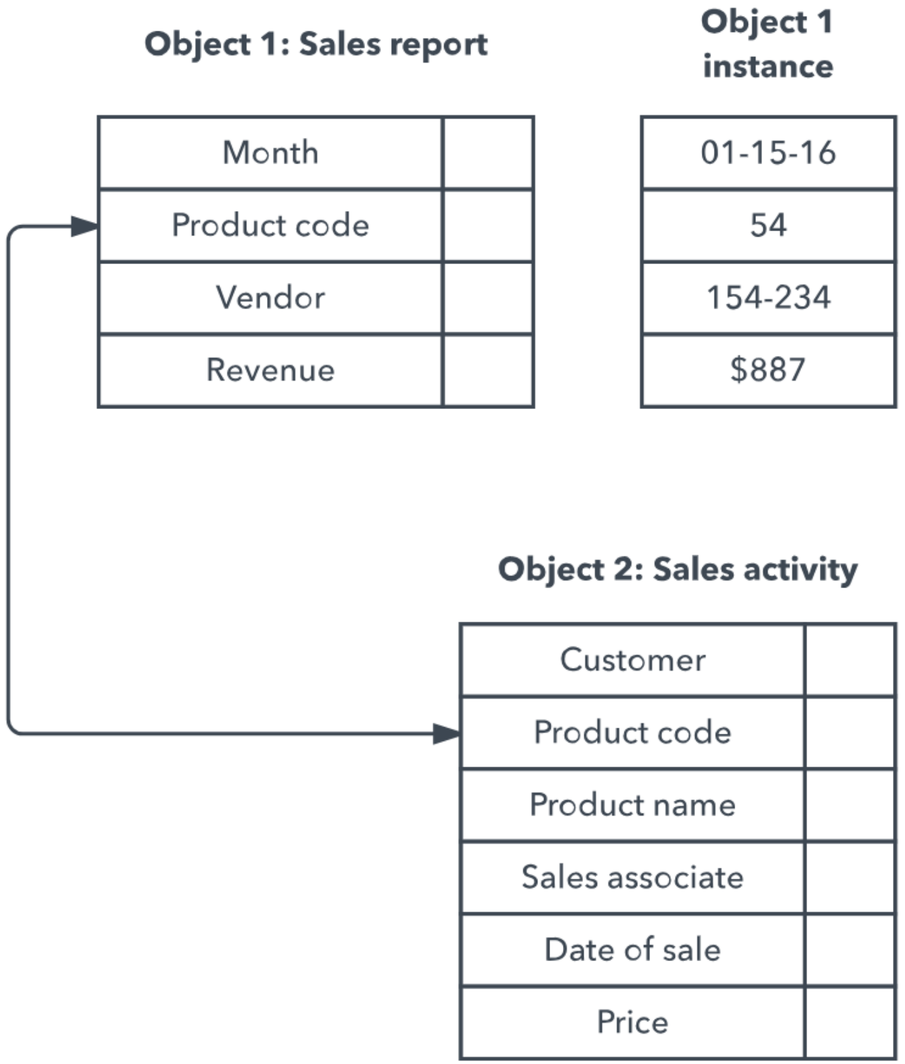


Object Based Data Model

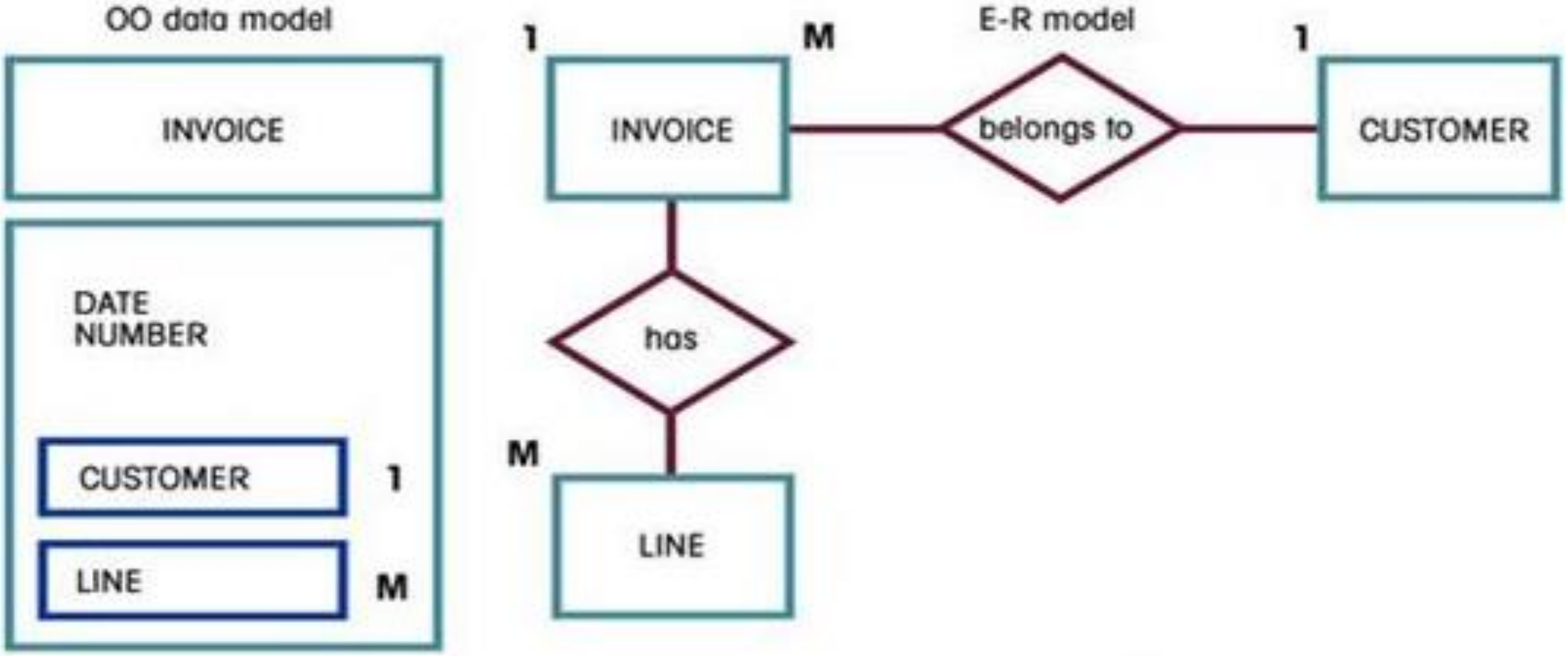
Object-Oriented Model



Object Based Data Model

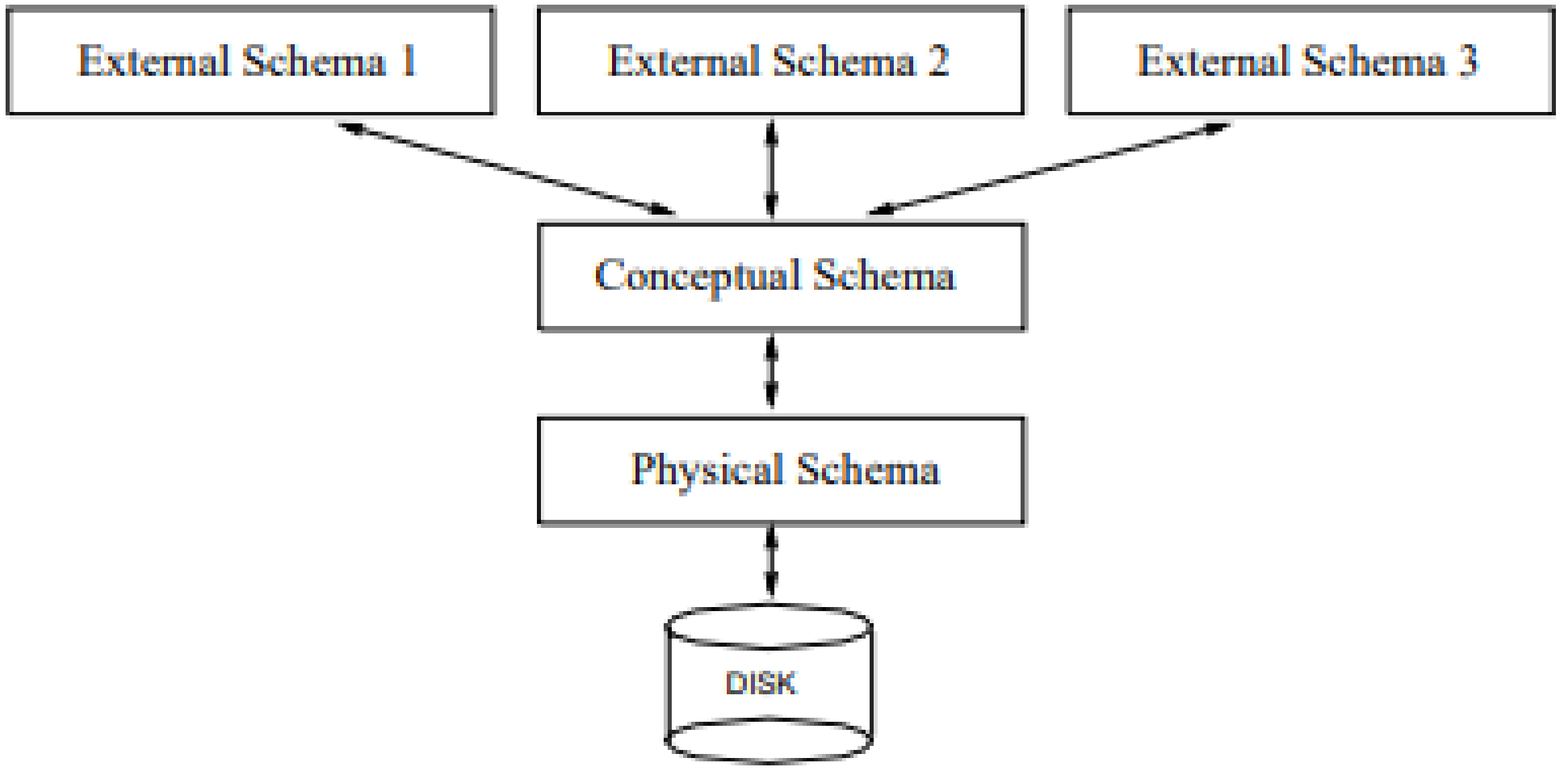


Object Based Data Model



A comparison of OO data model and ER model

Level of Abstraction



Level of Abstraction

Conceptual Schema (sometimes called the logical schema) describes the stored data in terms of the data model (tables) of the DBMS

Physical Schema specifies additional storage which summarizes how the relations described in the conceptual schema are actually stored on secondary storage devices (indexes)

External Schemas, which usually are also in terms of the data model of the DBMS, allow data access to be customized (and authorized) at the level of individual users or groups of users (views)

Reference

1. Raghu Ramakrishnan,"Database Management Systems", Fourth Edition, McGrawHill College Publications, 2015.
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THANK YOU