1. **Database Design Strategies :** Two approach
    a. Top-Down Approach : Model to Data. Ex : Hospital (Model) → Patient, Doctor (Data)
    b. Bottom-Up Approach : Data to Model. Ex : Model will be made by depending on Data.

    Requirement Analysis : Which data will be saved.
    Pitfalls to avoid :
    a. Redundancy → repetition of a record.
    b. Lack of completeness → non-existing entries/record in different table.

2. **ERD and Relationship :** Entity Relationship, [Database Modeling],
    To present a database as a model by using ERD Diagram.

    ERD Components:
    a. Entity (class); **b**. Attribute (self.variable); **c**. Relationship;

    Relationship :
    a. Connectivity (entity to entity relation);
    b. Cardinality (one to one, many to many)

3. **ERD Participations, Notations, Strong / Weak Entity :**
    ERD participation: How entities Participate in DBMS
    Total participation : All entities participate.
    Partial participation : Not all entities participate.

    ERD Notation :
    a. **Entity :**
        Rectangle → attributes inside. Header → entity name.

    b. **Relation** :
        Diamond sign between Entities
        Relation attributes in a rectangle dot dot dot - - - - downside of diamond sign.

c. **Connection :** Simple horizontal line. ———
d. **Cardinality :**
   if one to one relation → just write 1 in both side of relation notation (diamond sign).
   if one to many relation → write 0..N in the side where the relation is many and 0..1 in the side where there is one relation.

Strong Entity : Those entities who bear there own **primary key**.
Weak Entity : Those entities who **don't** have their **own primary key (**undefined**)**.
In this case we need to insert primary key. Because without primary key, we can't
identify any record uniquely in an entity.

Design Practices : To design efficiently. To any avoid pitfalls.
we should avoid any redundancy, also which create cyclic relation between entities.
we should avoid weak entity also.

4. **ERD More Notations, Generalization, Specialization :**

ERD Attributes Notations :

a. **Composite attribute : using [TAB]**
   too many together merged/compressed into one.
   using [TAB] for Ex. Name, Address.
b. **Multivalued attribute : Using {}**
   value is more than 1. many values. **Using {}.** Ex. {Phone No}.
   if value is 1 than → **singlevalued attribute**
c. **derived attribute : Using ()**
   getting value from somewhere. Ex. from date of birth we can calculate the age. so no need to take input age attribute in extra.

ERD Generalization/Specialization : something more or less like **inheritance.**

Dividing an entity into some child entity is **Generalization** and pointing children's parent

by arrow notaion is **Specialization**.

Specialization notation is arrow sign (→) towards the parent entity from its children entities

5. **Generalization, Specialization, Example :**

   Student & Employee → Compressed (Specialization) into Person.

   Person → divided (Generalization) into Student & Employee.

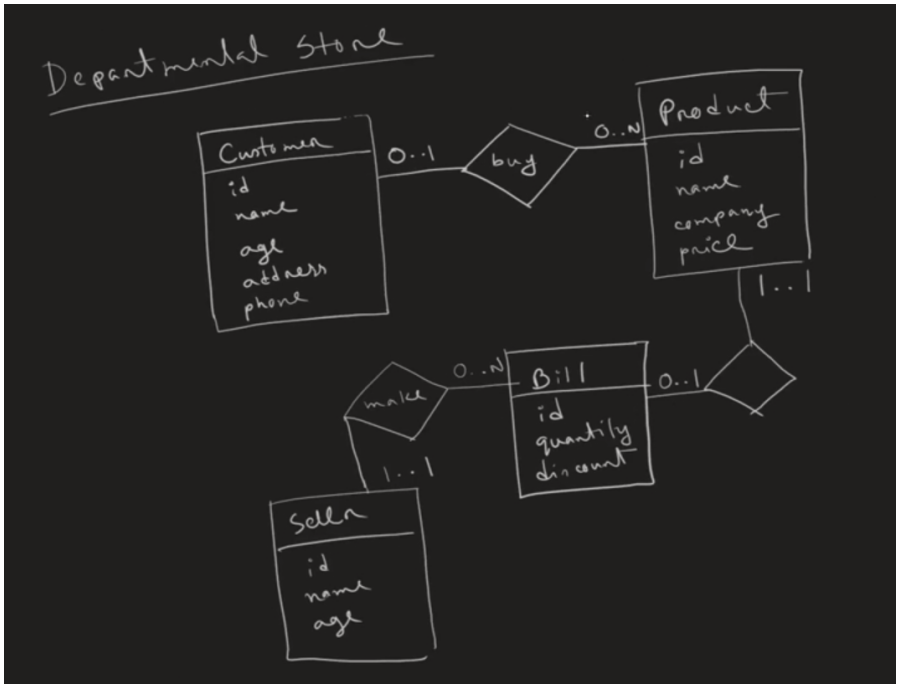
   Specialization :

   a. **Overlapping (**common**)** → arrow from each children to its parent.
   b. **Uncommon** → arrow firstly merged together into one line than to its parent.

   Example :

   Making a database on Departmental Store and presenting it by ERD Notation.

   ERD Database Representation :



6. **ERD Primary Key:**
   Primary Key : the unique field by which we can search a record uniquely.
   The ERD Primary key notation is <u>Underlined</u>

   For Weak Entity primary key notation will be dotted underlined. _ _ _ _ _ .

   Example :