Relational Database Management System

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CHAPTER-3

Entity Relationship Modelling

E-R Model

- E-R diagram is that the short name of "Entity-Relationship" diagram.
- AN E-R diagram with efficiency shows the relationships between numerous entities hold on in an exceedingly info.

Components of an E-R Model

1. Entity
2. Attribute
3. Relationship

Entity

Any real-world object will be delineated as associate in nursing entity concerning that knowledge will be keep during a information.

All realistic world objects sort of a book, a company, a product, a car, someone square measure the samples of an entity.

Any living or non-living objects will be delineated by an entity. An entity is symbolically delineated by a parallelogram in closure its name.
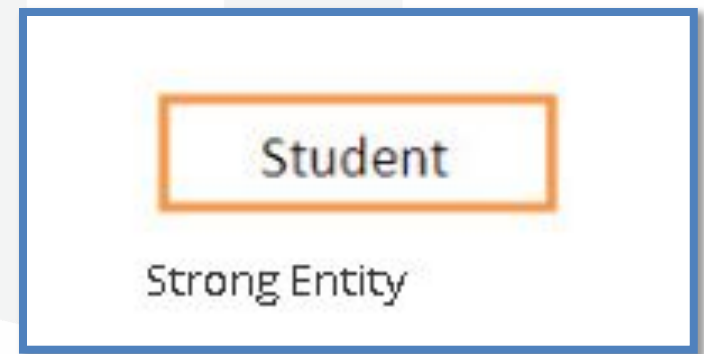
Student

Entity

Types of Entity

Entities can be characterized into two types:

1. **Strong entity:** A strong entity has a primary key attribute which individually identifies each entity. Representation of strong entity is identical as an entity.
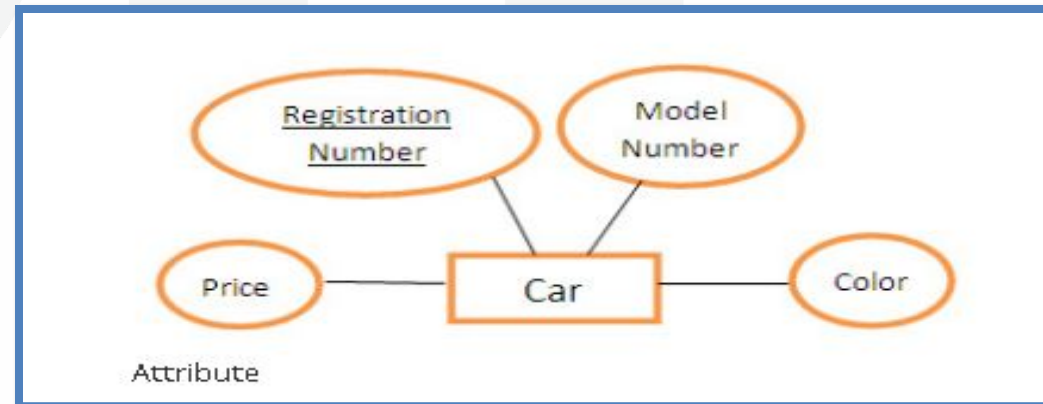
Student

Strong Entity

Types of Entity

2. **Weak entity**: A weak entity does not have a primary key attribute and depends on other entity via a foreign key attribute.
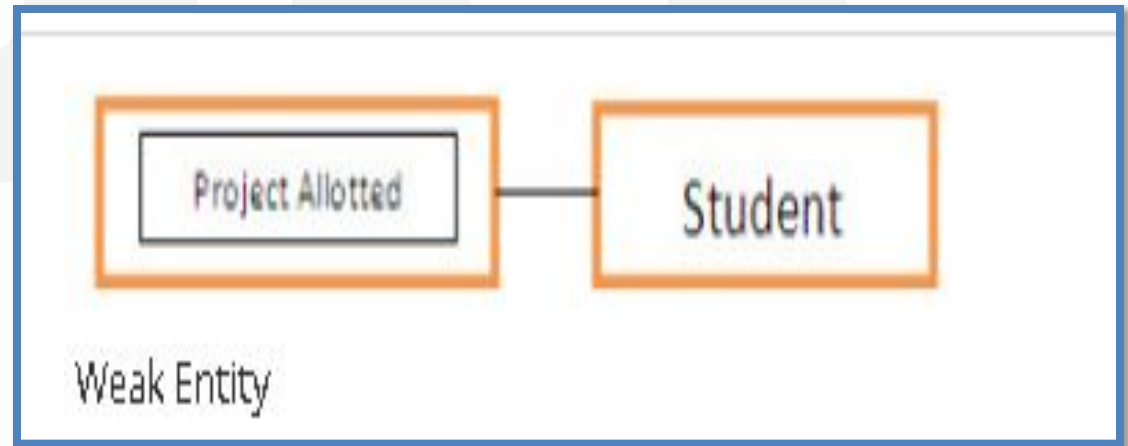
Attribute

Each entity features a set of properties. These properties of every entity ar termed as attributes. for instance, a automobile entity would be delineate by attributes like worth, identification number, model range, color etc. Attributes ar indicated by ovals in associate e-r diagram.
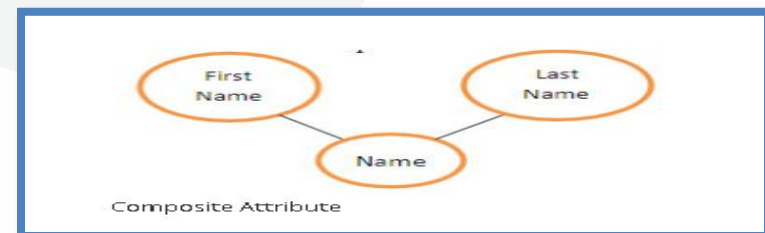
Types Of Attribute

A primary key attribute is delineate by associate degree underline within the e-r diagram. associate degree attribute are often characterised into following types:

Simple attribute:- associate degree attribute is assessed as an easy attribute if it can't be divided into smaller parts. as an example, age and sex of an individual. an easy attribute is delineate by associate degree oval.

Composite attribute:- A composite attribute are often divided into smaller parts that more type attributes. as an example, 'name' attribute of associate degree entity "person" are often lessened into given name and surname that more type attributes. Grouping of those connected attributes forms a composite attribute. 'name is that the composite attribute during this example.

Composite Attribute

Types Of Attribute

Single valued attribute:- If an attribute of a specific entity represents single value for every instance, then it's referred to as a single-valued attribute. as an example, Ramesh, Kamal and Suraj square measure the instances of entity 'student' and every of them is issued a separate roll variety. one oval is employed to represent this attribute.
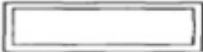
Multi valued attribute:– an attribute which may hold over one value, it's then termed as multivalent attribute. as an example, signalling of an individual. image of multivalent attribute is shown below Derived attribute: A derived attribute calculate its worth from another attribute. as an example, 'age' could be a derived attribute if it calculates its worth from 'current date' & 'birth date' attributes. A derived attribute is depicted by a broken oval.

Phone Number

Multi Valued Attribute

Entity List , E-R Diagram

ER Diagram Naming Conventions

Symbol	Meaning
	ENTITY
	WEAK ENTITY
	RELATIONSHIP
	IDENTIFYING RELATIONSHIP
	ATTRIBUTE
	KEY ATTRIBUTE
	MULTIVALUED ATTRIBUTE

Entity List , E-R Diagram
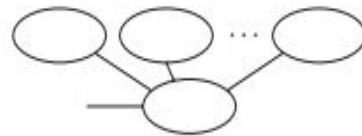
Composite Attribute
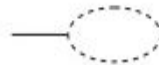
Derived Attribute
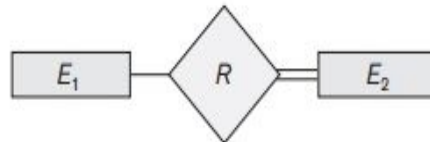
E_1 — R — E_2 Total Participation of E_2 in R
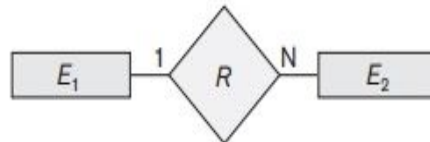
E_1 —1 R N— E_2 Cardinality Ratio 1: N for E_1:E_2 in R
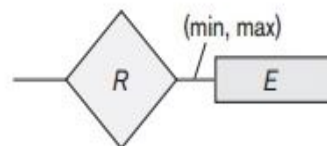
(min, max)
R — E   Structural Constraint (min, max) on Participation of E in R

Components Of ER Diagram in DBMS

- **Rectangle**
- **Ellipse**
- **Diamond**
- **Lines**
- **Double Rectangle**
- **Double Ellipse**
- **Double Lines**
- **Dashed Ellipse**

E-R Diagrams

1.Student Reading System

 student and books are the two entities. Both of them may have their own attributes. The student entity may have attributes like student_name, roll_no, address, date_of_birth, phone_number etc. And on the other hand, the books entity may have attributes like book_name, ISBN, author, price etc.
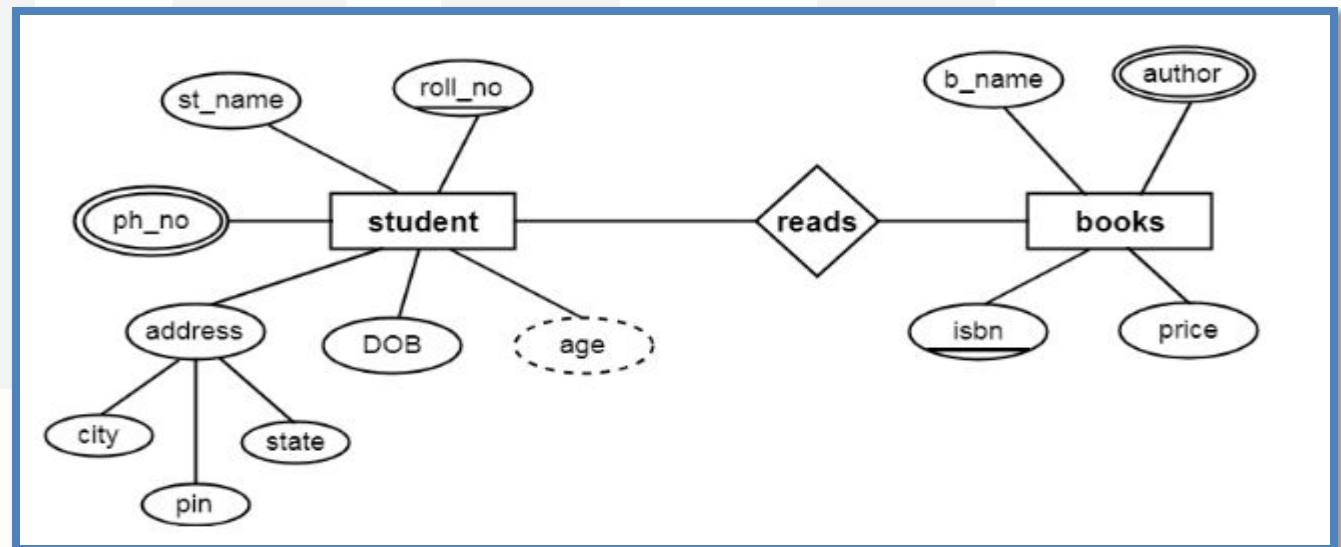
E-R Diagrams

Diamonds are used for defining the relationship between two or more entities. In the above example, if we consider "student reads books" then "reads" will be the relationship between the two entities student and books. All entities with their attributes and all the entities with relationships are linked by lines.

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E-R Diagram for bank system
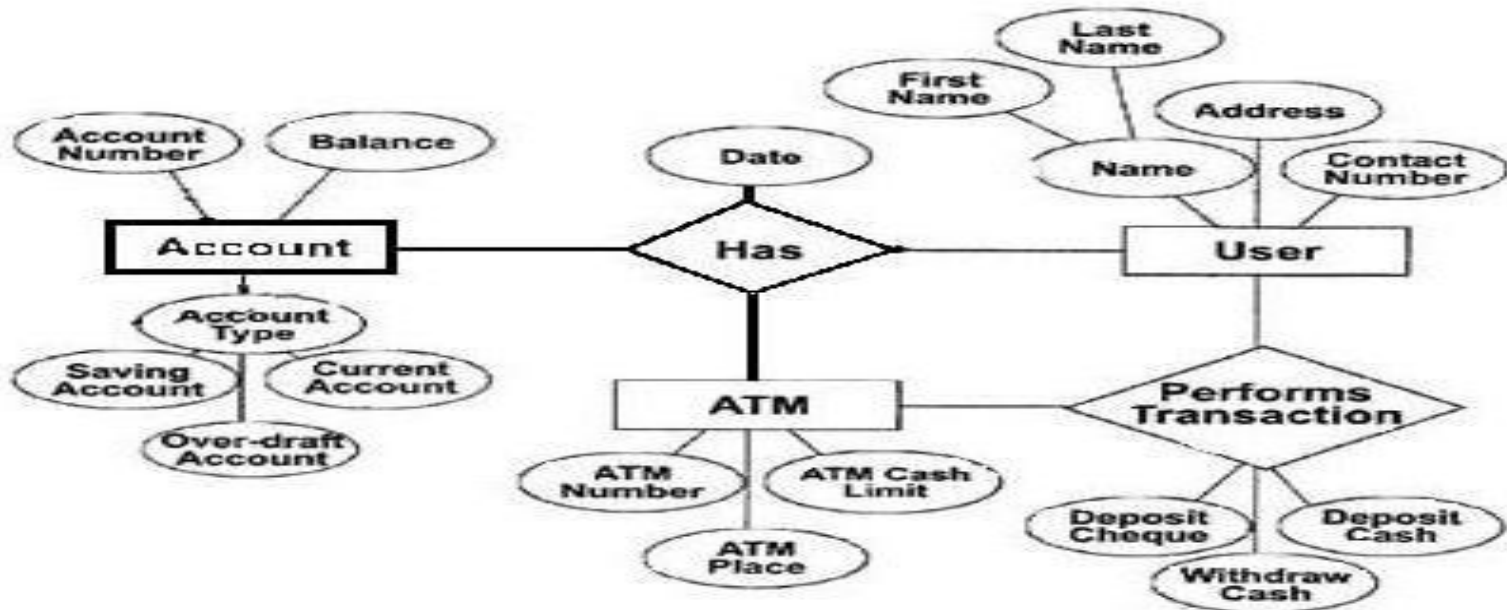
ER Diagram of Banking System

Image from google

E-R Diagram for Library Management system
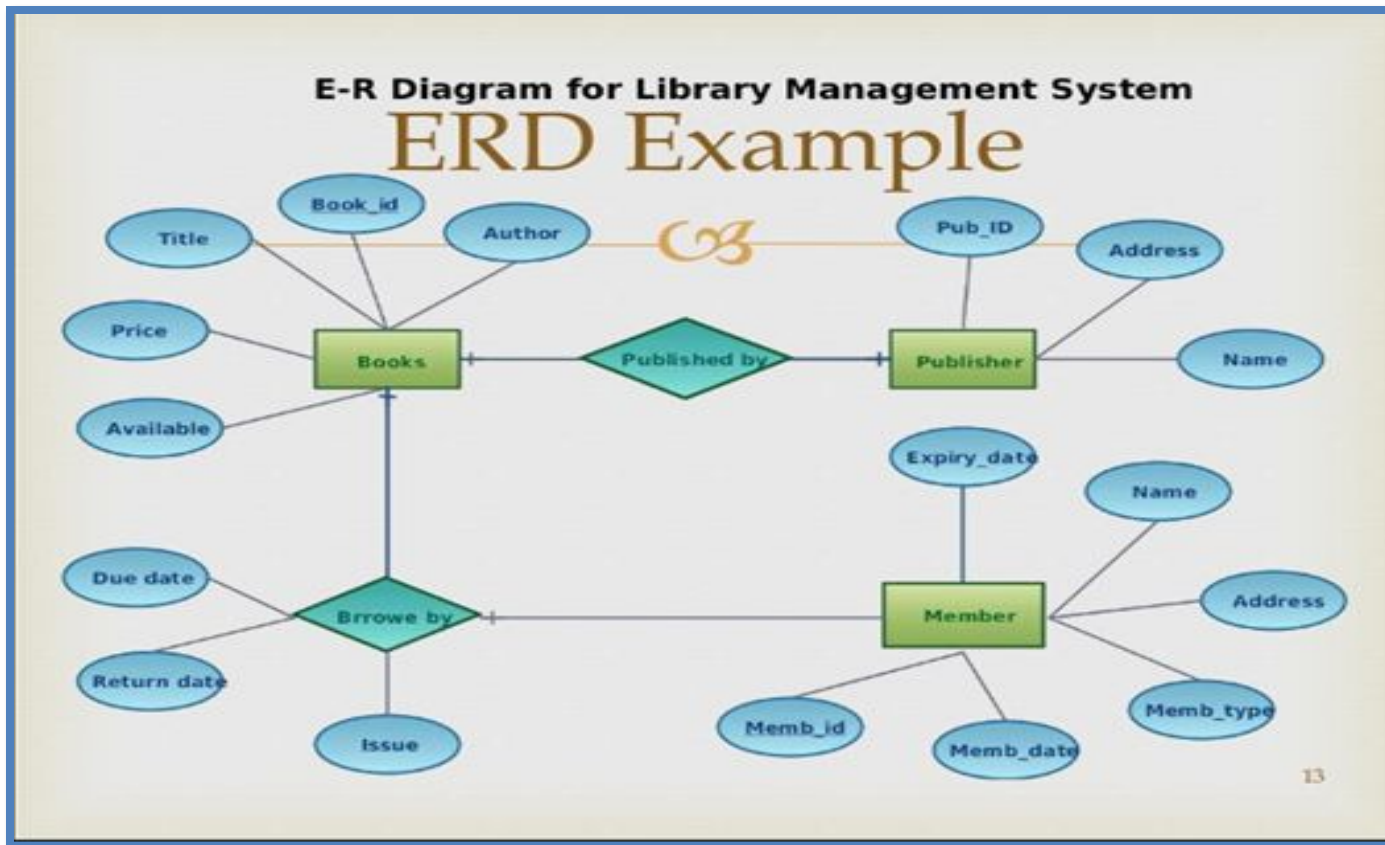
For practice

1. Inventory management system
2. Employee management system
3. Railway reservation system
4. Movie Database system

Super class entity type

In Inheritance, the present category from that the new categories square measure derived is understood because the taxonomic category. it's additionally called the parent category or base category.

There square measure totally different inheritance varieties. There square measure illustrated victimization the subsequent examples. contemplate A B and C as categories.
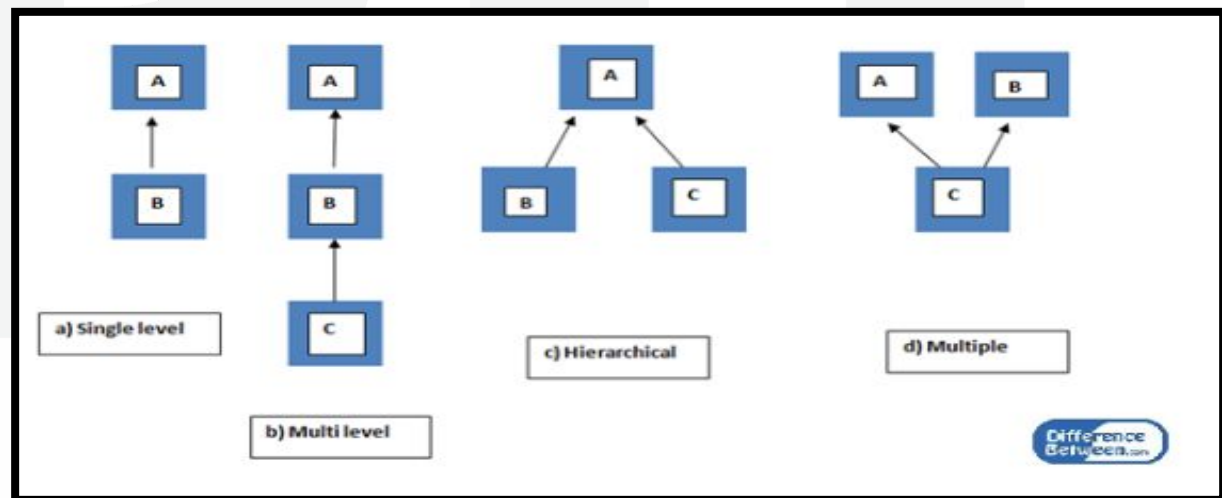
Super class entity type

According to the on top of diagrams, Superclasses varies from every inheritance sort. In single-level inheritance, A is that the taxonomic category. In structure inheritance, A is that the taxonomic category for B and B is that the taxonomic category for C. In hierarchal Inheritance A is that the taxonomic category for each B and C. In multiple inheritances each A and B are Superclasses for C.

Sub class entity type

- According to the on top of diagrams, Subclasses varies from every inheritance sort. In Single Inheritance, B is that the taxonomic category. In multi-level inheritance, B is that the taxonomic category of A and C is that the taxonomic category of B. In hierarchal Inheritance B and C are Subclasses of A. In multiple inheritances, C is that the taxonomic category for A and B.
- In Hybrid inheritance, the diagram within the left, B and C are Subclasses of A. D is that the taxonomic category of B and C. within the diagram to the proper, B is that the taxonomic category for A. C is that the taxonomic category of B and D.
- According to the on top of Inheritance program, category B is extending category A. Therefore, all properties and strategies {of category of sophistication} A ar accessible by class B. category B is that the new category that inherits from category A. it's referred to as the taxonomic category. it's additionally referred to as the kid category or derived category. category B has multiply () methodology and it also can access sum() and sub() strategies of sophistication A victimisation inheritance.

What is the Difference between super class and Subclass

Superclass vs Subclass	
When implementing inheritance, the existing class from which the new classes are derived is the Superclass.	When implementing inheritance, the class that inherits the properties and methods from the Superclass is the Subclass.
Synonyms	
Superclass is known as base class, parent class.	Subclass is known as derived class, child class.
Functionality	
A superclass cannot use the properties and methods of the Subclass.	A subclass can use the properties and methods of the Superclass.
Single-Level-Inheritance	
There is one Superclass.	There is one Subclass.
Hierarchical Inheritance	
There is one Superclass	There are many Subclasses.
Multiple Inheritance	
There are many Superclasses.	There is one Subclass.

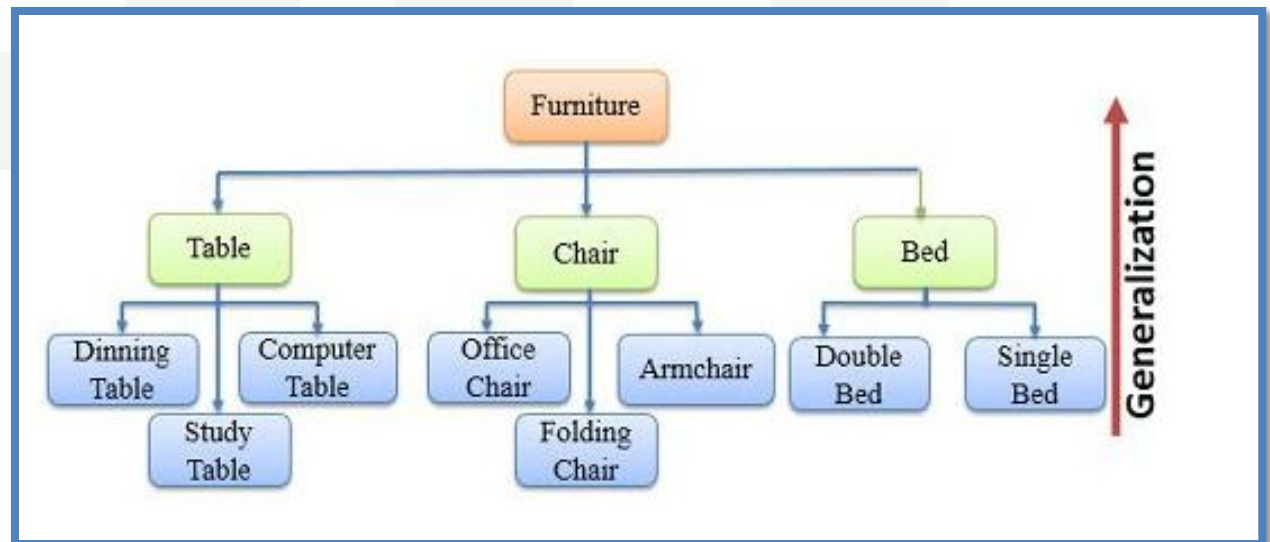# Generalization V/s Specialization

Generalization and Specialization each the terms are a lot of common in Object familiarised Technology, and that they also are employed in the Database with an equivalent options. Generalization occurs after we ignore the variations and acknowledge the similarities between lower entities or kid categories or relations (tables in DBMS) to make a better entity.
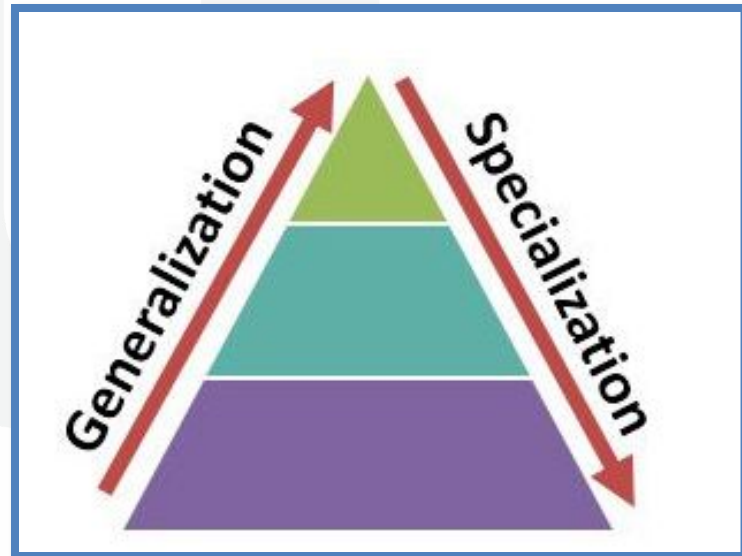
Generalization

Generalization is often applied on a gaggle of entities, and if overviewed it appears to reduce the size of a schema.Let us discuss associate example of generalization. If I raise you to call some furnishings, then it's common to say study table, eating table, laptop table, armchair, folding chair, workplace chair, double bed, single bed and the list is thus on.

Image from google

Generalization

- Generalization, this term is usually used while planning any relative Schema. If planning is in a bottom-up manner then it's featured as Generalization. If the entities, that are worked out to make a schema shares some similar options, then they're combined to create a higher-level entity.

- In generalization, we are saying if some lower level entities have some characteristics in common then they're clubbed to create a brand new higher level entity which will additional mix with some entities to create a brand new higher level entity. In generalization, there will ne'er be a high level entity with none lower level entity.
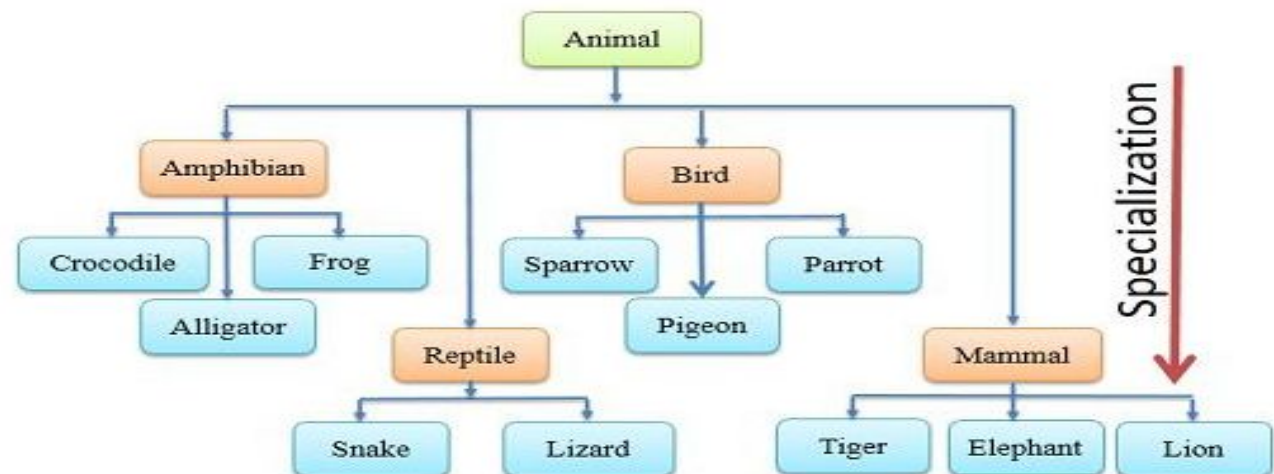
Specialization

Specialization is a coming up with procedure that issue in a top-down manner. Specialization is simply opposite to Generalization. In specialization, we tend to split associate entity to make multiple lower level entities. These new fashioned lower level entities inherit some options of the upper level entities . It may happen that the next level entity might not split additional and therefore, it's going to not have any lower level entity. Specialization is often applied on one entity, and if overviewed, it will increase the scale of a schema.

Specialization

Lets discuss specialization with the assistance of associate degree example. allow us to take associate degree entity Animal and apply specialization thereon. The entity animal will more be spilt into amphibian, reptiles, birds, mammals the list is long, however this a lot of is enough for explaining specialization.

Image from google

Comparison Chart of Generalization V/s Specialization

Basics	Generalization	Specialization
Basic	It income in a very bottom-up manner.	It income in a very top-down manner.
Function	Generalization extracts the common options of multiple entities to create a replacement entity.	Specialization splits associate degree entity to create multiple new entities that inherit some feature of the ripping entity.
Entities	The higher level entity should have lower level entities.	The higher level entity might not have lower level entities

Comparison Chart of Generalization V/s Specialization

Size	Generalization reduces the scale of a schema.	Specialization will increase the scale of a schema.
Application	Generalization entities on cluster of entities.	Specialization is applied on one entity.
Result	Generalization ends up in forming one entity from multiple entities.	Specialization ends up in forming the multiple entity from one entity.

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