Enhanced E-R Model

Introduction

- Today the complexity of the data is increasing, so it becomes more and more difficult to use the traditional ER model for database modeling.
- To reduce this complexity of modeling, improvements or enhancements were made to the existing ER model to make it able to handle the complex application in a better way.
- Hence, as part of the Enhanced ER Model, along with other improvements, 3 new concepts were added to the existing ER Model, they were:

1. Generalization
2. Specialization
3. Aggregation

Generalization

- It is a form of abstraction that specifies that 2 or more entities that share common attributes can be generalized into a higher-level entity type, called ***SUPER TYPE*** or ***GENERIC TYPE***.
- The lower level of entities becomes the ***SUBTYPE***(*or* categories) to the super type. Subtypes are dependent entities. Generalization is used to emphasize the similarities among lower-level entity sets and to hide differences.
- It makes ER diagram simpler because shared attributes are not repeated.
- It is denoted through a triangle component labeled *"IS A"* as shown in the example in next slide.
- It is a *bottom down approach*, in which two lower level entities combine to form a higher level entity.

Example of Generalization

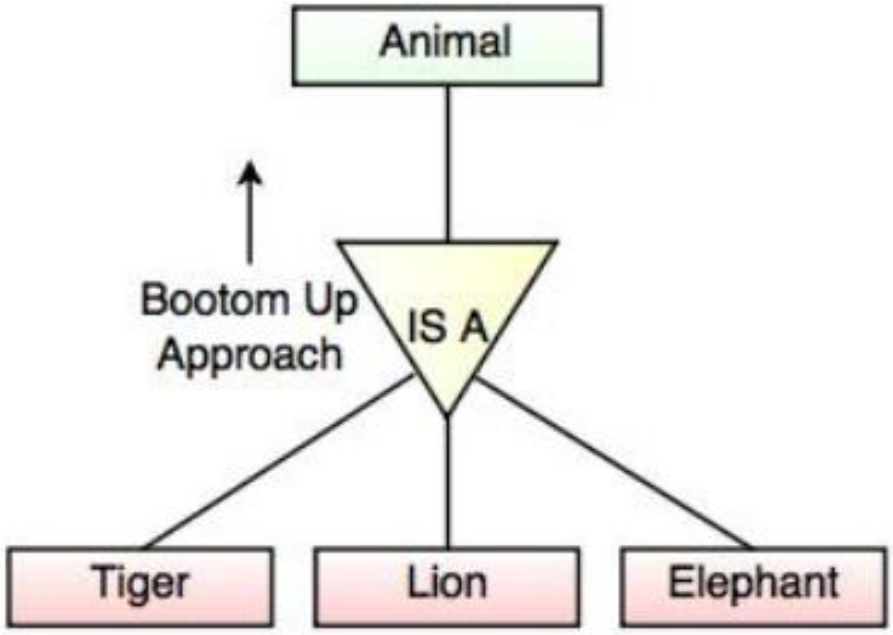
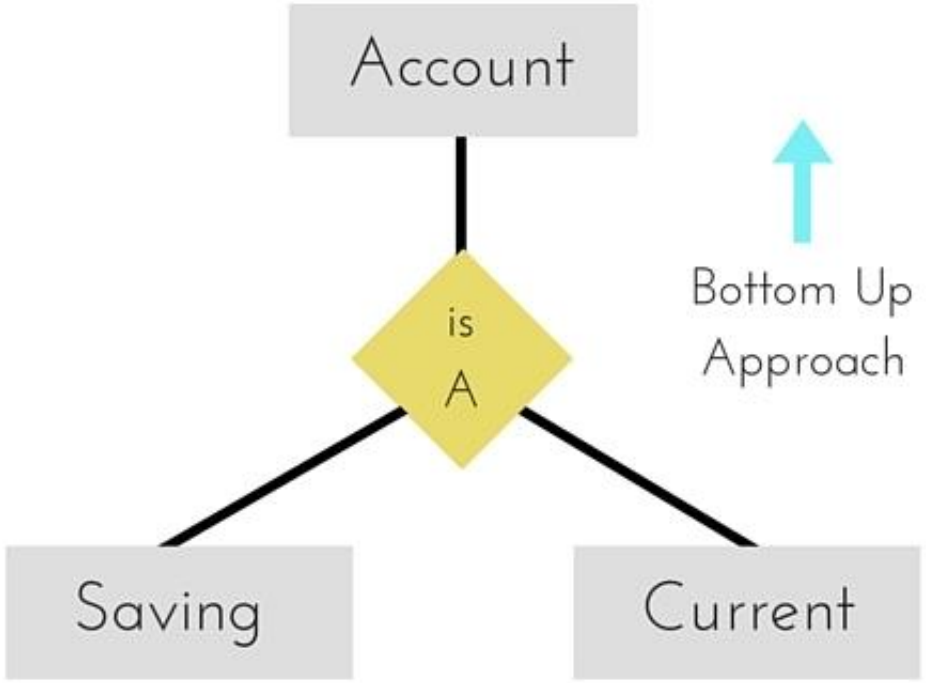
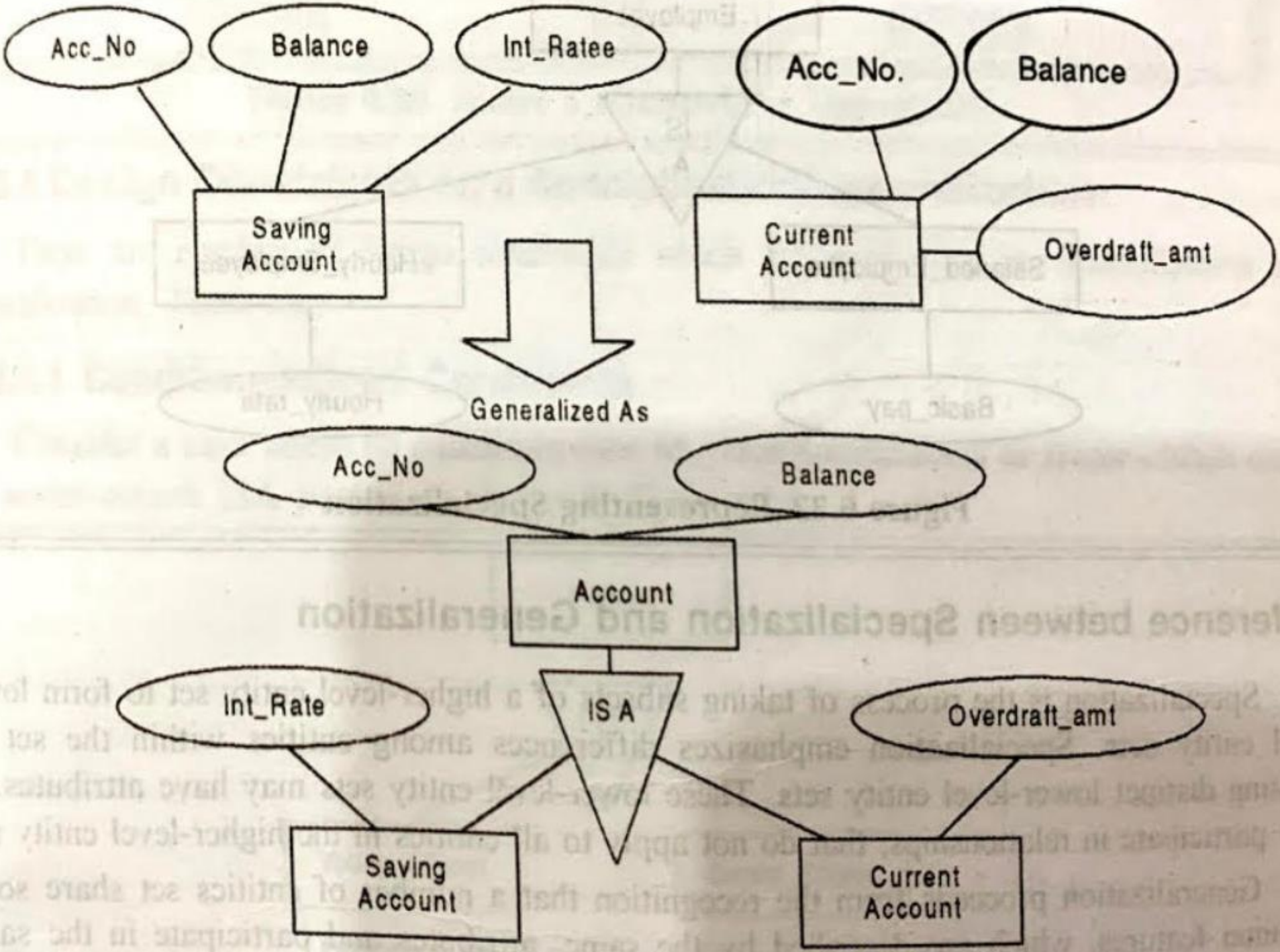


Fig. Generalization




Acc_No
Balance
Int_Ratee
Saving Account
Acc_No.
Balance
Current Account
Overdraft_amt
Generalized As
Acc_No
Balance
Account
Int_Rate
IS A
Overdraft_amt
Saving Account
Current Account

Specialization

- Specialization is the process of taking subsets of a higher-level entity set to form lower level entity sets.
- It is a process of defining a set of subclasses of an entity type, which is ***SUPERCLASS*** of specialization.
- The process of defining subclass is based on the basis of some distinguish characteristics of entities in the super class.
- It is a ***top down approach***, in which one higher entity can be broken down into two lower level entity.

Example of Specialization

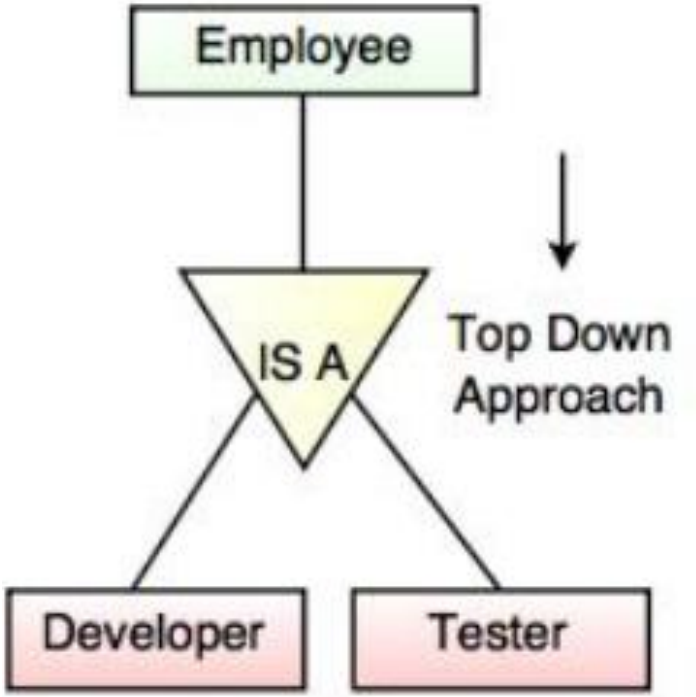
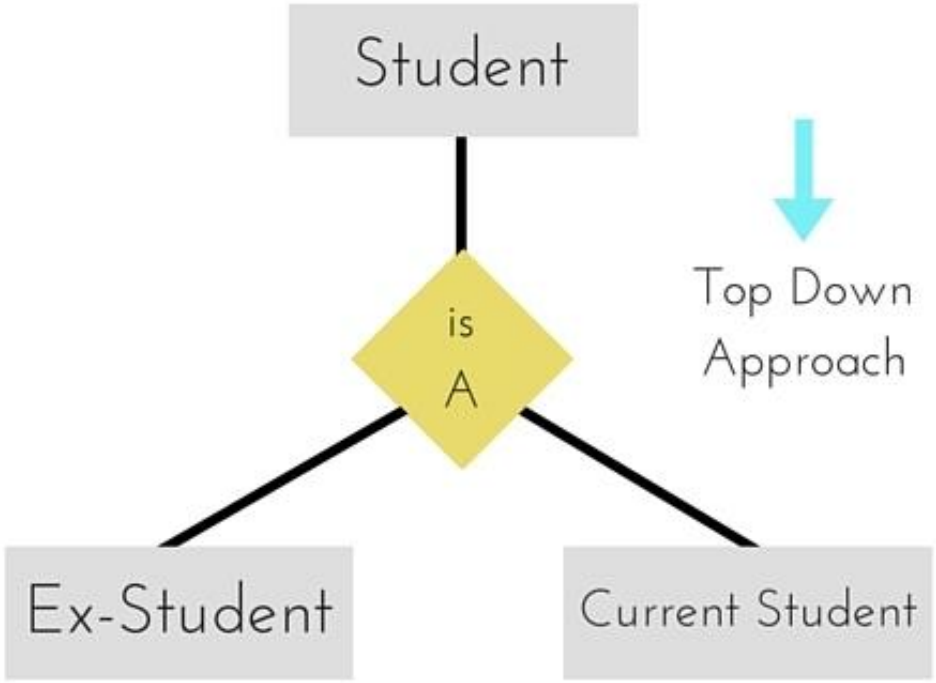
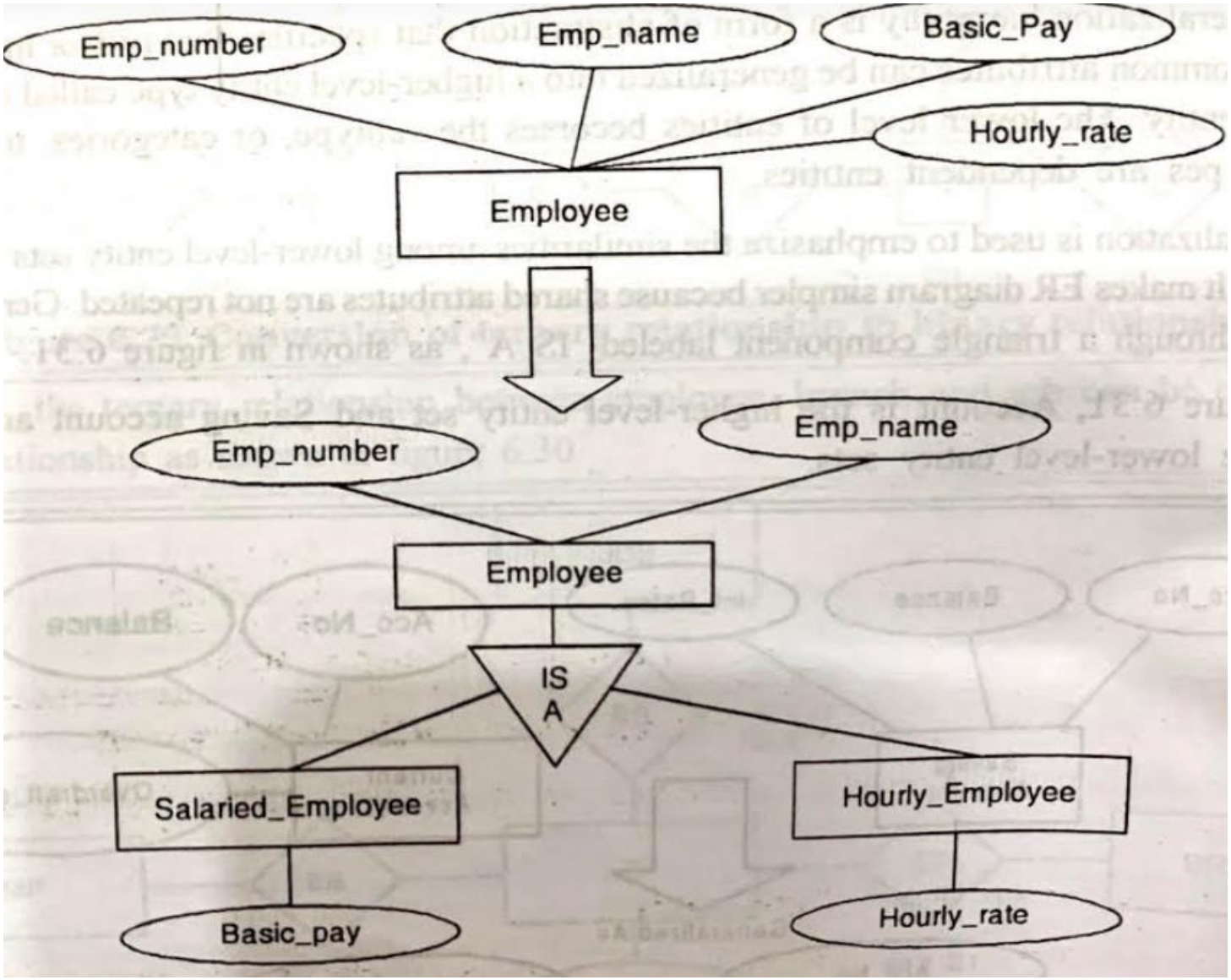


Fig. Specialization



In below example, specialization of ***Employee*** entity type yields the set of subclass namely ***Salaried_Employee*** and ***Hourly_Employee*** on the method of pay.



BASIS FOR COMPARISON	GENERALIZATION	SPECIALIZATION
Basic	It proceeds in a bottom-up manner.	It proceeds in a top-down manner.
Function	Generalization extracts the common features of multiple entities to form a new entity.	Specialization splits an entity to form multiple new entities that inherit some feature of the splitting entity.
Entities	The higher level entity must have lower level entities.	The higher level entity may not have lower level entities.
Size	Generalization reduces the size of a schema.	Specialization increases the size of a schema.
Application	Generalization entities on group of entities.	Specialization is applied on a single entity.
Result	Generalization results in forming a single entity from multiple entities.	Specialization results in forming the multiple entity from a single entity.

Aggregation

- Aggregation is a process when relation between two entities is treated as a *single entity*.
- It is the process of compiling information on an object, thereby abstracting a higher-level object.
- Example: Below figure shows the notation for aggregation

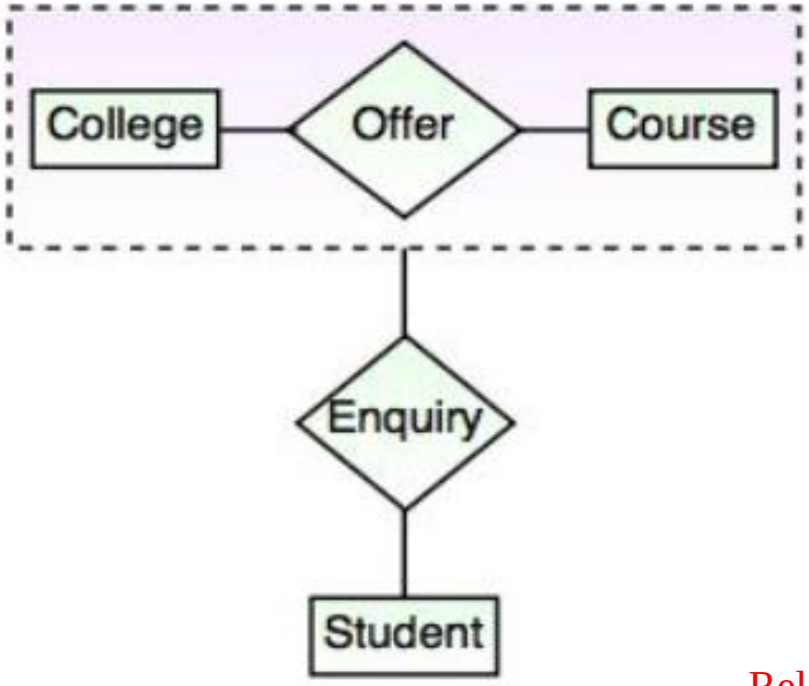
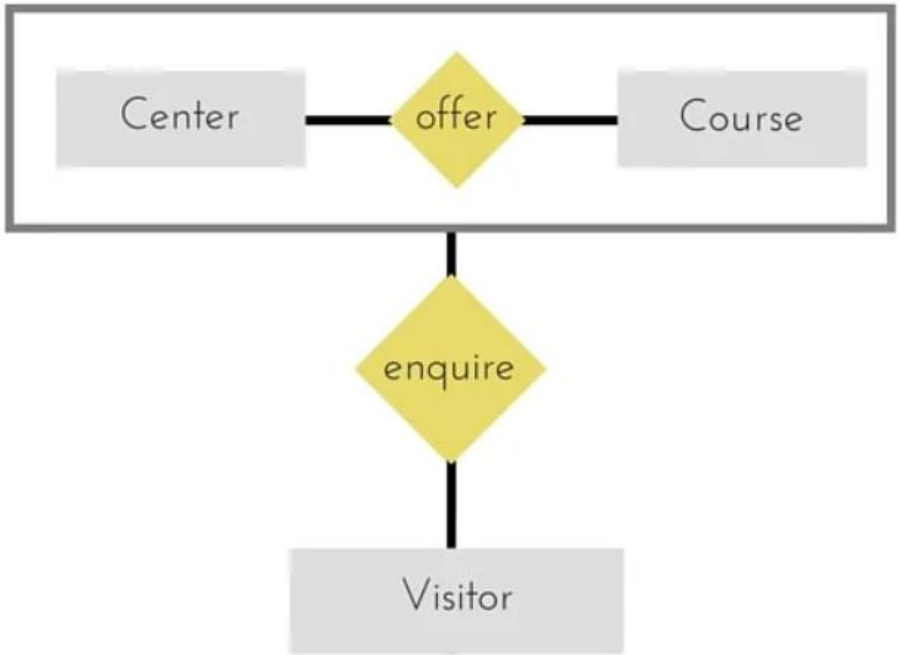
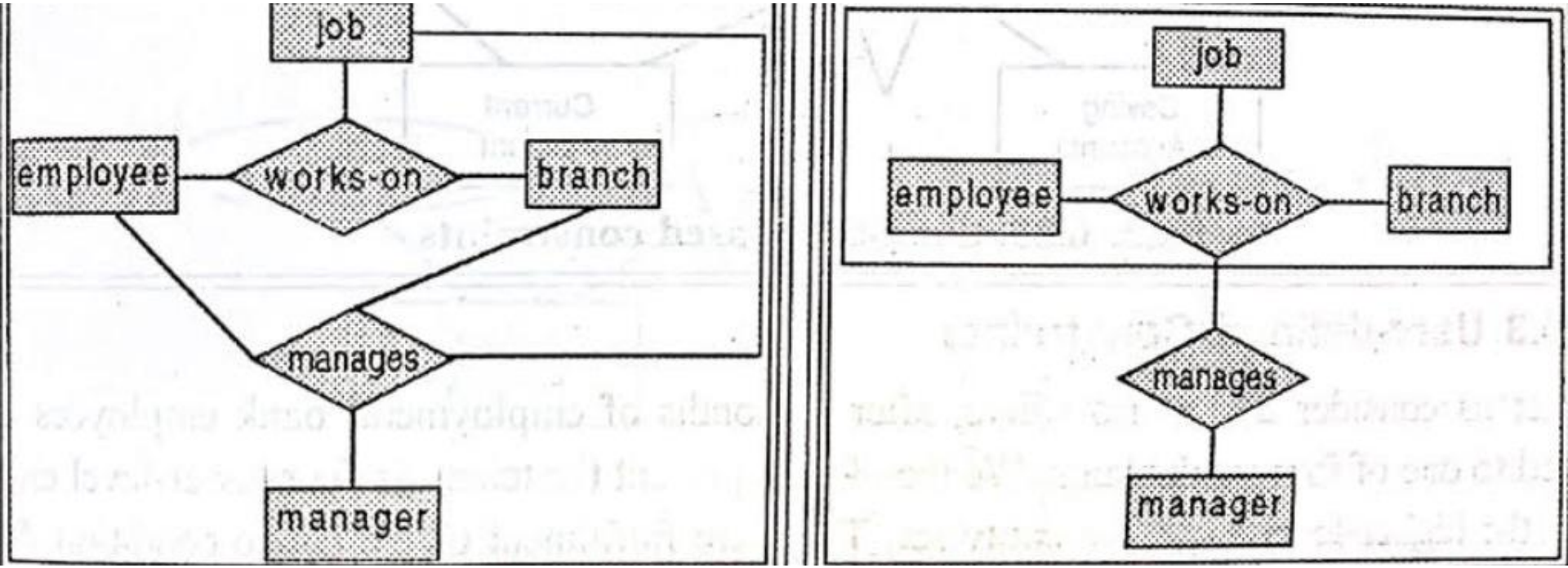


Fig. Aggregation



Relationship between **Center** and **Course** together, is acting as an Entity, which is in relationship with another entity **Visitor**.



Notation for aggregation