Course code : **CSE2007**
Course title : **Database Management System**
Module : **2**
Topic : **4**

Extended ER Model

Objectives

This session will give the knowledge about

- Extended ER Model

Extended ER Model

The ER Model that is supported with the additional semantic concepts is called extended entity relationship model.

The EER Model includes all the concepts of the original ER model together with the following additional concepts:

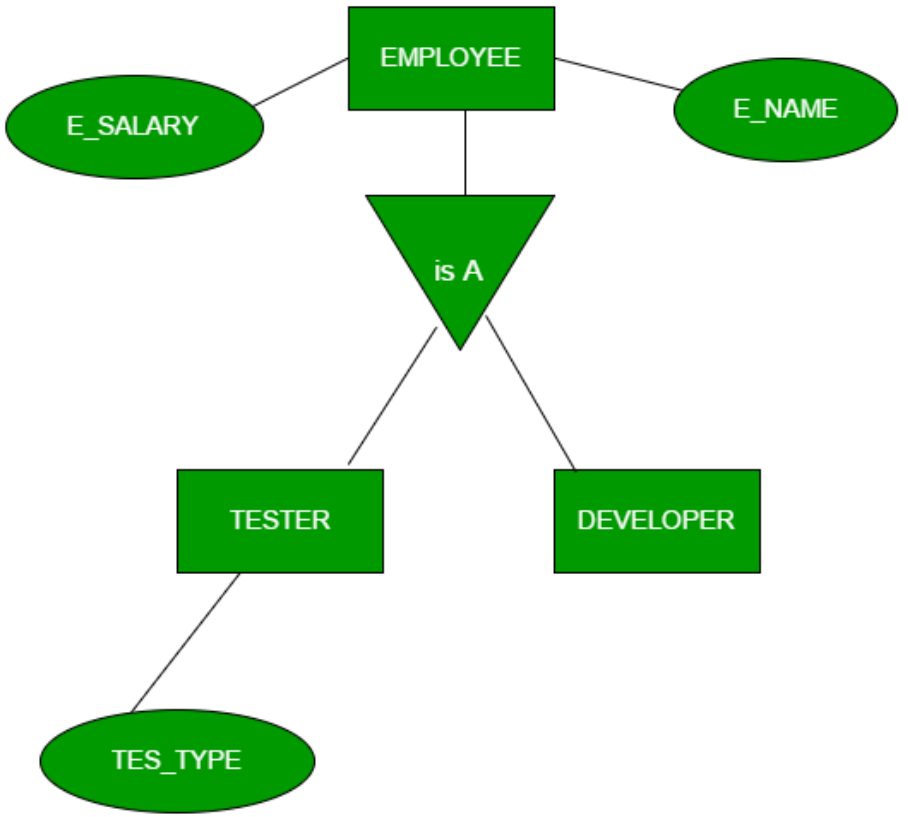
- Specialization
- Generalization
- Aggregation

Specialization

Specialization is the process of designating subgroupings within an entity set.

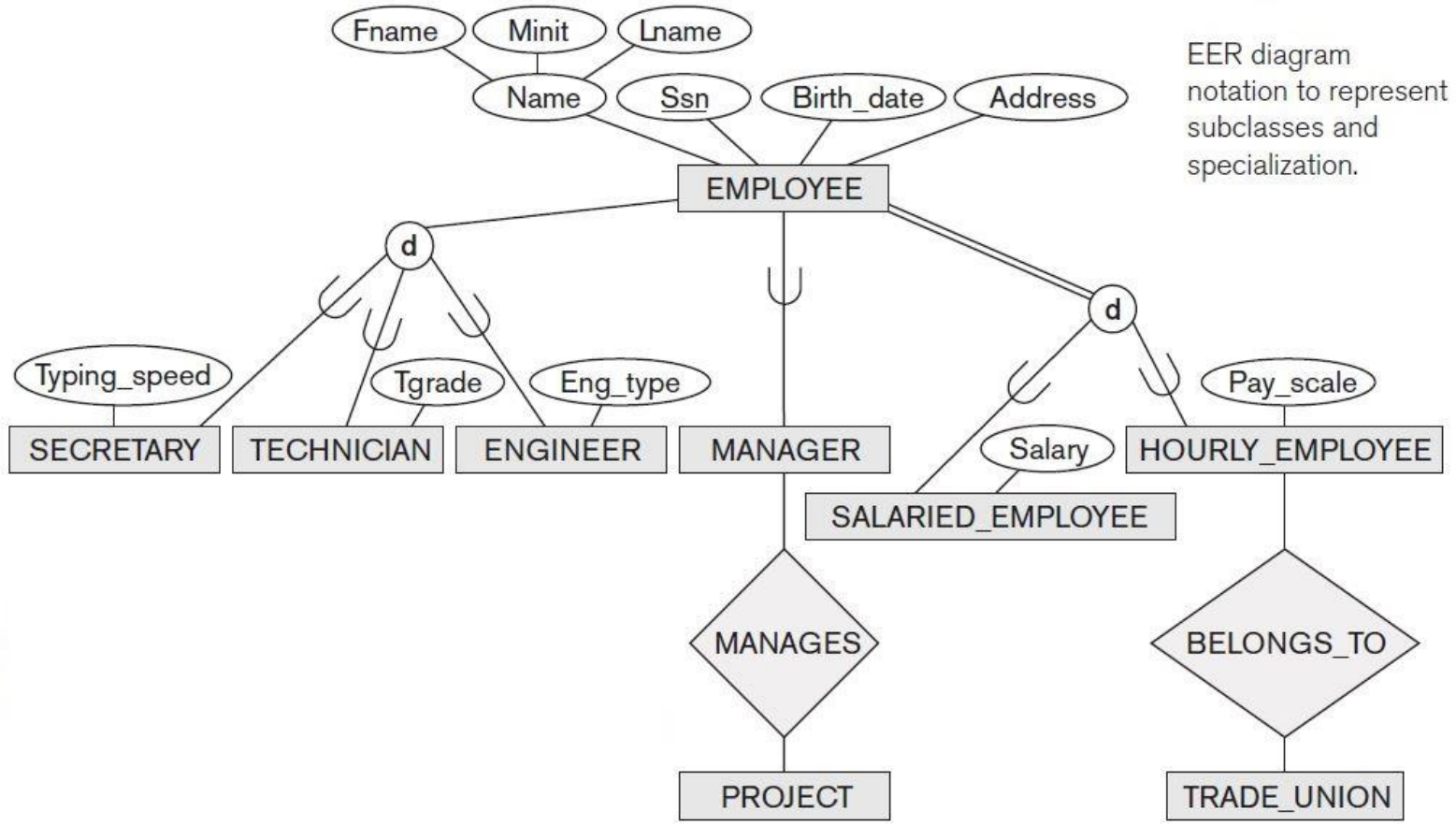
It is a top-down approach in which one higher level entity can be broken down into two lower level entity.

Attributes that apply only to entities of a particular subclass are called specific (or local) attributes of the subclass. Similarly, a subclass can participate in relationships known as specific relationship types



Specialization

Specialization

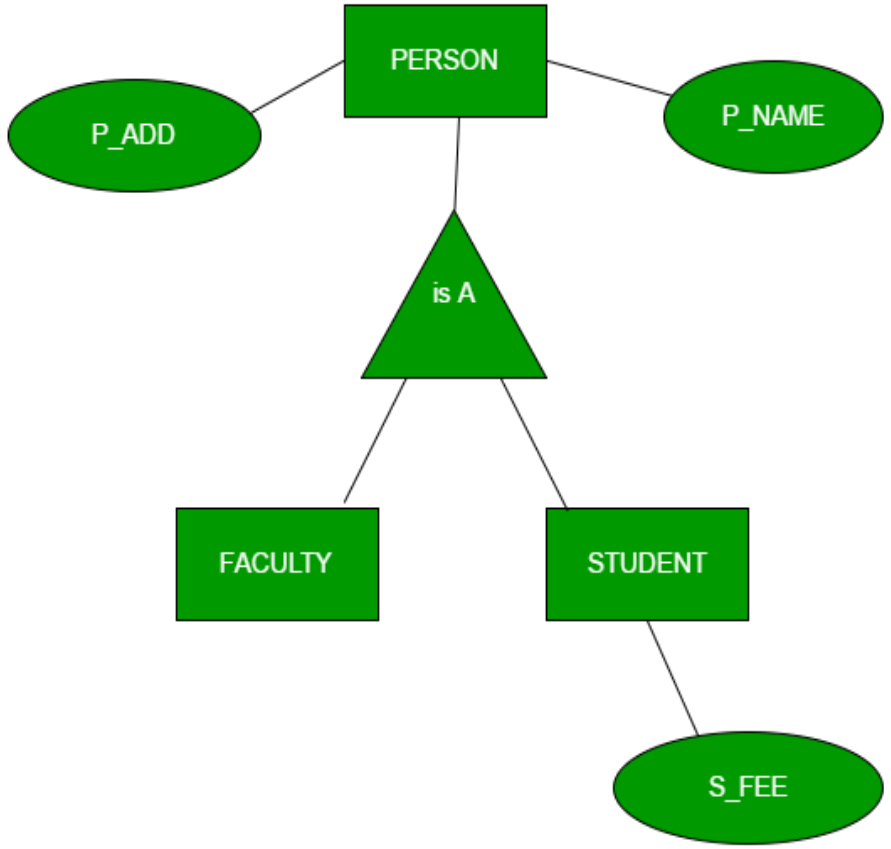


EER diagram notation to represent subclasses and specialization.

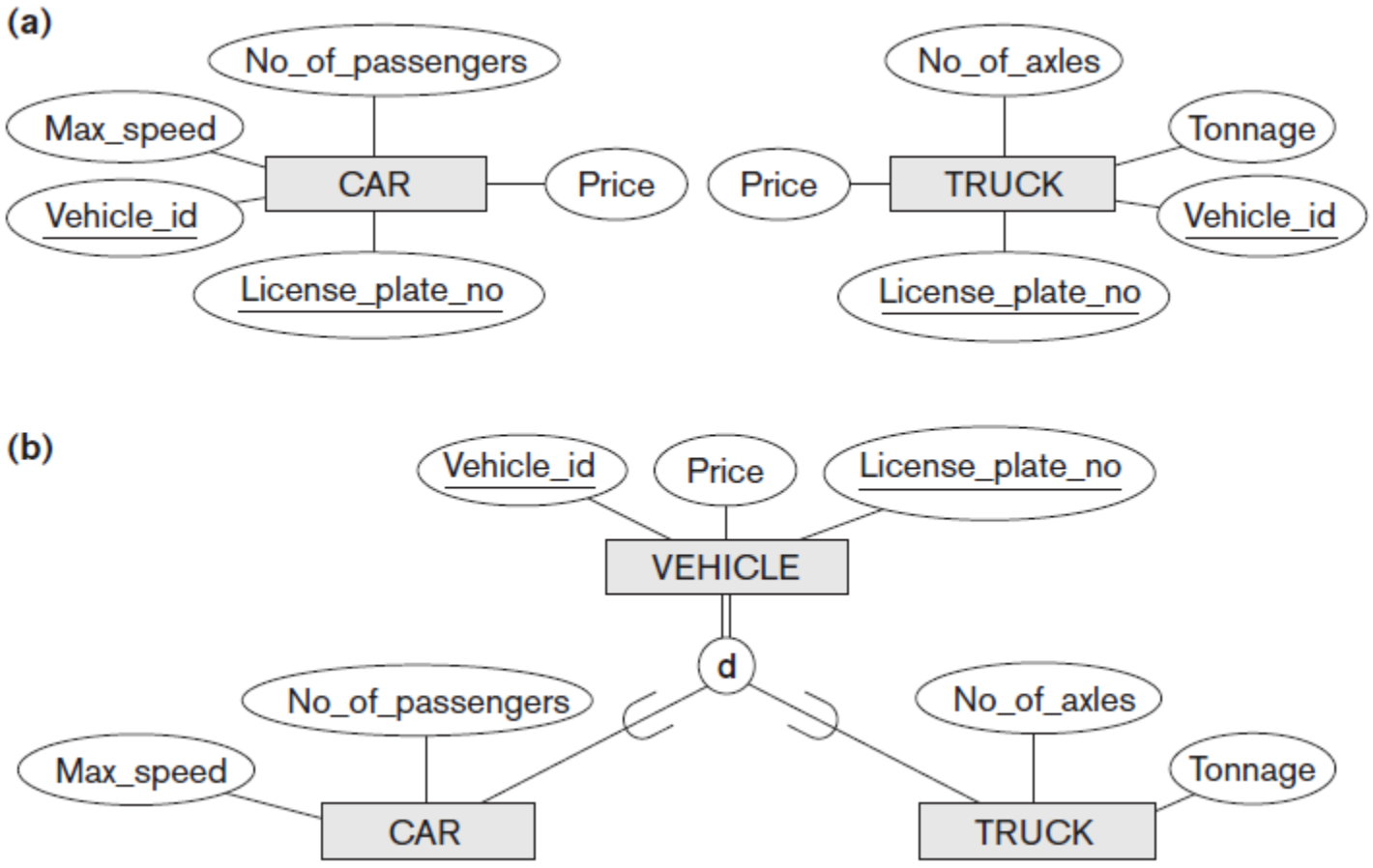
Generalization

Generalization is the process of extracting common properties from a set of entities and create a generalized entity from it.

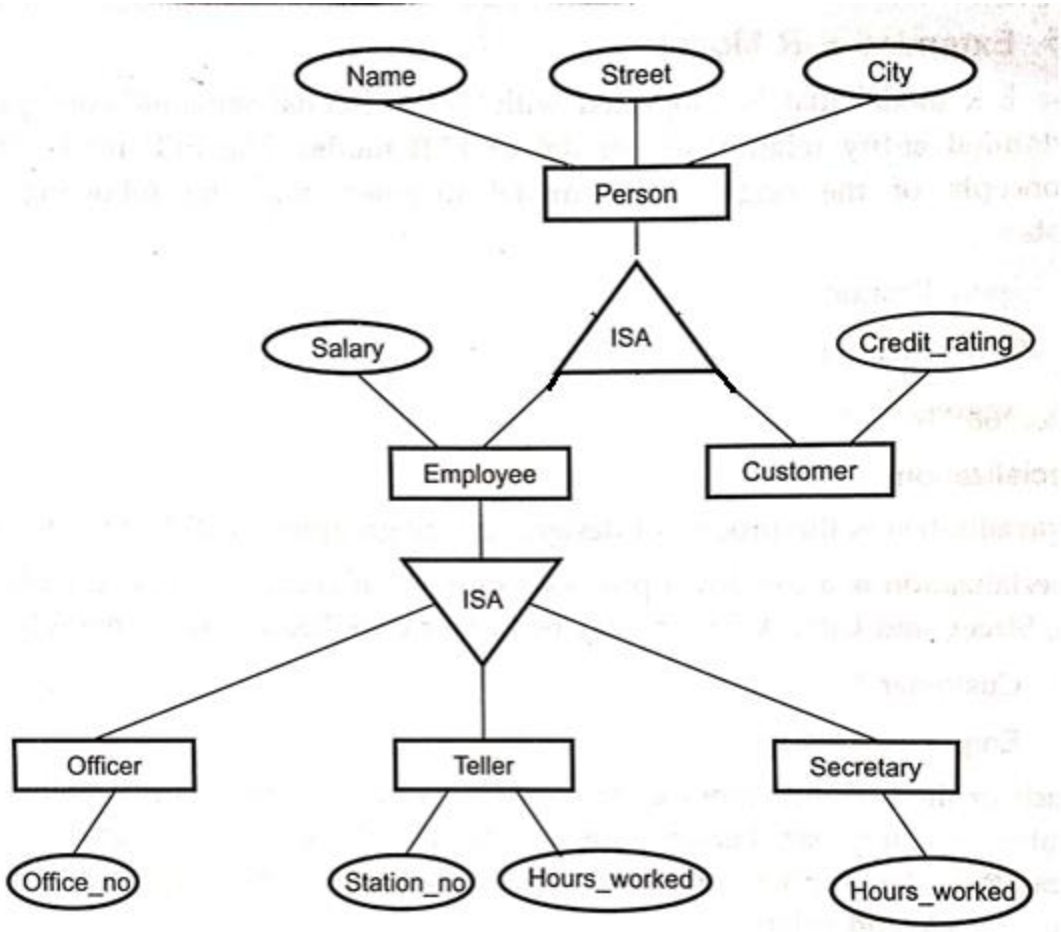
It is a bottom-up approach in which two or more entities can be generalized to a higher level entity if they have some attributes in common.



Generalization



Generalization and Specialization



Constraints of Specialization and Generalization

Constraints in specialization and generalization allow us to capture some of the important business rules that apply to the relationships.

Type-1: it determines which entity can be the members of a given lower-level entity set.

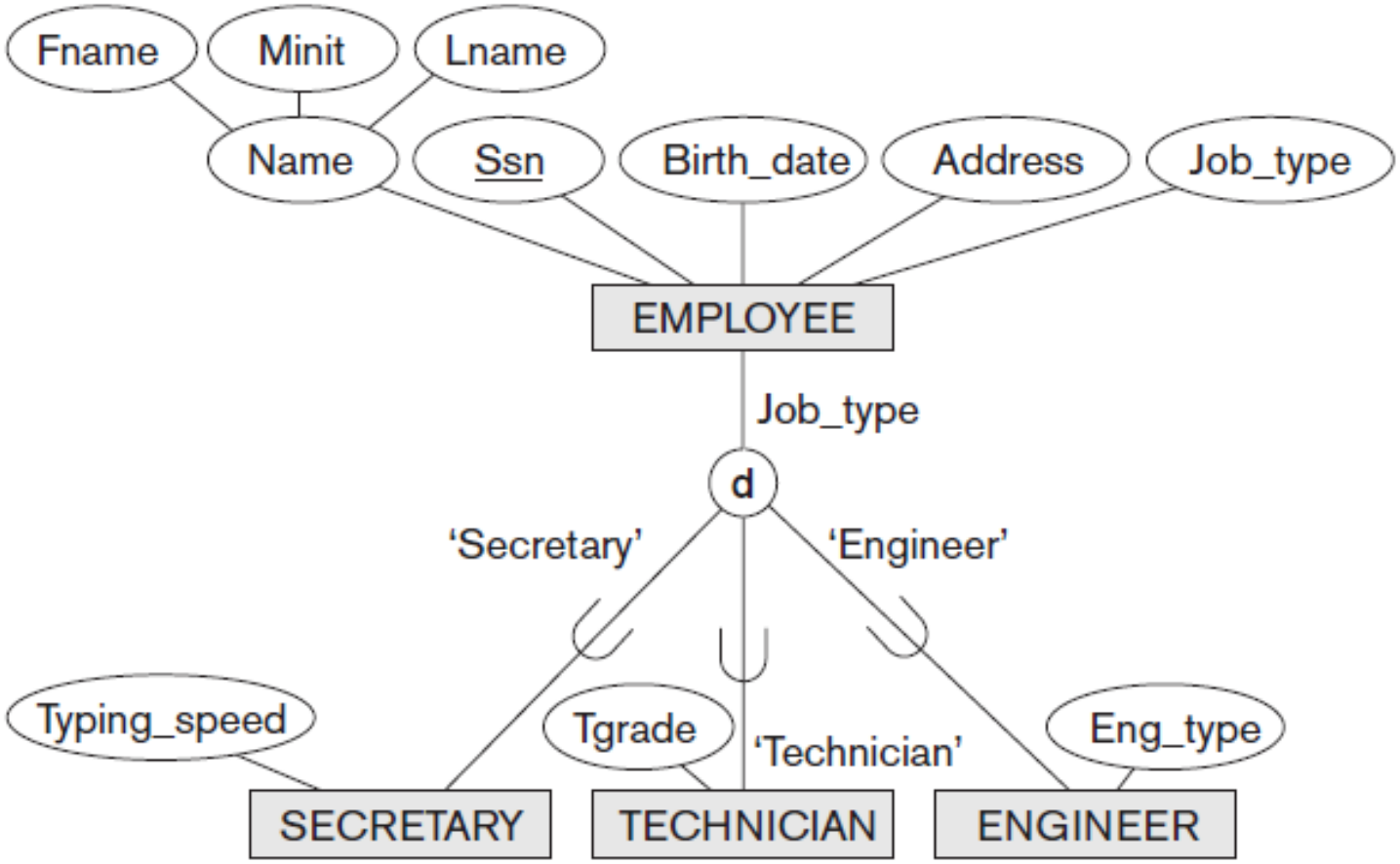
Condition-defined subclass: In some specializations we can determine exactly the entities that will become members of each subclass by placing a condition on the value of some attribute of the superclass. Such subclasses are called predicate-defined (or condition-defined) subclasses.

Constraints of Specialization and Generalization

User-defined subclass : When we do not have a condition for determining membership in a subclass, the subclass is called user-defined subclass. Membership in such a subclass is determined by the database users when they apply the operation to add an entity to the subclass

Attribute-defined specialization: If all subclasses in a specialization have their membership condition on the same attribute of the superclass, the specialization itself is called an attribute-defined specialization, and the attribute is called the defining attribute of the specialization.

Constraints of Specialization and Generalization



Constraints of Specialization and Generalization

Type-2: it relates to check whether entities belong to more than one entity set with a single generalization or not.

Disjoint : a disjointness constraint requires that an entity belong to only one lower level entity set. Example: Account may be either savings or current.

Overlapping: in overlapping generalization, the same entity may belong to more than one lower-level entity set within a single generalization. Example: Person is overlapping generalization with employee and customer entities.

Constraints of Specialization and Generalization

Type-3: it is a completeness constraint on a specialization/generalization. It specifies whether an entity in higher level entity set must belong to atleast one of the lower level entity sets within the generalization/specialization.

Total generalization/specialization: each higher level entity must belong to a lower level entity set. It will be represented with double line to connect the box representing the higher level entity set. Example: EMPLOYEE, HOURLY_EMPLOYEE, SALARIED_EMPLOYEE

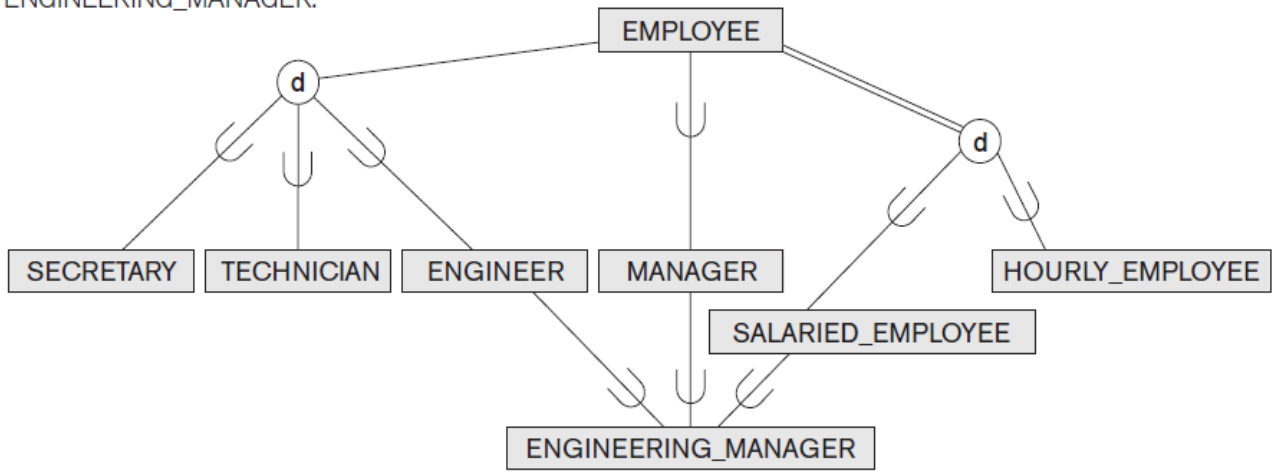
Partial generalization/specialization: some higher level entity may not belong to any other lower level entity set. Partial generalization is the default. Example: EMPLOYEE, SECRETARY, ENGINEER, TECHNICIAN

Attribute Inheritance

A crucial property of the higher and lower level entities created by specialization and generalization is attribute inheritance.

The attributes of higher level entity sets are said to be inherited by the lower level entity sets. Example: Customer and Employee inherit all the attributes of the higher level entity Person.

A specialization lattice with shared subclass ENGINEERING_MANAGER.

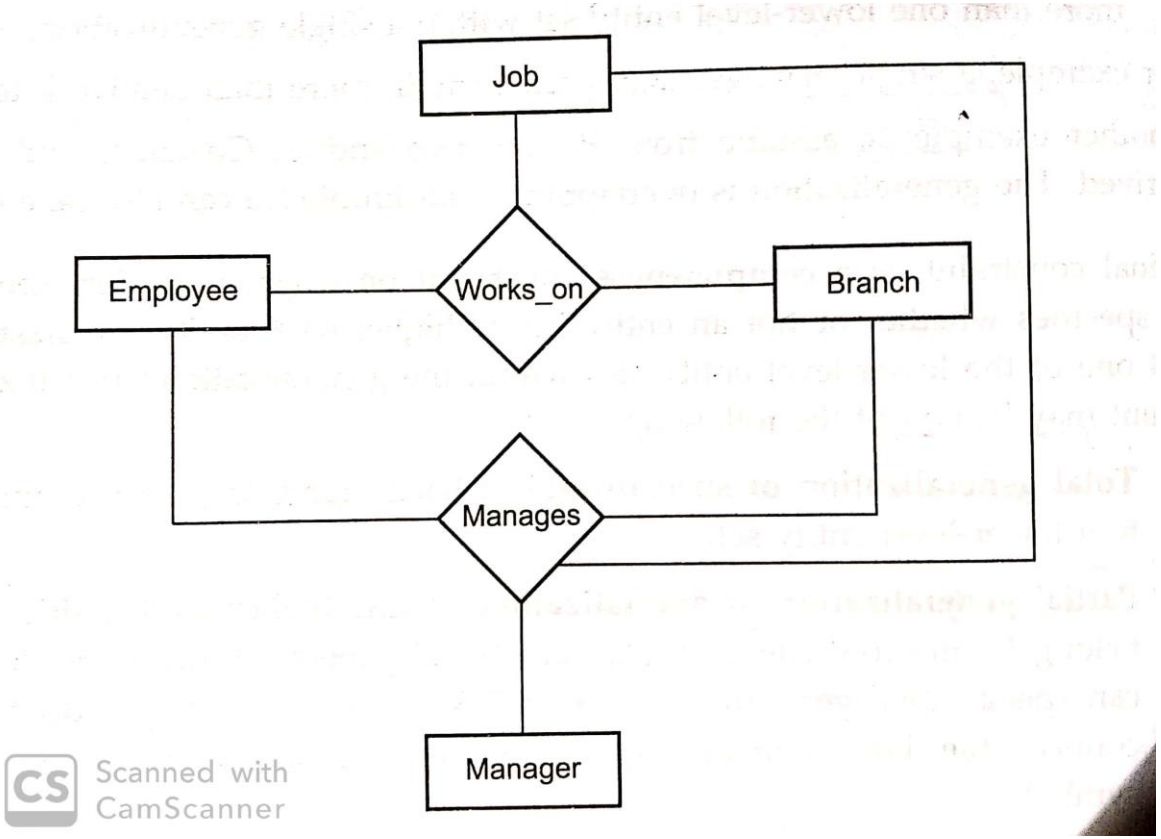


Aggregation

One limitation on ER Model is that it can not express the relationship among relationships.

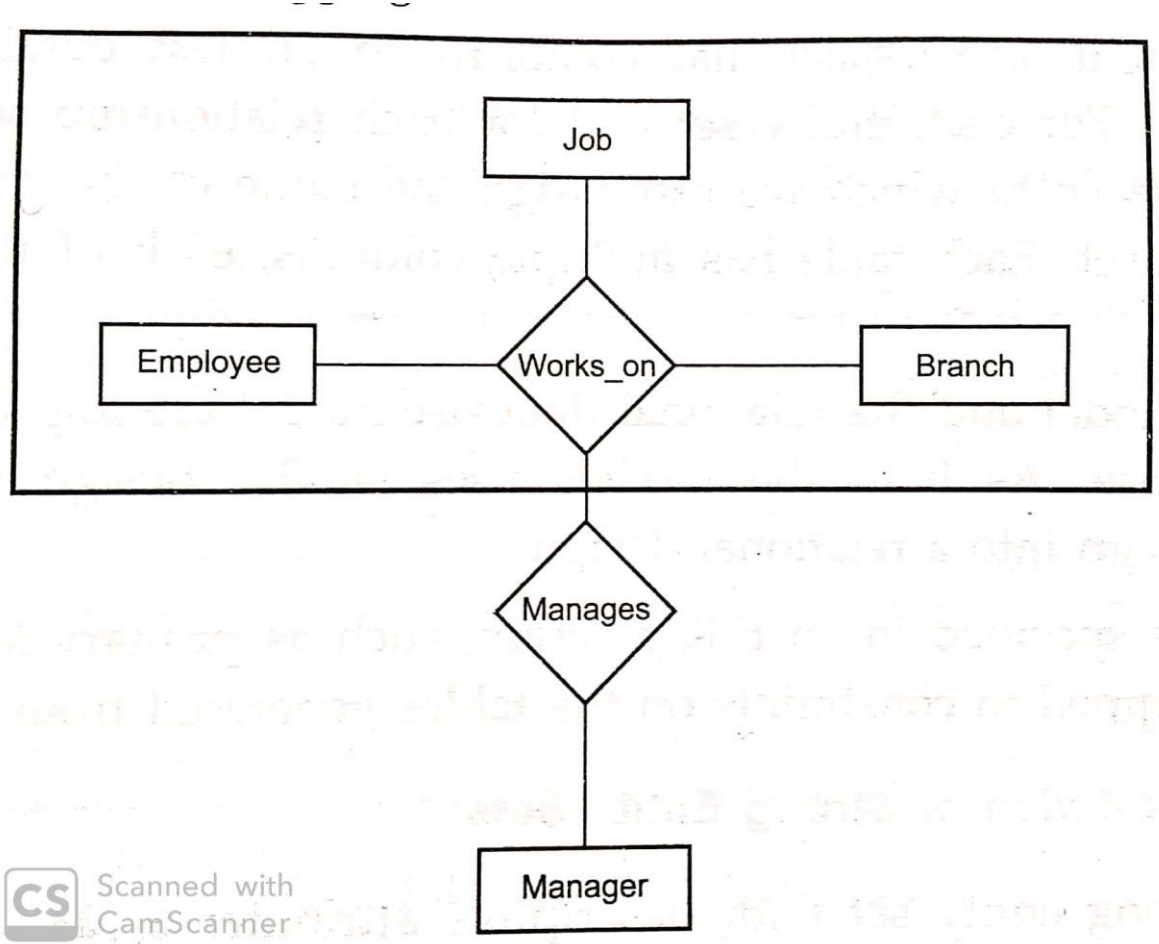
There is redundant information in the ER model.

Every attribute is connected through a relationship “manages” with manager entity.



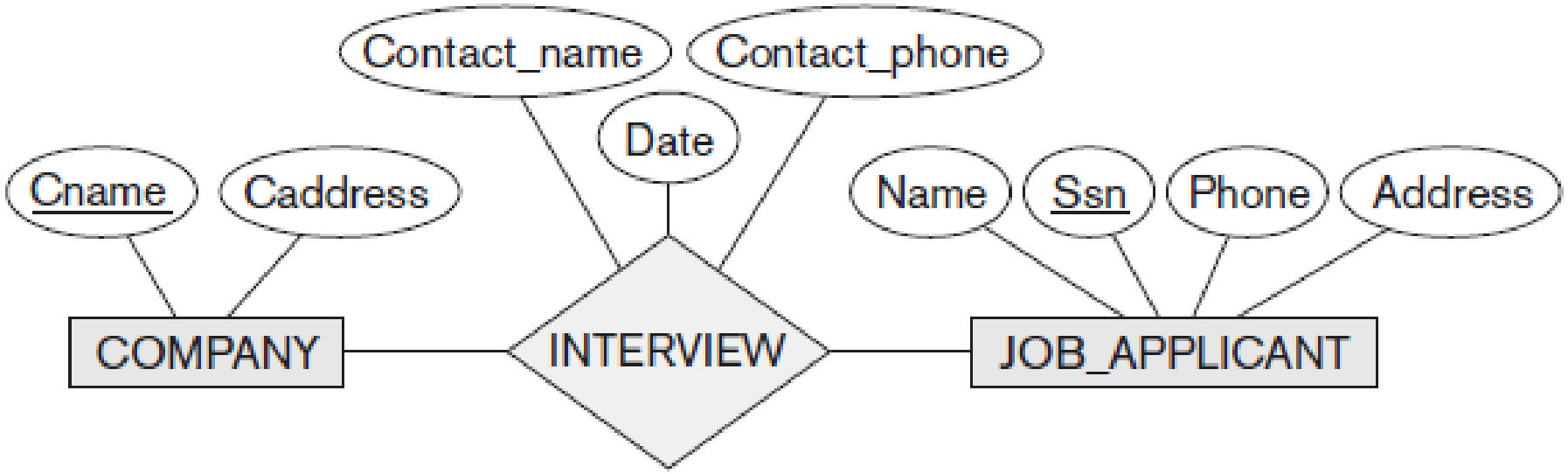
Aggregation

Aggregation is an abstraction through which relationships are treated as higher level entities.



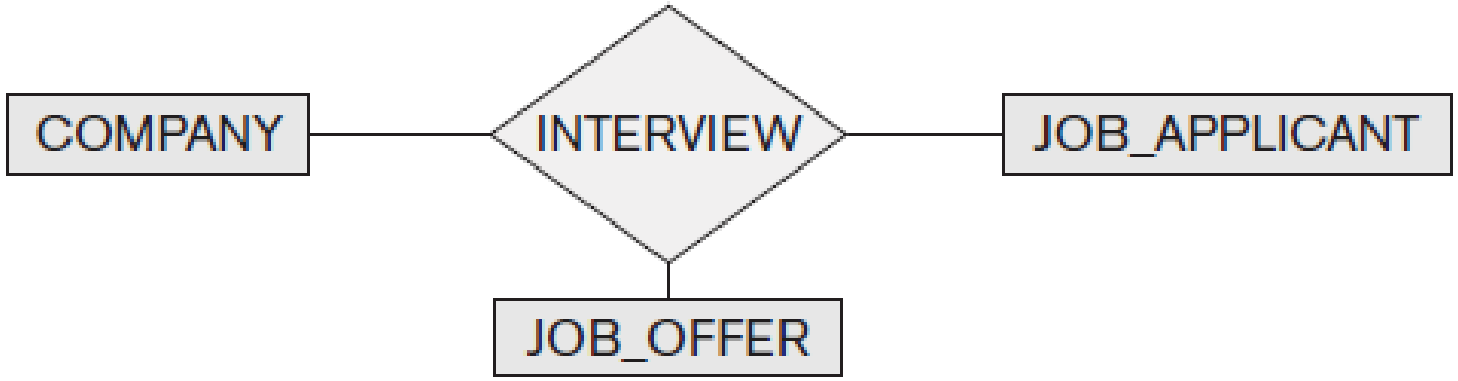
Aggregation

The relationship type INTERVIEW.



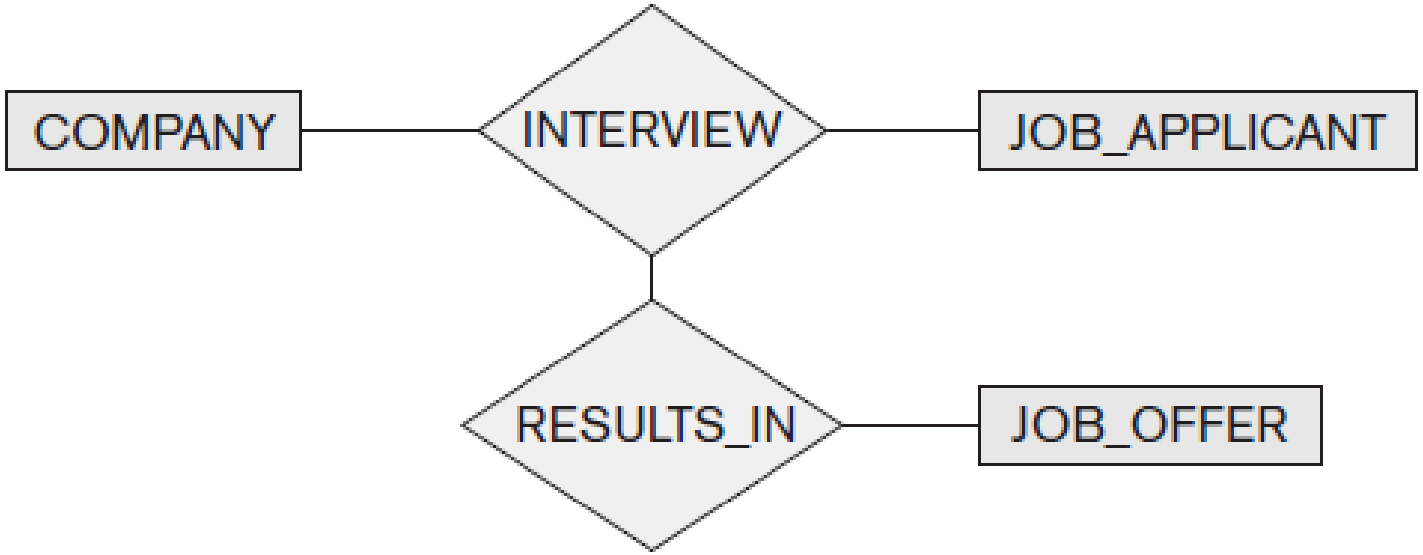
Aggregation

Including JOB_OFFER in a ternary relationship type (incorrect).



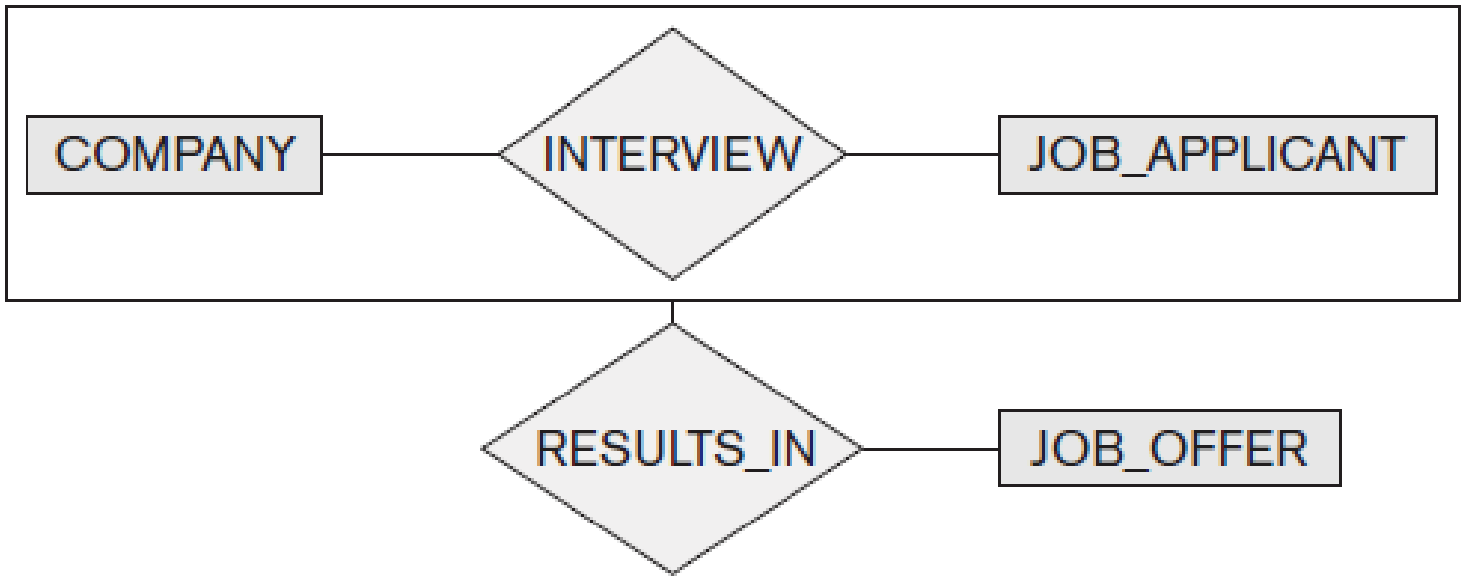
Aggregation

Having the RESULTS_IN relationship participate in other relationships (not allowed in ER).



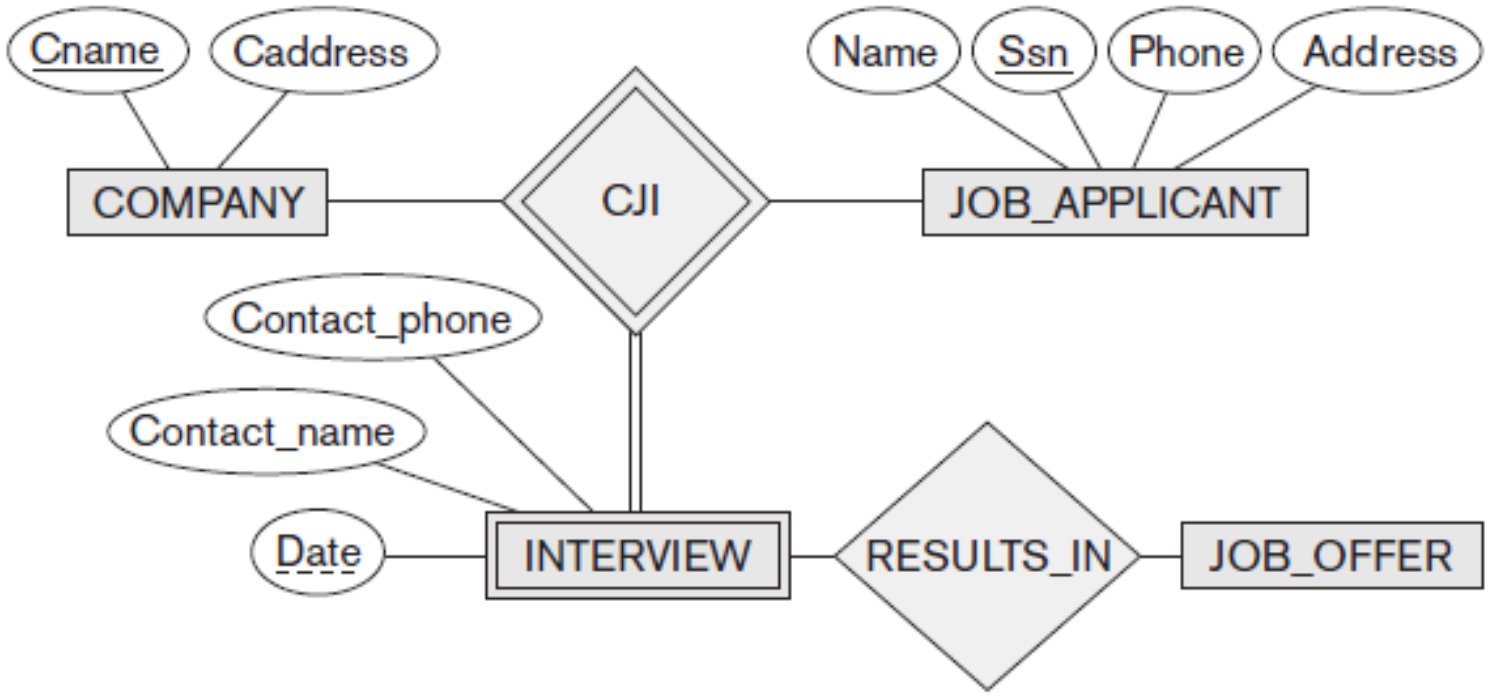
Aggregation

Using aggregation and a composite (molecular) object (generally not allowed in ER but allowed by some modeling tools)

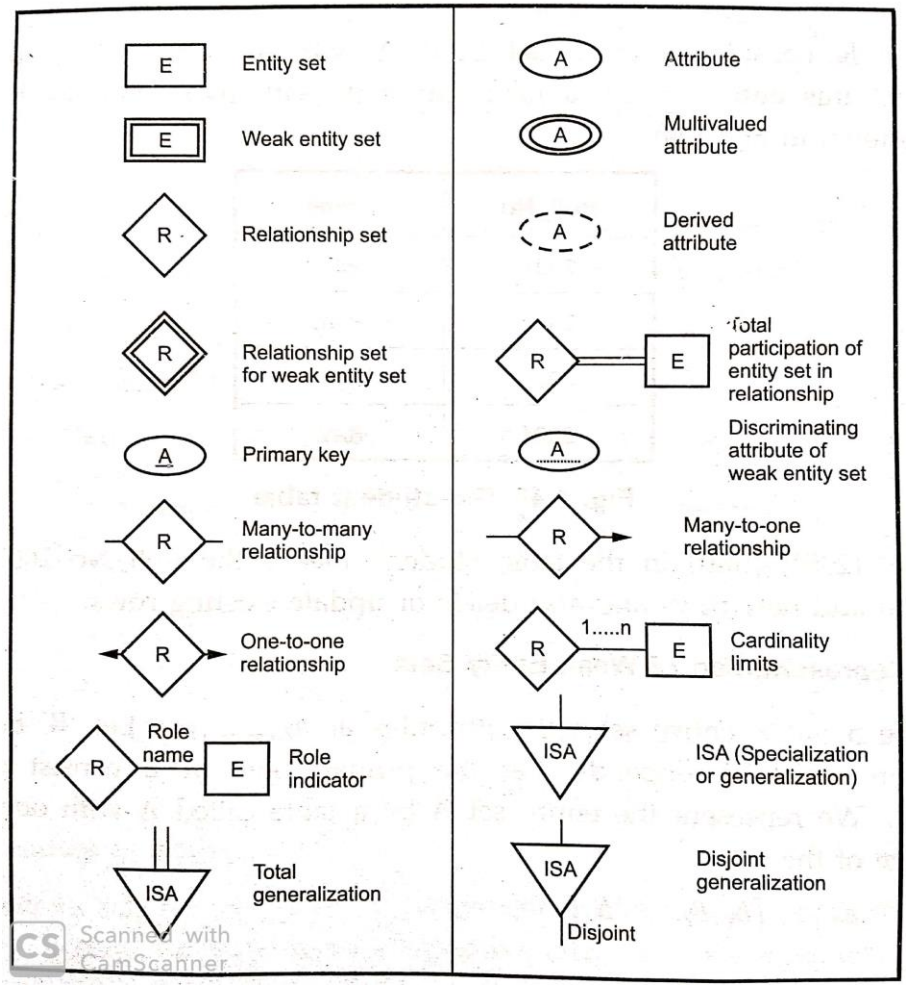


Aggregation

Correct representation in ER.



Alternative ER Notations



Summary

This session will give the knowledge about

- Extended ER Model