UNIT 1

Lecture 9

EER Model

Extended E R Model

1. Specialization
2. Generalization
3. Attribute Inheritance
4. Aggregation

Specialization

- The process of designating sub-groupings or dividing a higher level entity set into a number of lower level entity set on the basis of specific features is known as specialization.
- It is an **Top – Down** approach.

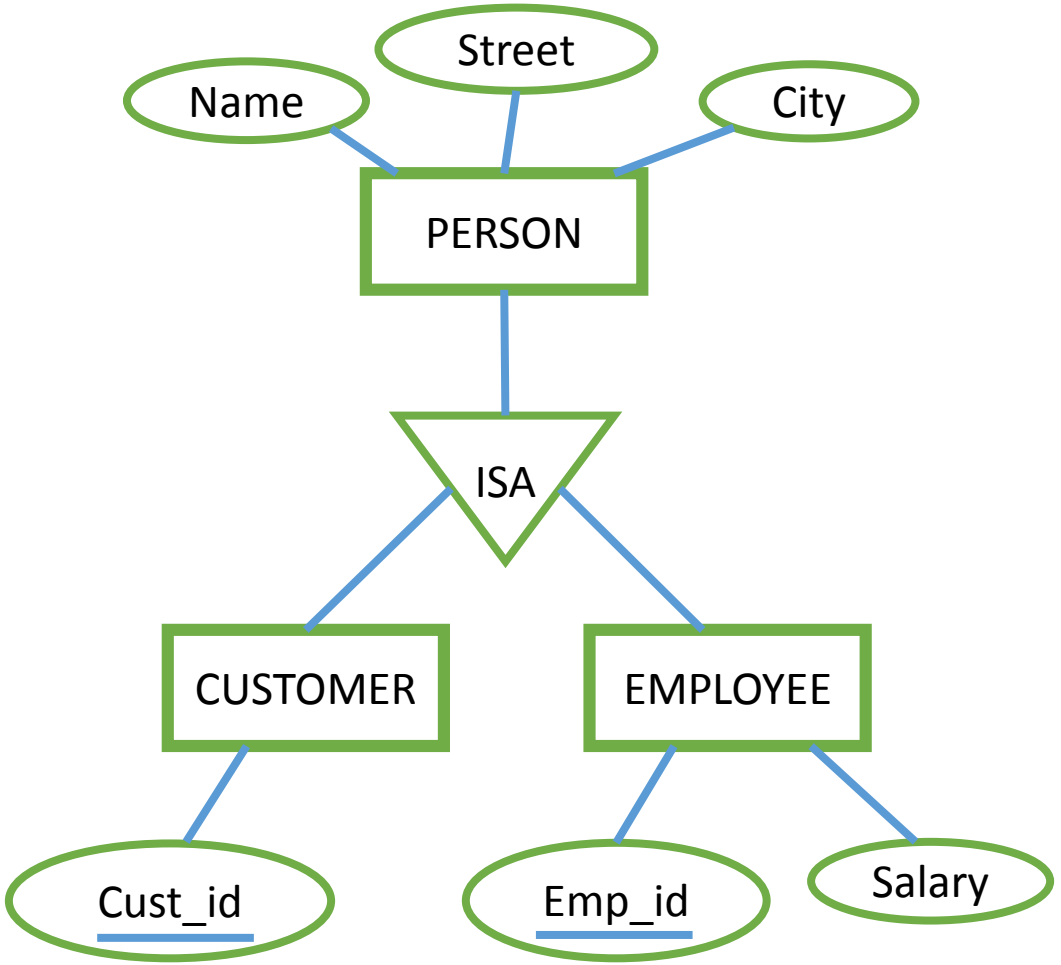
Generalization

- The process of grouping or joining two or more lower level entity sets to make a higher level entity set on the basis of their common features is known as generalization.
- It is an **Bottom – Up** approach.

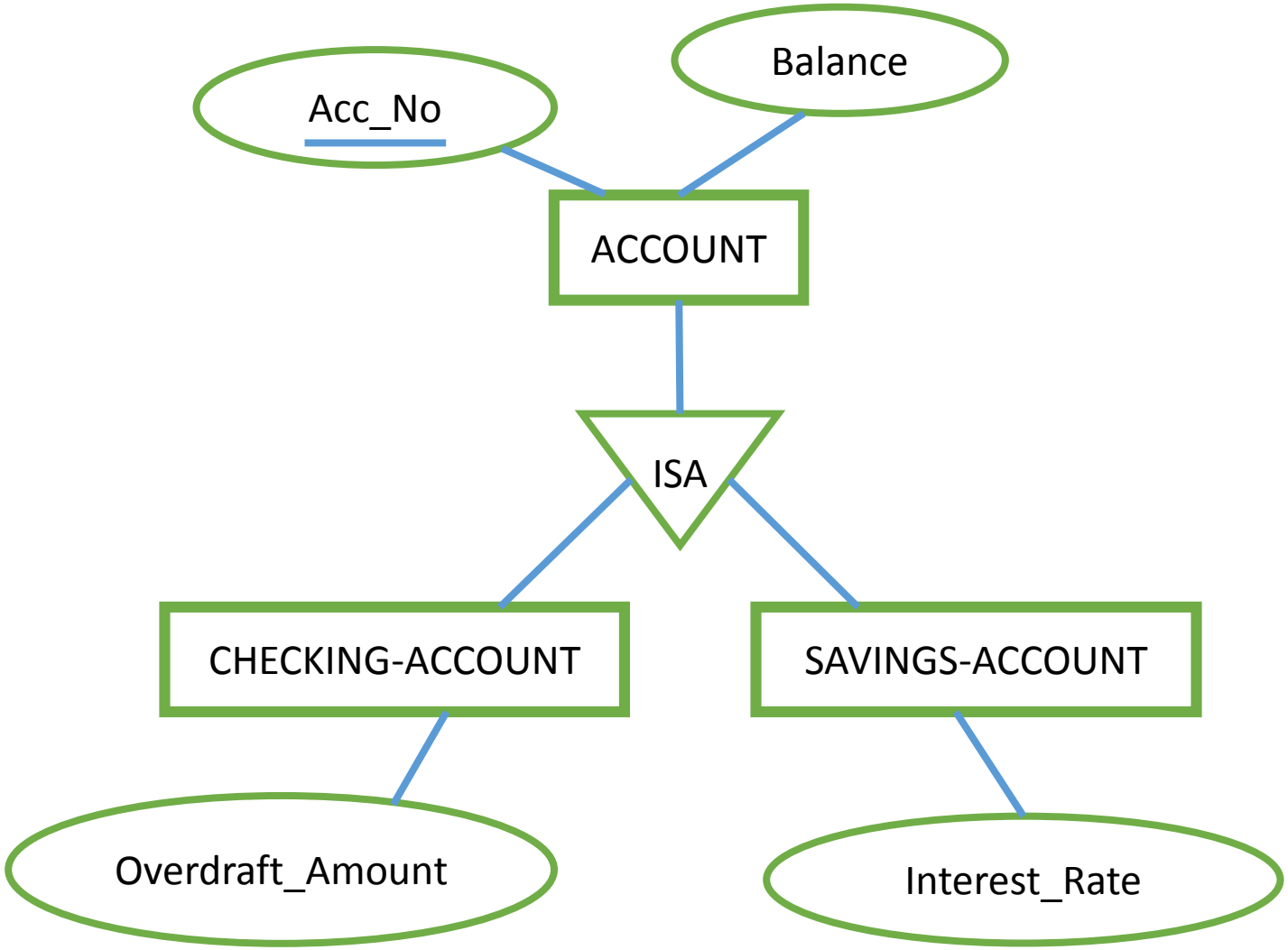
Specialization/ Generalization

- In terms of an E-R diagram, specialization is depicted by a ***triangle*** component labeled **ISA**.
- The ISA relationship may also be referred to as a **superclass-subclass** relationship.
- Higher and lower-level entity sets are depicted as regular entity sets i.e., as rectangles containing the name of the entity set.

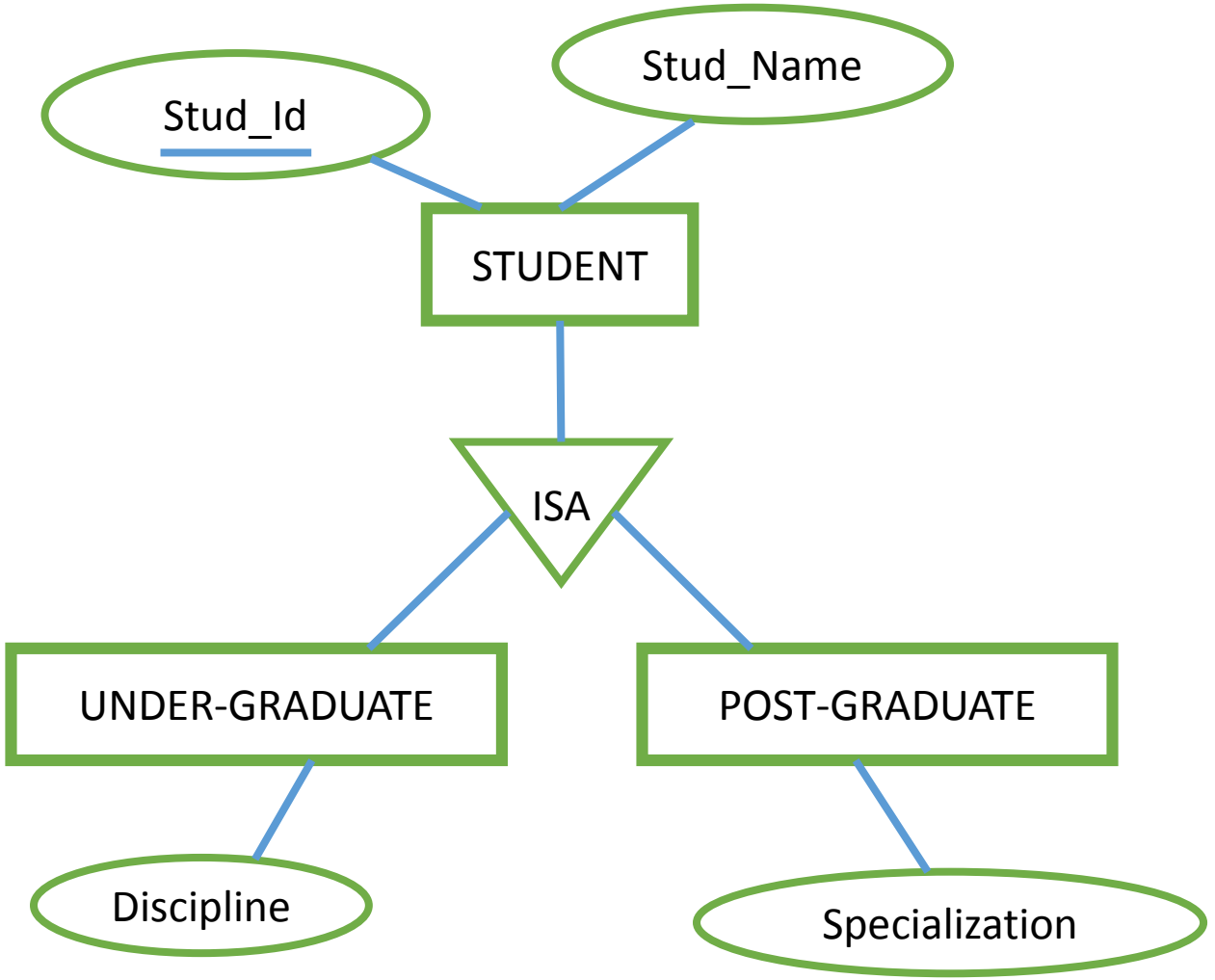
Generalization/ Specialization



Generalization/ Specialization



Generalization/ Specialization



Difference

No.	Specialization	Generalization
1	It is a Top Down approach.	It is a Bottom Up approach.
2	Specialization stems from a single entity set; it emphasizes differences among entities within the set by creating distinct lower-level entity sets.	Generalization proceeds from the recognition that a number of entity sets share some common features (namely, they are described by the same attributes and participate in the same relationship sets).
3	The process of designating sub-groupings within an entity set is called **specialization**.	The process of designating groupings from various entity sets is called **generalization.**
4	Specialization is a result of taking a subset of higher level entity set to form a lower-level entity set.	Generalization is a result of taking the union of two or more disjoint (lower-level) entity sets to produce a higher-level entity set.

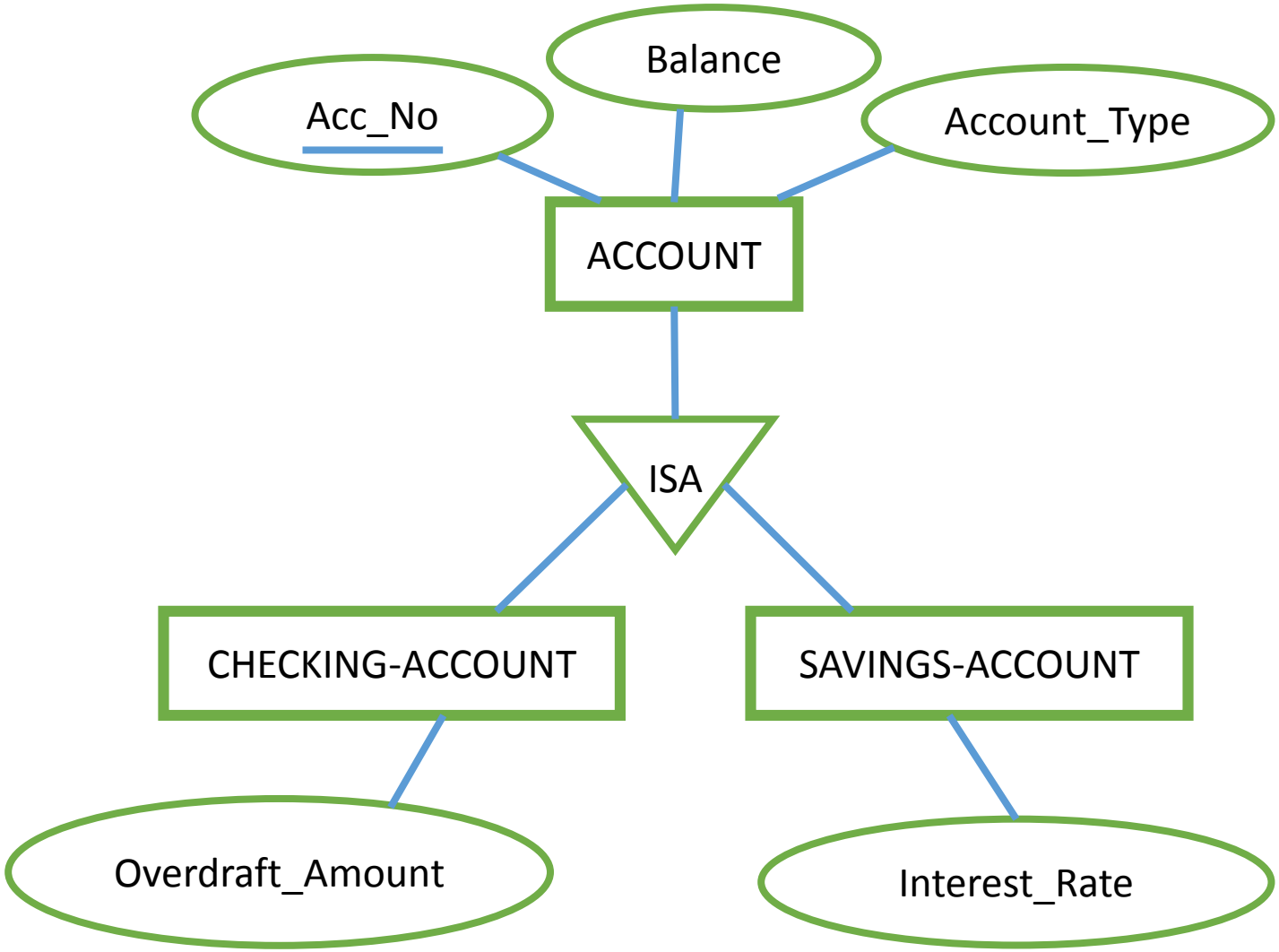
Attribute Inheritance

- A crucial property of the higher and lower-level entities created by specialization and generalization is **attribute inheritance**.
- The attributes of the higher-level entity sets are said to be **inherited** by the lower-level entity sets.

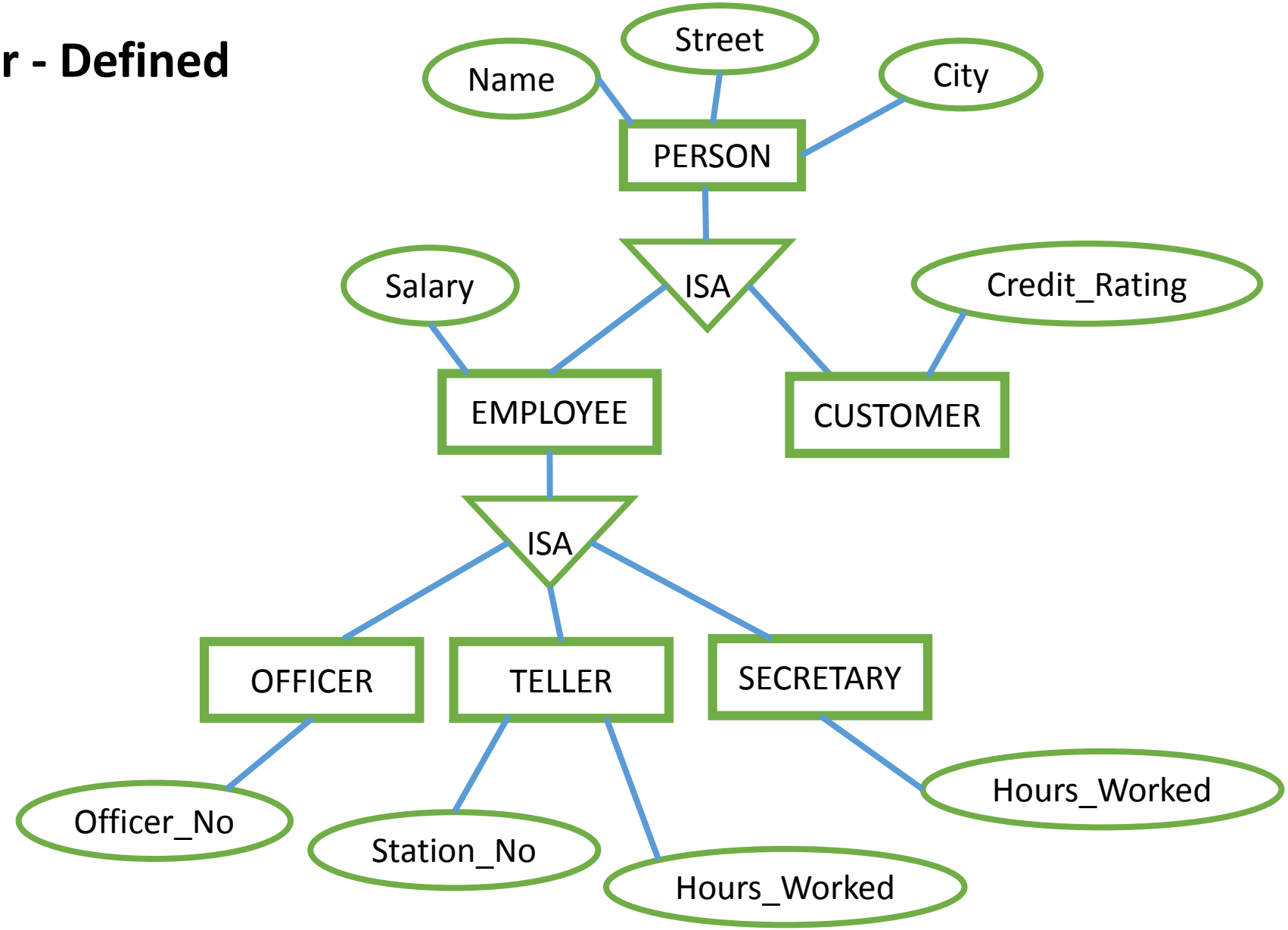
Constraints on Specialization/ Generalization

- **Condition-defined**. In condition-defined lower-level entity sets, membership is evaluated on the basis of whether or not an entity satisfies an explicit condition or predicate.
- **User-defined**. User-defined lower-level entity sets are not constrained by a membership condition; rather, the database user assigns entities to a given entity set.

Condition - Defined



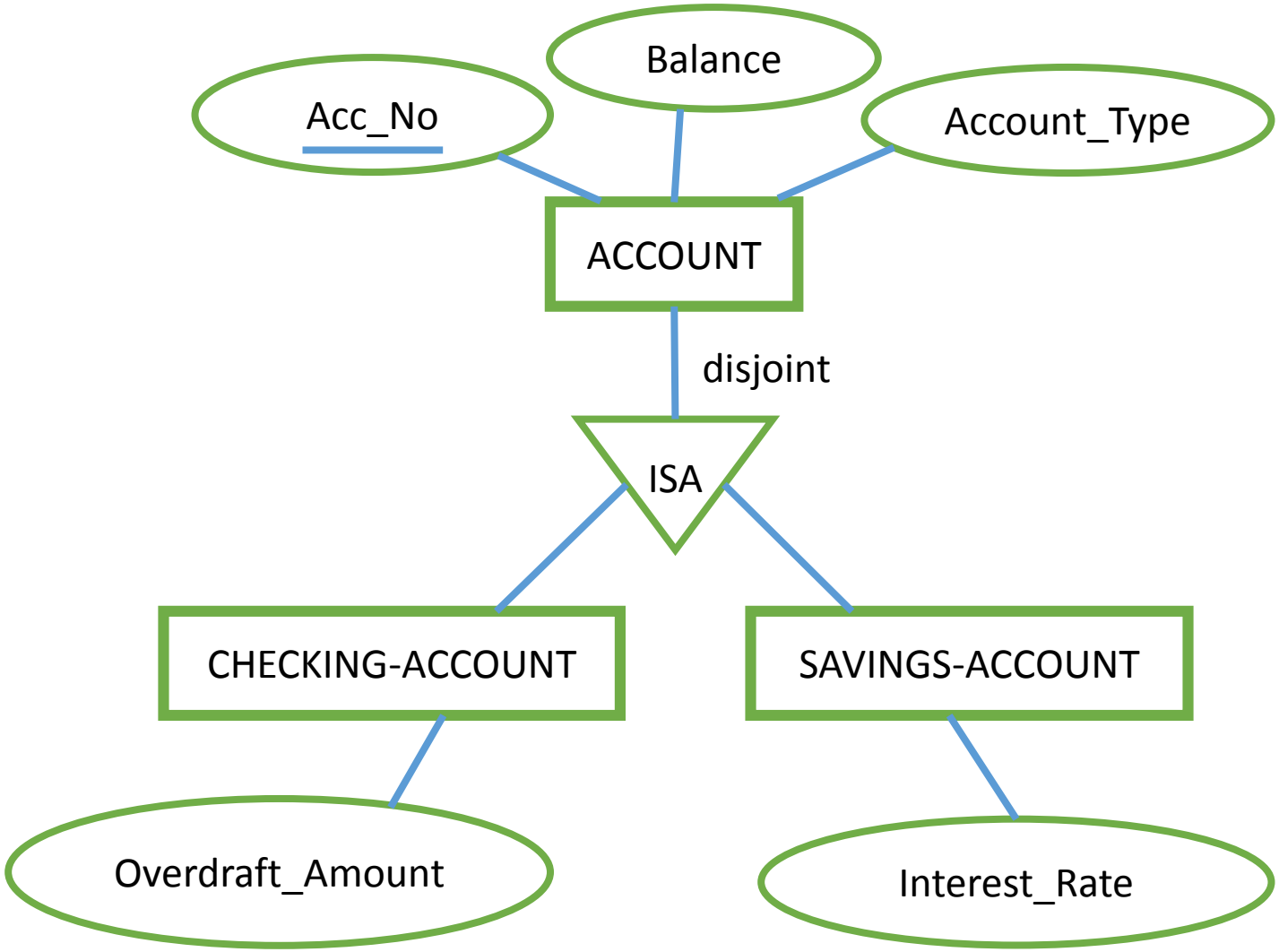
User - Defined



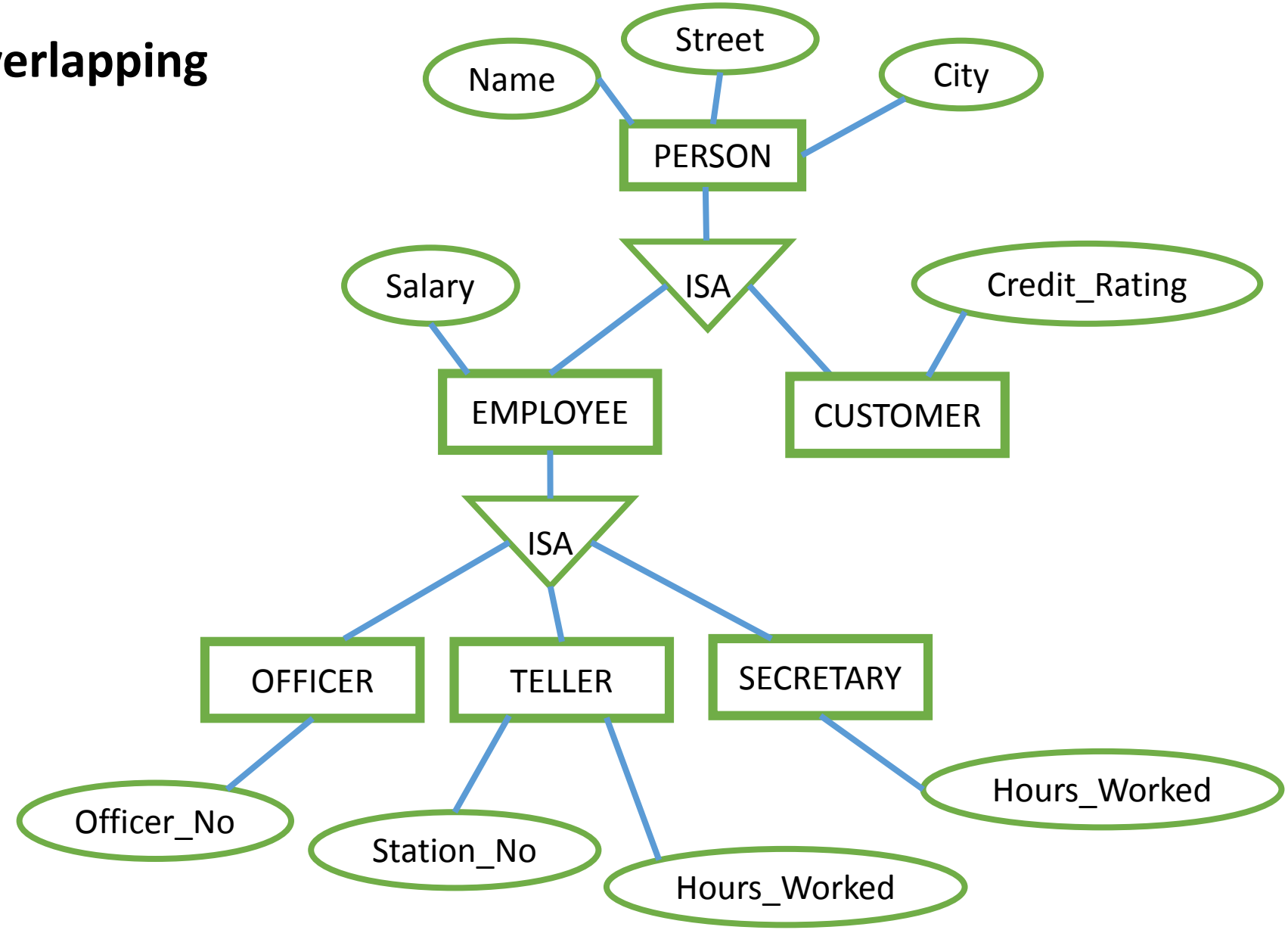
Constraints on Specialization/ Generalization

- A second type of constraint relates to whether or not entities may belong to more than one lower-level entity set within a single generalization. The lower-level entity sets may be one of the following:
- **Disjoint**. A *disjoint-ness constraint* requires that an entity belong to no more than one lower-level entity set.
- **Overlapping**. In *overlapping generalizations*, the same entity may belong to more than one lower-level entity set within a single generalization.
- Lower-level entity overlap is the default case; a disjoint-ness constraint must be placed explicitly on a generalization (or specialization). We can note a disjointedness constraint in an E-R diagram by adding the word *disjoint* next to the triangle symbol.

Disjoint Constraint



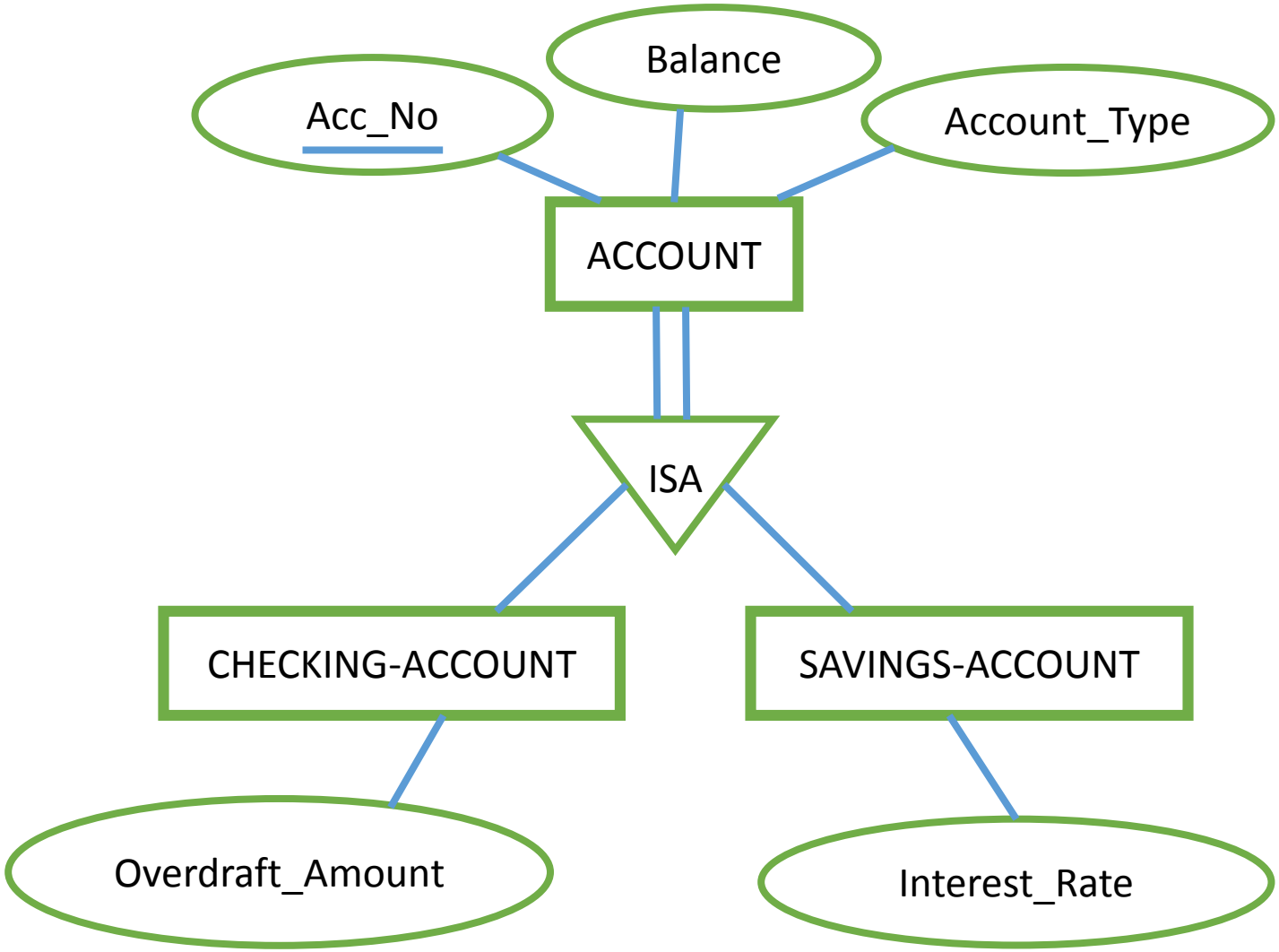
Overlapping



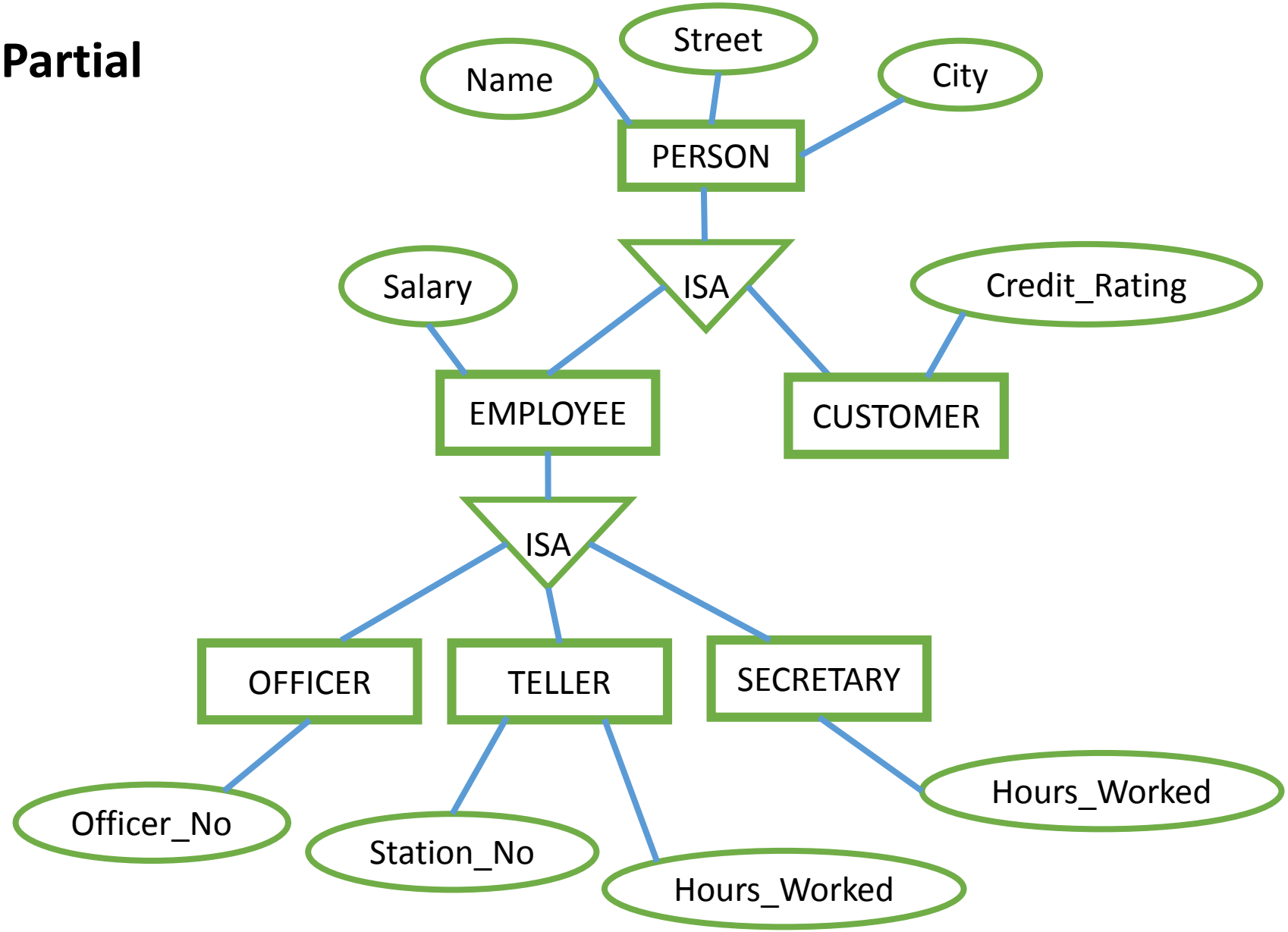
Constraints on Specialization/ Generalization

- A final constraint, the **completeness constraint** on a generalization or specialization, specifies whether or not an entity in the higher-level entity set must belong to at least one of the lower-level entity sets within the generalization/specialization. This constraint may be one of the following:
- **Total generalization** or **specialization**. Each higher-level entity must belong to a lower-level entity set.
- **Partial generalization** or **specialization**. Some higher-level entities may not belong to any lower-level entity set.
- **Partial generalization** is the **default**.
- We can specify **total generalization** in an E-R diagram by using a **double line** to connect the box representing the higher-level entity set to the triangle symbol.

Total Specialization/ Generaliztion



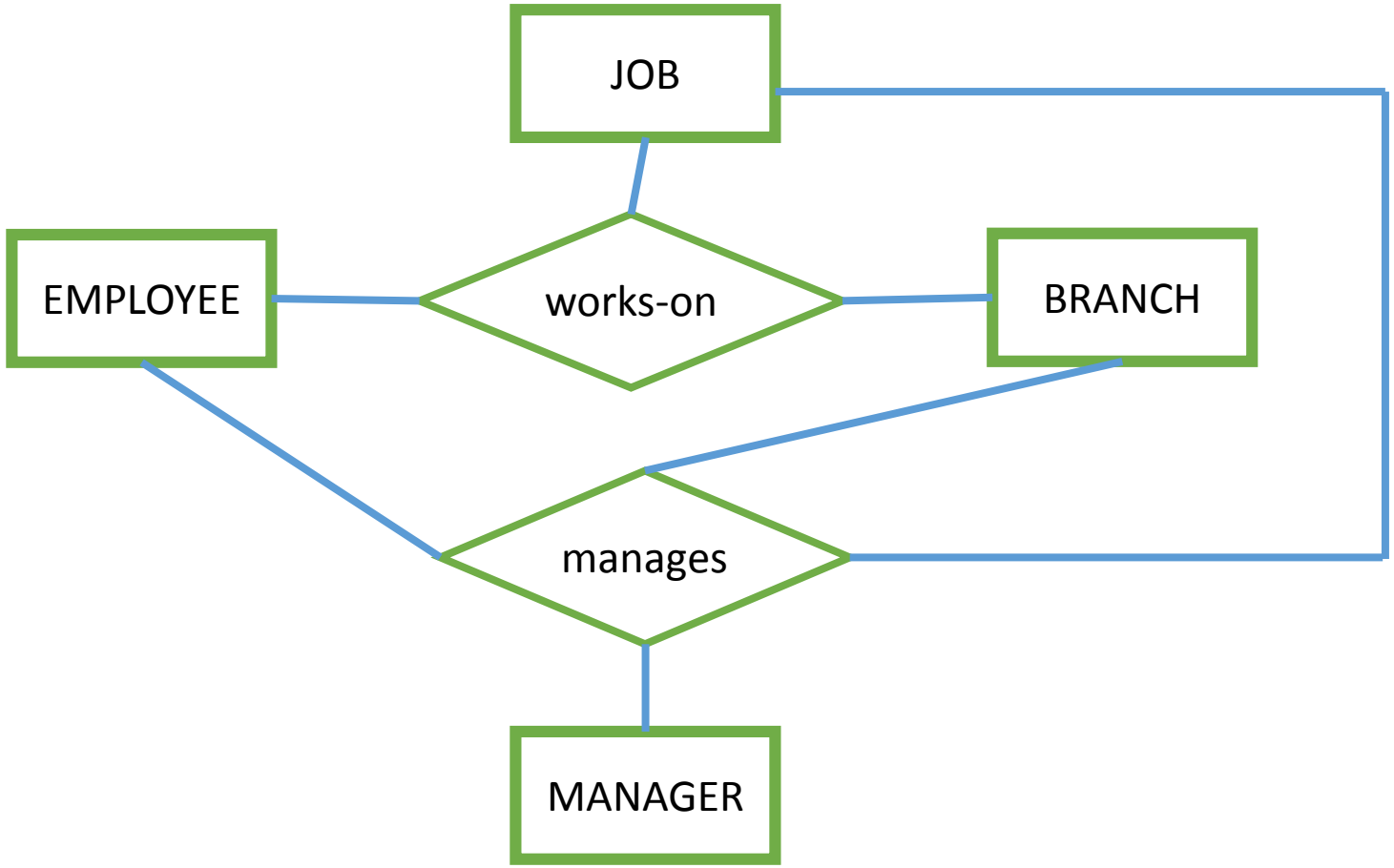
Partial


Street
Name
City
PERSON
ISA
Salary
Credit_Rating
EMPLOYEE
CUSTOMER
ISA
OFFICER
TELLER
SECRETARY
Officer_No
Station_No
Hours_Worked
Hours_Worked

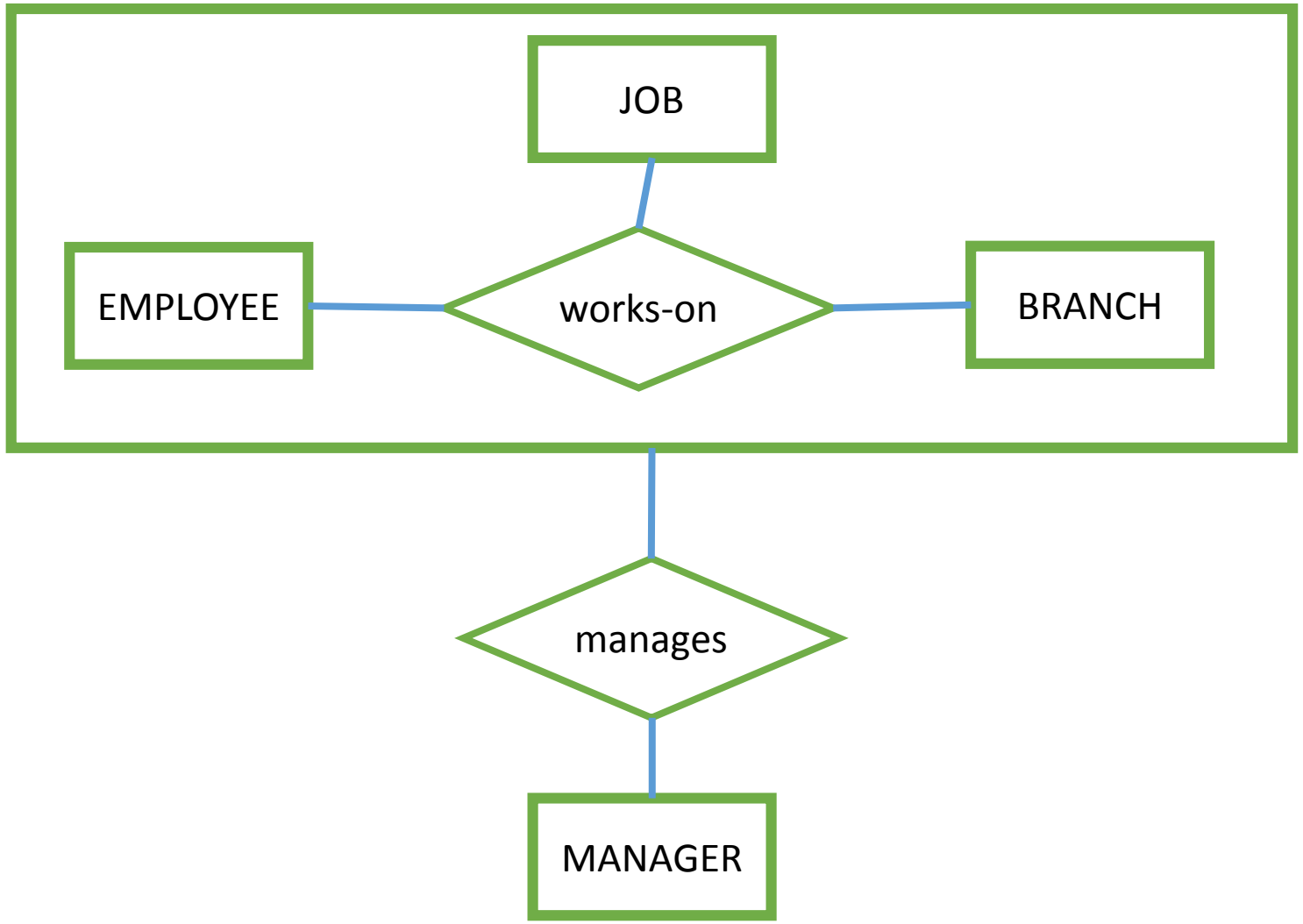
Aggregation

- One limitation of the E-R model is that it cannot express relationships among relationships.
- **Aggregation** is an abstraction through which relationships are treated as higher level entities.

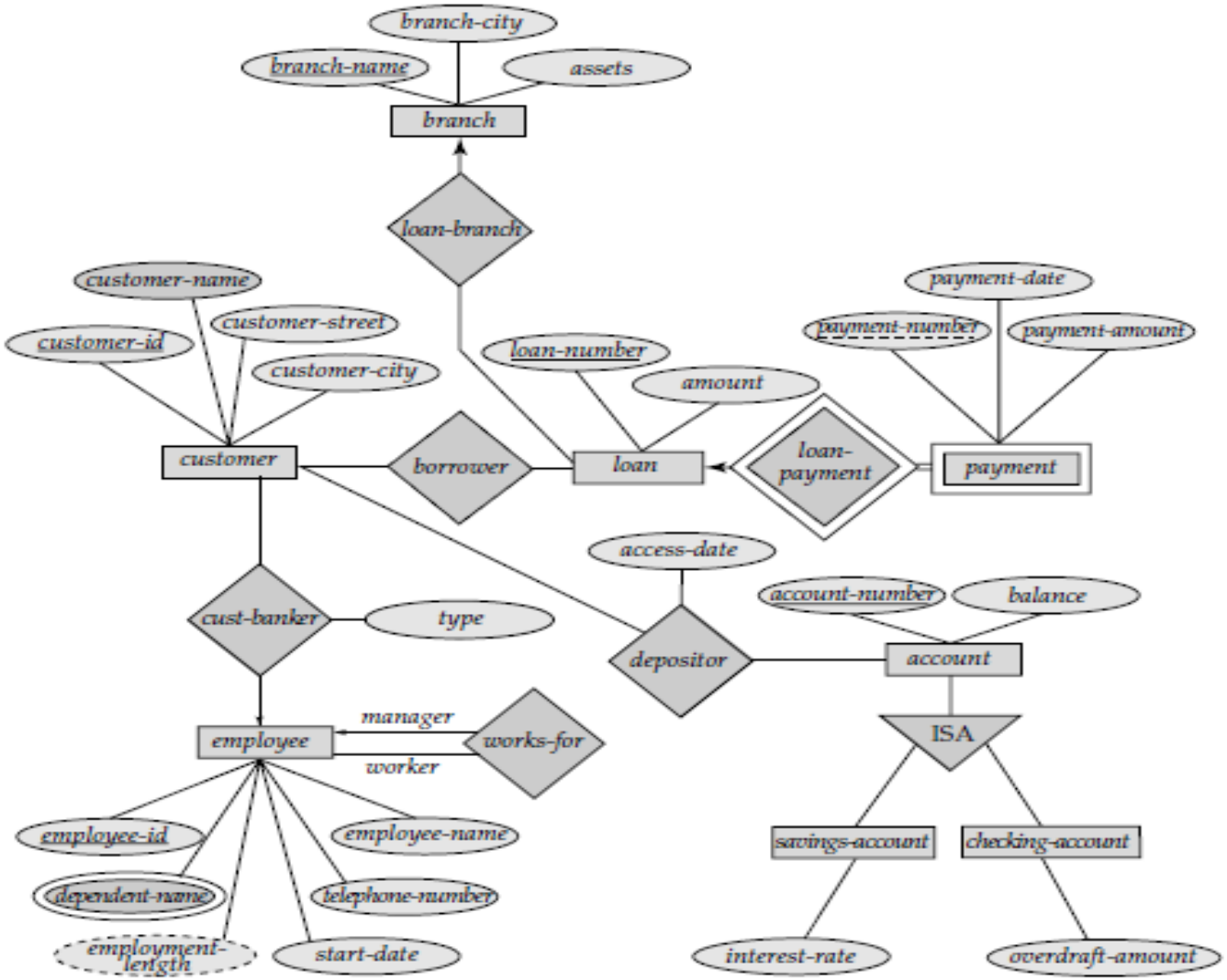
ER Diagram with redundant relationships



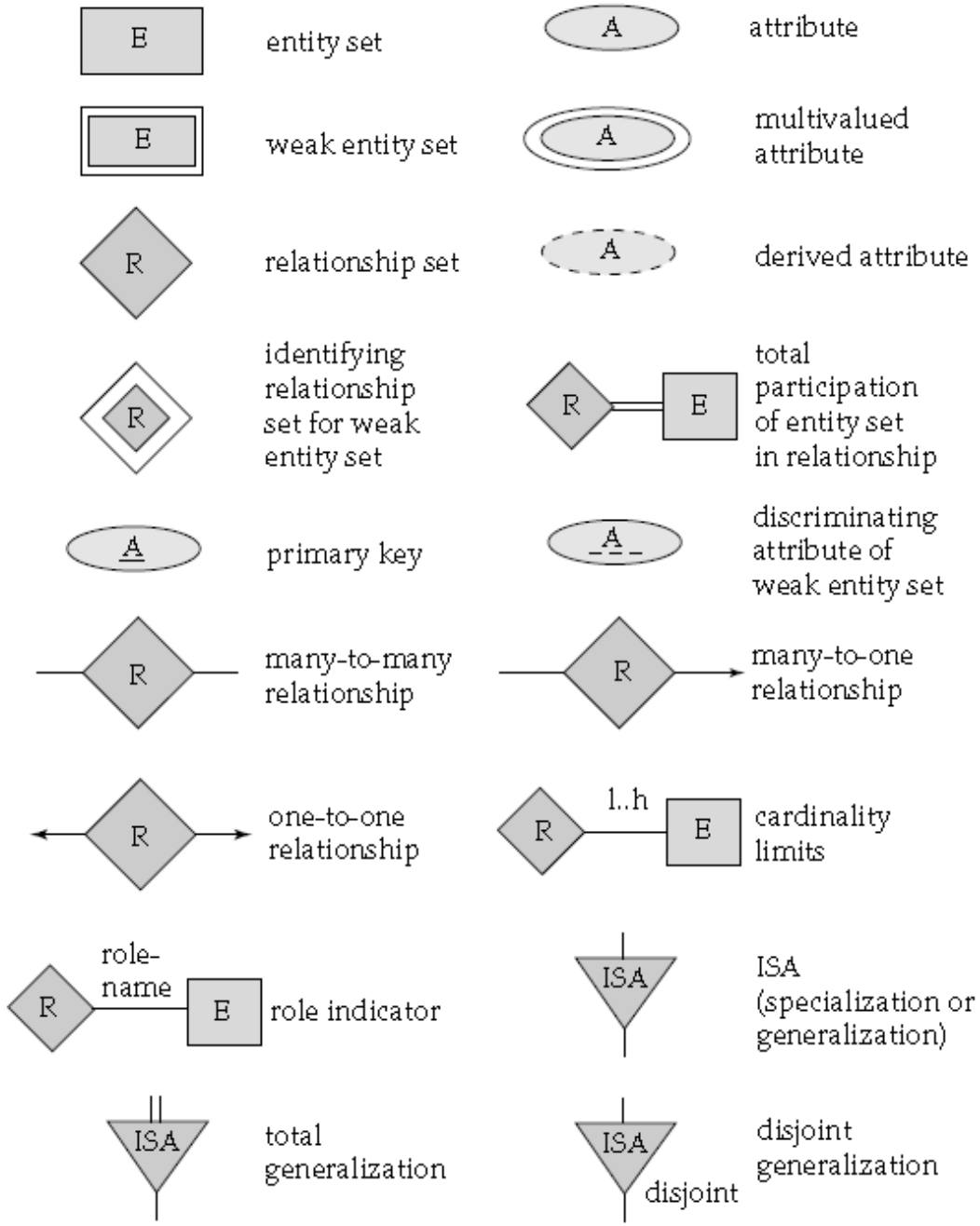
ER diagram with Aggregation



Draw the ER diagram for a banking enterprise



E R Diagram Notations



University Questions

1. Write short notes on
    1. Generalization
    2. Specialization
    3. Disjoint and overlapping constraints
    4. Condition defined and user defined constraints
    5. Total and partial generalization
2. Explain the constraints based on generalization and specialization.
3. Differentiate between specialization and generalization.
4. Explain aggregation with example.
5. Explain enhanced entity set model with examples.

For Video lecture on this topic please subscribe to my youtube channel.

The link for my youtube channel is

https://www.youtube.com/channel/UCRWGtE76JlTp1iim6aOTRuw?sub_confirmation=1