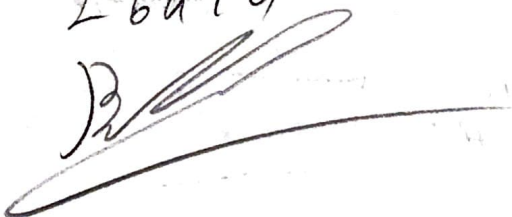Baha Mert Ersoy
26414

Being human is not only about breathing, it is about community. We humans have learned to live with each other, eventually developing civilizations and perhaps even more in the future. For a community to function well, it needs people who trust each other. That's why integrity is absolute. No one will trust someone who has plagiarized before, especially in the educational field. A liar always remains a liar, and will have a hard time finding a place for themselves in their community. Hence, it is important to be a human with integrity for it is one of the characteristics which define us. It is an integral part of being human, and is the bedrock of every community.

Receiving unauthorized help from our peers is wrong because it is not an act of integrity. Not only will we lack education, but also if found out will lose the trust of our professors and peers forever. Same with cheating, cons far outweigh the pros. If found out we will lose the respect of our peers and professors alike.

I pledge on my honour that I have not given or received any unauthorized assistance on this examination from any other person.

Baha Mert Ersoy
26414

Baha Meet Ersoy
26616

Examples will be shown with a figure
below the text in this page.

1.

(a) Entity: An entity is an object and it can be distinguished from other objects. Their sets are indicated by rectangles in ER models.
There are also weak entities, which are objects just like regular entities but they can't exist on their own. More specifically only by the primary key of another entity (owner) can they be identified. They are indicated by a bold rectangle and the diamond representing their relationship will also have to be bold. An example will be shown below the page.

(b) Entity Set: Entities which share the same properties are named an entity set. They are basically a set of objects of same type. They may overlap. They are represented by a rectangle.

(c) Attribute: Both relationships and entities can have attributes which describe them. While entity sets need to have attributes relationships don't need them, but can have them. They are designated by ellipses. Each attribute has a group of permitted values (domain).

(d) Key: Shown by underlining the attribute representing it. Each entity has a key. Each key's value is unique, so for each entity in an entity set their keys are different from each other. There are two types of keys: Primary and foreign keys.
Non-weak entities have primary keys and they each have a unique primary key (can be one attribute or a group of attributes).
Entities which can't exist by themselves and/or in one-to-many lone-to-one relationships will have foreign keys. Since these entities can't exist by themselves, the primary key of the non-weak entity they are connected to will be their foreign key.

(e) Relationship: When two or more entities are related they form a relationship. Degree of a relationship set basically means the amount of entity sets which participate in a relationship. They can have attributes. There are one-to-one, one-to-many, many-to-one and many-to-many relationships. Due to 1-page constraint I can't show all of them. Relationships are indicated by diamonds.
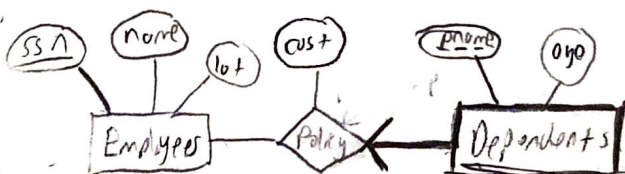
• Dependents = weak entity set, can't exist w/o an employee.
• ssn is the primary key of employees and foreign key of dependents.
• Pname is a partial key since it can't exist on its own and when (ssn, pname) is combined, its unique.

• Employees is an entity set, which contains entities Employees. Both Korem and Ayşe has a unique ssn, a name and a lot.
• One-to-many relationship because because there is a key constraint, participation constraint from dependents and dependents is a weak entity set

2) Baha Mart Essay 264 14

One-to-one | If a single entity from an entity set can only relate to a single entity from an entity set, then their relationship is called a one-to-one relationship because neither entities can relate to multiple entities. Example:

Mother —has— Child

• Each child can only have one mother, and each mother can only have one child. So in a country with this policy no mother can have more than one child

One-to-many | If a single entity from an entity set can relate to many entities from an entity set but not the other way around, then it is a one-to-many relationship because only one of the entities can relate multiple entities.

Mother —has— Child

• Each mother can have multiple children but a child can only have one mother.

Many-to-one | If multiple entities from an entity set can relate to only a single entity from an entity set but not the other way around, then it's a many-to-one relationship because multiple entities from an entity set can relate to only one entity from an entity set.

Students —enrolled— School

• Each student is enrolled in only in a single school but a school can have multiple students.

Many-to-many | If multiple entries from an entity set can relate to multiple entities from another entity set it is a many-to-many relationship.

Students —enrolled— Classes

• Multiple students can be enrolled in multiple classes and each class can have multiple students.

3) There are two kinds of participation: Total participation (The entities in the entity set should all participate in the relationship) and partial participation (not all entities are forced to participate). If there is a participation constraint then it is total participation, and it is indicated by a thick line.

```
[courses] ---- <enrolled> ═══ [student]
```

- Multiple students can be enrolled in multiple courses, but <u>each</u> student has to be enrolled in at least one course, so they must all participate in enrolled relationship.

Key constraints are used to determine the type of relationship (one-to-many, many-to-one etc.) They are indicated by an arrow and the entity set they are connected to can only connect to one entity from the entity set it is related to.

```
[courses] ---- <enrolled>→ [students]
```

- There is a key constraint from Student entity set, which means that each student can <u>only be enrolled to a single course but a course can have multiple students.</u> One-to-many relationship.

4) <u>A weak entity is an entity which can't be defined unless it is in an identifying relationship. In an identifying relationship, the weak entity is dependent on the other entity and cannot exist on its own without a relationship with that entity. A partial key is an attribute of a weak entity.</u> The reason it is called a partial key is since a weak entity can't exist on its own, it also needs a foreign key from the entity it is in a relationship to form a unique primary key with its own partial key. <u>In all weak entities there will be a participation constraint since they can't exist on their own and a key constraint since it has to be one-to-many.</u>

```
[Mother] ━━━ <has> ━✕ [Child]
```
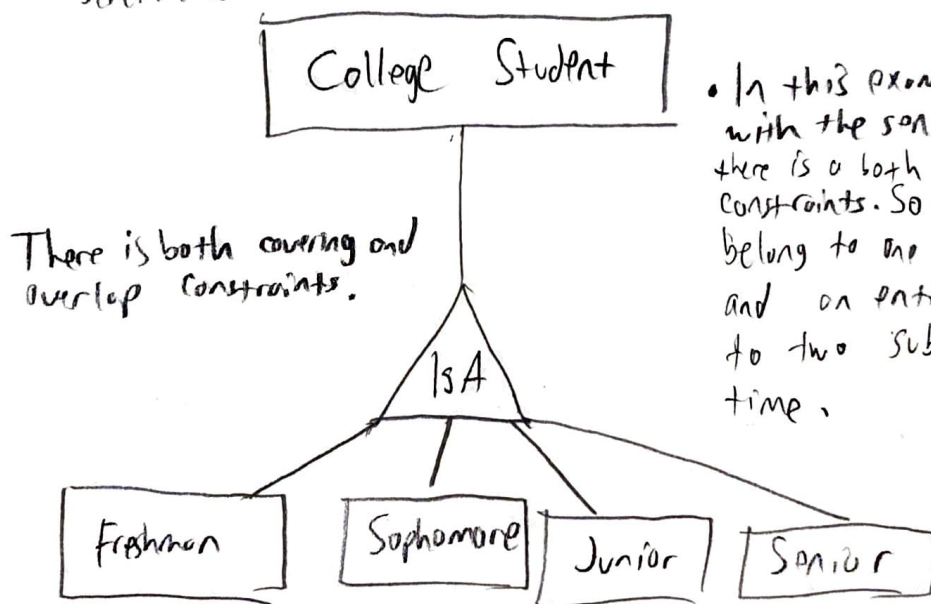
- Partial key: CID of child.

- Participation constraint (since thick)
- and key constraint (since arrow)

- Child is a weak entity and is in an identifying relationship because it can't exist without "has" relationship with a mother entity. Thus, all child entities have to be in a "has" relationship with a mother entity and each child can only have one mother. This is a one-to-many relationship.

5) <u>ISA indicates a hierarchy.</u> It is used to make entities with attributes specific to a subclass, and to identify entities which participate in a relationship. It could specialize on entity, by making a subclass of specialized entities and this also means there will be a more <u>generalized</u> version of the subclasses.

There are two kinds of constraints regarding a ISA hierarchy: <u>Covering constraints</u> and <u>Overlap constraints</u>. Overlap constraints indicate whether an entity can belong to more than one subclass, and covering constraints indicate whether an entity has to belong to a subclass (specialized) or not. We indicate these with sentences.

```
              ┌─────────────────────┐
              │   College  Student  │
              └─────────────────────┘
                         │
There is both covering and      │
overlap constraints.          ╱ ╲
                          ╱ IsA ╲
                        ╱    │    ╲
                      ╱      │      ╲
        ┌─────────┐ ┌──────────┐ ┌───────┐ ┌────────┐
        │ Freshman│ │Sophomore │ │ Junior│ │ Senior │
        └─────────┘ └──────────┘ └───────┘ └────────┘
```

• In this example, as indicated with the sentence on the left, there is a both covering and overlap constraints. So each student has to belong to one of the subclasses and an entity can't belong to two subclasses at the same time.