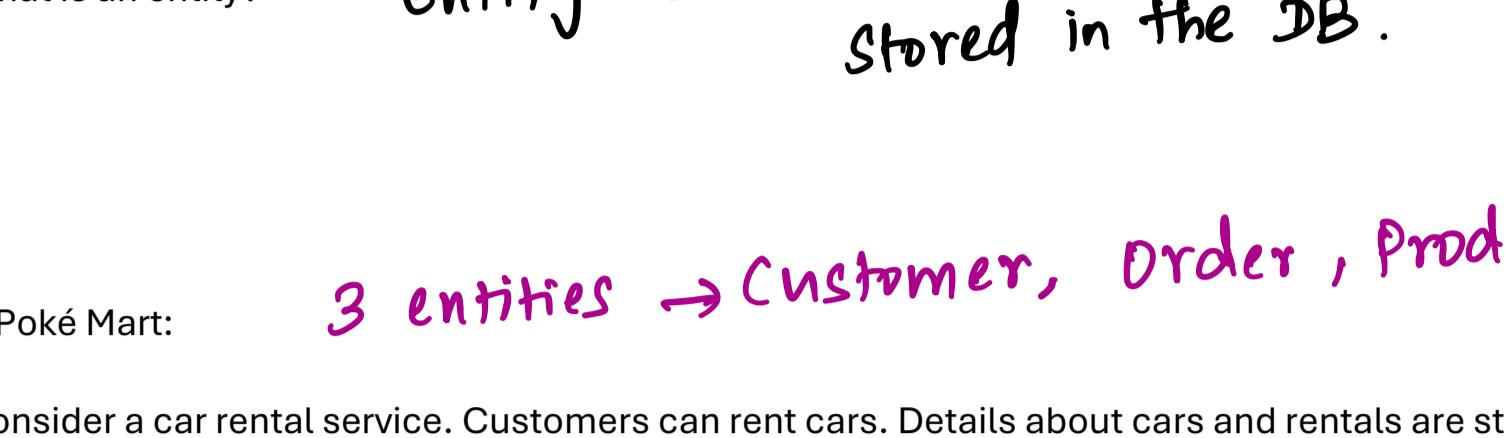


## Week 2 (ER Diagrams)

1. What are the steps in the top-down approach to database design?
1. Conceptual design  $\rightarrow$  ER diagrams (Entity Relationship) WEEKS 2,3
  2. Logical design  $\rightarrow$  Transformation. WEEK 4
  3. Physical design  $\rightarrow$  DB vendor WEEKS 5, DB implementation

2. What are business rules?
- Specifications provided by the client (person/company who requires DB)*

3. The Poké Mart has launched an online store and needs to record customer information. Customers place purchase orders for products. Order and Product information must also be stored. How many tables would you need?

Entities

1. What is an entity? Entity is a concept  $\checkmark$  objects that needs to be stored in the DB.

Poké Mart: 3 entities  $\rightarrow$  Customer, Order, Product

2. Consider a car rental service. Customers can rent cars. Details about cars and rentals are stored. Identify the entities here.

Customer Car Rental  $\leftarrow$  singular word.

3. Students are identified by their StudentID. They enrol in units. Units are identified by UnitCode. Identify the entities here.

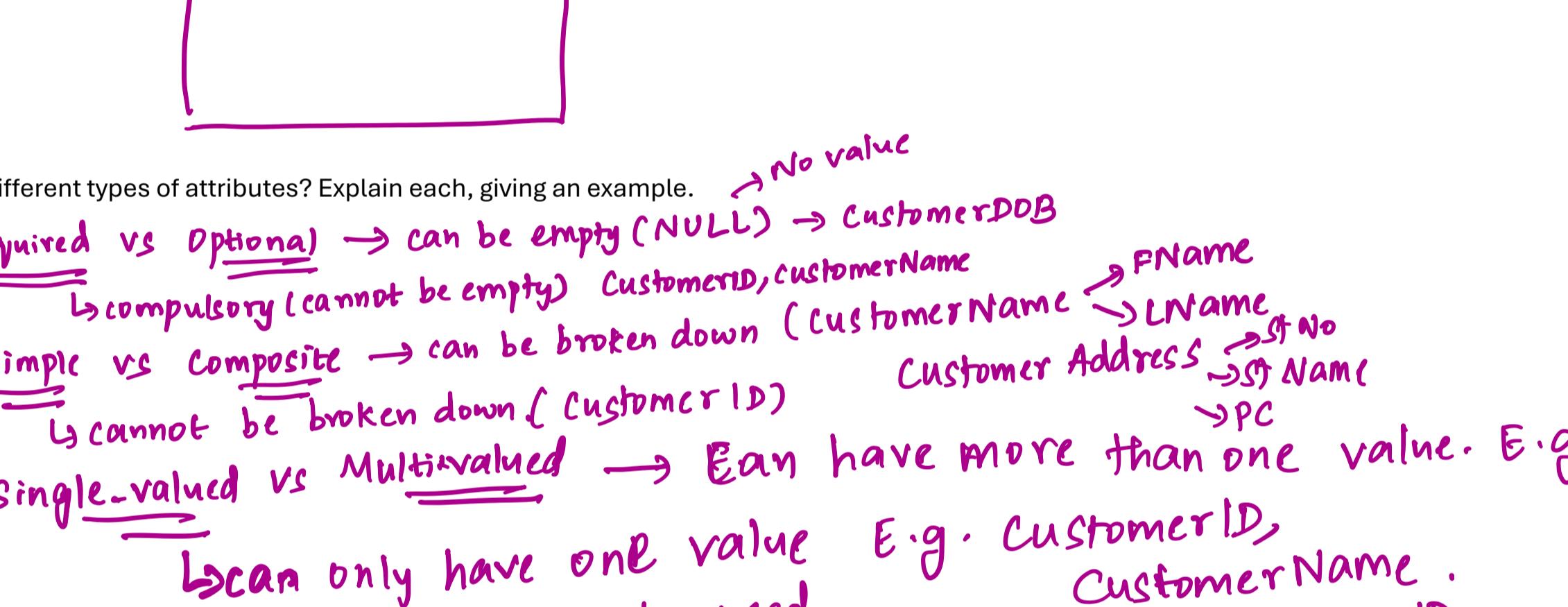
**entity** **entity** **Strong entities**

4. What are the different types of entities? Explain each, giving an example.

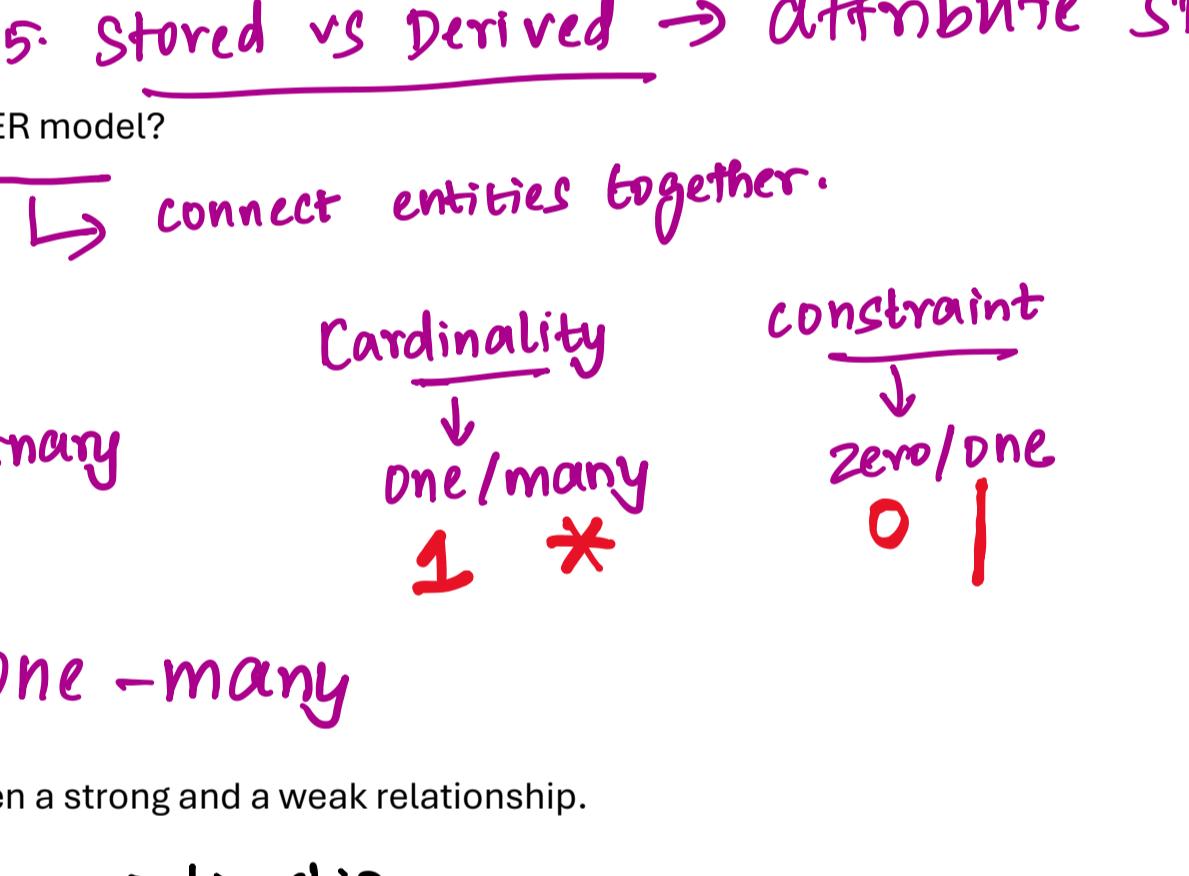
1. **Strong entity:** → can exist on its own → identified by an ID E.g. Student, Unit.  
Season identified by an ID → Season
2. **Weak entity:** → cannot exist on its own (needs a strong entity)  
"Has an ID but the ID repeats for every Strong entity value"  
E.g. EPISODE  $\leftarrow$  SEASON
3. **Associative entity:** → "many-many" "ternary"

Attributes

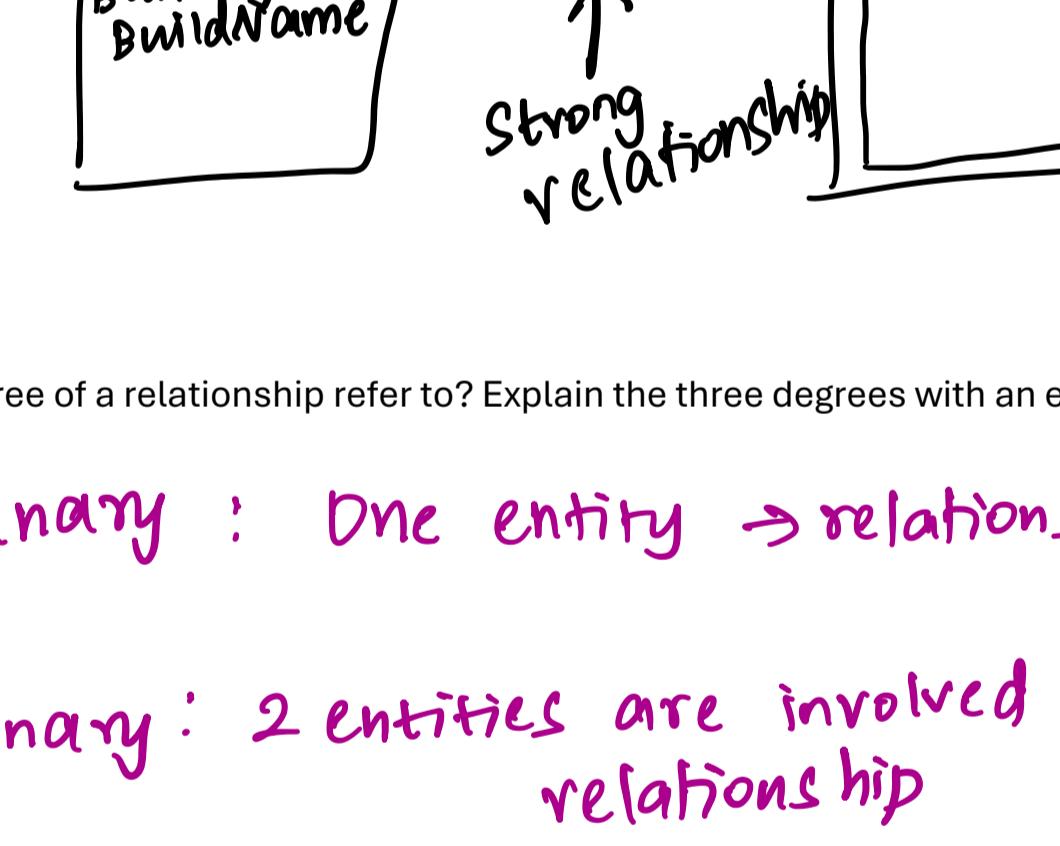
5. What are attributes? Come up with 5 attributes for a Customer entity.



6. An order is identified using its OrderID. Details of the order such as CustomerID, and Order date are saved. Draw an entity for Order along with attributes.



7. Students are identified by their StudentID. Details of the student such as StudentID, name and address are saved. Students can enrol in multiple units. Draw an entity for the student along with its attributes.



8. What are the different types of attributes? Explain each, giving an example.

1. **Required vs Optional** → can be empty (NULL) → no value  
↳ compulsory (cannot be empty) CustomerID, CustomerName
2. **Simple vs Composite** → can be broken down (CustomerName) → PName, LName  
↳ cannot be broken down (CustomerID) CustomerAddress → No Name
3. **Single-valued vs Multivalued** → can have more than one value. E.g. Customer Qualifications
4. **Identifier attributes** → can be used to identify the entity E.g. CustomerID, CustomerName.
5. **Stored vs Derived** → attribute stored from E.g. CustomerDB - CustomerAge.

Relationships

9. What are relationships in an ER model?

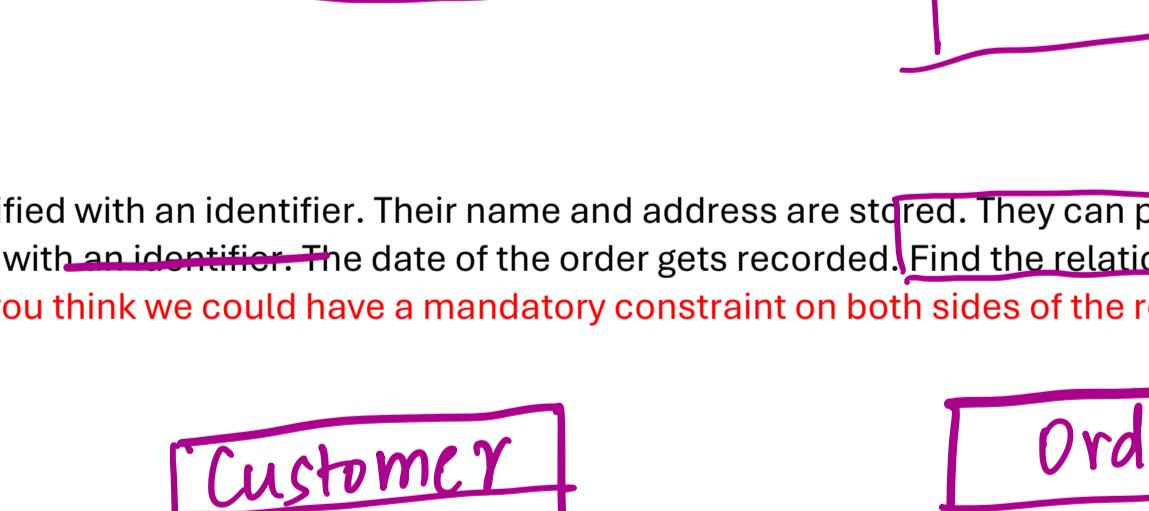
→ connect entities together.

Degree	Cardinality	constraint
unary	one/many	1 *
binary	one/many	1 *
ternary	one/many	0 1

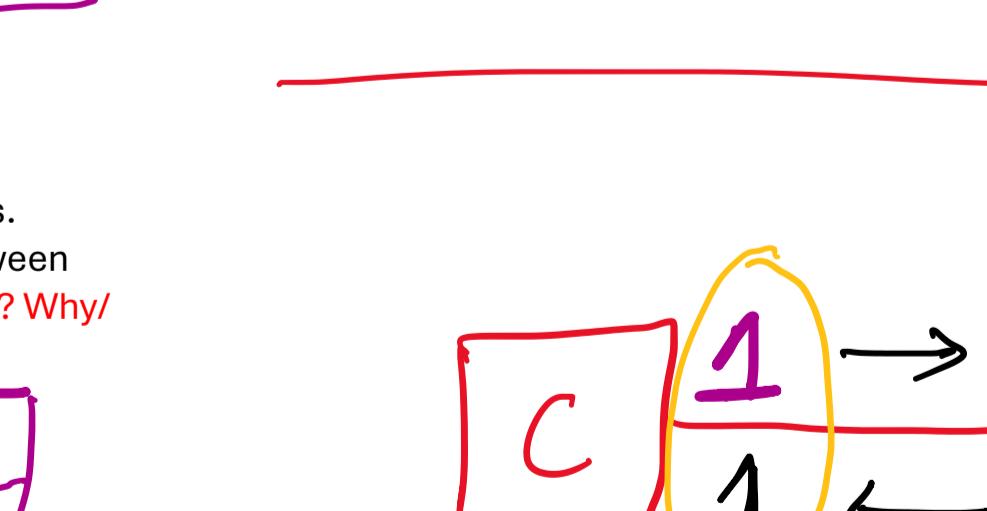
Type → One-many

10. Explain the difference between a strong and a weak relationship.

We Strong relationship

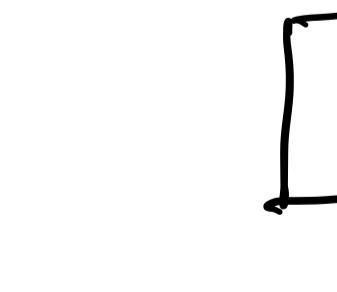


Weak relationship (2 strong entities)



11. What does the degree of a relationship refer to? Explain the three degrees with an example of each.

1. **Unary**: One entity  $\rightarrow$  relationship to itself



2. **Binary**: 2 entities are involved in the relationship



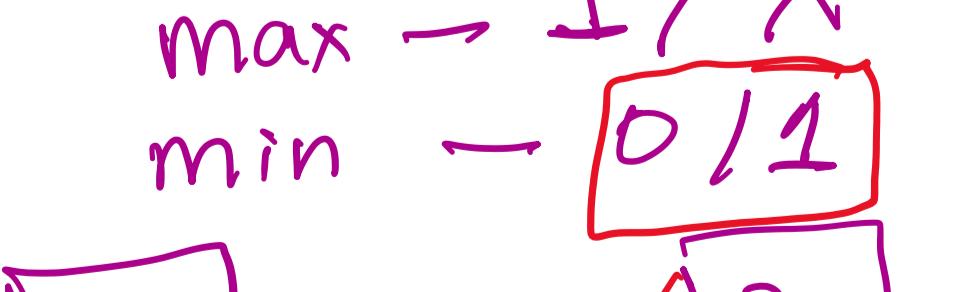
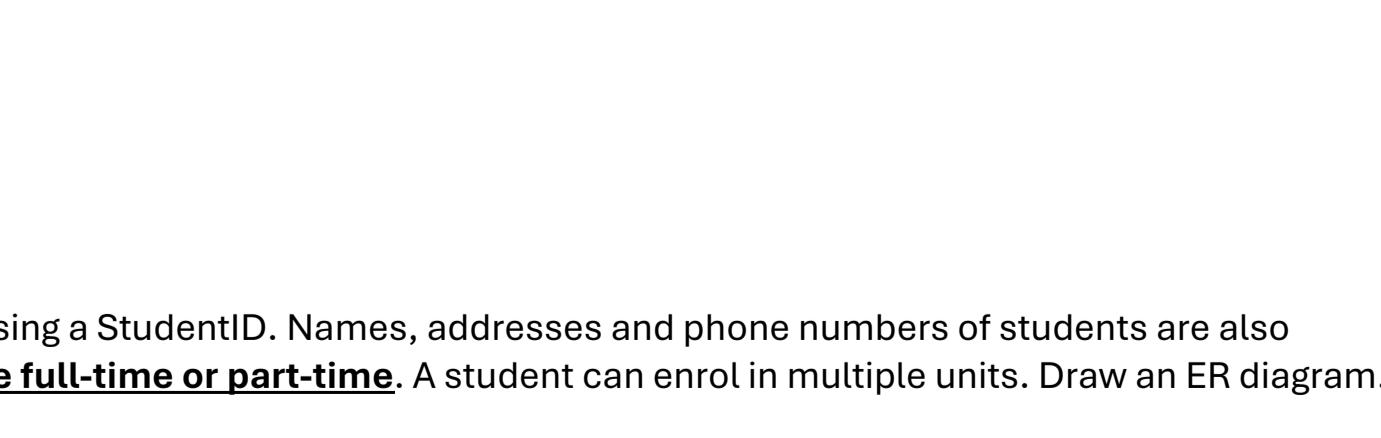
3. **Ternary**: 3 or more entities



12. What is the cardinality/constraint in a relationship?

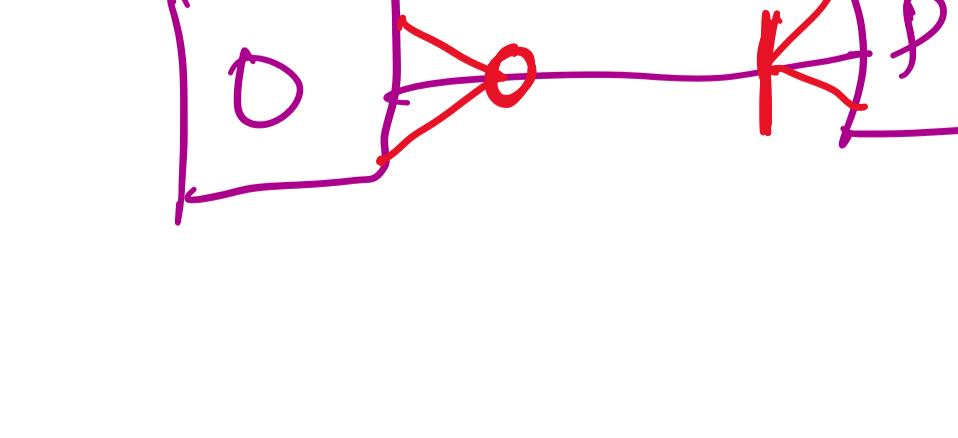
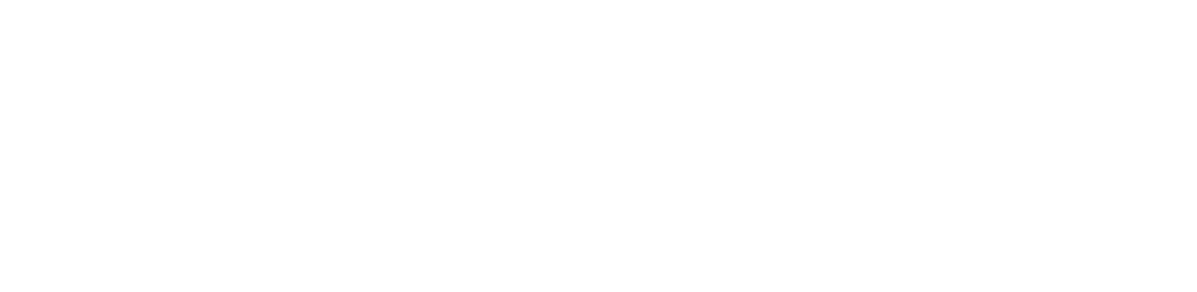
max = 1/\*  
min = 0/1

13. Professor Oak has a strict rule for Pokémon trainers that are about to embark on their journey. Each trainer can have only one Pokémon that will accompany them; the Pokémon can be assigned to one trainer only. Trainers are identified by their trainerID. Individual Pokémons are identified by a unique PokémonID. Find the relationship between the two entities.



One-one

14. Customers are identified with an identifier. Their name and address are stored. They can place orders. Orders are identified with an identifier. The date of the order gets recorded. Find the relationship between the two entities. Do you think we could have a mandatory constraint on both sides of the relationship? Why/why not?



one - many

max = 1/\*  
min = 0/1

15. An order may contain multiple products. Find the relationship between the two entities.



max = 1/\* (cardinality)  
min = 0/1 (constraints)



max = 1/\*  
min = 0/1

16. A student is identified using a StudentID. Names, addresses and phone numbers of students are also stored. Students can be full-time or part-time. A student can enrol in multiple units. Draw an ER diagram.

Important Takeaway points: