REPRESENTING SUPERTYPES AND SUBTYPES

Subtype: is a subgrouping of the entities in an entity type that is meaningful to the organization.

- For example, STUDENT is an entity type in a university. Two subtypes of STUDENT are GRADUATE STUDENT and UNDERGRADUATE STUDENT.

Supertype: is a generic entity type that has a relationship with one or more subtypes.

- In this example, we refer to STUDENT as the supertype.

Basic Concepts and Notation

There are a few symbols and notations that come with subtypes and supertypes, this is an image of them:

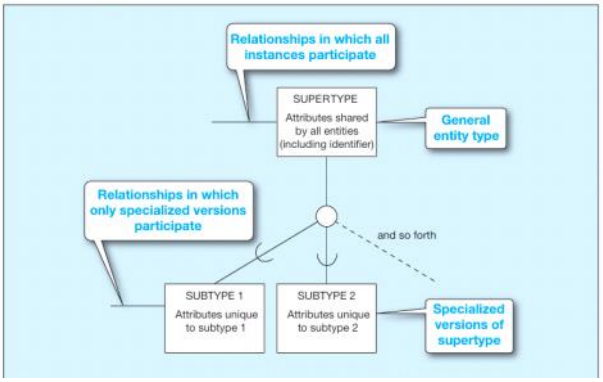


FIGURE 3-1 Basic notation for supertype/subtype relationships

(a) EER notation

The U shape on the relationship lines indicate the direction of the hierarchy
The big circle with lines coming from it indicate the supertype and the subtypes

Example of a supertype and subtype relationship:

Suppose you have EMPLOYEES with different roles, Hourly Employee, Salaried Employees, and Contract consultant

- ***Hourly employees*** Employee Number, Employee Name, Address, Date Hirec Hourly Rate
- ***Salaried employees*** Employee Number, Employee Name, Address, Date Hirec Annual Salary, Stock Option
- ***Contract consultants*** Employee Number, Employee Name, Address, Date Hirec Contract Number, Billing Rate

Notice they share similar attributes but some are different

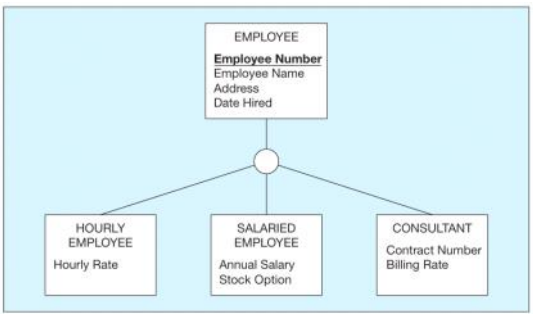


FIGURE 3-2 Employee supertype with three subtypes

This is how you could structure them

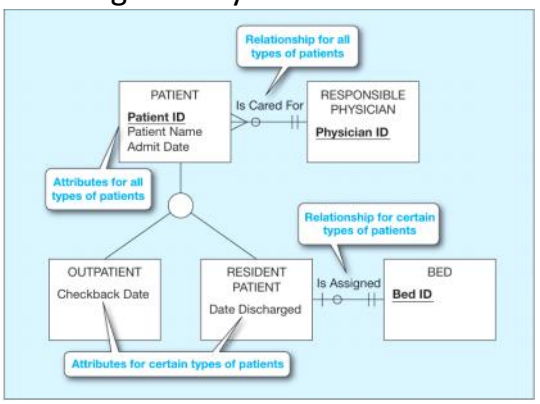
ATTRIBUTE INHERITANCE: is the property by which subtype entities inherit values of all attributes and instance of all relationships of the supertype.

- In the example above, the fact the SALARIED EMPLOYEE is a subtype of EMPLOYEE means that it must posses the Employee Name attribute. More so,
- Basic inheritance applies like in object oriented programming

WHEN TO USE SUPERTYPE/SUBTYPE RELATIONSHIPS

1. There are attributes that apply to some (but not all) instances of an entity type.

2. The instances of a subtype participate in a relationship unique to that subtype.
   - Meaning that there exists a relationship specific to a certain subtype that shouldnt exist for a single entity

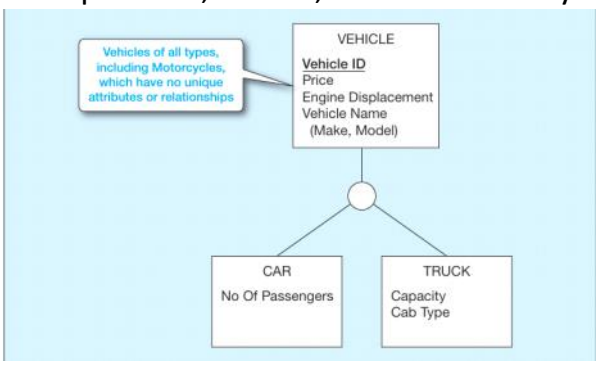


Notice that there exists subtypes with certain relationships that don't occur with other subtypes or the supertype

Representing Specialization and Generalization

"But in developing real-world data models, how can you recognize opportunities to exploit these relationships? There are two processes—generalization and specialization—that serve as mental models in developing supertype/subtype relationships."

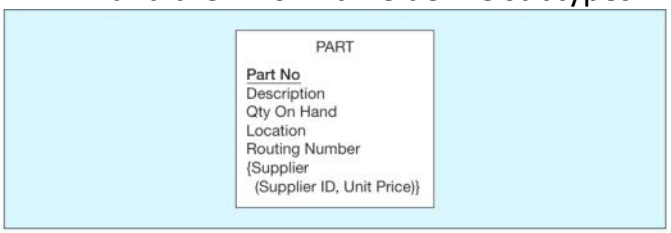
- Generalization: is the process of defining a more general entity type from a set of more specialized entity types.
  - This is a bottom up approach
  - You have a set of things that are very similar and thus you define a supertype the generalize these things
  - Example: CAR, TRUCK, MOTOCYCLE -> you come up with a supertype called VEHICLE

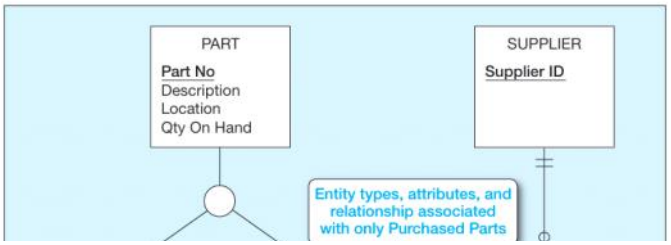


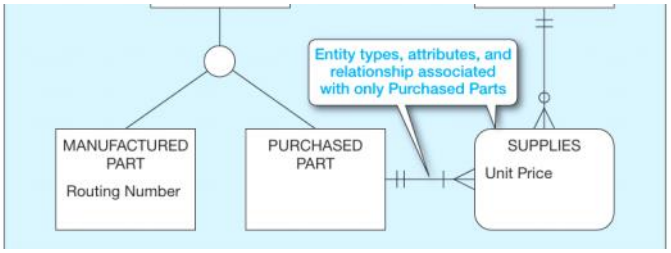
Notice how motorcycle is not included this is because we come to the conclusion that MOTORCYCLE does not have a specific attribute for it.

We will discuss later how to deal with this

- Specialization: is a top-down process, the direct reverse of generalization. We define an ENTITY and then from it we derive subtypes






Entity types, attributes, and relationship associated with only Purchased Parts
MANUFACTURED PART
Routing Number
PURCHASED PART
SUPPLIES
Unit Price