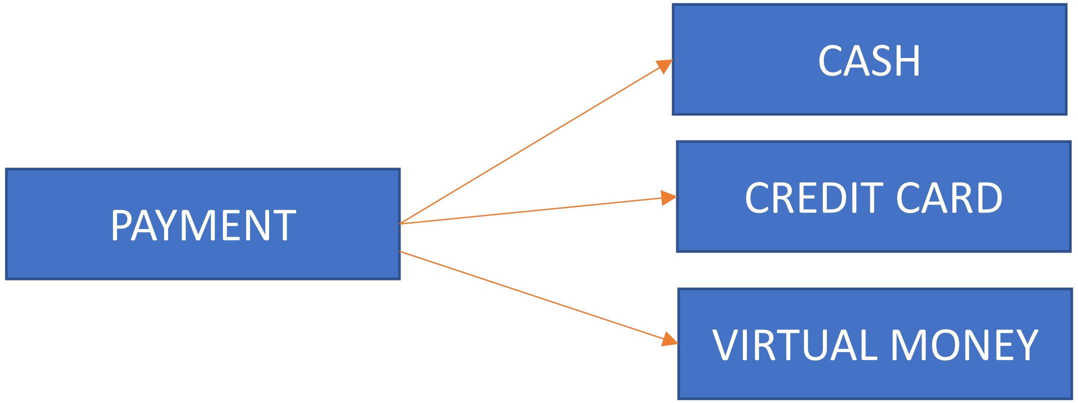
SUPERTYPE & SUBTYPE

Evaluating Entities

Often some instances of an entity have attributes and/or relationships that other instances do not have

Imagine a business which needs to track payments from customers

Customers can pay by cash, by credit card or by virtual money



PAYMENT

CASH

CREDIT CARD

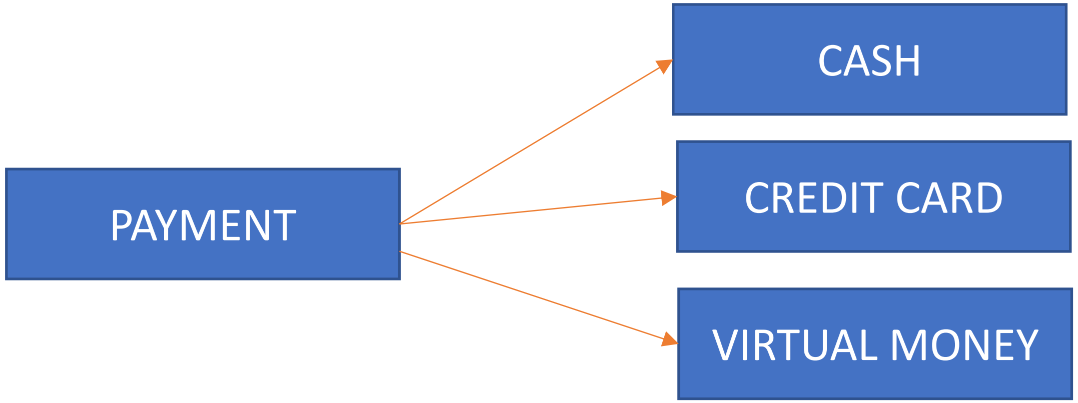
VIRTUAL MONEY

Evaluating Entities

All payments have some common attributes: payment date, payment amount, and so on

But only credit cards would have a “card number” attribute

And for credit card and virtual money payments, we may need to know which CUSTOMER made the payment, while this is not needed for cash payments



PAYMENT

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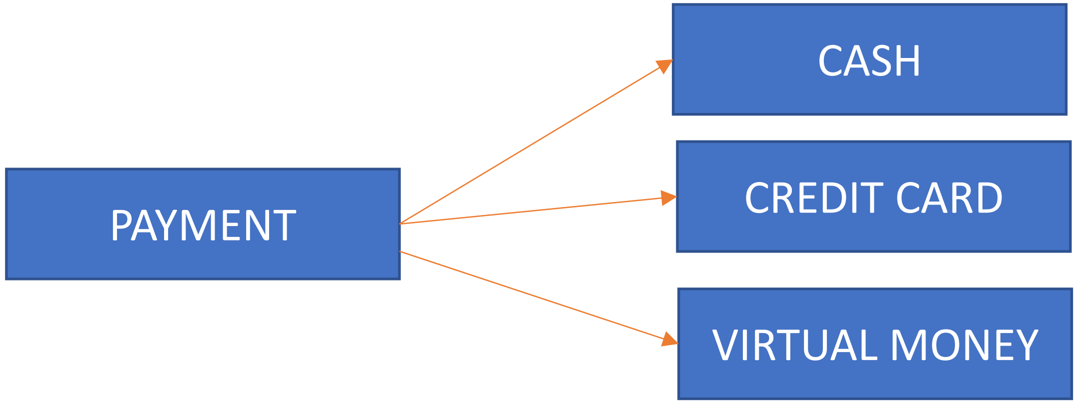
Evaluating Entities

Should we create a single PAYMENT entity or three separate entities CASH, virtual money, and CREDIT CARD?

And what happens if in the future we introduce a fourth method of payment?



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Subdivide an Entity

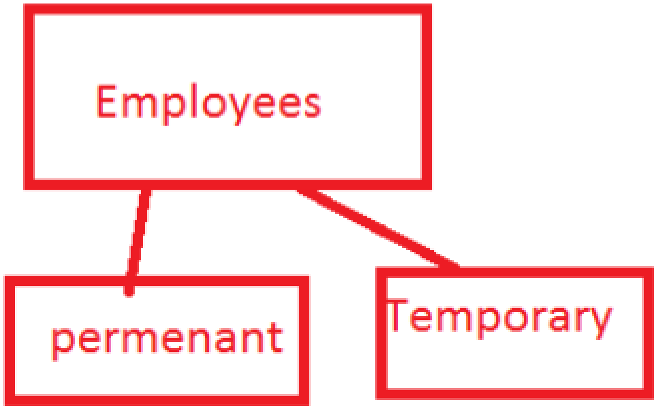
Sometimes it makes sense to subdivide an entity into subtypes

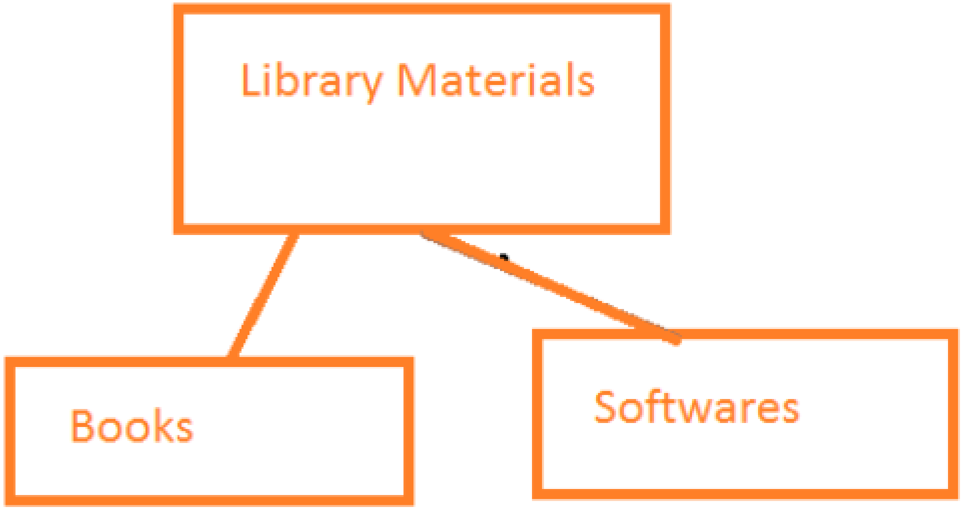
This may be the case when a group of instances has special properties, such as attributes or relationships that exist only for that group

In this case, the entity is called a "supertype" and each group is called a "subtype"

Subtype Characteristics

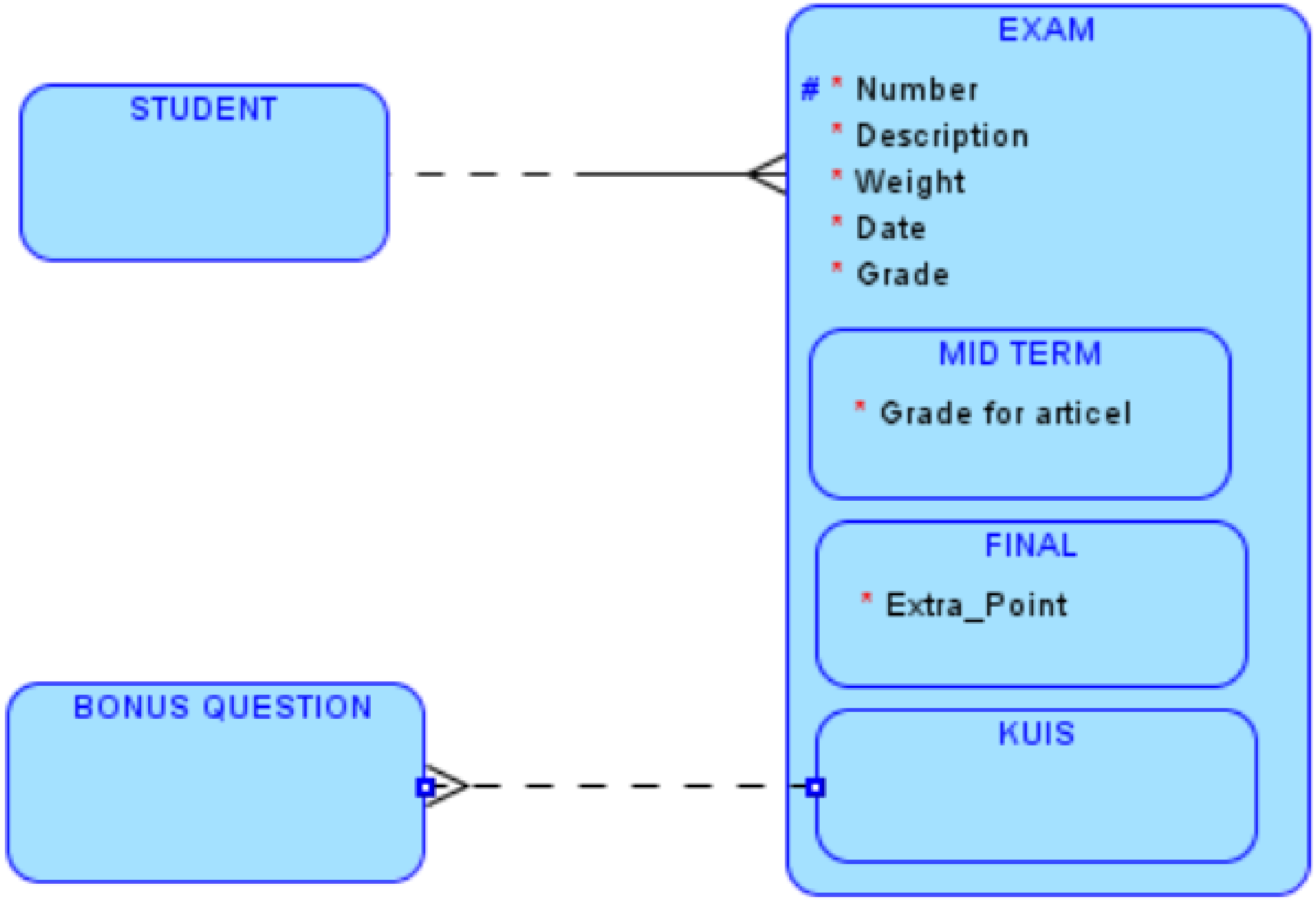
- Inherits all attributes of the supertype
- Inherits all relationships of the supertype
- Usually has its own attributes or relationships
- Is drawn within the supertype
- Never exists alone
- May have subtypes of its own





Supertype/ Subtype Example

- EXAM is a supertype of QUIZ, MIDTERM, and FINAL
- The subtypes have several attributes in common
- These common attributes are listed at the supertype level



Always More Than One Subtype

- When an ER model is complete, subtypes never stand alone
- In other words, if an entity has a subtype, a second subtype must also exist, this makes sense
- A single subtype is exactly the same as the supertype

- This idea leads to the two subtype rules:
  - –Exhaustive: Every instance of the supertype is also an instance of one of the subtypes. All subtypes are listed without omission
  - –Mutually Exclusive: Each instance of a supertype is an instance of only one possible subtype

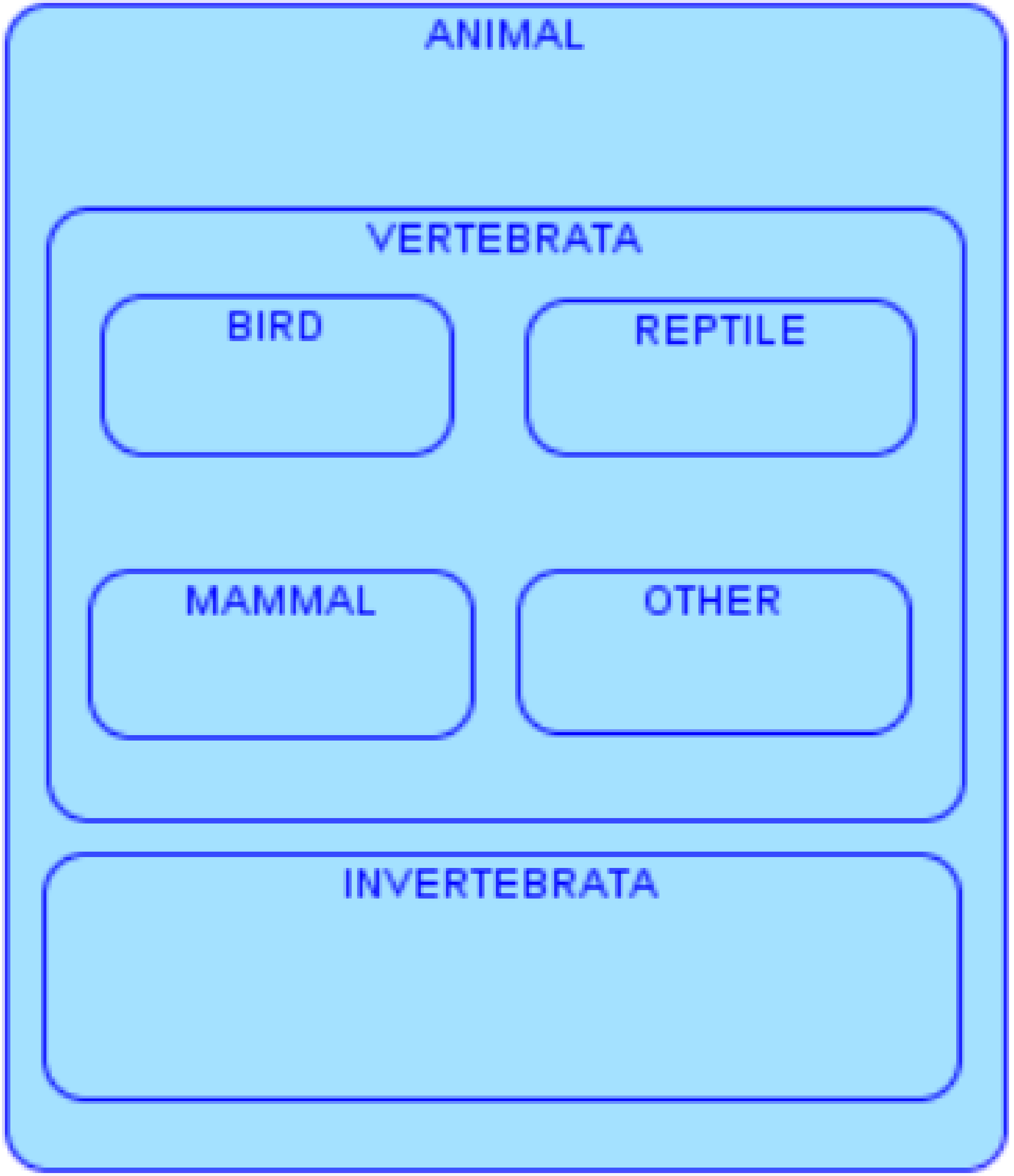
Correctly Identifying Subtypes

When modeling supertypes and subtypes, you can use three questions to see if the subtype is correctly identified:

- Is this subtype a kind of supertype?
- Have I covered all possible cases? (exhaustive)
- Does each instance fit into one and only one subtype? (mutually exclusive)

Nested Subtypes

- You can nest subtypes
- For ease of reading – “readability” -- you would usually show subtypes with only two levels, but there is no rule that would stop you from going beyond two levels



NESTED ANIMAL SUPERTYPE