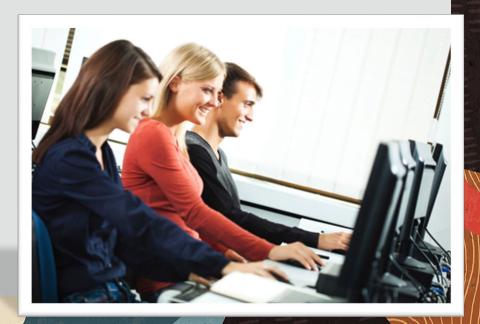
ORACLE Academy

Database Design

4-1
Supertypes and Subtypes





Objectives

- This lesson covers the following objectives:
 - Define and give an example of a subtype
 - -Define and give an example of a supertype
 - -State the rules relating to entities and subtypes, and give examples of each
 - Apply the rules of supertype and subtype by evaluating the accuracy of ER diagrams that represent them
 - Apply the rules of supertype and subtype and include them in a diagram when appropriate



Purpose

- Supertypes and subtypes occur frequently in the real world:
 - -food order types (eat in, to go)
 - -grocery bag types (paper, plastic)
 - payment types (check, cash, credit)
- You can typically associate 'choices' of something with supertypes and subtypes
- For example, what will be the method of payment cash, check or credit card?
- Understanding real world examples helps us understand how and when to model them



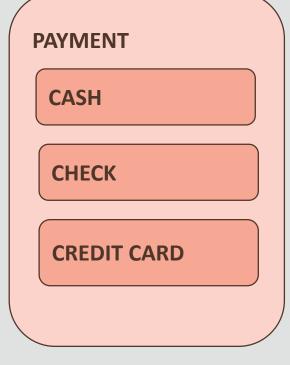
Evaluating Entities

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 check, or by credit card



PAYMENT SUPERTYPE



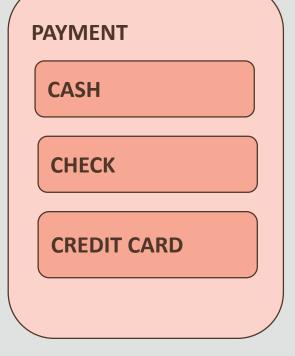
Evaluating Entities

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 check payments, we may need to know which CUSTOMER made the payment, while this is not needed for cash payments



PAYMENT SUPERTYPE

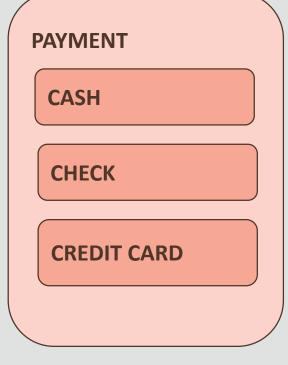


Evaluating Entities

Should we create a single PAYMENT entity or three

separate entities CASH, CHECK, and CREDIT CARD?

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



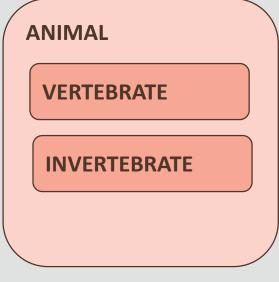
PAYMENT SUPERTYPE



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"

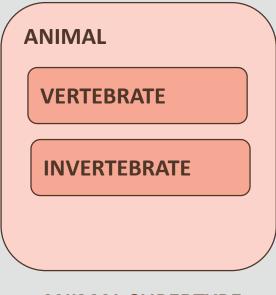


ANIMAL SUPERTYPE



Subtype Characteristics

- A subtype:
 - -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



ANIMAL SUPERTYPE

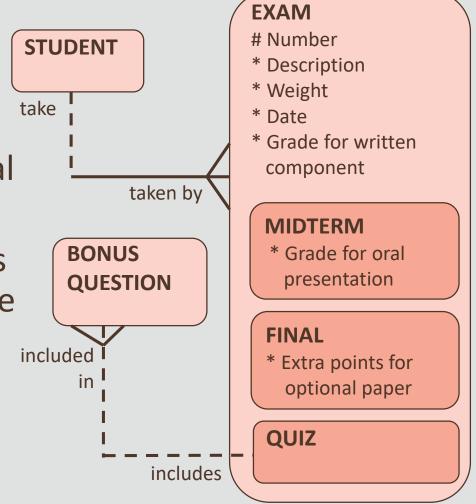


Supertype Example

 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

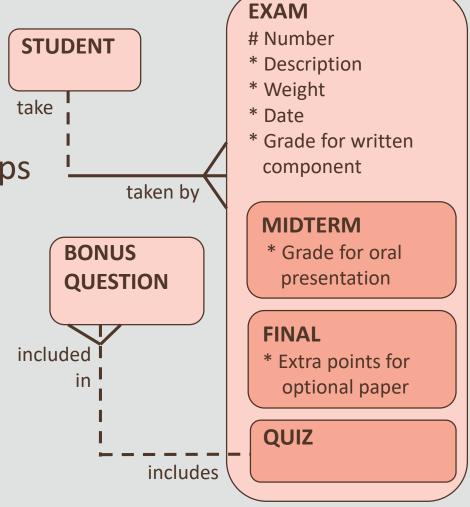




Supertype Example

The same applies to relationships

• Subtypes inherit all attributes and relationships of the supertype entity





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



Always More Than One Subtype

At the conceptual modeling stage, it is good practice to

include an OTHER subtype to make sure that your subtypes are exhaustive -- that you are handling every instance of the supertype



WALLCOVERING SUPERTYPE



Subtypes Always Exist

Any entity can be subtyped by making up a rule that

subdivides the instances into groups

- But being able to subtype is not the issue—having a reason to subtype is the issue
- When a need exists within the business to show similarities and differences between instances, then 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)

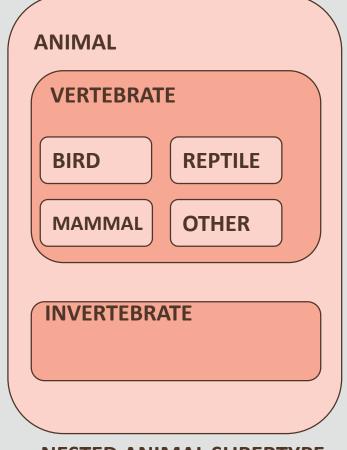


SNOWSPORT SUPERTYPE



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

Terminology

- Key terms used in this lesson included:
 - -Exhaustive
 - -Mutually exclusive
 - -Subtype
 - -Supertype



Summary

- In this lesson, you should have learned how to:
 - -Define and give an example of a subtype
 - -Define and give an example of a supertype
 - -State the rules relating to entities and subtypes, and give examples of each
 - Apply the rules of supertype and subtype by evaluating the accuracy of ER diagrams that represent them
 - Apply the rules of supertype and subtype and include them in a diagram when appropriate



ORACLE Academy