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AG Software Engineering: Dependability

Foundations of Software Engineering

Exercise 4

Task 1: UML - Analysis (Class Diagram)

The company TrueSoundMusic asks you to develop a person management software which manages managers and musicians of TrueSoundMusic. The company owner explained the structure to you as follows:

We employ managers who look after bands. Each manager can manage one or more bands, sometimes he is not assigned a band at all, but still has other stuff to do in our company. A band can only be managed by one manager at a time. This way we prevent chaos and unclear responsibilities and the musicians know who to contact.
Any person who deals with us should sign a contract. But of course contracts differ for each one, i.e. the contract of a manager is different than the musician's and a manager and so on.
When we hire a new manager, he or she gets 3 mobile phones from us, because they should always be available. This gives us the advantage of separating intern-company calls from band calls. We don't care about the extra costs of mobiles. The phones are usually delivered after a few days of hiring new managers.
A band consists of several musicians and a solo singer. Usually a musician is a member of only one band, but there are exceptions; but fortunately it is very rare, because we always need the band name. Some singers have stage names and, unfortunately, sometimes more than one. All musicians play at least one instrument; let's say almost all of them, singers often concentrate only on their voice.

a. Create a class diagram for the TrueSoundCompany (don't forget associations, cardinalities and good role names).

Task 2: UML – Analysis (Sequence Diagram)

Develop a sequence diagram showing the interactions involved when an employee scans items with a scanner. After the employee scans an item with a scanner, the scanner would decode the barcode then add the item to the cash register which in turn gets the price of the item from the product catalog. After that the cash register would print the item with its price. When the employee is finished with scanning all the items, the cash register would print out the total invoice value.

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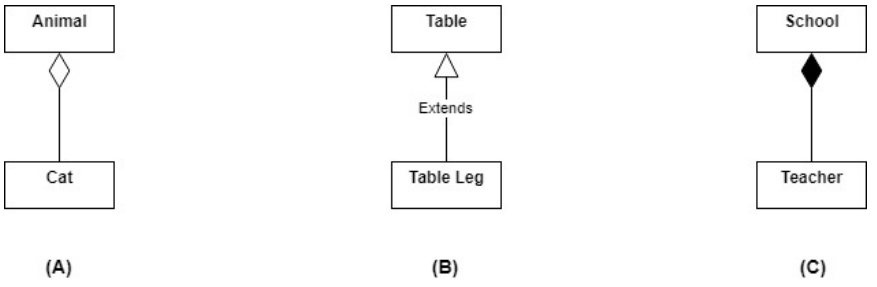
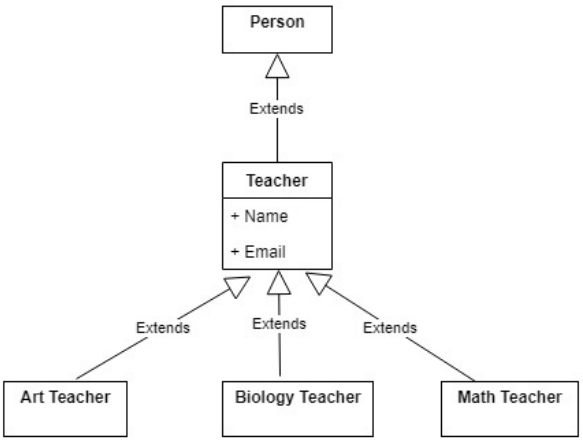
Task 3: UML – Analysis

a. Review the following sections from UML class diagrams. Assess whether the diagrams are correct and meaningful. If necessary, create a corrected version.



(A) (B) (C)



(D)

Task 4: UML – Design

a. Modify the class diagram form task 1.a to suit object-oriented design.
b. Answer the following questions and justify your answers.
   i. Does the modeling of a class diagram depend on the programming language used?
   ii. When can child classes (directly) access the attributes of the parent classes?
   iii. When can multiple inheritance cause problems?
   iv. Which methods can class C call in the following class diagram?