Project Report Task 1

Data Storage Paradigms, IV1351

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Declaration:

By submitting this assignment, it is hereby declared that all group members listed above have contributed to the solution. It is also declared that all project members fully understand all parts of the final solution and can explain it upon request.

It is furthermore declared that the solution below is a contribution by the project members only, and specifically that no part of the solution has been copied from any other source (except for lecture slides at the course IV1351), no part of the solution has been provided by someone not listed as a project member above, and no part of the solution has been generated by a system.

1 Introduction

The goal for this particular task of the project was to create a conceptual model of the Soundgood music school database and visualize it as an Entity Relationship (ER) diagram using either the Unified Modeling Language (UML) or a crow foot notation. The conceptual model must contain all data described in section 1 of the project description.

2 Literature Study

To prepare for this assignment, the lectures on UML, IE notation and conceptual models given by Leif Lindbäck were watched to get a good base for how to go about solving the task at hand. Chapter 3 of Fundamentals of Database systems was also studied with a quick foray into chapter 4 for some added depth on inheritance in ER diagrams.

3 Method

For this project the IE (Information Engineering) crow foot notation was used to create the ER diagram in the diagram editor Astah. The creation of the diagram followed the same five steps laid out in the lectures:

3.1 Noun identification

Every noun encountered in section 1 of the project description was indiscriminately made en entity in the diagram.

3.2 Category list

To find any remaining entities, the category list from the lectures on conceptual modeling was used discover more potential candidates and were added as entities to the diagram.

3.3 Remove unnecessary entities

This was the first step to start and clean up the diagram by removing entities that were clearly irrelevant or out of the scope for the model.

3.4 Find attributes

At this point, the remaining entities in the diagram was considered and relevant attributes added to them. Some of the entities can even end up as attributes of another entity. The cardinality of the attributes were also considered at this point as well as whether or not they are unique and necessary for the entity, i.e not null.

3.5 Find relations

Last of the 5 steps was to find relations between the different entities, decide whether the relationships are identifying or non-identifying as well as the cardinality of the relations.

Business Rules

Additionally, business rules and other restrictions that could not be clearly modeled within the framework of an ER diagram was added in plain text as notes in suitable locations.

4 Result

After going through the steps laid out in section 3 the resulting diagram can bee seen in figure 1. Where all data required for the Soundgood music schools operations are modeled.

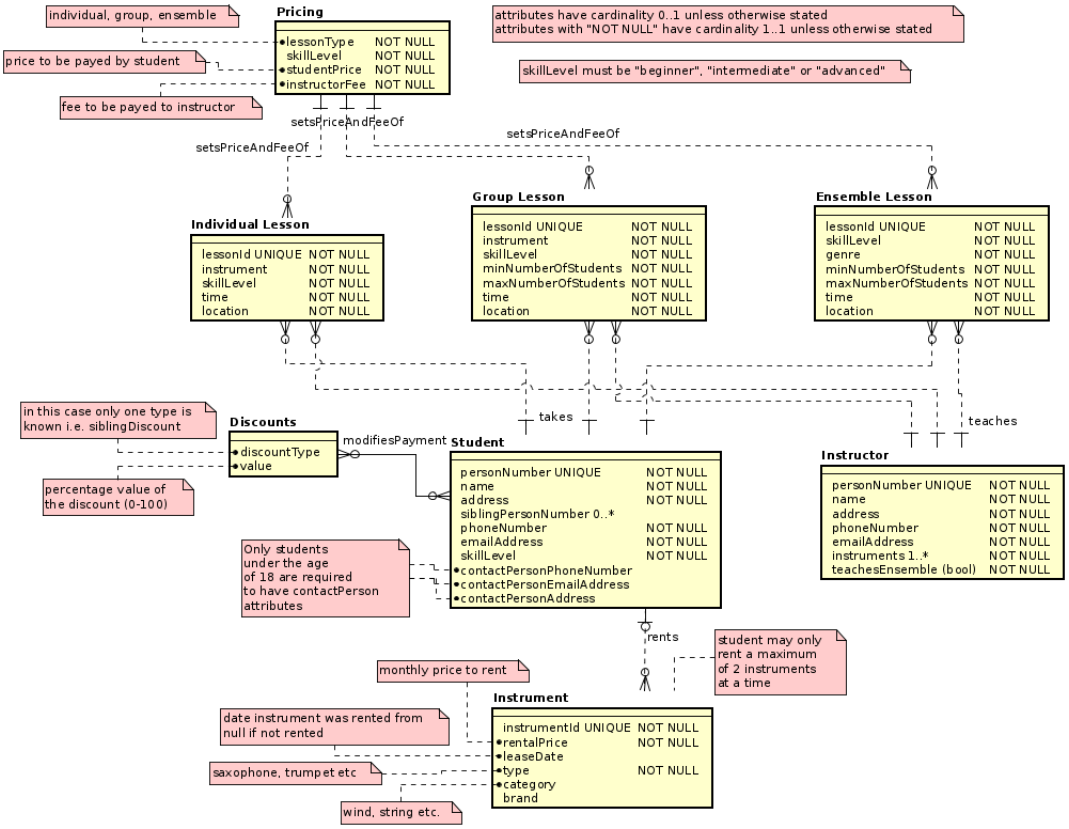

Figure 1: The conceptual model as an ER diagram in IE notation (without inheritance)

However, it was considered whether improvements to this model could be made using inheritance. A first attempt at this can be seen in figure 2 where both the Lesson and Person entities have been added as superclasses of Individual Lesson, Group Lesson and Ensemble Lesson as well as Student and Instructor respectively.

Whether or not the amount of inheritance used in the previous version was actually appropriate is something that can and is discussed in the next section. As a compromise the superclass Person was removed from the diagram and the final resulting conceptual model can be seen in figure 3.

5 Discussion

The first point of contention regarding the conceptual model(s) presented in the previous section is whether or not they cover the entirety of the Soundgood music school from the project description. It is believed to be complete as far as can be discerned without additional information or feedback from the Soundgood music school. However the actual structure of the diagram is one of many different possible solutions. For example

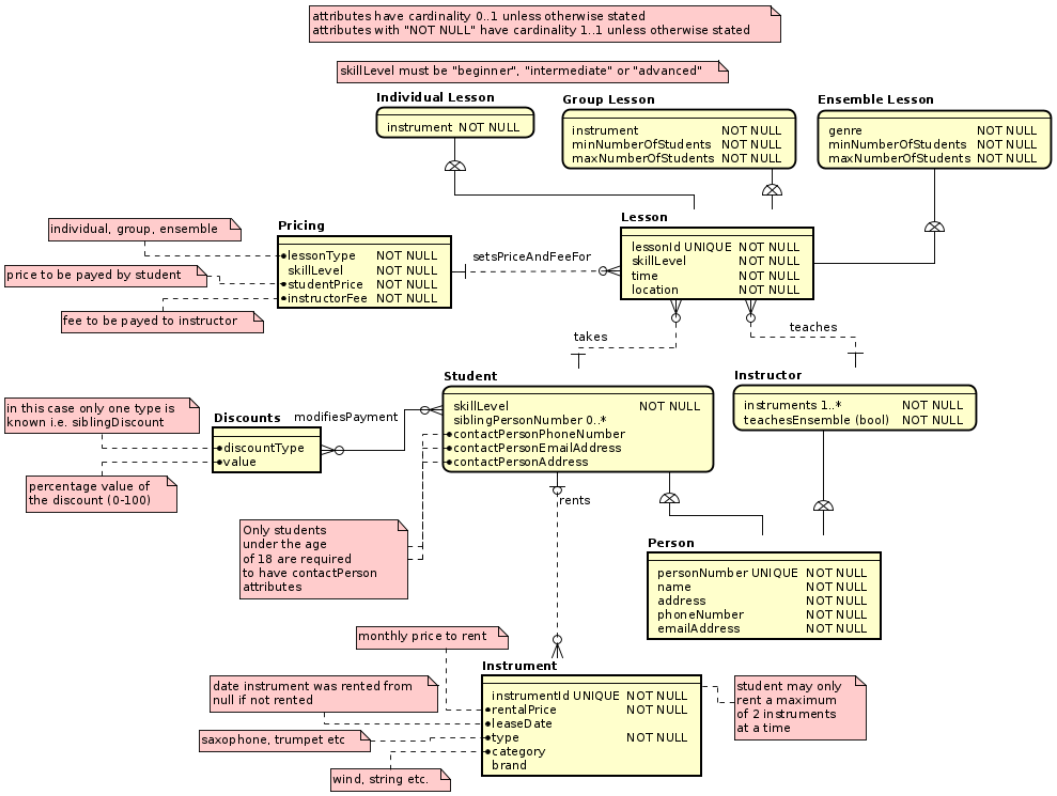

Figure 2: The conceptual model with Lesson and Person added as superclasses in the diagram.

the contact person information of the student as well as the siblingPersonNumber could be modeled as their own entities which relate to Student. At that point, the contact details of Student, Contact Person and Instructor are repetions of each other and could be broken out into their own entity and so on. However, for this first attempt at a conceptual model it was decided to minimize the number of entities to promote diagram clarity at the cost of granularity.

Looking at the first version if the CM in figure 1, it can be observed that the relations from Student and Instructor to the different Lesson entities are quite crowded. It was attempted to fix this using inheritance where Individual-, Group- and Ensemble-lessons are considered specializations of the new entity Lesson containing their common attributes. The Person entity was also created with Student and Instructor becoming subclasses of said entity. This version of the diagram can be seen in figure 2.

At this point, both advantages and disadvantages using inheritance can be observed. In the case of the Lesson superclass it does a great job of de-cluttering the diagram and hopefully making it easier to read. For the Person entity, the inheritance in this case

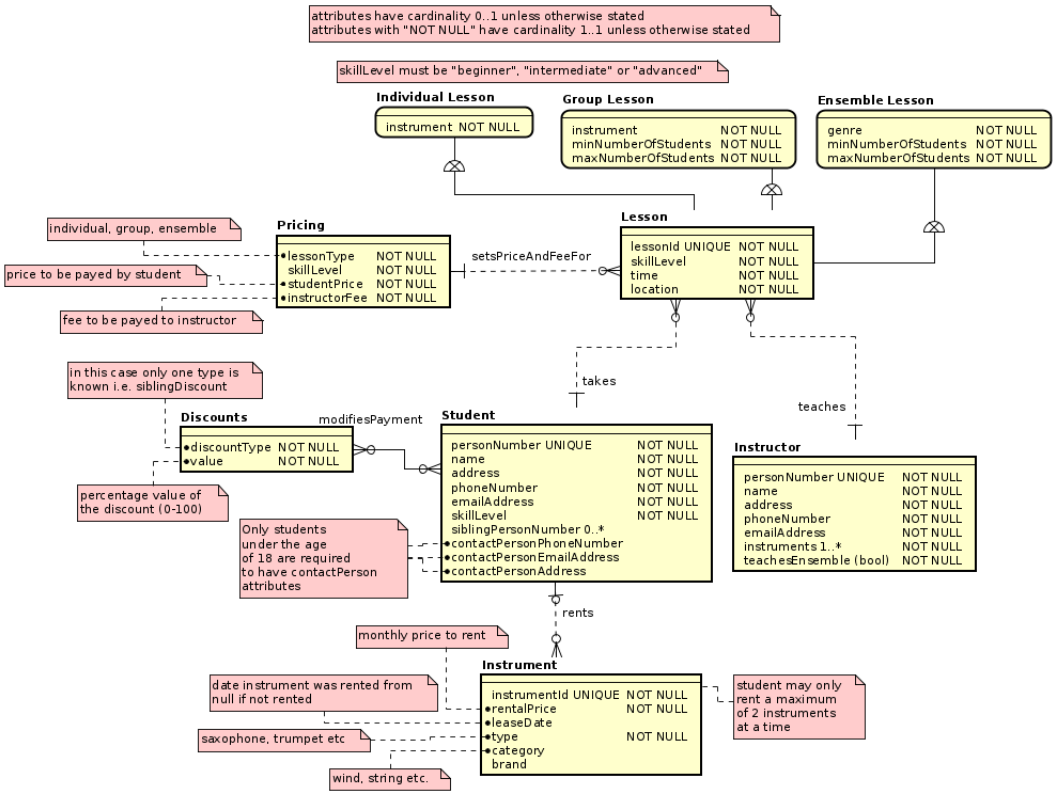

Figure 3: The conceptual model with the superclass Lesson intact but Student and Instructor modeled as independent entities.

is correct with the subclasses Student and Instructor being specialized versions of the more general Person as well as having a potential "is a..." type of relation instead of the inheritance relation. However, the model does not particularly benefit from having this inheritance present in the diagram as it does not make it easier to read and instead adds additional complexity. Potentially obfuscating the implementation of Student and Instructor for anyone not familiar with ER diagrams, e.g. a customer or other stakeholder.

The final conceptual model therefore became the one seen in figure 3 where Lesson is kept as a superclass of Individual lesson, Group lesson and Ensemble lesson but attributes from Person is re-integrated into Student and Instructor.

6 Comments About the Course

To complete this assignment, approximately 15-20 hours was spent on information gathering, creating the conceptual model, writing this report and attending the seminar.