

CZ2007 Example Class 1 (ER Diagram)

Discussion

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In this discussion, we are going to look at the different aspects of the ER diagram and explain why certain properties are modelled in certain ways. In particular, we are going to elaborate on our choice of subclasses, weak entity sets, relationship types, referential integrity issues and the dilemma of choosing between 2-binary and ternary relationships.

Subclasses

- We first establish the entity set Person, and from there we derived the 4 subclasses, Stakeholder, Professor, Staff and Student – since these four entity sets inherit the attributes of Person. We also note that a Person can be part of one or more of the subclasses.
- We also established subclasses for Staff, namely Admin_Staff and Technical_Staff, since they also inherit the attributes of staff.
- Technical_Staff are assigned to Lab, and Lab can be further classified into the subclasses Teaching_Lab and Research_Lab.
- Student can be classified into the subclasses Undergraduate and Graduate.

Weak entity sets

- The Lab contains Equipment which can only be identified if provided the name and school of the Lab. As such, Equipment is a weak entity set which depends on the attribute name and school of the entity Lab.
- We created an entity set called Experiment, which is done by Undergraduate. Experiment can be linked to the Course associated with it as well as the Teaching_Lab. Experiment is considered a weak entity set because we cannot uniquely identify it just based on its date – this entity set depends on the Undergraduate and the Teaching_Lab.
- The entity set Comment is to keep record of the comments and suggestions made by Stakeholder. As it cannot be uniquely identified just based on its topic and date. Thus, this is also a weak entity set and it depends on the identity of the Stakeholder who made the comment.
- We also have the entity set Teaching_Record which takes note of the teaching activities of Professor. It is also a weak entity set as identifying the Teaching_Record requires knowledge of the Professor teaching, the relevant Course and the Timetable of the course.

Relationships

- Most of the relationships are many-to-many relationship such as the relationship between Professor and Graduate. A Professor can supervise many Graduate, and a Graduate can be supervised by many Professor. Similarly, an Undergraduate can take many Course, and a Course can be taken by many Student.
- Some relationships must keep the many-to-one relationship. For example, a Technical_Staff can only be assigned to one Lab.

Referential integrity

- We keep the referential integrity of relationships where one of the entity sets must have at least one. For instance, a Teaching_Record must be taught by at least one Professor. Similarly, an Equipment must be contained in at least one of the Lab (in fact, exactly one).

The dilemma of 3-binary or ternary relationships

- We are faced with the dilemma of choosing between the two. For example, the relationship “performs experiment” could have been a ternary relationship involving Undergraduate, Course and Teaching_Lab. However, we decided to convert this into a 3-binary relationship by creating a new weak entity set called Experiment as this will greatly make things clearer.