Students

We map the “Students” Entity Set, the relation “Occupy” and the relation “Is_a_roommate_with” into a relational schema “Students” with

- attributes: sid, name, mat_num, birthday (sid is the primary key(generated by the machine))
- 2 foreign keys:
    - “rsid” referencing “sid” in the Students schema, which describes “Is_a_roommate_with” relation
    - “rid” referencing “rid” in the Rooms schema, which describes “Occupy” relation

We map “ISA Hierarchy”: Students_with_special_need using the first alternative with a relational schema with primary key and foreign key “sid” which references the “sid” in the “Students” schema. The schema Students_with_special_need also has more attributes like sickness and special_need. We choose this method because of space efficiency (compared to alternative 3) and also there are some students who do not have special needs(so we cannot choose alternative 2).

Colleges

We map the “College” Entity Set to the College schema with the primary key “cid”(also generated by the machine), and attributes: cid, name, address.

Rooms

We map the “Room” Entity Set, the relation “is_a_part_of” into a relational schema “Rooms” with

- attributes: rid, number, floor, mailbox, availability (the primary key is rid(generated by the machine))
- a foreign key:
    - “cid” referencing the Colleges shema, which describes “Is_a_part_of” relation

We map “ISA Hierarchy”: Double_room “ISA” Rooms with a schema with primary key and foreign key “rid” which references the “Rooms” schema. It also has an additional attribute “position” which represents the left room or the right room. We choose this method because of space efficiency (compared to alternative 3) and also there are some rooms that are not double (i.e single room) (therefore we cannot use alternative 2).

Managers

We map the “Managers” Entity Set, the relation “Manages” into a relational schema “Managers” with

- Attributes: mid, name, age, contact_num, (the primary key is mid(generated by the machine))
- Foreign keys:
    - “cid” referencing “cid” in the Colleges schema, which describes “Manages” relation

We map “ISA Hierarchy”: RM, RA “ISA” Managers with two more separate relational schemas with primary key and foreign key “mid” which references the “mid” in Managers schema. The RA relational schema has an additional attribute “availability” whereas the RM schema has an additional attribute “office_hour”. Students are able to contact the RA 24/7 when they are available or go to the office hour of the RM. We choose this method because we want to make the query in all “Managers” easy for students. The second alternative (relations only entity sets with instances) is also a feasible choice since each manager must be in one of the two subclasses (they are either RA or RM). However, we do not choose this approach because in the future, we might decide to also include the security offices or more types of managers who are not either RA or RM.