Room Booking System for Student Dormitories

Database Model and ER Diagram

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I. User Stories

1. As a user I want to register with my credentials
2. As a user I want to be designated as an admin who can approve/disapprove room bookings, etc.
3. As a user I want to be able to be designated as a student who requests certain rooms, etc.
4. As a student I want to be able to submit and track maintenance requests
5. As a student I want to be able to search and filter rooms based on criteria.
6. The system mush handle room bookings in real-time with immediate updates
7. As a student I want to make and respond to roommate requests
8. As a user I want to be able to view my booking history and current reservation
9. As the system it should store data related to each and every dorm room
10. As the website it should send auto notifications for booking confirmations
11. As the website, it should aggregate data to generate reports on room occupancy, etc.

II. Entities

- User (abstract)
- Student (concrete version of User)
- Admin (concrete version of User)
- Room
- Maintenance Request
- Room Request
- Roommate Request

III. Relationships

- A `Student` lives in `Room` (many-to-one; partial participation)
- A `Student` makes `Room Requests` (one-to-many; partial participation)
- `Room Requests` request a single `Room` (one-to-one; total participation)
- A `Student` makes `Maintenance Requests` (many-to-many; partial participation)
- `Maintenance Requests` request maintenance for a single `Room` (one-to-one; total participation)
- `Admins` manage `Room Requests` (many-to-many; total participation)
- `Students` make and manage `Roommate Requests` (many-to-many; partial participation)

IV. ER Diagram

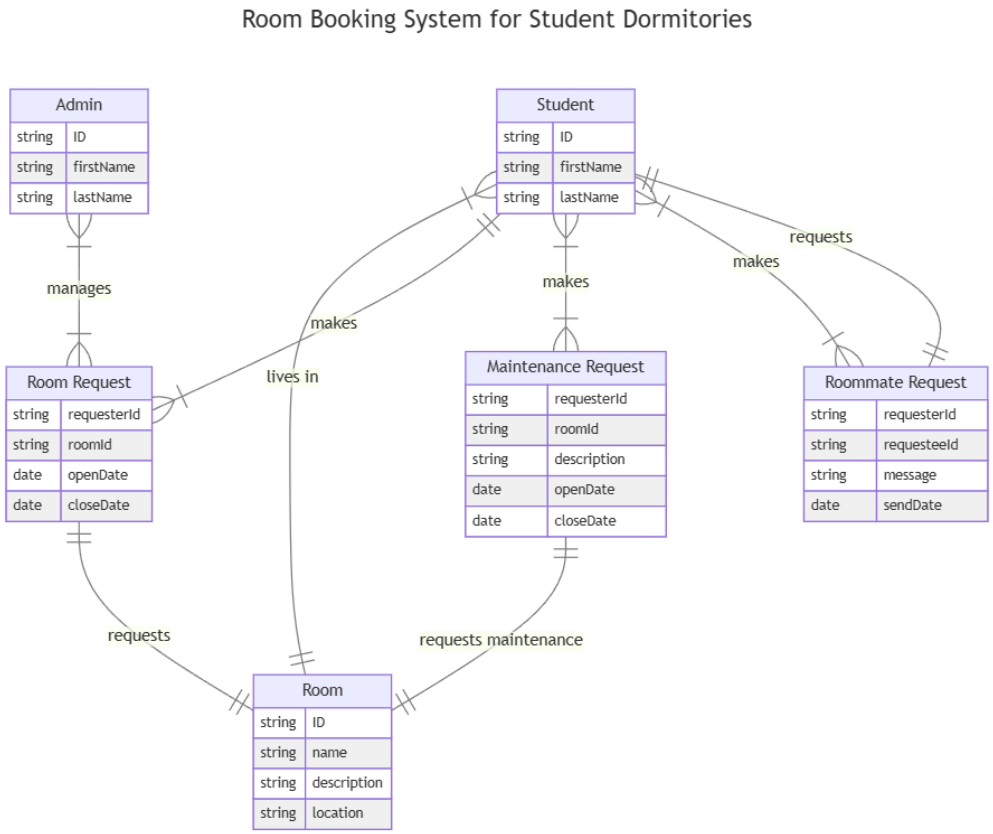

Figure 1: ER diagram showing the relationships and entities described above

V. Justification

There were multiple entities in our project: most obviously are `Students` and `Admins` (ideally with their common attributes put into an abstract `User`). Alongside the actual users, there were also the "things" these users handle: `Students` book and live inside of `Rooms`, make `Room Requests` to try and get a certain `Room` they want, make `Maintenance Requests` when the room they're living in has something break (e.g., a light), and also make `Roommate Requests` when they want to live in a specific `Room` with someone. Lastly, the `Admins` managed all of these requests.

As alluded to before, there are also multiple relationships that each entity has with at least some of the others. Most pertinently is that `Students` would be living in a `Room`; however, not every `Student` does live in a `Room` (e.g., some end up living off-campus), but those that do live in exactly one `Room` (though `Rooms` can have multiple occupants); hence, this is a many-to-one relationship with only partial participation. Then, `Students` make requests for a `Room` via `Room Requests`; `Students` can make multiple `Room Requests`, but not every `Student` will make one (e.g., again, they decide to live off-campus). Thus, `Students` and `Room Requests` have a one-to-many relationship with partial participation. `Room Requests` themselves on request a single `Room`, but

each `Room Request` *will* request one and only one; thus, this is a one-to-one relationship with total participation.

In addition to requesting and living in `Rooms`, `Students` can also make `Maintenance Requests` for the room they live in; much like `Room Requests`, `Students` can make as many `Maintenance Requests` as necessary but some `Students` may not make any (e.g., nothing breaks in their room), thus this is a many-to-many relationship with partial participation. Similarly, `Students` can make many `Roommate Requests` (but some may not make any), thus there is a many-to-many relationship with partial participation.

Lastly, `Admins` manage (approve/decline) the `Room Requests` that `Students` make, but any available `Admin` can do that and all `Room Requests` will (eventually) be approved or declined, thus there is a many-to-many relationship with total participation.