SuiteMate

No More Gloomy Roomie :)

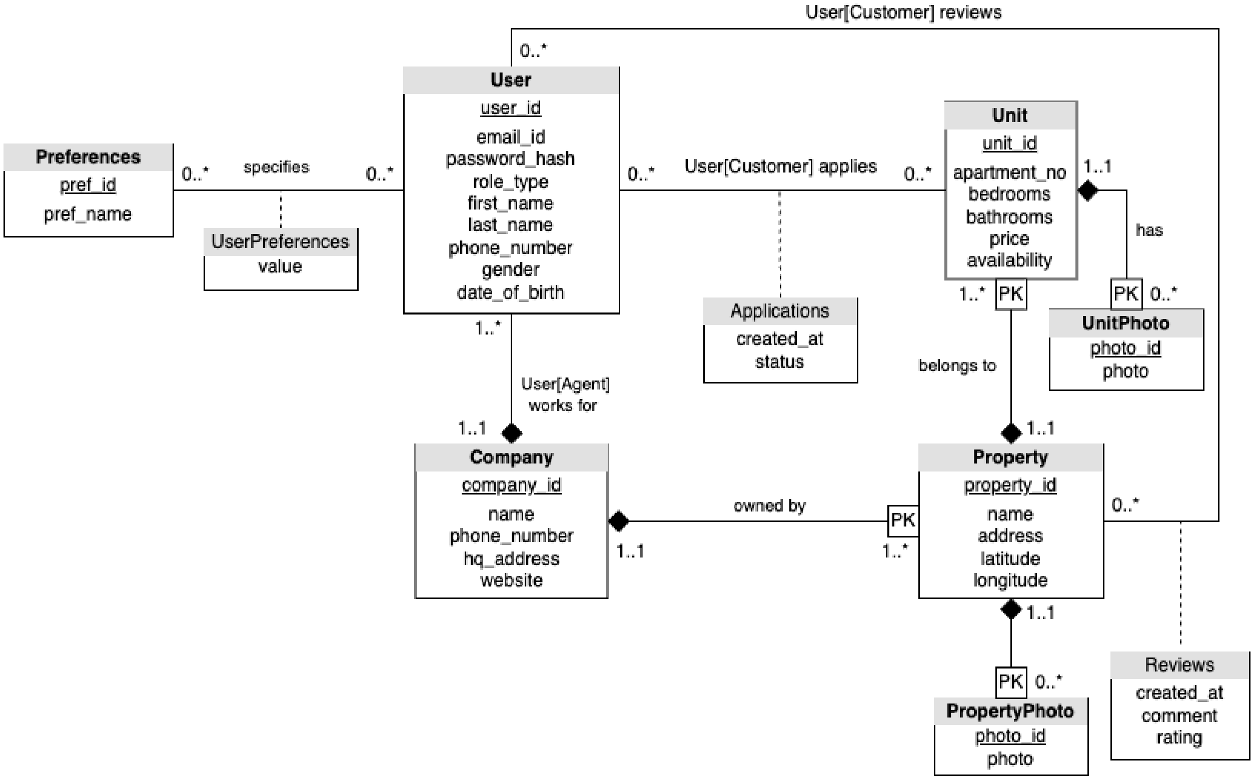
Project Track 1 : Stage 2

Database Design

Team034 - TeamNescafe

Mehul Oswal - mehuljo2
Daksh Gandhi - dakshg3
Daksh Pokar - dakshp2
Dhruv Kathpalia - dhruvk5

UML Diagram



Entities

1. Users

User is an entity which corresponds to all the users of SuiteMate.

Assumptions

- A User can either be a Customer or an Agent working for a leasing company.

Relationships and Cardinality

- A User[Customer] can *review* 0 or more Properties.
- A User[Customer] can *apply* to 0 or more Units.
- A User[Customer] *can have* 0 or more preferences for potential roommates.
- A User[Agent] *works for* exactly 1 company.

```
User (
        user_id: INT [PK],
        email_id: VARCHAR(255) UNIQUE,
        password_hash: VARCHAR(255),
        role_type: ENUM(Customer, Agent),
        first_name: VARCHAR(255),
        last_name: VARCHAR(255),
        phone_number: VARCHAR(20),
        gender: VARCHAR(10),
        date_of_birth: DATE
)
```

2. Company

It is an entity representing leasing companies which own the rental properties and employ Agents to handle rental applications.

Assumptions

- A Company needs to own at least one rental property.
- These are *prefilled* rows with the company information.

Relationships and Cardinality

- A Company can *employ* 0 or more Agents.
- A Company can *own* 1 or more properties.

```
Company(
        company_id: INT [PK],
        name: VARCHAR(255),
        phone_number: VARCHAR(20),
        hq_address: VARCHAR(255),
        website: VARCHAR(255),
)
```

3. Property

Property is an entity representing a rental building consisting of individual units/apartments for rent. A property belongs to a leasing company.

Assumptions

- A property can be created, updated and deleted by a User[Agent] who works for the same company as the property.

Relationships and Cardinality

- A property must be *owned* by exactly 1 company.
- A property can *have* 0 or more photos.
- A property can *contain* 1 or more units.
- A property can be *reviewed* by 0 or more Users[Customer].

```
Property(
        property_id: INT [PK],
        name: VARCHAR(255),
        address: VARCHAR(255),
        latitude: REAL,
        longitude: REAL,
        company_id: INT [FK to Company.company_id]
)
```

4. PropertyPhoto

PropertyPhoto is an entity which represents the photos of a property.
PropertyPhoto is a weak entity which cannot exist without the property

Assumptions

- Property and Unit can have separate photos.
- A `photo` is a VARCHAR type because it will store a URL (and not bytes).

Relationships and Cardinality:

- A PropertyPhoto can *belong* to 1 Property only.
- A Property *can* have 0 or more photos.

```
PropertyPhotos(
        photo_id: INT [PK],
        property_id: INT [FK to Property.property_id],
        photo: VARCHAR(255)
)
```

5. Unit

A unit is an entity which represents a specific unit in a property. A unit is a weak entity which cannot exist without the property.

Assumptions

- All the units in a given property will be managed by User[Agent] of the same company.
- A specific unit can be applied to by a specific User[Customer] only once.
- `bathroom` is a REAL datatype since it can also be added as 1.5.

Relationships and Cardinality

- A Unit can *belong* to exactly 1 Property.
- A Unit can be *applied* to by 0 or more User[Customer].
- A Unit can *have* 0 or more photos.

```
Unit(
        unit_id: INT [PK],
        property_id: INT [FK to Property.property_id],
        apartment_no: INT,
        bedrooms: INT,
        bathrooms: REAL,
        price: REAL,
        availability: BOOLEAN,
)
```

6. UnitPhoto

UnitPhoto is an entity which represents the photos of a unit.
UnitPhoto is a weak entity which cannot exist without the unit.

Assumptions

- Property and Unit can have separate photos.
- A `photo` is a VARCHAR type because it will store a URL (and not bytes).

Relationships and Cardinality

- A UnitPhoto can *belong* to 1 Unit only.
- A Unit *can* have 0 or more photos.

```
UnitPhoto(
        photo_id: INT [PK],
        unit_id: INT [FK to Unit.unit_id],
        photo: VARCHAR(255),
)
```

7. Preferences

Preferences is an entity which describes the types of preferences that a user can have for potential roommates. It is designed in such a way that it can handle *addition / updation / deletion* of preferences in future.

Assumptions

- These are *prefilled* rows with the preferences like *Gender, Food Choices (Veg/Non-Veg)* and many others.

Relationships and Cardinality

- A Preference Type can be *specified by* 0 or more Users[Customer].

```
Preferences(
        pref_id: INT [PK],
        pref_name: VARCHAR(255),
)
```

Relationships

1. UserPreferences

UserPreferences is a **many-to-many** relationship between the Users and Preferences table where a user can define the preferences that he has for searching roommates. The `value` field in relationship signifies the choice or weightage of the preference. Let's say if it's a preference like “Dietary Preference", we can store a value which can be either Veg, Non-Veg or Vegan, or for “Cleanliness” the values will range from “1-5”.

Assumptions

- A preference may or may not be specified by a User[Customer].
- These values will be used by the preference matching algorithm to find potential roommates.

```
UserPreferences(
        user_id: INT [PK] [FK to User.user_id],
        pref_id: INT [PK] [FK to Preferences.pref_id],
        value: VARCHAR(255),
)
```

2. AgentCompanyRelationship

User[Agent] is a special type of User that is employed by a leasing agency. This is a **many-to-one** relationship. As we have a different type of User[Customer] it is not ideal to store the `company_id` inside the User table.

Assumptions

- An Agent can work for exactly one company.
- A company can have multiple agents.

```
AgentCompanyRelationship(
        user_id: INT [PK] [FK to User.user_id],
        company_id: INT [PK] [FK to Company.company_id]
)
```

3. Applications

Application is a relation between Users and Units. Since multiple Users can apply for multiple Units, we have a separate table for this **many-to-many** relation.

Assumptions

- An application can be approved/rejected by any agent belonging to the same company as the property in the application.
- If an application for a unit is accepted by an agent, then other applications for the same unit will be automatically rejected.

```
Applications(
        user_id: INT [PK] [FK to User.user_id],
        unit_id: INT [PK] [FK to Unit.unit_id],
        created_at: DATE,
        status: VARCHAR(255)
)
```

4. Reviews

Review is a relation between Users and Properties. Since multiple users can review multiple properties, we have a separate table for this **many-to-many** relation.

Assumptions

- Users can only review the Properties that they have leased.
- A user can review a property exactly once.

```
Reviews(
        user_id: INT [PK] [FK to User.user_id],
        property_id: INT [PK] [FK to Property.property_id],
        created_at: DATE,
        comment: VARCHAR(255),
        rating: INT,
)
```

5. Unit - UnitPhoto Relationship

This is a relation between Unit and UnitPhoto. This is a **one-to-many** relationship as each unit can have 0 or many photos. This relation has no additional attributes. `unit_id` is a foreign key in the UnitPhoto table which references the `unit_id` of the Unit table.

6. Property - PropertyPhoto Relationship

This is a relation between Property and PropertyPhotos. This is a **one-to-many** relationship as each property can have 0 or many photos. This relation has no additional attributes. `property_id` is a foreign key in the PropertyPhotos table which references the `property_id` of the Property table.

7. Company - Property Relationship

This relation is between Company and Property. This is a **one-to-many** relationship as each company can have multiple properties. This relation has no additional attributes. `company_id` is a foreign key in the Property table which references the `company_id` of the Company table.

8. Unit - Property Relationship

This relation is between Unit and Property. This is a **many-to-one** relationship as each property can have multiple units. This relation has no additional attributes. `property_id` is a foreign key in the Unit table which references the `property_id` of the Property table.

Normalization

The database design will be based on the following 11 normalized tables. A relation R is in 3rd Normalization Form (3NF): if whenever there is a nontrivial dependency A1, A2, ..., An → B for R, then *{A1, A2, ..., An}* is a super-key for R, or B is part of a key. This holds for our tables.

All our tables follow the following:

- No partial dependencies exist, so it satisfies the first normal form (1NF).
- There are no transitive dependencies, so it also satisfies the second normal form (2NF).
- Since all non-key attributes are functionally dependent on the primary key, it satisfies the third normal form (3NF).

1. Users

Dependencies: No transitive dependencies are present. All non-key attributes are functionally dependent on the primary key (`user_id`).
Conditions for 3NF: It satisfies 3NF since it doesn't have any transitive dependencies.

2. Company

Dependencies: No transitive dependencies are present. All non-key attributes are functionally dependent on the primary key (`company_id`).
Conditions for 3NF: It satisfies 3NF since it doesn't have any transitive dependencies.

3. Property

Dependencies: The attributes (`name, address, latitude, longitude`) are functionally dependent on the primary key (`property_id`). The `company_id` foreign key establishes a relationship with the Company table.
Conditions for 3NF: It satisfies 3NF since it doesn't have any transitive dependencies.

4. PropertyPhotos

Dependencies: All attributes are functionally dependent on the primary key (`photo_id, property_id`).
Conditions for 3NF: It satisfies 3NF since it doesn't have any transitive dependencies.

5. Unit

Dependencies: All attributes are functionally dependent on the primary key (`unit_id`). The company_id foreign key establishes a relationship with the Property table.
Conditions for 3NF: It satisfies 3NF since it doesn't have any transitive dependencies.

6. UnitPhoto

Dependencies: All attributes are functionally dependent on the primary key (`photo_id, unit_id`).

Conditions for 3NF: It satisfies 3NF since it doesn't have any transitive dependencies.

7. Preferences

Dependencies: All attributes are functionally dependent on the primary key (`pref_id`).
Conditions for 3NF: It satisfies 3NF since it doesn't have any transitive dependencies.

8. UserPreferences

Dependencies: All attributes are functionally dependent on the composite primary key (`user_id, pref_id`).
Conditions for 3NF: It satisfies 3NF since it doesn't have any transitive dependencies.

9. AgentCompanyRelationship

Dependencies: All attributes are functionally dependent on the composite primary key (`user_id, company_id`).
Conditions for 3NF: It satisfies 3NF since it doesn't have any transitive dependencies.

10. Applications

Dependencies: All attributes are functionally dependent on the composite primary key `(user_id, unit_id).`
Conditions for 3NF: It satisfies 3NF since it doesn't have any transitive dependencies.

11. Reviews

Dependencies: All attributes are functionally dependent on the composite primary key `(user_id, property_id).`
Conditions for 3NF: It satisfies 3NF since it doesn't have any transitive dependencies.

From our analysis, all tables are in 3NF. All non-primary attributes in each table are directly dependent on the primary key of their respective tables, and no non-primary attribute determines another non-primary attribute. We chose 3NF to avoid the loss of information and preserve the dependency.