

Foundations of Databases A.Y. 2022-2023

Homework 1 Requirements Analysis

Master Degree in Computer Engineering
Master Degree in Cybersecurity
Master Degree in ICT for Internet and Multimedia

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Objectives of the System

A co-living is a residential community living model that accommodates people living in the same dwelling unit, facilitated by a professional host. Co-living contributes to a lifestyle concentrated around an international community that provides shared housing for people with similar values or intentions.

While people can create co-living situations on their own, businesses that facilitate the relationship provide some benefits. The main one is that they remove the burdens of doing it on your own, such as negotiating your own contract, furnishing the place and setting up utilities, Wi-Fi and other services. Co-living businesses take care of all of these factors and make it easy to move right in.

Running a co-living business is similar to a hotel business in some ways, such as providing great service. In order to do that, the management team needs to have access to an easy-to-use tool to supervise their co-living business.

The objectives of such a database are to help people find the facility that is right for them, book rooms and enter the community. The database provides real-time information about room reservations and availability, keeps the information about current tenants (contact information, documentation, contracts), connects all members and allows them to interact and send requests. It can also be used to advertise users about events, new services and experiences to help residents bond.

Interviews

The following interviews were set with the users to gather more information in order to create a better understanding of the system's requirements and purposes:

- The management team: taking into consideration that the management team has an important role in this system, we could get from them different sections of information about the co-living environment. For instance, possible data to gather could be: the number of rooms, details about all available facilities or even the technical problem that occurred in some buildings. In addition, the management team emphasized its interest in accessing/retrieving as many details as possible about the tenants.
- Tenants: interviewing the tenants is important to understand their needs and requirements. In this system, the tenants asked for the possibility to pre-book a room depending on specific filters (ex: shared or private bathroom). They would also want to see the different events that can take place in the co-living building. It's essential for them to keep in touch with the management team for various possible issues and to be able to give ratings about the building.

Users and Stakeholders of the System

The **users** of the System are:

- The tenants: can see if there is a room available. If so they can apply for one directly on the website. They can visualize the events and activities held in the structure they are currently in. Each building has one tenant named "ambassador" who has the possibility to get in touch with the organization in case direct communication is needed.
- The management team: visualizes and supervises tenants and ambassadors for each building and organizes all the various parties and activities.

The **stakeholder** of the System is the organization who defined the system's requirements and its main purposes. In particular, the stakeholder of the system could be both the owner of the building, who's willing to implement a database based system to facilitate the structure management, or an organization who owns multiple buildings and needs to keep track of what's going on in each of those buildings.

Natural Language Sentences

The members of a start-up company were searching for real estate investment opportunities around the world. Throughout their research, they noticed that, in the major cities, a lot of buildings were rented both by young professionals and students as a house share. These locations had really poor management and were not really great places to live in overall. After talking with some of the tenants, they realized that there was a strong need for affordable, flexible and convenient house shares and people were struggling to find them. With these premises, the start-up decided to pivot to a co-living business that could provide a network of adaptable, fully furnished accommodations by creating sustainable and community-driven shared homes.

To efficiently run this business, the company needs a database to manage all the information about the co-living buildings, their tenants and promote the networking between them. This database will also function as a back-end for the company site and for a mobile app that the tenants can use.

People who want to become tenants have to fill in a form on the company site in which they will express the following preferences: the city they plan to live in, the city district or a specific co-living, booking date (two options, A.S.A.P. or specific date), duration of the stay (6 months or more), type of room offer (normal or premium with more space and a private bathroom). After the form, the site requires the user to insert basic personal information: first and last name, email address, phone number, birth date, occupation and bank statement for a rough estimate of the income.

At this point of the process, the potential tenant enters a pre-booking state in which they have to schedule an interview with a member of the company staff; if the interview is successful, they can enter in a queue for an available slot in a co-living based on the preferences previously expressed in the form. When the booking of a room is finalized, the new tenant has to provide more critical information, like government ID, employment/student status, tax returns, personal guarantors, etc. (depending on the country's legislation). After all these data is stored in the database, a room number is associated with the single tenant, together with the rent deadline and other vital information about the facility he will live in. If the applicant was already a tenant in a different co-living they will have priority over people that are outside of the network. Once a tenant has settled in, they can invite guests as long as they fill in a form with personal information (for safety reasons) and all the other housemates agree.

About the buildings that constitute the co-living network, it's necessary to store the data concerning the various characteristics of the different places: like the country, city and address, number of rooms, their characteristics and their availability. Next, it's important to store the type and amount of common spaces and amenities available in the building (with the respecting cleaning schedule for all of them). Then, the company needs a list of all the partnerships with local suppliers and structures.

For each building one of the tenants will also be the ambassador, a person in charge of communicating with the management team if a problem occurs. The ambassador will represent all the other tenants in case repairs are needed as well.

The system also needs to implement a co-living rating process in which the scores are given anonymously and will be publicly available, stating only the room number of the reviewer.

One of the most important aspects of this project is networking, so the management team will organize events for tenants coming from different co-livings and possibly their guests who have to fill in a basic form (similar to the one the applicants have) to register for the event. The events can be simple, like breakfasts or dinners, or even physical group activities, like soccer or volleyball games.

The mobile app, which will be used mainly by the tenants, in addition to all the aforementioned information (contract terms, payments situation, personal data) will also provide on-demand services (monthly supply of groceries, room cleaning, various subscriptions), confirmation notifications for events, access to smart home devices, management team tickets tracking and general house info.

Filtered Sentences

The users of the systems are:

- **Co-living management team:** we consider only one management team, who may own multiple buildings and apartments, each of which is characterized by a specific kind of offer.
 - A management team member is defined by: name, surname, email, phone number.
 - The management team is the only one who can add or delete buildings and tenants to/from the platform.
 - The management team can modify, by adding or deleting amenities to/from each co-living.
 - The management team can accept, according to a waitlist and to a selection process, new tenants in its co-livings.
 - The management team has access to all the information regarding each building: how many rooms are available, when tenants are moving in or out, manage events, reviews...
 - The management team receives complaints and emergency requests from tenants.
- **Applicant:** potential customers who started a pre-booking process can check all the public information about rooms and co-livings. In particular:
 - Applicants are identified by the basic information that they provide when they start a pre-booking: name, surname, age, email, phone number, home address, nationality, bank information, purpose of the stay (i.e. work or study), check-in date, check out-date, id/passport information.
 - Applicants must specify the check-in and check-out dates.

- Applicants can see the offer of each co-living in terms of facilities, amenities, common spaces, partnership; applicants can see high-level information about current tenants of the co-living, such as name, surname, if they work or study and nationality; nevertheless they cannot have access to private information and contacts.
- **Tenants:** tenants are currently living in the co-living, so they can do anything a potential customer can. In addition:
 - Tenants are defined by: name, surname, age, email, phone number, home address, nationality, bank information, purpose of the stay (i.e. work or study), check-in date, check out-date, day of rent payment for each month.
 - Tenants can sign-up and login to the platform.
 - Tenants can have access to their contract and all the information of their stay.
 - Tenants must upload a picture of their id/passport.
 - Tenants can rate the co-living building.
 - Tenants are supposed to choose a person, among all the people living in the same co-living, that must be in charge of representing all the tenants of the building.

The **Co-living** is characterized by its own facilities, rooms, tenants, partnerships, in particular:

- Each co-living is defined by: address, number of rooms and the list of attributes.
- Each co-living has a specific number of rooms: if a room is occupied the information of the tenant is specified, if not the information of the next person moving in with the corresponding date of arrival is displayed. If the room does not have a future tenant, the room is specified as vacant.
- Each co-living has specific *common spaces*: kitchen, living room, terrace, garden...
- Each co-living has specific *facilities*: gym, club, pool, work space...
- For each co-living tenants can check out the kind of amenities available (e.g. dishwasher, washing machine, dryer, robot, drying rack, vacuums...).
- For each co-living there is a specified *cleaning schedule* for the common spaces, cleanings are supposed to be addressed by an external company.
- Each co-living may host *events*: tenants can freely access events, while external people can be invited, but they need to fill in a form to access the buildings.
- Each co-living may have specific *partnerships* with clubs, restaurants and grocery shops in the nearby, so that tenants can get discounts and special treatment.
- Each co-living has a list of *emergency contacts*, which includes some of the members phone numbers of the management team, and useful numbers to address everyday issues.

- Each co-living must have an *ambassador*, i.e. a tenant in charge of representing all the other tenants in the building when it comes to issues, repairs and complains.

The booking process is in two steps:

1. **Pre-booking:** once an applicant fills in the form with the basic information needed, he is added to a waiting list, each waiting list follows a chronological order, i.e. first in first out for the new applicants. applicants must also comply with some basic requirements in order to not be discarded from the waiting list. These requirements include: age range, minimum availability in the bank account, either study or work purpose.
2. **Booked:** if the applicant accomplishes all the requirements and they are the first in the waiting list, his status is set to booked and he signs the contract by providing all the specified information.

Term Glossary

Term	Description	Synonyms	Connection
Co-living	The living space owned by the Owner and shared among the other tenants. A co-living consists of bedrooms to be occupied by tenants and common spaces, like kitchens, living rooms, etc.	House-share	Management team, tenant, room, facilities, rating
Tenant	An individual renting a room in a co-living, by means of paying a monthly sum to the management team.	Resident, renter	Co-living, owner, rating
Room	The bedroom inside the co-living which the tenant rents.		Tenant
Applicant	An individual who has completed the pre-booking process.		Pre-booking, waitlist
Management team	The people who own the co-living. They are in charge of renting the rooms to tenants and maintaining the co-living to satisfactory conditions.	Landlords	Co-living, tenant, event

Facilities	Common spaces, that are not for basic utilities, to be used by tenants. Examples can be fitness rooms, work and study spaces, etc.		Co-living, tenant
Rating	An evaluation of the co-living itself, based on the general living conditions of the tenant. Reflects how satisfactory the overall experience was in the co-living.	Evaluation, grade	Co-living, tenant
Guest	A person visiting a tenant. The length of stay and the room of the hosting tenant are registered in the database.		Tenant, room
Event	An event, for example a party, organized for the tenants. Their guests are allowed to take part in it if they fill in a form.		Tenant, guest, management team
Occupation status	Information about the current status of a room. A link to the current or next tenant is provided, along with the date of the next arrival if the room is now free.		Tenant, room
Pre-booking	The action performed by people who would like to rent a room, by filling in a form with essential personal data and providing a bank statement, so they are allowed to take an appointment.		Applicant, room
Contract	The type of room, the amount of the rent, the deadline of the payment.		Tenant, management team, room
Waitlist	A list of people who have pre-booked a room, associated with basic personal data and based on FIFO policy with priority for already tenants.		Pre-booking, tenant
Booking	The action performed by people who have already pre-booked a room and earned the right to stay in the co-living, by providing other personal data, for example ID or passport.		Co-living, room, tenant, pre-booking

Table 2: Describe in this table the terms of your system

Functional Requirements

The data-base must store:

- Building data:
 - Common spaces (number of kitchens, rooms, living room, terrace, garden. . .)
 - Facilities (gym, pool, co-working space)
 - Address of the building
 - List of events organized
 - Problems reported
 - List of tenants (with number of room they are attached to, duration of the stay) → maximum number of guests for each room
 - Amenities available (tv, kitchen robot. . .) → inventory for the common spaces
 - Table with cleaning days of the common spaces
 - Emergency contact with the name of the management team and his phone number
 - The ambassador name
- Rooms data:
 - Number of the room
 - Building in which it is
 - Occupied (link to the student/worker) or not (date of the next arrival) or vacant if nobody is expected to rent the room
 - Type of bathroom (shared or not) → 2 types
 - Waitlist of the next tenants who pre-booked the room
 - Monthly rent
- Tenants data:
 - Name and surname
 - Username and password
 - E-mail
 - Profession: student (degree) or professionals

- Fiscal code
- Bank information
- Country of living
- Nationality
- Link to contract
- Contact of guarantors
- Id /passport
- Deadline of payment for each month
- Duration of the stay (arrival date and departure date)
- Subscription to on-demand services
- Ambassador or not

The system must allow:

- Future tenants to fill a form with basic personal information and take an appointment → pre-book
- Selected future tenants to book a room by sending the deposit and giving more personal details
- The management team to know which rooms are free or occupied
- The management team to choose the next tenant in the waitlist to accept
- The management team to check the information about each tenants
- The management team to check if there is any problem reported in each building
- The management team to check when will a room be free
- The management team to handle all the payments and store it
- The management team to add or delete co-living spaces
- The tenant to login and check his applications

- The tenant to receive a notification when a room is ready for him/her or when he/she is the next one on the waitlist
- The tenants to check reviews for each building
- The tenants to see what is the next event organized for the building
- The tenants to check when cleaning has been done
- The tenants to invite a certain number of guests
- The potential applicants to filter the price, type of bathroom, address of the rooms on the platform when searching for a room
- The tenants to check partnerships with the local suppliers and structures
- The ambassador to represent all the other tenants in case of issues

Non Functional Requirements

The designed system has to :

- Send a confirmation e-mail to each applier within 30 seconds
- Optimize the number of occupied rooms
- Ensure the "first come first serve" for the new applicant. The tenant of the room has priority if he/she wants to re-book it.
- Inform the management team within a day of any problem that occurred in a building and solve it before the end of the week
- Provide the best co-living space respecting each other
- Provide a secure booking (no transfer of money if no rooms are available)
- Guarantee privacy and security functionalities to protect sensible data (e.g. bank information)

Constraints

The system application should satisfy the following constraints:

- It should be implemented in PostgreSQL;
- The hosting will be handled by an Amazon EC2 instance running Ubuntu Server.
- The server side will be implemented using Node.js and Express;
- The client side will be implemented using React and React Native.

Group Members Contribution

- Daria Zanin mainly contributed to the *objective* section;
- Euxhenio Sulku mainly contributed to the *interviews* section;
- Riccardo Broetto mainly contributed to the *Users and Stakeholders* section;
- Luca D'Este a Alberto Gobbin mainly contributed to the *Natural language sentences* section;
- Nicole Zattarin mainly contributed to the *filtered sentences* section;
- Marco Gasparini and Nicolás Ortiz De Zárate mainly contributed to the *Term glossary* section;
- Anaïs Battut and Anaïs Fagne mainly contributed to the *Functional and Non functional requirements* sections;

Everybody contributed in reviewing and writing down the constraints, moreover we developed all together the guideline and the ideas.