EasyHome

Search Algorithm

Emili Khachatryan, Diana Vossberg, Naji Danial Advanced Data Analytics

Alejandro Martinez

December 19th, 2025

Table of Contents

Table of Contents..... 1

Summary..... 2

Customer Development..... 3

Business Model Canvas..... 4

Product Design..... 5

Product Development..... 6

Conclusion..... 7

Summary

In today's current real estate landscape, finding an apartment has become more difficult than ever. The quest for apartments is certainly a difficult task, especially when it comes to larger cities where the demand and the prices are higher. Thousands of international students travel abroad to settle in a new country and begin their studies. However, beyond the intricate academic related procedures, students must find an apartment and, potentially, roommates. This task can become hectic easily when one doesn't know much about the culture, the language, the safest neighborhoods, among other apartment related features. In light of these complexities, an efficient application dedicated to apartment and roommate search is imperative for international students.

EasyHome is an application based in Madrid, Spain that simplifies the apartment search process and connects its users with potential roommates based on shared characteristics. Although it is designed for international students, it can be used by national citizens as well. The application relies on the latest algorithmic techniques such as quicksort, binary search, dictionaries, and object oriented programming to make both the apartment and roommate matches for its customers.

How does it work? We created a database filled with numerous apartments available, each one with unique features such as price, location, and number of rooms/bathrooms, etc. The users will be asked to input the price range they are willing to pay, as well as other apartment specifications (number of rooms, location, etc). The code will use quicksort and binary search algorithms to create a new dataset to quickly narrow down the housing options using the inputs as a reference. Then, the user will be asked again some questions related to the type of person they are looking for to be their roommate (age, gender, personality type, etc.). The program will take into account both the houses selected and the roomate characteristics to output the ideal solution. The information about the other users that will be possible matches are recorded previously using a survey and added into a dataset.

Customer Development

EasyHome is designed for international university students in Madrid who are unfamiliar with the city and who are encountering many difficulties when finding a nice apartment below their budget. Given that in Madrid it has become nearly impossible to find an affordable apartment, looking for a roommate is the most reasonable option. Our primary users are those concerned about living with incompatible roommates and, therefore, want to be able to choose their roommate based on provided information.

From the customer interviews we discovered that students would have been pleased to find the application earlier in the academic year, given the difficulties that come with being a first year student in a new country. Therefore, we became aware of the demand for an application like the one we are currently developing. They also shed light on other customer segments where our application could be useful aside from the international university students. An example would be, for people that come to Madrid and do not know how to speak spanish. As a result, they want to find someone who speaks the same language as them to be able to communicate properly. Although our application was initially created for international students, it can be used across many customer segments.

Although some of the students we interviewed admitted that their parents were the ones who took care of the process of finding an apartment, they also explained that it was a difficult and time-consuming process for them and that if our application was developed and available for customer usage, it will be very popular and certainly used by them and their families.

By looking at the empathy map, we can classify our ideal targeted customer into the following points:

- First-year international university students.
- Unfamiliar with the city they will be living in for the following years (Madrid).
- Looks for a well-located and well-equipped apartment for an affordable price.
- Worried about their roommate being someone that makes coexistence difficult.
- Lives outside of the EU and has issues contacting realtors.

Business Model Canvas

Customer Segment

International students coming to Madrid, aged between 18 and 25 years old who are looking to experience easy and fast accommodation processes.

Value Proposition

The main purpose of EasyHome is to facilitate the apartment search for international students in Madrid. We will assess each client individually to evaluate their specific needs and priorities (budget, furniture, location, transportation, etc).

The product will be in the form of an application. The services may vary for each individual customer. In our services we include an evaluation of the clients' needs and other further implications regarding their apartment search (contacting landlords, guidance in monetary transfers, documentation) and a feature to search for potential roommates.

EasyHome is different from any other search apartment application because it ensures the customers comfort in the whole accommodation process. We perform deep market research in order to find the paint points of our customers and try to mitigate them. Some of these problems include linguistic barriers, overcomplicated websites, inability to contact other students.

Even though EasyHome is based in Madrid, the services will be conducted in both Spanish and English given that international students don't necessarily speak the native language. The application will be straightforward, the user will be provided some questions and all the available apartments will be listed. Finally, it will offer an additional feature to find potential roommates. This will guarantee having both apartment and roommate search in the same application, increasing efficiency.

Customer Relationship

Our customers expect us to establish a close relationship with them. If we are going to charge a certain fee for their use of our app/website/service we need to justify our involvement in the process of them finding an apartment and roommates. Also they expect us to reach them/ be

able to reach us through social media platforms because it is easier for them to find and contact us.

We have not yet established the social media platforms but they are able to contact us through SEO.

These relationships are integrated with the rest of our business model because our model is about making the apartment and roommate search for students easier, and if it is easy for the customers to contact us, then the job is being done correctly.

These relationships are costly if we consider that we may need workers (a social media manager, app/website developers,etc). However, if we do this work, there are no costs.

Channels

Our customers want to be reached through a modern and easy-to-use platform/channel. If possible, through social media platforms which they are really familiar with. Also, as usual, our website/app should be available through SEO.

As of right now, we are only reaching them through SEO. Our possible channels are integrated because they are all online platforms, in which no matter in what part of the world the customer is, they are able to access our platform and request our services. Our channels are all functional, however, through SEO and social media we are able to see the interaction people have with our posts/platform which can be beneficial for predictive analysis.

Using emails and SEO is more cost efficient because there is no cost. On the other hand, for social media platforms, there are fees that need to be paid for our posts to be sponsored and shown to the wider public.

We can integrate these channels with customer routines by scheduling emails/posts on peak browsing times (maybe evenings and weekends). Also, by the end of semester 2, when students start looking for apartments.

Key Activities

What Key Activities do our Value Propositions require: We require the creation of a digital

website. The website should be able to provide apartments to each individual customer based on their needs.

Our Distribution Channels: The distribution channel of the website will be mainly through SEO and email. We could implement SEO to gain valuable insights and integrate scheduled emails to keep the customers engaged.

Customer Relationships: We will send them weekly emails with information, surveys, and some other interactive activities that will keep their attention and let them know we are at their disposal. Also, we will post weekly on our social media platforms for our content to reach them.

Revenue streams: In our project we could have two streams. The first one from downloading the app/website, and the other one to have access to the 'match' roommate compatibility option.

Key Resources

Our value proposition requires collection of data and that would need searching for proper datasets that are available on the internet. Some of those might require payments.

We will have a direct relationship with customers in order to customize their specific needs and satisfy them properly.

Revenue Streams?

Revenue is made from taking percentages off the landlords where they need to pay in order to be listed on the website.

Key Partners

Our key partners can be already existing agencies and companies such as idealista, whom we can ask for listings access. We will also be heavily working with the clients and customers to ask for their preferences and work towards achieving them

The key suppliers are landlords who are willing to list their apartments for rent on our platform. We need a database to work with in this case, so we need to find the databases as

our supply. The partners list apartments for rent in madrid.

Costs Structure

What are the most important costs inherent in our business model?

It is crucial to consider that for building an efficient AI-based website we need a vast amount of data which is expensive. Also, we will need to collaborate with agencies and use their data sets, not all agencies will agree to collaborate for free

Which Key Resources are most expensive?

Data, Time

Which Key Activities are most expensive?

SEO, Social Media Marketing

Revenue Structure

For what value are our customers really willing to pay?

Students will not pay if the price of our app/project is higher than the fees they could have if they decided to hire an agency.

For what do they currently pay? How are they currently paying?Most students have to pay for their university expenses (and usually do this by a monthly bill throughout the year). Since these payments are not small, our app has to have a reasonable price in order to increase the segment of the population that has access to our app.

How much does each Revenue Stream contribute to overall revenues? As said before in 'Key activities', we could have 2 sources of revenue. The one that could bring the most benefits would be the matching roommates option since it is what differs our idea from others in the market and, therefore, people would want to choose our idea over others because of this.

Product Design

Inception Deck

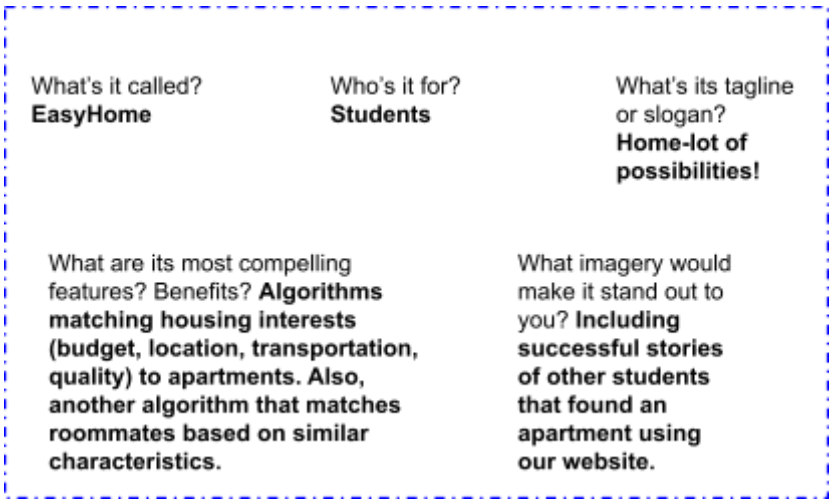
Why are we here?

Most of us are international students that know how difficult it is to find apartments, even after living in Madrid for two years. We want to create a tool that facilitates the accommodation process for international students.

Create Elevator Pitch

"Are you tired of Idealista's hard and tedious apartment search processes? If you are a student who wants an easy apartment selection process, EasyHome is the way to go. Discover amazing apartments that cater your desires!"

Design Product Box



Create a NOT List

Within the Scope	Outside the scope
- Sort houses based on budget. - Sort houses based on location. - Sort houses based on number of rooms.	- Filtering the apartments based on their furniture quality. How are we going to determine the quality of the apartment in the present time? What is considered good quality for each individual?

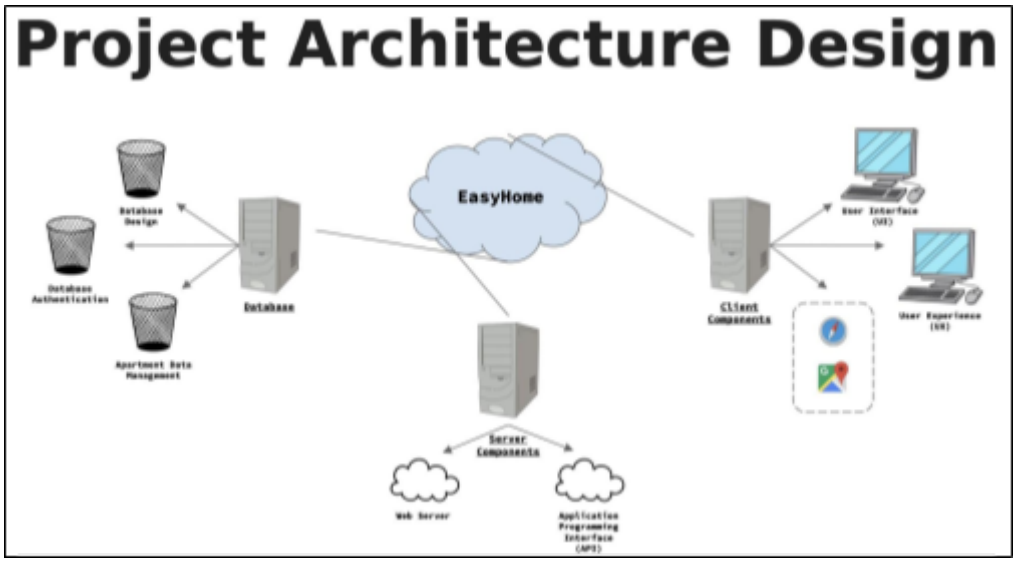
Undecided
Match roommates based on a short description (specific words) of what each person is looking for in their roommate. For example, two clients (students) are looking for someone calm, they will be matched as possible roommates (filter the word "calm").

Know Our Neighbors

Tourism Agency	**Real Estate Agent**
Country Consul	**University President**

Show the Solution

- We will create an application that facilitates the apartment search of students.



What Keeps Us Awake?

Manageable Risks	**Unmanageable Risks**
1. Technical Issues: These can include server outages, software bugs, or cybersecurity issues. 2. Data Privacy and Security: with sensitive user information, we must ensure data privacy and security on our website.	1. Competition: Other similar platforms may emerge and compete for the same user base. 2. Market Fluctuations: Real estate markets can be influenced by factors like interest rates, inflation, and demand.

3. User Adoption: we need to provide all the means for users to adopt to a new platform.	3. Pandemics or Natural Disasters: Unforeseen events like pandemics or natural disasters can disrupt operations and affect the housing market.

Weighting Up

Business Related Tasks
Tasks
1.Project Planning - Define objectives, goals, and project timeline and budget.
2. Market Research and Analysis - Identify the demand and needs of the customers, and understand the competitors' faults.
3. Front-End Development - Design UI layout, user authentication, search and filtering features, etc.
4. Back-End Development - Develop APIs, manage database and data, create search and recommendation algorithms, etc.
5. Quality Assurance and Testing - Conduct thorough testing (user and integration testing). Identify bugs/glitches.
6. Marketing and Promotion - Develop a marketing strategy and collaborate with end customers (e.g., universities).

Points
1. Project Planning - 3
2. Market Research and Analysis - 5
3. Front-End Development - 8
4. Back-End Development - 10
5. Quality Assurance and Testing - 5
6. Marketing and Promotion - 6

Programming Related Tasks
Tasks
1.Selecting the proper algorithms for our application.
2. Developing the algorithms.
3. Testing the algorithms

Points
1.Selecting the proper algorithms for our application. -1
2. Developing the algorithms. - 5
3. Testing the algorithms -2

What Do We Give?

Preference Labeling Table										
	1	2	3	4	5	6	7	8	9	10
Budget						X				
Scope			X							
Time				X						
Quality							X			

How Much is it Going to Cost?

Resource	Cost per Month	Number of Months	Total Cost
Acquiring datasets & data collection	50	1	50
Launching and updating the website	30	7	210
Marketing the website on social media	55	3	165
Designing the logo and posters	10	1	10
Project Total Cost			**435**

User Stories

EasyHome Navigation

Description:

As a user I want to see the apartment and roommate options in the EasyHome app/website to be able to filter both of these to my desired taste. This will allow me to find where to live and with who.

User Conversation:

Login

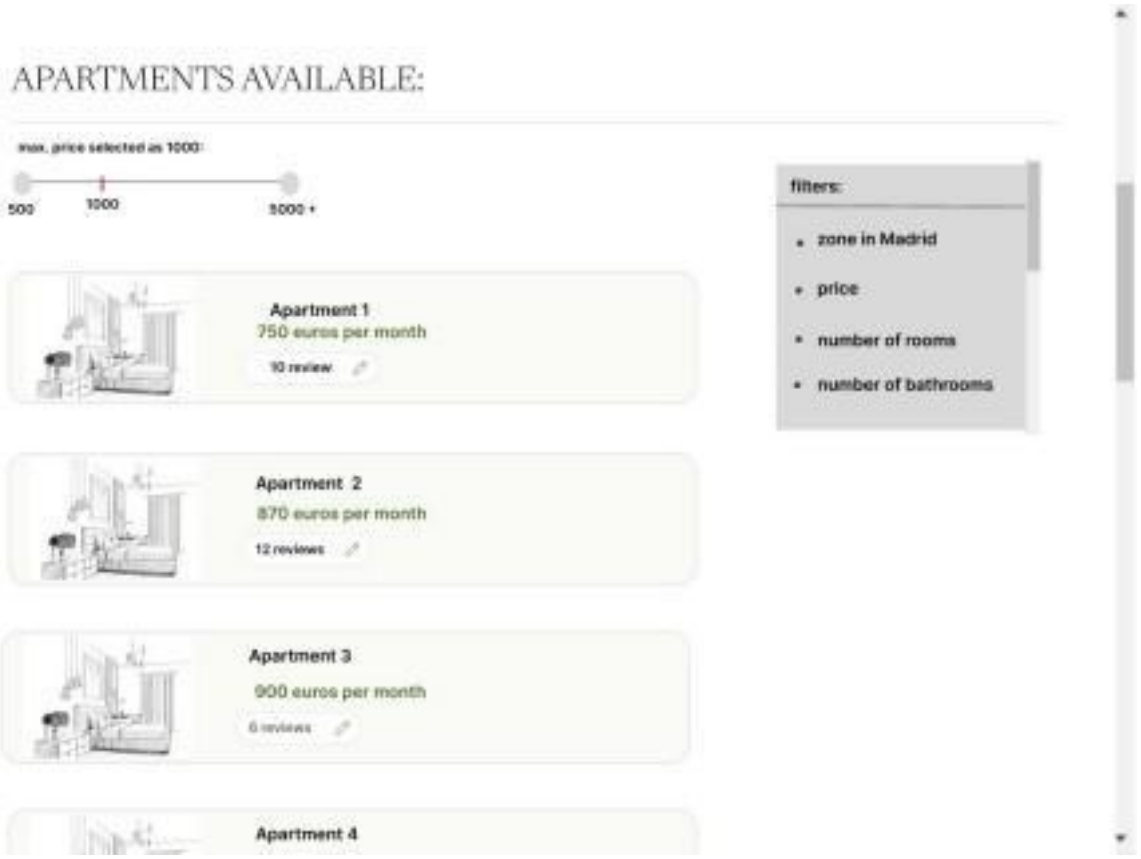
- The user must first use the browser webpage to enter our website or download the application to their phone.
- When the user clicks our website URL/application → The system will redirect the user to a login/signup page. The system allows the user to either create an account with a username and password or enter your already existing account with your premade username and password. You can also sign up through Google, Facebook or Apple.
- Once both fields are filled, the system makes the <enter> button appear→ The user clicks the enter and it takes them to EasyHome's homepage.

Apartment search

- The system displays an apartment search button and a roommate search button →the user selects the apartment search button and it will take them to the list of apartments available.
- In the apartment search page, the system displays the most recently added apartments

and their price per month. Above the list, the system displays a price range → the user can adjust it to their desire.

- To the right of the list, the system puts a filter box → The user can adjust the price, number of bedrooms and number of bathrooms.
- The user selects an apartment option → The system opens a more detailed page of the apartment selected and the contact information of the owners/real estate agent.



- If the user selects the zones in Madrid button in the filters box → The system displays the following a map of the 21 zones in Madrid → The user can choose their desired zone for the apartments to be filtered to the selected zone/zones.

Roommate search

- The system displays an apartment search button and a roommate search button →the user selects the roommate search button and it will take them to the list of roommates available.
- In the roommate search page, the system displays the most recently added roommate and their description.
- To the right of the list, the system puts a filter box → The user can use search bar to put wanted characteristics in a roommate
- Above the list, there is a search bar → The user can write keywords to find a roommate that matches those keywords in their descriptions.
- The user selects a roommate option → The system opens a more detailed page of the roommate selected and the contact information of this roommate option.

Product Development

As part of the product development stage, the scrum retrospective method has been adopted to reflect on the actions made by the team and to evaluate the performance of such actions in a way where strength and weakness points alongside some improvements are proposed.

What Went Well:

- Effective Stand-ups:
    - The daily stand-ups played a crucial role in facilitating communication, providing visibility into team progress, and ensuring that everyone was on the same page.
- Incremental Advancements:
    - The use of incremental development helped in achieving steady progress. The project moved forward with each sprint, and we could witness tangible results regularly.
- Collaboration and Communication:
    - Team collaboration was strong, and communication channels remained open. This allowed for quick problem-solving and efficient resolution of blockers.
- Task Distribution:
    - Tasks were distributed well among team members during sprint planning, ensuring a balanced workload and optimal use of individual strengths.

What Could Be Improved:

- Algorithm Implementation:
    - One of the significant challenges we faced was the implementation of algorithms. Going forward, we should allocate more time during sprint planning for detailed discussions and planning around algorithmic components.
- Code Separation and Integration:
    - The approach of developing code separately on different computers and then sending them across caused integration issues. This led to conflicts and delayed the development process.

Action Items:

- Algorithm Refinement Session:
    - Schedule dedicated sessions during sprint planning or as needed to refine and discuss algorithms. This will ensure a shared understanding and better implementation.
- Collaborative Coding Sessions:
    - Implement pair programming or collaborative coding sessions to address the challenges of code separation. This will promote real-time collaboration, reducing integration issues and improving code quality.
- Version Control Training:
    - Conduct training sessions on effective use of version control systems to streamline code integration. This will help in avoiding conflicts and ensuring a smoother development process.
- Continuous Improvement in Stand-ups:
    - Encourage team members to provide more detailed updates during stand-ups, including potential roadblocks or challenges they foresee. This will enhance the effectiveness of daily stand-up meetings.

What Will We Continue Doing:

- Daily Stand-ups:
    - Continue the practice of daily stand-ups as they have proven to be invaluable for team coordination and progress tracking.
- Incremental Development:
    - Maintain the focus on incremental development to ensure a steady and measurable progression in the project.
- Open Communication:
    - Foster an environment of open communication and collaboration to address issues promptly and facilitate efficient problem-solving.

The Scrum retrospective has shown that the team has made admirable progress in the development of the apartment and roommate search website. By addressing the identified challenges, we aim to further enhance our development process and deliver a high-quality product. The retrospective serves as a valuable opportunity for continuous improvement, and

with the proposed action items, we look forward to a more streamlined and effective development cycle in the upcoming sprints.

UX Tests:

To conduct the UX tests, the application was provided to some users randomly, where they were asked to try the application being provided with no instructions and little background information, the behaviors of these users were observed and recorded to enhance the user experience of our application. The users were later questioned about their experience using the application, what they thought worked well and what they thought needed improvement. All these observations have led to the formulation of the following conclusions:

- Adding a user interface would be significantly better for the user.
- Adding error handling code would help better the experience of the user when encountering errors.
- Fix the code so that it is not case sensitive.
- The results produced by the code are well understood by the user and are exactly what he/she expects.
- The inputs from the user for the code offer great help in filtering the houses and producing the perfect match for a roommate if wanted.

With the information that we gathered, we decided to make some updates and develop our code to match the wants of the users and resolve their concerns with the application. Since it is not inside the scope of the course, it was decided that adding a user interface would be a part of the future steps that would be taken to further enhance the project. As it pertains to the rest of the points however, we took the initiative of fixing the code in terms of some variables being case sensitive so that it decreases the probability of occurrence of errors when dealing with user input. It was a priority that whatever changes were made based on the feedback gained from the UX test did not hinder the strengths of our application, this was done by ensuring that the filters used remained the same and the results shown at the end of the user journey were still well understood and beneficial for our users.

Conclusion & Next Steps

Through this project, we've learned the importance of starting with a customer-centric approach and effective task delegation within the team to develop an appropriate product. If starting anew, we would opt for a more collaborative coding platform to address non-simultaneous coding challenges.

The EasyHome project has made substantial progress in creating a user-friendly platform that simplifies apartment searches and fosters new roommate connections. While we managed to realise the idea we had, there's room for further refinement, particularly in algorithmic enhancement. Exploring decision trees for roommate matching can significantly improve accuracy by considering criterias like age, gender, personality type, and user preferences. Incorporating tree structures into the algorithm design would enhance the efficiency and accuracy of roommate matches significantly.

As we test and gather more data, we aim to refine our models, making the matching algorithm more accurate and precise. Soliciting feedback from users interacting with our demo will be crucial in refining features based on their experiences and enlarging our database.

One of our platform's primary advantages is providing a convenient space for users to find both roommates and apartments, eliminating the need to exchange contact information. To further enhance user experience, our next major step involves developing a synchronous platform where matched roommates can seamlessly communicate through chats, share apartment options, and collaboratively filter and search without the hassle of navigating numerous links. After conducting thorough research, we've identified unique features that set EasyHome apart from competitors. These distinctive attributes not only address specific customer needs but also differentiate us within the market.

We also prioritize creating an intuitive user interface for both the website and app, emphasizing easy navigation without extensive coding knowledge. Ensuring privacy and security in our database remains paramount, with a commitment to storing users' data securely and meeting all privacy requirements.

In line with our vision for globalization, we aim to expand the project's applicability beyond Madrid to reach users in various cities. We're committed to continually improving our processes, and our team is dedicated to overcoming challenges and putting forward actions to create a more efficient development cycle for upcoming projects.