

iCare

Revolutionizing Home Service Management

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ABSTRACT

This report proposes the development of iCare, a groundbreaking web-based application designed to redefine the homeowner experience in managing basic home services. iCare offers a comprehensive platform where homeowners can effortlessly organize property profiles, encompassing mortgage and insurance information, lawn measurements, floor plans, and connectivity requirements.

One of iCare's distinguishing features is its advanced algorithmic matching capability, which enables homeowners to find services tailored precisely to their needs. Through real-time notifications, homeowners stay informed about better service matches, ensuring optimal service selection.

iCare not only streamlines home service management but also guides homeowners in understanding their property's unique requirements, from lawn dimensions to interior layouts, as well as optimizing phone and internet usage. Powered by innovative technology, iCare promises to revolutionize the homeowner experience, offering unparalleled convenience, efficiency, and personalization.

By introducing iCare, we anticipate a transformative shift in how homeowners interact with and manage their homes, paving the way for enhanced comfort, convenience, and satisfaction in residential living.

KEYWORDS

Database Design, Digital Home Care, Homeowner Profiling, Home Services Subscription, Fullstack Web-Dev

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1 INTRODUCTION

As technology advances and services begin to move onto the World Wide Web, traditional companies that serve homeowners in the home maintenance industry need a way to efficiently communicate

with their customers. With diverse companies using different websites or in-person services to continue their business, it's necessary to create a web-based application in which the two parties can communicate with each other.

1.1 Modern Day Issues

Some of the issues that are common within modern solutions can be summarized into three ideas: usability challenges, lack of integration, and cost management.

1.1.1 Usability Issues. With a substantial amount of websites and services provided by businesses on the internet, homeowners face the issue of using different applications depending on the business. When clients use different websites, they may have trouble navigating through the different user interfaces, as well as finding the data they need. This hindrance causes a problem for the efficiency of the customer. Along with complex user interfaces, a client can find trouble through poor information organization. Ideally, the client has access to all necessary information such as contract terms, billing information, and service provider details. Finally, with different applications, there's a higher risk of receiving bad information due to technical errors and bugs. Having a central application that can provide reliable and stable service is fundamental to gaining the client's trust.

1.1.2 Lack of Integration. Different aspects of home maintenance services can cause trouble to homeowners. To provide efficient and cost-saving services, having integration between home maintenance jobs such as lawn care, interior management, and internet/phone services is fundamental. This will provide opportunities to help the homeowner save money as well as decrease the amount of inefficiencies.

1.1.3 Cost Management. Having multiple service providers means homeowners will face the challenge of unexpected price increases, difficulty in comparing prices between services, and hidden fees. Effective cost management requires constant monitoring, communication, and enough information provided to the homeowner so they can make a decision.

1.1.4 Mitigating Pester of Homeowners. Homeowners frequently express frustration with the inundation of spam mail and unsolicited offers for services they don't require. From incessant flyers cluttering mailboxes to relentless phone calls and emails, the persistent solicitation can become overwhelming.

iCare addresses this modern-day nuisance by implementing a selective notification system that prioritizes relevance and minimizes

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2024-05-06 04:29. Page 1 of 1–9.

intrusion. Homeowners receive notifications only when iCare identifies a better match for their property's needs, ensuring they are informed without being inundated with unnecessary messages.

Central to iCare's approach is a commitment to user privacy and control. Homeowners retain full control over their contact information and communication preferences, with stringent safeguards in place to protect their privacy.

Moreover, iCare establishes clear guidelines for business users, restricting their ability to send unsolicited junk mail. Access to homeowner contact details is granted solely within the context of an active plan or engagement, preventing indiscriminate outreach.

By prioritizing relevance, respect, and user autonomy, iCare not only streamlines home service management but also cultivates a more pleasant and tailored communication experience for homeowners. With iCare, homeowners can enjoy a clutter-free inbox and peace of mind, knowing that their interactions with service providers are purposeful and mutually beneficial.

2 SYSTEM DESIGN

The iCare system follows a client-server architecture, consisting of two primary components: a front-end application catering to homeowners and businesses for data entry and viewing, and a back-end server responsible for data processing and logic. This architecture facilitates seamless communication between users and the system, ensuring efficient management of home services and business operations.

2.1 Front-End Application

The iCare front-end presents a user-centric web interface tailored for both homeowners and businesses. It dynamically adjusts based on the session type—whether for a homeowner or a business—to display the relevant dashboard. Built using React and Material-UI, it ensures a seamless and intuitive experience for all users, catering to their specific needs and preferences.

2.1.1 Homeowner Experience. The homeowner dashboard within the iCare front end serves as a comprehensive tool for homeowner property management, service plan data display, and budgeting tools and a match generator. This allows users to create and manage personalized property profiles, encompassing essential details like addresses, and preferences. Additionally, the dashboard facilitates the viewing of a

2.1.2 Business dashboard. The business dashboard within the iCare application empowers businesses with comprehensive management capabilities. Businesses can efficiently oversee their available plans, create new offerings, and remove existing plans as needed. Moreover, the dashboard facilitates the exploration of potential homeowner matches based on the business's available plans, enabling targeted outreach and service provision. Additionally, businesses gain visibility into their current customer base through a readily accessible list of existing customers, enhancing customer relationship management.

2.2 Back-End Application

The iCare backend will serve as the foundation of the entire system, coordinating data processing, storage, and retrieval. Here is an overview of its key components and functionalities

2.2.1 Django Framework. The backend of iCare utilizes the Django framework, a high-level web framework, to construct tables and database structures. Django is a robust framework with plenty of built-in features such as ORM(object-relation modeling), user auth, and URL routing. This will facilitate rapid development times and ease the maintenance of backend components.

2.2.2 Django Rest Framework. Integrated into the backend, the Django-REST framework enables the creation of APIs for communication between the frontend and backend components. It simplifies the process of building RESTful APIs with built-in serialization, authentication, and request-handling functionality.

In summary, the backend of iCare plays a critical role in facilitating communication between the frontend and database layers, ensuring data security, and providing a scalable and efficient platform for delivering home services to users.

2.3 E/R Diagram

This is the entity relationship diagram for the iCare web application.

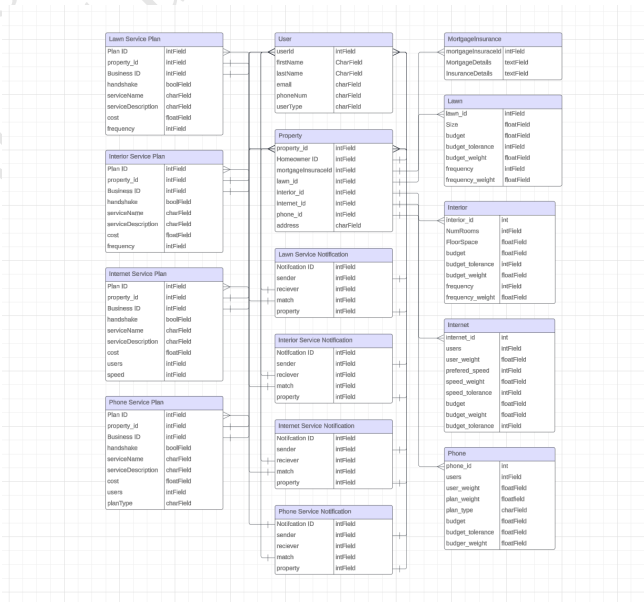


Figure 1: Entity Relationship Diagram

3 TECHNOLOGY STACK

The tech stack chosen for the development of the iCare project plays an essential role in the functionality, shape, and performance of the system. This section will give an overview of the key technologies utilized to build iCare, highlighting their strengths, compatibility, and contributions.

3.1 Development Environment

The development environment for the iCare project will be centered on Venv, VScode, and git. Venv or a virtual environment will be used to create an isolated Python development environment, this is essential for dependency management and consistency across systems. VScode will serve as the primary code editor, it offers a range of extensions for ease of development. Meanwhile, Git will be used to facilitate collaboration among team members as well as version control and file backup. Together these tools provide a foundation for streamlined, collaborative, and scalable software development for iCare.

3.2 Frontend Stack

The frontend stack of the iCare project will be built with React, Vite, and Material-UI. React is a JavaScript library famous for its component-based approach to frontend design, this will allow for a dynamic and interactive UX/UI. Vite is a modern build tool got web-dev, it enhances the development process with its fast build times and instant server startup. Additionally, Material-UI provides a large collection of predesign components and styling options, allowing for swift implementation and consistent and visually appealing UI components. By combining React with Vite and Material-UI, the iCare frontend will deliver a responsive, performant, and visually appealing user experience.

3.3 Backend Stack

The backend stack for the iCare project is centered around the high-level Python web framework, Django, Django Rest Framework (DRF), CORS headers, and SQLite. Django provides a robust foundation for building secure and scalable web apps. Paired with the DRF, which offers tools for building RESTful APIs, we will be able to create endpoints to handle data transmission from and frontend and backend components of iCare. CORS headers are essential in managing cross-origin resource sharing and ensuring secure data transfer between frontend and backend components. SQLite will serve as a lightweight and efficient relational DBMS, enabling seamless data storage and retrieval for the iCare application. With these technologies, the iCare backend stack is reliable, performant, and secure.

4 TIMELINE

4.0.1 Phase I. Phase I will commence at the beginning of the 2024 Spring semester (January 10th) and be complete on February 15th. This is where brainstorming and the design of the database schema will take place. E/R design and phase I report will be completed before february 15th

4.0.2 Phase II. Phase II will commence at the end of Phase I (February 15th). This is where we'll begin to create our application using our tech stack, a functioning backend built in django and an interactive frontend built in react. At the end of this phase (March 19th), we should have a prototype that displays some of our frontend functionality, a backend that can effectively store and retrieve data and the mathematical scaffolding for the matching function that we will be working to implement in phase III.

4.0.3 Phase III. After successfully connecting our frontend and backend into a functioning prototype, we'll take the time to begin implementing the matching function in the backend of the project. Towards the end of this phase (April 19th), we'll have a functional prototype that utilizes the matching function to send notifications to users when matches are made.

4.0.4 Phase IV. Phase IV (April 30th) is where we'll have a final report, as well as a fully functional prototype ready to be exhibited.

5 DATABASE STRUCTURE

The iCare database is designed with the intent to manage essential information related to the operations and services provided by the iCare web app. Structured into 4 main groups of tables - users, plans, notifications and properties. Each group plays a key role in facilitating various aspects of iCares core features, user management, service plans, and property details. The iCare database ensures efficient data management and streamlined access to crucial information.

5.1 Users

The user table group in the iCare database encompasses homeowner and business tables, both built upon Django's abstract base user model. Users are divided into two main categories: homeowners and businesses, each with distinct permissions for interacting with other database models.

For homeowners, these permissions are for creating, editing, and deleting various model instances linked to their properties via foreign key, such as managing lawn care and phone needs. In contrast, businesses are limited to adding, editing, or deleting service plan model instances, aligning with their role as service providers within iCare.

This structure ensures that users can efficiently carry out their tasks while maintaining data integrity and security, contributing to the overall effectiveness of iCare's operations.

5.2 Plans

To complement the matching function of the iCare system, after a successful pairing has been made between a property and a business, a service plan instance is created, detailing the services provided by the business and linking the property to the business entity via a foreign key. This streamlines communication and ensures clarity in service delivery, formalizing the agreement between the homeowner and the business within the iCare system.

5.3 Properties

Homeowner properties play a pivotal role within the iCare system, enabling homeowners to securely store crucial information about their residences. Each property is linked to its respective homeowner through a foreign key association. This linkage extends to various sub-property models, including lawn care, phone services, internet connectivity, and interior services.

These sub-property models serve as repositories for all pertinent information necessary for the recommendation engine to analyze homeowner needs effectively and propose suitable matches. For

each sub-property model, essential details such as lawn size or internet user requirements are stored, along with designated budgets and tolerance levels. Additionally, specific fields are assigned weights, enhancing the recommendation engine's ability to tailor matches according to homeowner preferences and priorities.

Utilizing this comprehensive dataset, the recommendation engine employs algorithms to analyze homeowner requirements accurately and determine optimal matches for each property. By considering budget constraints, tolerance levels, and weighted criteria, the engine ensures precise and personalized recommendations, enhancing homeowner satisfaction.

5.4 Notifications

The backend schema of iCare incorporates five types of notifications, each serving specific communication purposes within the platform.

Base Notification: This notification type forms the foundation for communication between properties and businesses with existing matches. It enables seamless messaging and updates between parties involved in ongoing service arrangements.

1) **Lawn Plan Notification:** Dedicated to lawn care services, this notification signals when a better match is identified for a property's lawn maintenance plan. It includes a reference to the newly matched lawn service plan, facilitating frontend communication and decision-making for homeowners.

2) **Interior Plan Notification:** Similarly, this notification type pertains to interior service plans, such as cleaning or maintenance services. It notifies homeowners of improved matches for interior service plans, with relevant references to the matched plan for frontend integration.

3) **Internet Plan Notification:** For connectivity-related services, such as internet plans, this notification informs homeowners of superior matches for their internet service requirements. It incorporates references to the newly matched internet service plan, aiding frontend interactions and selections.

4) **Phone Plan Notification:** Completing the suite of service plan notifications, this type focuses on phone service plans. It alerts homeowners to optimized matches for their phone service needs and includes references to the corresponding service plans for frontend utilization.

The inclusion of references to matched service plans in these notifications is essential for frontend functionality. By providing clear guidance on improved matches, homeowners can make informed decisions regarding service selection, enhancing their overall experience with iCare.

6 MATCHING ENGINE

To get the best match for the customer, we'll have a mathematical equation that weighs the users' specific plan needs (budget, frequency, etc.) along with the current plans/offers that the businesses within the database have.

We decided to create these mathematical models to provide clarity, precision, and confidence in decision-making processes. Having a standard equation that can allow flexibility depending on the user's wants/needs will help significantly in the matching process.

Note: The following models are subject to change based on feedback from instructors. These are preliminary mathematical models and their accuracy is not guaranteed. We aim to refine these models as we work on the project and receive feedback for our formulas.

6.1 Mathematical Model for Lawn and Interior services

The score for a lawn or interior plan can be calculated using the following formula:

$$\text{Score}_{\text{lawn}} = \text{Cost}_{\text{norm}} \times \text{CostWeight} + \text{Frequency}_{\text{norm}} \times \text{FrequencyWeight}$$

where:

$$\text{Cost}_{\text{norm}} = \max(0, \min(1, 1 - \frac{\text{cost} \times \text{frequency}}{\text{budget} + (\text{budget} \times \text{budget_tolerance})}))$$

$$\text{Frequency}_{\text{norm}} = \max(0, \min(1, 1 - \frac{|\text{frequency} - \text{desired_frequency}|}{\text{desired_frequency}}))$$

CostWeight : Weight assigned to the cost factor

FrequencyWeight : Weight assigned to the frequency factor

6.1.1 Implementing the Model. To successfully match the customer with the best lawn care service, we'll use the function to grab the customer's budget, the business' cost, and the customer's wants for frequency of service.

6.2 Phone Service Plan Score Function

The score for a phone plan can be calculated using the following formula:

$$\text{Score}_{\text{phone}} = \text{Cost}_{\text{norm}} \times \text{CW} + \text{User}_{\text{norm}} \times \text{UW} + \text{Plan}_{\text{norm}} \times \text{PW}$$

where:

$$\text{Cost}_{\text{norm}} = \max(0, \min(1, 1 - \frac{\text{cost}}{\text{budget} + (\text{budget} \times \text{budget_tolerance})}))$$

$$\text{User}_{\text{norm}} = \max(0, \min(1, 1 - \frac{|\text{p_users} - \text{users}|}{\text{users}}))$$

$$\text{Plan}_{\text{norm}} = \begin{cases} 1 & \text{if plan} == \text{p_plan} \\ 0 & \text{otherwise} \end{cases}$$

CW : Weight assigned to the cost factor

UW : Weight assigned to the user factor

PW : Weight assigned to the plan factor

6.2.1 Implementing the Model. With the above equation, we obtain a score that can range from negative to positive values depending on the tolerance level specified to the user and other factors such as the budget and the cost of the plan provided by the business. In general, the higher the number, the more "aligned" the score is with the user's preference. The lower or negative scores correlate with not having as good an alignment with what the user wants.

6.3 Internet Service Plan Score Function

The score for an internet plan can be calculated using the following formula:

$$\text{Score}_{\text{internet}} = \text{Cost}_{\text{norm}} \times \text{BW} + \text{User}_{\text{norm}} \times \text{UW} + \text{Speed}_{\text{norm}} \times \text{SW}$$

where:

$$\text{Cost}_{\text{norm}} = \max(0, \min(1, 1 - \frac{\text{cost}}{\text{budget} - (\text{budget} \times \text{budget_tol})}))$$

$$\text{User}_{\text{norm}} = \max(0, \min(1, 1 - \frac{|\text{p_users} - \text{users}|}{\text{users}}))$$

$$\text{Speed}_{\text{norm}} = \max(0, \min(1, 1 - \frac{|\text{p_speed} - \text{speed}|}{\text{speed}}))$$

BW : Weight assigned to the budget factor

UW : Weight assigned to the user factor

SW : Weight assigned to the speed factor

6.3.1 Implementing the Model. First, to implement the internet plan scoring model, identify the user's preferences for cost, internet speed, and the number of devices/users. Then, gather information about the internet plans offered by different providers, including the cost, internet speed, and user support.

Next, assign weights to each factor based on the user's priorities, such as cost, speed, and user support. Use the provided mathematical model to calculate a score for each plan, considering the plan's cost, speed, and user support concerning the user's preferences and applying the assigned weights.

Next, compare the scores of different plans to determine which plan best matches the user's preferences and requirements. Finally, recommend the internet plan with the highest score to the user, as it will likely offer the best combination of cost, speed, and user support according to their preferences. Adjust the model as needed based on feedback or changes in user priorities.

6.4 Matching Function

After data is received from the user, we'll invoke our matching function that will make sure the correct data arrives in the correct location.

We'll gather data from the database that the user submits. Once all the required information is present, we'll call the specific Python function needed for the service. After calling the Python function, we'll find the best plans that are available for the user. This process is currently planned to execute in the backend.

7 DATA INPUT

Obtaining data from the user can happen in two ways. First, if they already know their needs (such as lawn size, phone plan, internet plan, etc.), they'll have the option to manually insert that data into a form.

This straightforward approach allows users who are confident about their requirements to swiftly provide the necessary information, streamlining the process.

If the user doesn't have that information readily available, we'll guide them through two links designed to assist them in gathering the required details. One link will direct them to a tool for measuring the dimensions of their lawn accurately, ensuring precise data input for tailored recommendations. The other link will lead them to a series of questions aimed at understanding their preferences and usage patterns, facilitating personalized recommendations for internet or phone plans.

These procedures serve to support users who may be uncertain about their specific needs, offering them clarity and direction in the

data collection process. Once the user has obtained the requisite information, they will proceed to input it into the form, ensuring completeness and accuracy.

After the information is in the form, the user will give their "importance" to each of the variables within the given service. As mentioned in Section 6, these importance ratings will be utilized to fine-tune the recommendation algorithm, ensuring that the resulting suggestions align closely with the user's priorities and preferences.

8 BACKEND FUNCTIONALITY

The backend functionality of iCare serves as the engine that powers the platform's rich and unique features, leveraging the underlying database schema to deliver seamless user experiences and efficient service management. This section provides an in-depth exploration of the key components and functionalities of iCare's backend architecture.

8.1 Scoring Queries

The scoring queries lies at the heart of iCare's matchmaking algorithm, playing a vital role in selecting the best-matched service plans for a given property. This subsection delves into the mechanics of the scoring query and its significance in facilitating personalized and efficient matchmaking processes.

The scoring query operates by leveraging mathematical functions and property information to evaluate the compatibility of service plans with a given property. The process begins by retrieving the relevant property aspect associated with the plan type under consideration, such as lawn or internet.

Once the property aspect is determined, the scoring query retrieves all existing plans of the corresponding type from the database. These plans are then fed into the scoring function, along with the relevant property information, to calculate a score for each plan based on its compatibility with the property.

The scoring function takes into account various factors, including but not limited to, the frequency of the service, the price of a plan and budget of a property, and the specific weights assigned to each factor.

The scores and corresponding plans are organized into a dictionary and sorted in descending order based on the calculated scores. This ensures that the top-rated plans, which offer the best match for the property, are prioritized for consideration.

To optimize efficiency and relevance, the scoring query typically selects the top 5 plans with the highest scores to be returned as potential matches for the property. This streamlined approach allows iCare to present property owners with a curated selection of service plans that align closely with their needs and preferences.

By employing the scoring query within its matchmaking algorithm, iCare enhances user satisfaction by facilitating informed decision-making and maximizing the likelihood of successful matches between property owners and service providers.

8.2 Plan Retrieval Queries

Plan retrieval queries are instrumental in fetching relevant service plans for both homeowners and business accounts in iCare. These

queries play a crucial role in presenting users with a curated selection of plans that align with their preferences and requirements. The plan retrieval queries can be categorized into two groups: homeowner plan retrieval and business plan retrieval.

8.2.1 Homeowner Plan Retrieval. The homeowner plan retrieval query is responsible for fetching active plans associated with a specific property. This query filters through the plans to extract those that match the property ID and have the handshake field set to true, indicating mutual agreement between the homeowner and the business. The retrieved plans are serialized and returned to the homeowner for consideration.

8.2.2 Business Plan Retrieval. For business accounts, there are multiple plan retrieval queries tailored to different scenarios:

All Plan Retrieval Query for Businesses: This query fetches plans associated with a specific business account. Similar to the homeowner plan retrieval query, it filters plans based on the user ID matching the business ID.

Pending Plan Retrieval Query for Businesses: This query retrieves plans that are pending approval from the business account. It filters plans based on the user ID matching the business ID and selects plans where the property is not null but the handshake field is false, indicating pending approval. These plans are serialized and presented to the business for review and approval.

Active Plan Retrieval Query for Businesses: The final plan retrieval query for businesses fetches active plans associated with the business account. Similar to the previous queries, it filters plans based on the user ID matching the business ID and selects plans where the property is not null and the handshake field is true, indicating active agreements. These active plans are serialized and returned for the business to manage and monitor.

By executing these plan retrieval queries, iCare ensures that both homeowners and business accounts have access to relevant and up-to-date service plans that meet their specific needs and preferences. This streamlined approach enhances user satisfaction and facilitates efficient service management and decision-making.

8.3 Budget Query

The budget query is instrumental in providing users with insights into their property's financial status within iCare. This query performs two primary functions: collecting the active budget of each property detail and summing it up to calculate a total property budget, and gathering all active costs from plans in which the property is currently enrolled.

Upon execution, the budget query retrieves the active budget allocated to each property detail. These individual budgets are then aggregated to calculate the total property budget, providing users with a comprehensive overview of their financial obligations within iCare.

In addition to collecting the property budget, the query also gathers information on the active costs associated with plans that the property is currently enrolled in.

By consolidating these two figures—the total property budget and the active costs from enrolled plans—the budget query enables users to assess their property's financial health and make informed

decisions regarding budget allocation and expenditure management within iCare.

8.4 Better Match Notification Query

The Better Match Notification Query plays a crucial role in iCare's functionality by facilitating the notification process for homeowners when their property is matched with a better-suited service plan. This subsection outlines the workflow and logic behind this query, detailing how it identifies and notifies homeowners of potential better matches.

Upon the creation of a new service plan, the Better Match Notification Query is triggered to evaluate the compatibility of the plan with existing properties within iCare. Using the mathematical models previously established, each property is scored against the newly created plan to assess the degree of alignment between the plan specifics and property requirements.

If a perfect match is identified, where the plan details precisely match the property requirements, the plan is immediately paired with the corresponding property exhibiting this quality. However, in cases where no perfect match is found, the query proceeds to identify the property with the highest score whose current plan is of a lesser score.

Once a potential better match is identified, the respective property is promptly notified of the offer through the iCare platform. Homeowners are provided with the option to either accept or deny the offer, empowering them to make informed decisions regarding their property's service plans.

By leveraging the Better Match Notification Query, iCare ensures that homeowners are promptly informed of potential opportunities to optimize their property's service plans. This proactive approach not only enhances user satisfaction but also facilitates efficient decision-making and resource allocation within the iCare ecosystem.

9 FRONT END DESIGN

Using the MUI library, our front end has a simple and intuitive feel. MUI offers numerous React components that are easy to implement within a React project.

9.1 Login

The login process is the gateway for users to access the iCare web app securely. Upon entering the app, users are greeted with the login page, where they are required to authenticate their credentials to gain access to the platform.

In iCare, user authentication is a paramount concern, and stringent measures are in place to ensure the security and integrity of user accounts. User credentials undergo thorough verification to authenticate users and prevent unauthorized access to the platform.

The login process is designed with user experience in mind, featuring intuitive prompts and clear instructions to guide users through authentication seamlessly. In case of authentication errors or issues, users are provided with helpful error messages and support resources to resolve any login-related issues promptly.

By integrating robust authentication mechanisms, proactive session management, and user-friendly design principles, iCare ensures that users can access the platform securely and conveniently, fostering trust and confidence in the app's capabilities.

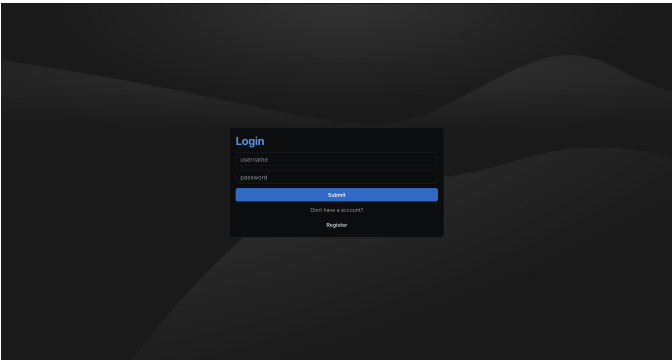


Figure 2: Login Page

9.2 Registration

The registration process in iCare is designed to onboard new users seamlessly and efficiently. If a user does not have an existing account, they can access the registration view to create one.

During registration, users are prompted to distinguish between two primary user roles: Homeowner or Business owner. This distinction directs users to a specific view tailored to their chosen role, offering a unique experience that aligns with their needs and objectives within iCare.

As illustrated further in this report, different user roles are associated with distinct views and functionalities within iCare. Whether accessing homeowner-specific tools for property management or business-focused features for service provision, users can expect a tailored experience that caters to their unique requirements.

By seamlessly integrating role-based distinctions and user-centric design principles, iCare ensures that users can easily navigate the registration process and access the functionalities that matter most to them.

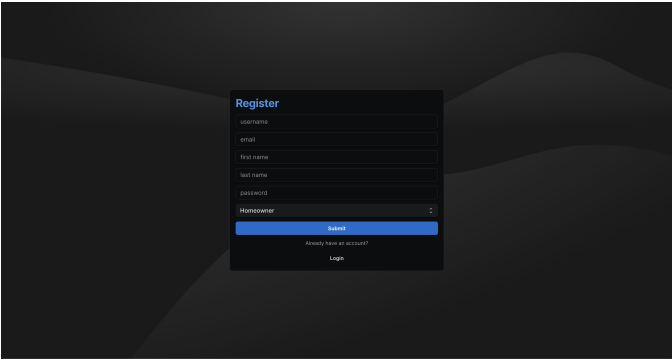


Figure 3: Registration Page

9.3 Dashboard

Upon completing the authentication process, users are directed to the Dashboard, a central hub where they can access key information and manage their property's service plans efficiently.

The Dashboard provides users with an overview of their current active plans, including details such as service provider information, plan specifics, and billing status. Additionally, users can monitor their budget allocation through a visually intuitive circular progress component, which illustrates expenditure and available funds. This visual representation serves as a valuable budgeting tool, enabling users to make informed decisions about additional services or plan upgrades.

Users with multiple properties can easily navigate between them using the property selection option, ensuring a seamless experience for property management.

In addition to viewing plan details, users can interact with the Dashboard to initiate communication with service providers through a convenient contact form. The navigation bar on the side offers quick access to other sections of the platform, including the Profile page for creating reading updating, and deleting different property profiles, the Matchmaker page where users can generate new matches, a notifications dropdown that displays all of a user's notifications and the Logout button for secure session termination.

The Dashboard's user-friendly interface and comprehensive features empower users to manage their property's service portfolio effectively while providing insights and tools for budget optimization. With customizable options and intuitive navigation, the Dashboard offers a tailored experience that enhances user satisfaction and productivity within the iCare platform.

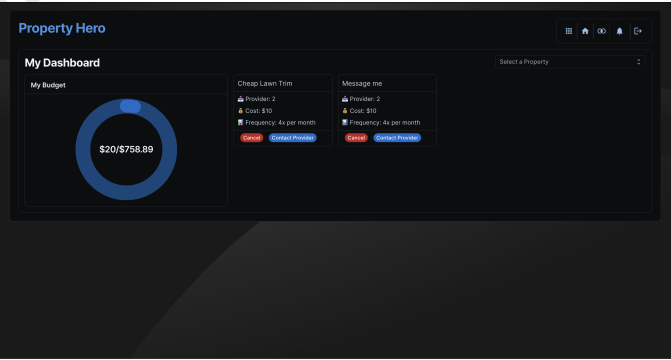


Figure 4: Dashboard

9.4 Property Profile

The Property Profile page is a vital component of iCare's frontend, empowering users to input and manage essential details about their properties to optimize service matching and management.

At the core of the Profile page is the ability for users to upload comprehensive property information, including lawn size, budget constraints, and other customizable data points. Users have a wide range of options to customize their profiles, ensuring that the information provided accurately reflects their property's unique characteristics and service needs. This data forms the foundation

for iCare’s matching function, enabling the platform to generate tailored service provider matches that align closely with users’ preferences and requirements.

In addition to inputting property information, users can seamlessly add or remove properties as needed, offering flexibility and control over their property portfolio within iCare. This functionality facilitates efficient property management, allowing users to adjust their profiles to reflect changes in their real estate holdings or service preferences.

Furthermore, the Profile page integrates seamlessly with other iCare features, such as budget calculations and notification settings, leveraging property profile data to provide users with a holistic and personalized experience. The Property Profile page is crucial in optimizing user satisfaction and service efficiency within the iCare platform by centralizing property information and customization options.

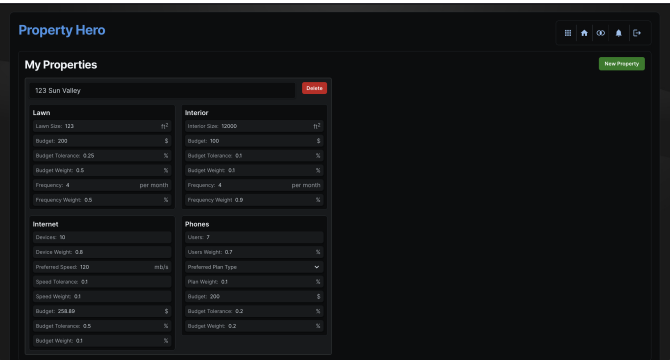


Figure 5: Property Profile

9.5 Match Maker

The Match Maker section empowers users to discover and evaluate potential matches for their property’s service needs within iCare. Before generating matches, users can specify their preferences by selecting which services they would like to match on. This is done through a list of checkboxes that indicate the 4 different service types. This ensures that the results align exactly with their needs.

Once preferences are set, users can generate matches and explore the results presented to them. Match details include the match score, service name and description, specific plan details, and an option to accept the offer if it aligns with their interests. Users can review match details comprehensively and make informed decisions based on their preferences and priorities. These potential matches are displayed in an accordion for easy readability of the service name, service type, and match score. Once an accordion section is expanded the service description, specific plan details, and the option to accept a plan are displayed. This design provides an intuitive feel to the matchmaker page.

Upon accepting an offer, the respective business account offering the service is notified of a pending plan that requires approval. Once approved by the business account, a match is generated, finalizing the service arrangement between the homeowner and the service provider.

Throughout the match-making process, users have the flexibility to interact with potential matches and explore their options thoroughly. Whether accepting offers that meet their criteria or exploring alternative matches, users can engage with the Match Maker section to find the best-fit service providers for their property needs.

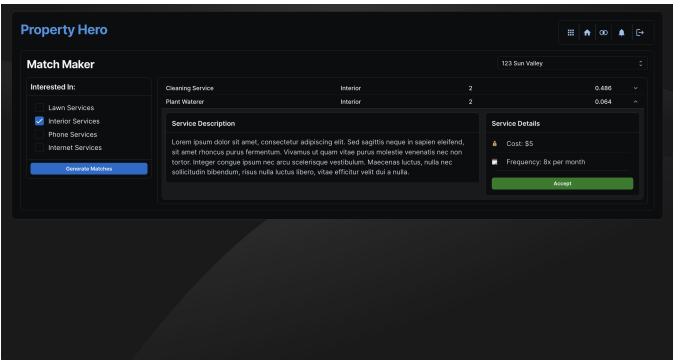


Figure 6: Matchmaker

9.6 Business Dashboard

The Business Dashboard in iCare offers businesses a comprehensive platform to manage their service plans and interact with properties effectively. Upon creating an account, businesses are presented with a tailored view that facilitates seamless plan management and engagement with potential customers.

Within the Business Dashboard, businesses can create new plans and view their existing plans effortlessly. The dashboard features three plan categories to help businesses organize and monitor their offerings: Active plans, Pending plans, and All plans. Active plans showcase plans with active property subscriptions, while Pending plans display plans awaiting approval from interested properties. In the future, businesses will have the capability to access specific property details to make informed decisions on accepting properties as customers. The All plans category provides an overview of all plans, regardless of their status.

To create plans, businesses can select the desired plan type, triggering dynamic updates to the form to display relevant fields. Upon form submission, the newly created plan appears in the plan list for easy reference. Additionally, businesses have the flexibility to remove plans from the dashboard if they no longer wish to offer them.

The Business Dashboard facilitates seamless interaction between businesses and properties. Businesses can review pending plan requests from properties and respond accordingly, leveraging property details to make informed decisions about customer acceptance. The user interface design of the dashboard prioritizes usability and efficiency, ensuring that businesses can access key functionalities and take decisive actions with minimal effort.

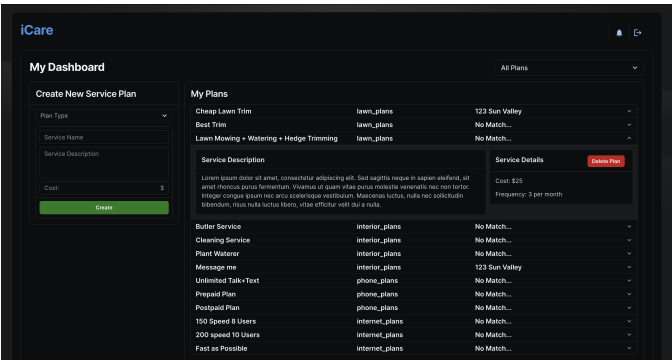


Figure 7: Business Dashboard

9.7 Future Enhancements

While the current version of iCare boasts a comprehensive set of core features, there is still ample room for growth and improvement. As we look to the future, several areas stand out for potential enhancements and optimizations.

9.7.1 *Landing Page.* The landing page serves as the initial point of contact for users and plays a crucial role in introducing them to iCare and guiding them through the account creation process. To create a user-friendly experience, the landing page will feature compelling content and messaging designed to resonate with users and communicate the value proposition of iCare effectively.

9.7.2 *User Journey Mapping.* User journey mapping is a critical step in guiding users through the onboarding process effectively and ensuring they are comfortable with iCare’s features and interface. Upon initial login, users will be greeted with an interactive tutorial designed to familiarize them with iCare’s functionality and purpose.

9.7.3 *Quality of Life.* To improve the overall user experience, iCare will implement quality-of-life fixes aimed at enhancing usability and clarity for users. Two key areas of focus are the addition of tooltips to buttons and icons, and the incorporation of more helper text throughout the platform.

The implementation of tooltips will provide users with contextual information and guidance when interacting with buttons and icons within the iCare interface. Tooltips will offer concise explanations of button functions, icon meanings, and actions, enhancing clarity and usability. For example, hovering over a service icon may display a tooltip explaining its purpose or available actions.

In addition to tooltips, iCare will introduce more helper text throughout the platform to provide users with additional guidance and support. Helper text will be strategically to assist users in understanding iCare’s functionalities and navigating the platform effectively.

9.7.4 *Notification Enhancement.* Expanding the notification system to provide more detailed information about matched plans and properties is essential for enhancing user engagement and decision-making in iCare. The current implementation, while functional, lacks crucial details that are necessary for informing users and aiding them in making the right decisions for their needs.

Moving forward, notifications will include comprehensive details about matched plans, allowing users to make informed decisions about accepting or rejecting offers. This will include information such as plan name, service provider, plan description, pricing, and any relevant terms or conditions. By providing users with a complete overview of matched plans, notifications enable users to evaluate offers effectively and choose the best option for their requirements.

10 MATHEMATICAL MODELS IN HIND SIGHT

10.1 Review of Models

As mentioned in the Phase II report, we developed mathematical models for determining whether or not a given customers’ wants/needs are appropriate for a business that is offering their services on iCare. There are many ways in which one can implement these models, however, the problem of distance is one that needs to be taken into account.

10.2 Example of Distance

Say there’s a customer who wants an internet plan that is 75mbps and can handle up to 4 devices at once. Their monthly budget is \$100.

Now, say there’s a business owner who’s offering at 75mbps plan that can handle up to 4 devices at once, but they’re offering it at \$200 per month.

If the business owner has the only plan on the site or the only internet plan, the customer has but no choice to take that plan.

The distance between the budgets can make the customer unhappy, but due to the business being the only supplier, the customer must take the plan.

10.3 Ideas for Fixing the Distance Problem

The distance problem is going to be apparent in future plans for this project.

How can one fix the problem?

The obvious fix is to create another mathematical model that can take into account the distance that is created. However, this will be no easy task.

Perfecting a mathematical model can take a numerous amount of trial and error, and it’s probably best to get help from a mathematical source.

10.4 Distance Problem Summary

There is no easy fix for this problem. The answer lies within the economical environment of the businesses and customers.

Determining a new equation can be a future task in order to create a more accurate matchmaking system with iCare.