

OROWIDE Properties Corporation: A Web-Based Property Management System

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CHAPTER I

INTRODUCTION

1. Background of the Study

Historically, property management in the real estate industry heavily relied on manual processes, often involving tasks such as manual property listings, spreadsheet tracking, and physical file management. These conventional methods, while once the norm, are increasingly recognized as inefficient and prone to error, particularly as the volume of transactions and data continues to grow (Castle, 2024).

The emergence of Property Management Systems (PMS) marks a shift from traditional manual methods to more modern and automated solutions. As technology advances, every industrial sector has continued to innovate and scale. Several property technologies have fast-tracked nominal developments and accelerated the growth of the Real Estate market. (Udo. M, Obinna.W, 2022). Technology has revolutionized the real estate industry, streamlining operations and enhancing overall customer experiences. (Magazine. A, 2023).

The importance of this project will have a potential benefit that can bring to the real estate company. Through the development of the property management system, research and interviews have been conducted on the challenges faced by the administrators and agents in their day-to-day operations. This includes the analysis of the practices currently in use, pain points identified, and study of existing web management systems in the market.

Orowide Properties Corporation is a new type of company established in 2023, emerged as a player in the real estate industry. With a diverse portfolio of services that includes real estate development, realty, brokerage, construction building, and legal documentation services. One of the challenges faced by the Orowide Properties Corporation involves time-consuming manual processes, the manual monitoring itself using Excel that is prone to errors, and as soon as there are many transactions, it cannot be monitored itself. Similarly, this traditional mode is not only inefficient, it will seriously affect the efficiency of project management and damage the economic benefit of enterprises. (Li. B, 2023).

The proposed system intends to provide a customized solution, addressing these challenges and enhancing overall productivity through understanding the particular needs of property managers and agents. The successful implementation of the property management system has the potential to significantly transform real estate companies' operations by simplifying administrative tasks, improving communication and collaboration, and increasing the efficiency of agents. Thus, this project will provide a solution for companies that are still using traditional ways of operating their real estate businesses like Orowide Properties Corporation in Cagayan De Oro City by developing a web-based property management system. This project will document the development process, features, and benefits of the Orowide Properties Corporation solution and discuss its potential impact on assisting administrators and agents in achieving their goals more effectively in the real estate industry.

2. Statement of the Problem

Orowide Properties Corporation faces several challenges in its business processes due to the reliance on Excel as the main system, which is prone to errors. The specific problems to be addressed are:

i. Agents Application:

Agents in the company are using manual or paper-based applications which are time-consuming, prone to errors, inefficient in data management, and pose significant security and compliance risks.

ii. Property Listing:

Agents list properties manually and post them on various social media platforms, leading to difficulties in tracking sales. Without a systematized method, agents struggle to know if a property is sold on another platform, complicating client interactions.

iii. Project Listing Management:

Administrators face challenges in managing agents and project listings, including rentals, brokerage, and development, while accurately calculating agent commissions, hindering efficiency and revenue tracking.

iv. Executive Supervision:

Executive leadership lacks adequate tools to monitor overall project sales and the monthly performance of top agents, hindering strategic decision-making and timely intervention in key areas of operation.

v. Data Monitoring and Management:

Staff members experience challenges in monitoring the flow of data into and out of the system, leading to inefficiencies and potential data inaccuracies, risking operational integrity and decision-making processes.

3. Objectives of the Study

This project aims to develop a property management system to automate the current workflow and processes within their real-estate company. The following are the specific objectives of this project:

i. Design and implement user registration module that assign specific privilege levels to different types of users within the property management system.

ii. Design an interface for agents to effectively display property listings to customers, ensuring accessibility to available properties and complete listing details.

iii. Develop a module for administrators that enables them to manage all data for agents and project listings, including rental, brokerage, and development projects, and to manipulate the commission given to agents in specific project deals.

iv. Create a module for executives that will enable them to effectively view and monitor the overall sales on each project monthly, view the top agents of the month, and have access to all relevant data.

v. Provide a feature for staff to effectively monitor the flow of data into and out of the system.

4. Scope and Limitations of the Study

The property management system will provide administrators and agents with a user-friendly interface that allows them to access and update property listings, manage client inquiries and appointments, track leads and sales, and generate summary reports for the developer, brokerage, and as well as moderator to support all sales, inventory and simplify the overall workflow, reduces administrative burden, and facilitates better communication and coordination within the company.

However, certain limitations are acknowledged. Firstly, the successful implementation of the system depends on the existing technology infrastructure of Orowide Properties Corporation. This reliance on pre-existing technology may pose challenges in terms of compatibility and scalability. Moreover, the system's internet-dependency, being a web application, introduces vulnerability to disruptions in connectivity. Additionally, the payment transaction is limited to cash basis transactions exclusively, excluding other modes of payment. Furthermore, while designed for Orowide Properties Corporation, the system's applicability may not extend seamlessly to other real estate entities without requiring customization. An additional constraint is the physical submission of important documents, such as land titles, to the executives, which adds a layer of manual processing to an otherwise digital system. These limitations underscore the need for thorough planning and potential adaptations to ensure the system's effectiveness and compatibility with broader industry standards.

5. Significance of the Study

The proposed project will benefit the Orowide Properties Corporation specifically the following group of individuals:

i. Administrators

This proposed project will assist the administrators in Orowide Properties Corporation in monitoring projects, clients(developers, property owners), and tracking the agent's sales. These will streamline the operations and lessen the human effort and reduce error.

ii. Agents

This proposed project will provide agents with easy access to project listings, significantly enhance their ability to serve clients effectively, save time, seize sale opportunities, and boost overall productivity in the company.

iii. Staff

The proposed project will provide the staff with seamless project monitoring allowing them to audit more efficiently and effectively.

iv. Executives

The proposed project will provide the executives more control and facilitate decision-making processes by offering insights into sales performance. This enhanced control and access to valuable data will empower executives to make informed strategic decisions that can drive business growth and ensure the company remains competitive in the real estate industry.

v. Clients

The implementation of this project will reduce the time of watching the listing one-by-one via 'group-chat', by making this feature, the customers can properly decide on choosing the property that will suit their needs.

CHAPTER II

REVIEW OF RELATED LITERATURE AND STUDIES

1. Review of Related Concept

i. Overview of Real Estate Property Management Systems

Real estate, globally, has attracted huge financial investment in recent years. Since 2012, real estate technology-based companies have raised almost \$6.4 billion in funding across 817 deals in the United States alone (Waxman, 2018). With the introduction of recent digital technologies, global industries have transformed. The real estate industry is no exception, as it tries to keep up with global advancements. However, the real estate industry is currently trailing behind the global technology curve and requires improvement to compete with its industrial competitors (Ullah et al., 2019).

Constant changes in the economic environment of development companies, as well as a large number of impact factors on the economic results of these companies, complicate the management processes of their economic potential formation and growth. To achieve stable economic potential growth for a real estate company, it is necessary to constantly improve methods and approaches to managing its development (Rosynskyi, 2023).

Moreover, the regrets among customers of real estate are increasing mainly due to the poor quality of information provided to them through online means and platforms. Adoption of digital disruptive technologies and innovative methods can help real estate transform its traditional rigid approach to a more up to date, advanced and smart approach (Ullah et al., 2019).

ii. Real Estate Technology and Innovations

Digital technologies are leading the way in global innovation and disrupting many different industries in specialized domains like nutrigenomics, quantum biology, and nanotechnology to commonplace recreational activities and daily pursuits like cell phones. Disruptive digital technologies (DDTs), along with smart devices, are prevalent (Iivari et al., 2020; Low et al., 2020). As the world is experiencing digital disruptions; industries such as real estate lag behind the technology curve by more than five years, and adoption of digital technologies is inadequate (Shaw, 2018).

The real estate industry has the potential to be disrupted, but there are a lot of obstacles in the way, mostly because of the conventional views of real estate managers. But if this industry is going to follow Industry 4.0 and become a smart industry, then something has to change (Ullah and Sepasgozar, 2020). Therefore, research into and exploration of the possibilities of various technologies in the real estate business are imperative. In order to address this important but neglected topic, it would also be beneficial to look into the obstacles to their adoption and provide a mitigation approach. All parties involved will benefit from increased productivity and better service quality as a result (Ullah et al., 2018).

2. Review of Related System

Examples of web-based real estate management are the following: Real Estate Management System by Arunkumar et al., (2023). The Aim of this project is to develop a real estate web application using JAVA and SQL. This is a website where users can register then login and manage their property. This website helps the process and removes the overhead documents. The availability of websites makes the process more user friendly and makes it more effective. The system's key features are allowing the buyers to search for houses by features or address. It provides functionality for the seller, authorizing them to log into the system and add new advertisements or delete existing ones. For this each user is provided a login account with login ID and password (Arunkumar et al., 2023).

Real Estate Management System by Patil et al. (2023). This is an innovative software solution designed to enhance the management and operational processes within the real estate industry. The system's key features include an intelligent property listing module that allows real estate agents to create and update property listings with detailed descriptions, images, and pricing information. The tenant management module enables seamless onboarding, lease agreement management, rent collection, and communication with tenants. REMS also provides a comprehensive financial tracking component, which automates rent calculation, generates invoices, tracks expenses, and offers detailed financial reports (Patil et al., 2023).

Real Estate Management System by Sedamkar et al. (2023) helps property managers and real estate agents manage their properties and listings more efficiently through these system features such as property search, online payments, maintenance requests, and lease management, among others. The system will also allow property owners to register and post their property details, such as address, number of bedrooms, bathrooms, rent or lease, and document registration number. Registered users will be able to search for properties based on location, price, size, and other parameters (Sedamkar et al., 2023).

Real Estate Management System by Deepika et al. (2022) minimizes the problem arising in the existing manual system and it eliminates the human errors to zero level and improve property functions and to regulate and change property through these system features such as post property details which It contains information about the land Id, owner name, address, description, date, advance. The post land details are stored in the database. The stored information maintained by the land owner. Search apartment and land features allow the customer to view the details of apartment id, land id, size in square feet, rent per month, advance amount, floor details and other detailed description. View request from user feature contains information about the customer id, customer name, address, land id, owner name, phone no. The requested information from the user side should be stored in the database. The stored information maintained by the property owner (Deepika et al., 2022).

3. Effectiveness

According to Arunkumar et al., (2023), The main purpose is to develop this real estate management system project to resolve the issue of both buyer and seller. The seller can submit the property what he wants to sale with a full house or flat detail such as location, area, hall, kitchen, furnished, semi-furnished, price, and all facilities can list in the form, Buyer can search the property according to their budget, location then direct contact to the seller.

The Real Estate Management System enhances efficiency and convenience for both users and administrators. Users can easily find properties that meet their requirements, view their details, and make bookings with a few clicks. Admins can efficiently manage property listings, track bookings, and ensure smooth operations. By implementing a Real Estate Management System, real estate agencies, property owners, and users can experience several benefits. These include improved accessibility to property information, reduced manual paperwork, streamlined booking processes, increased transparency, and enhanced customer satisfaction (Patil et al., 2023). The system facilitates better communication between property owners and users. The system provides a secure environment by implementing appropriate authentication and authorization mechanisms. It ensures the privacy and protection of user data, safeguarding against unauthorized access (Patil et al., 2023). A Real Estate Management System is a valuable tool that revolutionizes the way real estate properties are managed and booked. It brings efficiency, convenience, and improved user experiences to the real estate industry, benefiting all stakeholders involved (Patil et al., 2023).

Real estate management systems can help property managers and real estate agents manage their properties and listings more efficiently, while Python Flask is a popular choice for developing web applications due to its simplicity and flexibility. The literature review highlights the importance of these two topics and provides insights into the benefits and limitations of using real estate management systems and Python Flask for web development (Sedamkar et al., 2023). An advantage of the Slovenian system is that it provides information about public real estate management resources based on one-services. Moreover, the country uses one-stop shops as well as front office/back office. Besides, it has a well-functioning land register and has recently introduced online registration of property rights (including public properties) (Gross & Žróbek, 2015).

4. Challenges and Solutions

There are some important issues in developing the real estate web application. First, the search time should be minimum. Second, the web application should give the services that both buyer and seller want. Third, the web application should have a friendly user interface. These websites provide features like search property, add property and give different offers which will be beneficial to users. But even with these features there are certain required aspects which make these sites limited. There are no search that gives correct information about basic services available from chosen location like displaying the distance of nearest bus stop, railway station, hospital etc. and no flexibility in information retrieval for e.g. listing houses is within the 2Km radius of allocation (Arunkumar et al., 2023).

Specification based searching, this feature provides the related information to the users according to the specification they have provided to the website. Agent notification, once the user is focused on a particular property and clicks the “Confirm” button a mail type message would automatically be sent to the agent who manages the corresponding zone, informing agent about the user’s name, his contact number and email address. Adding property for sale, a user can add his property that he is willing to sell so that it can be viewed by other potential clients focused on similar property. For this purpose the client is supposed to enter not only the location but also pictures and the cost at which he is willing to sell that property. Notifying interested users, whenever new stuff is added, then a mail type notification is automatically sent to all those clients who were interested or were searching for a nearby property. Cart, an added database advantage to the users. The users would be given the feature of adding gripping properties into a cart before making a final

decision. User Map, once a particular area is selected the user can gain needed related information on the basis of geographical factors (Arunkumar et al., 2023).

With the exponential growth of the global real estate market, the need for efficient and automated systems to handle property management tasks has become crucial. REMS addresses these challenges by providing a comprehensive platform that integrates various aspects of real estate management, including property listings, tenant management, financial tracking, and maintenance scheduling. By leveraging technology, we aim to provide a centralized platform that simplifies property management tasks, enhances communication and collaboration, and enables data-driven decision-making. Our project seeks to optimize property performance, reduce operational costs, and improve overall efficiency in the real estate management sector (Patil et al., 2023).

The system's key features include an intelligent property listing module that allows real estate agents to create and update property listings with detailed descriptions, images, and pricing information. The tenant management module enables seamless onboarding, lease agreement management, rent collection, and communication with tenants. REMS also provides a comprehensive financial tracking component, which automates rent calculation, generates invoices, tracks expenses, and offers detailed financial reports. REMS incorporates a maintenance scheduling module, which allows property managers to schedule and track maintenance tasks, assign service providers, and monitor progress. The system can also leverage data analytics to generate insights and predictions related to property performance, market trends, and investment opportunities, empowering users to make informed decisions. (Patil et al., 2023).

The internet is frequently used to share land listings with prospective purchasers. leading to the need for efficient and effective real estate management systems. Whether the listing is provided by a real estate agent, a local newspaper, or a website specifically designed to host the listing, the components of sharing the information are the same (Sedamkar et al., 2023).

The proposed real estate management system using Python Flask will be developed using a combination of HTML, CSS, and JavaScript for the front-end and Flask for the back-end. The system will incorporate a database system, which will store information about properties, including their location, price, size, and amenities, as well as information about property owners and potential tenants. The system will provide features like property search, online payments, maintenance requests, and lease management, among others. The system will also allow property owners to register and post their property details, such as address, number of bedrooms, bathrooms, rent or lease, and document registration number. Registered users will be able to search for properties based on location, price, size, and other parameters (Sedamkar et al., 2023).

CHAPTER III

TECHNICAL BACKGROUND

In the development of the project, the proponents carefully selected a set of tools and technologies to ensure efficient and effective development. This section provides an overview of the critical components of our technical stack:

1. Programming Language and Integrated Development Environment (IDE)

i.PHP

The proponents of the project will be using PHP as the main programming language for this web application since it is an open-source, well-suited programming language for server-side web development which ensures it meets the features of the project. So, most frameworks and libraries are available for free.

PHP supports things like MySQL, Oracle, Sybase, etc. PHP was used because it is by far compatible with servers like Apache, IIS, etc. PHP runs on platforms, such as Windows, Linux, etc. Using PHP to create is very simple because of the easy functions, methods, and syntax of this language. PHP also supports database management systems and other open-source databases (DigitalPugs, 2016).

ii. Visual Studio Code

In the development of the system, the proponents made use of Microsoft Visual Studio Code for encoding the source code of the system in order to be accurate and fast acquisition of data and information. The built-in features of Visual Studio Code allowed us to easily navigate through the codebase and make necessary modifications. Additionally, its support for various programming languages made it an ideal choice for our multi- functional system.

2. Framework

i. Laravel 9

The proponents will use Laravel framework version 9 for developing the proposed system to robust and efficiently structure the algorithms of PHP programming language while programming also helps website developers simplify their development process with clean and reusable code.

Laravel is an open-source backend PHP web framework with expressive, elegant syntax. This framework attempts to take the pain out of development by easing common tasks used in many web projects, such as authentication, routing, sessions, and caching. Laravel is accessible, yet powerful, providing powerful tools needed for large, robust applications (Otwell, 2019).

3. Backend Services and Database

i. MySQL

MySQL will be utilized by the proponents because it is one of the system development-compatible databases that can efficiently store and manage data logic on our databases in the proposed system. MySQL's flexibility and user-friendliness are some of the reasons behind its popularity. Furthermore, its status as an industry standard has fostered a rich pool of resources and skilled developers, ensuring continuous development and ample support for users (Domantas, 2024). The

developer's familiarity with Mysql based on prior experience is a great factor in this choice.

ii. Navicat

The proponents will use Navicat for the MySQL database in the proposed system, it can manage our data efficiently with the use of a graphical interface for database management. Navicat is one more client-side tool that can be used for developing and administering MySQL or MariaDB databases. The most interesting feature of Navicat is that MariaDB and MySQL databases can be connected to this application at the same time simultaneously.

4. Frontend services

i. Bootstrap

The proponents will use the Bootstrap framework for enhancing the system designs which can easily tweak out the designs of the web pages because of the use of provided design templates.

Bootstrap is the most popular framework with an exceptionally vast community, which makes it extremely easy to find what you are looking for in the detailed itemized documentation out there. Developing your website comes easy and intuitive as most of the work is already done. Once you learn the grid system and the CSS classes of Bootstrap, you could take advantage of the high-speed development and complete your projects in no time. (Boicheva, 2020).

5. Design and Prototyping Tools

i. Figma

The proponents will use Figma as a prototyping tool for the creation of the user interface (UI) and user experience (UX) design of the system. Using Figma for UI and UX design allows for collaborative work among team members, real-time feedback, and seamless integration with other design tools, enhancing the efficiency of the design process. Its robust features, such as component libraries and version history, ensure consistency and ease of iteration throughout the design phase.

6. Version Control and Collaboration

i. Github

The proponents will utilize GitHub as the primary platform for version control and collaboration in managing the system's source code. The GitHub repository will facilitate the seamless integration of contributions from team members across different locations, ensuring efficient development processes. Additionally, regular code reviews and issue tracking on GitHub will enhance transparency and accountability within the project team.

CHAPTER IV METHODOLOGY

1. Conceptual Framework

INPUT	PROCESS	OUTPUT
<ul style="list-style-type: none">• Project listings (Development, Rentals, Brokerage)• Financial data• Client Information• Agent Information• User Information	<ul style="list-style-type: none">• Data validation• User authentication• Project listing verification• Financial data verification• Commission calculations• Generate summary reports• Generate Top Agents of the month	<ul style="list-style-type: none">• Validated Project Listings• Verified Financial Data• Authenticated Information (client, user, agent)• Calculated commissions• Summary Reports• Top Agents of the Month

Figure 1. Input-Process-Output Model of the System

Figure 1 shows the conceptual framework of OROWIDE Properties Corporation's property management system. The proposed system will use the Input-Process-Output Model (IPO). Upon receiving inputs such as project listings, financial data, client information, agent information, and user information, the system will undergo several processes. First, the system will validate the data provided, ensuring its accuracy. Following this, user authentication will be carried out to secure access to the system and verify the user's privilege in the system. Then the system will verify project listings to maintain their integrity and authenticity. Commission calculations will be performed based on the verified financial data. Additionally, the system will generate summary reports to provide a comprehensive overview of the company's operations.

Moreover, the system will generate a list of the top agents of the month. Finally, the system will produce outputs including validated project listings, verified financial data, authenticated information (client, user, agent), agent commissions, summary reports, and the list of top agents of the month. This approach will enable OROWIDE Properties Corporation to efficiently manage and track its sales while digitally executing various listings across all categories.

2. Research Approach

The proponents used the interview approach which questions the problems of the OROWIDE Properties Corporation together with Eda Arevalo the President, Laura Elorde Vice President, and Bobby Langga the Corp. Secretary. Bobby Langga discussed and explained the current process in the company, the systems they are using in the company. The company is using Excel to store information about the Projects and every Listing, agents' information details, and the sales of the company.

This provides the developers with complete information to completely understand the system process of the company.

3. Systems Development Methodology

This project will employ the agile development method as shown in Figure 2 with four sprints, allowing our team to efficiently manage the development process.

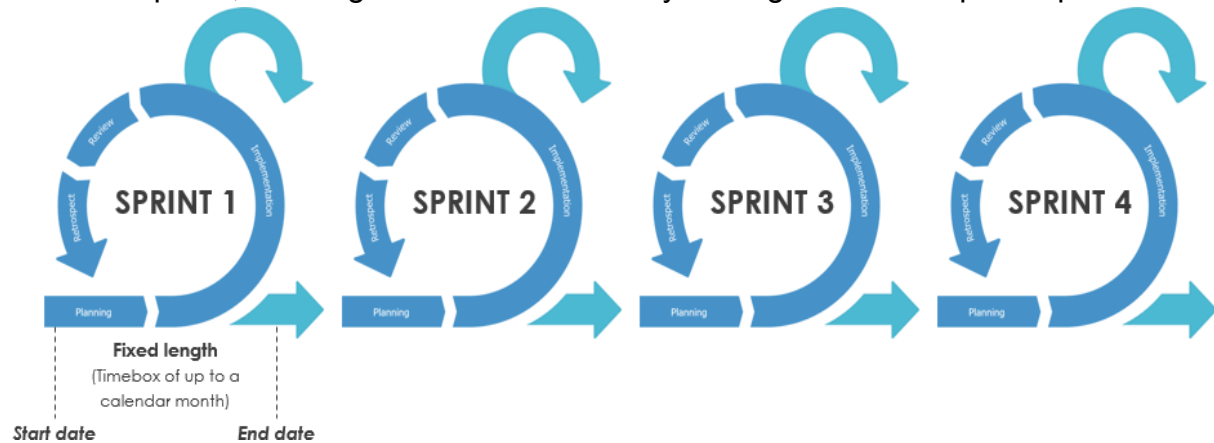


Figure 2. Agile Methodology (Visual Paradigm, 2024)

The project is divided into a few parts, carrying simple goals. This would be done as an analysis to achieve the goals. From planning, designing, build, testing and evaluation, until it reaches its deployment, it is the most suitable for developing the property management system for Orowide Properties Corporation.

i. Sprint 1 - Requirement Analysis

- The first phase is requirement gathering of each sprint entails defining the objectives, specifications, and the extent of the particular sprint. In this stage, the proponents will gather data and information from the stakeholders through interviews to identify the problems within the company and the needs. After gathering the data and pieces of information, the proponents will sprint's backlog in order to rank the features and tasks that need to be completed. In addition, the task will be divided into more manageable and smaller segments in order to finish a sprint. Next phase, the proponents will develop a prototype design of the system, these are the dashboard, and the user interfaces of the admin, executive, staff, and agents. In this phase, the proponents will plan the system structure, what are the needed functionalities to be done, the database design of the system, the user interfaces that include the admin, agents, executive, and staff, and the flowchart of the system to ensure the system design. In the last phase of the 1st sprint, the developers will develop the basic user interface of the admin, the executive, the staff, and the agent's side as well as the basic login/user authentication of the users for security.

ii. Sprint 2 - Admin, Executive Staff and Agents

- In the second sprint phase, the proponents will develop the complete function of the admin side of the system. The admin's functionality is limited only to the authorization of the executives. The functionalities of the admin involve the basic CRUD of properties to post in every project and the agents which can disable or edit the basic information of the agents. Next stage, the proponents will develop the complete functionalities of the executive side which is the viewing of the summary of sales and generating the sales of a specific month and also the monitoring of agent

listings. In this phase, the proponents will develop the Staff's functionality, the function of the staff is limited only to viewing the listings of projects and the agents lists. And in this stage, the proponents will develop the agent's side of the dashboard where the listings in every project will be seen by the agents. This dashboard can also be used to properly introduce the properties available that can help the customers decide what type of property, how much the price, and the location of the property needed. In this last stage of the second sprint, the proponents will integrate the database to make sure that the functionalities of the Admin, Executive, Staff, and Agents will work properly and efficiently.

iii. Sprint 3 - Sales report and Initial Deployment

- For the third sprint, the proponents will integrate a function that will compute the sales of the company, and the admin will input the details also the percentage given to the agent who deals with that particular client, it will automatically compute the sales and will transfer to the sales database with all the details. It will also generate total sales in all the projects which the executive can view and monitor. With this stage, the proponents will undergo alpha testing of the system to ensure that the system will work properly and to detect some errors and bugs before initial deployment. In the next stage, the proponents will initially deploy the system to the company and ensure a smooth transition from the old system to this new system, the proponents will demo the system functionalities to the admin, the executives, the staff, and the agents. After the initial deployment of the system, the proponents will gather some feedback to the company, and some improvements and revisions will be documented to address properly the improvements of the system.

iv. Sprint 4 - Final Deployment

- In the last sprint, the proponents will analyze the documented feedback of the company. Documentation will assist the developers in order to make sure the system meets the needs of the client. In the next stage, the proponents will have the final development based on the improvement and feedback based on the last sprint and the documentation. This will be the completed system that is ready for deployment. Also in this stage, the proponents will conduct beta testing for the stakeholder which is the Orowide Properties Corporation. The proponents will demo the updated system to the admin, the executives, the staff, and agents. In this last stage, the system is ready to be deployed to the Orowide Properties Corporation. After ensuring that the system is ready without defects and issues, the proponents will officially launch. The proponents will document the final deployment of the system.

4. System Analysis

The proponents studied the traditional process or manual method used by the Orowide Properties Corporation. Researchers will create a Web Based Property Management System to improve navigating, manage their task, and view the summary efficiently.

i. Flow Chart Diagram

Figure 3 in Appendix B, shows the current process of Orowide Properties Corporation. Opens the Excel spreadsheets for data information about project listings and closed deal summary listings in development, brokerage, and rentals. Views the list of information in the salesperson or agent and provides a deal information form in project deals of the salesperson and validates the data

depending on their inspection of project deals, if there's an update of the information in projects, deals, and salesperson. Updates their data in an Excel spreadsheet.

Figure 4 in Appendix B, shows the current workflow of the salesperson. First, they open the Excel spreadsheets and view project listings in development, brokerage, and rentals. Then a salesperson fills in the deal information form according to their project deals. Presents the data and validates salesperson project deals and updates their data in spreadsheets.

Figure 5 in Appendix B, shows the proposed process and the admin workflow. During the starting point, the user has to login and input their password, if the admin does not have an account, user must register and input their admin information, then proceed to admin input validation, if all has input valid then user will directly go into admin dashboard. Admin will manage the agents, sales summary and the three projects including development, brokerage and rentals. Users can edit the agent commission on projects, monitor deals in rental and brokerage projects. Under the managed sales summary, admin can view who are the top agents of the month, then the user has the option to logout.

Figure 6 in Appendix B, shows the proposed agent workflow of the system. From the starting point, the user has to login and input their password, if the agent does not have an account yet, user must register and input their agent information, then proceed to agent input validation, if all has input valid then user will directly go into the agent dashboard. Agent's task can upload their deal information forms according to their projects to development listings, rental listings, and brokerage listings, users can edit their profiles and have an option to logout.

ii. Use Case Diagram.

Figure 7, the proponent's main use case diagram of the system found in the appendices. The user executive in the dashboard can view total sales and determine the monthly top agent. Then the executive and admin can view development listings, brokerage listings, rental listings, agent listings, and summary reports on projects.

Additionally, they can add agents and include projects in development, brokerage, and rentals. Agents can view three project listings in development, brokerage, and rental listings. The staff can also view the agent listings and projects in development, brokerage, and rentals.

5. System Requirements Specification

i. Functional Requirements

Functional requirements specify what a software system must perform and how it should operate; they are product characteristics that prioritize user demands. This portion of the document offers the functional requirements, which are classified by user class and outline the project's fundamental operations.

a. User Login Authentication

The system must allow users to log in using a username and password. Upon successful authentication, the system then identifies the level of user's privilege, the system should grant access to the user based on the user's privilege.

b. Manage Development Projects

Users with administrative privileges should be able to create, update, and delete development projects.

c. Manage Rental/Leasing Projects

Administrators should have the ability to create, edit, and remove rental/leasing projects from the system. The system should support the specification of rental/leasing project details such as property location, duration, and rental rates.

d. Manage Brokerage Projects

The system must provide functionality for administrators to add, modify, and delete brokerage projects.

e. Manipulate Commissions

Administrators should be able to set commission rates for different types of projects (e.g., development, rental/leasing, brokerage) and the system should allow administrators to adjust commission rates based on various factors such as project size, complexity, and performance metrics.

f. Manage Agents

Administrators should have the ability to add, edit, and remove agent profiles from the system. Administrators should be able to view and update agent contact information, including name, phone number, email address, and license details. Administrators should be able to track and monitor the performance of agents, including their sales activities, commissions earned, and client interactions.

g. View and Monitor Sale Summary

The system must generate and display a summary of sales activities, including total revenue, commissions earned, and project performance indicators. Administrators should be able to filter and analyze sales summaries based on different criteria such as project type, timeframe, and geographical location. Administrators can view the top Agents of the Month.

ii. Non-functional Requirement

- a. Security: All data and information are safeguarded and encrypted.
- a. Scalability: The system should be able to handle multiple concurrent users without degradation in performance.
- a. Availability: The system should have at least 99.9% uptime, ensuring that it is accessible to users 24/7 with minimal downtime for maintenance.
- a. Usability: The system should be usable and user-friendly.

iii. Other Project Requirements

a. Software Requirements

The software requirements accessing the system are any browser that suits the user needs and an operating system that supports this browser.

b. Hardware Requirements

Basic hardware configuration that meets the software requirements and is capable of running the system on devices such as desktop computers and laptops is necessary to properly operate the system.

Operating System	Windows/Mac
Central Processing Unit(CPU)	Dual Core and above/2nd generation Intel Core or newer, or AMD CPU 1st generation.
Random Access Memory(RAM)	8gb and above
Network	Online

Figure 9. Admin Hardware Requirements.

c. Input requirements

i. Registration: Requires personal information such as name, address, email address, contact information and other important information needed for users to identify their privilege level.

ii. Project data entry: All the data of each project will be inputted in the system including the financial data, property data, client information, and other relevant information. Only the administrators and Executives can create, update and delete the records in the system.

iii. Commission entry: Users with higher privilege will be able to update the commission rate for each agent.

d. Output requirements

i Validated user registration: The system will be able to validate the user's level of privilege depending on the user's credentials.

ii. Projects listings: The users will be able to view all the project listings in the system such as rentals listings, brokerage listings and development projects.

iii Sales report summary: The users with higher privilege will be able to see the overall sales report summary each month.

iv. Top agents report: Returns the list of top performing agents of the month.

v. Commissions: the agents will be able to see their commissions.

6. System Design

i. Entity Relationship Diagram

Figure 6, shows the Entity Relationship Diagram of Orowide Properties Corporation, a Web-Based Property Management System. It shows their relationship between entity sets. ERD helps assist in database design and optimization, and serves as a roadmap for system maintenance and future development. This has become an essential tool in database management to create a better visual presentation.

ii. UI of the Software or image of the prototype

Figures 12 to 17 in Appendix E shows the major user interface of the proposed system required to achieve our objectives, figure 12 shows the User login page, users can login to their account matching to their roles. Figure 13 shows the User registration page, this is where the user can register their accounts.

The Agent dashboard is shown in Figure 14, the agent will have their own interface where they can navigate through the project listings and enable them to view property listings. In the admin dashboard, the admin can view and manage relevant information about the project listings, properties, agents as shown in figure 15.

Figure 16 depicts the example of what a project would look like, in this example the proponents select the development project page. In this page, the user can access the information of the property listed in the specific project.

Lastly, the agent listing page is shown in figure 17, here admin can manage all the agent listings.

7. Project Management

To see the project's timetable, researchers utilize a Gantt chart. Allows researchers to see the project timeline, and tasks, and identify any issues on scheduling, enabling stakeholders to track progress and make informed decisions to ensure the successful development and implementation of the property management system.

Figure 11 in Appendix D, shows the Gantt chart of Orowide Properties Corporation. The first sprint shows the Requirement Analysis which consists of requirement gathering, prototype design, system planning, and basic user interface. In requirement gathering, the proponents will gather the data needed, next is the prototype designing, in this phase, the proponents will develop a prototype based on the data. System planning will plan the system structure, and needed functionalities to be done, together with the database design and the flowchart of the system. Second sprint will implement the following users on the system side in admin, executive, agent, and staff. Then database integration process for establishing connections between the different databases. Third sprint is adding the sales, then proceed to alpha testing will be performed to identify the bugs before releasing the application to real users, then initial deployment will be done and feedback to users if some might be add changes to system. Lastly, fourth sprint for documentation of the project, then performed the final development of system and beta testing for final stage that will be uncover bugs, errors, or usability issues before final deployment, then the final project proposal defense for the researchers and lastly to its final deployment of the system.

8. Testing Methodology

i. Development of Web-Based Property Management System

The proposed system will develop a Web-Based Property Management (PMS) System that will merge innovative technologies and features. Allow to assist realtors in effectively managing real estate properties. The primary focus of the PMS is to streamline workflows, enable data analysis, and enhance overall efficiency in property management outcomes.

ii. Implementation and Testing

In this stage, the proponents plan to implement a Web-Based Property Management System, which involves testing the system with users to ensure the functionalities are accurate and efficient. This will help researchers identify any issues, make necessary adjustments, and determine if the system is ready for use at Orowide Properties Corporation. Strict testing methodologies will be employed to identify and rectify defects, including Functional Testing, User Acceptance Testing (UAT), and usability evaluation using the System Usability Scale (SUS).

a. Functional Testing

It ensures that every function within the real estate management system operates as intended. For example, it verifies that property listing functionalities allow admins to add, edit, and remove listings accurately. By meticulously testing each feature, functional testing ensures that the system meets the unique requirements and workflows of OROWIDE Properties Corporation.

b. User Acceptance Testing

UAT involves real estate company representatives testing the system to validate its suitability for their needs. This testing phase allows stakeholders to provide feedback, identify any discrepancies between the system and their expectations, and ensure that the system aligns with their business objectives. By

involving end-users in the testing process, UAT enhances user satisfaction and adoption of the system.

c. System Usability Scale (SUS)

As part of the usability evaluation process, the System Usability Scale (SUS) is implemented. This reliable and cost-effective scale provides a comprehensive assessment of the system's perceived usability. With its 10-item questionnaire and five-point Likert scale responses, the SUS generates a score ranging from 0 to 100, indicative of the system's usability. Upon collecting SUS scores, interpretation becomes crucial. Scores above 80 suggest excellent usability, while those between 70 and 80 denote good usability. Scores falling between 50 and 70 signal average usability, and anything below 50 indicates poor usability. These interpretations guide the proponents in gauging the system's effectiveness and identifying areas for improvement, ensuring that the Web-Based Property Management System meets the needs and expectations of Orowide Properties Corporation.

iii. Deployment

In this final stage of the system development process, the system will be used by the Orowide Properties Corporation admin for training and deployment. Thus, the manual process used in operating the company will be replaced and changed in the management process of Orowide Properties Corporation into a Web-Based Property Management System.

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APPENDICES

APPENDIX A: Use Case Suites and Use Case Diagram

USE CASE SUITES

UC-00 Register New User Account	
Summary:	A process of a new user creating an account on the application.
Priority:	Expected
Use Frequency:	Often
Direct Actors:	New Users (Agent, Admin, Staff, Executive)
Main Success Scenario:	<ol style="list-style-type: none">1. A user navigates to the Register page by clicking the "Register" button.2. The user provides the required information.3. The system validates the entered details for accuracy and completeness.

UC-01 Login to Account	
Summary:	An existing user is accessing their account on the application using user credentials.
Priority:	Expected
Use Frequency:	Often
Direct Actors:	Existing Users (Agent, Admin, Staff, Executive)
Main Success Scenario:	<ol style="list-style-type: none">1. A user navigates to the login page.2. The user will provide credentials.3. The system validates the credentials against the stored user information in the database.4. The system identifies the user's privilege to the system.5. Upon successful validation, users can access the system features.

UC-02 Post Listings	
Summary:	A user upload a project(Rentals, Brokerage, Development)
Priority:	Expected
Use Frequency:	Often
Direct Actors:	Agents
Main Success Scenario:	<ol style="list-style-type: none"> 1. An agent navigates through the upload page. 2. The agent will provide project information. 3. The system admin then validates the information provided by the agent. 4. After validation, the project is then listed in the system and stored in the database.

UC-03 Manage Project Listings	
Summary:	A user manages project listings(Rentals, Brokerage, Development)
Priority:	Expected
Use Frequency:	Often
Direct Actors:	Administrator
Main Success Scenario:	<ol style="list-style-type: none"> 1. The administrator navigates through the three project listings(Rentals, Brokerage, Development). 2. The admin manages all the project listings. 3. The admin may Create, Read, Update, Delete project listings.

UC-04 Manipulation of the Commissions of Agents	
Summary:	The administrator manipulates the commissions of the agent.
Priority:	Expected
Use Frequency:	Often
Direct Actors:	Administrator
Main Success Scenario:	<ol style="list-style-type: none"> 1. The administrator navigates through the commissions page. 2. The admin manages all the commissions of the agent by their performance.

UC-05 Management of overall sales	
Summary:	The executives manage all the overall sales of the company.
Priority:	Expected
Use Frequency:	Often
Direct Actors:	Executives
Main Success Scenario:	<ol style="list-style-type: none"> 1. The executive officers will navigate through the system. 2. The executives will manage all the overall sales of the company and monitor the performance of the agents.

OROWIDE Properties Corporation

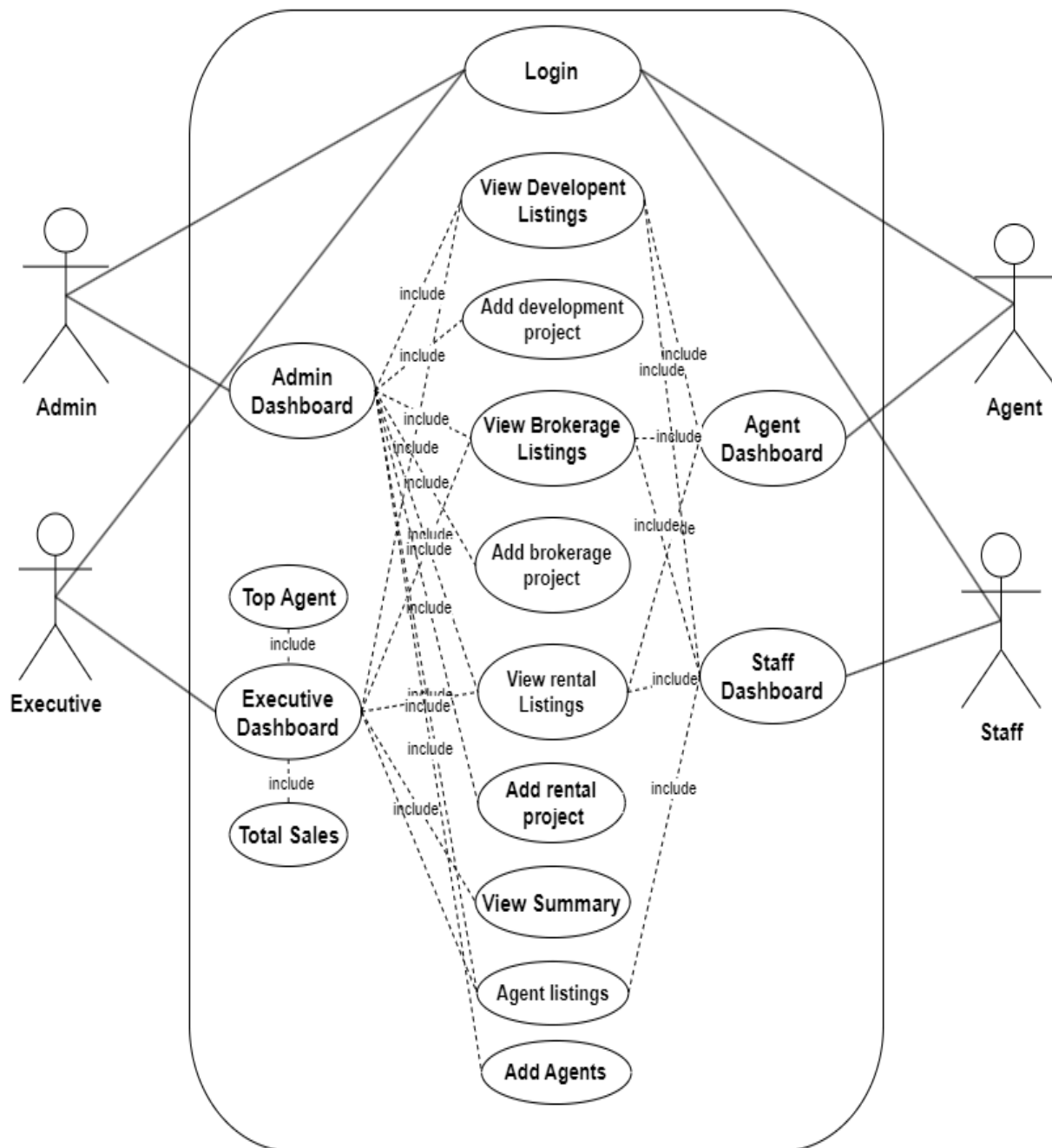


Figure 7. Use Case of Property Management System of Orowide Properties Corporation

APPENDIX B: Flowcharts and System Design

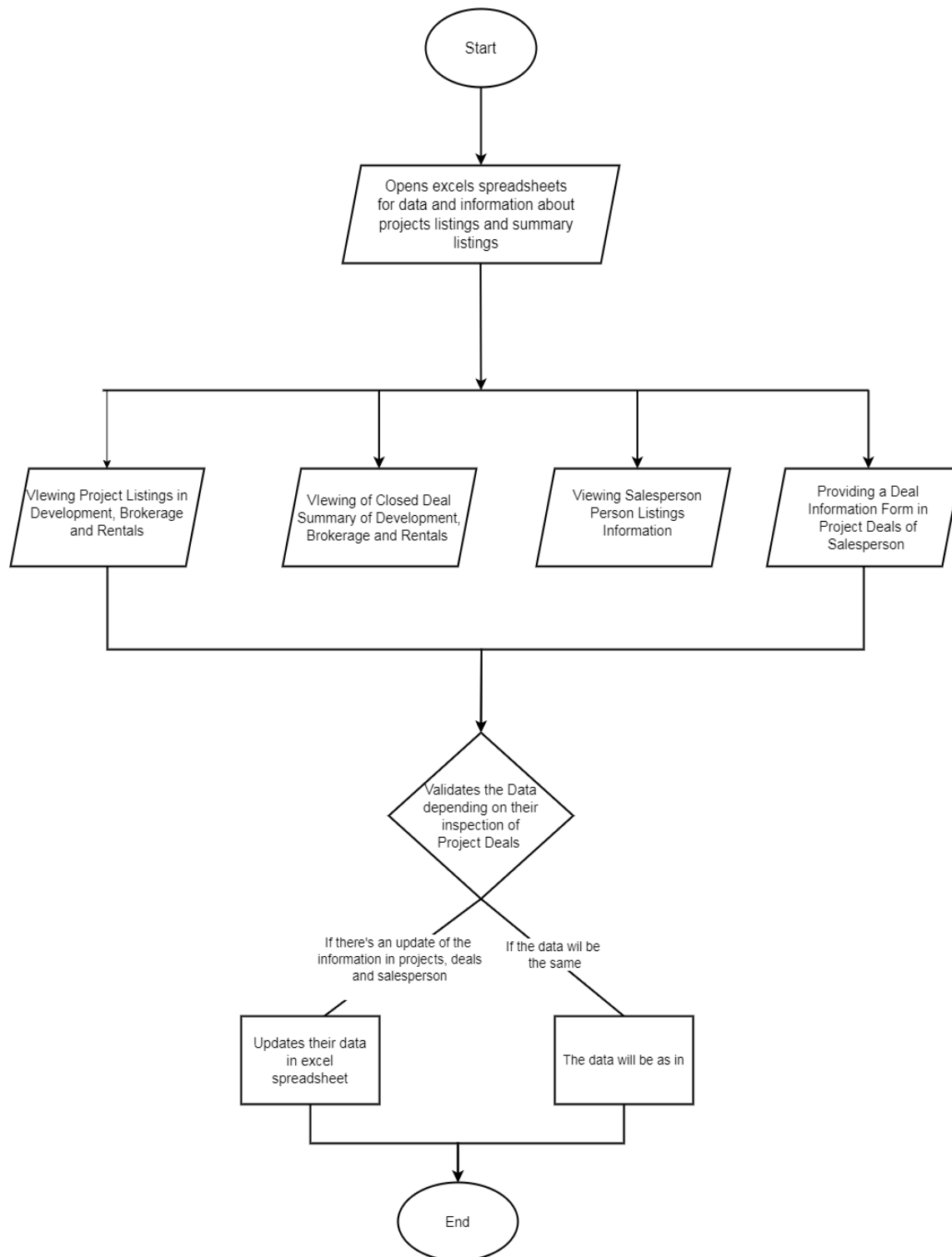


Figure 3. Flowchart Diagram of the Current Process of Orowide Properties Corporation Executive Module

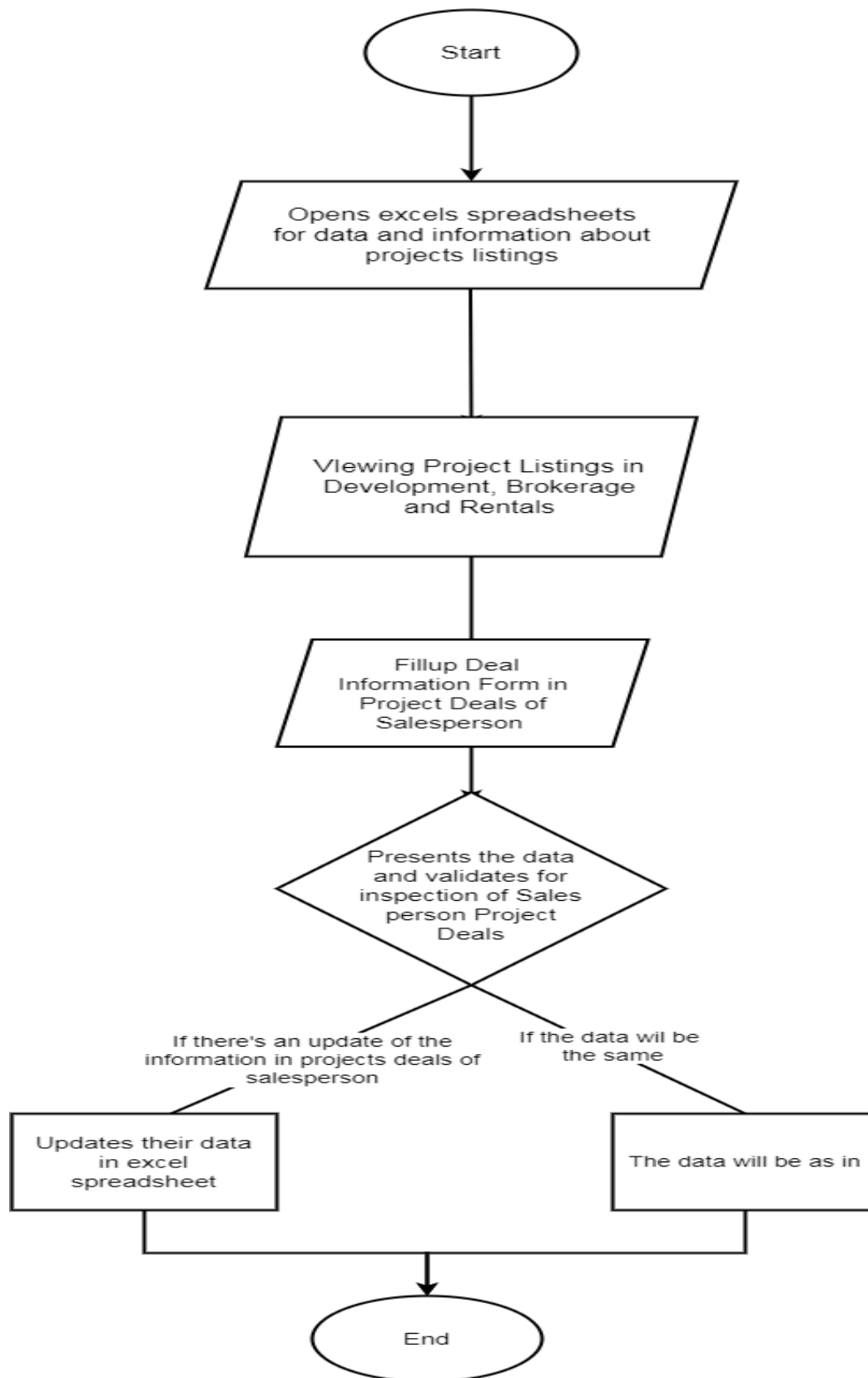


Figure 4. Flowchart Diagram of the Current Process of Orowide Properties Corporation Salesperson Module

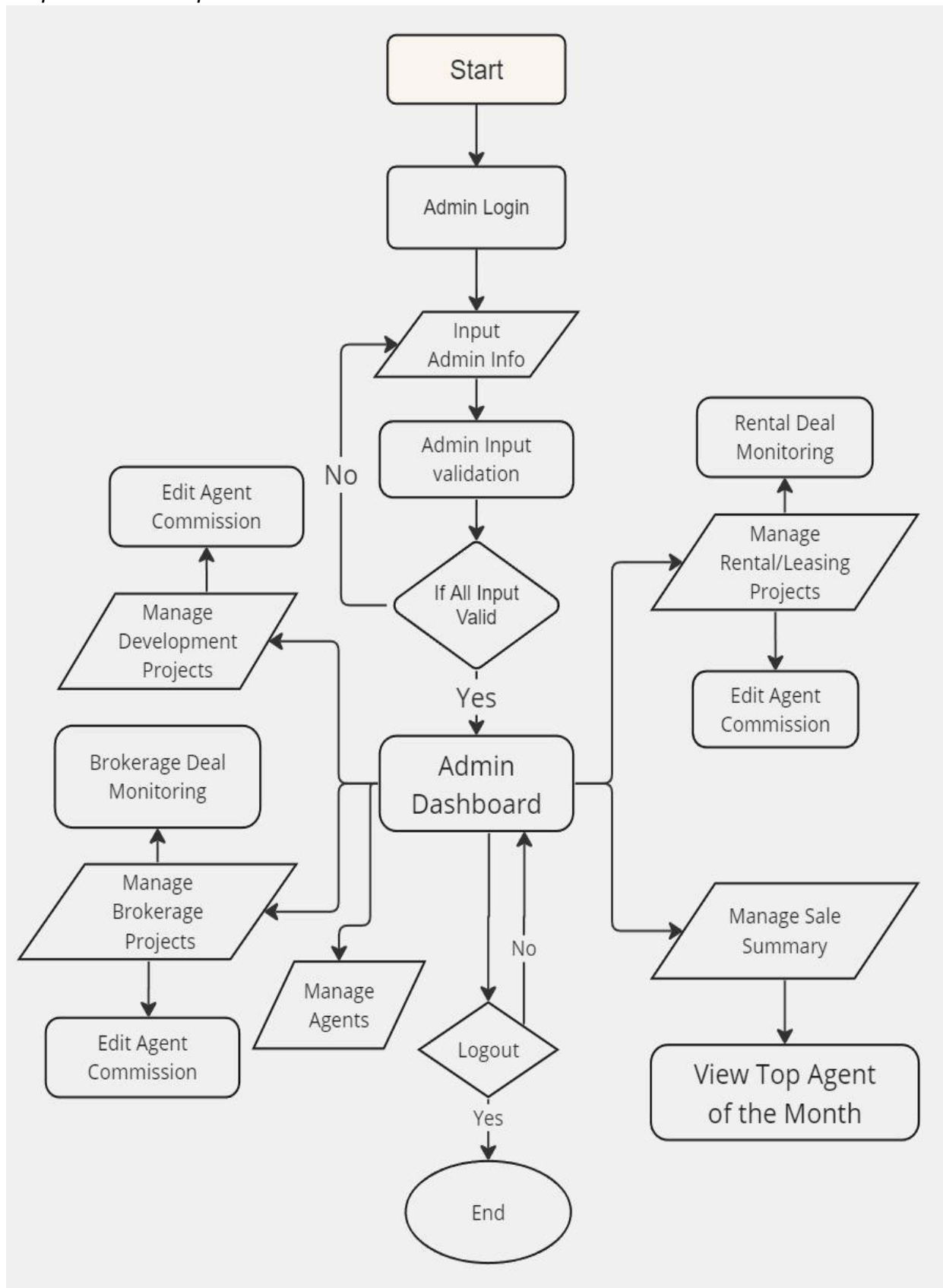


Figure 5. Property Management System of Orowide Properties Corporation Admin Flow Chart

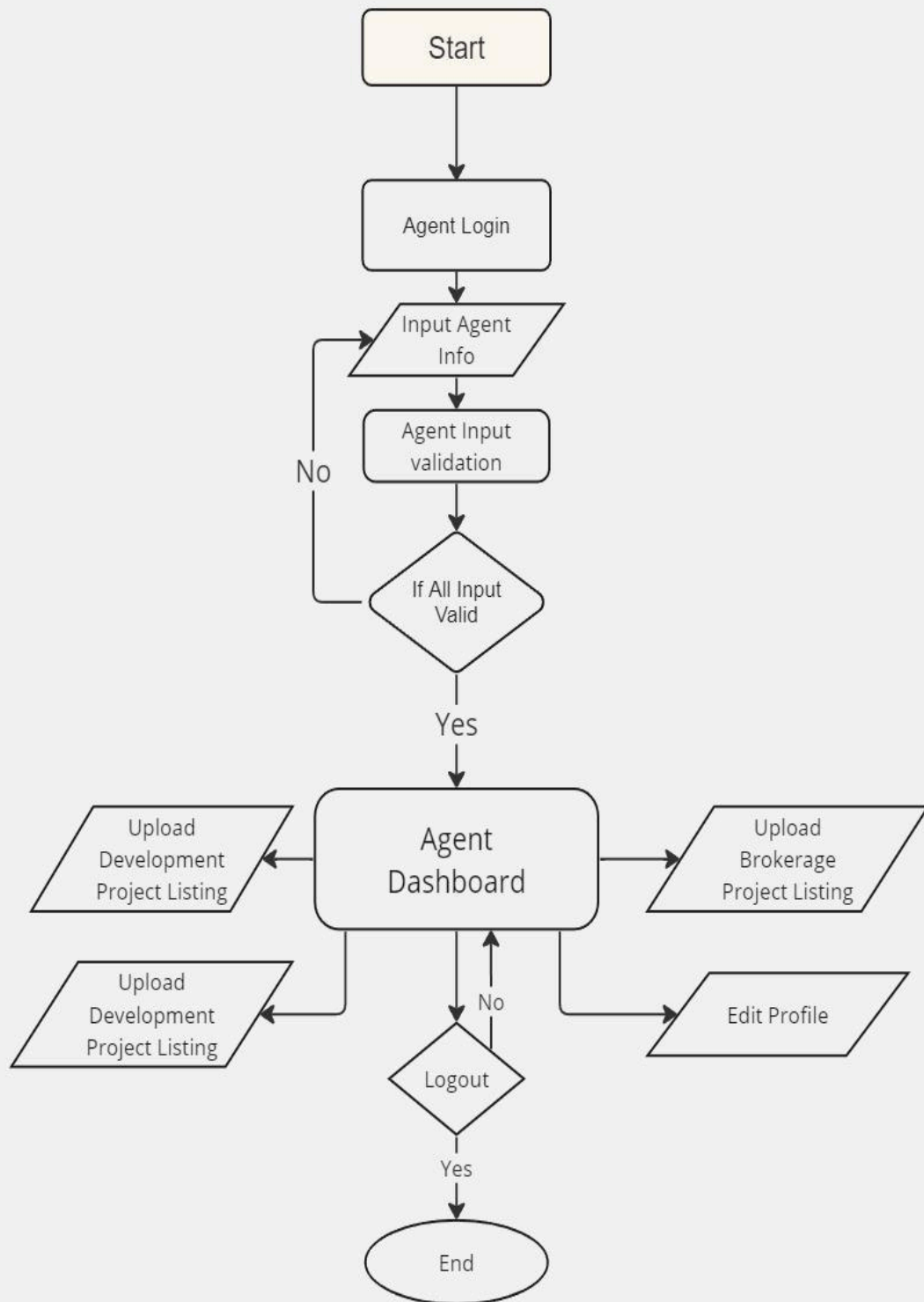


Figure 6. Property Management System of Orowide Properties Corporation Agent Flowchart

APPENDIX C: Entity Relationship Diagram

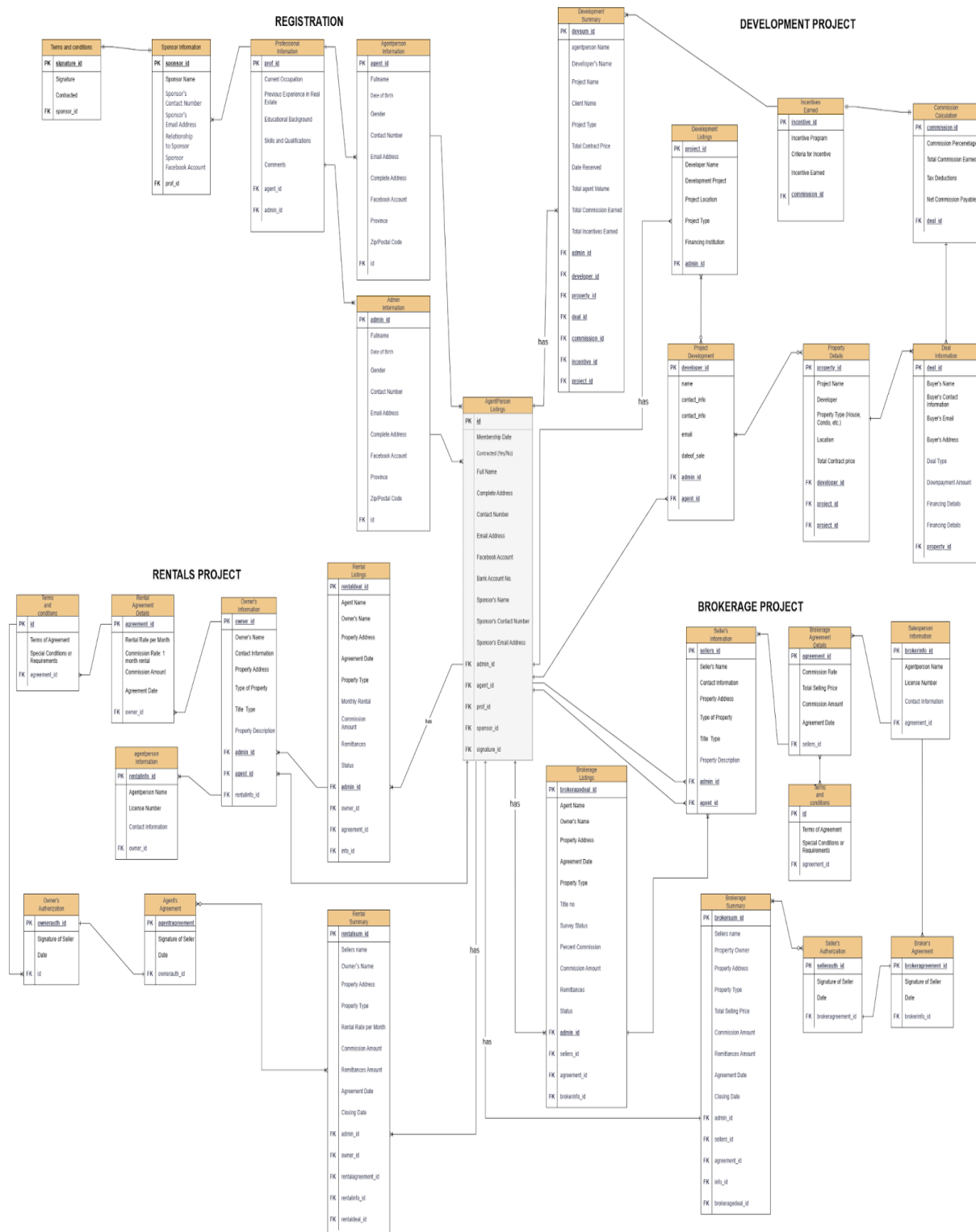


Figure 10. Entity Relationship Diagram of Orowide Properties Corporation.

APPENDIX E: UI image design

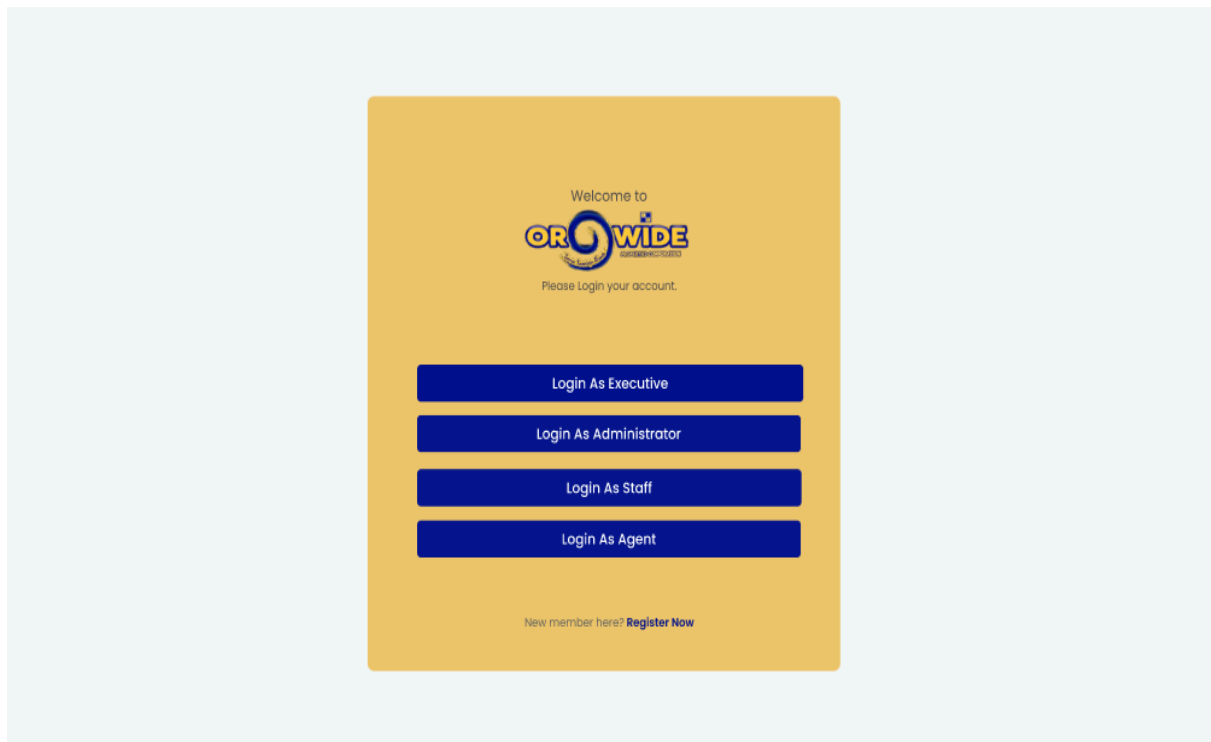


Figure 12. User image of the prototype login role of user

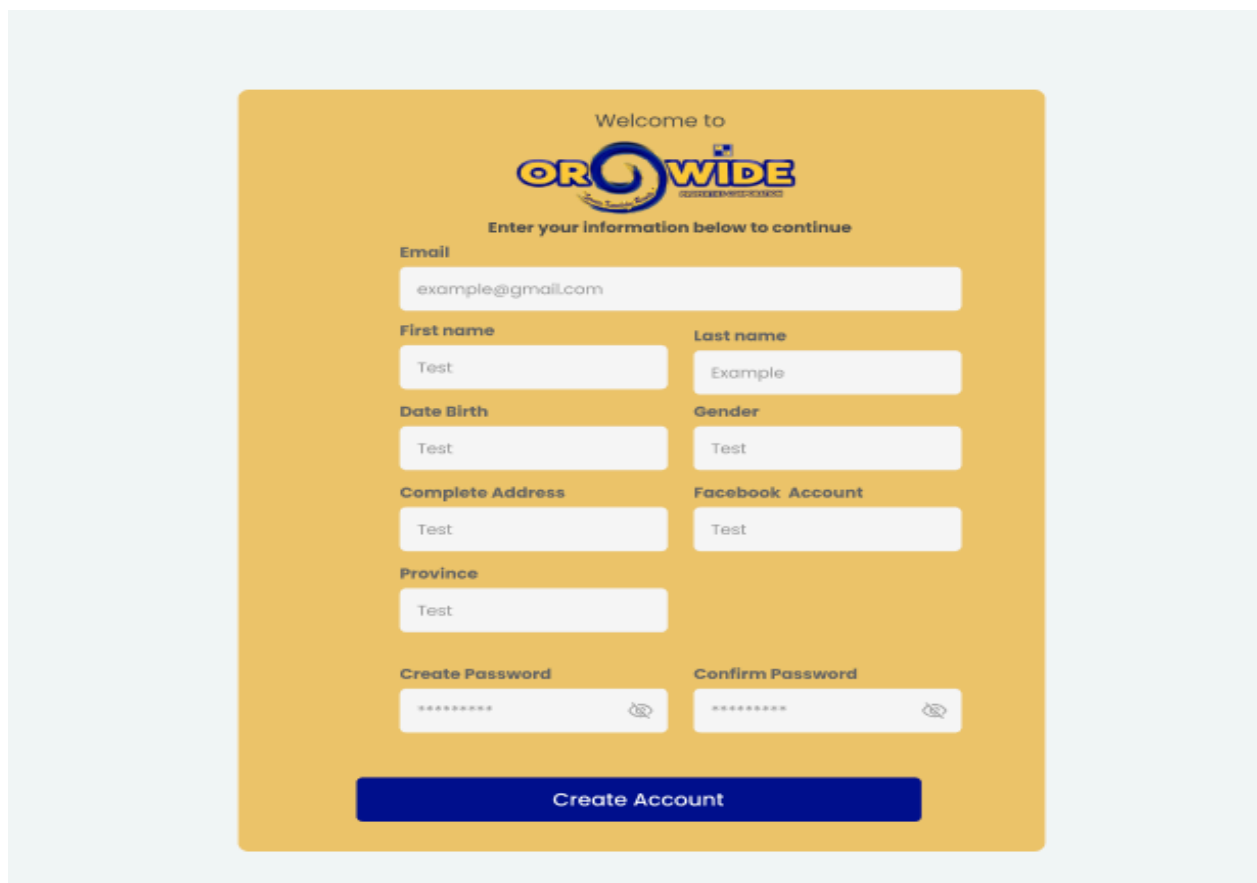
The image shows a registration form for 'OROWIDE'. It starts with 'Welcome to OROWIDE' and the instruction 'Enter your information below to continue'. The form fields are: 'Email' (example@gmail.com), 'First name' (Test), 'Last name' (Example), 'Date Birth' (Test), 'Gender' (Test), 'Complete Address' (Test), 'Facebook Account' (Test), 'Province' (Test), 'Create Password' (masked with asterisks), and 'Confirm Password' (masked with asterisks). Each field has a small eye icon to toggle visibility. At the bottom is a large blue button labeled 'Create Account'.

Figure 13. Image of the prototype user registration form

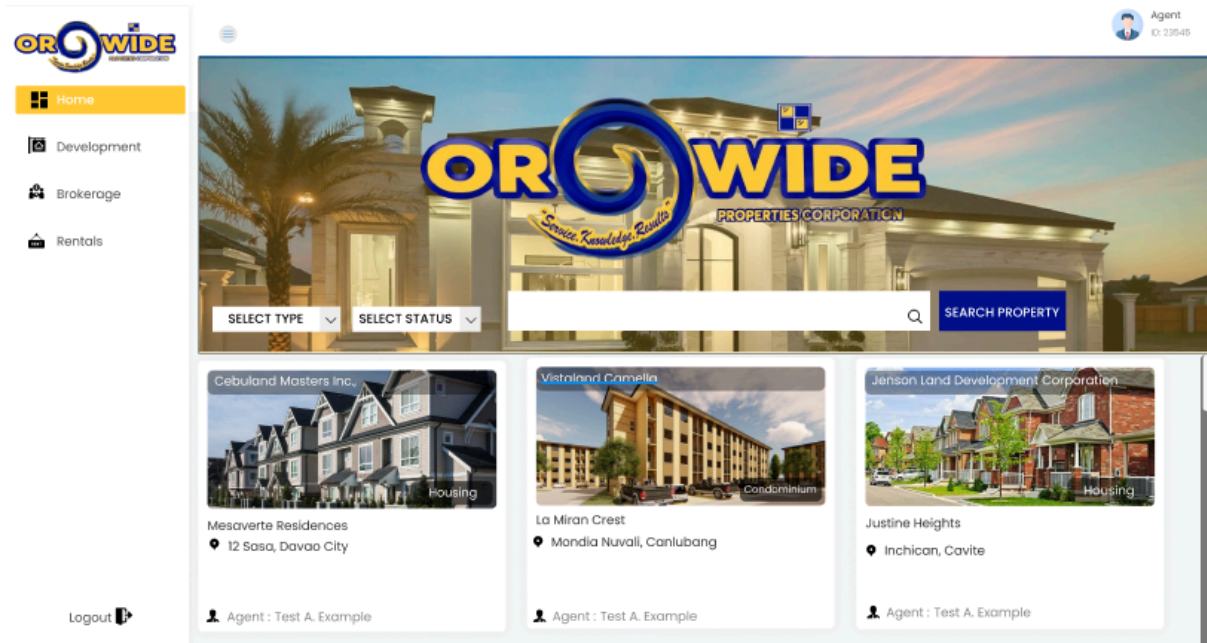


Figure 14. Image of the prototype Agent dashboard

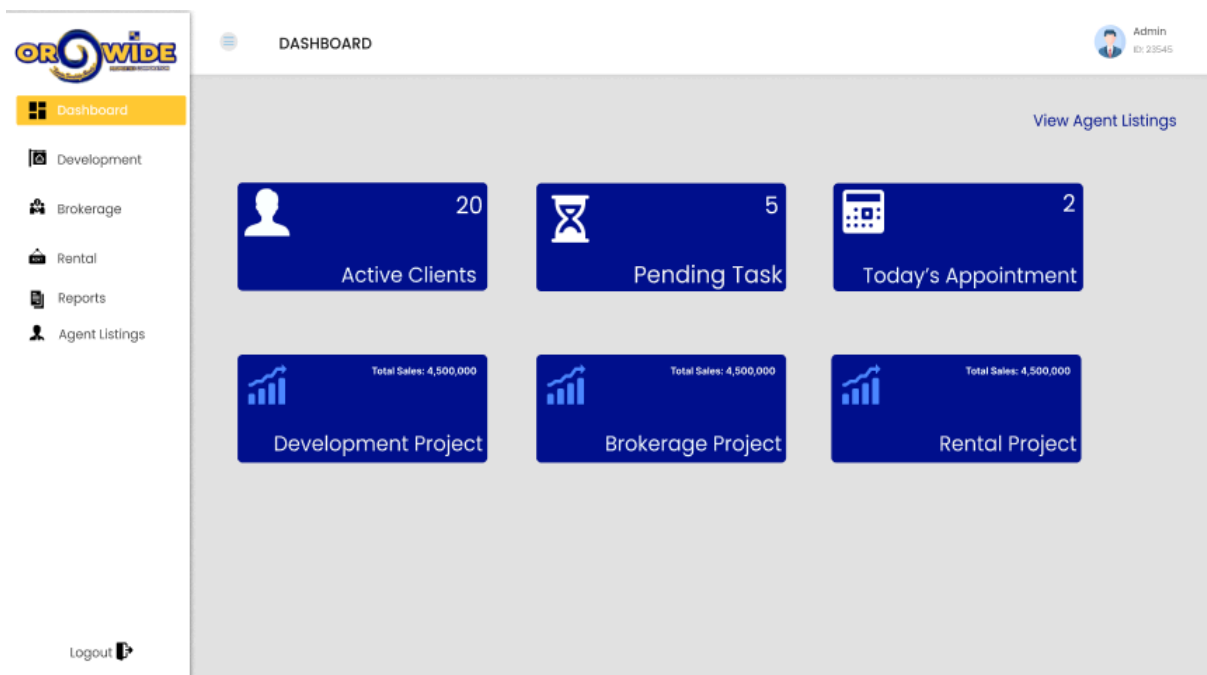


Figure 15. Image of the prototype Admin dashboard

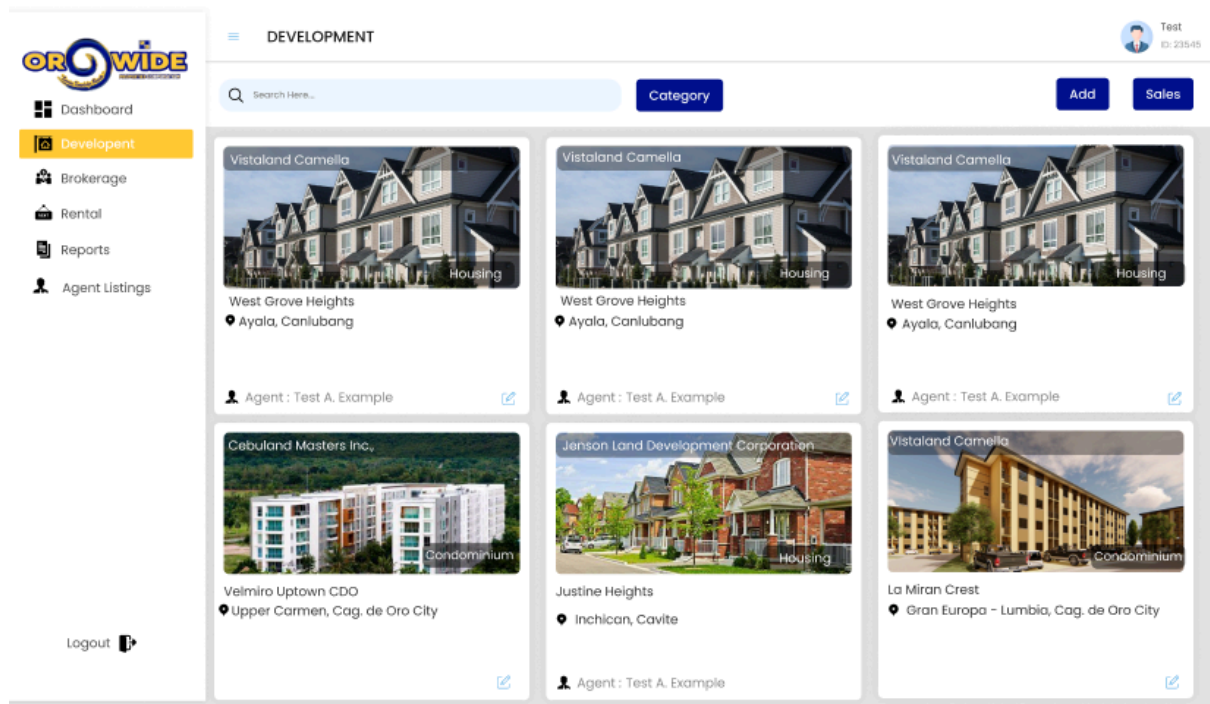


Figure 16. Image of the prototype Development Project

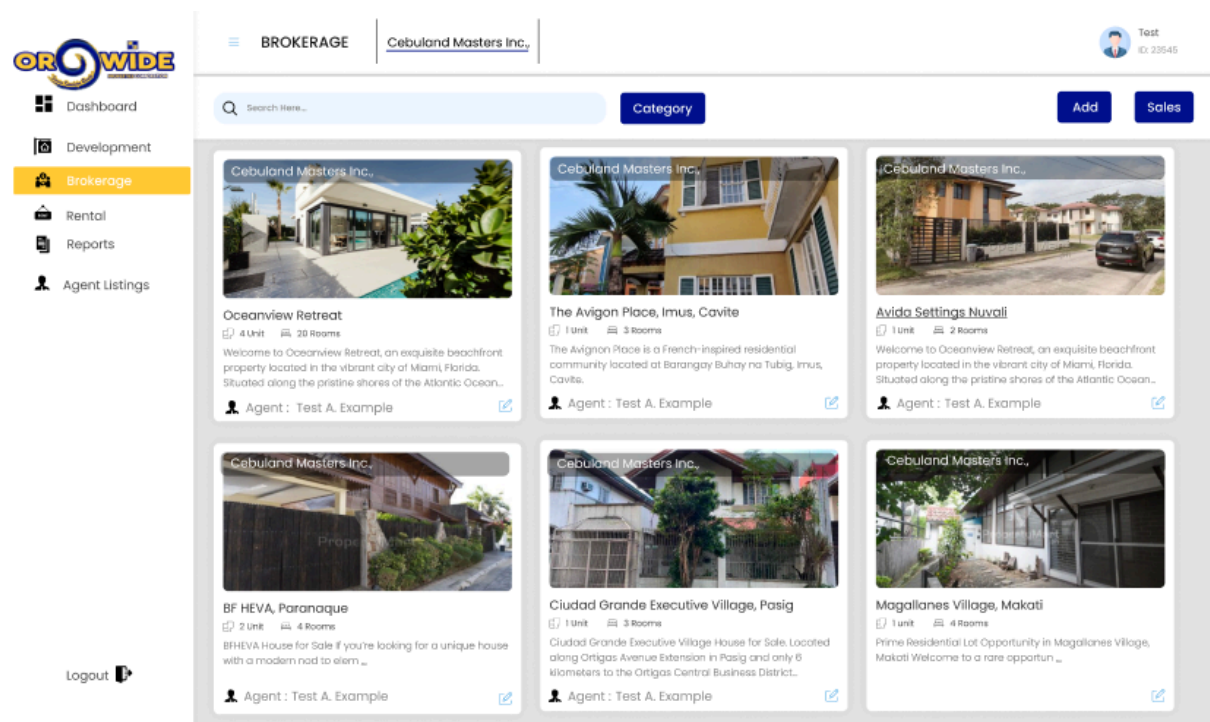


Figure 17. Image of the prototype of Brokerage Project

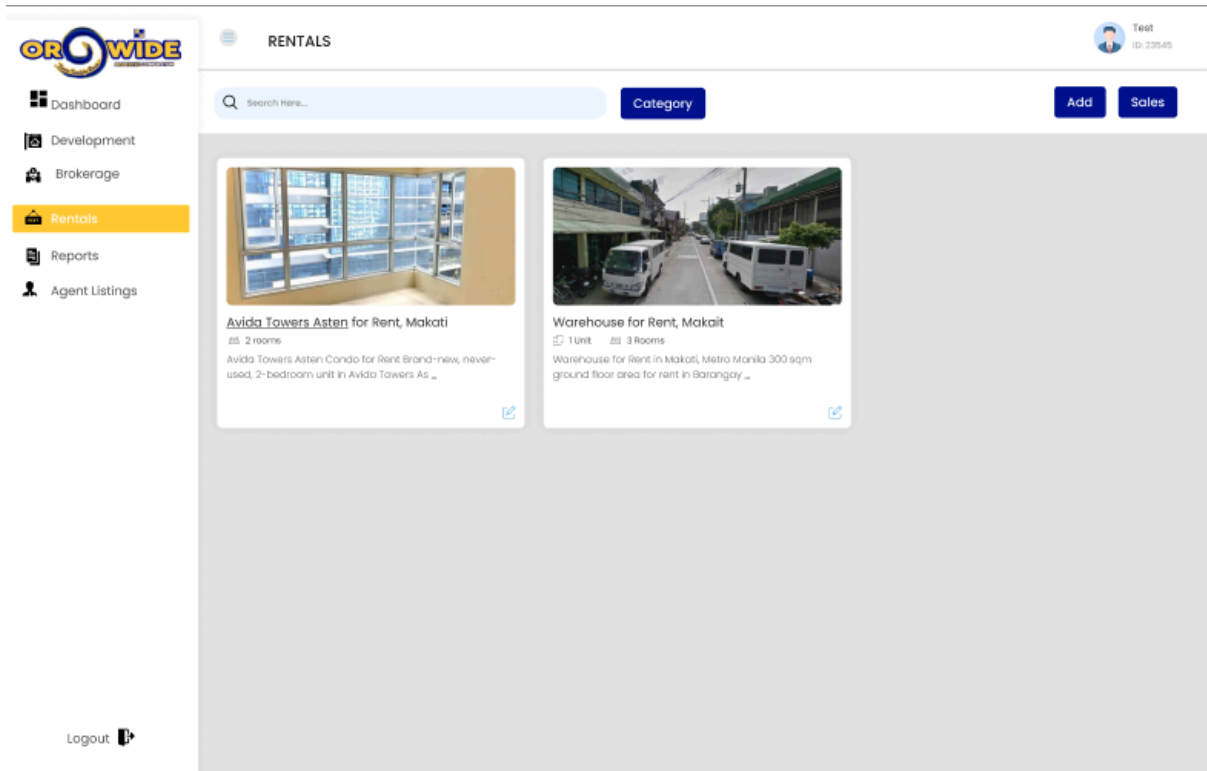


Figure 18. Image of the prototype Rentals Project

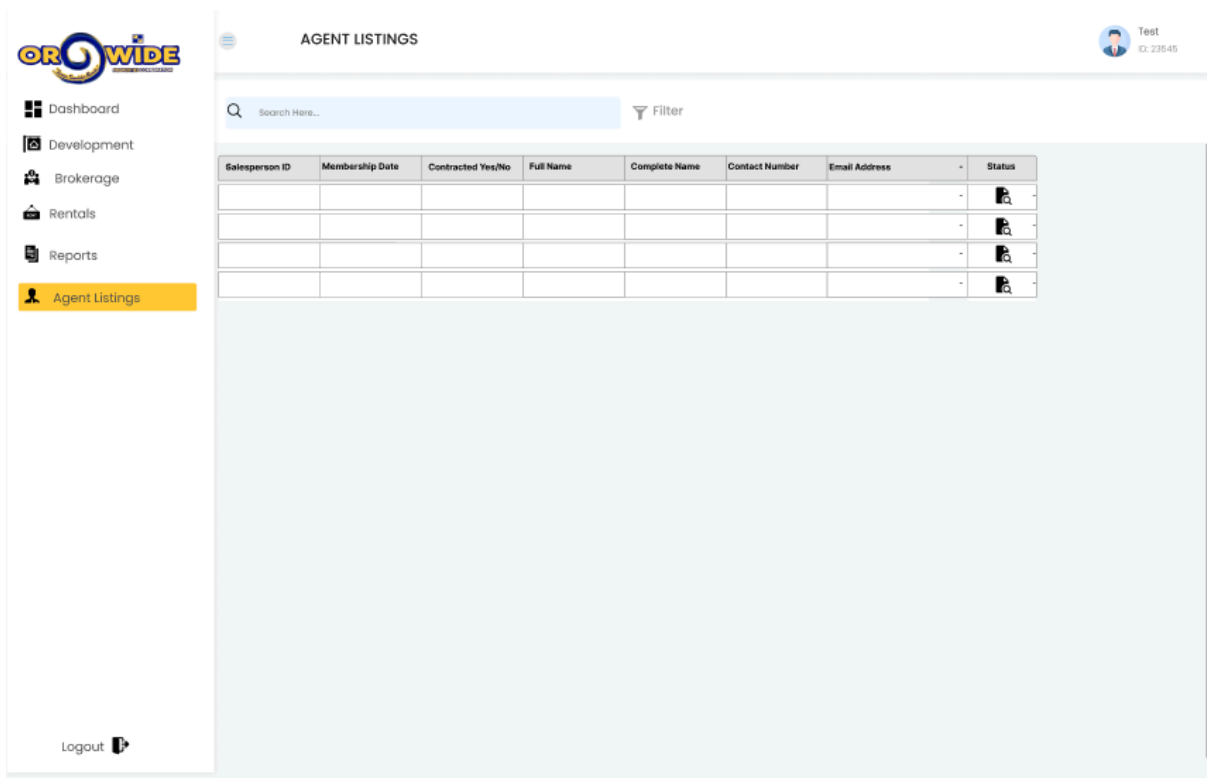


Figure 19. Image of the prototype of Agent Listings

APPENDIX D: Gantt Chart

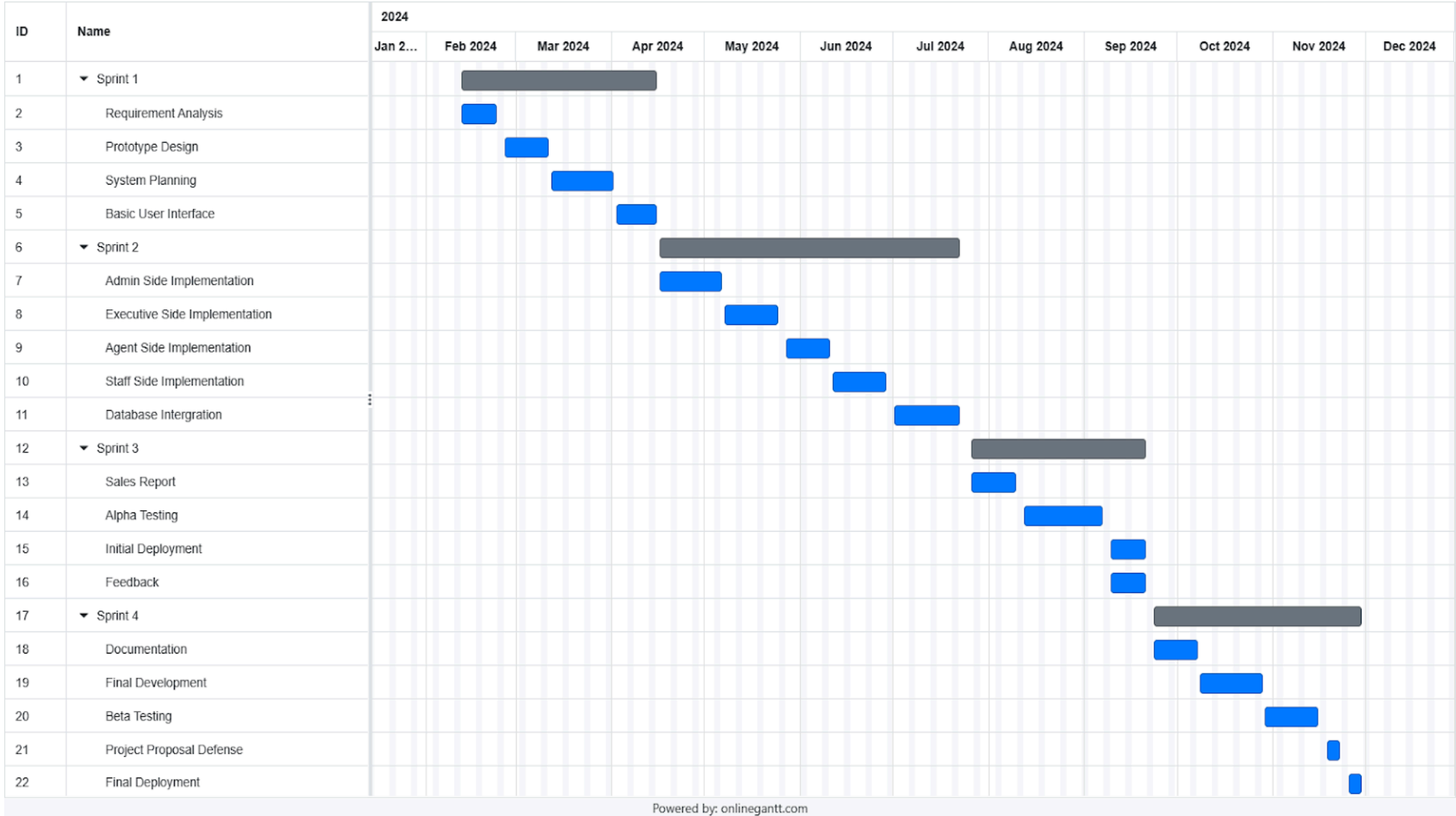


Figure 11. Gantt chart of Orowide Properties Corporation

