

Documentation – Haukainga Home Winds

Business Application Programming – Part 2: Formal Documentation

Michael Amann, Talgat Narbaev, Lukas Weitzer



Introduction	4
Executive Summary.....	4
Background	5
Analysis of Business Issues.....	5
Booking Management.....	5
Property Management.....	5
Account Management	6
User Experience	6
Photo Identification	6
Payments and Refunds	7
Privacy and Business Laws	7
Key areas of Application Issues	8
Maintainability	8
Scalability and Performance	8
Security	8
Reflection and Analysis of Program Specifications.....	9
Booking Management.....	9
Users (clients/owners)	9
Scheduling.....	9
Summer and Winter rates.....	10
Photo Identification	10
Ratings and Feedback	10
User Management	11
Property Management.....	12
System Administration.....	12
Data Management	13
Data Flow Diagram Lvl 0	14
Entity Relationship Diagram	14
System Architecture Diagram	15
Data Flow Diagram Lvl 2	15
Design Documents	16
Wireframes	16
Sitemap	18

Activity Diagrams	19
Testing.....	20
Integration Testing [IT]	20
Usability Testing [UT]	20
User Acceptance Testing [UAT].....	20
Scenarios	21
Conclusion.....	22

Introduction

This documentation provides detailed descriptions of methods, design documents, analysis and requirements which are needed in the development of Haukainga Home Winds. The project was requested by Hauia Te Kanua. The development team decided to implement the necessary features previously specified in the proposal using the WordPress framework and multiple Plugins. This documentation will provide a more detailed description as well as changes to the requirements stated in the proposal.

Project Client	Hauia Te Kanua
Project Lead	John Jaimison
Developer	Michael Amann
Developer	Talgat Narbaev
Developer	Lukas Weitzer

Executive Summary

The Client is unsatisfied with the currently available property booking services. The development of this web application aims to fulfill the requirements and offer an authentic platform for property rentals that represents Aotearoa and the Māori culture.

This property booking system will include features to publish, view, and book properties. In addition, plugins will be used to conduct payment and refunds, as well as photo identification to ensure liability and authenticity. A detailed analysis and reflection of key areas and specifications will be included in this document.

Background

Before the Client decided to commission the development of this web application, Book-a-Bach was used to rent the properties. The Client was dissatisfied that the service was mainly directed towards foreign travelers. This posed not only liability issues but also made it difficult to provide the properties to Kiwi travelers. Recent business decisions have also led to a reduction in the revenue of property owners. Additionally, the design of the platform was generic and didn't capture the idiosyncrasies of the Māori culture and Aotearoa in general.

This led to the decision to reach out to us and commission an application that provides a fair, easy and authentic property rental service that captures the hospitality of New Zealand. Owned by locals, available to everyone.

Analysis of Business Issues

Booking Management

The main purpose of this application is to provide a booking system for properties. We decided to use "Hotel Booking", a WordPress plugin that includes various features that are needed to fulfill the requirements of the client.

WordPress, as well as the plugin, enables a fast implementation of most of the requirements. Additional features are going to be added by modifying the plugin. The choice is further supported by security and maintenance concerns we will discuss later.

Booking management includes scheduling, placing and cancelling bookings. Various features like photo identification, payment aspects, and user experience also play a crucial role but will be discussed in the following.

Property Management

Properties need to be created, modified, managed, and in some cases deleted. These features are already realized in the "Hotel Booking" plugin and only need minor adjustments for specific requirements.

Providing a map with the location of the properties is required and will be added using the Google Maps API. This ensures availability and maintainability. In addition, it is the most common provider of map services, which is beneficial for the user experience.

Account Management

To use the booking system, it will be necessary to implement multiple user groups with different permissions. This includes user groups for system administrators, property owners, and customers.

In this case, the plugin also provides various features already implemented. The configuration of the permissions will be guided by the requirements specification. Managing the user profiles will be available to all user groups and ensure that information about the user can be updated anytime.

User Experience

As previously stated, the client wants to provide an authentic New Zealand and Māori themed user experience. We are using existing WordPress themes and adjusting them to fit the wanted design. Making use of child themes will ensure the maintainability and configuration of specific website features.

Feedback and rating features will be added to make the user experience more interactive and give a sense of participation to the customers. Additionally, the website will be available in multiple languages to increase accessibility. Combined with the features and aspects we discussed before, this makes the booking experience intuitive and convenient.

Photo Identification

Before a booking can be placed there is a need to authenticate the customer. We offered multiple possible solutions in our proposal. Various benefits and drawbacks of each were mentioned. We recommended using a third-party authentication plugin for WordPress. This plugin would provide real-time authentication supporting various IDs, driver licenses, or Passports.

Out of financial and time management reasons we decided to implement an alternative solution but recommend updating to the third-party tool when needed.

We will provide an upload feature where an ID, driver license or passport can be uploaded. After manually checking the validity of the uploaded document the user gets marked as being authenticated and is able to use the booking system with all features.

Payments and Refunds

The last missing step to successfully place a booking is the implementation of payment functionalities. We decided to use a third-party plugin to achieve this because of security, privacy, maintainability, and reliability concerns. Depending on the final plugin used, we can provide the payment with various payment methods.

Depending on the refund policy the client wants to implement we decided to notify the property owner or system administrator to handle refunds manually. The limited time frame of this project and financial concerns led to this decision, but certain payment plugins can handle refunds automatically and can be implemented in the future.

Privacy and Business Laws

The choice of using the WordPress framework and plugins is beneficial when discussing privacy and security issues. The widespread use of these services and big community provides a high amount of privacy and security features. Regular updates and fixes of known security problems ensure that the web application provides privacy and security of data. Additionally, we don't store payment related data in the databases. The uploaded documents for identification will be deleted after validation. Industry standard encryption methods will be used for any sensitive data stored in the databases as well as password protection for accessing data and user accounts. Combined with access permissions, this ensures privacy and security.

Because the development team is consisting of only International students, we rely on the project manager and client to ensure that we follow all business laws related to our application. Contact details will be added to the website to make sure customers can notify the system administrator.

Key areas of Application Issues

Maintainability

The extensive use of third-party plugins and the WordPress framework ensures that maintaining the application is easy and should work without the need for adjustments. Child themes prevent any changes in the display of the website when updating parent themes. In cases of problems, the community of the plugins and WordPress can provide support and possible solutions. We suggest checking for updates for plugins and WordPress on a regular basis to ensure security and usability.

Depending on the final hosting solution, we also encourage the client to regularly check for updates for the database and server.

Maintenance after rollout is not part of the scope for this project.

Scalability and Performance

The restricted use of the web application to properties located in New Zealand will probably not pose any problems concerning scalability and performance. Comparing different hosting providers can minimize possible problems.

Choosing the hosting provider is not part of the scope for this project.

Security

Already stated when discussing privacy and business issues, we ensure security by using commonly used plugins for the WordPress framework. Regular updates combined with encrypted databases with access restrictions and permissions provide the security needed to fulfill legal requirements.

Additional security measures can be provided by the hosting service and should be considered.

Reflection and Analysis of Program Specifications

Booking Management

The Booking management reflects the main process of this website and includes operations like viewing and booking various properties by the clients. The offered sites are not only owned by the property owners but also managed online by them so that property owners can showcase their sites in their desired way.

Users (clients/owners)

To create this distinction between usual website users, property owners and website administrators, we utilize different user accounts. Basic functions like viewing properties and general browsing of the website can be completed without the need to log in to any account. Any further action, for example the actual process of booking a property requires a logged-in user. Depending on the WordPress plugin that will be used, the User Management Process is already being handled and only needs slight adjustments or it must be implemented using a separate WordPress Plugin. During this particular process, the website user either creates a new User Account or logs into an already existing account. The required credentials are the username/email address and a corresponding password. The accounts of the property owners have special permission and allow them to publish site offers, edit, and delete them. These special accounts can be acquired by contacting the client, who will be able to create these particular accounts and can forward the credentials to the property owners. All the accounts and their corresponding roles are stored within a database, which needs to be maintained by the client.

Scheduling

As on most rental websites, the scheduling of the different bookings is essential for a successful booking process. As with most other functions, the scheduling will be handled by a WordPress plugin, which will provide a calendar for the user to choose the desired checking dates. Since the users can only book stays for three or four days starting on Monday and Friday, all users will only have a restricted selection of available dates to choose from during the booking process. In most calendar and Hotel Booking WordPress plugins, this feature of minimum and maximum stay is already included and can, therefore, be used as it is. It is important to know that Longterm stays are also possible but need to be negotiated with the property owner directly. The property owner, then, has permission to schedule the site for a longer period of time, which is not possible for clients during a normal booking process.

Summer and Winter rates

With higher interest and booking activity during the main season (summer), some property owners might want to adjust their prices depending on the current season. Luckily, this feature is already established in most Hotel Booking WordPress plugins. Therefore, no additional code needs to be written to fulfill this requirement and the property must not even change the prices themselves, since the prices change automatically for most plugins.

Photo Identification

As mentioned before, Photo Identification is a requirement that needs to be met, but can be implemented in many ways. As a beginning, we want to implement an upload field, where the identification document needs to be uploaded to. This field is a critical requirement during the booking process and the property booking cannot be completed without an uploaded file. The identification of the user needs to be checked manually by the Property Owner. In future steps, this process can be upgraded with an automatic check of authenticity but will probably generate additional fees for the client.

Ratings and Feedback

Ratings and Reviews of the different properties will be shown as part of each offered site. There are multiple ways to implement the feedback system and those need to be discussed with the client (Haukainga Home Winds) prior to development. We suggest a system where users need to log in and then can give feedback to any offered property. We rely on the users to only give feedback to the sites they visited, but it is still possible to rate other properties. This feedback consists of basic a five-star rating and a comment section, where users can comment on their experiences of the property. To delete fake reviews (people giving feedback to places they did not visit) or remove the entire feedback section, the system administrator and owner of the website need to be contacted. This approach should work fine, when the number of fake reviews is low. In case the number of those reports increases, we suggest a system where the Property Owners control their own respective feedback section. It is important to note that the latter approach will not be implemented as part of this project but can be added in future updates.

User Management

User Management is a key feature in every rental/booking website. Allowing different users to perform exclusive tasks is essential to build a functional booking website. This website will have three different User roles, which each have distinct permissions, when it comes to operating on the website.

First and the most basic account, is the basic user account (client). Users of the website who wish to book a property first need to log in or create an account. For creating an account, the client must enter his/her name, birthdate and email address. These pieces of information are mandatory to check the authenticity of the Photo Identification, which is part of the booking process.

The second account is the Property Owner account, which allows the user to publish, edit and delete personal properties (see Property Management). These accounts cannot be created by the property owner but must be generated by the system administrator. The procedure ensures that only selected people can showcase their properties on the website. To receive such an account, the client (Haukainga Home Winds) needs to be contacted. After contacting the owner of the website and potential inspections of the property, it is up to the website owner, if he/she wants to give out the account. The system administrator can easily create these special accounts by generating a new account and setting the role to "Property Owner".

The third type of account is the system administrator. This account has full control over the website and performs all the system administration tasks (see System Administration). Since this account can alter every aspect of the website, it is important to use this account only when it is required.

All these accounts are essential for the smooth operation of the website. The most basic features, like viewing offered properties or generally navigating through the website can be done without any active account.

Property Management

As mentioned before, Property Owners need to be able to add, edit and remove their personal properties. Property details, which can be adjusted by the individual Property Owners include the name of the Property, the location, the owner, the size, the number of rooms, a general description of the site, the price, pictures, etc. Since we heavily rely on existing WordPress plugins, this key feature must be available in the plugin we finally choose. Because it is one of the most important requirements of any rental websites, most plugins come with the necessary functionality in this regard, meaning that only small features need to be added manually. This includes the integration of Google Maps to the different properties. This feature is often not included by default but can be added to the website using additional third-party WordPress plugins. One example of those plugins is “WP Go Maps (formerly WP Google Maps)” which uses the Google Maps API and relies on so-called short codes to project the created maps onto the website.

System Administration

System administration is a major part of web development, which greatly increases in significance after the development process of the website. In general, there are multiple tasks a system administrator needs to take care of. One of the most important tasks is the maintenance of the website. This includes bug fixes, updates, error handling, etc. All these tasks are essential to keep the website updated and to reduce the risks of cyber-attacks. Since the client is personally not capable of fulfilling this function, we suggest getting in touch with an experienced IT employee to handle these tasks.

When it comes to the system of the website itself, there are additional choices that need to be made by the client, where we, as the developers, can only recommend certain solutions.

One important aspect is the act of hosting the website. For this project, there is no need to set up a personal webserver to host the website. This approach would not only generate additional fees for the client, but also increase the workload for the system administrator. In contrast, we recommend hosting the website on a third-party platform, which is rather cheap depending on the platform and the maintenance of the entire hosting process does not need to be handled by the client.

The next step of setting up the website so that it can actually be used, is to get a domain name. There are several websites where domain names can be leased (the client has the right for the specific domain name only for a certain period of time). The name of the website needs to be determined by the client prior to hosting the website.

During the operation of the website, there must be a distinct separation of concerns between the system administrator and the Property Owners within the website.

Property Owners can only adjust the details of their personal properties. They have permission to add new properties and delete them at any given point in time. How to handle newly added properties is up to the client, cannot be developed without communications with the client. One example might be a system where the Property Owner needs the approval of the system administrator to publish a new property. But as stated before, this system will not be implemented, and Property Owners can offer as many sites as they wish.

It is essential to note that apart from their personal properties, the Property Owners cannot affect the website in any other way.

This task belongs to the system administrator, who has permission to navigate through the website freely with the possibility to change every aspect of the website. This includes changing the details of the various properties. But as mentioned, this part of the website should be managed by the Property Owners and should only be entered into by the system administrator in rare circumstances. Other than that, it is the task of the system administrator to keep the website running smoothly and make changes, which will affect all users of the website (for example adding new features for the Property Owners to use).

In addition, the system administrator has extra tasks like creating the account of the Property Owners, deleting hateful or insulting reviews, and keeping the databases secure and updated.

Data Management

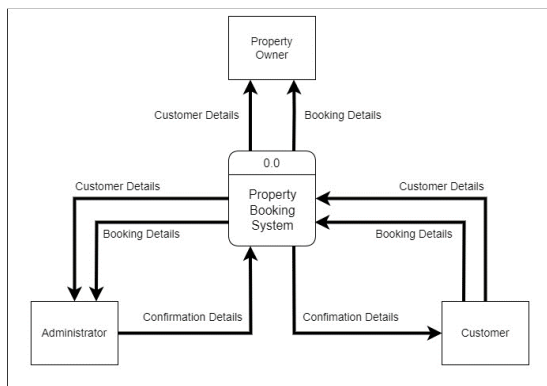
Data Management is not just important for booking websites, but for any online applications, where sensitive information is stored. During the development process and the maintenance phase, keeping the database updated, restricting access to the sensitive information and choosing strong passwords are fundamental to prevent sensitive information from leaking to the public.

The system administrator needs to ensure that the right accounts have access to the databases. In detail, this means that only the administrator is allowed to access the database with personal information. Property Owners and regular website Users will not be able to access any sensitive information. This does not mean that they cannot change their personal data, but rather that they cannot actively access the database and make changes there.

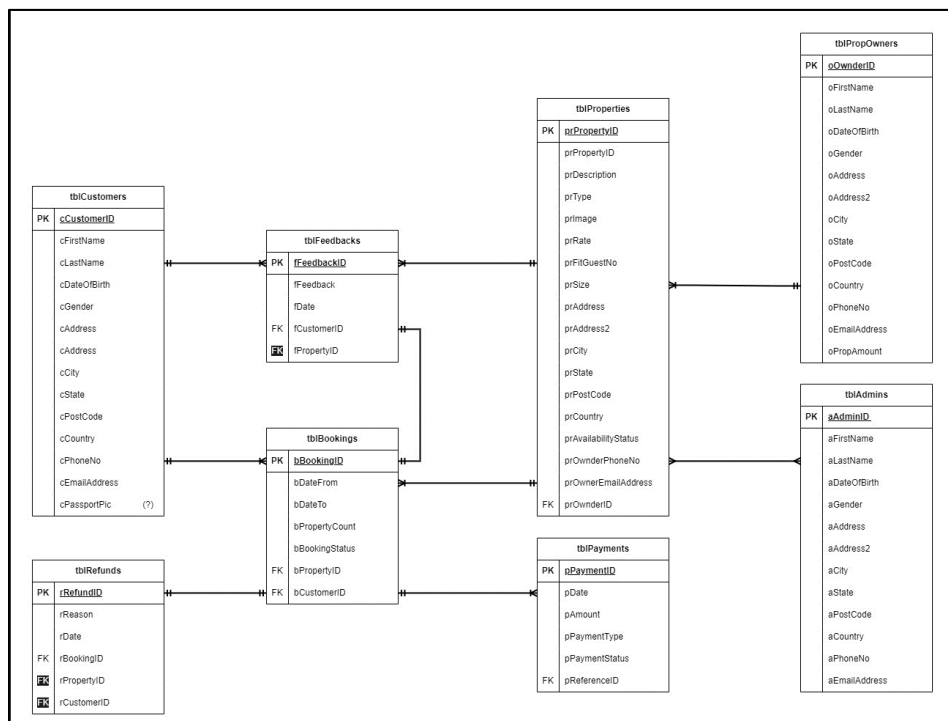
This sensitive information includes details about customers, Property Owners, system administrators, payments, refunds, bookings, feedback, etc. Closer specifications about the stored data can be observed in the ERD diagram.

It is of utmost importance that the storage of personal information is in accordance with the privacy act of 2020. Ignoring this privacy act puts the client in a position for a possible lawsuit, which might have grave consequences.

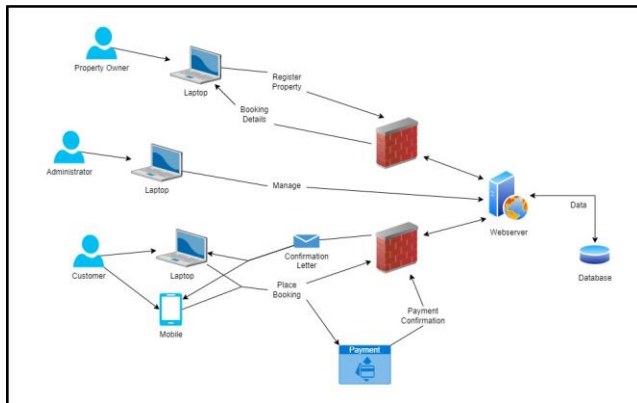
Data Flow Diagram Lvl 0



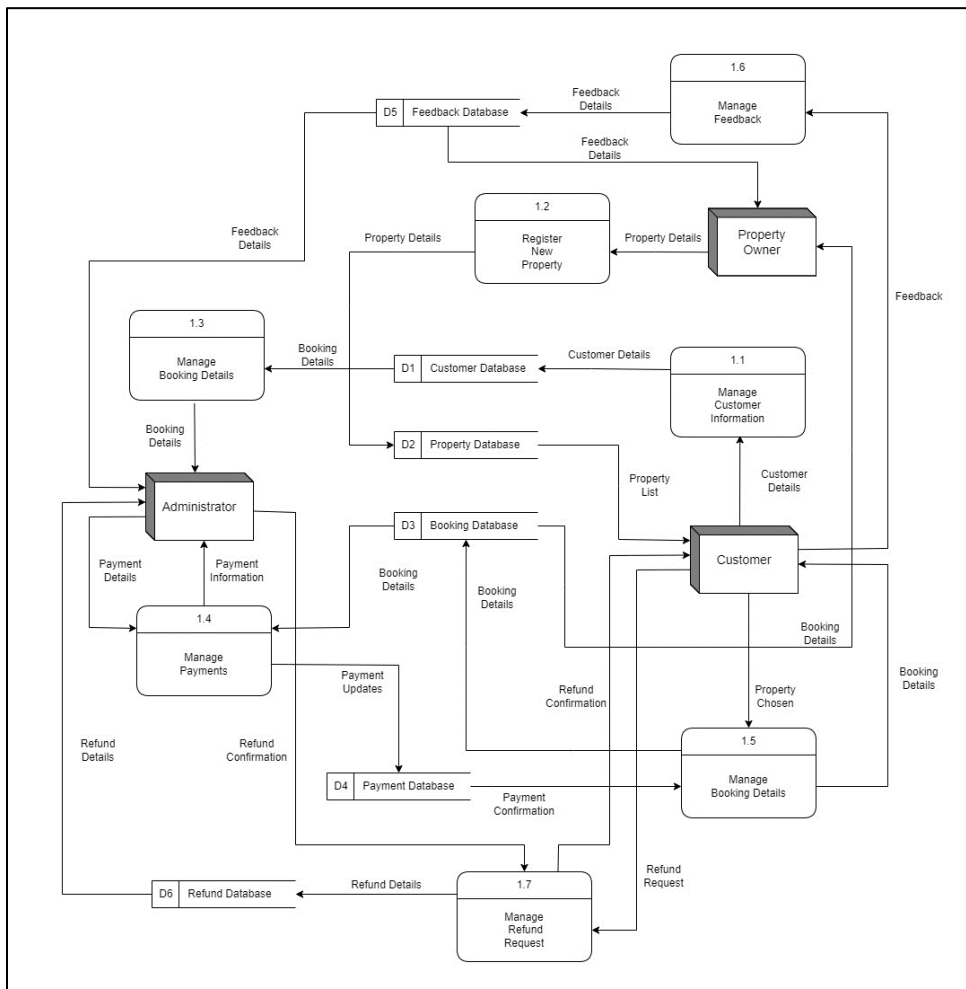
Entity Relationship Diagram



System Architecture Diagram



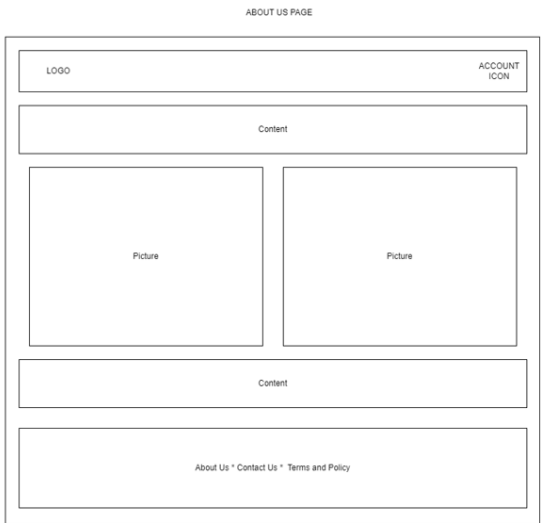
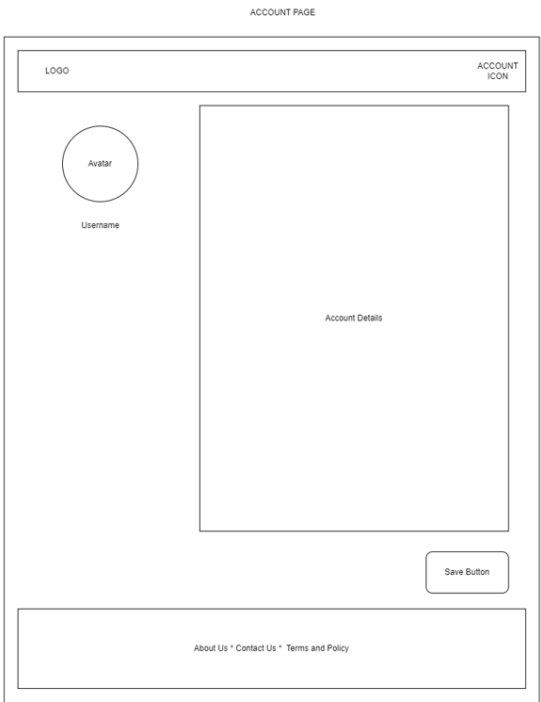
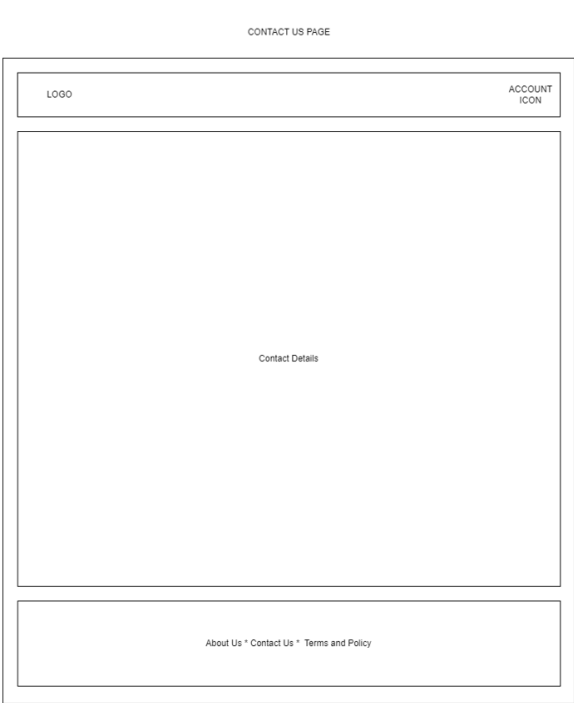
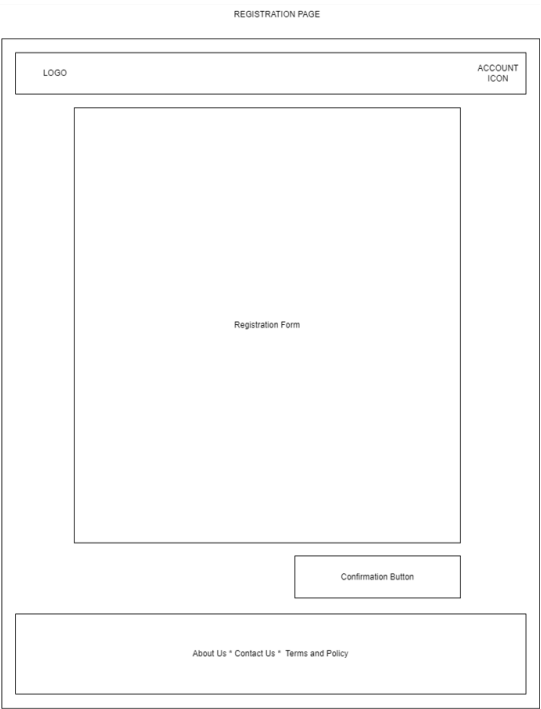
Data Flow Diagram Lvl 2

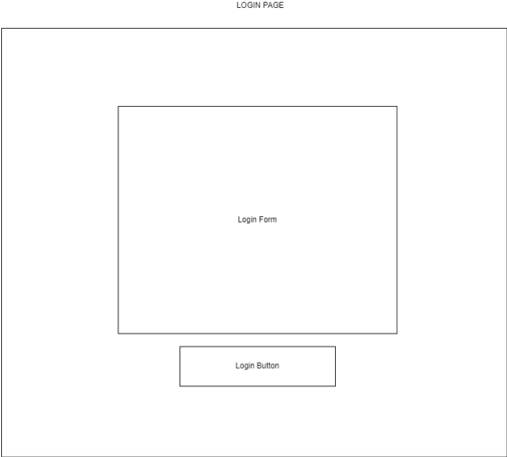


Design Documents

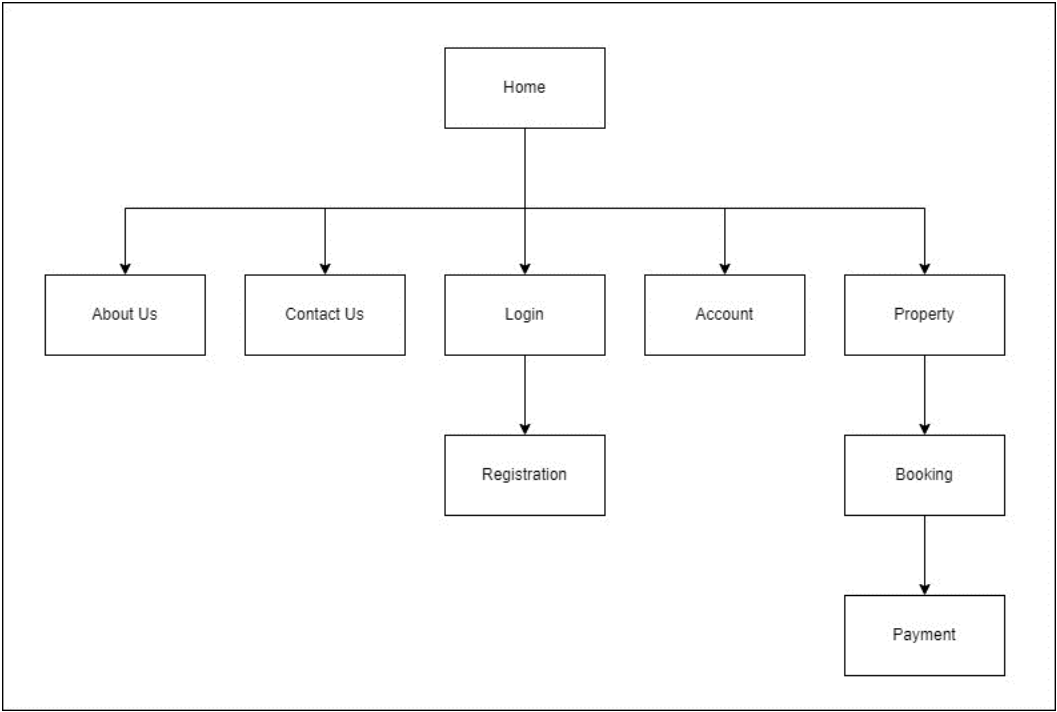
Wireframes



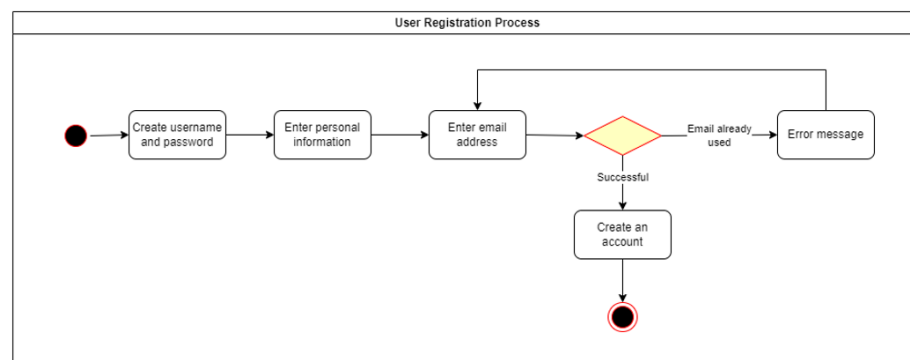
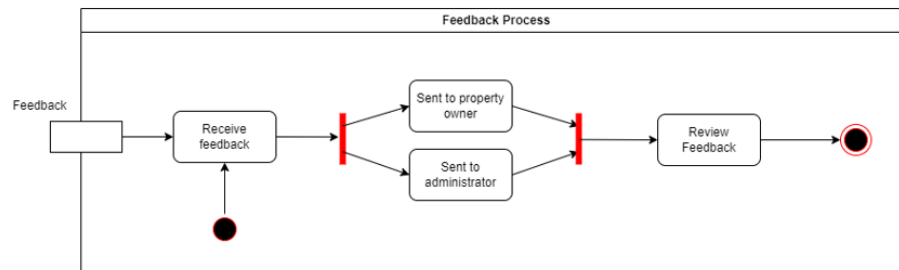
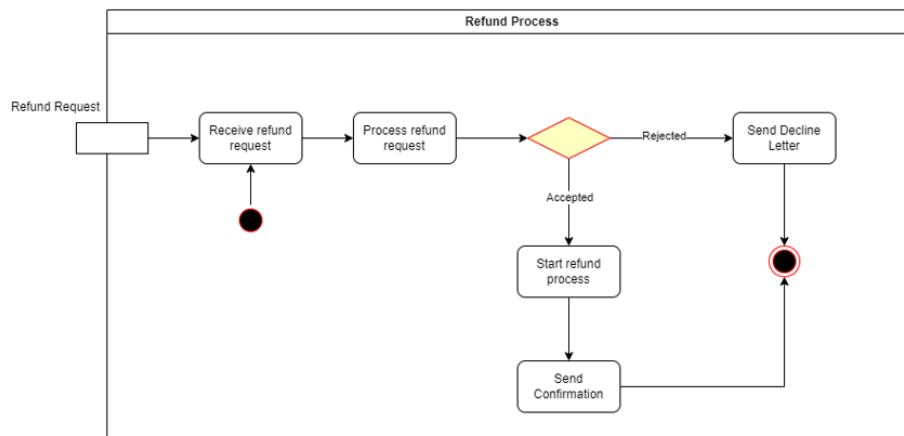
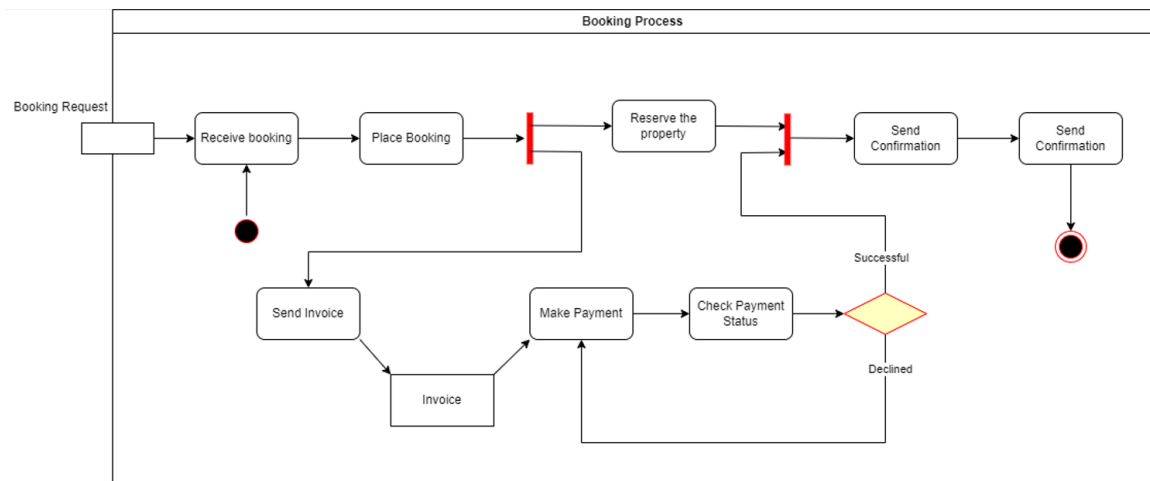




Sitemap



Activity Diagrams



Testing

Testing our Web Application will play a crucial role before handing the project over to the client. We will make use of different testing categories to ensure functionality, usability, and security. We used the OWASP testing framework for inspiration, but out of the limited time frame and scope of this project we are conducting specific tests to match our requirements.

Integration Testing [IT]

Integration Testing will make sure that WordPress and all third-party plugins and code are compatible and working as intended. This Test will be conducted during the development phase and will help reduce the risk of problems linked to integration points of plugins and external code.

Testing scenarios that involve multiple components or plugins will be executed, observed, and documented. An analysis of the results will determine if there are issues in need of debugging and potential re-testing.

Any changes will be documented and monitored throughout the development and implementation process.

Usability Testing [UT]

At the later stages of development, we will conduct several testing scenarios to ensure that the web application is working as intended. The criteria that have to be fulfilled can be linked to specific requirements stated in this document and the project proposal.

Observation and analysis of the testing results can guide further improvements and re-testing. Multiple iterations of testing, observing and improving the application can be performed until criteria are sufficiently met or the issues are resolved, not part of the scope or not important enough for further consideration. This prioritization plays a crucial role considering the limited time scope of this project.

User Acceptance Testing [UAT]

The UAT will be conducted before we hand over the project to the client. It will make use of scenarios used for Integration and Usability Testing as well as introducing new scenarios for specific user groups.

At this stage, not only the development team is conducting the tests. We will ask people without any knowledge of the application or project in general to go through the testing scenarios. This will make sure that not only functionality, usability and security issues are resolved, and the user experience matches the expectations of the client.

Observation, documentation, interviewing the testers and implementing changes with additional re-testing will be necessary. All this will be tested in the development environment, because the final implementation on a hosting service or server is not part of this project's scope.

Scenarios

The testing scenarios include various use cases of different user groups. All these scenarios will be conducted for UT and UAT. When IT is necessary it will be stated.

Customers:

- Creating, modifying and deleting a user account
- Place a booking for a property (includes usage of payment services) [IT]
- Give feedback on a property
- Cancel a booking (includes usage of payment services) [IT]
- Using the Photo Identification [IT]
- Navigation using map features [IT]

Property Owners:

- Create, modify and delete a property entry
- Modifying property owner account
- Manage the property (scheduling) [IT]
- Manage bookings [IT]

System Administrator:

- Creating and deleting property owner account
- Access and manage databases [IT]
- Deleting feedback
- Verifying Photo Identification [IT]
- Refund cancelled bookings [IT]

General:

- Access all sites on the Website
- Using navigation and search functions [IT]
- Contacting property owners and administrators [IT]

Conclusion

During the documentation phase of this project, we encountered some obstacles, which we needed to understand, document and find solutions to.

This includes decisions like writing our own plugins, how to combine various plugins, what requirements are important for an effective operation of the website, how we are going to test all the documented requirements, and so on. Regarding self-written plugins, we decided to create a WordPress website by fully relying on third-party plugins. We concluded that by efficiently combining these plugins, we will have better overall quality than by creating our own software from scratch. Through communication with the client, we try to include as many requirements as possible and, therefore, provide the client with a high-quality product at the end of this project. By documenting these aspects, we are prepared to begin the next phase of this project: the development of the website. This phase brings together all the acquired documents to form the final product which will be delivered to the client.