Information Systems Developer ICA

Element 1: Group Report

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Teesside University / Management Development Institute of Singapore

Information Systems Developer (**CIS2007-N**)

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Acknowledgements

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We would also like to thank the developers at Mendix for creating the external plugins that contributed to the development of our application.

1.0 Introduction

Managing finances can be a major chore for small businesses and freelancers. With limited resources, completing work and managing finances can be difficult for those working alone or in small teams. An accounting application that can help in keeping track of finances would greatly benefit the productivity of said businesses.

The application is to be developed to be deployed as a product for SimpleBooks Inc. for users to access through the Internet. The users would be expected to sign up for their own accounts to access the service for their own use.

1.1 Group Members

Our group consists of five members: Si Thu Zaw, Tapan Thakar, Raghav Kapoor, Yang Chen, and Hemanathan Sathiamoorthy. Each person has been assigned general roles for the project; Si Thu Zaw is the team leader, Raghav is the group secretary, and Tapan, Yang Chen, and Hemanathan are the group members. The resumes of all group members are attached in the report (Appendix A).

1.2 Project Proposal

To develop a cloud-based application for managing finances with built-in functionality to categorise transactions and produce invoices for small businesses and freelancers. The application lets the users keep track of expenses on projects, produce professional-looking invoices to send to clients with links for payment and generate reports on the finances of the business on the platform. As the application is aimed at those whose work is more based on commissions such as freelance artists and music producers, the transactions are categorisable into their respective projects so that clients can see the costs associated with their commission more clearly. Report generation tools are also built into the application so that the users can visualise their data in the form of visual charts and graphs for easy digestion of the financial data. Users can log in to the application as administrator and business owner.

1.3 Inspiration for Project

A significant influence that drove us to undertake this project was the printed advertisements on public transport and billboards publicising online accounting and financial management tools, which captured our attention towards them and led us to test out their features.

1.3.1 Overview of Software Accounting

There have always been ways in the past for people to account for and manage the finances related to their various projects, but ever since the growth of the internet, many businesses are transitioning to online tools for their accounting needs.

1.3.2 Market Opportunity

Since there is a shortage of such available tools and the proprietary nature and expenses associated with the existing ones, most of the accounting work by small businesses and freelancers is still being done either on the traditional pen and paper, or on computers which have differing amounts of available features, depending on the scale of the businesses utilising them (Bemont, 2017).This scarcity provides an incentivised motivation to develop such an application with the central accounting features and market it to the masses at an affordable price point, hence gaining an edge over competitors in the market.

1.3.3 Impact of the Problem

As the freelancers and small businesses are still performing their accounting calculations handwritten on paper or in digital, unsynchronised files on the computer, the records are prone to having mismatches, inconsistencies and redundancies following human error, which could lead to business losses. This is a larger problem for freelancers because they usually do not have a dedicated team to handle the organisation of paperwork, and hence would have to waste invaluable time and energy to traverse through and sort it out.

1.3.4 Existing Approaches to Problem

However, there are a few other applications that offer solutions to the issue using different procedures, as discussed below.

1.3.4.1 Competitor Analysis

In this section, we are going to look at similar applications on the internet, examine their features and state what sets our system apart from them.

1.3.4.1.1 Financio

Financio is another cloud-based accounting tool that offers features for handling the finances of small and medium-sized businesses effortlessly. They provide a free 30-day trial of their Premium subscription which is a sufficient period to evaluate their complete set of benefits such as unlimited finance management, large file storage, and real-time and daily backup options (Asian Business Software Solutions., 2018).

Figure 1: Financio

Their application displays a condensed view of the user's finances on the dashboard, with illustrative graphics and informative charts. They also have a feature to calculate the GST for Singapore and Malaysia regions, which provides a more accurate calculation of the user's accounts. However, there is a lack of automatic invoices and time tracking, both of which are an essential part of financial accounting. Also, as it only has three languages, it is not exportable globally which restricts it to a much smaller market than if it had more language localisation available.

Hence, as our application is easy to use and provides the major accounting features including time tracking to our users for unlimited documents for free currently, it is better than Financio in that regard because it saves the user's valued time and increases their productivity.

1.3.4.1.2MYOB

MYOB is an online accounting and business services software, which is tailored primarily towards medium-sized companies. It has a simple user interface that has mostly remained the same, which lets new users get accustomed to it quickly and makes it comfortable to utilise for existing customers. Like Financio, it also provides support for GST invoices. It is available on both the desktop and the cloud and allows for inventory and business management. There are free trials available for all three versions, and there are tutorials and free online demos available to learn about the product itself. It also has multi-currency support in the Premier version (361 Degree Consultancy Pte Ltd, 2018).

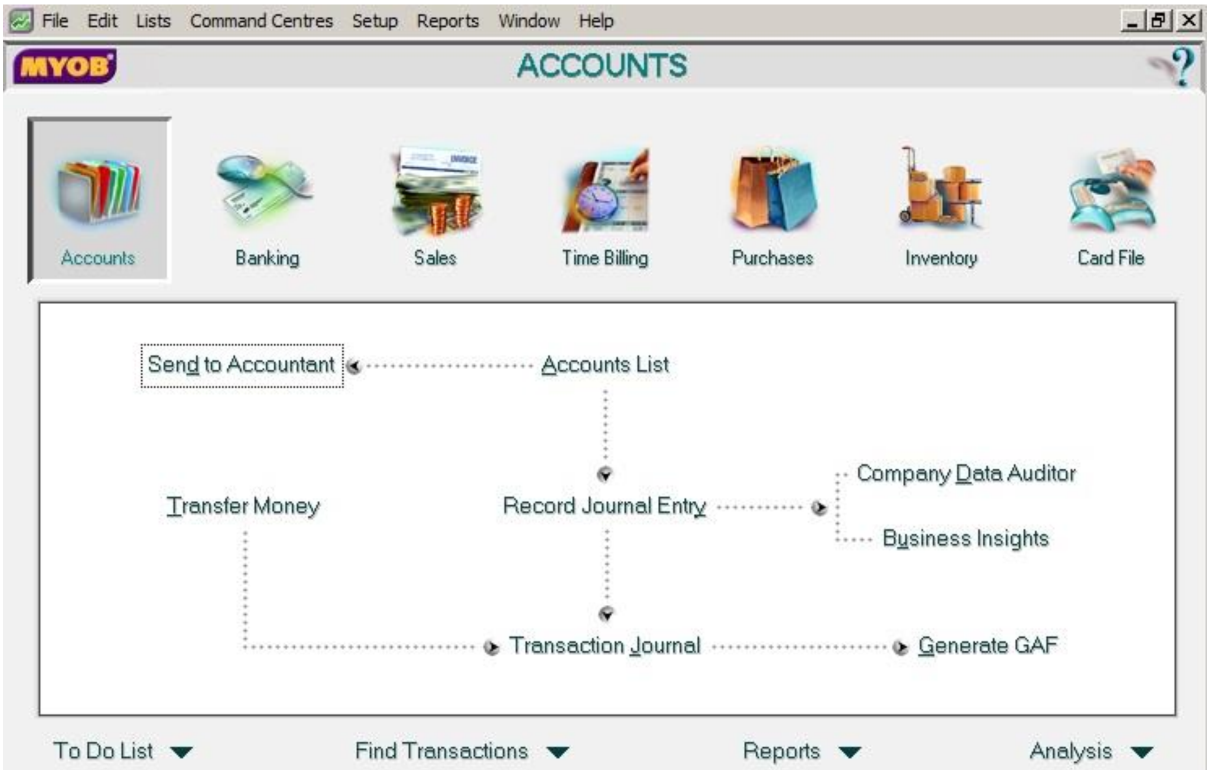

Figure 2: MYOB

However, it still mostly relies on the desktop edition as the cloud app is slower and not well optimised. It does not have a mobile version. Like Financio, it also lacks automated invoices and is only available in English. Not only is it outdated, but also the support and add-ons are not included and must be purchased separately, which implies that there are extra costs than just the regular software prices. On top of that, the pricing for the base software is extremely exorbitant for the limited features it offers.

With all that said, nobody but our app does it better at a more affordable price for the customer.

1.3.4.1.3 Sage50c

Sage50c is a web service that provides stock inventory management, and the ability to create sales and purchase orders. Like the other reviewed services above, it also offers a 30-day trial and money-back guarantee to test it out. It has different versions for small (Business Cloud Accounting), medium (50cloud Accounts) and large (Business Cloud Financials) sized enterprises, which allow the company to choose the one that fits them best (Sage Group plc, 2018).

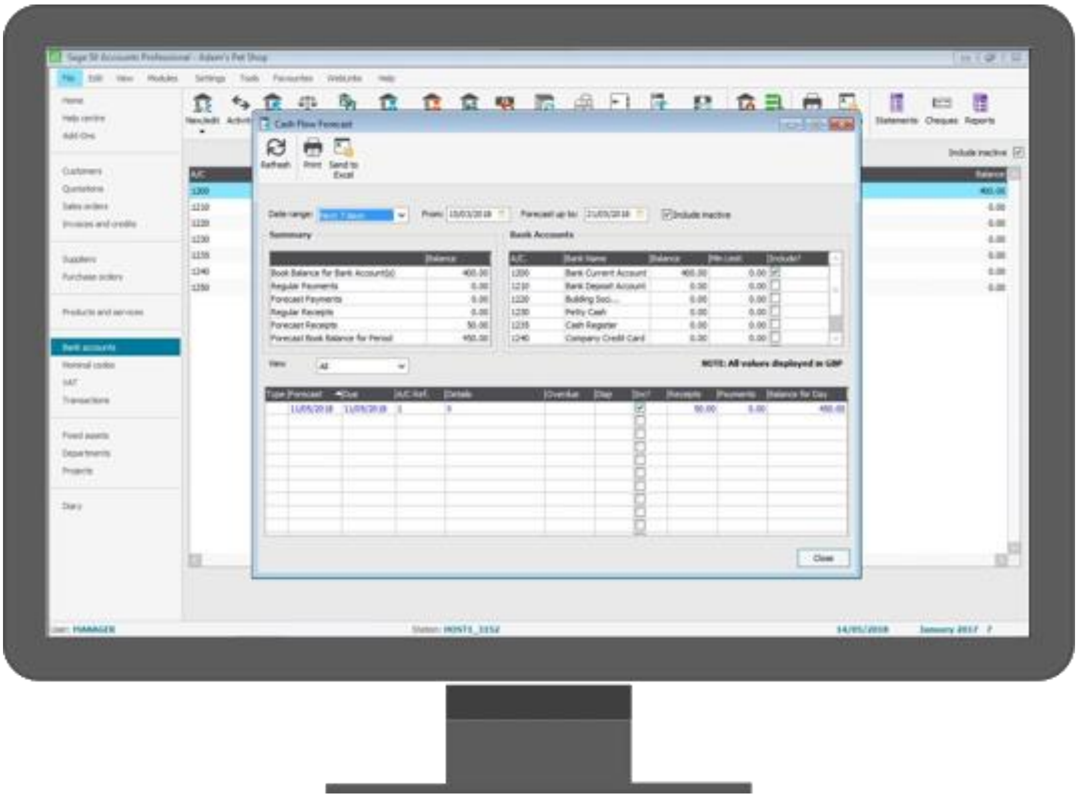

Figure 3: Sage50c

Though it is cloud-based, it still provides the same functionality as a desktop counterpart. However, it does not include automatic invoices, and time or resource logging to track productivity for better efficiency management.

As such, it has some useful features beyond what we offer, but it lacks some key features that differentiate us from most accounting programs.

1.4 Standards and Procedures

As an online service provider, SimpleBooks strictly adheres to the codes of conduct and practice set forth by the British Computer Society (The British Computer Society, 2015).

A short set of some statements in the code of conduct are as follows:

1. Public Interest

a. Have due regard for public health, privacy, security and well-being of others and the environment.

b. Have due regard for the legitimate rights of Third Parties

c. Promote equal access to the benefits of IT and seek to promote the inclusion of all sectors in society wherever opportunities arise.

SimpleBooks duly follows this section by making adequate security provisions on the application to protect the privacy of its users, properly acknowledging any external source codes utilised and granting access to its complete set of features to all registered users on the application.

2. Professional Competence and Integrity

a. Only undertake to do work or provide a service that is within your professional competence.

b. Develop your professional knowledge, skills and competence on a continuing basis, maintaining awareness of technological developments, procedures, and standards that are relevant to your field.

c. Ensure that you have the knowledge and understanding of Legislation* and that you comply with such Legislation, in carrying out your professional

responsibilities.

d. Respect and value alternative viewpoints and, seek, accept and offer honest criticisms of work.

e. Reject and will not make any offer of bribery or unethical inducement.

We have followed this statute by developing an enterprise-grade application within the limited timeframe, accounting for the legal principles associated, providing an avenue to reach out regarding issues and feedback at our mailbox address mentioned on our contact page and non-compliance with bribes or unethical schemes of any kind.

3. Duty to Relevant Authority

a. NOT disclose or authorise to be disclosed or use for personal gain or to benefit a third party, confidential information except with the permission of your Relevant Authority, or as required by Legislation.

b. NOT misrepresent or withhold information on the performance of products, systems or services (unless lawfully bound by a duty of confidentiality not to disclose such information), or take advantage of the lack of relevant knowledge or inexperience of others

We comply with this section by strictly following the Data Protection Act 2018 and Computer Misuse Act 1990 and designing a reliable and dependable system with calculations and functions that are accurate to the best of our knowledge.

4. Duty to the Profession

a. Seek to improve professional standards through participation in their development, use and enforcement.

b. Act with integrity and respect in your professional relationships with all members of BCS and with members of other professions with whom you work in a professional capacity.

c. Encourage and support fellow members in their professional development.

We follow this section by continually learning new and advanced features of Mendix during the development of the application, treating all group members with a high level of courtesy and respect, and concerting a collective effort to develop the complete system.

1.5 Deliverables

This project will deliver the SimpleBooks application hosted on the Mendix cloud server and a Mendix project package (.mpk) file, access credentials for both versions of the application, an in-depth report detailing the analysis, design and implementation of the application, results of testing, accompanying user guides and other relevant project planning documents.

2.0 Aims and Objectives

2.1 Product Aims

The aim of the product is to simplify accounting, sending invoices and receiving payments for small business and freelancers. The users are able to log their expenses for individual projects/orders, send invoices that contain payment links and notifies the users when the invoices have been seen. The application also produces various reports such as monthly costs, revenue and profit for an easy overview of the business. The users will also be able to export the data from the system into common file formats such as Excel.

2.2 Project Aims

'Assignment of roles based on skills identified from Resumes'

At the start of the project, each of the group members was required to prepare a simple resume that listed their technical abilities which would be helpful to the project. The production of these resumes proved useful in allocating each members' tasks to contribute to the group project (Appendix A).

'Picking a group project topic from written individual proposals'

Each group member expressed their idea for the project by drafting a proposal for the application of their choice. The ideas suggested by them are given below:

Raghav - Video streaming and rental platform (Vidflix)

Si Thu Zaw - Accounting software

Tapan - IT Hardware e-store

Yang Chen - Restaurant order management system

Hemanathan - Video live streaming service

After considering all the submitted proposals, we decided to undertake Si Thu Zaw's topic of the accounting software, as we felt that it was a unique concept and that the market required an affordable online tool for seamless finance management (Appendix B).

'Implementing a good standard and methodology for development'

We opted to choose Scrum to develop the application after a careful analysis of different development methodologies, as it supported the agile approach, allowed for efficient organisation and was the best fit for our group size.

'Creating a polished application design'

We designed the different graphical components of the system such as the logo, icons and user interface to look consistent with the overall colour scheme, giving the application a visually pleasing look and feel.

2.3 Academic Aims

Development of this application will provide the members involved with experience in developing an enterprise-grade application suitable for real-world industrial implementation. It will utilise the skills and knowledge gained in previous modules such as Systems Design and Databases, Rapid Development Tools, Rapid Development Systems, as well as updated technical skill in operating the software to write procedures, constraints, custom code, etc. to fulfil business objectives. By the end of the project, the members will be more well-versed with Mendix, especially the integrated tools for team management, product ideas and requirements organization along with the development and testing tools.

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3. Development Plan

3.1 Choosing a Development Methodology

There are various methodologies available to use for developing a system, and as such, we will be going through the advantages and disadvantages of each and based on which, decide upon the optimal one to use for our project.

3.1.1 Waterfall Model

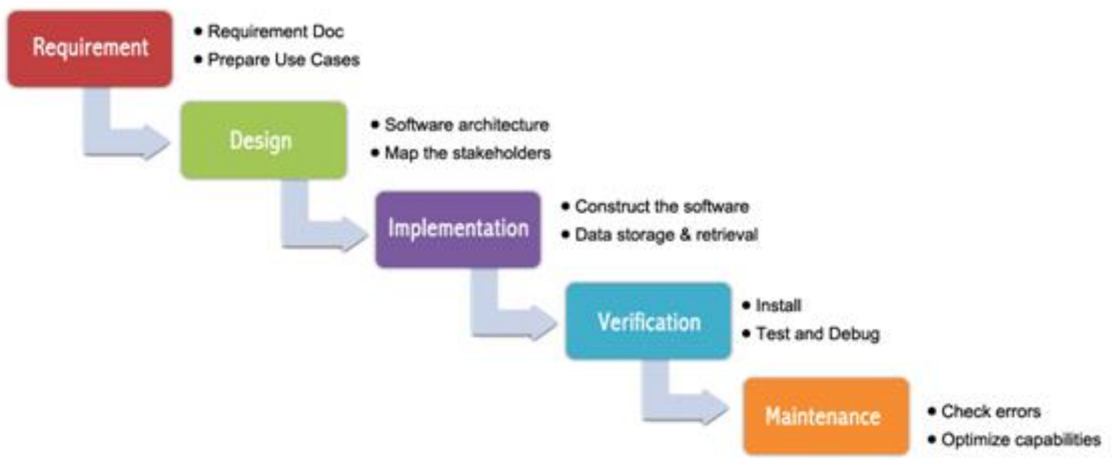

Figure 4: Waterfall Model

The waterfall model is a sequential working process that requires the completion of prior sequences before moving on. Due to being ordered linearly, there is an emphasis on deadline management, where each course is planned out individually to do within a time or budget limit. Done through written documentation that sets out precisely what is to be done by whom, by when, and the extent of the required content, it allows the leader to maintain the progress of the project efficiently, as everything required of the members is made clear on paper, instead of verbally or leaving up to the individuals. Due to the nature of this methodology, the members need to agree upon what is set out in the agenda, and there is thus a need for regular discussions (TutorialsPoint, n.d.).

Advantages	Disadvantages
It provides for easy verification of requirement progress.	It requires processes to proceed linearly; may be tedious to rollback changes to procedures.
Planning before executing results in little waste of time or money.	A glut of documentation causes greater time spent on keeping up to date on specific items.
It allows for easier management of the project.	Rigid control by leader means not much freedom in deviating from the documentation.
The product tends to be close to the promised artefact, due to following the written documentation rigidly.	Any problematic features tend to be discovered late due to linear scaffolding, causing time delays in application development due to implementing fixes at the last minute.

3.1.2 Prototyping Development Model

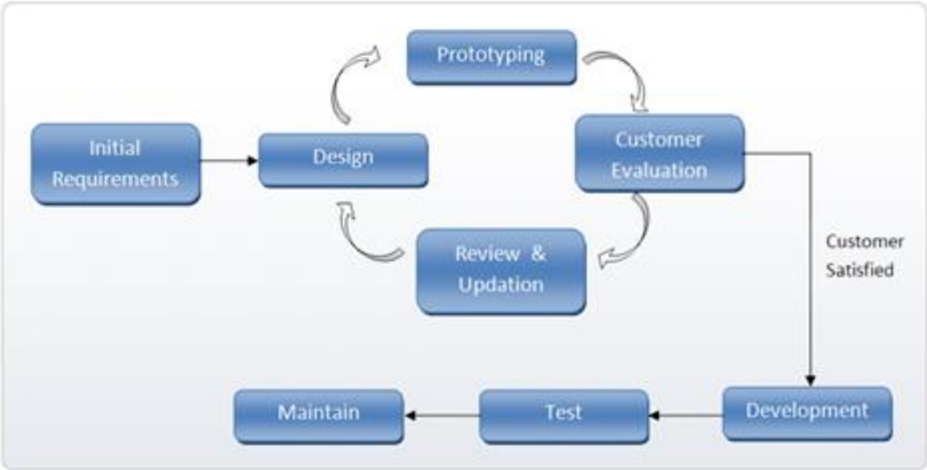

Figure 5: Prototype Development Model

The prototyping model is primarily used in conjunction with other methodologies to test the condition of needed features. Each part is tested separately, which allows fine-tuning and easy management before the completion of the actual project. In comparison with the waterfall model, where product testing is done almost at the end, prototyping provides for subsequent modifications to the program which allows for more flexibility in the design as well (TutorialsPoint, n.d.).

Advantages	Disadvantages
Early testing of features allows timely implementation of bug fixes.	Its flexibility leads to lesser control which makes it harder for the leader to oversee the project.
It is straightforward to fine tune with regards to user requirements.	Lack of documentation may make it hard to recognise faulty parts of the design due to the development of features initially.
Constant fixing allows for more flexibility due to making quick changes.	Needs of the system may change after creating the prototype.
It allows the showcase of features early on to the customers/users.	Working on features may result in an end system which does not work well together as a whole, as some testing of the critical parts may be left out in the first place.
Due to continuous work, it is easier to generate nouveau features as it encourages thinking out of the box.	

3.1.3 Spiral Development Model

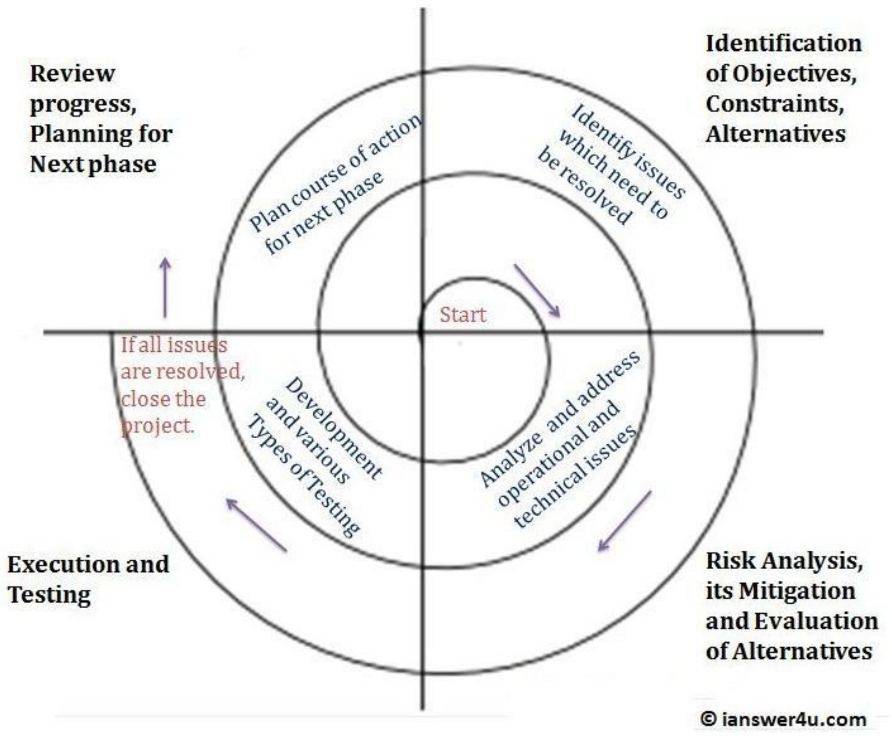

Figure 6: Spiral Development Model

The spiral model prevents project failure by making the risks involved more transparent by doing the work in cycles, which is done by planning on the purpose of each version of the project, brainstorming on any additions and their risks, minimising or removing the risks and implementing it, and subsequently producing the results and finally comparing them with the intended result (Boehm, 1988).

Advantages	Disadvantages
It allows for less risk by going through planning at every stage, as well as having a finished product that can be refined in later iterations.	Inconsistent workloads could result in not meeting deadlines due to lack of foresight on the possible time taken in each iteration.
It is also flexible in allowing the use of other methodologies, which may alleviate risks as needed.	Due to the combinative nature of this, it may inevitably turn into other methodologies completely.
	An experienced leader is required to use the relevant methodology effectively for each iteration. As a result, one may not utilise it often.

3.1.4 Scrum and Agile Development

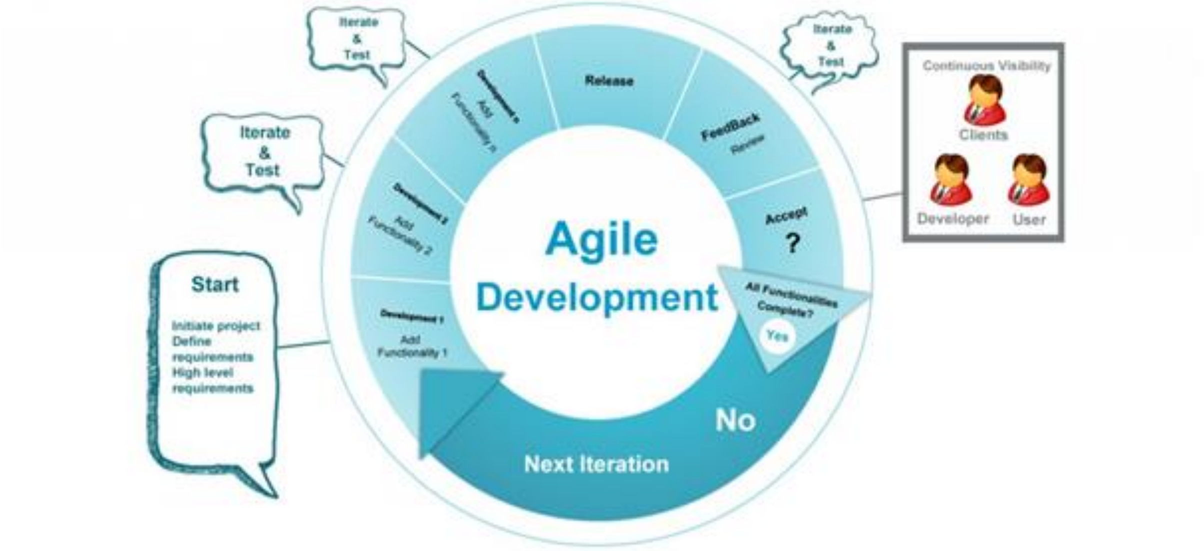

Figure 7: Agile Development Model

The scrum methodology identifies a set of tasks to make the product, each of which is assigned to and done by the group members, with regular meetings for progress identification, roles rearranging, risk identification and obstacles faced being brought up and discussed at the group level. Primarily, the group will have a scrum master who oversees the progress, and group members who will execute the tasks (though, for smaller groups, the scrum master might be doing more than just being a scrum master, and members might have more than one role too), with commercial projects involving the customer as well (Scrum.org, 2018).

Advantages	Disadvantages
It allows easy adaption to new requirements.	It does not work with a large number of people involved.
It is less resource-intensive and more people-intensive, leading to cost and time savings by doing tasks as and when needed.	It requires talented and motivated members and leader, as one person might have to juggle different roles and tasks as required, while the leader needs to manage task allocation and deadlines reasonably competently.
It allows for person-hours to be calculated easily from the company's point of view, and consequently, their pay and bonuses.	

3.1.5 Chosen Methodology

Based upon analysis of the above-mentioned methodologies, we have concluded that scrum and agile is the best fit for us, due to the deadline requirements, the small group size and having a competent scrum master who can oversee the management of the project, as well as members who are able to do their part.

3.2 Choice of Development Platform

3.2.1 Microsoft Visual Studio

Visual Studio is an integrated development environment built by Microsoft which allows users to develop vibrant and dynamic applications and websites for various platforms. It is based on the C# language and offers a flexible way to create a site by dragging and dropping simple pre-generated elements such as buttons to design web pages and providing options to users for customising their designs. Visual Studio also includes a good error debugging utility to find code bugs easily (Microsoft, 2018).

However, Visual Studio is a highly memory-intensive program, and its debugging tool sometimes falters while developing a website with ASP.NET as it reports vague errors which one cannot always figure out directly. Moreover, its exorbitant costs for enterprise applications made it an unsuitable platform for our group to develop the system on.

3.2.2 Wordpress

WordPress is an open-source online web development platform that allows users to create impressive websites and blogs simply and quickly, which makes it a popular choice, especially for beginners. It offers pre-made sophisticated templates to start with and enables users to customise page elements to design as per their wish. It also contains external plugins for powerful integrations with many different major third-party companies, such as Stripe, Google Apps, PayPal and Slack (Automattic, Inc, 2018).

The main reason that we didn't use WordPress to develop our application was that the relational database included with it is harder to manage compared to object-oriented databases. Additionally, there can be specific security concerns while installing any external plugins from unknown sources, along with its unfamiliarity and high pricing that deterred us from utilising it.

3.2.3 Mendix

The application will be developed on the Mendix platform, which is a proprietary Rapid Application Development tool used to facilitate app development using the Scrum methodology. It is a low-code application development software which provides a simple user interface to drag and drop different types of customisable page elements (Mendix, 2018).

3.2.3.1 Background Information

Mendix mostly uses a logic-based workflow for development of application functions. It provides various features for fast and easy application development, including designing custom and platform-specific app pages. It also offers high security as it gives options to make each element accessible by particular users, and error messages that are easy to understand, greatly simplifying the debugging process.

3.2.4 Why we chose Mendix

We are developing a cloud-based accounting application having significant features like client management, estimate, invoice and report generation, project control, expenses and time tracking for our group project. Users, mainly comprising of freelancers and small businesses, can sign up for an account, add clients to their client list, send estimates, start projects, account for expenses, send invoices and generate complete financial reports. We prefer to utilise Mendix for developing the system as it has powerful capabilities to create refined applications within relatively shorter time periods than conventional development environments. Having prior experience with using it in the previous module 'Rapid Development Tools' would also allow us to proceed faster with creating the app. We believe that this could be an opportunity for us to learn some advanced features of Mendix to assist us in developing a professional application with it.

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3.3 Proposed Project Development Plan

The following chart shows the project plan that we initially designed at the start of the project. It shows the timeframe for the tasks we needed to do, sections of the report we needed to write and functions of the application we intended to include in the project.

Estimated Project Development Plan	Proposed Timeline										
Activity	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14
Planning	o	o	o	o							
Review all project guides	x	x	x	x							
Complete Project Plan		x									
Assign Roles	x										
Prototyping Experimental Features	x	x									
Create an enterprise poster			x	x							
Analysis			o	o	o						
Project Specification			x	x	x						
Requirements Gathering			x	x	x						
System Modelling			x								
Choice of Methodology			x	x	x						
Background Information			x	x							
Competitor Analysis / Target Market				x	x						
Data Protection					x						
Design				o	o	o	o				
Color Scheme Development				x							
Site Map				x	x						
Entity Relationship Diagram					x						
Use Case Diagram						x					
Product Logo					x	x					
Font Selection				x							
User Roles and Access Rights				x	x	x					
Wireframes					x	x	x				
Mood Board						x	x				
Implementation						o	o	o	o	o	
Database Implemention and modification						x	x	x	x	x	
User Account Control and Login						x					
Function: Clients						x	x				
Function: Projects						x	x				
Function: Estimates / Items							x	x			
Function: Expanses							x	x			
Function: Invoices								x	x		
Function: Charts and Other Calculations										x	
Overview elements									x	x	
Field Validation											
Testing									o	o	o
User Control									x	x	
Functions										x	x
Visuals									x		
Documentation							o	o	o	o	o
User Guide: User							x	x	x	x	x
User Guide: Administrator									x	x	x
Presentation Slides										x	x
Critical Review									x	x	x

Figure 8: Initial Project Development Plan

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3.4 Actual Project Development Plan

The following chart shows the finalised plan to write sections of the project report and develop the application. As shown in the chart, we decided that writing about Font Selection was unnecessary and that we will continue using the stock font from Mendix.

Actual Project Development Plan	Status	Actual Timeline										
Activity		Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14
Planning	Completed	o	o	o	o	o						
Assign Roles	Completed	x										
Prototyping Experimental Features	Completed	x	x									
Complete Project Plan	Completed		x									
Review all project guides	Completed	x	x	x	x							
Create an enterprise poster	Completed			x	x	x						
Analysis	Completed		o	o	o	o						
Project Specification	Completed		x									
Requirements Gathering	Completed		x	x								
System Modelling	Completed		x	x								
Choice of Methodology	Completed				x							
Background Information	Completed				x							
Competitor Analysis / Target Market	Completed				x	x						
Data Protection	Late								x			
Design	Completed			o	o	o	o	o				
Site Map	Completed			x	x	x	x					
Entity Relationship Diagram	Completed			x								
Use Case Diagram	Completed			x	x	x						
Product Logo	Completed			x	x							
Font Selection	Terminated											
Color Scheme Development	Completed					x						
User Roles and Access Rights	Completed			x	x	x	x					
Wireframes	Completed					x	x	x				
Mood Board	Completed											
Implementation	Completed			o	o	o	o	o	o	o	o	o
Database Implemention and modification	Completed			x	x	x	x	x	x	x	x	
User Account Control and Login	Completed				x	x	x					
Function: Clients	Completed				x					x		
Function: Projects	Completed					x	x	x				
Function: Estimates / Items	Completed							x	x	x		
Function: Expanses	Completed				x		x	x				
Function: Invoices	Completed						x	x	x			
Function: In-App Emailing	Completed							x	x	x		
Function: Invoice Payments	Completed									x	x	
Function: Android Application	Completed									x	x	
User Interface	Completed							x	x	x	x	
Function: Charts and Other Calculations	Completed										x	x
Overview elements	Completed										x	x
Field Validation	Completed										x	x
Testing	Completed										o	o
User Control	Completed										x	x
Functions	Completed										x	x
Visuals	Completed										x	x
Other Documentation	Completed									o	o	o
User Guide: User	Completed									x	x	x
User Guide: Administrator	Completed									x	x	x
Presentation Slides	Completed											x
Critical Review	Completed											x

Figure 9: Actual Development Plan

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4.0 System Analysis

4.1 Terms of Reference

4.1.1 Statement of Purpose

The purpose of the project is to develop a cloud-based accounting application that allows the users to manage their finances efficiently. It provides the key accounting features such as client record keeping, project management, expenses monitoring, time tracking, payments, and estimate, invoice and report generation. Users can add their clients to a personal address book to track their contact information and send estimates and invoices to them. The application also allocates a project dashboard listing the projects of each user where they can effectively manage them, along with time tracking tools to determine time left until the completion deadline of the undertaken projects and maximise productivity accordingly. Coupled with expense reviewing, payment functionality and the documents generation, SimpleBooks acts as a cost- effective, full-fledged account management software.

4.1.2 Scope of Application

The application will be created and documented according to the specifications and features listed in this document.

The application will be deployed on the Mendix Cloud v4 as a Free app with storage limitations of 100 MB database, 100 MB file server and ten concurrent users. These are the limitations of utilising the community edition of the service, which can only be removed by purchasing a paid service plan starting from US$1,875 per month. (https://www.mendix.com/pricing/)

Concerning the features, the app is constrained to client management, project management, expense and time tracking, and documents (estimate and invoice) and report generation. The payments feature is partially implemented due to the limited timeframe of the project.

4.1.3 Intended Target Audience

The application aims to simplify the accounting needs of small businesses, and freelancers who work on a commission basis and majority of whom cannot afford to purchase licenses to use the currently available accounting tools online, as they are either expensive or proprietarily designed. It aims to provide vital finance management features in an easy-to-use system priced at an economical rate to expand its reach and offer great value to the users.

4.1.4 Issues to be Considered

4.1.4.1 Legal

SimpleBooks Inc. sources its code from open source projects on Mendix as well as those developed by our team. As such, it maintains our company policy of not infringing upon intellectual property as we do not use any code that is under copyright regulations. Copyright Designs and Patents Act, 1988 of United Kingdom, applies to copyrighted material made before its enactment. However, it is not relevant as the software used for accounting programs is usually post 1987 (Her Majesty's Government, 2018).

Any code that is open source belongs to the original developers, and we are using it under the license set by them, which generally is usage following the original license and also distribution following the terms and conditions set in the license if used as part of project, while any code written by us for the specific purposes of this app belongs to us under the copyright act as well.

SimpleBooks is an accounting application, and as such, it is not an accounting entity bound to the ACRA Code of Professional Conduct and Ethics for Public Accountants and Accounting Entities nor

IESBA Code of Ethics for Professional Accountants. However, the clients we serve will need to and while we will provide support for such services as well as taxes, we will not be liable for any legal issues liable to arise from non-compliance as it is the company's responsibility to do so.

4.1.4.2 Ethical

SimpleBooks will be privy to a lot of confidential data as part of facilitating services for the clients. This information would be useful to people who make use of such information to either conduct tailored marketing or hacking.

We will make sure that such information is only used for what it is needed and commit to not selling the information to any third-party organisations, as that would be unethical from the point of a business relationship with our customers. Also, we will not work together with companies that are not legally or ethically compliant as we would not like to encourage unlawful behaviour, and as such, if they ask us to go against the law, we will politely decline.

4.1.4.3 Security

Mendix development makes the internal use of the app more secure as the permissions for each user group can be tailored. However, some of the data will be sent to third-party corporations to facilitate the services, which could result in an external data breach if they have lax security.

Also, since some of the code is open source, it could result in hackers being able to breach our app through backdoor vulnerabilities present in that code. This deficiency will necessitate constant updating of not only our code but also frequent checks on the open source code to make sure it is not the weak link in our security.

4.2 List of Requirements

We have determined a list of requirements necessary to achieve the goals of the application we plan to create. The following list details the requirements sorted by various categories.

4.2.1 Functional

- Registration: An interface to allow would-be users to register for an account on the application.
- Login: Account access controls to allow users to login and manage their data on the application.
- Client Management: Pages to allow users to input and store their clients' information such as their contact information and their addresses.
- Logging Expenses: Pages and function for users to log their expenses on the application to have them represented in easy-to-read graphs and associate them to related projects.
- Estimate Generation and Sending: Pages and functions necessary for creating and sending estimates to users' clients through the application.
- Invoice Generation and Sending: Pages and functions necessary for creating and sending invoices to users' clients through the application.
- Payments: The function to let the clients of the users pay for the invoice sent to them through the system.
- Project Tracking: An interface and functions to allow the users to enter parameters about their project and have all the relevant information displayed.
- Account Settings: Function to allow users to edit their information and system specific parameters such as the time zone.

4.2.2 Non-Functional

- Interface: The user interface of the application needs to be easily understood and navigable for ease of use.
- Compatibility: The application needs to be reasonably accessible from various browsers, with different screen resolutions and screen sizes and from the mobile phone application.

4.2.3 System Availability

The application running on the cloud server needs to be accessible to the users with good reliability for 24/7.

However, this requirement cannot be achieved with the free version of Mendix cloud access we are using since it automatically shuts down inactive applications and take a short while to start them if a user wish to access them after a period of inactivity. This limitation can be easily removed if the application is migrated to a paid hosting service such as Amazon Web Services.

4.2.4 Security and Access Control

- Sensitive information stored on the application data such as passwords need to be encrypted with an appropriate algorithm to ensure the safety of the data.
- Functional access control mechanisms need to be implemented to ensure that the users can only access their data and intended functions allowed for users.
- Connections to and from the web application need to be secured with appropriate HTTPS protocol and certificates to ensure the security of the data.

4.2.5 Technical Requirements

- Web browser: Google Chrome, Microsoft Edge, Mozilla Firefox
- Internet connection

4.3 CASE Tools

4.3.1 UML (Unified Modelling Language)

UML is a modelling language that allows programmers to conceptualise their system designs as diagrams. Primarily, there are two broad categories of UML, structural and behavioural. Structural UML deals with the components or objects in the system and their interdependencies, while behavioural UML deals with the functionality of those systems. The former consists of component, class, composite structure, package, profile, deployment and object diagrams, while the latter consists of activity, timing, state machine, communication, sequence, interaction and use case diagrams.

Activity – Used for business process modelling to describe the flow of different activities and actions between users and the system, this can be both parallel and sequential. Primarily made of action, decision node, control flows, start node, end node.

Use case – Functional requirements and their relationships with actors (users or external systems). It is used to show the interactions between the system and the actors, the goals that the entities achieve, as well as the scope of the system.

Interaction – Specialised activity diagram with interactions made up of objects, the message flows and their sequences, and object organisation. Used to show the message flow and interactions in the system between the objects, the structural organisation of the objects and the dynamic behaviour of the system itself.

Timing – Duration based timeline diagram consisting primarily of lifeline, state timeline, duration constraint, time constraint and destruction occurrence. Can be used to improve efficiency in resources such as time and money by reducing the time spent in a specific phase that is longer than it should be.

State Machine – State charts that show the changes in the state of a system component based on events. Used to show how objects are affected by events, and how they change over the timeline. Made up of choice pseudostate, event, exit point, first state, guard, state, substate, terminator, transition and trigger.

Sequence - Depicts the architecture of the design system and their relations with each other, used mainly to understand the requirements for a new system or to document an old process. Made up of object symbols, activation box, actor symbols, package symbols, lifeline symbols, option loop symbols and alternative symbols.

Communication – Similar to sequence diagram but have association connections instead and are easier to modify, and they focus more on the messages between the objects. It consists of a frame, lifeline and message.

Class – Consists of classes, attributes and behaviours, used to document software architecture and to describe the system as a type of structure diagram.

Object – An individual instance of a class, which allows for a more in-depth analysis of class fields and inherent design. Made up of objects, class titles, class attributes and links. Used to test the class diagram and to see an overview of the system.

Component – Shows the structure and wiring of physical components in a system, and is shown through components, interface, dependencies and ports. Used to show the physical structure of the system and the service behaviour of the system.

Composite Structure – Represents a class' internal structure components and their relationships, and is made of up class, part, port, connector and usage. Used similarly to class diagram but parts instead of classes.

Deployment – Describes the physical deployment of information generated onto the hardware components. Typically used to show the mapping of software components deployed upon hardware components, an overview of the hardware system and relation between the hardware and the deployed software.

Package – Grouping of deployment modules based on similarity, and which consists of a package, packageable element, dependency, element import, package import, and package merge. It is used to show the structure of a design system at the package level.

Profile – A structure diagram which showcases the UML metamodel, and consists of a profile, metaclass, stereotype, extension, reference and profile application. Used generally for adapting a pre-existing metamodel.

4.3.2 UML Tool Used: Lucidchart

Lucidchart is a diagramming tool that we have used to draw the UML diagrams for the planning and documentation of the application. It provides a platform with numerous sets of UML shapes to make drawing complex diagrams simpler and to collaborate with the team so that multiple people can work on the same diagrams at the same time.

4.3.3 Wireframe Tool Used: Illustrator

Adobe Illustrator is a graphics editing software that is part of the Adobe Creative Cloud suite of applications. It allows the user to create various attractive visual elements such as logos, artwork and illustrations to utilise in different media. We used it to design our application's wireframes and the poster in depth and high-quality.

4.4 User Stories

4.4.1 Anonymous Visitor

- As a visitor, I want to be able to register for a new account, so I can access the application.
- As a visitor, I want to be able to login to my account so that I can access my information in the application.
- As a visitor, I want to be able to pay for an invoice sent to me by a user of the application so that the user is appropriately compensated for their services rendered to me.

4.4.2 User

- As a user, I want to be able to store data in the application so that I can access it anywhere.
- As a user, I want to be able to see my account data at a glance on a dashboard so that I can view a quick synopsis of it.
- As a user, I want to be able to add my clients' details to my list of clients so that I can easily manage their information.
- As a user, I want to be able to add multiple addresses to each of my clients so that they can be reached in case of multiple locations.
- As a user, I want to be able to log my expenses so that I can keep track of them and bill them to my projects.
- As a user, I want to be able to send estimates of projects to my clients through the application so that they can be informed of the approximate project costs.
- As a user, I want to be able to send invoices to my clients through the application so that they can send payments to me for providing my services.
- As a user, I want to be able to give a discount to my clients and have it logged in the invoice so that new and regular customers can be rewarded for their loyalty.
- As a user, I want to be able to request deposits from my clients through the invoice so that they can pay the full amount in increments.
- As a user, I want to be able to create a project so that I can log the time and money spent and track its progress.
- As a user, I want to be able to log the hours worked on each project to be billed so that I am appropriately paid for my services.
- As a user, I want to be able to add a recurring vendor to my expense entries so that I can see which expenses are spent on specific vendors.
- As a user, I want to be able to customise the tax percentages to be in line with my country's tax laws.
- As a user, I want to be able to upload my own company's logo to be used in estimates and invoices I send to my clients.
- As a user, I want to be able to assign categories my expenses so that they are better organised.

4.4.3 System Administrator

- As an administrator, I want to be able to manage users' logins so that I can help the users with their login problems.

- As an administrator, I want to be able to manage the application's email settings so that I can diagnose and fix problems with outgoing emails from the application if they occur.
- As an administrator, I want to be able to see the currently active logged in users on the application so that I can fix problems with session related bugs.
- As an administrator, I want to be able to see all the data in the database tables so that I can fix errors that occur in any processes.
- As an administrator, I want to be able to create another administrator account to allow another administrator in the team to manage the application.

4.5 System Modelling

4.5.1 Use Case Diagram

The following diagram shows the different users and the functions they can access in the SimpleBooks application.

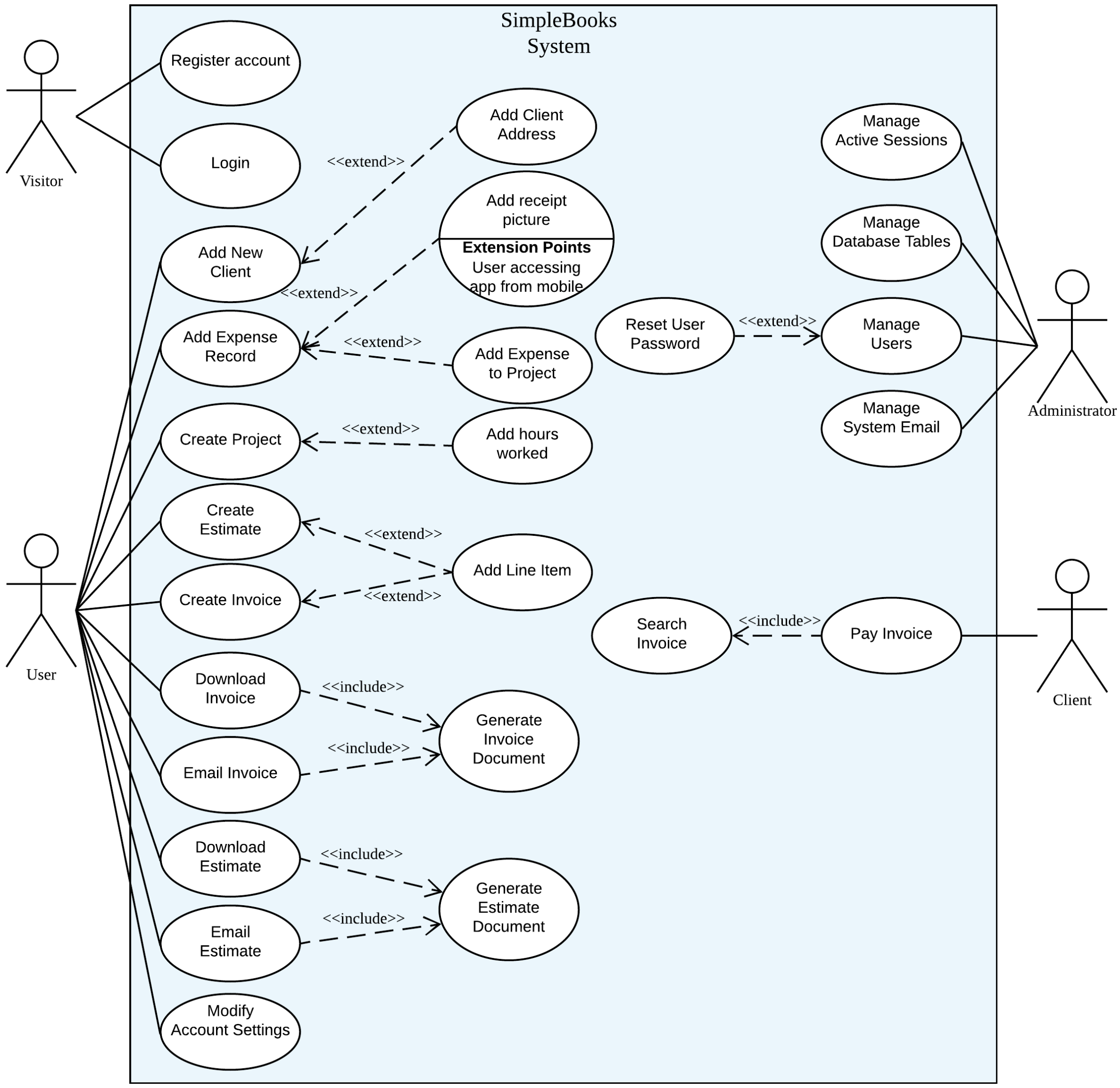

Figure 10: Use Case Diagram

4.5.2 Entity Relationship Diagram

The following diagram shows the associations between the main entities in the application and the attributes contained in them that we have created. However, it does not show the complete database necessary to operate the application as other system entities are also utilised for various functions in the system. The diagram would also make it appear as if there are many redundant associations between entities, but these are necessary in the HSQL database used in Mendix as the associations can only be used in one direction.

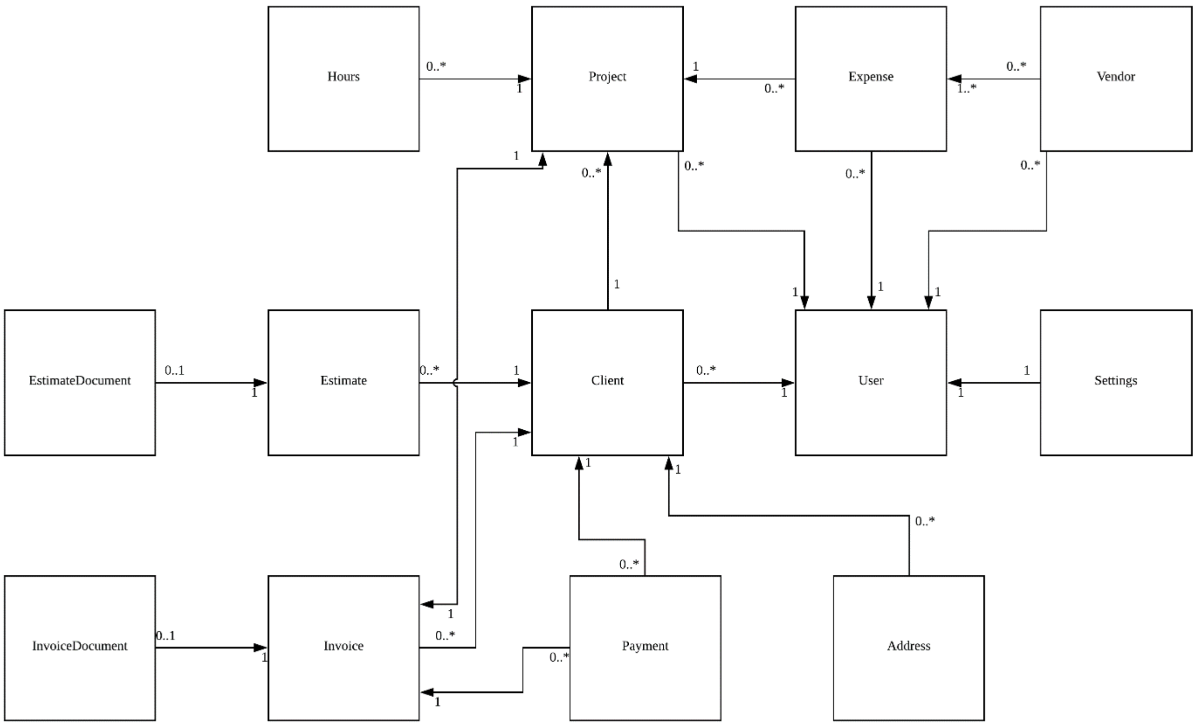

Figure 11: Entity Relationship Diagram

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4.6 Planned Sprints

Item id	Depth	Name	Story Type	Estimated Hours	Status	Description	Labels
2226927	Sprint	Sprint 1 (22/10/2018 – 04/11/2018)		25			
2226958	Story	As a user, I want to be able to store data in the application so that I can access it anywhere.	Feature	13	Complete		Database
2226961	+	Database table implementation.	Feature	13	Complete	The database tables to store all necessary operational data for the application.	
2226934	Story	As a visitor, I want to be able to login to my account so that I can access my information in the application.	Feature	5	Complete		Login
2226937	+	Create a login form.	Feature	5	Complete	This will be a simple form comprising of the Username and Password fields to log into the application.	
2226932	Story	As a visitor, I want to be able to register for a new account, so I can access the application.	Feature	7	Complete		Registration
2226935	+	Create a registration wizard.	Feature	7	Complete	This function will include series of forms guiding the users through the registration process by breaking up the required form entries into multiple pages. This is to make the process easier to understand to the user.	
2226938	++	Create registration form 1.	Feature	2	Complete	This page will include the form for the account's login details such as the username and password.	
2226943	++	Create registration form 2.	Feature	1	Complete	This page will contain the forms for details about the user such as their contact details.	
2226944	++	Create registration form 3.	Feature	1	Complete	This page will contain the users' company/business information such as the company name, address and contact information. This information will be shown to their clients through the estimates and invoices the users send.	

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2226946	++	Create microflows to link forms.	Feature	3	Complete	These microflows are required to pass the user object persistently through the registration wizard pages.	
2226928	Sprint	Sprint 2 (05/11/2018 – 18/11/2018)		20			
2227047	Story	As a user, I want to be able to add my clients' details to my list of clients so that I can easily manage their information.	Feature	5	Complete		Client
2227048	+	Client Management	Feature	5	Complete	This function will allow users to create client entries and add their information such as contact information and addresses to the database so that the information is easily accessible. It will also enable linking clients to other functions in the application.	
2227049	++	Create client dashboard.	Feature	3	Complete	This page will show a list of clients the user has created and their associated information. It will also have the controls to allow for editing the info, addresses or sending emails to the client through the application.	
2227050	++	Create New Client page.	Feature	2	Complete	This page will contain the form add a new client to the database.	
2227051	Story	As a user, I want to be able to add multiple addresses to each of my clients so that they can be reached in case of multiple locations.	Feature	4	Complete		Client; Address
2227052	+	Storing Client Addresses	Feature	4	Complete	This function will allow the user to create multiple address entries for each client.	
2227066	++	Create add address page.	Feature	1	Complete	This page will be accessible from the client dashboard and provide forms to enter details of the address.	
2227084	++	Create address list view on client dashboard.	Feature	1	Complete	This is a UI element that will show all the addresses associated with each client.	
2227086	++	Create add address microflow.	Feature	2	Complete	The microflow used to create an address object with the client association pre-set.	

2227090	Story	As a user, I want to be able to log my expenses so that I can keep track of them and bill them to my projects.	Feature	5	Complete		Expenses
2227101	+	Create Expenses dashboard.	Feature	3.5	Complete	This page shows the user the expenses they have added.	
2227149	+	Create New Expenses page.	Feature	1.5	Complete	This page will allow the user to add new expense log to their account, including a control for uploading a picture of the receipt. For mobile users, it will also contain a camera widget to allow for directly taking a picture of the receipt from their mobile devices.	
2227414	Story	As a user, I want to be able to add a recurring vendor to my expense entries so that I can see which expenses are spent on specific vendors.	Feature	3	Complete		Expenses
2227415	+	Adding Vendor	Feature	3	Complete	This function will allow the client to add vendors associated with their account, which can be selected optionally in expenses entries.	
2227416	++	Create an add vendor page.	Feature	1.5	Complete	This page contains a simple form to allow the user to enter a vendor's name.	
2227417	++	Add Vendor association to expenses and the expense form.	Feature	1.5	Complete	Add a reference selector to vendor from the new estimate page.	
2227428	Story	As a user, I want to be able to assign categories my expenses so that they are better organised.	Feature	3	Complete		Expenses
2227431	+	Categorisation of expenses into pre-set values.	Feature	2	Complete	This function will allow users to select the category they want to assign to an expense from a drop-down list while creating an expense.	
2227434	++	Add category attribute to expense table.	Feature	0.5	Complete	Adding an enumeration attribute with pre-determined types of expenses to the expense table.	
2227440	++	Adding drop down list to new expense form.	Feature	0.5	Complete	Add a drop-down list with the enumeration set to the one containing the categories.	
2226929	Sprint	Sprint 3 (19/11/2018 – 02/12/2018)		25			

2227373	Story	As a user, I want to be able to create a project so that I can log the time and money spent and track its progress.	Feature	7	Complete		Project Tracking
2227391	+	Project Management	Feature	3	Complete	This feature will allow users to enter details about the project and have the expenses and time spent on the project to be tracked and stored.	
2230098	++	Create project list.	Feature	2	Complete	This will be a data grid showing the list of projects the user has created. A microflow to pass the selected project object to the project overview page is needed.	
2230104	++	Create New Project form.	Feature	1	Complete	The form will contain the fields for the user to enter the project's parameters to create a new project.	
2227395	+	Project Dashboard Design	Feature	4	Complete	This function is to provide the user with an easily viewable project details page containing all the information in visual form such as progress circles and large fonts.	
2230094	++	Create Dashboard basic layout.	Feature	2	Complete	This will hold all the widgets on the page.	
2230095	++	Implement Project Timer.	Feature	1	Complete	This will show the user how much time is left until the deadline of the project that they have set.	
2230097	++	Implement Calculated Project Displays.	Feature	1	Complete	These will show on the UI the cost of the hours the user has logged in the project and the total of the expenses associated with the project.	
2227413	Story	As a user, I want to be able to log the hours worked on each project to be billed so that I am appropriately paid for my services.	Feature	5	Complete		Project Tracking
2230273	+	Logging project hours.	Feature	2	Complete	This function will allow users to log the hours they have worked on a project to be billed to the client.	
2230274	+	Create Hours table and association to Projects.	Feature	3	Complete	This table will store the logged hours and associate them to projects.	

2230275	++	Implementation into Project dashboard.	Feature	3	Complete	Create auto calculating microflows to show the hours and their costs according to the project's rate and show on the dashboard.	
2230091	Story	As an administrator, I want to be able to create another administrator account to allow another administrator in the team to manage the application.	Feature	3	Complete		Administration ; User Management
2230092	+	Creating User Accounts.	Feature	3	Complete	This function will allow administrators to create user accounts with various user roles in the system.	
2230093	++	Create 'Create User' function.	Feature	3	Complete	Add the function to the account overview page of the application.	
2229966	Story	As an administrator, I want to be able to manage users' logins so that I can help the users with their login problems.	Feature	4	Complete		Administration ; User Management
2229979	+	User Settings Management	Feature	4	Complete	This provides controls for administrators to manage the users' login settings such as their username and passwords. It also allows for creating and deleting users.	
2230087	++	Customise Account Overview page.	Feature	2	Complete	Using the page included in the Administration module, customise it to the application by removing unnecessary components.	
2230088	++	Implement User Management.	Feature	2	Complete	Enable administrators to be able to manage other users' accounts in Security settings of project.	
2227020	Story	As a user, I want to be able to see my account data at a glance on a dashboard so that I can view a quick synopsis of it.	Feature	6	Complete		User Interface; Dashboard
2227026	+	Summery Graphs	Feature	6	Complete	These graphs will show at a quick glance, information such as expenses and incoming payments over time and recent projects.	
2227027	++	Create Expenses line graph.	Feature	2	Complete	This graph will show the expenses the user had input with their amount and created date.	
2227032	++	Create Expenses category pie chart.	Feature	2	Complete	This chart will show the expenses spending by categories.	

2227033	++	Create recent projects.	Feature	2	Complete	This will show the users' 5 (3 on mobile) most recently created projects on the dashboard and the link to them.	
2226930	Sprint	Sprint 4 (03/12/2018 – 16/12/2018)		24			
2227153	Story	As a user, I want to be able to send estimates of projects to my clients through the application so that they can be informed of the approximate project costs.	Feature	7	Complete		Estimates; Email
2227154	+	Creating Estimates	Feature	3	Complete	Before being able to send estimates, the user needs to be able to enter details of the estimate in the application. This function will allow for creating estimate entries and generate a .pdf document from the entries entered.	
2227208	++	Create estimate document template for document generation.	Feature	1	Complete	Design a pre-set document template with dynamic attributes to use to create a pdf document of the estimate.	
2227228	++	Make microflows for calculated database columns.	Feature	1	Complete	The microflow takes project rate and project hours values, multiplies them and returns them to project total attribute.	
2227309	++	Create form page to create invoice.	Feature	1	Complete	This is a complex form containing form fields for creating an invoice and adding line items to the invoice.	
2227313	+	Adding line items to estimates.	Feature	2	Complete	This function is to add line items to the estimate in addition to the estimated project rate and hours.	
2227342	++	Create add line item page.	Feature	1	Complete	This is a form page to allow adding line items to an associated estimate.	
2227350	++	Implement a microflow for adding line items.	Feature	1	Complete	The microflow must create a new line item object with pre-set association to the currently editing line item object.	
2227358	+	Sending Estimates	Feature	2	Complete	This is the function for sending the generated pdf document of the estimate to the client's email using the in-app emailing system.	
2227361	++	Create microflow to create email with attached pdf document.	Feature	2	Complete	This microflow will create a new email, generate the estimate document as a pdf file, attach it to	

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						the email then present the user with the compose email page.	
2227418	Story	As a user, I want to be able to customise the tax percentages to be in line with my country's tax laws.	Feature	4	Complete		User Settings
2227419	+	User Settings	Feature	4	Complete	Create a table to store each user's unique settings such as the various tax values.	
2227420	++	Create user settings table.	Feature	4	Complete	Create table containing tax value attributes.	
2227421	Story	As a user, I want to be able to upload my own company's logo to be used in estimates and invoices I send to my clients.	Feature	4	Complete		User Settings
2227422	+	Custom logos for Estimates and Invoices	Feature	4	Complete	This function will allow users to upload their own logo, which will be used to represent their company in the estimates and invoice documents they send from the application.	
2227425	++	Create association to Mendix file system from user settings.	Feature	2	Complete	As only one image file needs to be stored at a time, the already existing user settings table can be generalised to system image table to be able to store one image associated with the user.	
2227427	++	Add dynamic logos to document templates.	Feature	2	Complete	Dynamic logo objects will automatically input the uploaded image of the users into the documents they send.	
2230276	Story	As a user, I want to be able to send invoices to my clients through the application so that they can send payments to me for providing my services.	Feature	8	Complete		Invoicing; Email
2229950	Story	As an administrator, I want to be able to see the currently active logged in users on the application so that I can fix problems with session related bugs.	Feature	1	Complete		Administration
2229951	+	Utilising existing 'Active Sessions' Page	Feature	1	Complete	The 'Administration' module comes with the session management built in. The page needs to be linked to the UI to be accessible.	
2229952	++	Add button to admin dashboard.	Feature	1	Complete	Create a link button on the admin dashboard to the active sessions page.	

2226931	Sprint	Sprint 5 (17/12/18 – 27/12/2018)		26			
2229953	Story	As an administrator, I want to be able to manage the application's email settings so that I can diagnose and fix problems with outgoing emails from the application if they occur.	Feature	6	Complete		Email; Administration
2229954	+	Email Administration Settings	Feature	6	Complete	The configuration of the email module can be changed on the email settings page to ensure continued operation of the email system through the application.	
2229957	++	Customise Email Settings page.	Feature	4	Complete	Remove unnecessary tabs and options that are unused in the current implementation of the system.	
2229958	++	Implement settings page.	Feature	2	Complete	Link the customised settings page to the administration dashboard to allow admins to access it.	
2229919	Story	As an administrator, I want to be able to see all the data in the database tables so that I can fix errors that occur in any processes.	Feature	3	Complete		Database; Administration
2229920	+	General Database Table Views	Feature	3	Complete	The function will allow users to see all the data in all existing tables through the web interface and provide controls for CRUD functions with all attributes being editable for administration purposes. This makes database management easier as HSQL OODB cannot be easily managed manually by manipulating the SQL.	
2229924	++	Create database table hub page.	Feature	1.5	Complete	A page to allow the admins to click on all tables in the database for easy controls and to clear the clutter the main administrator dashboard.	
2229949	++	Create table view pages.	Feature	1.5	Complete	The pages will contain data grids that allow admins to CRUD all entries on the table with no restrictions.	
2226945	Story	As a visitor, I want to be able to pay for an invoice sent to me by a user of the application so that the user is appropriately	Feature	9	Complete		Invoicing; Payments

		compensated for their services rendered to me.					
2226949	+	Mock payment card system.	Feature	3	Complete	To allow for demonstration of the payment system, a mock system to check if the credit/debit card information entered is valid is needed. It essentially emulates a bank for demonstration purposes.	
2226950	++	Create page to add list of mock payment cards for administrator.	Feature	1	Complete	This will allow for adding mock 'valid' cards for the system to check into the database.	
2226951	++	Create mock card database table.	Feature	2	Complete	This table will store the mock payment cards in the database.	
2226952	+	Invoice payment feature for visitors.	Feature	5	Complete	This will allow the non-logged-in visitors to search for their invoice on the system by entering the ID and their email that appears on the invoice sent to them by a user.	
2226953	++	Create invoice search page and microflow.	Feature	2	Complete	This page will allow the user to enter the attributes mentioned above to search their invoice. If there is a match, the user will be taken to the invoice detail page.	
2226957	++	Create payment form page and checking microflow.	Feature	3	Complete	A form to allow the visitor to enter their card information, which will check against in our case, the mock card table for validity. The microflow will update the status of invoice to 'paid' after validation.	
2230280	Story	As a user, I want to be able to give a discount to my clients and have it logged in the invoice so that new and regular customers can be rewarded for their loyalty.	Feature	4	Complete		Invoicing
2230292	+	Discounting Invoices.	Feature	4	Complete	This feature will allow the users to apply a flat discount to the invoice before they send it to their client.	
2230293	++	Add Discount attribute to invoice.	Feature	1	Complete	Add attribute to be able to store the discount and use to calculate the discounted total of invoice.	

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2230295	++	Design microflows to calculate subtotals and totals based on discounts.	Feature	3	Complete	These microflows will generate the attributes shown on the invoice to break down the pre-tax and pre-discounted totals.	
2230281	Story	As a user, I want to be able to request deposits from my clients through the invoice so that they can pay the full amount in increments.	Feature	4	Complete		Invoicing
2230296	+	Sending Deposit Invoices.	Feature	4	Complete	This function will allow users to send invoices that request deposits for projects rather than the full price of the invoice.	
2230303	++	Add deposit modifier to invoice table.	Feature	4	Complete	This modifier will allow users to request a percentage of the invoice total as deposit.	

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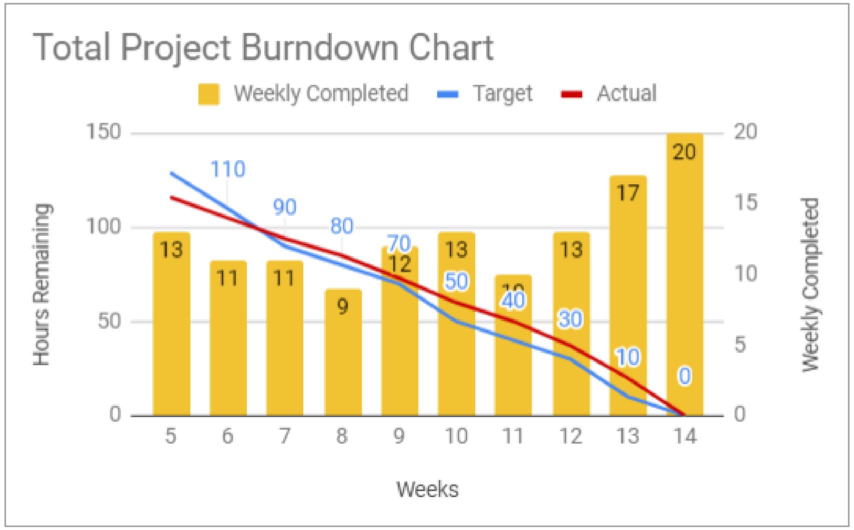
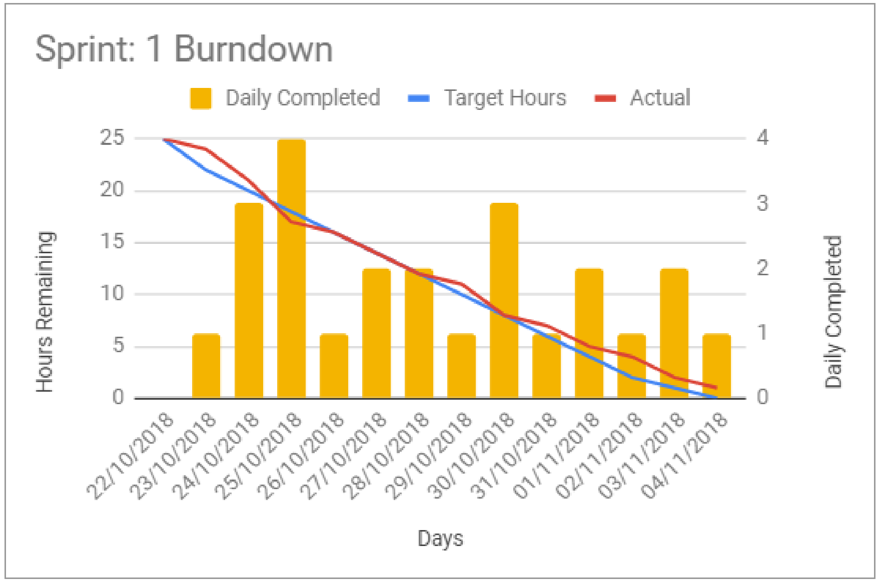
4.7 Sprint Burndown Charts

Date Range	Week	Target	Actual	Weekly Completed
22/10/18 - 28/10/18	5	129	116	13
29/10/18 - 04/11/18	6	110	105	11
05/11/18 - 11/11/18	7	90	94	11
12/11/18 - 18/11/18	8	80	85	9
19/11/18 - 25/11/18	9	70	73	12
26/11/18 - 02/12/18	10	50	60	13
03/12/18 - 09/12/18	11	40	50	10
10/12/18 - 16/12/18	12	30	37	13
17/12/18 - 23/12/18	13	10	20	17
24/12/18 - 2712/18	14	0	0	20





Sprint: 1			Interval: 2 Weeks
Days	Target Hours	Actual	Daily Completed
22/10/2018	25	25	0
23/10/2018	22	24	1
24/10/2018	20	21	3
25/10/2018	18	17	4
26/10/2018	16	16	1
27/10/2018	14	14	2
28/10/2018	12	12	2
29/10/2018	10	11	1
30/10/2018	8	8	3
31/10/2018	6	7	1
01/11/2018	4	5	2
02/11/2018	2	4	1
03/11/2018	1	2	2
04/11/2018	0	1	1

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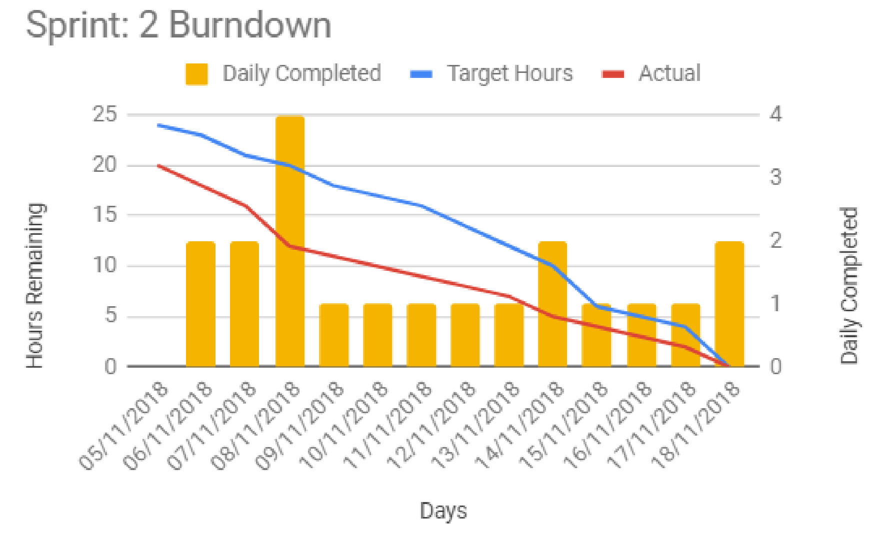
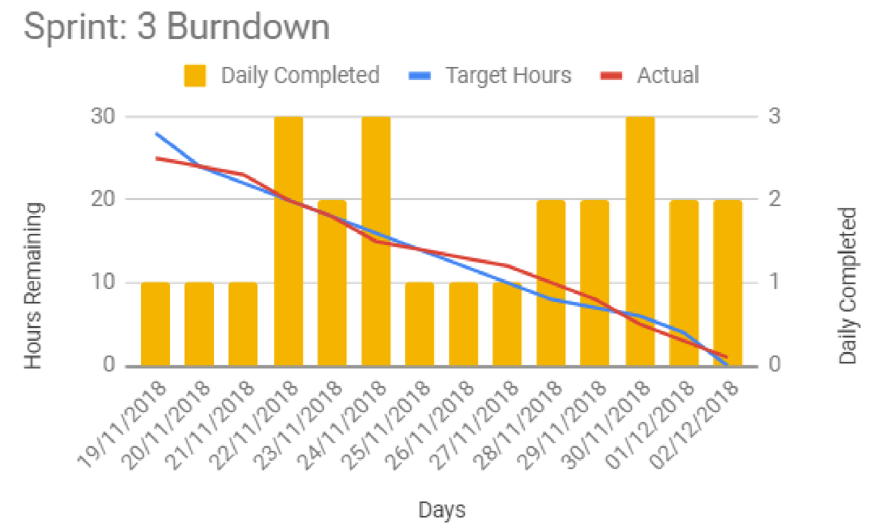


Sprint: 2			Interval: 2 Weeks
Days	Target Hours	Actual	Daily Completed
05/11/2018	24	20	0
06/11/2018	23	18	2
07/11/2018	21	16	2
08/11/2018	20	12	4
09/11/2018	18	11	1
10/11/2018	17	10	1
11/11/2018	16	9	1
12/11/2018	14	8	1
13/11/2018	12	7	1
14/11/2018	10	5	2
15/11/2018	6	4	1
16/11/2018	5	3	1
17/11/2018	4	2	1
18/11/2018	0	0	2



Sprint: 3			Interval: 2 Weeks
Days	Target Hours	Actual	Daily Completed
19/11/2018	28	25	1
20/11/2018	24	24	1
21/11/2018	22	23	1
22/11/2018	20	20	3
23/11/2018	18	18	2
24/11/2018	16	15	3
25/11/2018	14	14	1
26/11/2018	12	13	1
27/11/2018	10	12	1
28/11/2018	8	10	2
29/11/2018	7	8	2
30/11/2018	6	5	3
01/12/2018	4	3	2
02/12/2018	0	1	2

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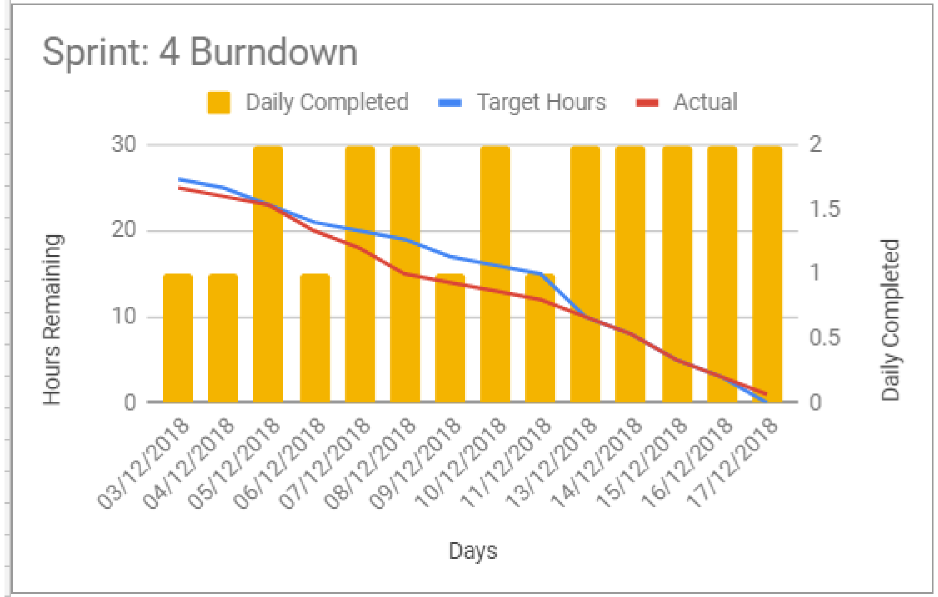
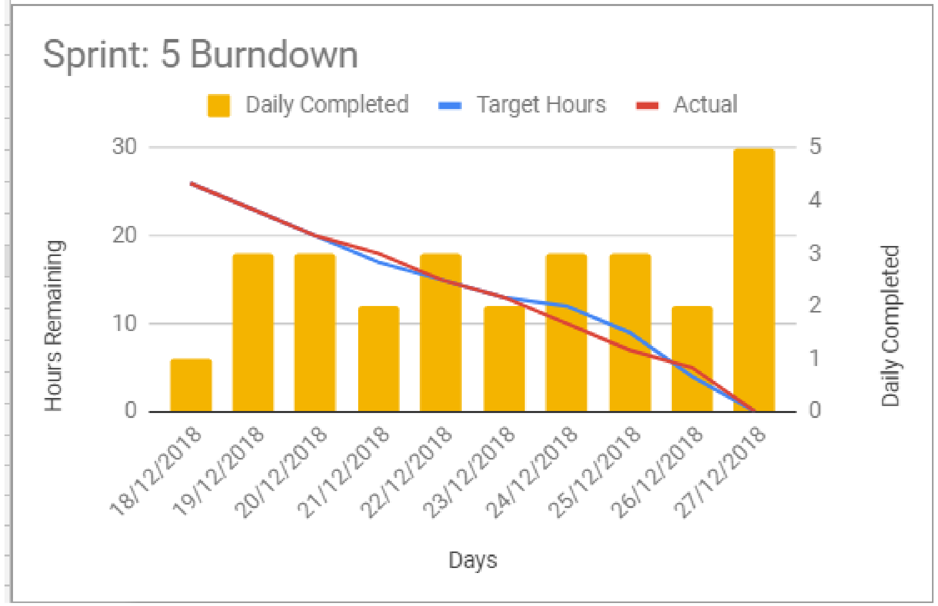


Sprint: 4			Interval: 2 Weeks
Days	Target Hours	Actual	Daily Completed
03/12/2018	26	24	1
04/12/2018	25	23	1
05/12/2018	23	21	2
06/12/2018	21	20	1
07/12/2018	20	18	2
08/12/2018	19	16	2
09/12/2018	17	15	1
10/12/2018	16	13	2
11/12/2018	15	12	1
13/12/2018	10	10	2
14/12/2018	8	8	2
15/12/2018	5	6	2
16/12/2018	3	4	2
17/12/2018	0	2	2



Sprint: 5			Interval: 2 Weeks
Days	Target Hours	Actual	Daily Completed
18/12/2018	26	26	1
19/12/2018	23	23	3
20/12/2018	20	20	3
21/12/2018	17	18	2
22/12/2018	15	15	3
23/12/2018	13	13	2
24/12/2018	12	10	3
25/12/2018	9	7	3
26/12/2018	4	5	2
27/12/2018	0	0	5

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4.8 Product Backlog

Item id	Depth	Name	Story Type	Description	Labels
2226927	Sprint	Backlog			
2226958	Story	As a user, I want to be able to store data in the application so that I can access it anywhere.	Feature		Database
2226961	+	Database table implementation.	Feature	The database tables to store all necessary operational data for the application.	
2226934	Story	As a visitor, I want to be able to login to my account so that I can access my information in the application.	Feature		Login
2226937	+	Create a login form.	Feature	This will be a simple form comprising of the Username and Password fields to log into the application.	
2226932	Story	As a visitor, I want to be able to register for a new account, so I can access the application.	Feature		Registration
2226935	+	Create a registration wizard.	Feature	This function will include series of forms guiding the users through the registration process by breaking up the required form entries into multiple pages. This is to make the process easier to understand to the user.	
2226938	++	Create registration form 1.	Feature	This page will include the form for the account's login details such as the username and password.	
2226943	++	Create registration form 2.	Feature	This page will contain the forms for details about the user such as their contact details.	
2226944	++	Create registration form 3.	Feature	This page will contain the users' company/business information such as the company name, address and contact information. This information will be shown to their clients through the estimates and invoices the users send.	
2226946	++	Create microflows to link forms.	Feature	These microflows are required to pass the user object persistently through the registration wizard pages.	
2227047	Story	As a user, I want to be able to add my clients' details to my list of clients so that I can easily manage their information.	Feature		Client

2227048	+	Client Management	Feature	This function will allow users to create client entries and add their information such as contact information and addresses to the database so that the information is easily accessible. It will also enable linking clients to other functions in the application.	
2227049	++	Create client dashboard.	Feature	This page will show a list of clients the user has created and their associated information. It will also have the controls to allow for editing the info, addresses or sending emails to the client through the application.	
2227050	++	Create New Client page.	Feature	This page will contain the form add a new client to the database.	
2227051	Story	As a user, I want to be able to add multiple addresses to each of my clients so that they can be reached in case of multiple locations.	Feature		Client; Address
2227052	+	Storing Client Addresses	Feature	This function will allow the user to create multiple address entries for each client.	
2227066	++	Create add address page.	Feature	This page will be accessible from the client dashboard and provide forms to enter details of the address.	
2227084	++	Create address list view on client dashboard.	Feature	This is a UI element that will show all the addresses associated with each client.	
2227086	++	Create add address microflow.	Feature	The microflow used to create an address object with the client association pre-set.	
2227090	Story	As a user, I want to be able to log my expenses so that I can keep track of them and bill them to my projects.	Feature		Expenses
2227101	+	Create Expenses dashboard.	Feature	This page shows the user the expenses they have added.	
2227149	+	Create New Expenses page.	Feature	This page will allow the user to add new expense log to their account, including a control for uploading a picture of the receipt. For mobile users, it will also contain a camera widget to allow for directly taking a picture of the receipt from their mobile devices.	

2227414	Story	As a user, I want to be able to add a recurring vendor to my expense entries so that I can see which expenses are spent on specific vendors.	Feature		Expenses
2227415	+	Adding Vendor	Feature	This function will allow the client to add vendors associated with their account, which can be selected optionally in expenses entries.	
2227416	++	Create an add vendor page.	Feature	This page contains a simple form to allow the user to enter a vendor's name.	
2227417	++	Add Vendor association to expenses and the expense form.	Feature	Add a reference selector to vendor from the new estimate page.	
2227428	Story	As a user, I want to be able to assign categories my expenses so that they are better organised.	Feature		Expenses
2227431	+	Categorisation of expenses into pre-set values.	Feature	This function will allow users to select the category they want to assign to an expense from a drop-down list while creating an expense.	
2227434	++	Add category attribute to expense table.	Feature	Adding an enumeration attribute with pre-determined types of expenses to the expense table.	
2227440	++	Adding drop down list to new expense form.	Feature	Add a drop-down list with the enumeration set to the one containing the categories.	
2227373	Story	As a user, I want to be able to create a project so that I can log the time and money spent and track its progress.	Feature		Project Tracking
2227391	+	Project Management	Feature	This feature will allow users to enter details about the project and have the expenses and time spent on the project to be tracked and stored.	
2230098	++	Create project list.	Feature	This will be a data grid showing the list of projects the user has created. A microflow to pass the selected project object to the project overview page is needed.	
2230104	++	Create New Project form.	Feature	The form will contain the fields for the user to enter the project's parameters to create a new project.	
2227395	+	Project Dashboard Design	Feature	This function is to provide the user with an easily viewable project details page containing all the information in visual form such as progress circles and large fonts.	
2230094	++	Create Dashboard basic layout.	Feature	This will hold all the widgets on the page.	

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2230095	++	Implement Project Timer.	Feature	This will show the user how much time is left until the deadline of the project that they have set.	
2230097	++	Implement Calculated Project Displays.	Feature	These will show on the UI the cost of the hours the user has logged in the project and the total of the expenses associated with the project.	
2227413	Story	As a user, I want to be able to log the hours worked on each project to be billed so that I am appropriately paid for my services.	Feature		Project Tracking
2230273	+	Logging project hours.	Feature	This function will allow users to log the hours they have worked on a project to be billed to the client.	
2230274	+	Create Hours table and association to Projects.	Feature	This table will store the logged hours and associate them to projects.	
2230275	++	Implementation into Project dashboard.	Feature	Create auto calculating microflows to show the hours and their costs according to the project's rate and show on the dashboard.	
2230091	Story	As an administrator, I want to be able to create another administrator account to allow another administrator in the team to manage the application.	Feature		Administration; User Management
2230092	+	Creating User Accounts.	Feature	This function will allow administrators to create user accounts with various user roles in the system.	
2230093	++	Create 'Create User' function.	Feature	Add the function to the account overview page of the application.	
2229966	Story	As an administrator, I want to be able to manage users’ logins so that I can help the users with their login problems.	Feature		Administration; User Management
2229979	+	User Settings Management	Feature	This provides controls for administrators to manage the users' login settings such as their username and passwords. It also allows for creating and deleting users.	
2230087	++	Customise Account Overview page.	Feature	Using the page included in the Administration module, customise it to the application by removing unnecessary components.	
2230088	++	Implement User Management.	Feature	Enable administrators to be able to manage other users' accounts in Security settings of project.	

2227020	Story	As a user, I want to be able to see my account data at a glance on a dashboard so that I can view a quick synopsis of it.	Feature		User Interface; Dashboard
2227026	+	Summery Graphs	Feature	These graphs will show at a quick glance, information such as expenses and incoming payments over time and recent projects.	
2227027	++	Create Expenses line graph.	Feature	This graph will show the expenses the user had input with their amount and created date.	
2227032	++	Create Expenses category pie chart.	Feature	This chart will show the expenses spending by categories.	
2227033	++	Create recent projects.	Feature	This will show the users' 5 (3 on mobile) most recently created projects on the dashboard and the link to them.	
2227153	Story	As a user, I want to be able to send estimates of projects to my clients through the application so that they can be informed of the approximate project costs.	Feature		Estimates; Email
2227154	+	Creating Estimates	Feature	Before being able to send estimates, the user needs to be able to enter details of the estimate in the application. This function will allow for creating estimate entries and generate a .pdf document from the entries entered.	
2227208	++	Create estimate document template for document generation.	Feature	Design a pre-set document template with dynamic attributes to use to create a pdf document of the estimate.	
2227228	++	Make microflows for calculated database columns.	Feature	The microflow takes project rate and project hours values, multiplies them and returns them to project total attribute.	
2227309	++	Create form page to create invoice.	Feature	This is a complex form containing form fields for creating an invoice and adding line items to the invoice.	
2227313	+	Adding line items to estimates.	Feature	This function is to add line items to the estimate in addition to the estimated project rate and hours.	
2227342	++	Create add line item page.	Feature	This is a form page to allow adding line items to an associated estimate.	

2227350	++	Implement a microflow for adding line items.	Feature	The microflow must create a new line item object with pre-set association to the currently editing line item object.	
2227358	+	Sending Estimates	Feature	This is the function for sending the generated pdf document of the estimate to the client's email using the in-app emailing system.	
2227361	++	Create microflow to create email with attached pdf document.	Feature	This microflow will create a new email, generate the estimate document as a pdf file, attach it to the email then present the user with the compose email page.	
2227418	Story	As a user, I want to be able to customise the tax percentages to be in line with my country's tax laws.	Feature		User Settings
2227419	+	User Settings	Feature	Create a table to store each user's unique settings such as the various tax values.	
2227420	++	Create user settings table.	Feature	Create table containing tax value attributes.	
2227421	Story	As a user, I want to be able to upload my own company's logo to be used in estimates and invoices I send to my clients.	Feature		User Settings
2227422	+	Custom logos for Estimates and Invoices	Feature	This function will allow users to upload their own logo, which will be used to represent their company in the estimates and invoice documents they send from the application.	
2227425	++	Create association to Mendix file system from user settings.	Feature	As only one image file needs to be stored at a time, the already existing user settings table can be generalised to system image table to be able to store one image associated with the user.	
2227427	++	Add dynamic logos to document templates.	Feature	Dynamic logo objects will automatically input the uploaded image of the users into the documents they send.	
2230276	Story	As a user, I want to be able to send invoices to my clients through the application so that they can send payments to me for providing my services.	Feature		Invoicing; Email
2229950	Story	As an administrator, I want to be able to see the currently active logged in users on the application so that I can fix problems with session related bugs.	Feature		Administration

2229951	+	Utilising existing 'Active Sessions' Page	Feature	The 'Administration' module comes with the session management built in. The page needs to be linked to the UI to be accessible.	
2229952	++	Add button to admin dashboard.	Feature	Create a link button on the admin dashboard to the active sessions page.	
2229953	Story	As an administrator, I want to be able to manage the application’s email settings so that I can diagnose and fix problems with outgoing emails from the application if they occur.	Feature		Email; Administration
2229954	+	Email Administration Settings	Feature	The configuration of the email module can be changed on the email settings page to ensure continued operation of the email system through the application.	
2229957	++	Customise Email Settings page.	Feature	Remove unnecessary tabs and options that are unused in the current implementation of the system.	
2229958	++	Implement settings page.	Feature	Link the customised settings page to the administration dashboard to allow admins to access it.	
2229919	Story	As an administrator, I want to be able to see all the data in the database tables so that I can fix errors that occur in any processes.	Feature		Database; Administration
2229920	++	General Database Table Views	Feature	The function will allow users to see all the data in all existing tables through the web interface and provide controls for CRUD functions with all attributes being editable for administration purposes. This makes database management easier as HSQL OODB cannot be easily managed manually by manipulating the SQL.	
2229924	+++	Create database table hub page.	Feature	A page to allow the admins to click on all tables in the database for easy controls and to clear the clutter the main administrator dashboard.	
2229949	+++	Create table view pages.	Feature	The pages will contain data grids that allow admins to CRUD all entries on the table with no restrictions.	
2226945	Story	As a visitor, I want to be able to pay for an invoice sent to me by a user of the application so that the user is	Feature		Invoicing; Payments

		appropriately compensated for their services rendered to me.			
2226949	+	Mock payment card system.	Feature	To allow for demonstration of the payment system, a mock system to check if the credit/debit card information entered is valid is needed. It essentially emulates a bank for demonstration purposes.	
2226950	++	Create page to add list of mock payment cards for administrator.	Feature	This will allow for adding mock 'valid' cards for the system to check into the database.	
2226951	++	Create mock card database table.	Feature	This table will store the mock payment cards in the database.	
2226952	+	Invoice payment feature for visitors.	Feature	This will allow the non-logged-in visitors to search for their invoice on the system by entering the ID and their email that appears on the invoice sent to them by a user.	
2226953	++	Create invoice search page and microflow.	Feature	This page will allow the user to enter the attributes mentioned above to search their invoice. If there is a match, the user will be taken to the invoice detail page.	
2226957	++	Create payment form page and checking microflow.	Feature	A form to allow the visitor to enter their card information, which will check against in our case, the mock card table for validity. The microflow will update the status of invoice to 'paid' after validation.	
2230280	Story	As a user, I want to be able to give a discount to my clients and have it logged in the invoice so that new and regular customers can be rewarded for their loyalty.	Feature		Invoicing
2230292	+	Discounting Invoices.	Feature	This feature will allow the users to apply a flat discount to the invoice before they send it to their client.	
2230293	++	Add Discount attribute to invoice.	Feature	Add attribute to be able to store the discount and use to calculate the discounted total of invoice.	
2230295	++	Design microflows to calculate subtotals and totals based on discounts.	Feature	These microflows will generate the attributes shown on the invoice to break down the pre-tax and pre-discounted totals.	

2230281	Story	As a user, I want to be able to request deposits from my clients through the invoice so that they can pay the full amount in increments.	Feature		Invoicing
2230296	+	Sending Deposit Invoices.	Feature	This function will allow users to send invoices that request deposits for projects rather than the full price of the invoice.	
2230303	++	Add deposit modifier to invoice table.	Feature	This modifier will allow users to request a percentage of the invoice total as deposit.	

5.0 System Design

5.1 Mood Board

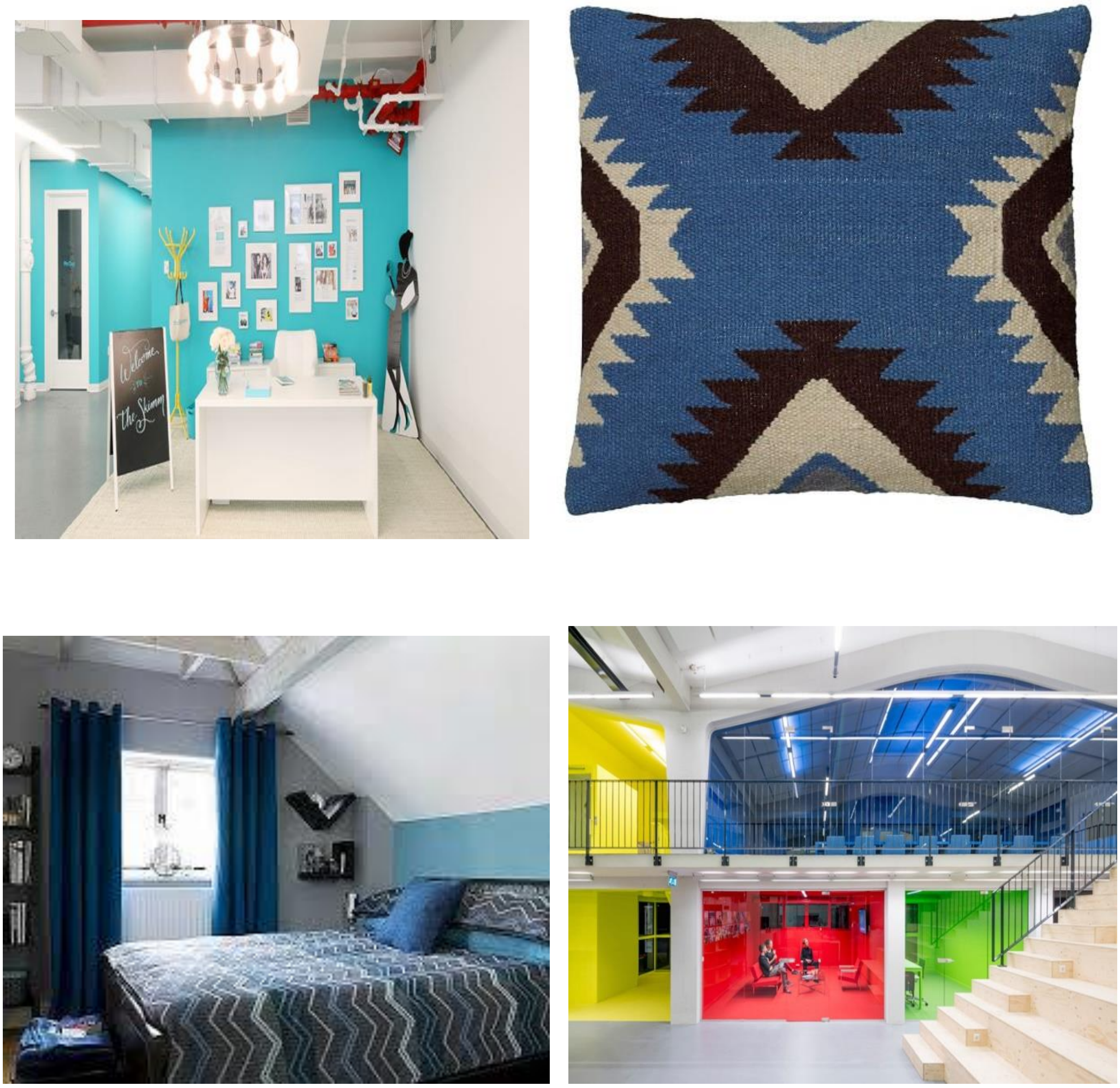

Figure 12: Inspirations for look and feel of application

This is the mood board for the application, which was decided based on the general inspiration from the colour scheme and the overall look of the system. Majority of it is blue and black, which was derived from the logo and some UI colours. Red and green scenes were obtained from some of the respectively designed buttons on the application. A white background has been applied on most pages, suggesting simplicity and minimalism in the design.

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5.2 Colour Scheme and Styles

The following table describes the colours to be used on the elements of the application. The colours are derived from the inspiration gathered from the mood board to achieve the look that we are aiming for the application to have. The main colours of the application are **(off white) and (grey)** with accompanying colours to indicate various buttons' functions.

No.	Attribute	Values
1.	Colour: Default	#DDDDDD (Very Light Grey)
2.	Colour: Primary	#0595DB (Strong Blue)
3.	Colour: Inverse	#252C36 (Very Dark Greyish Blue)
4.	Colour: Info	#48B0F7 (Bright Blue)
5.	Colour: Success	#76CA02 (Strong Green)
6.	Colour: Warning	#F99B1D (Vivid Orange)
7.	Colour: Danger	#ED1C24 (Vivid Red)
8.	Topbar: Background	#FFFFFF (White)
9.	Topbar: Border	#FFFFFF (White)
10.	Topbar: Text	#000000 (Black)
11.	Topbar: Height	60 px
12.	Topbar: App Name	#6B6B6B (Very Dark Grey)
13.	Topbar: Logo Width	50 px
14.	Topbar: Logo Height	50 px
15.	Sidebar: Background	#3A444B (Very Dark Greyish Blue)
16.	Sidebar: Text	#FFFFFF (White)
17.	Sidebar: Hover	#B0B0B0 (Grey)
18.	Backgrounds: Default	#F8F8F8 (Very Light Grey)
19.	Backgrounds: Dashboard	#F5F8FD (Light Greyish Blue)
20.	Typography: Base Font Family	Lato
21.	Typography: Base Font Size	14 px
22.	Typography: Base Font Colour	#000000 (Black)
23.	Typography: Hyperlink	#4ECD5B (Moderate Lime Green)

24.	Typography: H1 Size	31 px
25.	Typography: H2 Size	26 px
26.	Typography: H3 Size	24 px
27.	Typography: H4 Size	18 px
28.	Typography: Header Colour	#17347B (Dark Blue)

5.3 Logo

The logo for the application was designed using the online logo maker tool at https://www.FreeLogoDesign.org/. We were going for a clean and smooth look and feel, so we chose a bar chart icon as it conveys the purpose of our application as an accounting software directly. We coloured the bars blue to match the system colour scheme and wrote the company name 'SimpleBooks' in a font that looks elegant and stylish, leading to an overall polished logo. The logo is used in the web application, android application and the project poster.

Figure 13: Logo with Caption

Figure 14: Logo

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5.4 System Diagrams

5.4.1 Database Schema

The following diagram shows the complete entities and their data types, including the system tables utilised by authentication and file storage systems. The system tables are as provided by the Mendix engine and are not editable by developers.

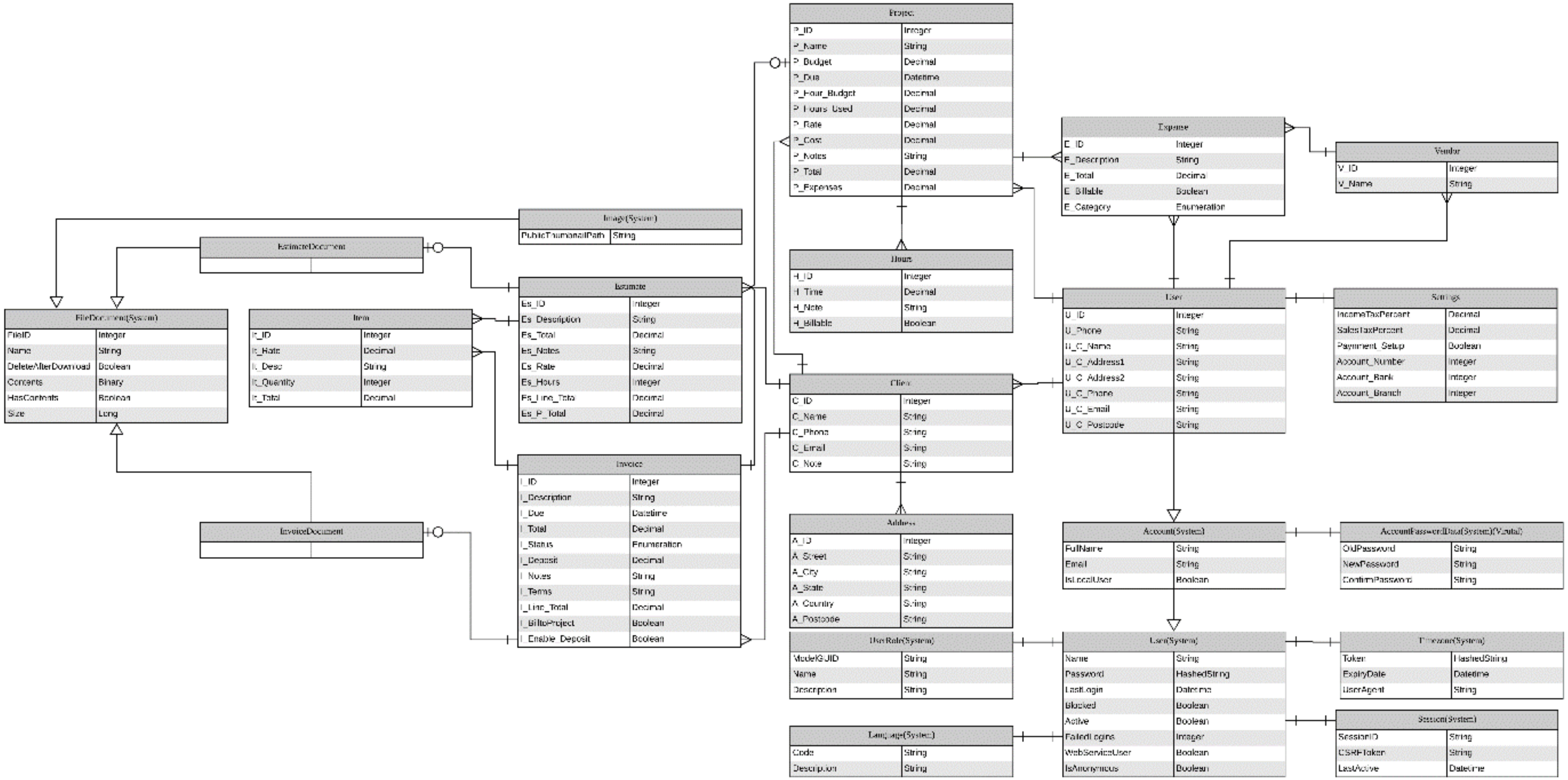

Figure 15: Implemented Database Schema

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5.4.1.1 Data Dictionaries

Entity	Attribute	Data Type	Default Values	Description
User	U_ID	AutoNumber	0	ID of User Objects
User	U_Phone	String	-	Phone number of users
User	U_C_Name	String	-	Company name of user
User	U_C_Address1	String	-	Address line 1 of user
User	U_C_Address2	String	-	Address line 2 of user
User	U_C_Phone	String	-	User's company phone number
User	U_C_Email	String	-	User's company email address
User	U_C_Postcode	String	-	User's company postcode
Settings	Income_Tax	Decimal	-	User's income tax value in %
Settings	Sales_Tax	Decimal	-	User's sales tax value in %
Settings	Payment_Setup	Boolean	False	Shows whether the user enabled online payments or not
Settings	Account_Number	Decimal	-	User's bank account number
Settings	Account_Bank	Decimal	-	User's bank's code
Settings	Account_Branch	Decimal	-	User's bank's branch code
Client	C_ID	AutoNumber	0	ID of Client Objects
Client	C_Name	String	-	Client's name
Client	C_Phone	String	-	Client's phone
Client	C_Email	String	-	Client's email address
Client	C_Note	String	-	Notes of client to be entered by the user.
Address	A_ID	AutoNumber	-	ID of Address Objects
Address	A_Street	String	-	Street name field
Address	A_City	String	-	City name field
Address	A_State	String	-	State name field
Address	A_Country	String	-	Country name field
Address	A_Postcode	String	-	Postcode field
Expense	E_ID	AutoNumber	0	ID of Expense Objects
Expense	E_Description	String	-	Description of expense
Expense	E_Total	Decimal	-	Total cost of expense
Expense	E_Billable	Boolean	False	Shows if expense is associated with a project
Expense	E_Category	Enumeration	-	Category of spending of expense.
Vendor	V_ID	AutoNumber	0	ID of Vendor Objects
Vendor	V_Name	String	-	Vendor's name
Project	P_ID	AutoNumber	0	ID of Project Objects
Project	P_Name	String	-	Project name
Project	P_Budget	Decimal	-	Project's monetary budget
Project	P_Due	DateandTime	-	Project due date
Project	P_Hours_Budget	Decimal	-	Project time budget
Project	P_Hours_Used	Decimal	-	Project time spent
Project	P_Rate	Decimal	-	Project bill rate per hour
Project	P_Cost	Decimal	-	Project total of (rate * time spent)

Project	P_Notes	String	-	Project miscellaneous notes
Project	P_Total	Decimal	-	Project total cost
Project	P_Expenses	Decimal	-	Project total of expenses associated
Hours	H_ID	AutoNumber	0	ID of Hours Objects
Hours	H_Time	Decimal	-	Time spent in entry
Hours	H_Note	String	-	Description of time entry
Hours	H_Billable	Boolean	False	Determines whether entry is calculated total cost of project.
Estimate	Es_ID	AutoNumber	0	ID of Estimate Object
Estimate	Es_Description	String	-	Description of estimate
Estimate	Es_Total	Decimal	-	Total cost of estimate
Estimate	Es_Notes	String	-	Miscellaneous notes on estimate
Estimate	Es_Rate	Decimal	-	Bill rate per hour
Estimate	Es_Hours	Integer	-	Estimate time required
Estimate	Es_Line_Total	Decimal	-	Line total of items associated
Estimate	Es_P_Total	Decimal	-	Value of (rate *time required)
Invoice	I_ID	AutoNumber	0	ID of Invoice Objects
Invoice	I_Description	String	-	Description of invoice
Invoice	I_Due	Datetime	-	Due date of invoice
Invoice	I_Total	Decimal	-	Total cost of invoice
Invoice	I_Status	Enumeration	-	Status of invoice
Invoice	I_Deposit	Decimal	-	Deposit percentage of invoice
Invoice	I_Notes	String	-	Miscellaneous notes on invoice
Invoice	I_Terms	String	-	Terms of invoice
Invoice	I_Line_Total	Decimal	-	Line total of items associated
Invoice	I_BilltoProject	Boolean	False	Shows whether invoice is billing for an existing project
Invoice	I_Enable_Deposit	Boolean	False	Shows whether the invoice requests a deposit payment.
Item	It_ID	AutoNumber	0	ID of Item Objects
Item	It_Rate	Decimal	-	Price of item
Item	It_Description	String	-	Description of item
Item	It_Quantity	Integer	-	Quantity of item
Item	It_Total	Decimal	-	Total price of item

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5.4.2 Sequence Diagrams

5.4.2.1 Registration Sequence Diagram

This diagram shows the application's background processes involving different components of the system when the user is signing up for an account.

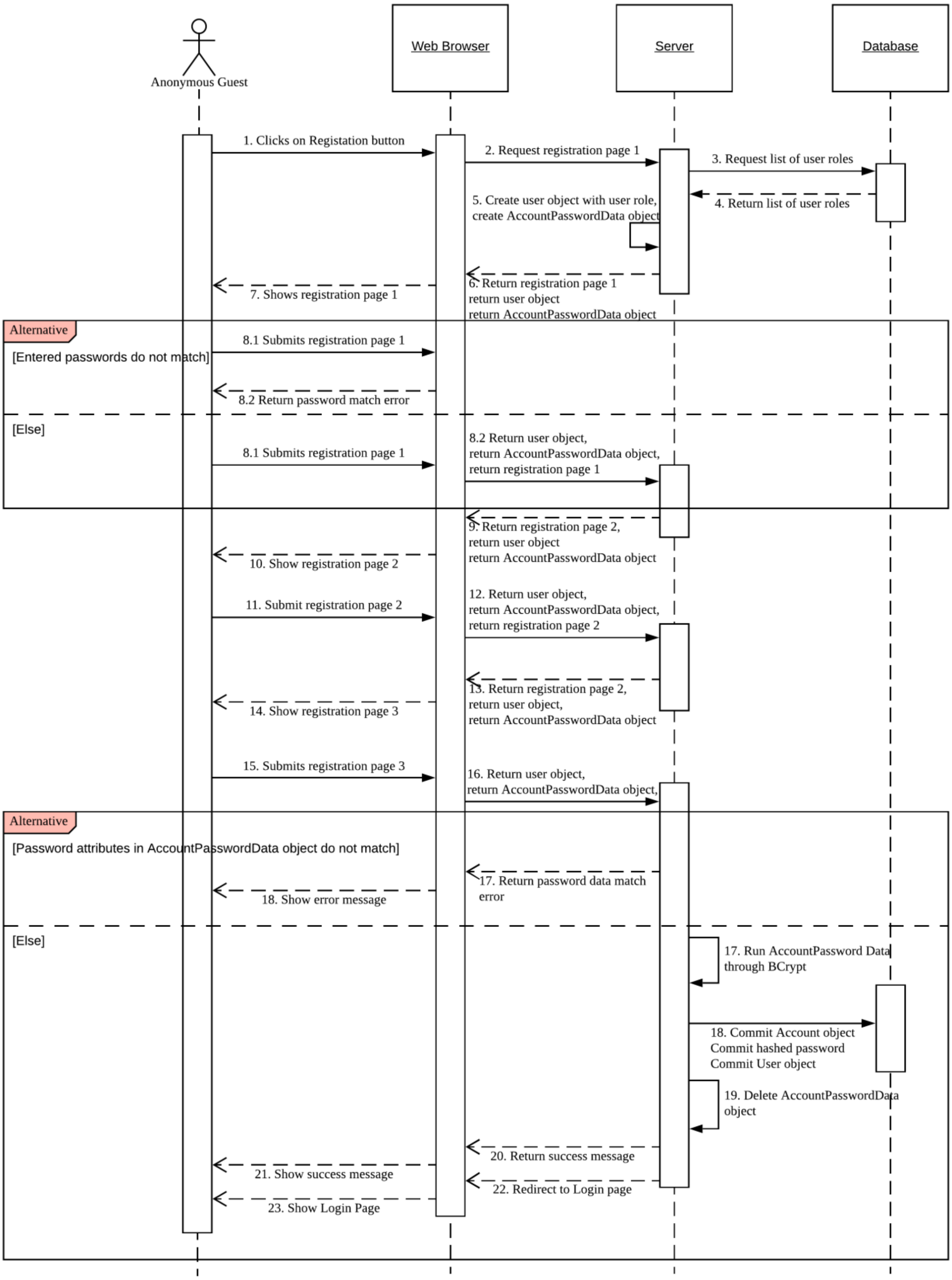

Figure 16: Registration Sequence Diagram

5.4.2.2 Login Sequence Diagram

This diagram shows the background processes in the system when the user logs into their account on the system.

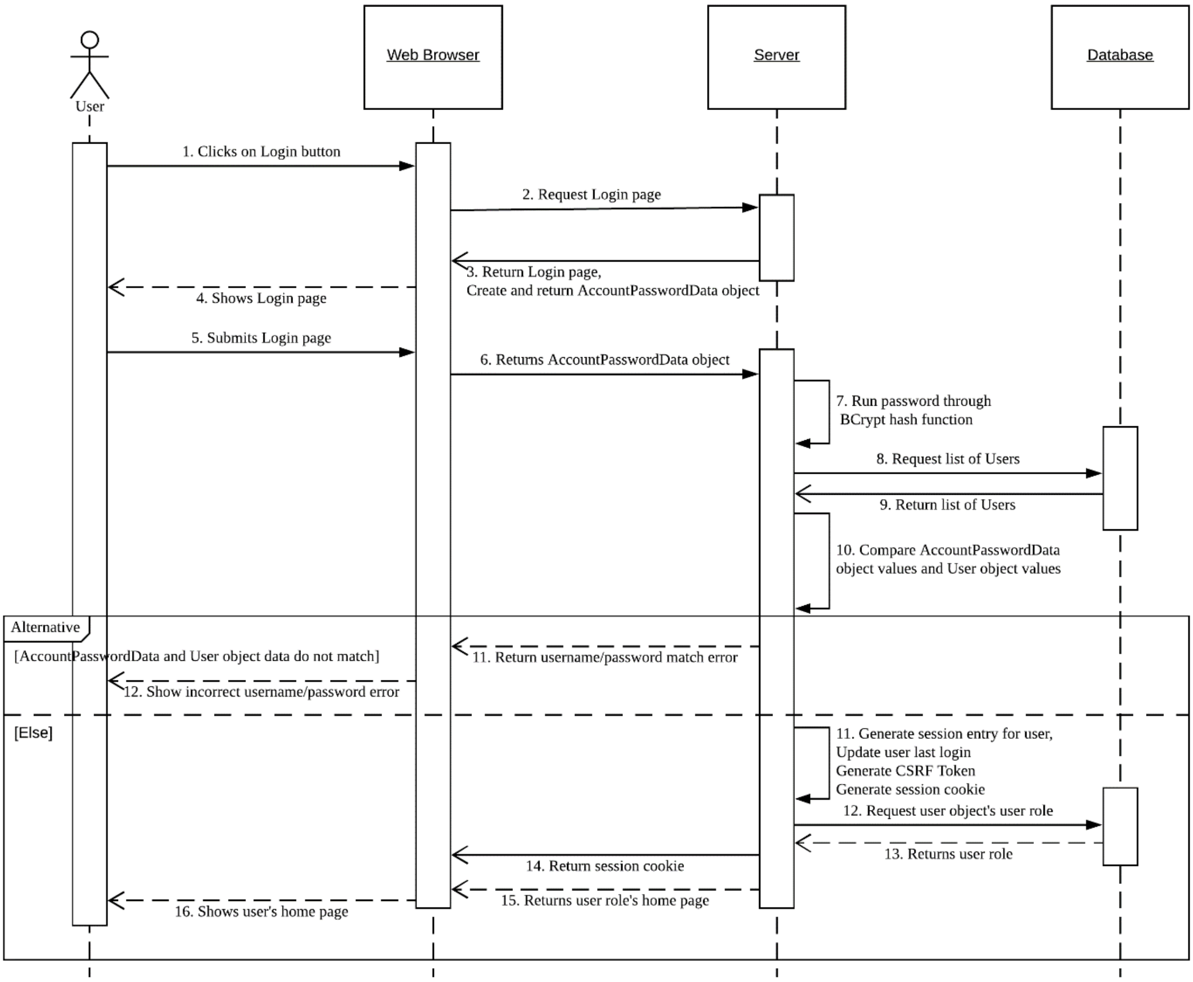

Figure 17: Login Sequence Diagram

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5.4.3 Microflow Diagrams / Activity Diagrams

Microflows are Mendix's version of discrete functions that can be called. The illustrations shown are similar to UML Activity diagrams but are taken directly from the Mendix Modeller.

5.4.3.1 Show_Settings

Identifies the current user and allow current user to view their account data.

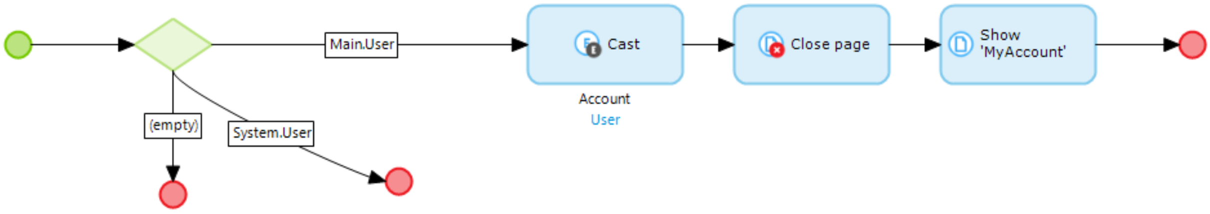

Figure 18: Show_Settings Microflow

5.4.3.2 Vendor_New

Creates a Vendor object and associates the current user to it. Afterwards, opens the New Vendor page and passes the Vendor object to it.

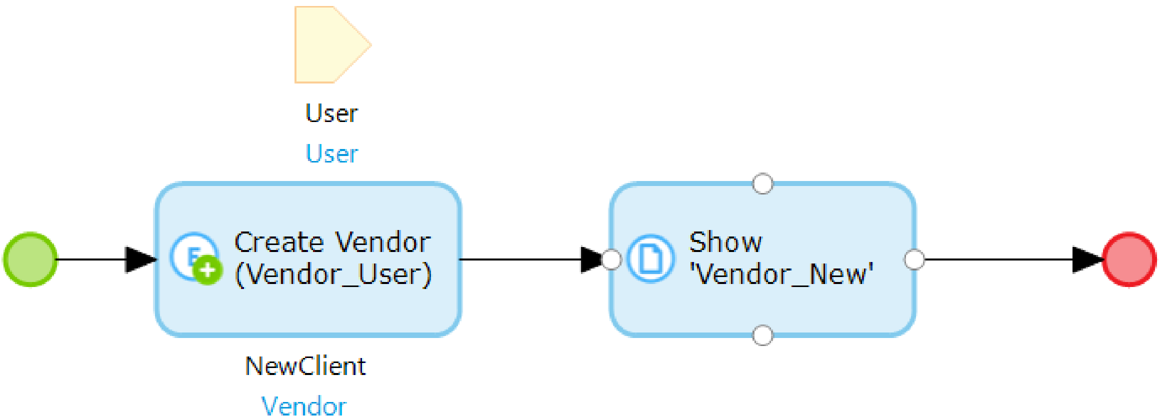

Figure 19: Vendor_New Microflow

5.4.3.3 Client_Email

Identifies the current user, retrieves the Client object as a parameter, creates a new Email object with "To" attribute set to the Client object's Email attribute, passes the new Email to Send_Email page.

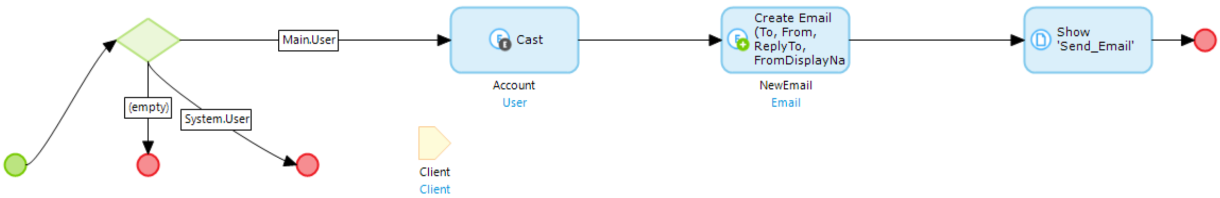

Figure 20: Client_Email Microflow

5.4.3.4 Save_User Microflow

Validates the password, if they are not equal show error message, if they are equal save data and shows success message and redirects user to the login page.

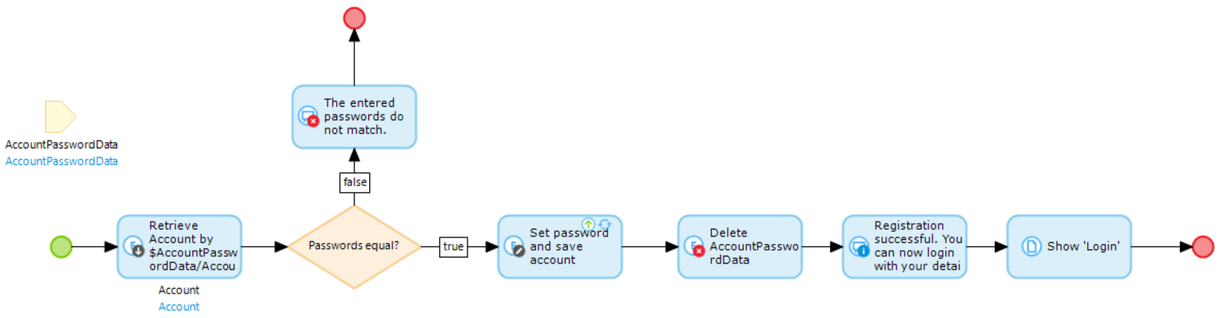

Figure 21: Save_User Microflow

5.4.3.5 RegisterUser Microflow

Creates a new user object with the user role set to “User”, creates a Settings object for the new User, creates a temporary AccountPasswordData object then passes all objects to Registration Wizard.

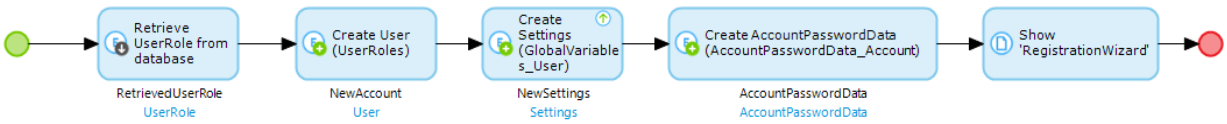

Figure 22: RegisterUser Microflow

5.4.3.6 Project_New Microflow

The button leads to the Project_New page after creating a new Project object associated to a user.

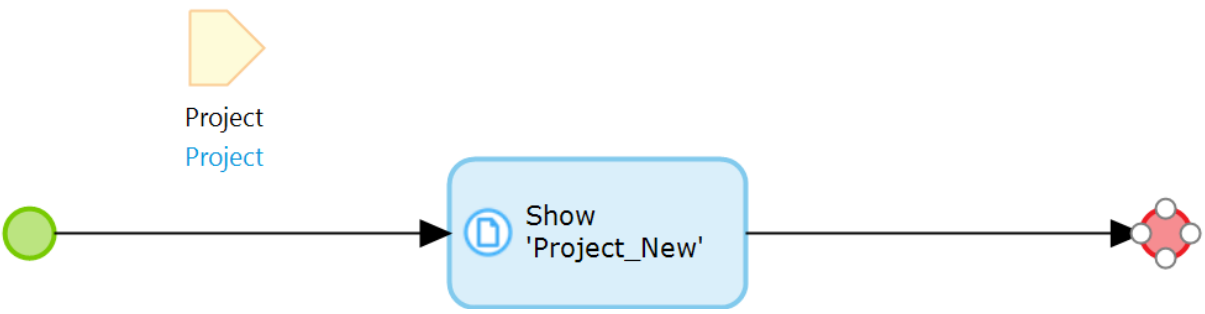

Figure 23: Project_New Microflow

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5.4.3.7 Expense_New Microflow

Create the new Expense object associated to a Project and show the Expense_New_Project page with the new Expense object.

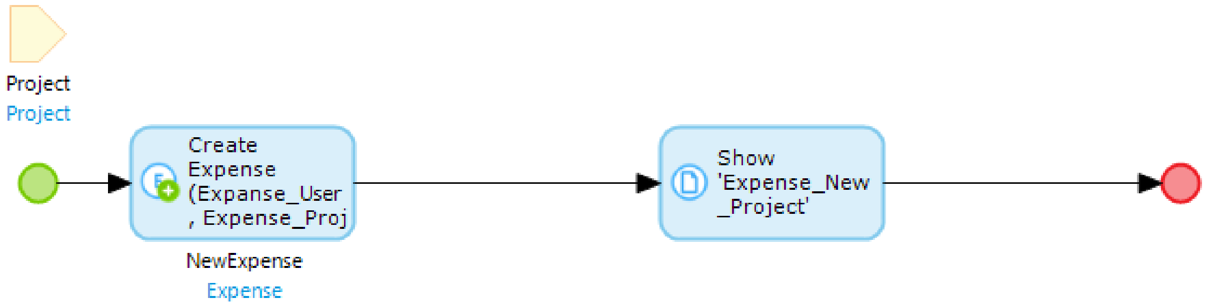

Figure 24: Expense_New Microflow

5.4.3.8 Project_Expense_Total

Retrieves the list of Hours objects associated with the Project object parameter, makes a sum of all "H_Time" attributes, returns the summed value as calculated column value.

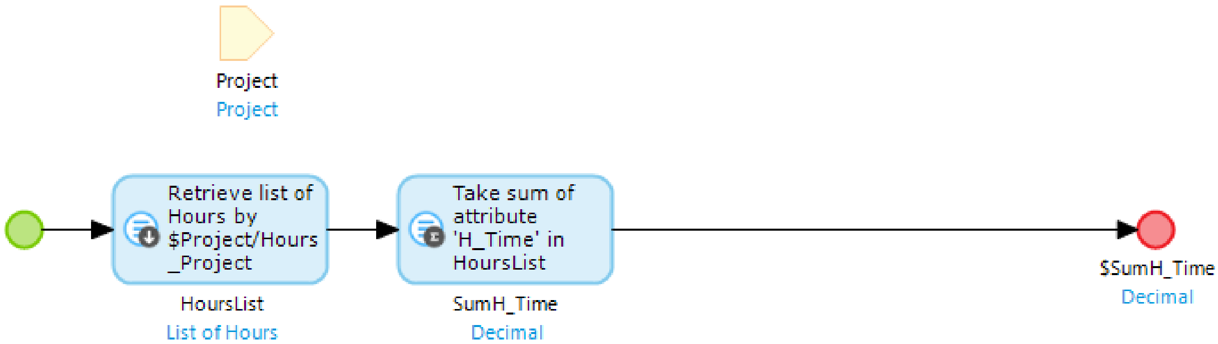

Figure 25: Project_Expense_Total Microflow

5.4.3.9 Estimate_New Microflow

Create a new Estimate record and commits the object immediately to update on the UI. Then the new object is passed to the form page.

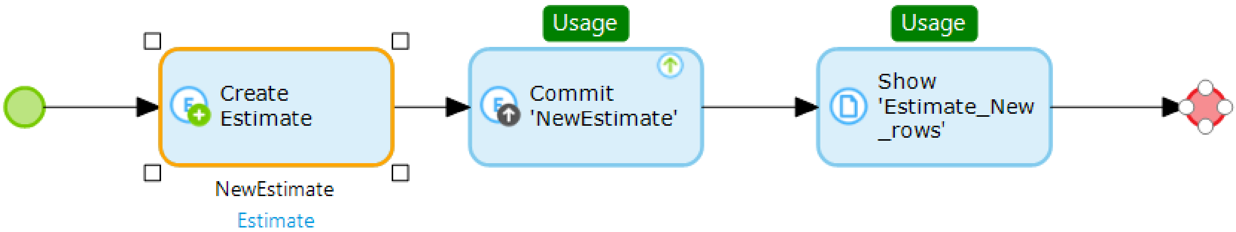

Figure 26: Estimate_New Microflow

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5.4.3.10 Project_Cost Microflow

Retrieves the list of Hours objects associated with the Project object parameter, makes a sum of all "H_Time" attributes, multiplies the summed value with "P_Rate" to obtain the project cost value, then returns the variable as "P_Cost" calculated column value.

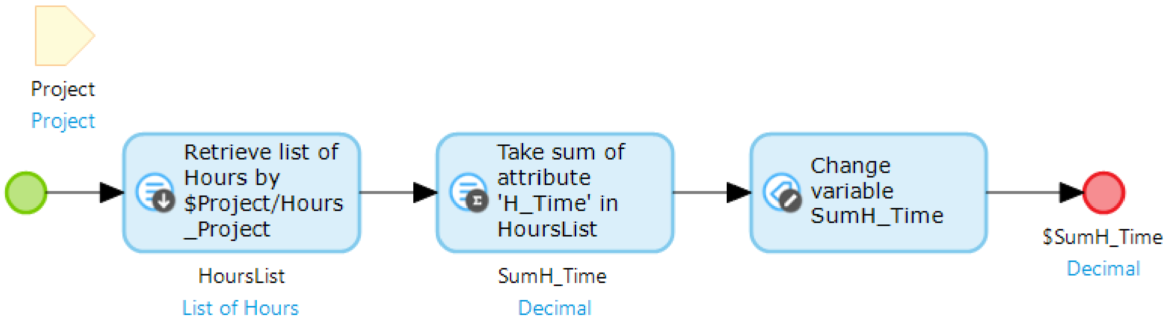

Figure 27: Project_Cost Microflow

5.4.3.11 Card_New Microflow

Create a new record in Card table and show the CardForm page.

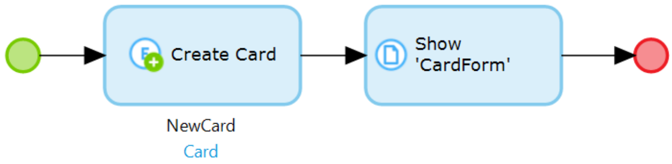

Figure 28: Card_New Microflow

5.4.3.12 Invoice_Total Microflow

Checks if the "I_BilltoProject" state first, if false, calculate the invoice total only. If true, checks if a project is associated. If false, calculate invoice total and prompts user to select a project. If true, retrieves the associated project, calculates the total of invoice then passes the values as calculated column.

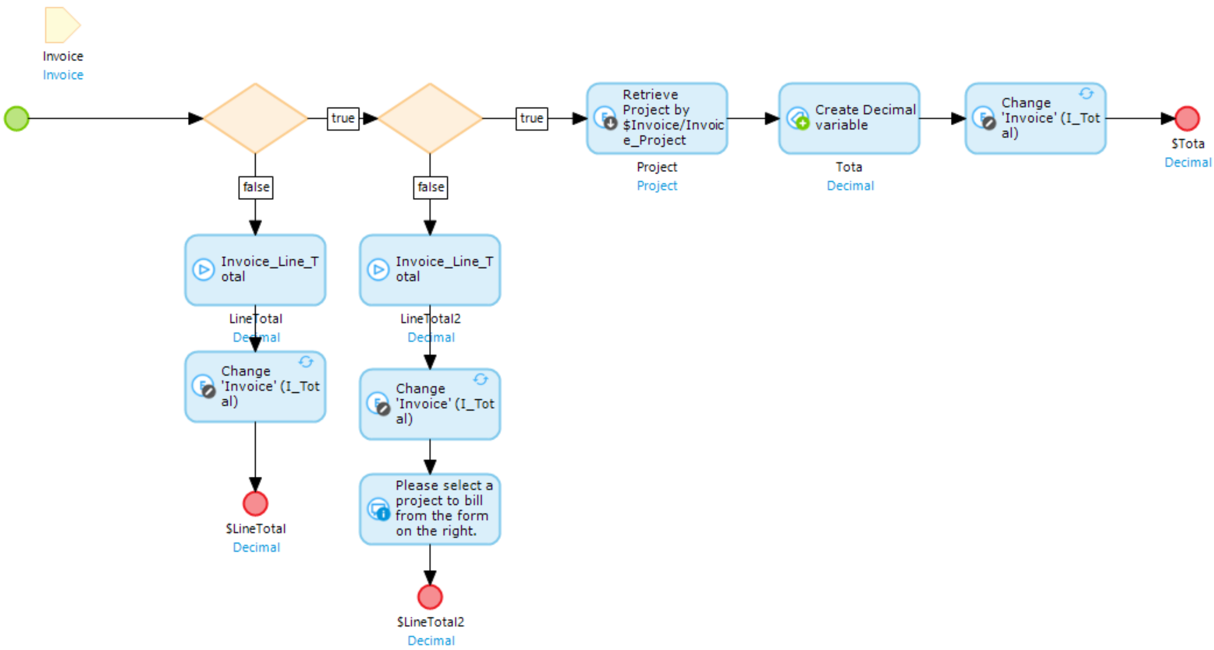

Figure 29: Invoice_Total Microflow

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5.4.3.13 Estimate_Delete Microflow

Deletes the chosen item in Estimate table and closes the page.

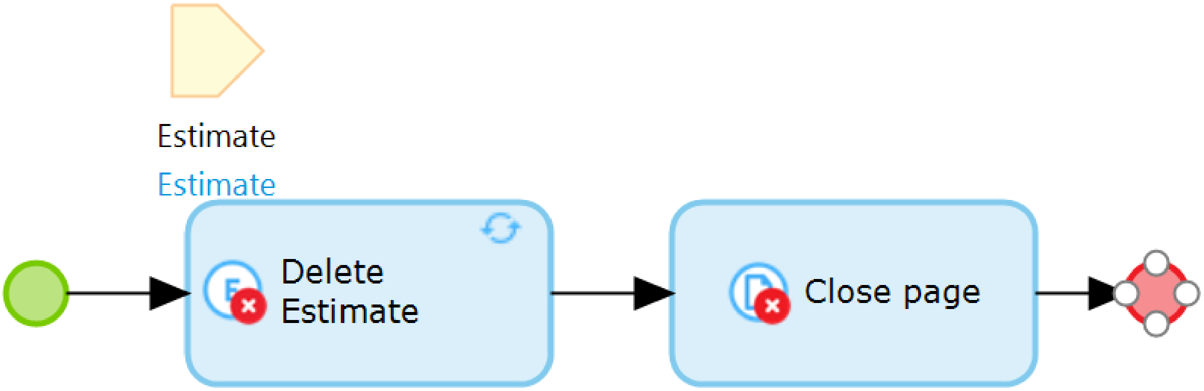

Figure 30: Estimate_Delete Microflow

5.4.3.14 Invoice_Doc_Download Microflow

Creates a new record in invoicedocment and generate the same file with PDF format and download the PDF file in local and show the success message.

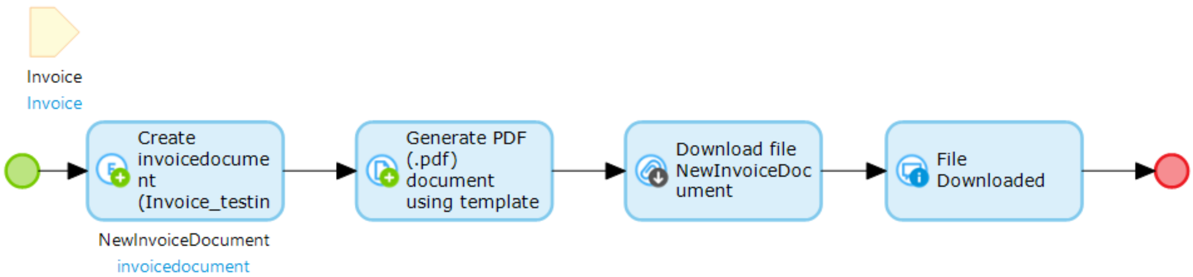

Figure 31: Invoice_Doc_Download Microflow

5.4.3.15 Invoice_Email Microflow

Creates an invoice document using the Invoice parameter object, creates a new email object and associates to current user with the Client's email attribute from the Client object parameter, attaches the generated invoice document as an attachment in the email then shows the "Send_Email" page.

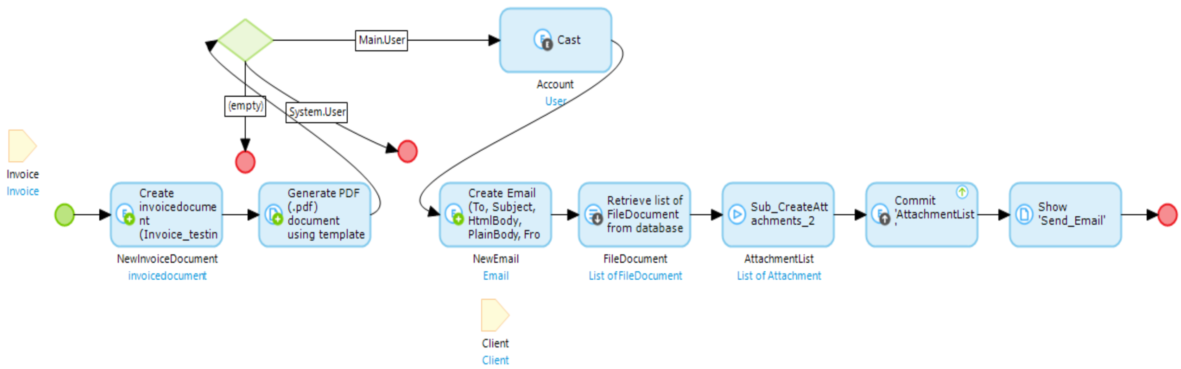

Figure 32: Invoice_Email Microflow

5.4.3.16 Estimate_Main_Total Microflow

Calculates the total of estimate by adding the project total and line total attributes from Estimate object, returns value as “Es_Total” calculated column attribute.

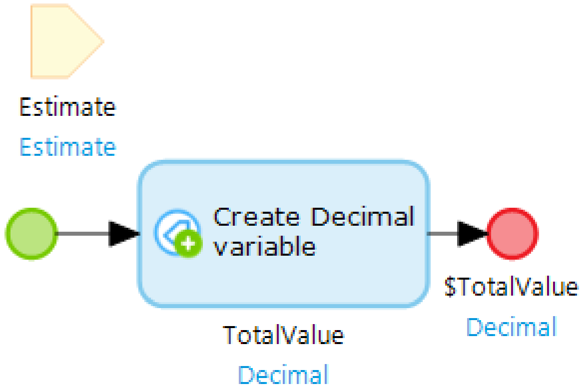

Figure 33: Estimate_Main_Total Microflow

5.4.3.17 IVK_SendEmail Microflow

This microflow is an included part of email system module. It retrieves the list of attachments on the email, retrieves pre-set header (if any), calls a microflow to retrieve the email settings then calls another microflow to send the email. Then it checks if email was successfully sent. If true, adds sent record, shows success confirmation and closes the “Send_Email” page. If not, adds an error log object.

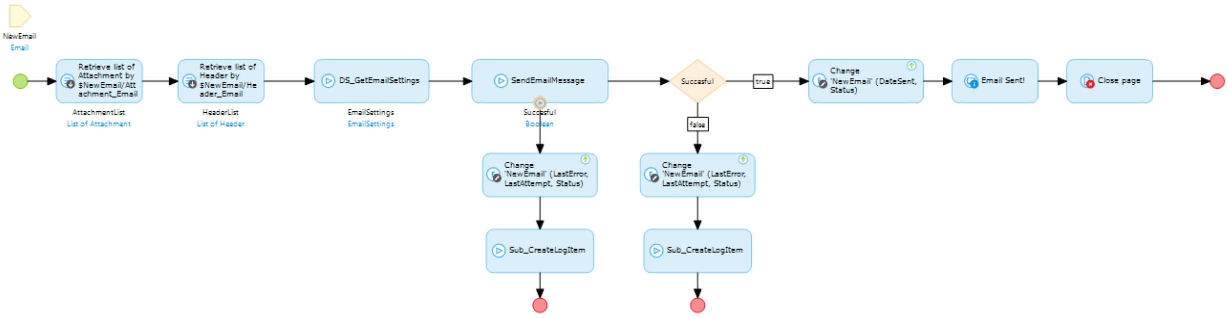

Figure 34: IVK_SendEmail Microflow

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5.5 Navigation

5.5.1 Site Structure

The application is structured so that the distinct features of the of the application are shown on their own set of pages. The main page of each function is linked to the sidebar of the UI to be easily accessible by the users. The administrators can access the administrator dashboard which containing the pages to view or edit the settings of the application on the UI without changing them in the backend.

5.5.2 Site Map

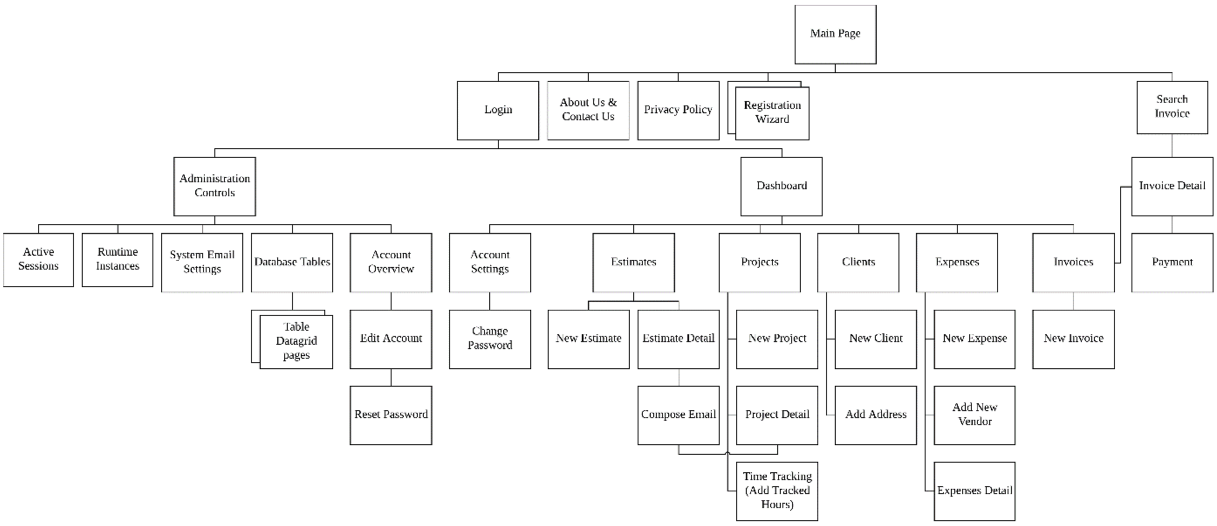

Figure 35: SimpleBooks Application Site Map

5.6 User Roles

The users of the system include:

User: These are the registered members on the application, which comprise of small businesses, freelancers and even the common people. They are given access to the powerful suite of accounting features by SimpleBooks including but not limited to, project management, time tracking, estimate and invoice documents generation and client addressing.

Administrator: The administrator of the system is responsible for the overall management of the application and its stored data. This user group includes the application developers and any other administrators assigned by them to overlook and upkeep the application.

Anonymous: These are the general visitors to the application website, who may do so for various reasons such as getting to know about the benefits and functions offered by the SimpleBooks accounting software.

5.7 User Access Matrices

The user access matrix for the application is provided below, which mentions the specific access rights to each element for each user role of the application.

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Yang Chen (T7206174)
Hemanathan S/O Sathiamoorthy (T7322656)

5.7.1 Page Access Matrix

The following list shows the pages directly accessible through the UI and the user roles they are authorised for. The pages that require an object to be passed to are handled by microflow and therefore, not included in the list.

Page	Administrator	User	Anonymous
AboutUsAndContactUs	✓	✓	✓
Address_New	✓	✓	
Client_New	✓	✓	
Estimate_Detail	✓	✓	
Estimate_Edit	✓	✓	
Estimate_New	✓	✓	
Expense_Detail	✓	✓	
Expense_New	✓	✓	
Hours_Add	✓	✓	
Invoice	✓	✓	
Invoice_Detail	✓	✓	
Invoice_Edit	✓	✓	
Invoice_New	✓	✓	
Login	✓		✓
Pay_Search	✓		✓
PrivacyPolicy	✓	✓	✓
Project_New	✓	✓	
SimpleBooks	✓	✓	✓
Vendor_New	✓	✓	
Expense_Edit	✓	✓	
Expense_New_Project	✓	✓	
Invoice_Detail_Guest	✓		✓
Address_Admin	✓		
Admin	✓		
Admin_Settings_New	✓		
CardForm	✓		
Client_Admin	✓		
Database	✓		
Estimate_Admin	✓		
EstimateDocument_Admin	✓		
Expense_Admin	✓		
Hours_Admin	✓		
Invoice_Admin	✓		
InvoiceDocument_Admin	✓		
Items_Admin	✓		
Payments_Admin	✓		
Project_Admin	✓		
Settings_Admin	✓		
TestCards_Admin	✓		
User_Admin	✓		
Vendor_Admin	✓		

5.7.2 Microflow Access Matrix

Microflow	Administrator	User	Anonymous	Notes
Address_Edit	✓	✓		Obtains the address object and passes to the edit page
Address_New	✓	✓		Creates an address object associated to Client and passes to new form page
Card_New	✓			Creates a Card object and passes to new form page
Client_New	✓	✓		Creates a client object associated to User and passes to new form page.
Client_Email	✓	✓		Retrieves current User, creates new Email object with “To” prefilled with Client’s email address, passes to email compose page
Disable_Pay	✓	✓		Changes the “Payment_Setup” Boolean to “false” in current User’s Setting object
Download_Estimate	✓			Downloads existing Estimate document from database table
Download_Invoice	✓			Downloads existing Invoice document from database table
Enable_Pay	✓	✓		Changes the “Payment_Setup” Boolean to “true” in current User’s Setting object
Estimate_Delete	✓	✓		Deletes the Estimate object
Estimate_Doc_Download	✓	✓		Creates a PDF document with data from Estimate object and downloads it into the browser
Estimate_Email	✓	✓		Generates PDF document with data from Estimate object, creates Email object, attaches generated PDF to Email and passes to email compose page
Estimate_Line	✓	✓		Calculates the total of line Items associated to an Estimate object
Estimate_New	✓	✓		Creates an Estimate object associated to User and passes to new form page
Expense_New	✓	✓		Creates an Expense object associated to User and passes to new form page.
Expense_Save	✓	✓		Commits the Expense object, force refreshes Expense page
Hours_New	✓	✓		Creates an Hours object associated to Project and passes to new form page.
Invoice_Delete	✓	✓		Deletes the Invoice object

Invoice_Doc_Download	✓	✓		Creates a PDF document with data from Invoice object and downloads it into the browser
Invoice_Line	✓	✓		Calculates the total of line Items associated to Invoice object
Invoice_New	✓	✓		Creates an Invoice associated to Client and passes to new form page
Invoice_Total	✓	✓		Calculates the total of Invoice cost by adding line total and project total
Line_Save_Invoice	✓	✓		Commits the Item object, force refreshes the invoice form
Pass_Search	✓		✓	Passes Invoice object from search results to “Invoice_Detail_Guest” page
Pay_Check	✓		✓	Retrieves Card object matching the details entered from form, if exists, retrieves Invoice object, sets Invoice status to “Paid”, creates and saves payment record object
Pay_Init	✓		✓	Creates temporary Card object and passes to payment form page
ProgressWizard1	✓		✓	Passes the Account and User objects to page 2 of the registration wizard
ProgressWizard2	✓		✓	Passes the Account and User objects to page 3 of the registration wizard
Project_Detail	✓	✓		Passes Project object to detail page
Project_Edit	✓	✓		Passes existing Project object to edit page
Project_New	✓	✓		Creates a Project object associated with User and passes to new form page
RegisterUser	✓		✓	Retrieves list of UserRole from system tables, creates a new User object with “User” user role, creates Settings object associated with user, creates temporary AccountPasswordData for password validation
SaveUser	✓		✓	Checks if password and password confirmation fields are equal, hashes and commits password and user account if

				true, deletes temporary AccountPasswordData object, shows success message
Show_Client	✓	✓		Retrieves current user account and passes to Client page
Show_Dashboard	✓	✓		Retrieves current user account and passes to Dashboard page
Show_Estimate	✓	✓		Retrieves current user account and passes to Estimate page
Show_Expenses	✓	✓		Retrieves current user account and passes to Expenses page
Show_Project	✓	✓		Retrieves current user account and passes to Projects page
Show_Settings	✓	✓		Retrieves current user account and passes to Settings page
Vendor_New	✓	✓		Creates a new Vendor object associated with User and passes to new form page

5.7.3 Entity Access Matrix

Entity	Module Roles	Create	Delete	Access Rights
Address	Administrator	Yes	Yes	Full Read, Full Write
	User	Yes	Yes	Full Read, Full Write
	Anonymous	No	No	Limited Read, Limited Write
Client	Administrator	Yes	Yes	Full Read, Full Write
	User	Yes	Yes	
	Anonymous	No	No	Full Read, No Write
Estimate	Administrator	Yes	Yes	Full Read, Full Write
	User	Yes	Yes	
	Anonymous	No	No	Full Read, No Write
EstimateDocument	Administrator	Yes	Yes	Full Read, Full Write
	User	Yes	Yes	
	Anonymous	No	No	
Expense	Administrator	Yes	Yes	Full Read, Full Write
	User	Yes	Yes	
	Anonymous	No	No	
Hours	Administrator	Yes	Yes	Full Read, Full Write
	User	Yes	Yes	
	Anonymous	No	No	
Invoice	Administrator	Yes	Yes	Full Read, Full Write
	User	Yes	Yes	
	Anonymous	No	No	Full Read, No Write
InvoiceDocument	Administrator	Yes	Yes	Full Read, Full Write
	User	Yes	Yes	
	Anonymous	No	No	Full Read, No Write

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Item	Administrator	Yes	Yes	Full Read, Full Write
	User	Yes	Yes	
	Anonymous	No	No	Full Read, No Write
Project	Administrator	Yes	Yes	Full Read, Full Write
	User	Yes	Yes	
	Anonymous	No	No	Limited read, No Write
Settings	Administrator	Yes	Yes	Full Read, Full Write
	User	No	No	
	Anonymous	No	No	No read, No Write
User	Administrator	Yes	Yes	Full Read, Full Write
	User	No	No	
	Anonymous	Yes	Yes	Limited read, No Write
Vendor	Administrator	Yes	Yes	Full Read, Full Write
	User	Yes	Yes	
	Anonymous	No	No	No read, No Write
	Administrator			
	User			
	Anonymous			

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5.8 Wireframes

5.8.1 Main Pages

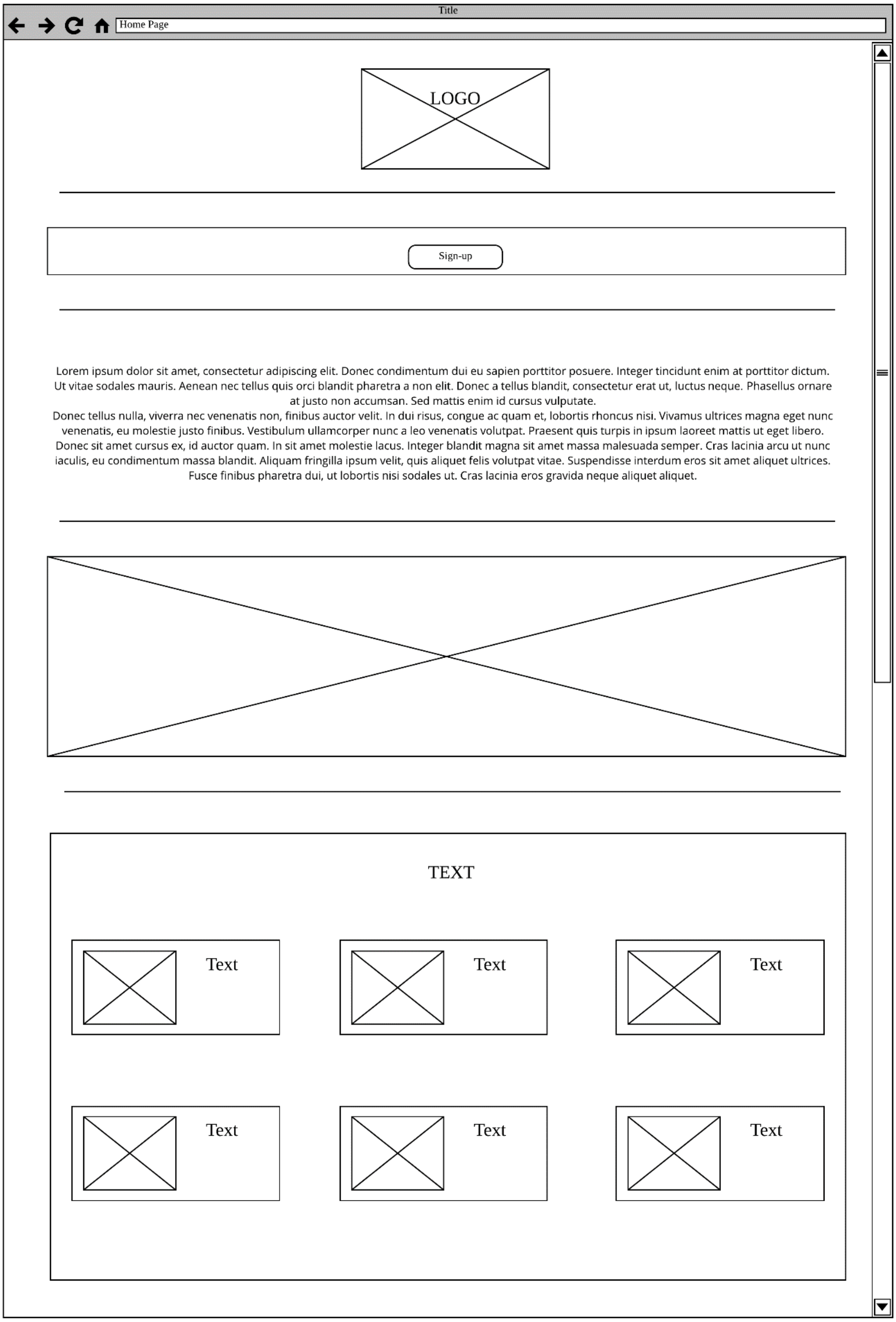

Figure 36: Wireframe Home Page

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Hemanathan S/O Sathiamoorthy (T7322656)

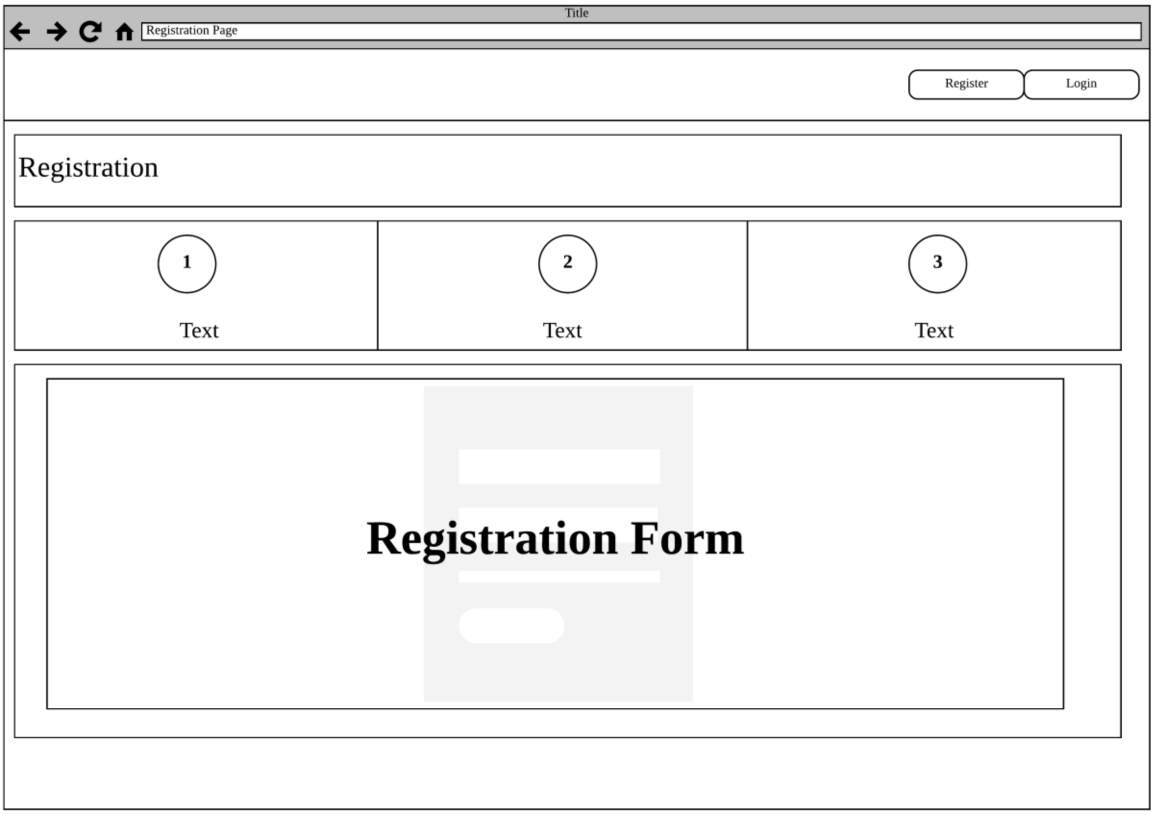

Figure 37: Wireframe Registration

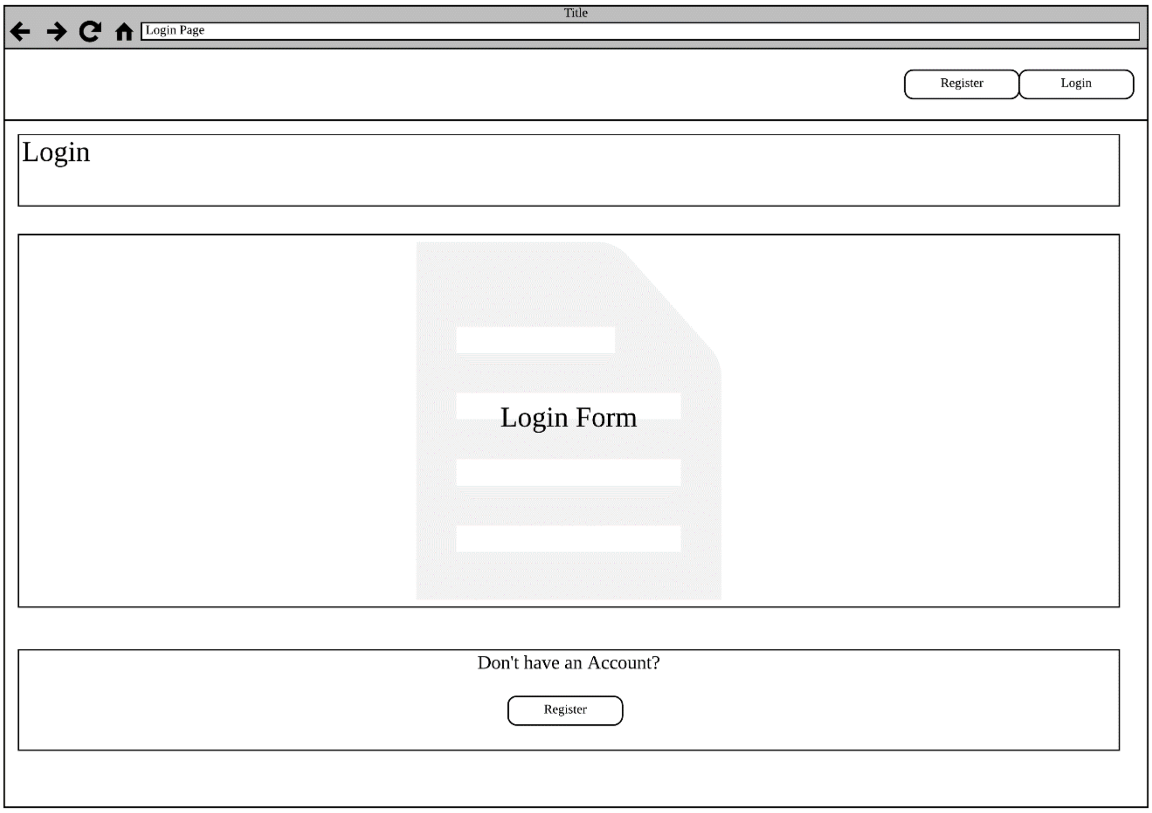

Figure 38: Wireframe Login

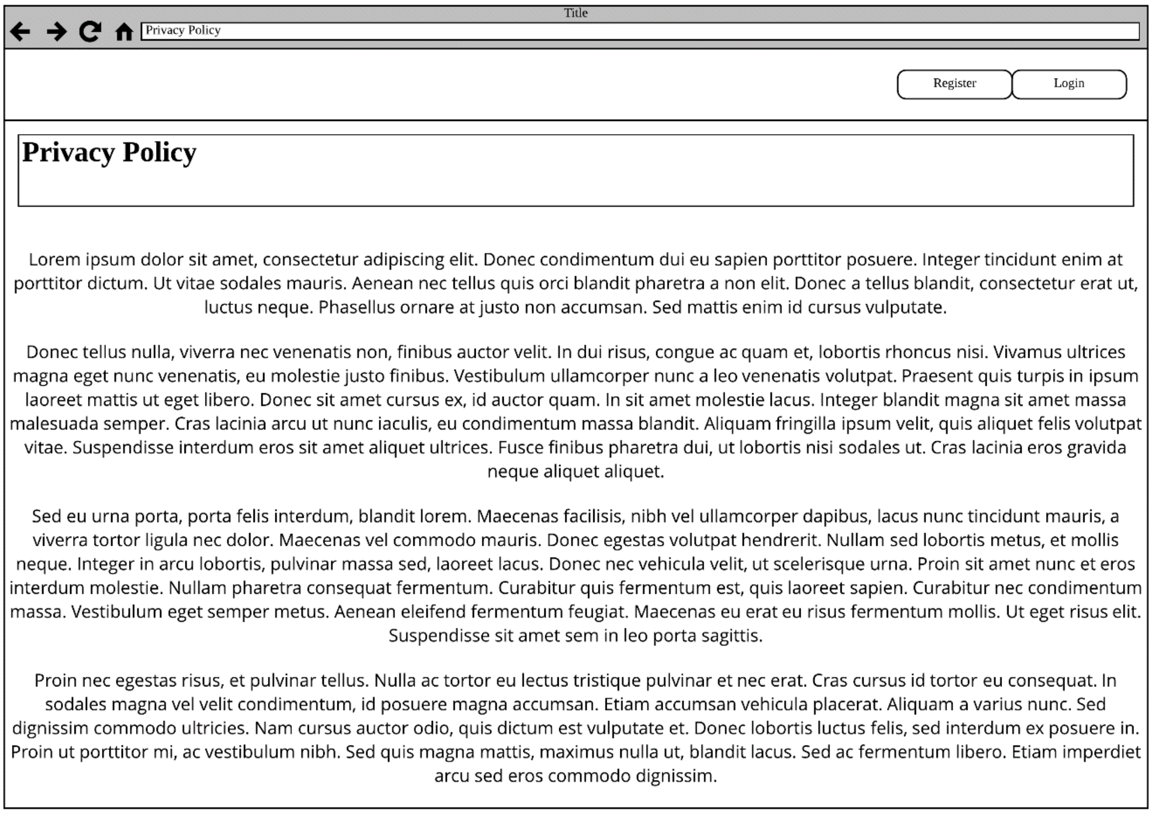

Figure 39: Wireframe Privacy Policy

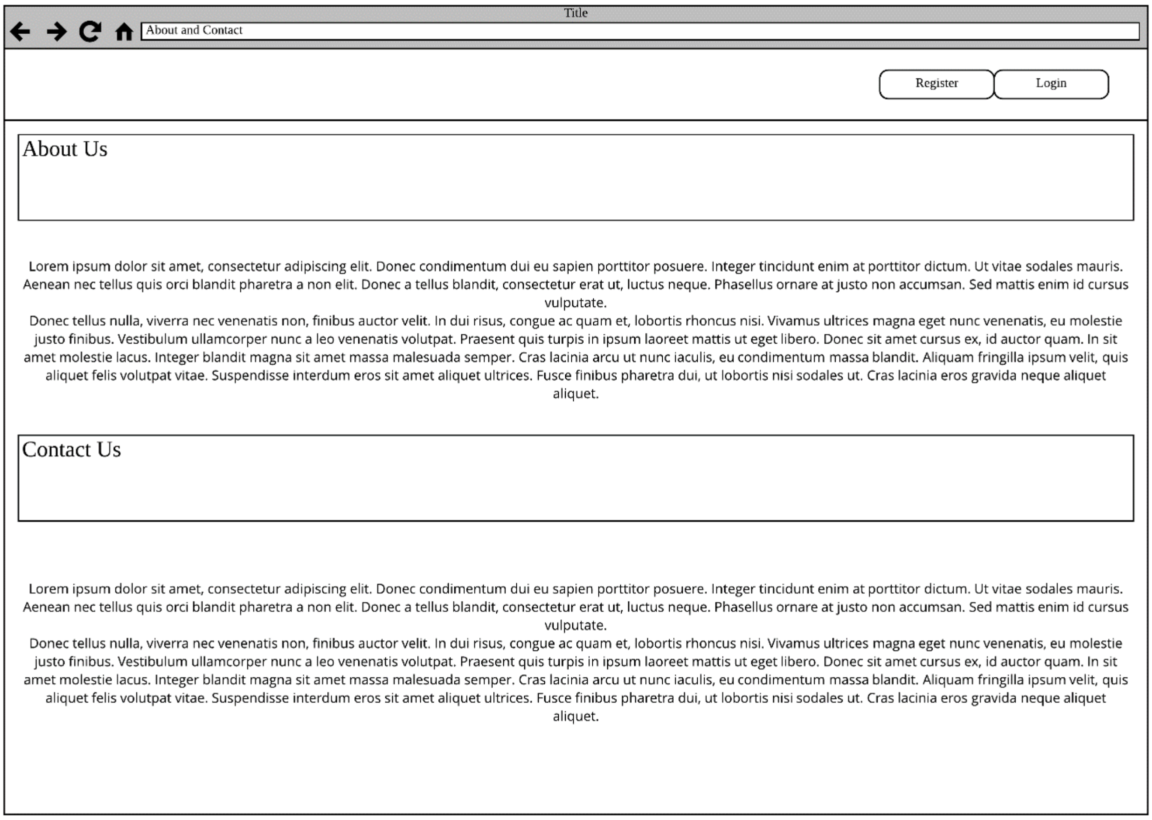

Figure 40: Wireframe About Us and Contact Us

5.8.2 User Pages

5.8.2.1 Clients

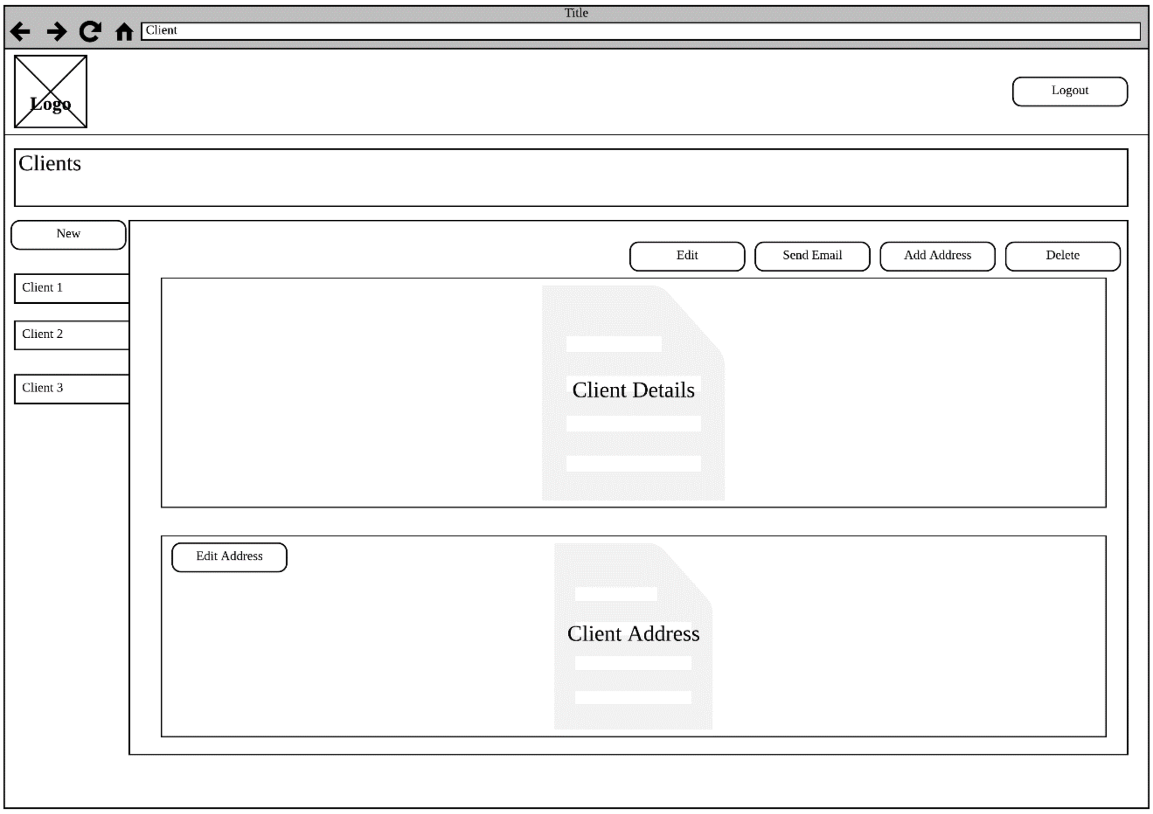

Figure 41: Wireframe Clients Page

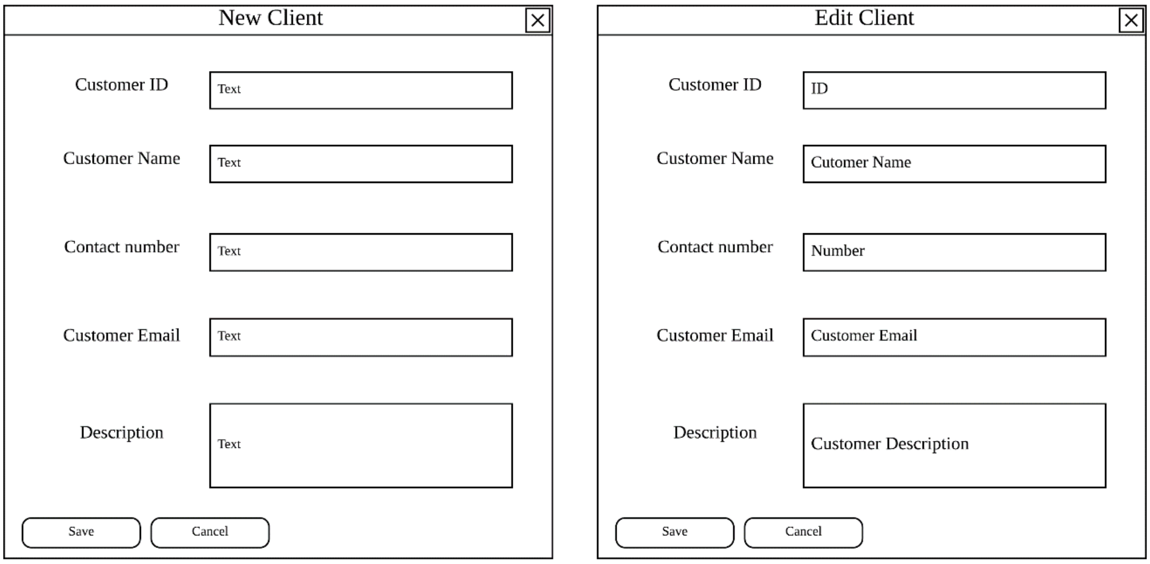

Figure 42: Wireframe New/Edit Client

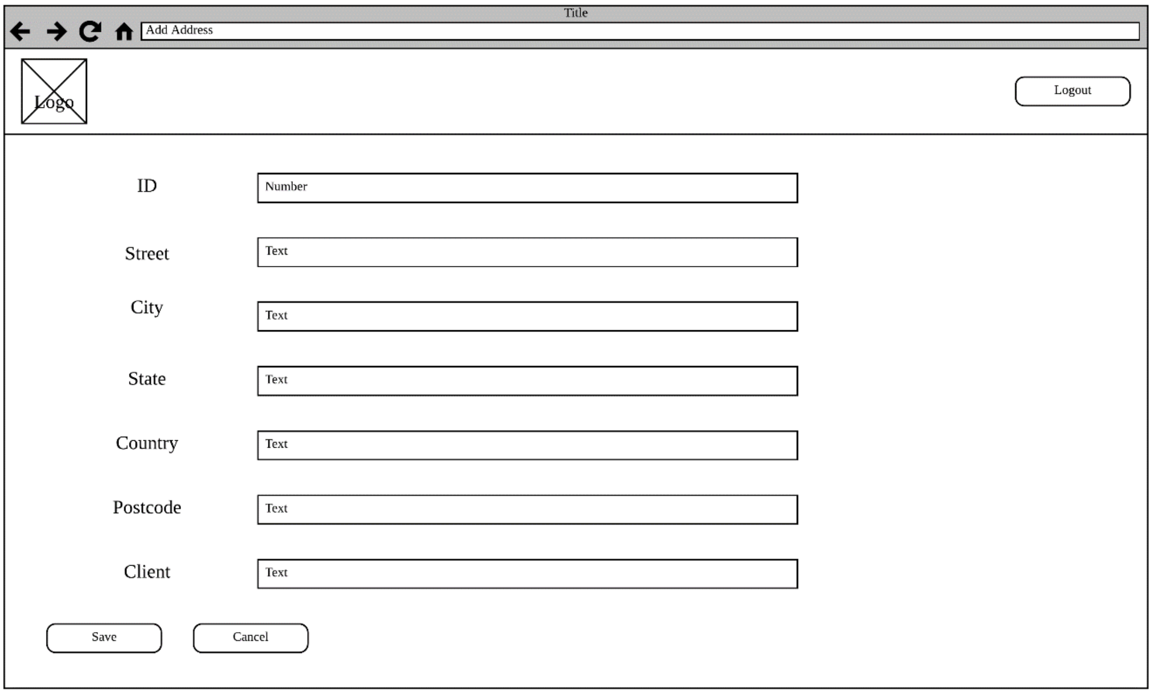

Figure 43: Wireframe Add Client Address Page

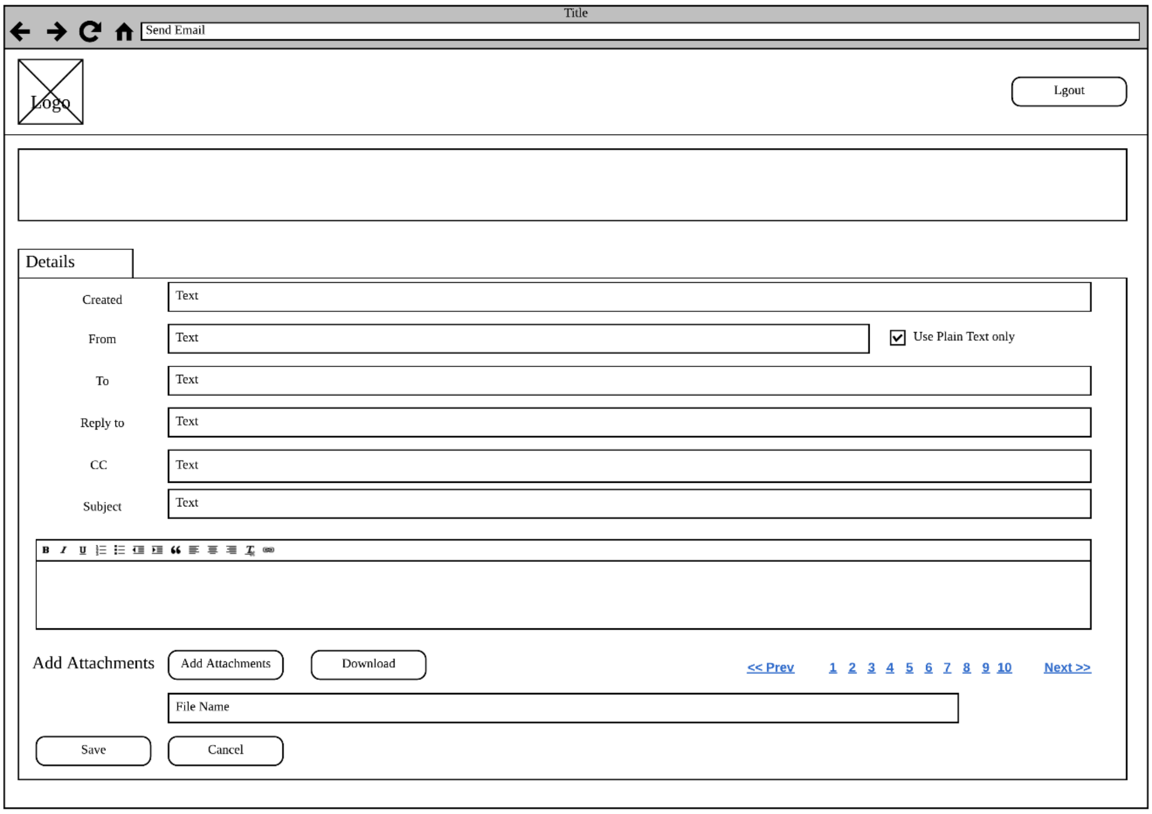

Figure 44: Wireframe Client Send Email

Si Thu Zaw (T7177793)
Raghav Kapoor (T7184782)
Tapan Thakar (T7318691)
Yang Chen (T7206174)
Hemanathan S/O Sathiamoorthy (T7322656)

5.8.2.2 Expenses

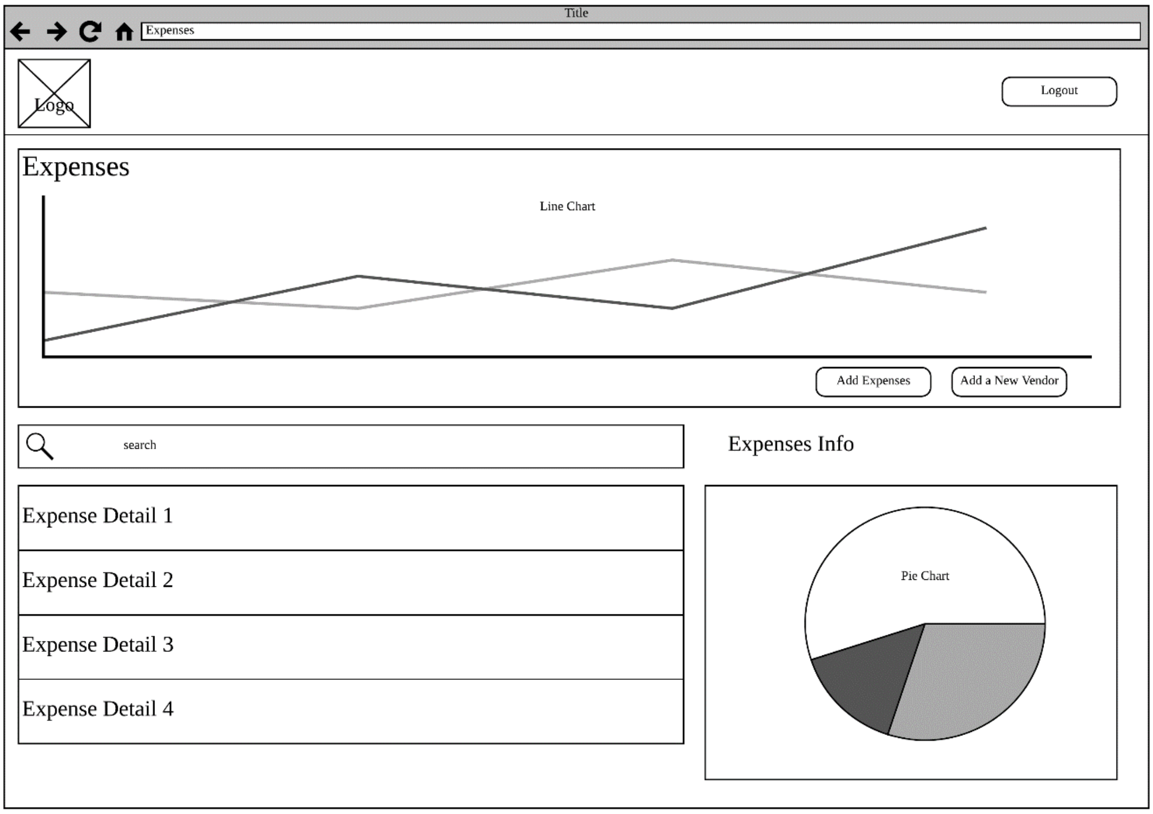

Figure 45: Wireframe Expenses Dashboard

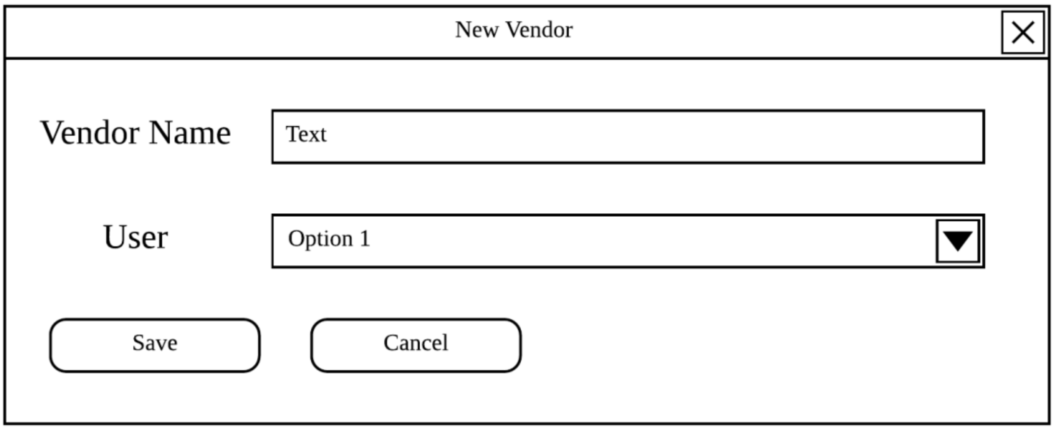

Figure 46: Wireframe New Vendor Page

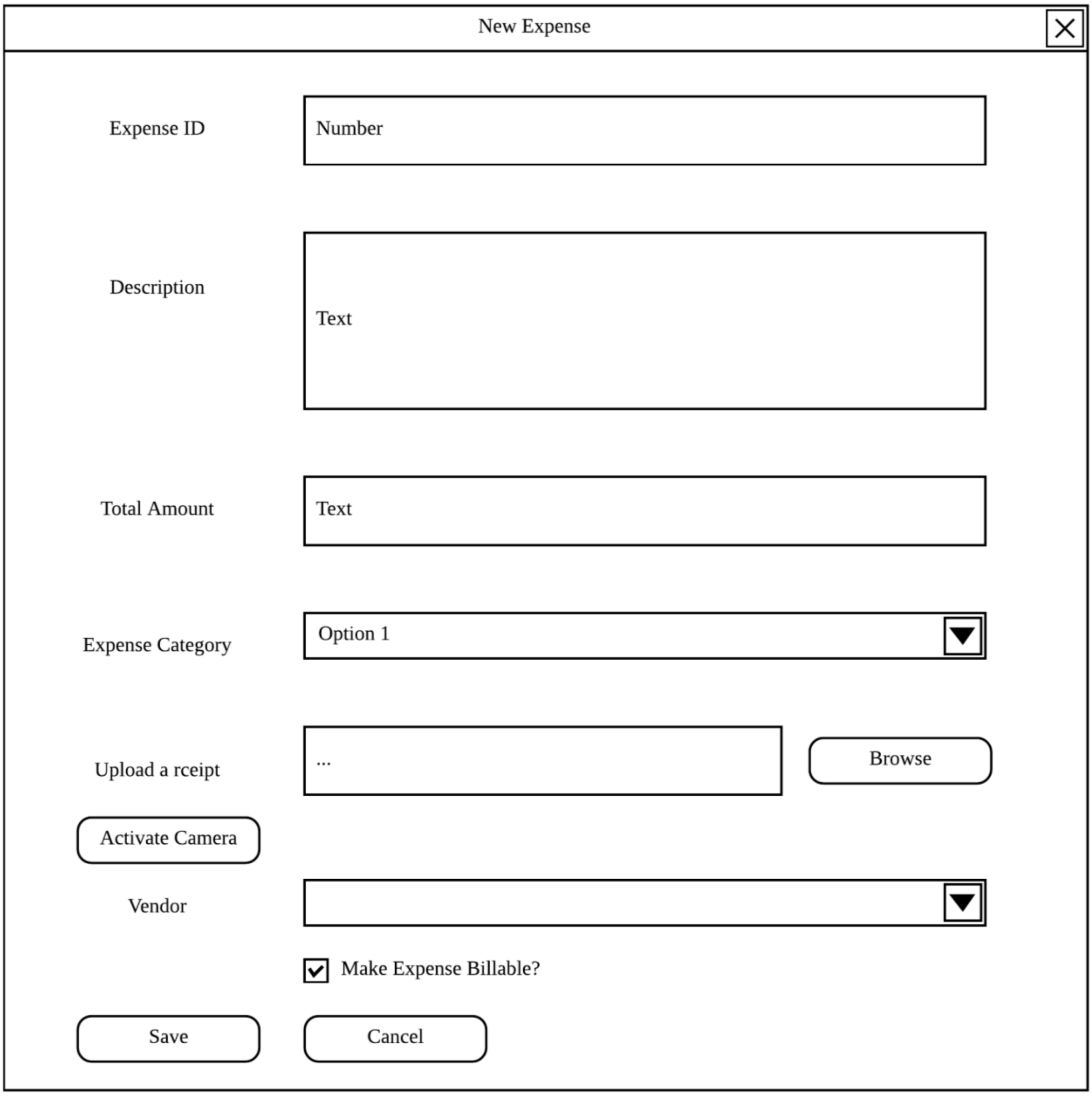

Figure 47: Wireframe New Expense Page

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Yang Chen (T7206174)
Hemanathan S/O Sathiamoorthy (T7322656)

5.8.2.3 Estimates

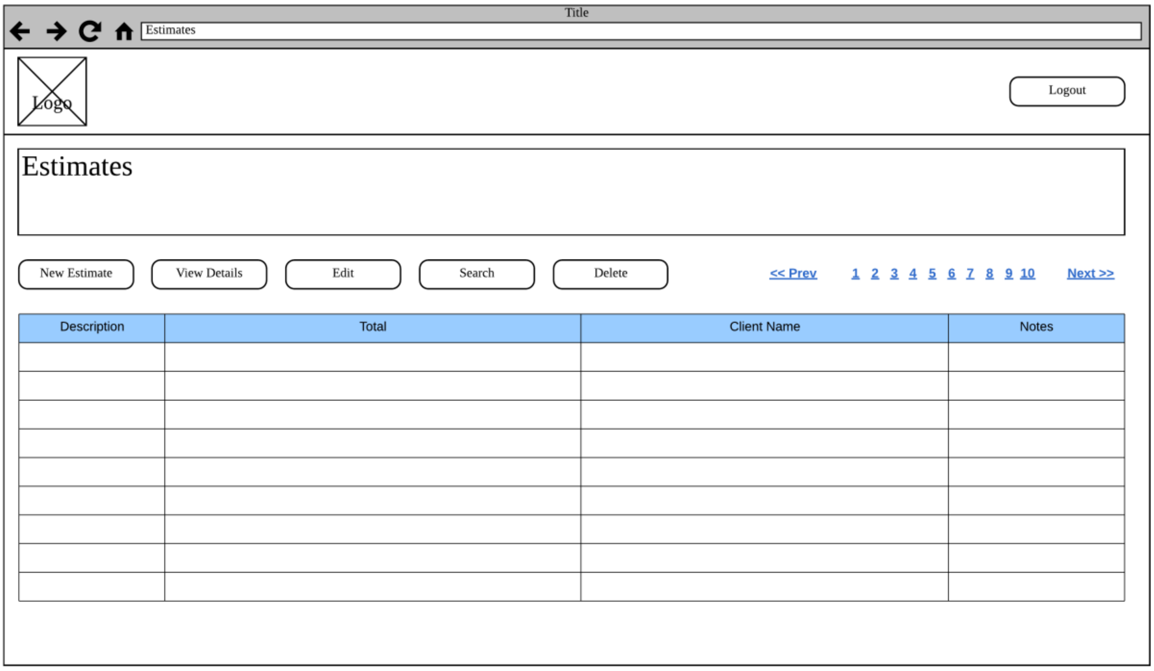

Figure 48: Wireframe Estimates Page

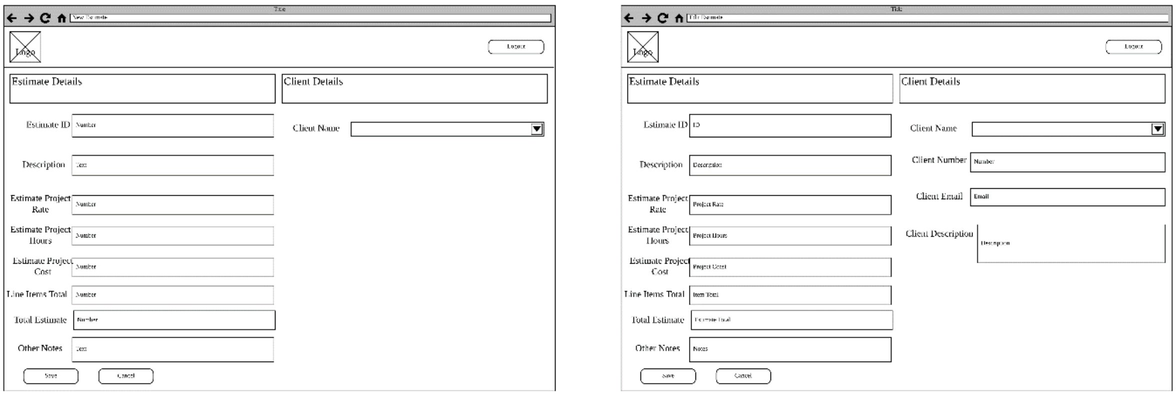

Figure 49: Wireframe New/Edit Estimate Page (Open and Collapsed Client Details)

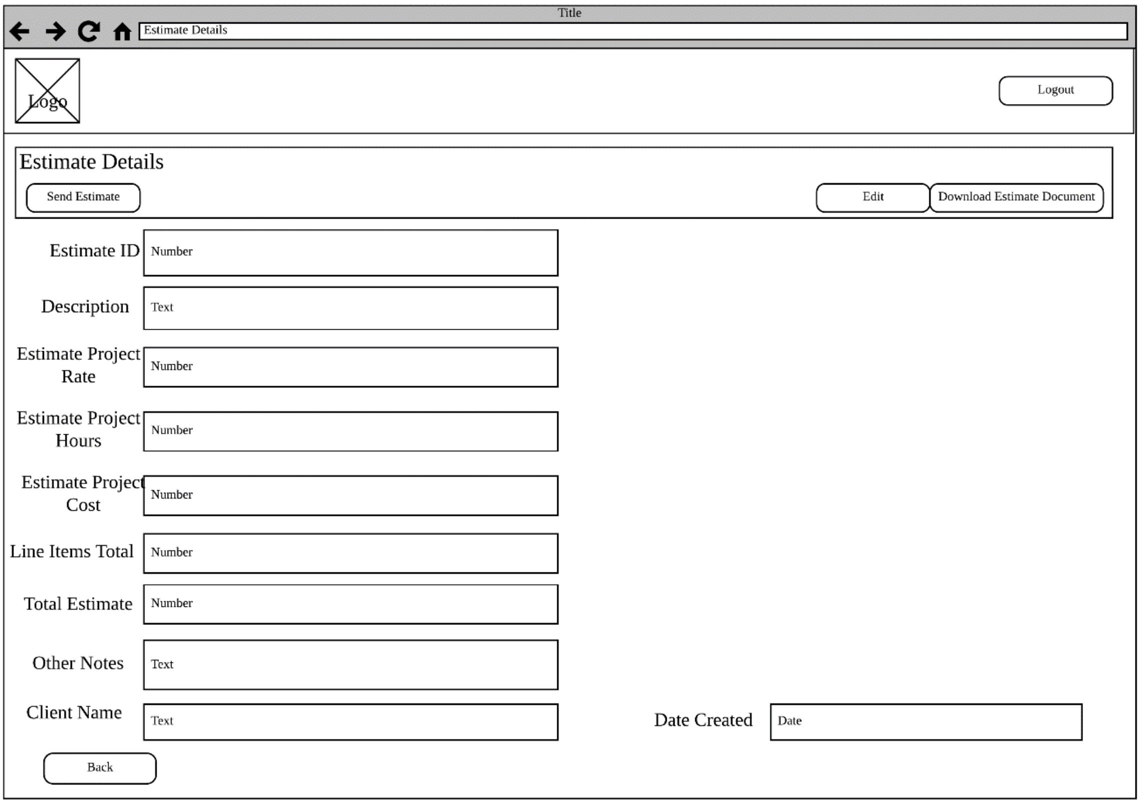

Figure 50: Wireframe Estimates Detail Page

5.8.2.4 Projects

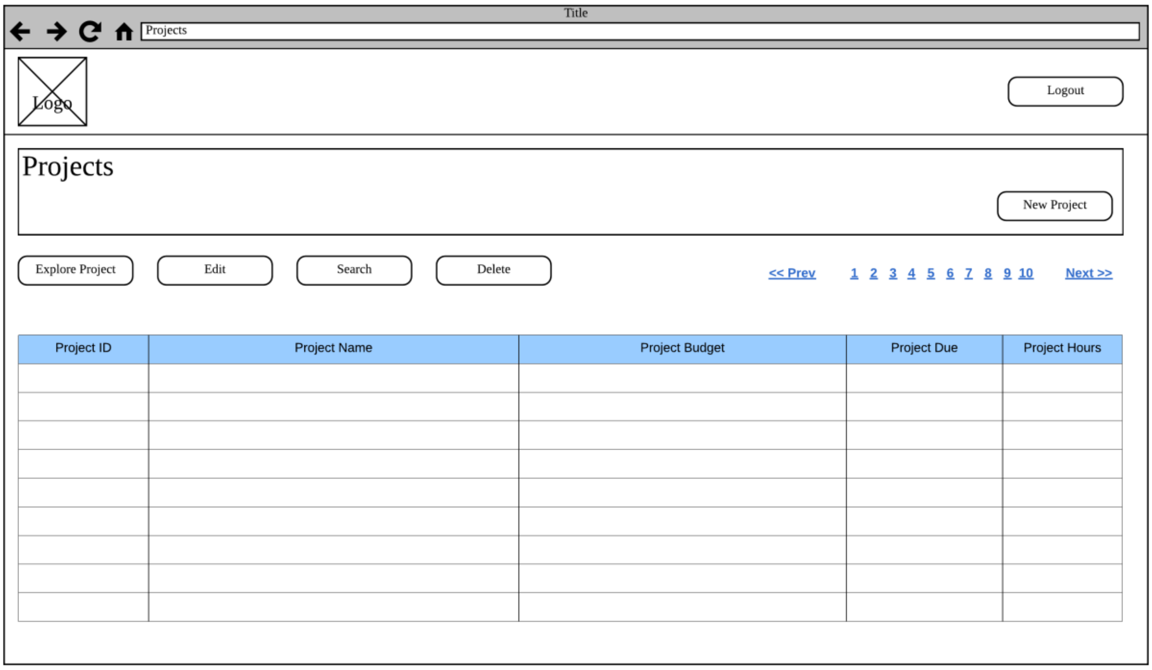

Figure 51: Wireframe Projects Page

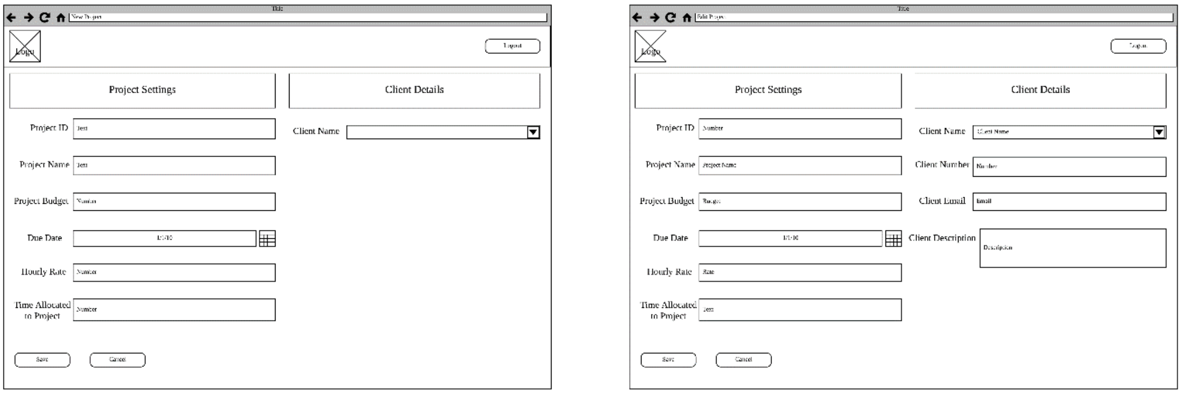

Figure 52: Wireframe Project New/Edit Page (Open and Collapsed Client Details)

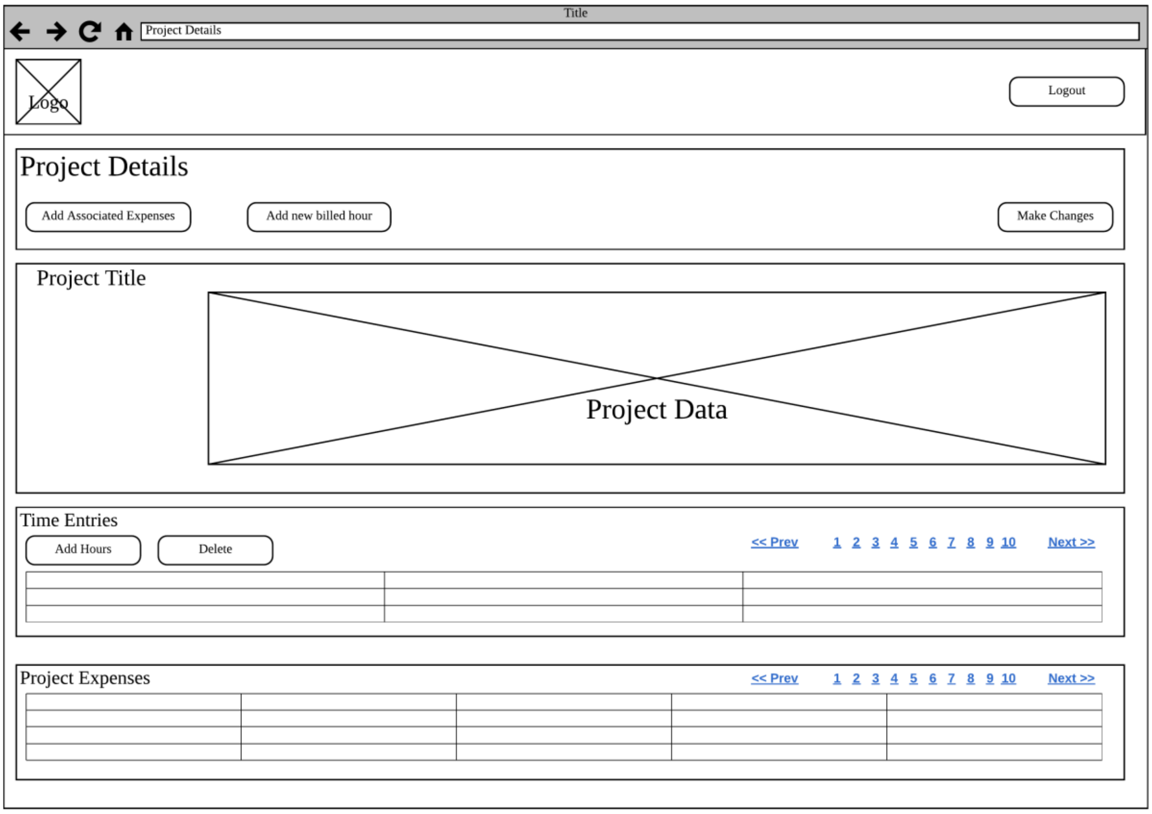

Figure 53: Wireframe Project Detail Page

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Hemanathan S/O Sathiamoorthy (T7322656)

5.8.2.5 Invoices

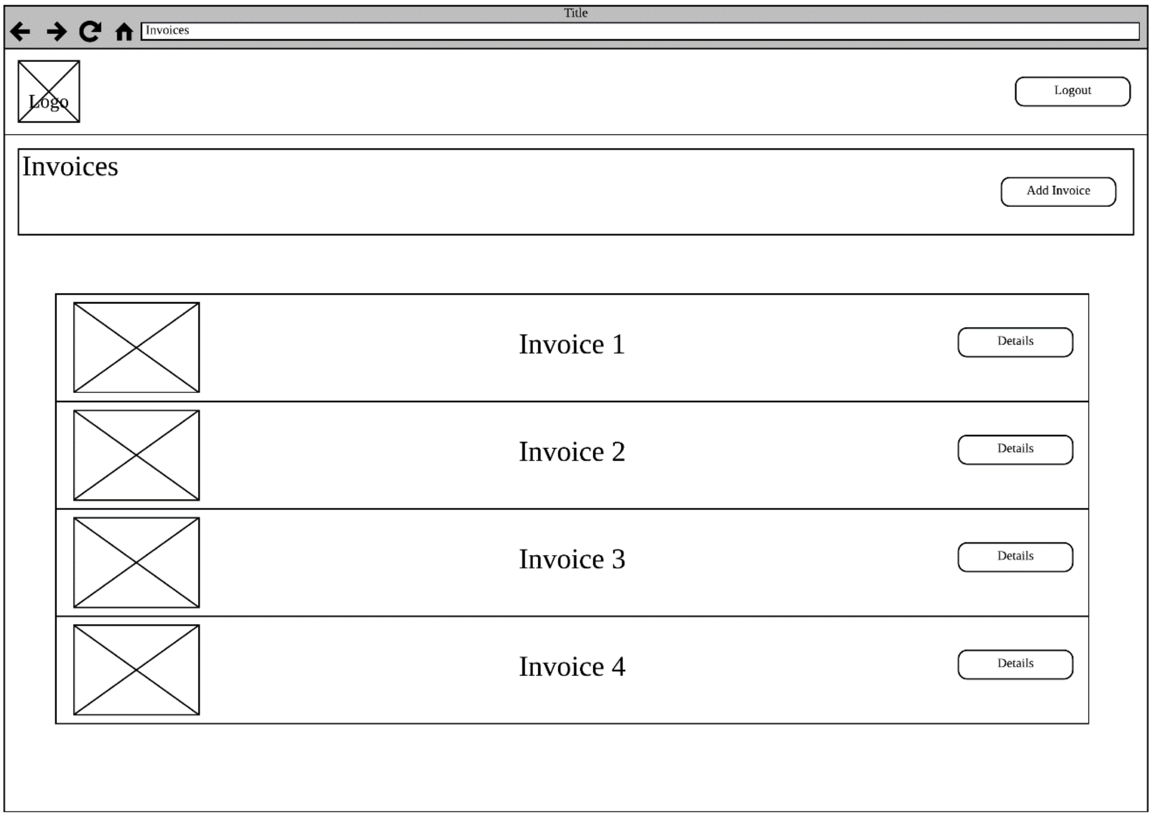

Figure 54: Wireframe Invoices

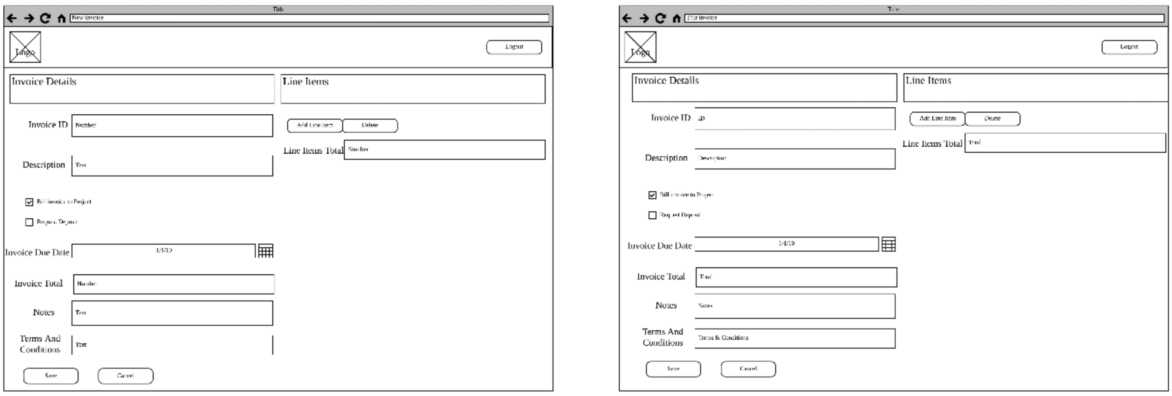

Figure 55: Wireframe New/Edit Invoice

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Yang Chen (T7206174)
Hemanathan S/O Sathiamoorthy (T7322656)

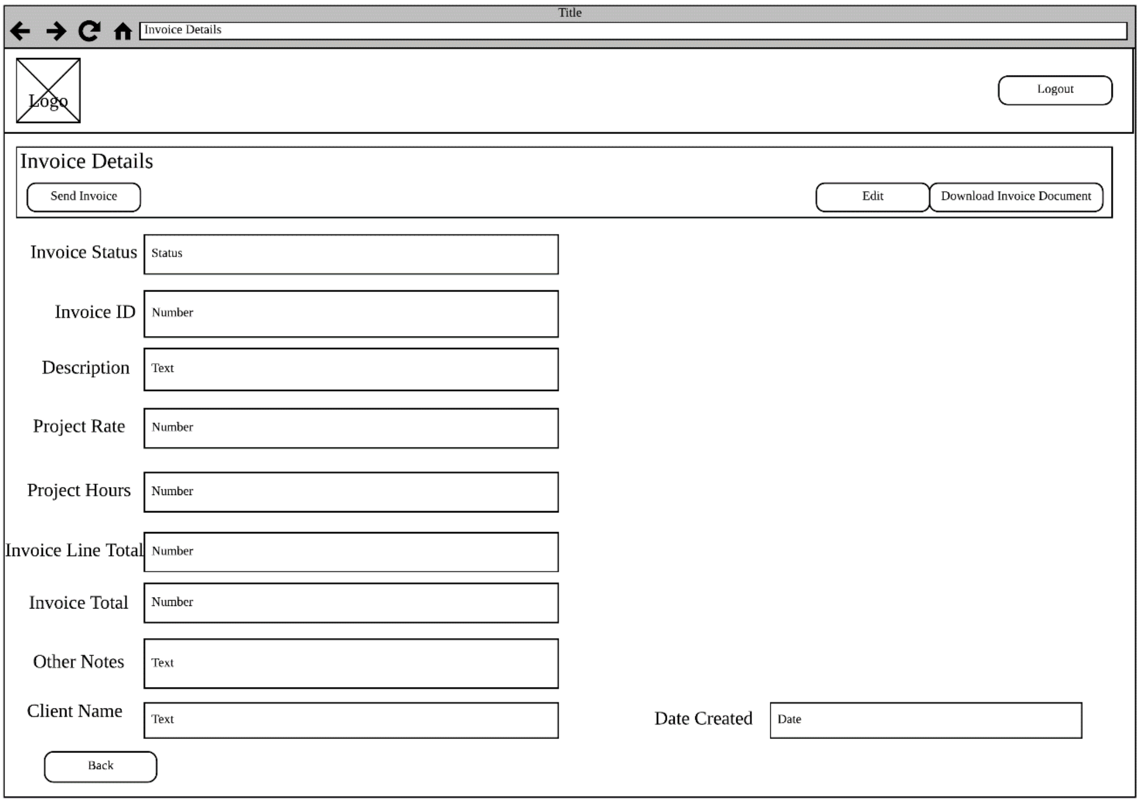

Figure 56: Wireframe Invoice Details

5.8.2.6 Others

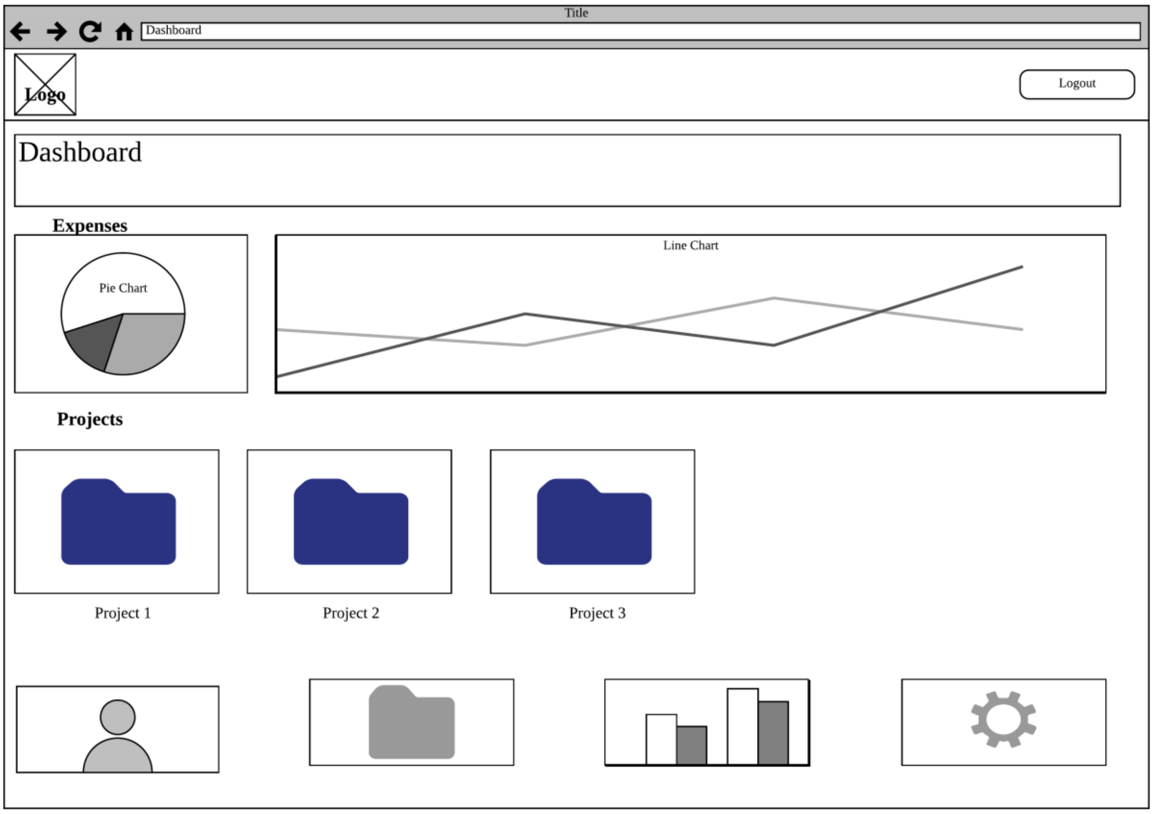

Figure 57: Wireframe User Dashboard

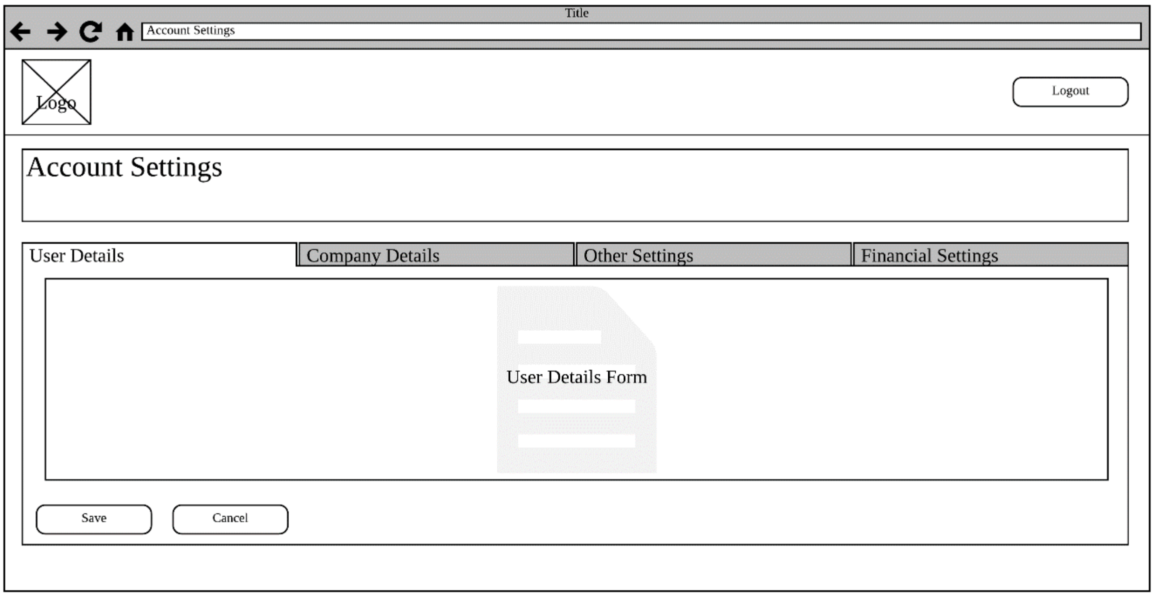

Figure 58: Wireframe User Account Settings

5.8.3 Administrator Pages

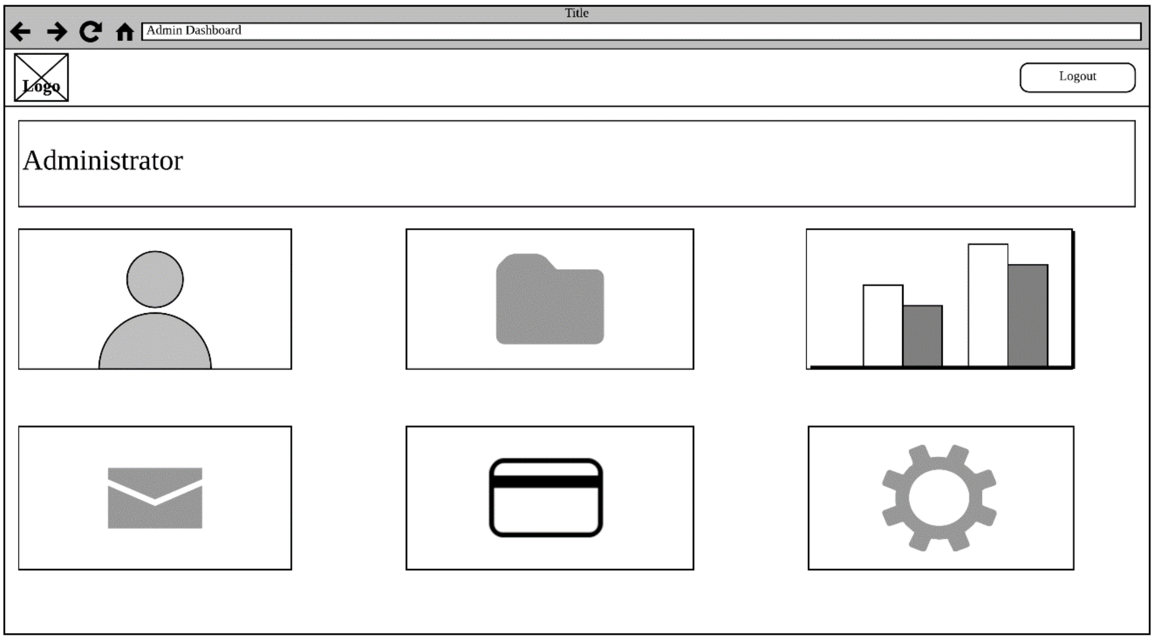

Figure 59: Wireframe Administrator Dashboard

Si Thu Zaw (T7177793)
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Yang Chen (T7206174)
Hemanathan S/O Sathiamoorthy (T7322656)

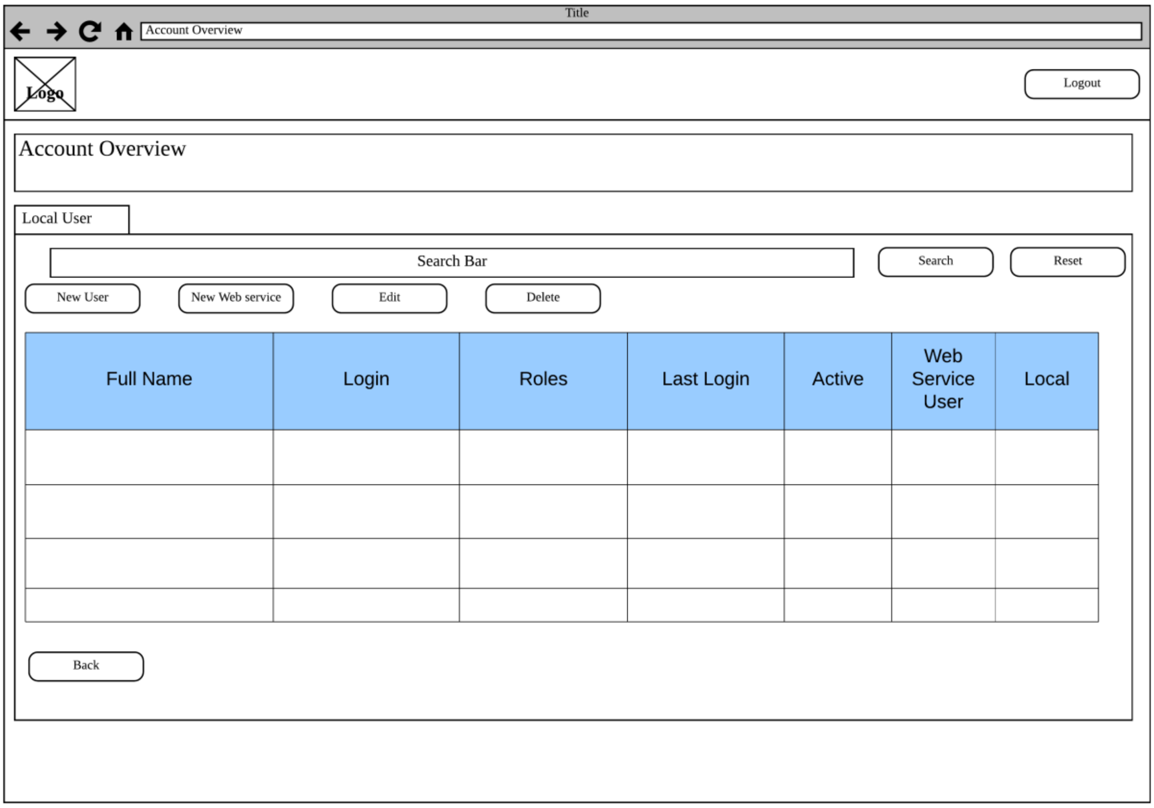

Figure 60: Wireframe Account Overview

Figure 61: Wireframe Database Dashboard

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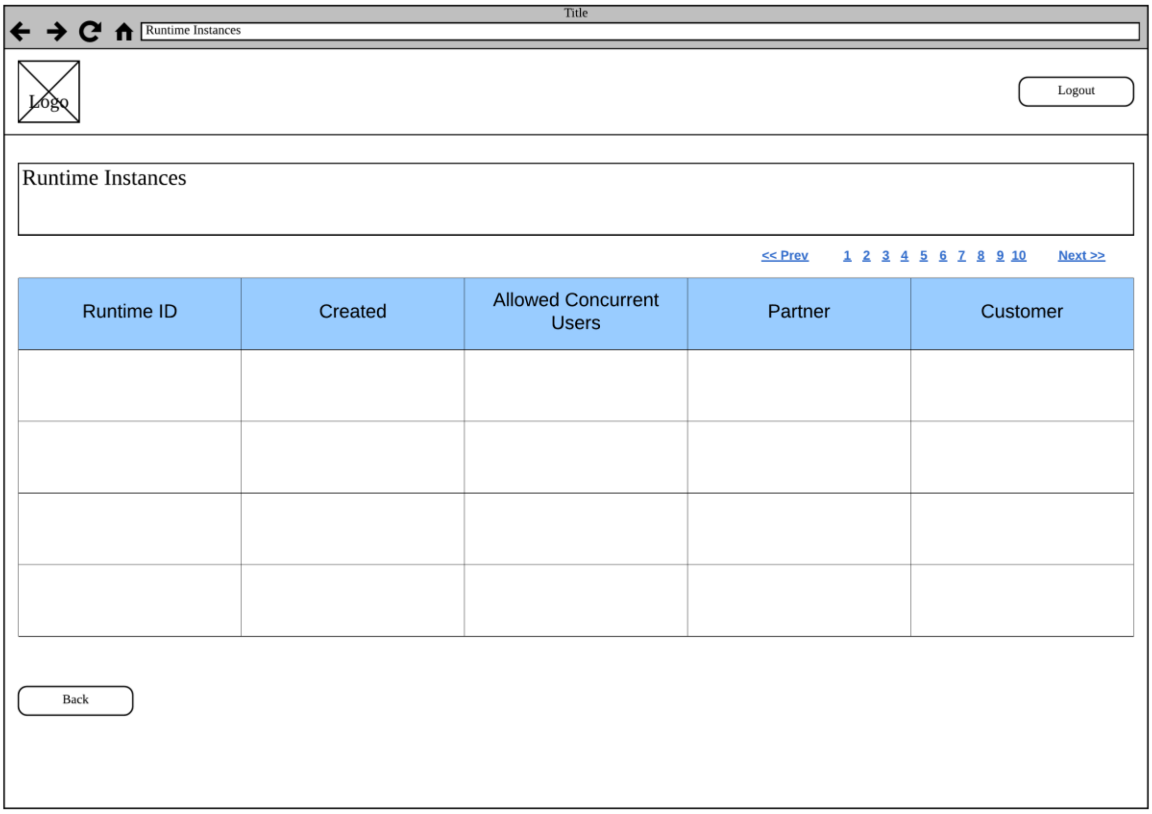

Figure 62: Wireframe Runtime Instances Page

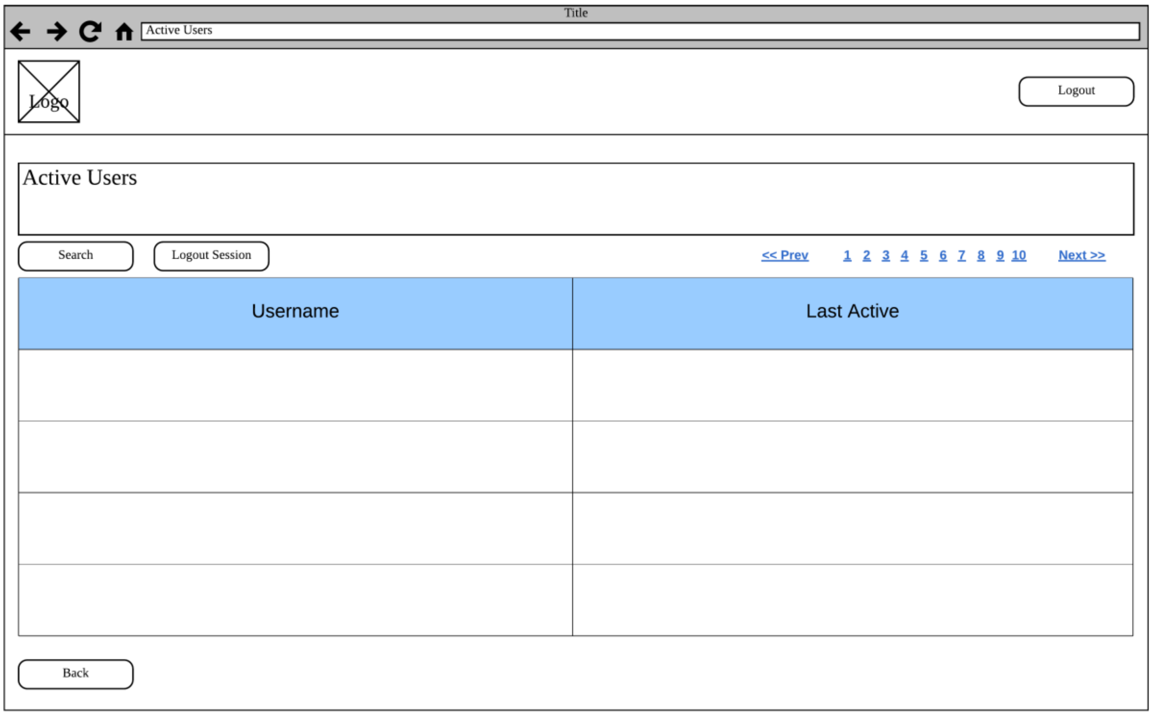

Figure 63: Wireframe Active Users Page

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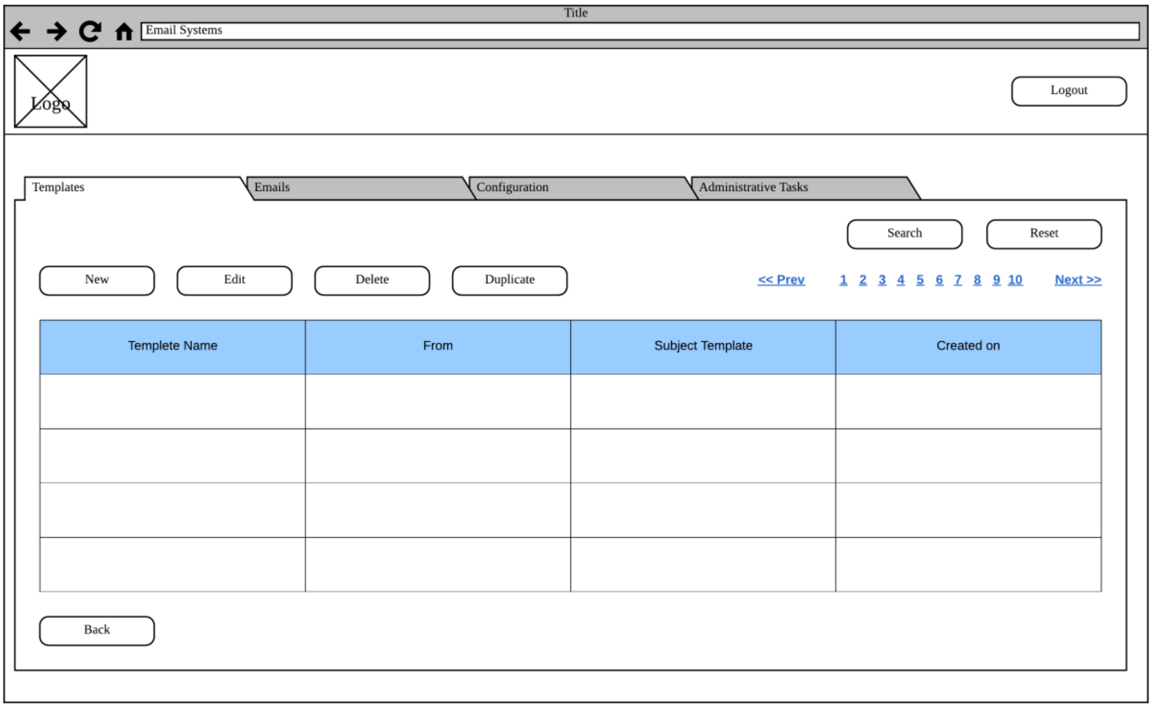

Figure 64: Wireframe Email Settings

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Yang Chen (T7206174)
Hemanathan S/O Sathiamoorthy (T7322656)

5.9 Project Poster

The poster depicted the various features and benefits offered by the system and provided the detailed development approach taken by the group to create the application. It also included related essential information such as the ethical and legal issues considered while building the system. It incorporated visual elements from the app such as the logo and icons, along with a subtle complementary background which imparted a professional quality to it.

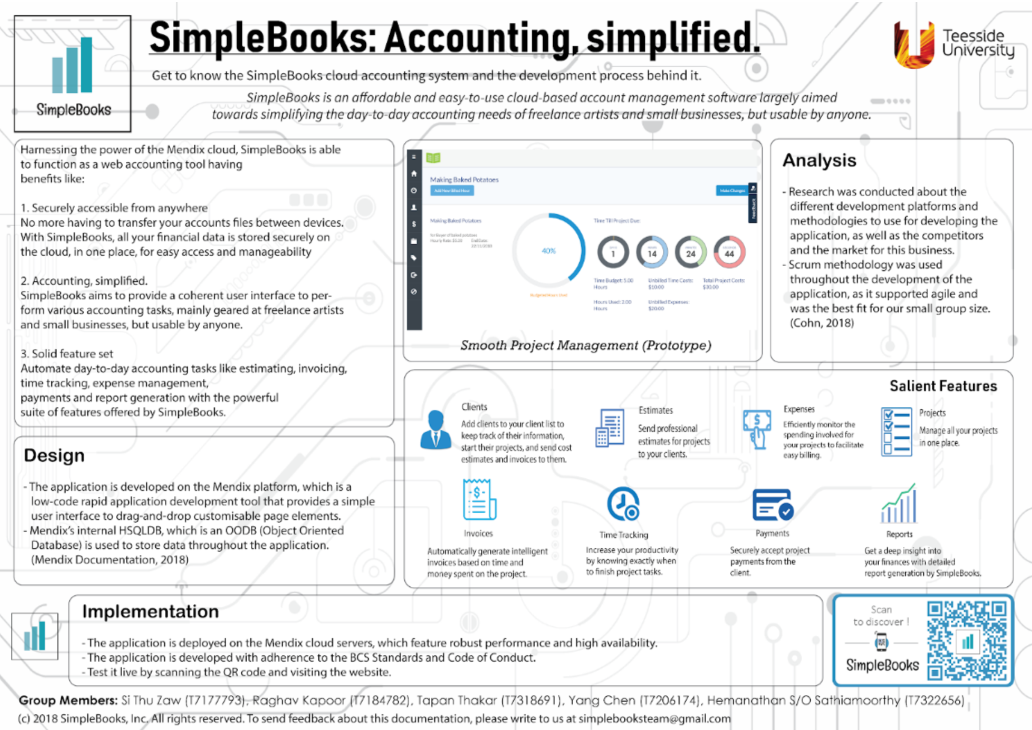

Figure 65: Poster front page

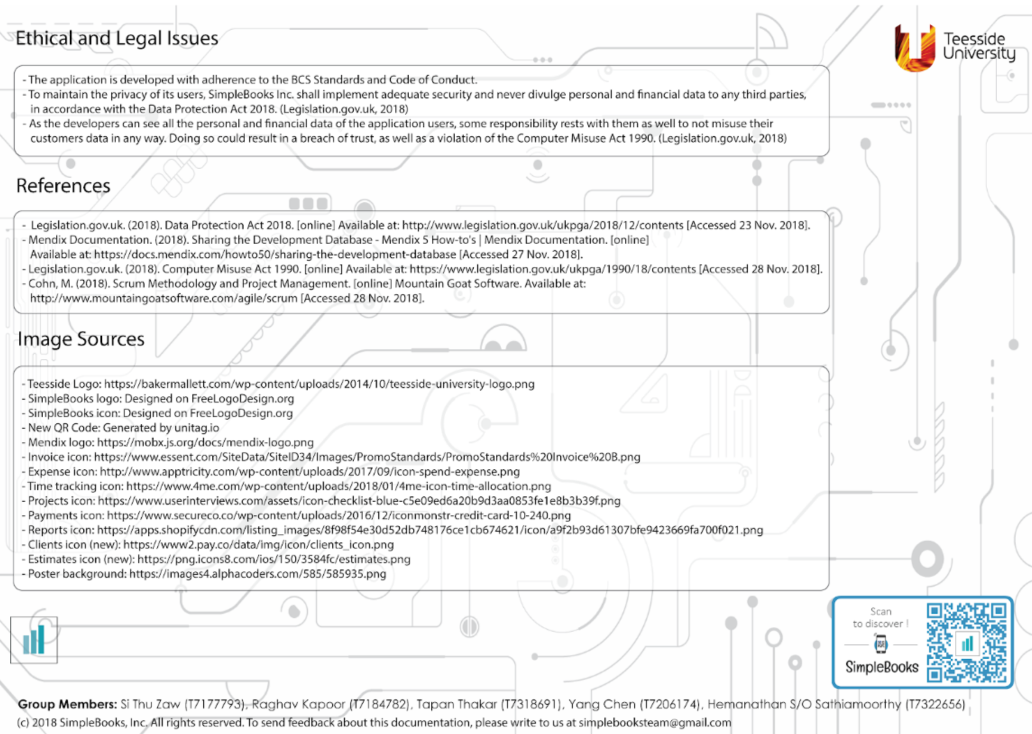

Figure 66: Poster back page

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Yang Chen (T7206174)
Hemanathan S/O Sathiamoorthy (T7322656)

6.0 System Implementation

6.1 Deployment

6.1.1 Online Application

The application will be deployed to run on the Mendix sandbox server, which is hosted by Mendix for deployment of applications on the Free tier.

6.1.2 Mobile Application

The Android version of the application *SimpleBooks* was also created as part of the deployment. The app is built using the Adobe PhoneGap service, which allows us to build the mobile application using the assets already made for the web application. This makes the app more directly compatible with the mobile devices compared to accessing through the web browser because the mobile app contains plugins to directly interface with the mobile devices' native controls, allow for some functions such as taking photos of expenses for example in the app using the built-in Android camera systems. It also stores the user's session so that they do not have to login every time they access the app, unlike the web version.

6.1.3 Deployment Diagram

The following diagram shows how the application is deployed, its modules, involved hosts and the communication protocols.

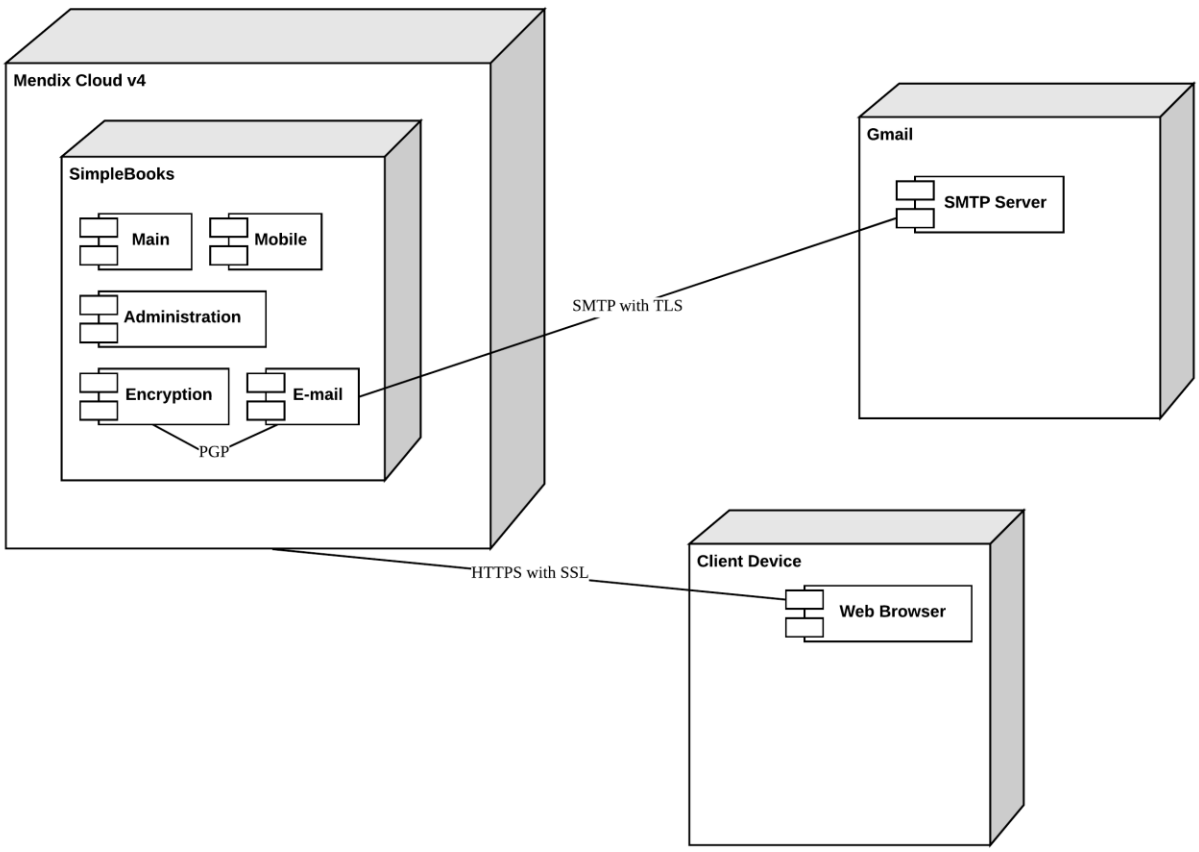

Figure 67: Deployment Diagram

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Yang Chen (T7206174)
Hemanathan S/O Sathiamoorthy (T7322656)

6.2 Application Modules

6.2.1 Main

The main module contains the central basic pages and microflows required for the operation of the application. It also supplies the UI for the web (desktop) version of the application, along with the custom created tables in the HSQL database.

6.2.2 Mobile

The mobile module contains the pages and microflows for the mobile version of the application. It draws dependencies from the database tables in the main module and provides phone optimised versions of the different data charts.

6.2.3 Administration

The administration module consists of pages and microflows for user management meant to be utilised by the administrators, including handlers for user logins and their password change mechanism.

6.2.4 Encryption

The encryption module has a functionality of encrypting and decrypting entered data using PGP. It provides support to the e-mail module by containing a function to encrypt the source e-mail password with a user-defined Encryption Key.

6.2.5 Email

The e-mail module contains essential pages and microflows for the functionality to send e-mail using SMTP through the application.

6.3 Access Instructions

SimpleBooks is currently hosted on the Mendix cloud community servers. The following are the access credentials to the accounts preloaded with sample data to show the capabilities of the application. The application also accepts new user sign-ups through the interface.

Cloud Application Link: ***https://simplebooks-sandbox.mxapps.io***

User Account

Username: ACMEShipping

Password: Password1!

Administrator Account

Username: MxAdmin

Password: admin

6.4 Post-Launch Migration

If the application were to become fully implemented for operational use, there are a few options for deploying the application.

The full application license can be purchased from Mendix to convert the currently free application to a commercial application hosted on the servers with large data storage, user allocations, high uptime and reliability. The application can also be exported to be hosted on a web service platform such as Amazon Web Services or on-premises of the SimpleBooks Inc. company.

7.0 Testing

7.1 Testing Methodology

7.1.1 Whitebox Testing

Whitebox testing is a method of testing software which involves checking the correctness of its internal workings, comprising of functions, objects and the flow of data among them throughout the application. The testers go through the code to confirm the proper handling of data and the output values matching the expected outcomes for all functions. As a result, the application is extensively tested and optimised to the best possible release (Software Testing Fundamentals, n.d.).

7.1.2 Blackbox Testing

Blackbox testing is the method of software testing in which the internal structure and functions of a system are unknown to the tester (Software Testing Fundamentals, n.d.). The testers simply check the different components of the application by supplying various inputs and make sure all processes are working as intended and returning the correct values, without worrying about the data flow throughout it. Hence, blackbox testing is a quicker procedure that can be performed for testing systems.

7.1.3 Chosen Testing Methodology

We have decided to follow the blackbox testing process for our application as it does not require a detailed approach to testing, is sufficient at our application level, would not involve high costs and take a relatively short time to complete.

7.2 Testing Plan

The following document contains the detailed alpha testing plan for the SimpleBooks application by the group (Si Thu Zaw, Raghav Kapoor, Tapan Thakar, Yang Chen, Hemanathan Sathiamoorthy). The plan includes test cases for five categories mentioned below for each page of the website for mobile and desktop platforms. The test cases are colour-coded by category for easy viewing.

<table>
<tr><td>Test Environment:</td><td colspan="2">Date of test: 21st December 2018</td></tr>
<tr><td rowspan="5">Test Environment Details</td><td>Screen size, type and resolution:</td><td>1920x1080 Full HD TN,
Windows Display Scaling 125%</td></tr>
<tr><td>Browser:</td><td>Google Chrome (Windows)</td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
</table>

Si Thu Zaw (T7177793)
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Hemanathan S/O Sathiamoorthy (T7322656)

7.2.1 Master Page

No.	Action	Element Type	Expected Outcome	Pass/Fail	Actual Outcome	Notes
1	Click ‘Register’	Button	Open registration wizard.	Pass	Opens registration wizard.	
2	Click ‘Login’	Button	Open login page.	Pass	Opens login page.	
3	Click ‘My Account’ (when signed in)	Button	Open pop-up to edit account details	Pass	Opens pop-up to edit account details	
4	Click ‘Log Out’ (when signed in)	Button	Log out of the application and open the home page.	Pass	Logs out of the application and opens the home page.	
5	Click ‘Sidebar Toggle’	Button	Expand and collapse sidebar.	Pass	Expands and collapses sidebar.	
6	Click ‘Home’	Button	Open home page.	Pass	Opens home page.	
7	Hover over ‘Forward Icon’	Button	Expand and collapse sidebar, display links to ‘Privacy Policy’ and ‘About and Contact’ pages.	Pass	Expands and collapse sidebar, displays links to ‘Privacy Policy’ and ‘About and Contact’ pages.	
8	Click ‘Dashboard’ (when logged in)	Button	Open ‘Dashboard’ page	Pass	Opens ‘Dashboard’ page	
9	Click ‘Clients’ (when logged in)	Button	Open ‘Clients’ page	Pass	Opens ‘Clients’ page	
10	Click ‘Expenses’ (when logged in)	Button	Open ‘Expenses’ page	Pass	Opens ‘Expenses’ page	
11	Click ‘Projects’ (when logged in)	Button	Open ‘Projects’ page	Pass	Opens ‘Projects’ page	
12	Click ‘Estimates’ (when logged in)	Button	Open ‘Estimates’ page	Pass	Opens ‘Estimates’ page	
13	Click ‘Payments’ (when logged in)	Button	Open ‘Payments’ page	Pass	Opens ‘Payments’ page	
14	Click ‘Invoices’ (when logged in)	Button	Open ‘Invoices’ page	Pass	Opens ‘Invoices page	
15	Click ‘Privacy Policy’	Link	Open ‘Privacy Policy’ page	Pass	Opens ‘Privacy Policy’ page	

16	Click ‘About and Contact’	Link	Open ‘About and Contact’ page	Pass	Opens ‘About and Contact’ page	
17	Click ‘Pay’	Button	Open ‘Invoice Search’ page	Pass	Opens ‘Invoice Search’ page	

7.2.2 Home Page

No.	Action	Element Type	Expected Outcome	Pass/Fail	Actual Outcome	Notes
18	Click ‘Set Up Free Account’	Button	Open registration wizard.	Pass	Opens registration wizard.	

7.2.3 Registration Wizard

7.2.3.1 Page 1

No.	Action	Element Type	Expected Outcome	Pass/Fail	Actual Outcome	Notes
19	Leave ‘User Name’ empty	Field	Show message ‘User name is required.’	Pass	Shows message ‘User name is required.’	
20	Leave ‘Password’ empty	Field	Show message ‘Password is required.’	Pass	Shows message ‘Password is required.’	
21	Enter weak ‘Password’	Field	Show appropriate error message for missing password criteria.	Pass	Shows appropriate error message for missing password criteria.	
22	Leave ‘Confirm Password’ empty	Field	Show message ‘The passwords entered must match.’	Pass	Shows message ‘The passwords entered must match.’	
23	Enter different passwords in ‘Password’ and ‘Confirm Password’	Fields	Show message ‘The passwords entered must match.’	Pass	Shows message ‘The passwords entered must match.’	
24	Click ‘Next Step’	Button	Open registration wizard page 2.	Pass	Opens registration wizard page 2.	
25	Click ‘Cancel’	Button	Cancel changes and open the home page.	Pass	Cancels changes and opens the home page	

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7.2.3.2 Page 2

No.	Action	Element Type	Expected Outcome	Pass/Fail	Actual Outcome	Notes
26	Leave ‘Full Name’ empty	Field	Show message ‘Full Name is required.’	Pass	Shows message ‘Full Name is required.’	
27	Leave ‘Contact Number’ empty	Field	Show message ‘Contact Number is required.’	Pass	Shows message ‘Contact Number is required.’	
28	Leave ‘Email’ empty	Field	Show message ‘E-mail is required and must be in the correct format.’	Pass	Shows message ‘E-mail is required and must be in the correct format.’	
29	Type ‘Email’ in wrong format	Field	Show message ‘E-mail is required and must be in the correct format.’	Pass	Shows message ‘E-mail is required and must be in the correct format.’	
30	Leave ‘Language’ empty	Dropdown	Show message ‘Language must be set.’	Pass	Shows message ‘Language must be set.’	
31	Leave ‘Time zone’ empty	Dropdown	Show message ‘Time zone must be set.’	Pass	Shows message ‘Time zone must be set.’	
32	Click ‘Next Step’	Button	Advance to registration wizard page 3.	Pass	Advances to registration wizard page 3.	
33	Click ‘Cancel’	Button	Cancel changes and open the home page	Pass	Cancels changes and opens the home page.	

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7.2.3.3 Page 3

No.	Action	Element Type	Expected Outcome	Pass/Fail	Actual Outcome	Notes
34	Leave ‘Company Name’ empty	Field	Show message ‘Company Name is required.’	Pass	Shows message ‘Company Name is required.’	
35	Leave ‘Company Address Line 1’ empty	Field	Show message ‘Company Address 1 is required.’	Pass	Shows message ‘Company Address 1 is required.’	
36	Leave ‘Company Address Line 2’ empty	Field	Show message ‘Company Address 2 is required.’	Pass	Shows message ‘Company Address 2 is required.’	
37	Leave ‘Company Postcode’ empty	Field	Show message ‘Company Postcode is required.’	Pass	Shows message ‘Company Postcode is required.’	
38	Leave ‘Company Email Address’ empty	Field	Show message ‘Company e-mail is required and must be in the correct format.’	Pass	Shows message ‘Company e-mail is required and must be in the correct format.’	
39	Type ‘Company Email Address’ in wrong format	Field	Show message ‘Company e-mail is required and must be in the correct format.’	Pass	Shows message ‘Company e-mail is required and must be in the correct format.’	
40	Leave ‘Company Phone Number’ empty	Field	Show message ‘Company Phone Number is required.’	Pass	Shows message ‘Company Phone Number is required.’	
41	Click ‘Save’	Button	Show message ‘Registration successful. You can	Pass	Shows message ‘Registration successful. You can now login with	

			now login with your details.’ and open login page		your details.’ and opens login page	
42	Click ‘Cancel’	Button	Cancel changes and open the home page.	Pass	Cancels changes and opens the home page.	

7.2.4Login

No.	Action	Element Type	Expected Outcome	Pass/Fail	Actual Outcome	Notes
43	Leave ‘Username’ empty	Field	Show message ‘No username or password given’	Pass	Shows message ‘No username or password given’	
44	Leave ‘Password’ empty	Field	Show message ‘No username or password given’	Pass	Shows message ‘No username or password given’	
45	Click ‘Login’	Field	Log in to the application and display the home page	Pass	Logs in to the application and displays the home page.	
46	Click ‘Set Up Free Account’	Button	Open registration wizard.	Pass	Opens registration wizard.	

7.2.5 My Account

No.	Action	Element Type	Expected Outcome	Pass/Fail	Actual Outcome	Notes
47	Leave ‘Full name’ empty	Field	Show message ‘Full name is required.’	Pass	Shows message ‘Full name is required.’	
48	Leave ‘Username’ empty	Field	Show message ‘The user name cannot be empty.’	Pass	Shows message ‘The user name cannot be empty.’	

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49	Leave ‘Language’ empty	Dropdown	Show message ‘Language must be set.’	Pass	Shows message ‘Language must be set.’	
50	Click ‘Save’	Button	Save changes and close pop-up	Pass	Saves changes and closes pop-up	
51	Click ‘Cancel’	Button	Cancel changes and close pop-up	Pass	Cancels changes and closes pop-up	
52	Click ‘Show Settings’	Button	Open account settings page	Pass	Opens account settings page	
53	Click ‘Change Password’	Button	Open change password page	Pass	Opens change password page	

7.2.6 Change Password

No.	Action	Element Type	Expected Outcome	Pass/Fail	Actual Outcome	Notes
54	Leave ‘Old password’ empty	Field	Show message ‘The password cannot be empty.’	Pass	Shows message ‘The password cannot be empty.’	
55	Leave ‘New password’ empty	Field	Show message ‘The password cannot be empty.’	Pass	Shows message ‘The password cannot be empty.’	
56	Leave ‘Confirm password’ empty	Field	Show message ‘The password cannot be empty.’	Pass	Shows message ‘The password cannot be empty.’	
57	Click ‘Change’	Button	Save changes, shows message ‘The password has been updated.’ and closes pop-up	Pass	Saves changes, shows message ‘The password has been updated.’ and closes pop-up	
58	Click ‘Cancel’	Button	Cancel changes and close pop-up	Pass	Cancels changes and closes pop-up	

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7.2.7 Account Settings

No.	Action	Element Type	Expected Outcome	Pass/Fail	Actual Outcome	Notes
59	Click 'Save'	Button	Save changes and open home page.	Pass	Saves changes and opens home page.	
60	Click 'Cancel'	Button	Cancel changes and open home page.	Pass	Cancels changes and opens home page.	

7.2.7.1 User Details

No.	Action	Element Type	Expected Outcome	Pass/Fail	Actual Outcome	Notes
61	Leave 'Full name' empty	Field	Show message 'Full name is required.'	Pass	Shows message 'Full name is required.'	
62	Leave 'Email' empty	Field	Show message 'E-mail is required.'	Pass	Shows message 'E-mail is required.'	
63	Leave 'Contact No.' empty	Field	Show message 'Contact Number is required.'	Pass	Shows message 'Contact Number is required.'	

7.2.7.2 Company Details

No.	Action	Element Type	Expected Outcome	Pass/Fail	Actual Outcome	Notes
64	Leave 'Company Name' empty	Field	Show message 'Company Name is required.'	Pass	Shows message 'Company Name is required.'	
65	Leave 'Company Address Line 1' empty	Field	Show message 'Company Address 1 is required.'	Pass	Shows message 'Company Address 1 is required.'	
66	Leave 'Company Address Line 2' empty	Field	Show message 'Company Address 2 is required.'	Pass	Shows message 'Company Address 2 is required.'	

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67	Leave ‘Company Post Code’ empty	Field	Show message ‘Company Postcode is required.’	Pass	Shows message ‘Company Postcode is required.’	
68	Leave ‘Company Email’ empty	Field	Show message ‘Company e-mail is required and must be in the correct format.’	Pass	Shows message ‘Company e-mail is required and must be in the correct format.’	
69	Type ‘Company Email’ in wrong format	Field	Show message ‘Company e-mail is required and must be in the correct format.’	Pass	Shows message ‘Company e-mail is required and must be in the correct format.’	
70	Leave ‘Company Contact Phone’ empty	Field	Show message ‘Company Phone is required.’	Pass	Shows message ‘Company Phone is required.’	
71	Insert non-image file on ‘Upload Company Logo’	Image uploader	Show message ‘You can only upload files of the following types here: jpg, png, jpeg, svg.’	Pass	Shows message ‘You can only upload files of the following types here: jpg, png, jpeg, svg.’	

7.2.7.3 Other Settings

No.	Action	Element Type	Expected Outcome	Pass/Fail	Actual Outcome	Notes
72	Leave ‘Language’ empty	Dropdown	Show message ‘Language must be set.’	Pass	Shows message ‘Language must be set.’	
73	Leave ‘Time zone’ empty	Dropdown	Show message ‘Time zone must be set.’	Pass	Shows message ‘Time zone must be set.’	

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7.2.7.4 Financial Settings

No.	Action	Element Type	Expected Outcome	Pass/Fail	Actual Outcome	Notes
74	Leave ‘Income tax’ empty	Field	Show message ‘Income tax is required and cannot be negative.’	Pass	Shows message ‘Income tax is required and cannot be negative.’	
75	Enter negative value in ‘Income tax’	Field	Show message ‘Income tax is required and cannot be negative.’	Pass	Shows message ‘Income tax is required and cannot be negative.’	
76	Leave ‘Sales tax’ empty	Field	Show message ‘Sales tax is required and cannot be negative.’	Pass	Shows message ‘Sales tax is required and cannot be negative.’	
77	Enter negative value in ‘Sales tax’	Field	Show message ‘Sales tax is required and cannot be negative.’	Pass	Shows message ‘Sales tax is required and cannot be negative.’	

7.2.7.5 Online Payments

No.	Action	Element Type	Expected Outcome	Pass/Fail	Actual Outcome	Notes
78	Click ‘Enable Online Payments’	Button	Enable online payments and show message ‘Payments enabled. Please enter your bank details to complete the setup.’	Pass	Enables online payments and shows message ‘Payments enabled. Please enter your bank details to complete the setup.’	
79	Click ‘Disable Online Payments’	Button	Disable online payments and show	Pass	Disables online payments and shows message ‘Payments disabled.’	

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			message 'Payments disabled.'			

7.2.8 Clients

No.	Action	Element Type	Expected Outcome	Pass/Fail	Actual Outcome	Notes
80	Click 'New'	Button	Open pop-up to add new client.	Pass	Opens pop-up to add new client.	
81	Click 'Edit'	Button	Open pop-up to edit selected client	Pass	Opens pop-up to edit selected client.	
82	Click 'Send Email'	Button	Open 'Send Email' page	Pass	Opens 'Send Email' page	
85	Click 'Add Address'	Button	Open 'Add Address' page	Pass	Opens 'Add Address' page	
86	Click 'Delete'	Button	Open pop-up to confirm deletion of selected client.	Pass	Opens pop-up to confirm deletion of selected client.	

7.2.8.1 Add New Client / Edit Client

No.	Action	Element Type	Expected Outcome	Pass/Fail	Actual Outcome	Notes
87	Leave 'Customer Name' empty	Field	Show message 'Customer Name is required.'	Pass	Shows message 'Customer Name is required.'	
88	Leave 'Customer Contact Number' empty	Field	Show message 'Customer Phone is required.'	Pass	Shows message 'Customer Phone is required.'	
89	Leave 'Customer Email' empty	Field	Show message 'Customer e-mail is required and must be in the correct format.'	Pass	Shows message 'Customer e-mail is required and must be in the correct format.'	

90	Type 'Customer Email' in wrong format	Field	Show message 'Customer e-mail is required and must be in the correct format.'	Pass	Shows message 'Customer e-mail is required and must be in the correct format.'	
91	Click 'Save'	Button	Save client and close pop-up.	Pass	Saves client and closes pop-up.	
92	Click 'Cancel'	Button	Cancel changes and close pop-up.	Pass	Cancels changes and closes pop-up.	

7.2.8.2 Add New Address / Edit Address

No.	Action	Element Type	Expected Outcome	Pass/Fail	Actual Outcome	Notes
93	Leave 'Street' empty	Field	Show message 'Street is required.'	Pass	Shows message 'Street is required.'	
94	Leave 'City' empty	Field	Show message 'City is required.'	Pass	Shows message 'City is required.'	
95	Leave 'State' empty	Field	Show message 'State is required.'	Pass	Shows message 'State is required.'	
96	Leave 'Country' empty	Field	Show message 'Country is required.'	Pass	Shows message 'Country is required.'	
97	Leave 'Postcode' empty	Field	Show message 'Postcode is required.'	Pass	Shows message 'Postcode is required.'	
98	Click 'Save'	Button	Save address and show clients page.	Pass	Saves address and shows clients page.	
99	Click 'Cancel'	Button	Cancel changes and show clients page.	Pass	Cancels changes and shows clients page.	

7.2.9 Send Email

No.	Action	Element Type	Expected Outcome	Pass/Fail	Actual Outcome	Notes
100	Leave 'To' empty	Field	Show message 'To address is required and must be in the correct format.'	Pass	Shows message 'To address is required and must be in the correct format.'	
101	Type 'To' in wrong format	Field	Show message 'To address is required and must be in the correct format.'	Pass	Shows message 'To address is required and must be in the correct format.'	
102	Click 'Add Attachment'	Button	Show pop-up to add an attachment.	Pass	Shows pop-up to add an attachment.	
103	Click 'Download'	Button	Download the attached file.	Pass	Downloads the attached file.	
104	Click 'Send'	Button	Send the e-mail to the customer.	Pass	Sends the e-mail to the customer.	
105	Click 'Cancel'	Button	Cancel changes and open clients page.	Pass	Cancels changes and opens clients page.	

7.2.9.1 Add Attachment

No.	Action	Element Type	Expected Outcome	Pass/Fail	Actual Outcome	Notes
106	Click 'Download'	Button	Download the attached file.	Pass	Downloads the attached file.	
107	Click 'Save'	Button	Add the attachment file to the e-mail.	Pass	Adds the attachment file to the e-mail.	
108	Click 'Cancel'	Button	Cancel changes and close pop-up	Pass	Cancels changes and closes pop-up	

7.2.10 Expenses

No.	Action	Element Type	Expected Outcome	Pass/Fail	Actual Outcome	Notes

109	Click 'Add Expense'	Button	Open pop-up to add new expense	Pass	Opens pop-up to add new expense	
110	Click 'Add a New Vendor'	Button	Open pop-up to add new vendor	Pass	Opens pop-up to add new vendor	

7.2.10.1 Add New Expense / Edit Expense

No.	Action	Element Type	Expected Outcome	Pass/Fail	Actual Outcome	Notes
111	Leave 'Description' empty	Field	Show message 'Description is required.'	Pass	Shows message 'Description is required.'	
112	Leave 'Total Amount' empty	Field	Show message 'Amount is required and must be positive.'	Pass	Shows message 'Amount is required and must be positive.'	
113	Leave 'Expense Category' empty	Field	Show message 'Category is required.'	Pass	Shows message 'Category is required.'	
114	Click 'Activate Camera'	Button	Activate the device camera to scan the QR code.	Fail	Shows message 'Unable to detect camera.'	Camera detection does not work on the desktop version.
115	Leave 'Billing Project' empty	Field	Show message 'Billing Project is required.'	Pass	Shows message 'Billing Project is required.'	
116	Click 'Save'	Button	Save expense and close pop-up.	Pass	Saves expense and closes pop-up.	
117	Click 'Cancel'	Button	Cancel changes and close pop-up.	Pass	Cancels changes and closes pop-up.	

7.2.10.2 Expense Details

No.	Action	Element Type	Expected Outcome	Pass/Fail	Actual Outcome	Notes

118	Click 'Edit'	Button	Open pop-up to edit expense.	Pass	Opens pop-up to edit expense.	
119	Click 'Delete'	Button	Open pop-up to confirm deletion of expense.	Pass	Opens pop-up to confirm deletion of expense.	

7.2.10.3 Add New Vendor

No.	Action	Element Type	Expected Outcome	Pass/Fail	Actual Outcome	Notes
120	Leave 'Vendor Name' empty	Field	Show message 'Vendor Name is required.'	Pass	Shows message 'Vendor Name is required.'	
121	Click 'Save'	Button	Save vendor and close pop-up.	Pass	Saves vendor and closes pop-up.	
122	Click 'Cancel'	Button	Cancel changes and close pop-up.	Pass	Cancels changes and closes pop-up.	

7.2.11 Projects

No.	Action	Element Type	Expected Outcome	Pass/Fail	Actual Outcome	Notes
123	Click 'New Project'	Button	Open new project page.	Pass	Opens new project page.	
124	Click 'Explore Project'	Button	Open project details page for selected project.	Pass	Opens project details page for selected project.	
125	Click 'Edit Project'	Button	Open edit project page for selected project.	Pass	Opens edit project page for selected project.	
126	Click 'Search'	Button	Display fields to search from list of projects.	Pass	Displays fields to search from list of projects.	

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127	Click 'Delete'	Button	Open pop-up to confirm deletion of project.	Pass	Opens pop-up to confirm deletion of project.	

7.2.11.1 Add New Project / Edit Project

No.	Action	Element Type	Expected Outcome	Pass/Fail	Actual Outcome	Notes
128	Leave 'Project Name' empty	Field	Show message 'Project Name is required.'	Pass	Shows message 'Project Name is required.'	
129	Leave 'Project Budget' empty	Field	Show message 'Project Budget is required and must be positive.'	Pass	Shows message 'Project Budget is required and must be positive.'	
130	Enter negative value in 'Project Budget'	Field	Show message 'Project Budget is required and must be positive.'	Pass	Shows message 'Project Budget is required and must be positive.'	
131	Leave 'Due Date' empty	Date picker	Show message 'Due Date is required and must be in the future.'	Pass	Shows message 'Due Data is required and must be in the future.'	
132	Enter past date in 'Due Date'	Date picker	Show message 'Due Date is required and must be in the future.'	Pass	Shows message 'Due Data is required and must be in the future.'	
133	Leave 'Hourly Rate' empty	Field	Show message 'Hourly Rate is required and must be positive.'	Pass	Shows message 'Hourly Rate is required and must be positive.'	

134	Enter negative value in 'Hourly Rate'	Field	Show message 'Hourly Rate is required and must be positive.'	Pass	Shows message 'Hourly Rate is required and must be positive.'	
135	Leave 'Time Allocated' empty	Field	Show message 'Time Allocated is required and must be positive.'	Pass	Shows message 'Time Allocated is required and must be positive.'	
136	Enter negative value in 'Time Allocated'	Field	Show message 'Time Allocated is required and must be positive.'	Pass	Shows message 'Time Allocated is required and must be positive.'	
137	Leave 'Client' empty	Dropdown	Show message 'Client selection is required.'	Pass	Shows message 'Client selection is required.'	
138	Click 'Save'	Button	Create the project and open projects page.	Pass	Creates the project and opens projects page.	
139	Click 'Cancel'	Button	Cancel changes and open projects page.	Pass	Cancels changes and opens projects page.	

7.2.11.2 Project Details

No.	Action	Element Type	Expected Outcome	Pass/Fail	Actual Outcome	Notes
140	Click 'Add Associated Expense'	Button	Open pop-up to add expense and link to selected project.	Pass	Opens pop-up to add expense and links to selected project.	
141	Click 'Add New Billed Hour'	Button	Open pop-up to add hours and link to selected project.	Pass	Opens pop-up to add hours and links to selected project.	

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142	Click ‘Make Changes’	Button	Open edit project page for selected project.	Pass	Opens edit project page for selected project.	
143	Click ‘Add hours’	Button	Open pop-up to add hours and link to selected project.	Pass	Opens pop-up to add hours and links to selected project.	
144	Click ‘Delete’	Button	Open pop-up to confirm deletion of hours.	Pass	Opens pop-up to confirm deletion of hours.	

7.2.12 Add Hours

No.	Action	Element Type	Expected Outcome	Pass/Fail	Actual Outcome	Notes
145	Leave ‘Time Entry’ empty	Field	Show message ‘Time is required and must be positive.’	Pass	Shows message ‘Time is required and must be positive.’	
146	Enter negative value in ‘Time Entry’	Field	Show message ‘Time is required and must be positive.’	Pass	Shows message ‘Time is required and must be positive.’	
147	Leave ‘Notes’ empty	Field	Show message ‘Note is required.’	Pass	Shows message ‘Note is required.’	
148	Click ‘Save’	Button	Add the hours and close pop-up.	Pass	Adds the hours and closes pop-up.	
149	Click ‘Cancel’	Button	Cancel changes and close pop-up.	Pass	Cancels changes and opens pop-up.	

7.2.13 Estimates

No.	Action	Element Type	Expected Outcome	Pass/Fail	Actual Outcome	Notes

150	Click ‘New Estimate’	Button	Open new estimate page.	Pass	Opens new estimate page.	
151	Click ‘View Details’	Button	Open estimate detail page for selected estimate.	Pass	Opens estimate detail page for selected estimate.	
152	Click ‘Search’	Button	Display fields to search from list of estimates.	Pass	Displays fields to search from list of estimates.	
153	Click ‘Download’	Button	Generate the selected estimate document in a pdf format, download it on the device and show message ‘File Downloaded.’	Pass	Generates the selected estimate document in a pdf format, downloads it on the device and shows message ‘File Downloaded.’	
154	Click ‘Delete’	Button	Open pop-up to confirm deletion of estimate.	Pass	Opens pop-up to confirm deletion of estimate.	

7.2.13.1 Add New Estimate / Edit Estimate

No.	Action	Element Type	Expected Outcome	Pass/Fail	Actual Outcome	Notes
155	Leave ‘Description’ empty	Field	Show message ‘Description is required.’	Pass	Shows message ‘Description is required.’	
156	Leave ‘Estimate Project Rate’ empty	Field	Show message ‘Rate is required and must be positive.’	Pass	Shows message ‘Rate is required and must be positive.’	
157	Enter negative value in ‘Estimate Project Rate’	Field	Show message ‘Rate is required and must be positive.’	Pass	Shows message ‘Rate is required and must be positive.’	

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158	Leave 'Estimated Project Hours' empty	Field	Show message 'Hours are required and must be positive.'	Pass	Shows message 'Hours are required and must be positive.'	
159	Enter negative value in 'Estimated Project Hours'	Field	Show message 'Hours are required and must be positive.'	Pass	Shows message 'Hours are required and must be positive.'	
160	Leave 'Client' empty	Dropdown	Show message 'Client selection is required.'	Pass	Shows message 'Client selection is required.'	
161	Click 'Add Line Item'	Button	Open pop-up to add new estimate line item.	Pass	Opens pop-up to add new estimate line item.	
162	Click 'Delete Item'	Button	Delete selected line item and open estimate detail page.	Pass	Deletes selected line item and opens estimate detail page.	
163	Click 'Save'	Button	Save the estimate and open estimate detail page.	Pass	Saves the estimate and opens estimate detail page.	
164	Click 'Cancel'	Button	Cancel changes and open estimate detail page.	Pass	Cancels changes and opens estimate detail page.	

7.2.14 Add Line Item (Estimate)

No.	Action	Element Type	Expected Outcome	Pass/Fail	Actual Outcome	Notes
165	Leave 'Item Description' empty	Field	Show message 'Description is required.'	Pass	Shows message 'Description is required.'	

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166	Leave 'Item Cost' empty	Field	Show message 'Cost is required and must be positive.'	Pass	Shows message 'Cost is required and must be positive.'	
167	Enter negative value in 'Item Cost'	Field	Show message 'Cost is required and must be positive.'	Pass	Shows message 'Cost is required and must be positive.'	
168	Leave 'Item Quantity' empty	Field	Show message 'Quantity is required and must be positive.'	Pass	Shows message 'Quantity is required and must be positive.'	
169	Enter negative value in 'Item Quantity'	Field	Show message 'Quantity is required and must be positive.'	Pass	Shows message 'Quantity is required and must be positive.'	
170	Click 'Save'	Button	Add the line item and close pop-up.	Pass	Adds the line item and closes pop-up.	
171	Click 'Cancel'	Button	Cancel changes and close pop-up.	Pass	Cancels changes and opens pop-up.	

7.2.14.1 Estimate Details

No.	Action	Element Type	Expected Outcome	Pass/Fail	Actual Outcome	Notes
172	Click 'Send Estimate'	Button	Generate the estimate document in a pdf format and open send email page with the file attached.	Pass	Generates the estimate document in a pdf format and opens send email page with the file attached.	
173	Click 'Edit'	Button	Open edit estimate page.	Pass	Opens edit estimate page.	
174	Click 'Download Estimate Document'	Button	Generate the estimate document	Pass	Generates the estimate document in a pdf format,	

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			in a pdf format, download it on the device and show message 'File Downloaded.'		downloads it on the device and shows message 'File Downloaded.'	

7.2.15 Payments

No.	Action	Element Type	Expected Outcome	Pass/Fail	Actual Outcome	Notes
175	Click 'Search'	Button	Display fields to search from list of payments.	Pass	Displays fields to search from list of payments.	

7.2.16 Invoices

No.	Action	Element Type	Expected Outcome	Pass/Fail	Actual Outcome	Notes
176	Click 'Add'	Button	Open create invoice page.	Pass	Opens create invoice page.	
177	Click 'Details'	Button	Open invoice details page for the selected invoice.	Pass	Opens invoice details page for the selected invoice.	

7.2.16.1 Create New Invoice

No.	Action	Element Type	Expected Outcome	Pass/Fail	Actual Outcome	Notes
178	Leave 'Description' empty	Field	Show message 'Description is required.'	Pass	Shows message 'Description is required.'	
179	Leave 'Invoice Due Date' empty	Date picker	Show message 'Due Date is required and must be in the future.'	Pass	Shows message 'Due Date is required and must be in the future.'	

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180	Enter past date in ‘Invoice Due Date’	Date picker	Show message ‘Due Date is required and must be in the future.’	Pass	Shows message ‘Due Date is required and must be in the future.’	
181	Leave ‘Project’ empty	Dropdown	Show message ‘Project selection is required.’	Pass	Shows message ‘Project selection is required.’	
182	Click ‘Add Line Item’	Button	Open pop-up to add invoice line item.	Pass	Opens pop-up to add invoice line item.	
183	Click ‘Delete Item’	Button	Delete selected line item and open invoice detail page.	Pass	Deletes selected line item and opens invoice detail page.	
184	Click ‘Save’	Button	Save the invoice and open invoice detail page.	Pass	Saves the invoice and opens invoice detail page.	
185	Click ‘Cancel’	Button	Cancel changes and open invoice detail page.	Pass	Cancels changes and opens invoice detail page.	

7.2.17 Add Line Item (Invoice)

No.	Action	Element Type	Expected Outcome	Pass/Fail	Actual Outcome	Notes
186	Leave ‘It rate’ empty	Field	Show message ‘Rate is required and must be positive.’	Pass	Shows message ‘Rate is required and must be positive.’	
187	Enter negative value in ‘It rate’	Field	Show message ‘Rate is required and must be positive.’	Pass	Shows message ‘Rate is required and must be positive.’	
188	Leave ‘Description’ empty	Field	Show message ‘Description is required.’	Pass	Shows message ‘Description is required.’	

189	Leave ‘It quantity’ empty	Field	Show message ‘Quantity is required and must be positive.’	Pass	Shows message ‘Quantity is required and must be positive.’	
190	Enter negative value in ‘It quantity’	Field	Show message ‘Quantity is required and must be positive.’	Pass	Shows message ‘Quantity is required and must be positive.’	
191	Click ‘Save’	Button	Add the line item and close pop-up.	Pass	Adds the line item and closes pop-up.	
192	Click ‘Cancel’	Button	Cancel changes and close pop-up.	Pass	Cancels changes and opens pop-up.	

7.2.17.1 Invoice Details

No.	Action	Element Type	Expected Outcome	Pass/Fail	Actual Outcome	Notes
193	Click ‘Send Invoice’	Button	Generate the invoice document in a pdf format and open send email page with the file attached.	Pass	Generates the invoice document in a pdf format and opens send email page with the file attached.	
194	Click ‘Edit’	Button	Open edit invoice page.	Pass	Opens edit invoice page.	
195	Click ‘Download Invoice Document’	Button	Generate the invoice document in a pdf format, download it on the device and show message ‘File Downloaded.’	Pass	Generates the invoice document in a pdf format, downloads it on the device and shows message ‘File Downloaded.’	

8.0 User Guides

8.1 User Manual

8.1.1 User Registration

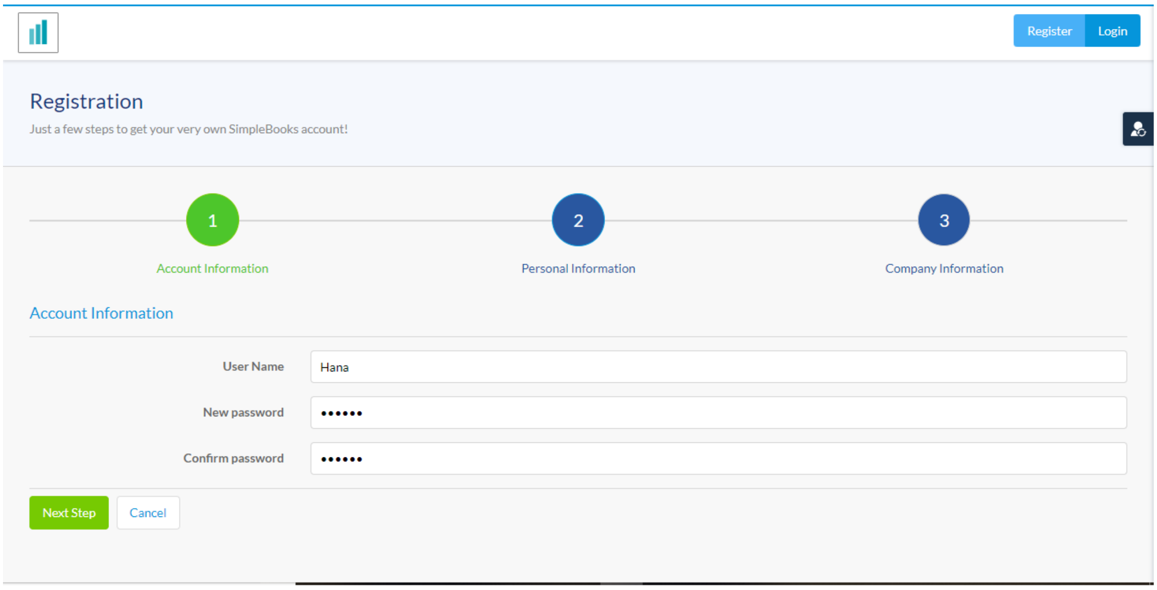

Figure 68: Registration Step 1

1. Fill in the desired username and passwords for the account. The passwords entered must match and they must be longer than 6 characters, must contain mixed case characters, a number and a symbol.

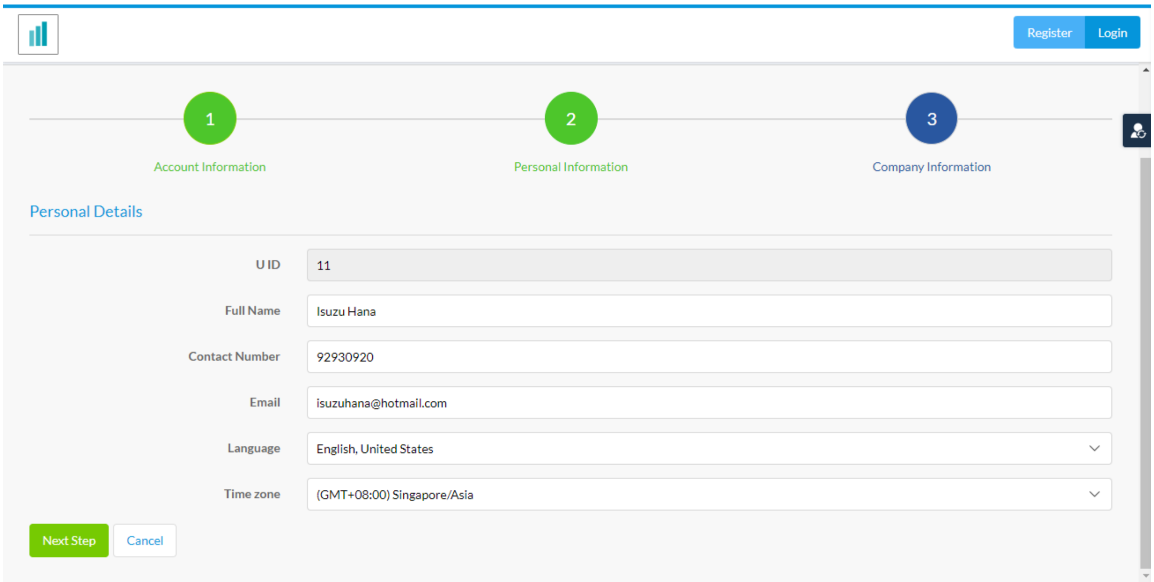

Figure 69: Registration Step 2

2. Next would be the personal information of the person, consisting of the name, contact details, email, their preferred language for using the app, as well as their time zone to make it easier to synchronise timings across different time zones within or between companies.

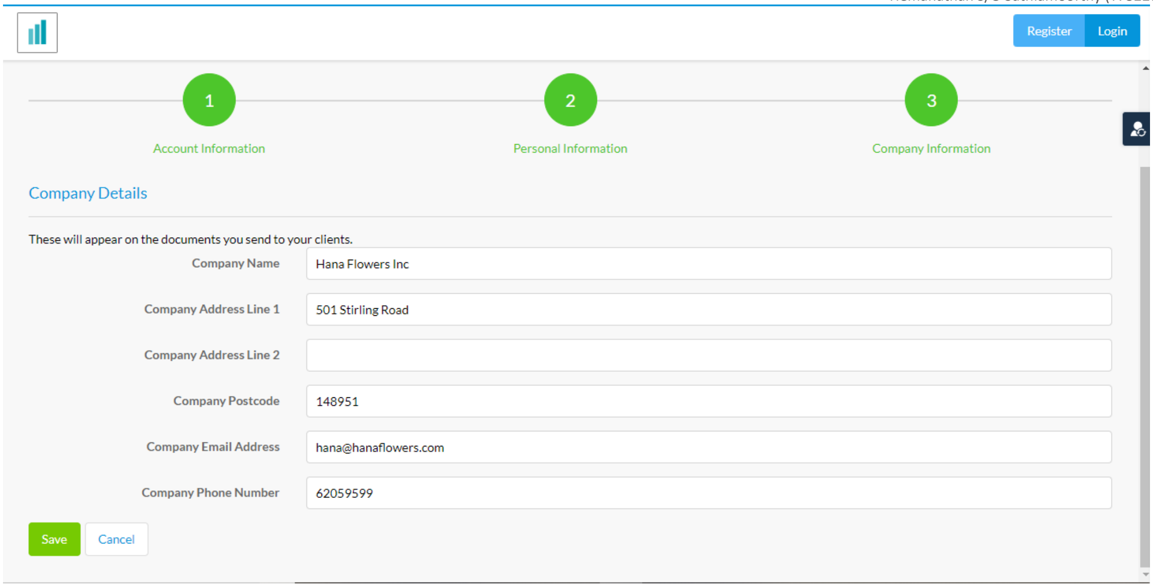

Figure 70: Registration Step 3

3. Lastly will be the company contact details, namely the company name, address, postcode, email address and phone number.

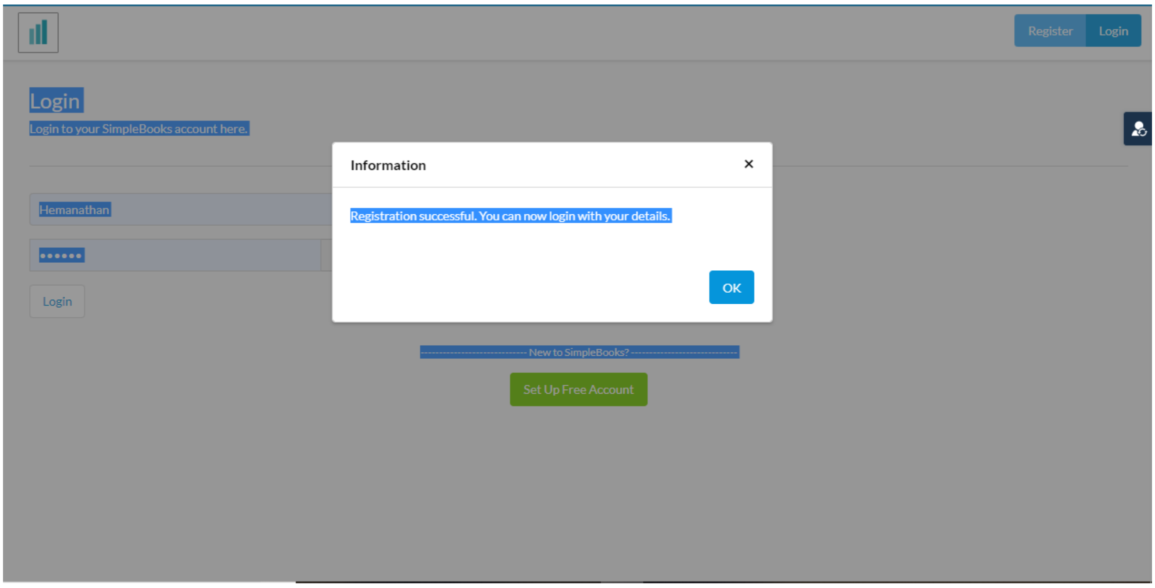

Figure 71: Registration Step 4

4. Once it has been successfully created, there will a pop-up window confirming that the account has been authorised to use the app.

8.1.2 Login

8.1.2.1 Login Page

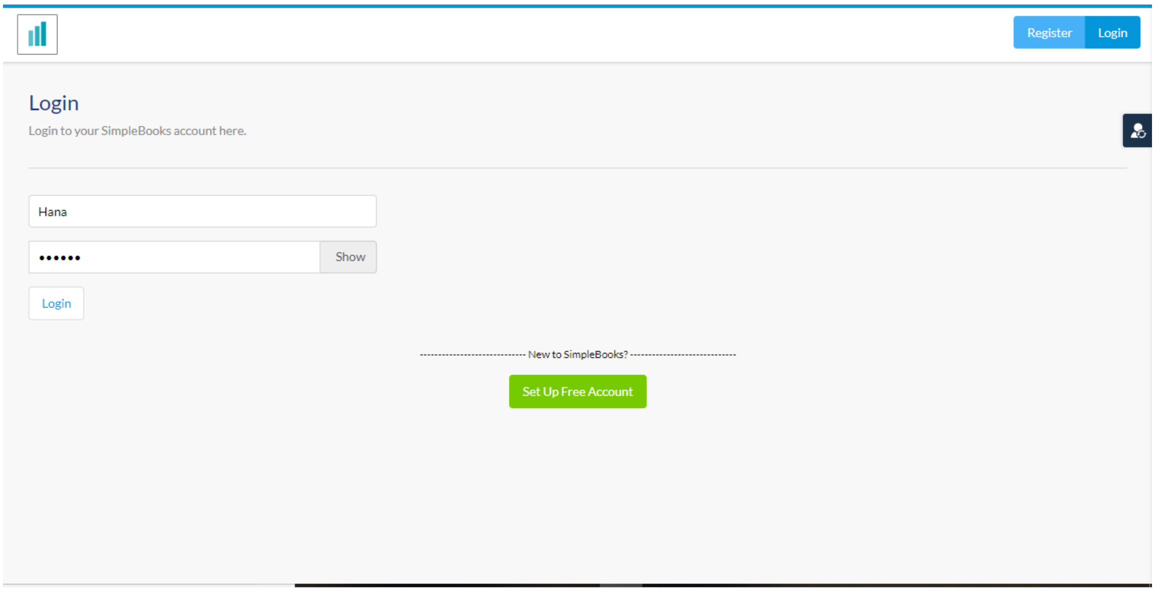

Figure 72: Login Step 1

1. This is where you will be redirected to if you have already created an account. If you have not already set one up, you can click the "Set Up New Account" button at the bottom and be redirected to the registration page.

8.1.2.2 Home Page after login

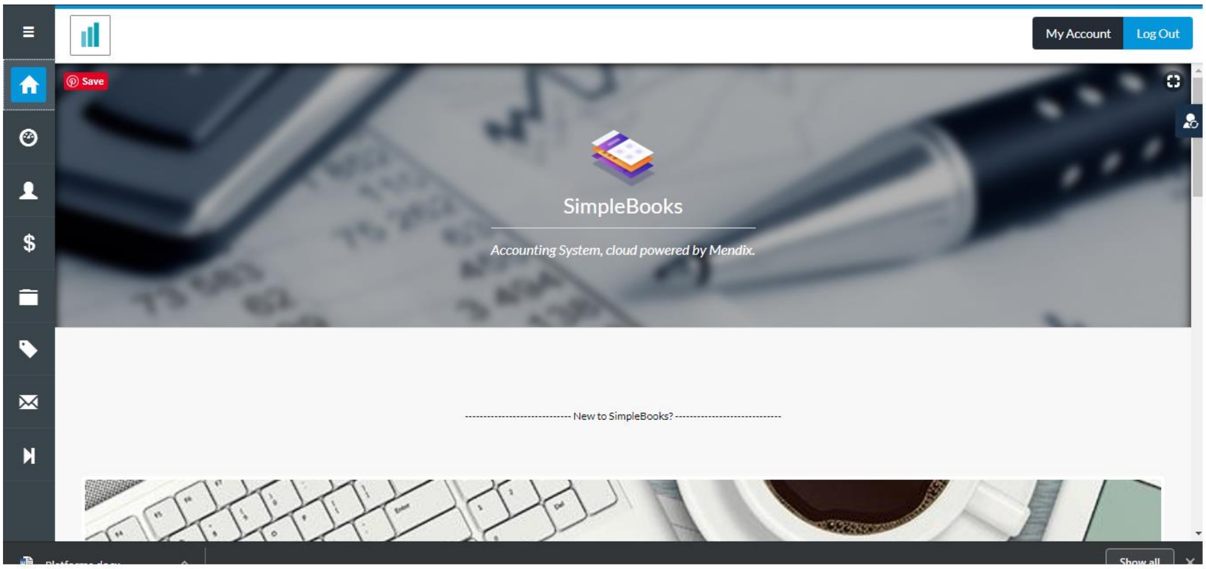

Figure 73: Login Step 2

2. Once you have logged in you will be able to access the home page.

8.1.3 Adding and editing Client

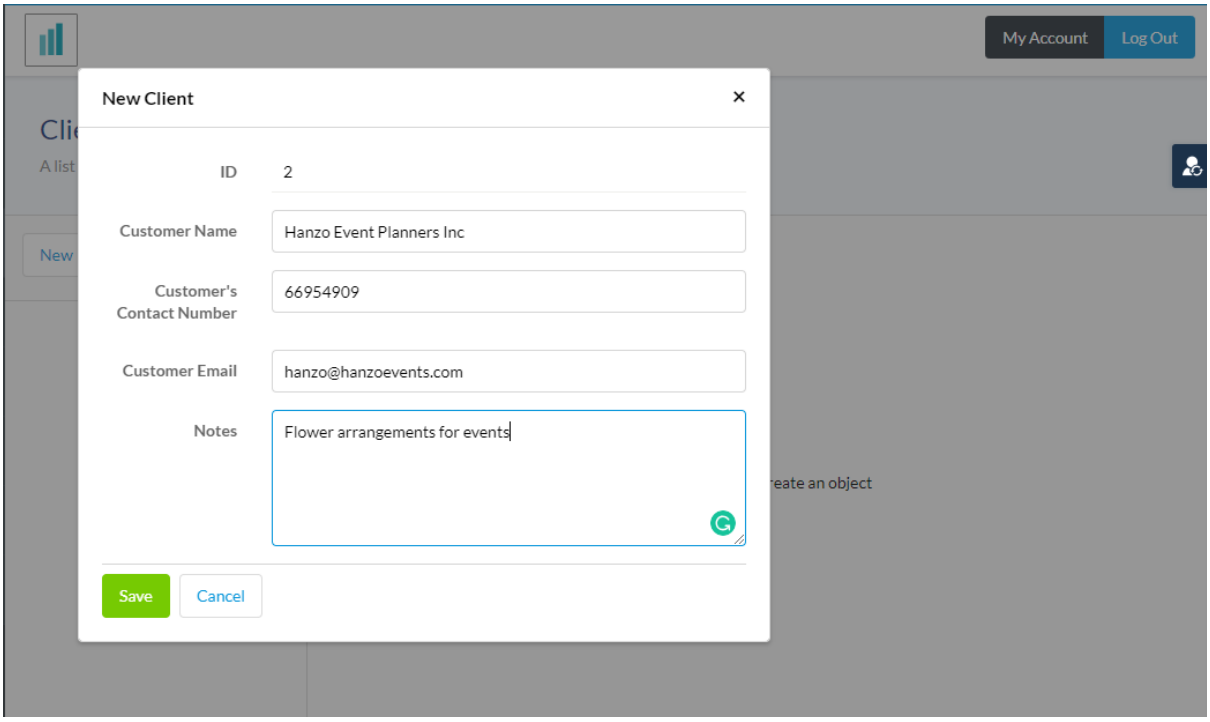

Figure 74: Adding Client Step 1

1. For the first time you must input the client details by clicking on new and then filling in the fields. Once done and saved, it will show as tab saved as below.

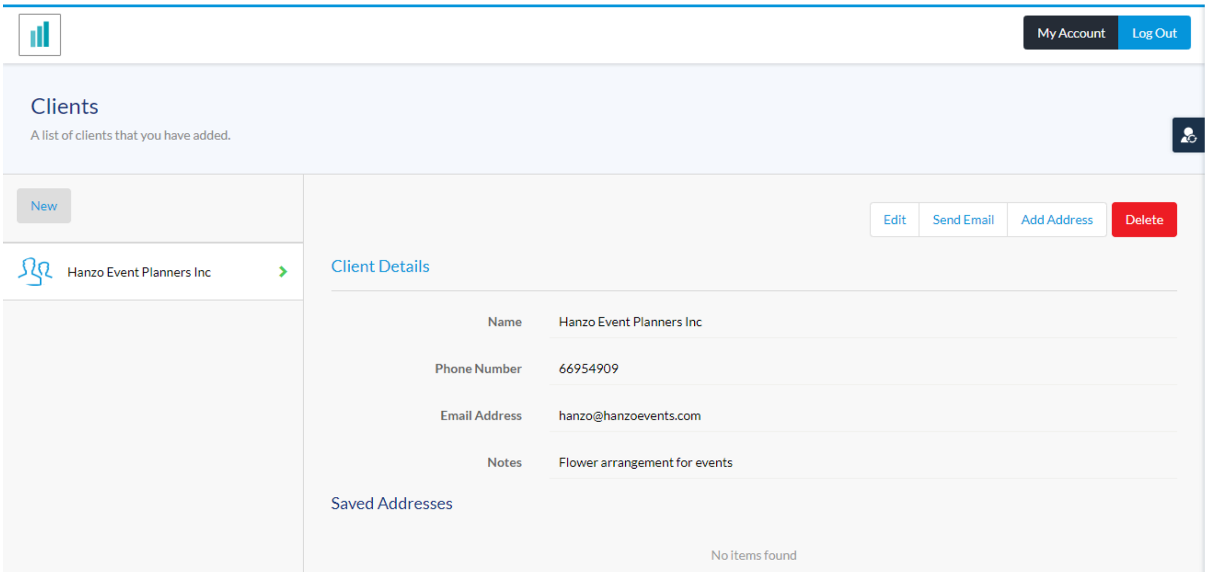

Figure 75: Adding Client Result

8.1.3 Adding Client Address

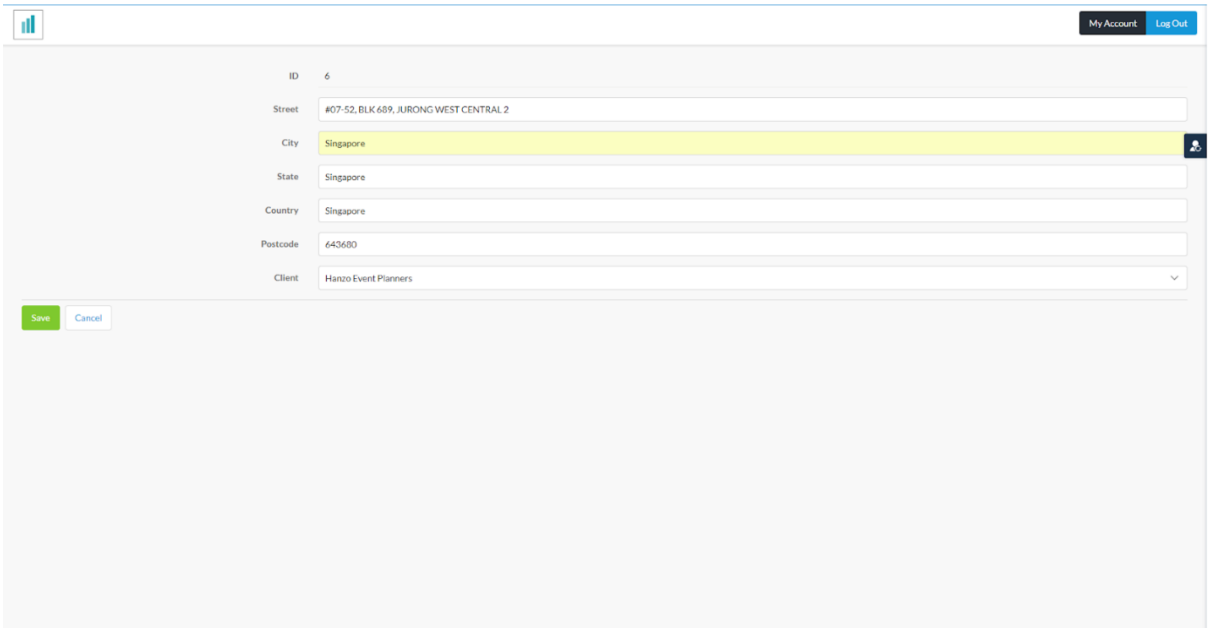

Figure 76: Adding Client Address

1. In each client, there is an option to add in the working address of the client, which will help for when needing to send or receiving goods.

8.1.4 Sending email to client from within the app itself

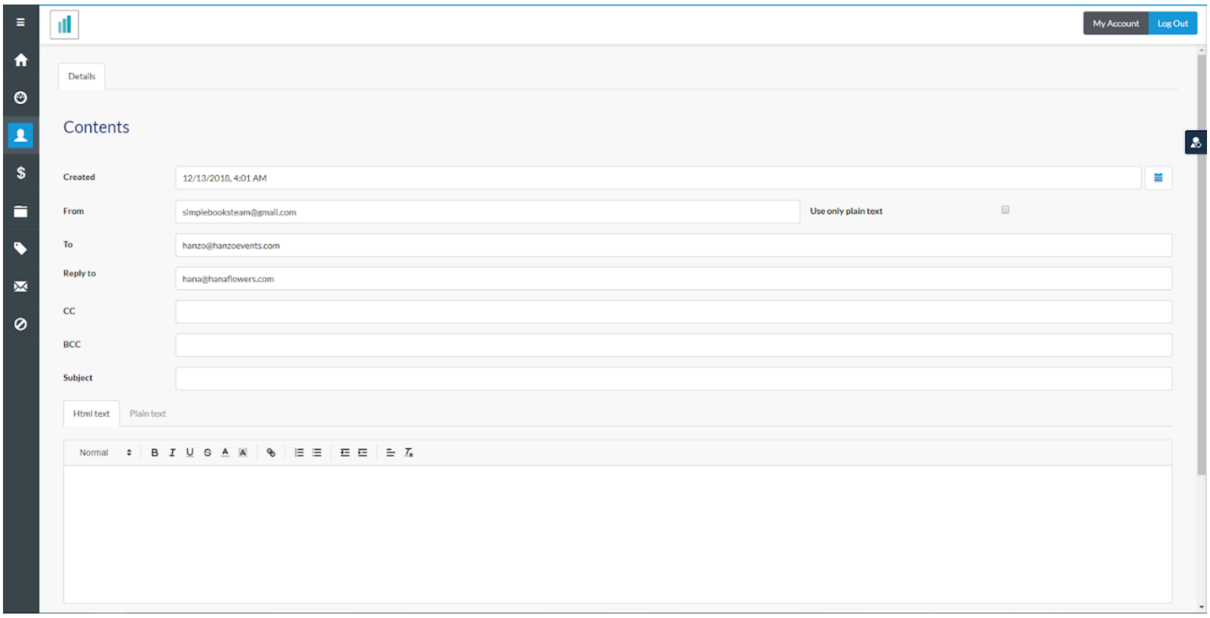

Figure 77: Sending an Email to Client

1. Often there is need for written communication between businesses to clarify or inform about parts of the sales. As such, it is useful to have an email system in the app itself which lets you easily email clients you need to contact.

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8.1.5 Account settings

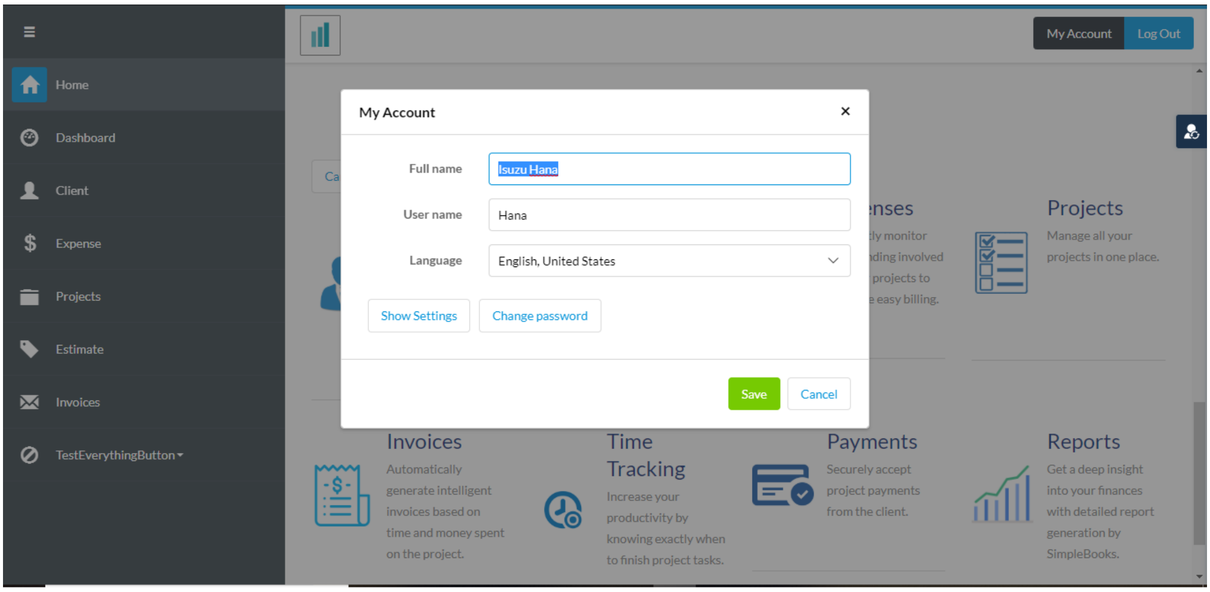


Figure 78: Changing Account Settings Step 1

1. On the top right-hand side on any page, you can find your account details and the logout button. You can change your details and settings or password from here.

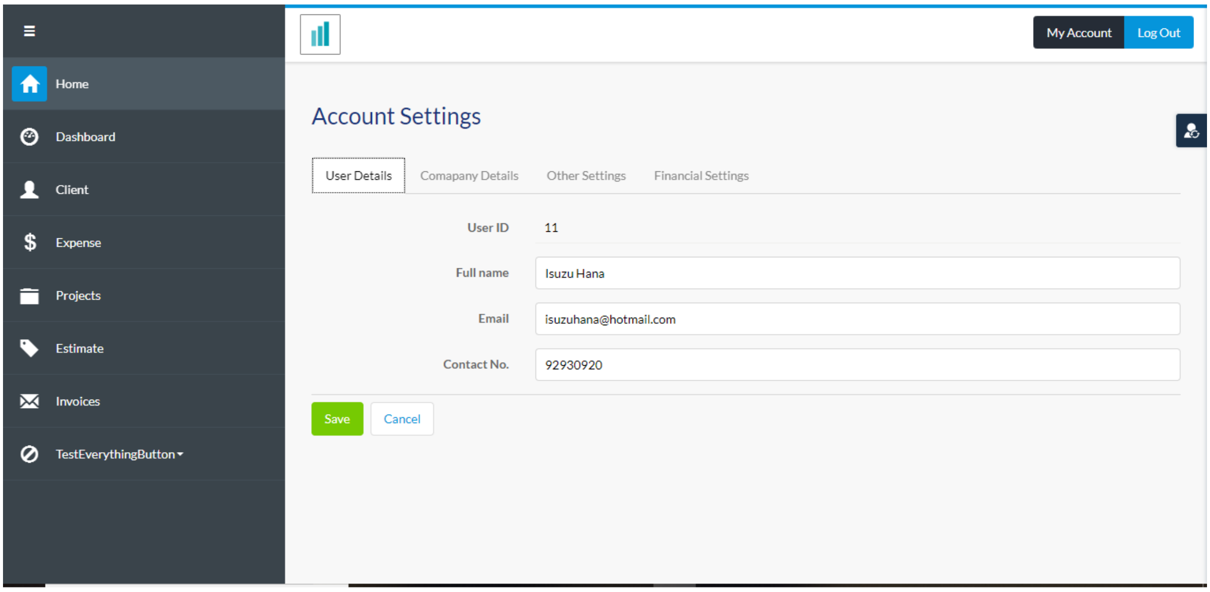


Figure 79: Changing Account Settings Step 2

2. Under the account settings are your details which you can edit anytime to update changes in them.

Si Thu Zaw (T7177793)
Raghav Kapoor (T7184782)
Tapan Thakar (T7318691)
Yang Chen (T7206174)
Hemanathan S/O Sathiamoorthy (T7322656)

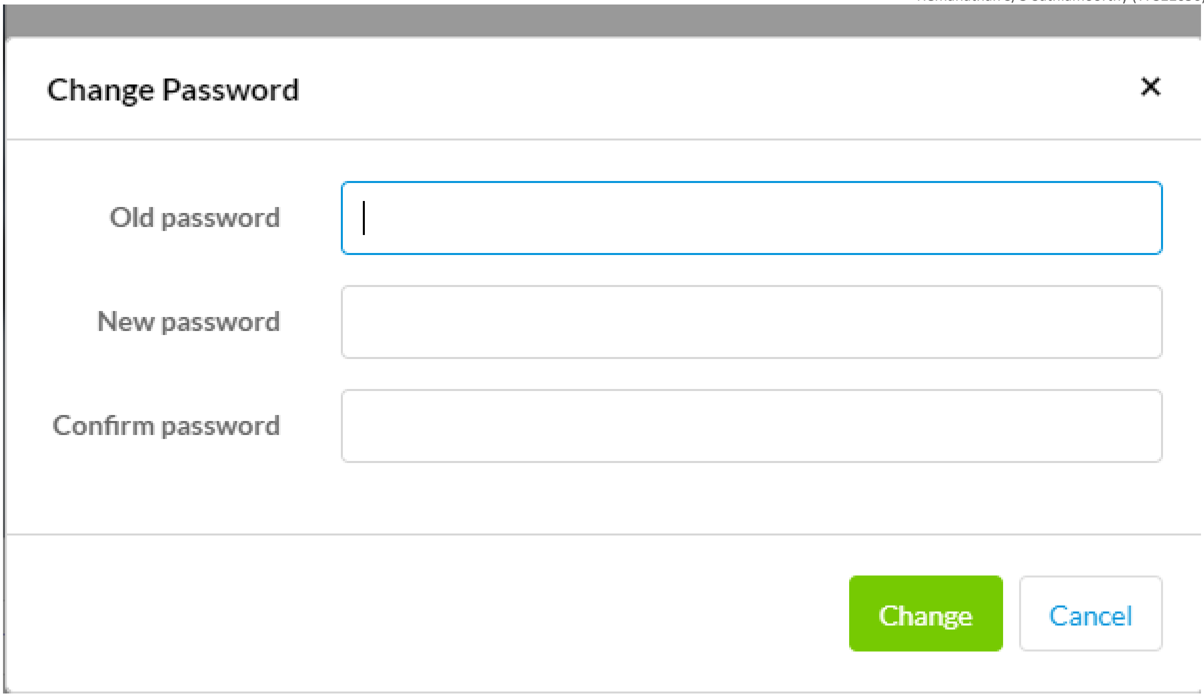


Figure 80: Changing Passwords Step 1

3. Changing your password requires your old pass and re-entering the new password twice to make sure you set it properly.

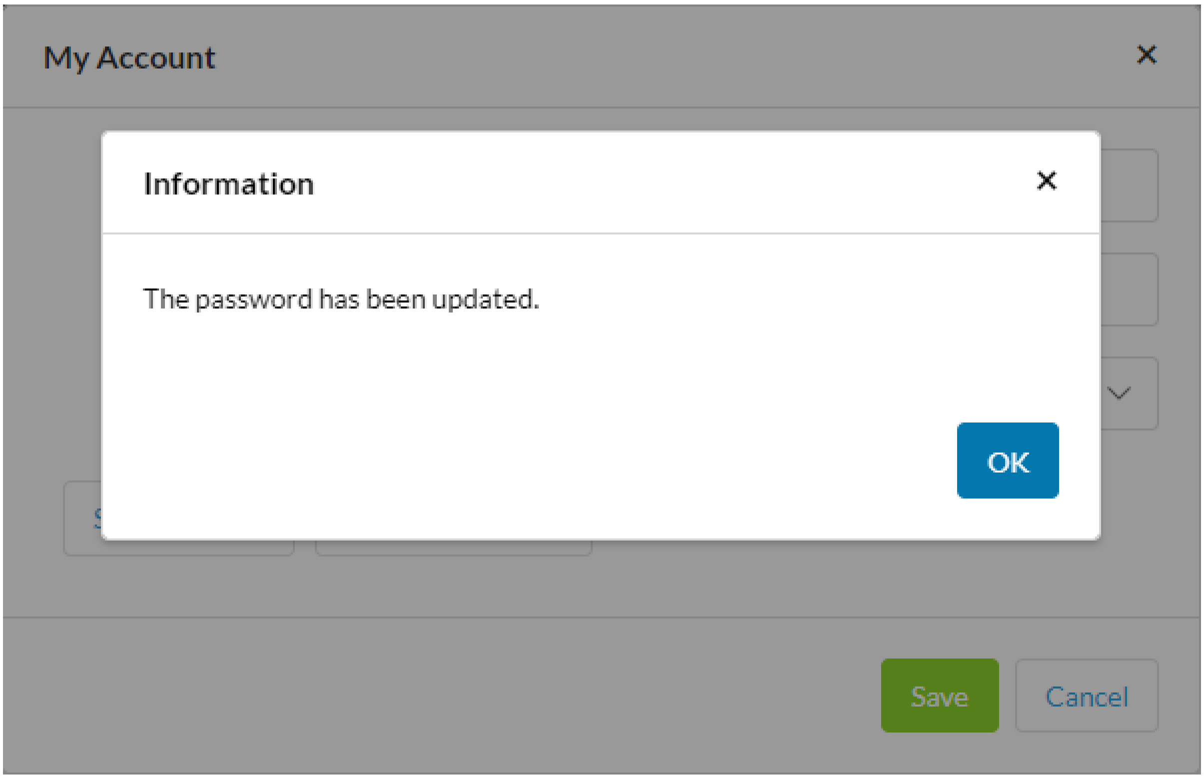


Figure 81: Changing Passwords Step 2

4. Once password has been changed successfully it will trigger a pop window notification indicating so.

Si Thu Zaw (T7177793)
Raghav Kapoor (T7184782)
Tapan Thakar (T7318691)
Yang Chen (T7206174)
Hemanathan S/O Sathiamoorthy (T7322656)

8.1.5 Expenses tracking

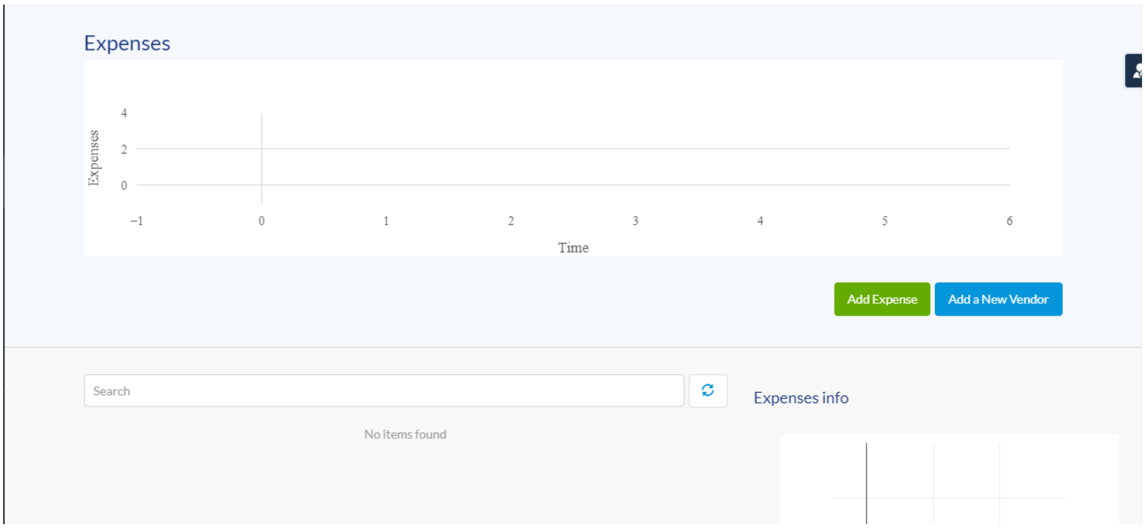


Figure 82: Expenses Tracking

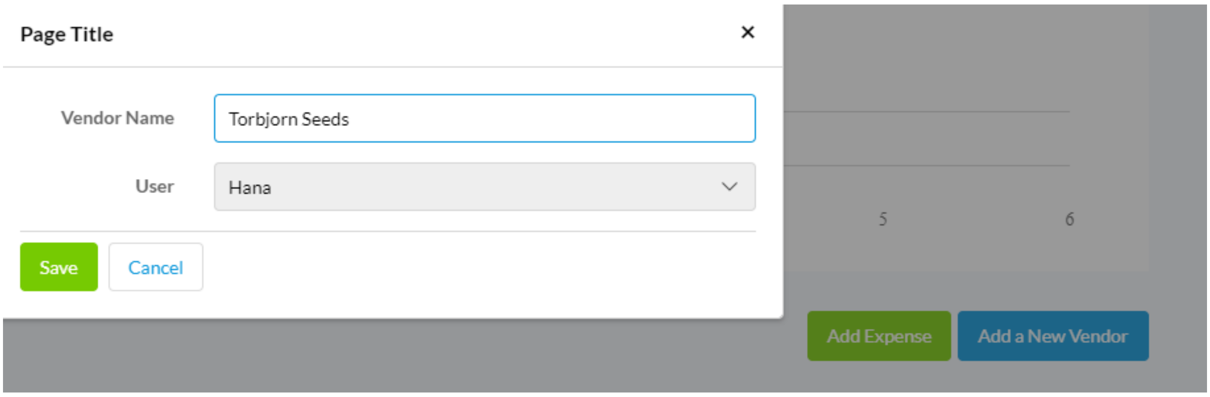


Figure 83: Adding Vendors

1. Firstly, you need to add the vendor

Si Thu Zaw (T7177793)
Raghav Kapoor (T7184782)
Tapan Thakar (T7318691)
Yang Chen (T7206174)
Hemanathan S/O Sathiamoorthy (T7322656)

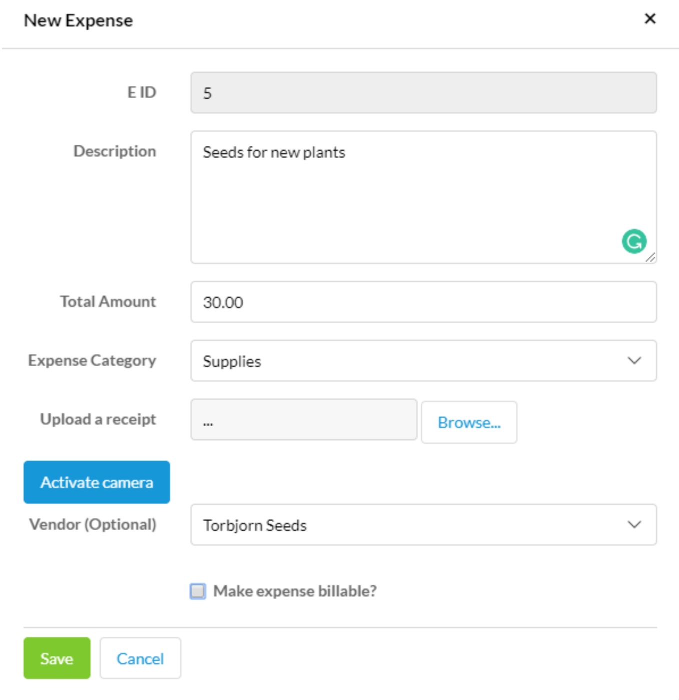


Figure 84: Adding Expense

2. After which you can add a new expense tagged to the specific vendor, whereupon it will be as below.

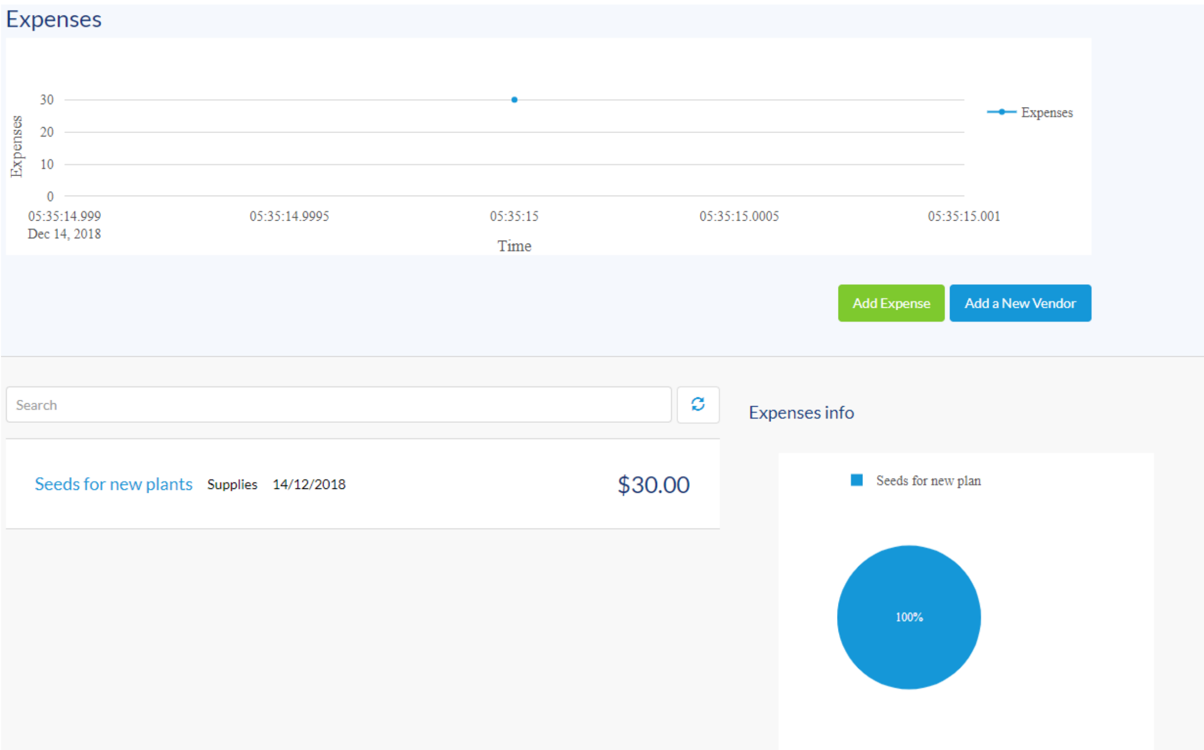
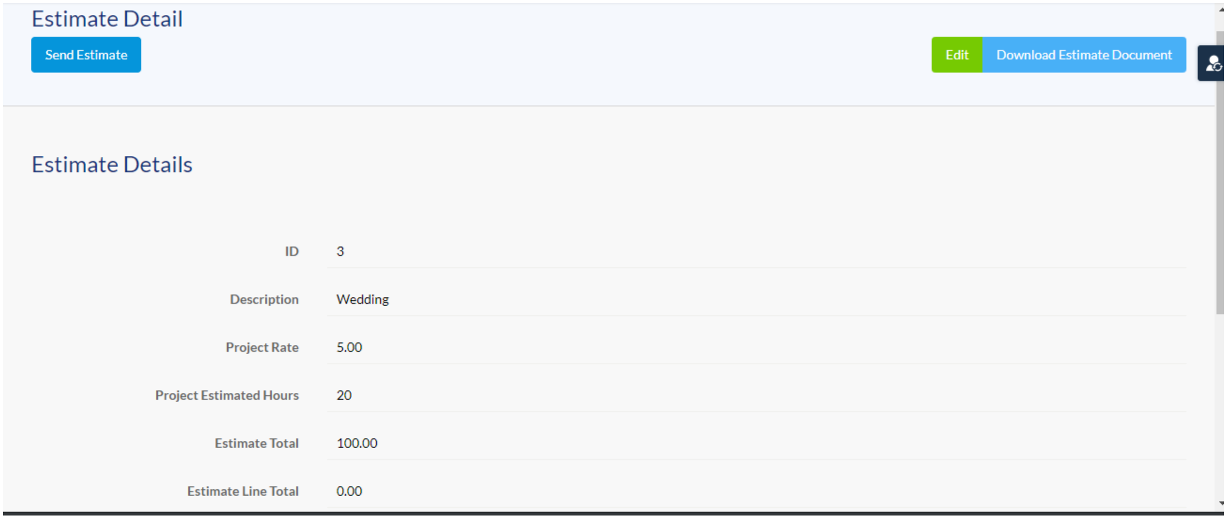


Figure 85: Adding Expense Result

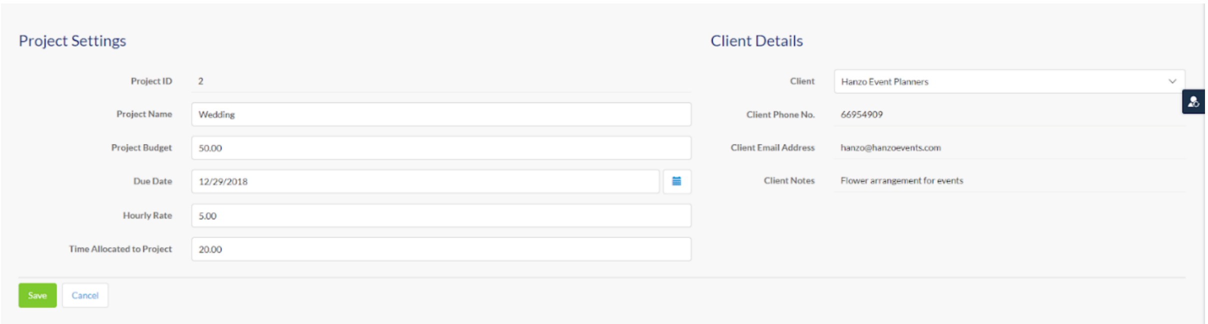
Si Thu Zaw (T7177793)
Raghav Kapoor (T7184782)
Tapan Thakar (T7318691)
Yang Chen (T7206174)
Hemanathan S/O Sathiamoorthy (T7322656)

8.1.6 Estimates

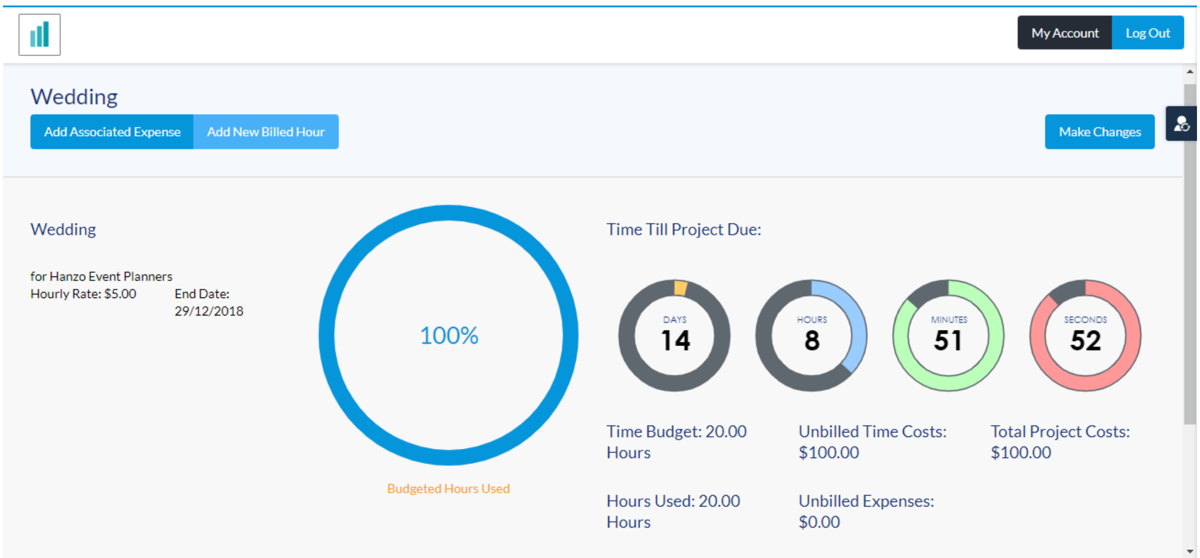


1. Estimate allows you to give your client an idea of roughly how much they can expect to pay for a project. It can be sent to them or downloaded like invoices.

8.1.7 Projects

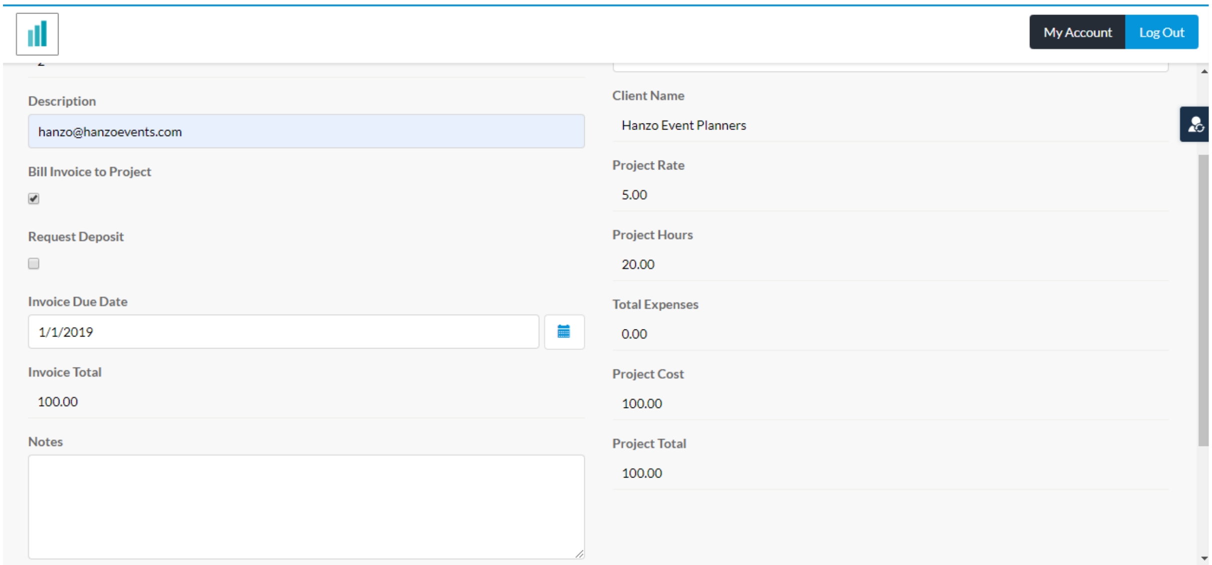


1. After the client has been created you can create projects tagged to them based on the budget, time available, and work rate. Once all the fields have been filled in, it will generate the below which allows you to easily see the deadline, budgets and billing costs for the client.

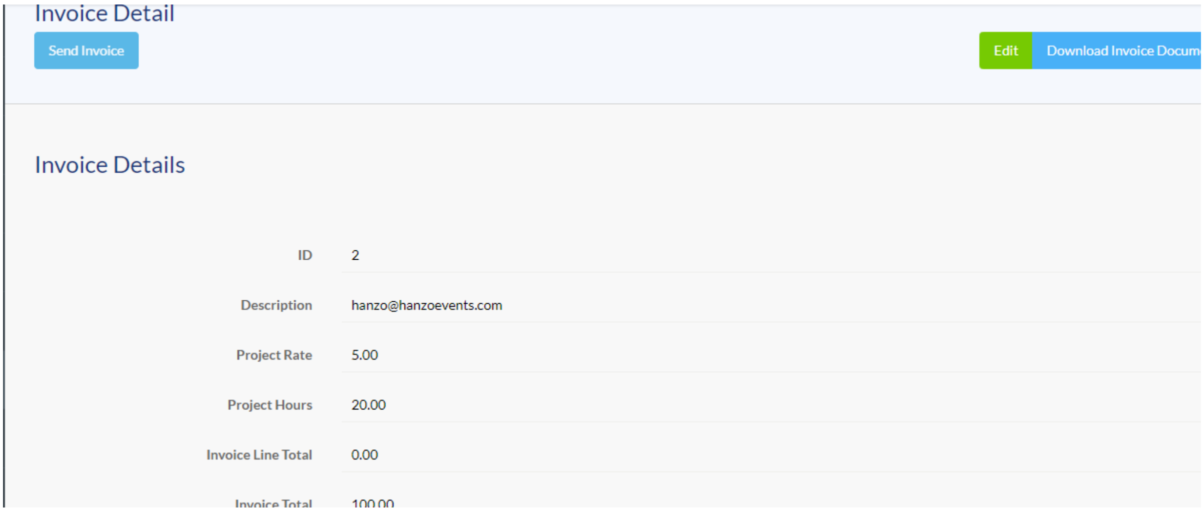


Si Thu Zaw (T7177793)
Raghav Kapoor (T7184782)
Tapan Thakar (T7318691)
Yang Chen (T7206174)
Hemanathan S/O Sathiamoorthy (T7322656)

8.1.8 Invoice



1. Based upon the project you can automatically create an invoice as below, which can be downloaded and sent to the client.



8.2 Administrator Manuals

8.2.1 Encryption Add-on:

8.2.1.1 Setting up Encryption Key

The application has an ‘Encryption’ module which contains settings used for data security in the application. It is specially utilised in the email system for encrypting and decrypting tasks. The steps to install your own encryption key are as follows:

1. Open the project file in the Mendix desktop modeler and navigate to *Project > App Store Modules > Encryption > Private - String en/de-cryption > Apis*, then open the EncryptionKey file in that folder.

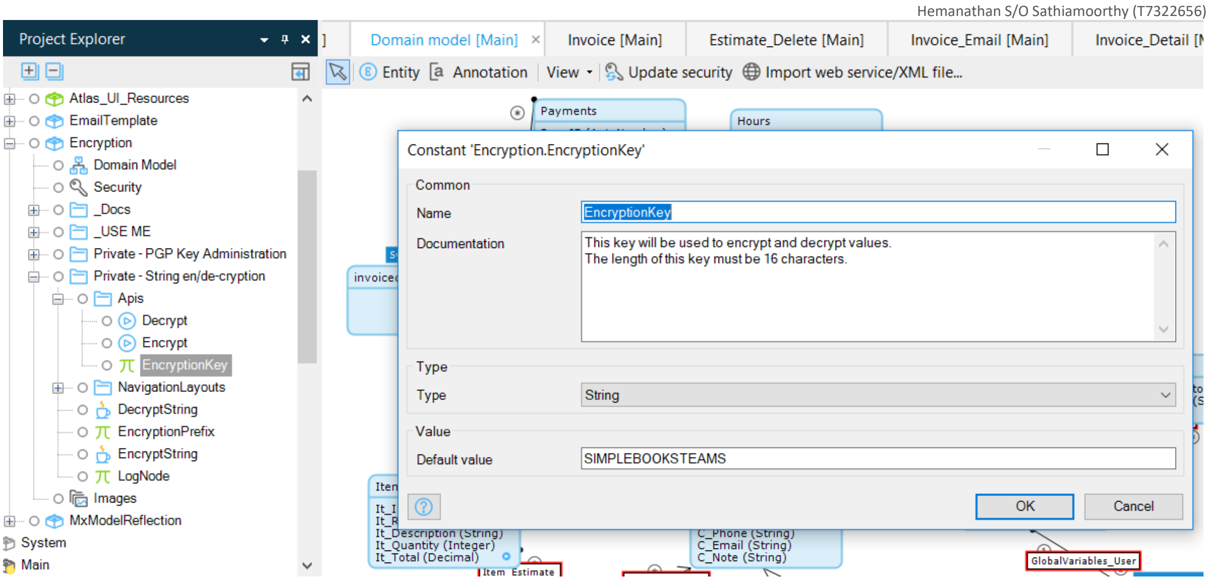


Figure 86: Setting up the Encryption Key

2. The encryption key window opens. Change the value in the 'Default value' field on the window to the new encryption key to be set. Make sure the key entered is 16 characters long and click OK when you are done.

3. Run the application (F5) to see the effected changes.

WARNING: This will override the application on the cloud. Make sure to test by running locally before deploying online.

8.2.2 Email System:

8.2.2.1 Setting up the SMTP Service

The application uses Simple Mail Transfer Protocol (SMTP) to handle sending emails on behalf of users. This service needs to be set up on the first launch of the application before attempting to send emails through the application for the system emails to function.

In the included configuration, a Google Mail account (simplebooksteam@gmail.com) is used to send emails from the application. Due to this, the SMTP needs to be configured to connect to Gmail's SMTP service with the following parameters from the email configuration page, accessible from the administrator control panel.

SMTP Address: smtp.gmail.com

TLS Connection: Enable

Connection Port: 587

Username: (System Email Address to Be Used)

Password: (System Email Address Password)

From Address: (System Email Address)

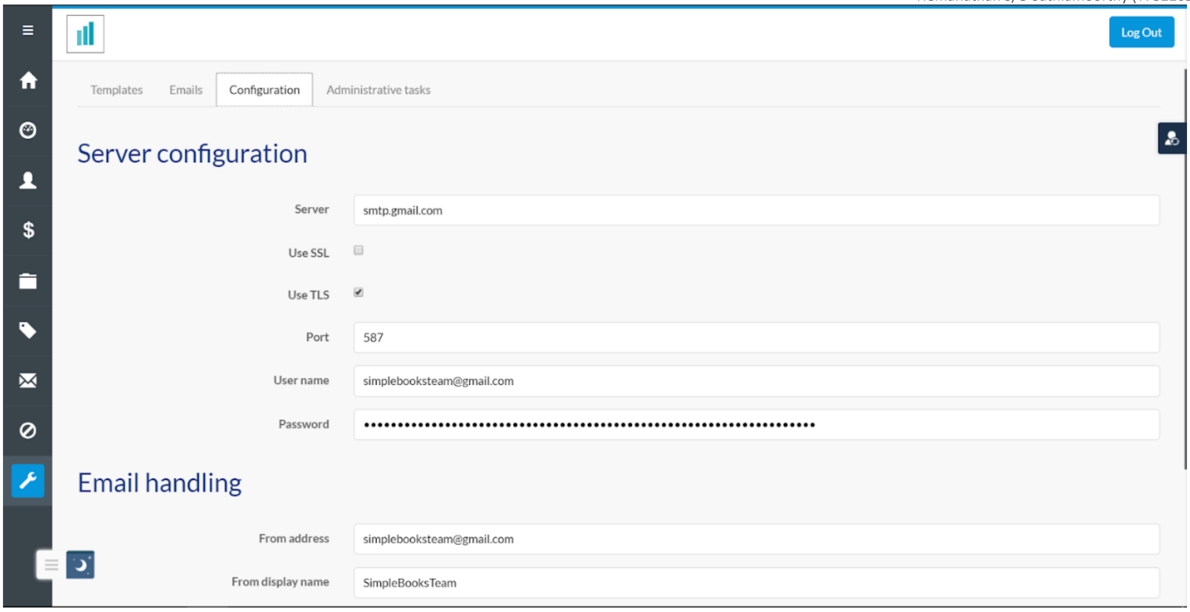


Figure 87: Email configuration Page

The email system configuration details as mentioned above have been input as shown in above screenshot. Upon entering the password, it is encrypted by PGP using the 16-character key specified in the ‘Encryption’ module downloaded from the Mendix App Store.

8.2.2.2 Solving Email Issues

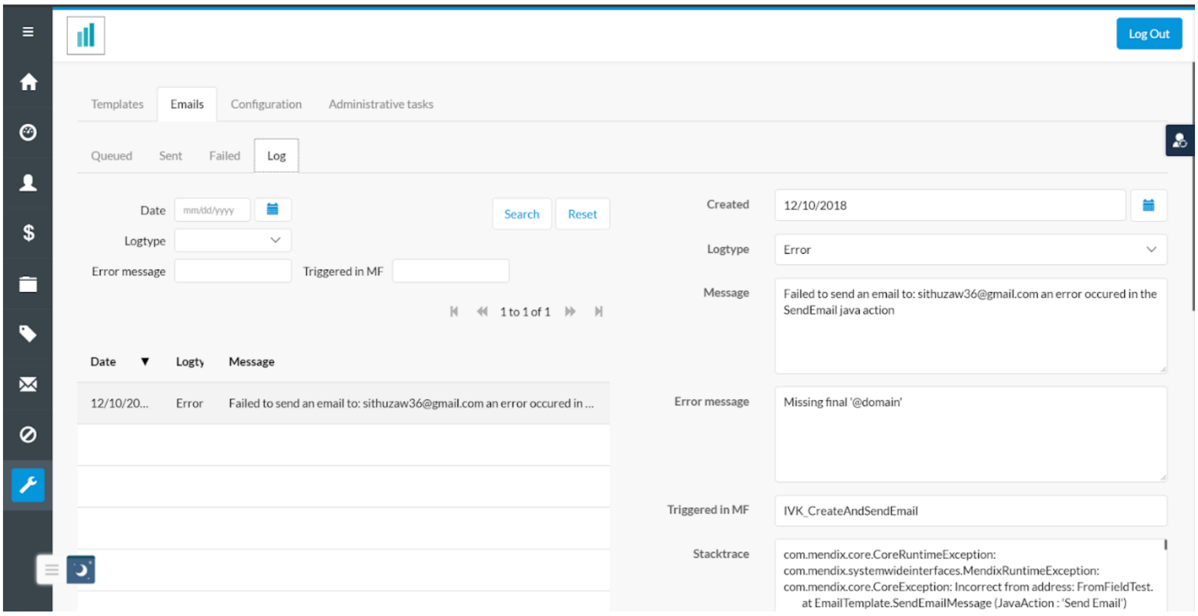


Figure 88: Email Error Log

The above screenshot shows an error in sending email because the domain part of the email address was not specified. All errors sending emails through the application are logged in this section of the email configuration with a proper description for the purposes of easy debugging.

8.2.3 Resetting User Passwords

The users' password can be reset by an administrator should the user forget their password. This can be done on the account overview page with the following steps:

1. Log into running Mendix application with an administrator account > navigate to Account Overview page from the Administrator dashboard.
2. Find the account of the user's who lost their password in the account list, double click on entry to edit the account.
3. Click "Change Password", enter new passwords and click "Save" to confirm new password.

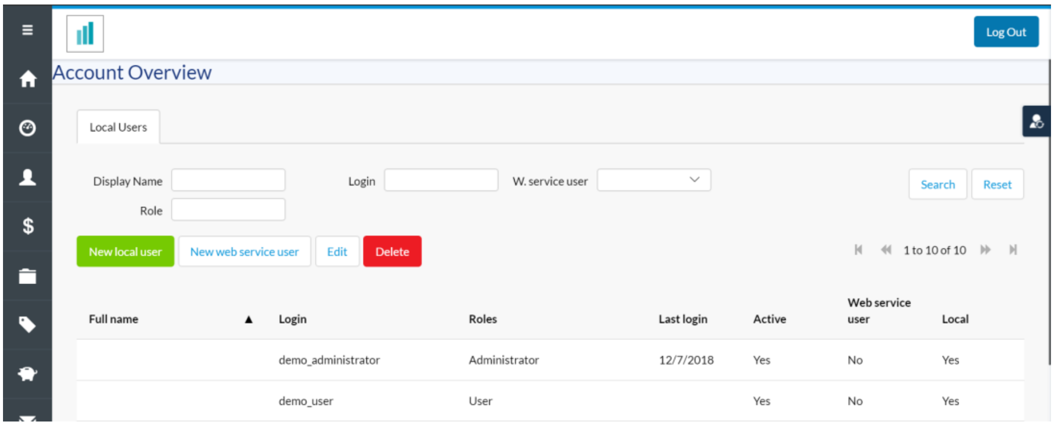


Figure 89: Account Overview Page

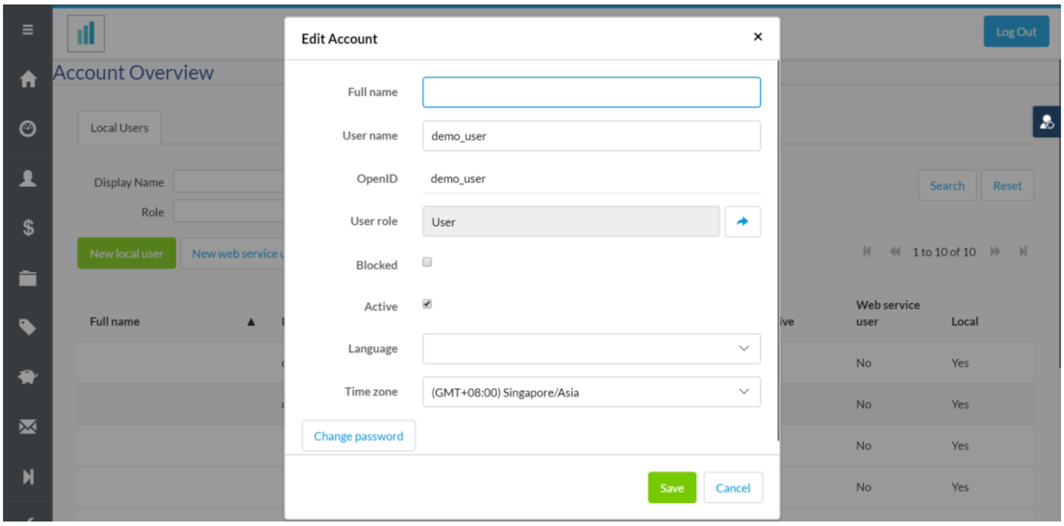


Figure 90: Edit Account page

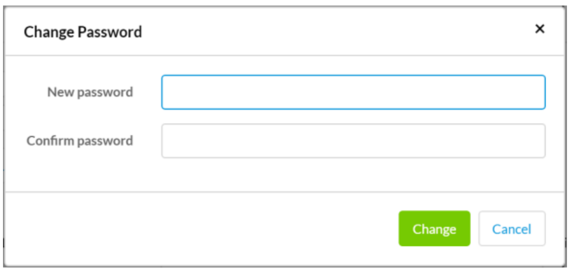


Figure 91: Password Change popup

9.0 Conclusion

9.1 Product Future Enhancements

9.1.1 'Allowing use of multiple currencies'

An impressive feature to have on our app would be to allow users to switch currencies on their account at any time and view the costs in the new one according to regularly updated exchange rates.

9.1.2 'Multilingual translations'

It would be helpful for non-English speakers to navigate the application if we tailor it to their regional languages. The first step here would be to translate in major languages like French and Spanish and extend it to the world in the late future.

9.2 Closing Thoughts

Looking back, we realise it was quite a good challenge to develop such an application within the amount of time provided to us, and we have definitely acquired some valuable knowledge and experience in developing an enterprise-level application.

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Available at: https://www.tutorialspoint.com/sdlc/sdlc_waterfall_model.htm
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Image Sources:

Figure 1: https://cdn01.vulcanpost.com/wp-uploads/2017/10/Financio-Stock-Image-16-Oct.jpg

Figure 2: http://www.myobaccountingsystem.com/wp-content/uploads/2013/07/Accounts.jpg

Figure 3: https://www.sage.com/en-gb/shop/images/feature-cash-flow.png

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Figure 5: https://techtalkdotorg.files.wordpress.com/2015/01/prototype_model_sdlc.png

Figure 6: https://4.bp.blogspot.com/-DrUmxAA-0ow/Tuel4-sLo1I/AAAAAAAAAIE/MziZ7Wnu1F8/s1600/Spiral_model.JPG

Figure 7: https://i2.wp.com/www.snyxius.com/wp-content/uploads/2016/10/agile-development-process.jpg?fit=736%2C552&ssl=1

Appendices

Appendix A: Group Member CVs

A.1 Si Thu Zaw (T7177793)

Si Thu Zaw

Undergraduate Student

Si Thu Zaw
86 Lakeholmz, Corporation Road, #06-12
Singapore, 649822

+65 97257377
sithuzaw36@gmail.com

Knowledgeable graduate student in Information Technology. Possesses good written and verbal communication skills. Able to work solo or in a team. Adaptable to Looking for a challenging role in Information Systems Development project.

Technical Skills

- HTML/CSS
- Javascript
- C++
- C#
- Visual Studio
- Mendix
- Microsoft SQL Server

Experience

Innova Junior College / CCA Head of Department
April 2015 - May 2016, Singapore

Acted as the head of department of 'Interactive Media And Design' in New Media Arts Club where members learnt and worked on projects using Arduinos, C++, CAD and 3D printing. Was responsible for ensuring smooth operation of the department and representing the department for external parties.

Education

Innova Junior College / GCE 'A' Level
January 2015 - November 2016, Singapore

Tanglin Secondary School / GCE 'O' Level
January 2012 - October 2014, Singapore

Jerudong International School
January 2010 - August 2011, Brunei Darussalam

Awards

Leadership Award / Innova Junior College
29 April 2016, Singapore

Received for exemplary leadership and outstanding contribution to New Media Arts Club

Project Work Festival Showcase / Innova Junior College
13 May 2016, Singapore

Project titled "TroubleChute" completed for Project Work subject was selected to be one of the twelve showcased at the Project Work Festival 2016 as an outstanding example for new students.

A.2 Raghav Kapoor (T7184782)

Raghav Kapoor

Tech Aficionado

Raghav Kapoor

+65 91512704
raghavkaps99@yahoo.co.in

Executive Summary

University student studying a Bachelor's degree in Information Technology, familiar with the Systems Analysis, Design and Development processes, proficient with web design using HTML and CSS languages, and a fast learner with good problem-solving skills.

Skills

Computer skills:

- Operational knowledge of C++, HTML and CSS.
- Good understanding of Systems Analysis and Design
- Fast learner with good problem-solving skills

Languages:

- Written expertise and fluency in English and Hindi

Continuing Professional Development

IT Security Foundations – Core Concepts

Photoshop CC 2018 Essential Training

User Experience for Web Designers

Education

GIIS, Singapore / Senior Secondary School Certificate
APR 2016 - MAR 2017, Singapore

Undertaken Computer Science as a subject.

GIIS, Singapore / Secondary School Certificate
APR 2014 - MAR 2015, Singapore

Undertaken Information Technology as a subject.

A.3 Tapan Thakar (T7318691)

Tapan Thakar

Undergraduate Student

Tapan Thakar
08-434, Blk 661C, Jurong West St. 64
Boon Lay, Singapore 643661

+6593751984
TapanThakar14@gmail.com

Skills

Hard-working, detail-oriented graduate student in Information Technology with ability to articulate complex subject matter. Excellent interpersonal skills; willing to help, listen, and learn.

Experience

Odazzit Pvt. Ltd. / Coding Specialist
May 2018 - August 2018, Singapore

Worked as a web development specialist for a startup which is creating a social platform for people to Connect, Learn & Monetize their talents and skills. Created video compression scripts and a credit management system for the platform.

Education

MDIS, Singapore / Advanced Diploma in I.T.
August 2017 - April 2018, Singapore

MDIS, Singapore / Foundation Diploma in Engineering
June 2017 - March 2018, Singapore

MDIS, Singapore/ Diploma in I.T.
November 2015 - November 2016, Singapore

GIIS, Singapore / Senior School Certificate
April 2016 - March 2017, Singapore

Christ Academy, Mumbai / Secondary School Certificate
Junel 2014 - March 2015, India

Achievements

- House Captain [High school] – Orchid House (2016-2017)

Contested among 15 students for the post and won the elections. Co-ordinated and organized 4 inter house competitions throughout the year and secured first position for overall best house for co-curricular as well as sports events.

- Winner – GIIS Hackathon (2016)

Contested among 25 groups and won the best design award for the designing an unmanned aerial vehicular drone.

- Global School Awards - GIIS, Queenstown (2016-2017)

Received the Values & Virtues Award for the excellent display of Teamwork.

A.4 Yang Chen (T7206174)

YangChen

Undergraduate Student

YangChen

151 Holland Road #04-01 The Loft Singapore 278580 4-1, 278580

+65 84270251
Yc4758366@gmail.com

Objective

Willing to learn new knowledge, more emphasis on consolidating old knowledge. As a programmer, the more important spirit is to understand team work, and to have a team spirit, serious and responsible for the work.

Skills

- Experience of C++, HTML, CSS,JavaScript, Unity3D, Asp.net and Microsoft Office
- Good understand and familiar with Network analysis
- Have consuming passion for IT
- Understand English and Chinese

Education

MDIS, Singapore / Foundation Diploma in Engineering
June 2017 - March 2018, Singapore

MDIS, Singapore/ Diploma in I.T.
November 2015 - November 2016, Singapore

A.5 Hemanathan S/O Sathiamoorthy (T7322656)

Hemanathan S/O Sathiamoorthy

Creative Director

Hemanathan S/O Sathiamoorthy
#06-52 BLK 680C JURONG WEST CENTRAL 1
Singapore, S643680

hemanathan958@gmail.com

Skills

Able to think out of the box and provide optional information or input relevant to topic. Excellent analysis skills able to manipulate coding and transfer information from one form to another.

Experience

CQMS Assistant / SAF
March 2014 - March 2016, Singapore

In charge of logistics for Kilo Company at Specialist Cadet School 3 in Singapore Armed Forces. Took apart in two overseas exercises as well, and received Commander's Coin for Exercise Wanderer and made sure of operational success of Exercise Starlight as admin company for entire School 3. Acted as CQMS in absence of authority.

Education

Nus High School of Mathematics And Science / Diploma
JAN 2008 - DEC 2014, Singapore
With majors in mathematics, biology, chemistry and physics.

Nus High School of Mathematics And Science/ Diploma
MAY 2016 - DEC 2016, Singapore
Completion of research project.

Awards

Commander's Coin / SAF
March 2015, Singapore

Received for exemplary leadership, exceeding expectations and outstanding contribution to Exercise Wanderer

Appendix B: All Individual Project Proposals

B.1 IT Hardware E-Store: Tapan Thakar (T7318691)

PROJECT PROPOSAL FORM	
PROJECT TITLE:	**IT Hardware E-store**
PROPOSER:	**The IT Shop pvt. ltd.**
From:	*Tapan Thakar (TapanThakar14@gmail.com)*
Submit To:	*Raghav Kapoor (raghugameshd@gmail.com)*
SUBMISSION DATE:	*08/10/2018*
KEYWORDS	**E-Commerce / Website / Database System**

PROJECT DESCRIPTION:

Aim is to develop an e-commerce store which manages the transactions and provides a tracking system for the order. The website allows the **users** to buy, track, compare and review all the products available on the store. The application will also manage help the **vendors** manage their stock in the inventory and automatically calculate the commissions for them for every transaction processed. Various report generation tools will also be built in to the application and made available to the vendors so that they can track their data in the form of visual charts and graphs for easy processing of the financial data. The application will be accessible on both desktop web browsers and as a mobile application to facilitate ease of access.

B.2 VidFlix: Raghav Kapoor (T7184782)

PROJECT PROPOSAL FORM	
PROJECT TITLE:	Video Streaming and Rental Service (Vidflix)
PROPOSER:	Vidflix Inc.
From:	*Raghav Kapoor (raghugameshd@gmail.com)*
Submit To:	*Raghav Kapoor (raghugameshd@gmail.com)*
SUBMISSION DATE:	*08/10/18*
KEYWORDS	**Web / Database System**

PROJECT DESCRIPTION:

To develop a video streaming and rental service (Vidflix) for the client Vidflix Inc., a media services company headquartered in Seattle, Washington. The platform will offer facilities for video streaming and digital rentals to its users. The customers will be able to watch all video content available in the streaming catalogue with a monthly/annual subscription as well as have the option to digitally rent any video on the rental catalogue for a limited duration of time. The two catalogues will have different content from each other. The service aims to offer a diverse selection of video content suited to the different needs of the users.

B.3 Application of Database and Navigation for video streaming: Hemanathan S/O Sathiamoorthy (T7322656)

PROJECT PROPOSAL FORM	
PROJECT TITLE:	**Application of Database and Navigation for video streaming**
PROPOSER:	**Bear_TV**
From:	*Hemanathan (hemanathan958@gmail.com)*
Submit To:	*Raghav Kapoor (raghugameshd@gmail.com)*
SUBMISSION DATE:	*08/10/2018*
KEYWORDS	**Sells order system/**

PROJECT DESCRIPTION:

Aim of the project is to create a database for videos and for user accounts. Users will then be able to access videos according to their user level, i.e. uploader, moderator, viewer, admin etc. The database for the videos will be tagged according to genre, uploader/publisher, year, which will allow for similar videos to be suggested to users based on their previous viewing history. Users will be able to search for videos and favourite them, so they can see any new uploads of their watched series immediately, while being able to see videos which are similar to those that they have watched. The system will be able to track if they liked suggested videos or not and be able to further refine suggested videos. This will also thus allow for funding to be redirected to commercially viable series, as you will be able to see which series is popular enough to warrant a sequel, or which current genre is in trend amongst viewers at the moment. The home page will show the most popular series so that people will watch those that are popular amongst viewers and are thus more likely to watch till the end as it is well produced enough to grasp attention and hold it as well.

Si Thu Zaw (T7177793)
Raghav Kapoor (T7184782)
Tapan Thakar (T7318691)
Yang Chen (T7206174)
Hemanathan S/O Sathiamoorthy (T7322656)

B.4 Restaurant Order System: Yang Chen (T7206174)

PROJECT PROPOSAL FORM	
PROJECT TITLE:	**Restaurant order system**
PROPOSER:	**XXX restaurant**
From:	*YangChen (yc4758366@gmail.com)*
Submit To:	*Raghav Kapoor (raghugameshd@gmail.com)*
SUBMISSION DATE:	*08/10/2018*
KEYWORDS	**Sells order system/**

PROJECT DESCRIPTION:

Aim to develop a web-based application which allow customer to order the food use their own phone or other devices. After customer click submit this order will directly transfer to chef's hand. Before serving the dish, waiters do the double check and click served the bill will automatically sent to the customer phone and allow them to do the online payment.

B.5 SimpleBooks: Si Thu Zaw (T7177793)

PROJECT PROPOSAL FORM	
PROJECT TITLE:	**SimpleBooks**
PROPOSER:	**SimpleBooks Inc.**
From:	*Si Thu Zaw (sithuzaw36@gmail.com)*
Submit To:	*Raghav Kapoor (raghugameshd@gmail.com)*
SUBMISSION DATE:	*08/10/2018*
KEYWORDS	**Web / Database Accounting System**

PROJECT DESCRIPTION:

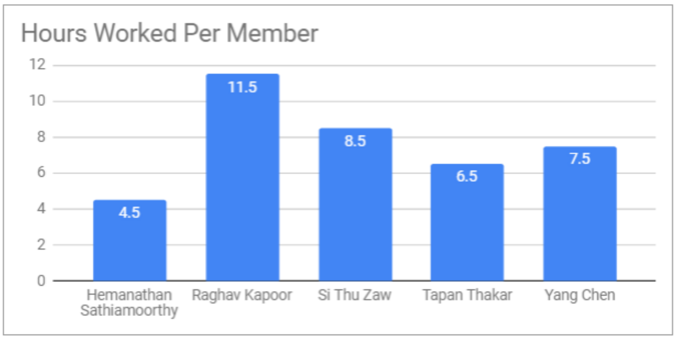
To develop a cloud-based application for managing finances with built-in functionality to categorise transactions and produce invoices for small businesses and freelancers. The application lets the users keep track of expenses on projects, produce professional-looking invoices to send to clients with links for payment and generate reports on the finances of the business on the platform. As the application of aimed at those whose work is more based on commissions such as freelance artists and music producers, the transactions will be able to be categorised into their respective projects so that clients can more clearly see the costs associated with their commission. Report generation tools will also be built in to the application so that the users can visualise their data in the form of visual charts and graphs for easy digestion of the financial data. The application will be accessible on both desktop web browsers and as a mobile application to facilitate easy searching of records for printed invoices.

Si Thu Zaw (T7177793)
Raghav Kapoor (T7184782)
Tapan Thakar (T7318691)
Yang Chen (T7206174)
Hemanathan S/O Sathiamoorthy (T7322656)

Appendix C: Group Time Sheets

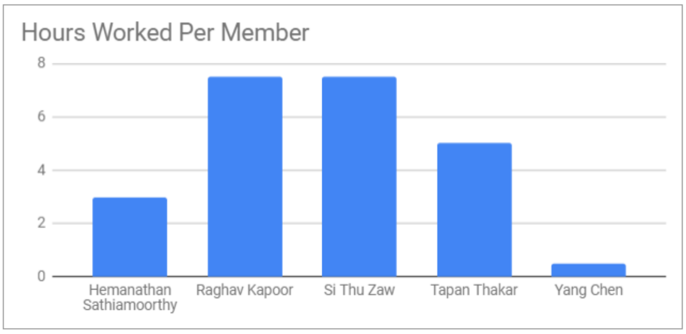
C.1 Week 2

Group A					Timeframe:		Week 2 01/10/18 - 07/10/18		
Member	**Task**	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**	**Sun**	**Total hours worked**
Hemanathan Sathiamoorthy	Writing Individual Proposal and Resume	0.5	1	1	1	1			4.5
Raghav Kapoor	Writing Individual Proposal and Resume	-	1	2	2	0.5			5.5
Raghav Kapoor	Prototyping the app (Vidflix)	0.5	1	0.5	1	3			6
Si Thu Zaw	Timesheet Design				1	2.5			3.5
Si Thu Zaw	Writing Individual Proposal and Resume	-	1	2	1.5	0.5			5
Tapan Thakar	Writing Individual Proposal and Resume	-	3	3	-	0.5			6.5
Yang Chen	Writing Individual Proposal and Resume	-	2	4	1	0.5			7.5
	Total/ day	1	9	12.5	7.5	8.5	0	0	



C.2 Week 3

Group A					Timeframe:		Week 3 08/10/18 - 14/10/18		
Member	**Task**	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**	**Sun**	**Total hours worked**
Hemanathan Sathiamoorthy	Writing Project Activity Log	-	-	-	3	-			3
Raghav Kapoor	Producing the project specification	-	-	-	1	1			2
Raghav Kapoor	Prototyping the app (Vidflix)	0.5	-	0.5	-				1
Raghav Kapoor	SimpleBooks app discussion	0.5	-	1	0.5	2.5			4.5
Si Thu Zaw	Project Activity Log templates design	-	-	-	0.5				0.5
Si Thu Zaw	SimpleBooks app prototyping	-	2	5	-				7
Tapan Thakar	Drafting Minutes of meeting document	-	-	-	2	3			5
Yang Chen	Writing Project Activity Log	-	-		0.5	-			0.5
	Total/ day	1	2	6.5	7.5	6.5	0	0	



Si Thu Zaw (T7177793)
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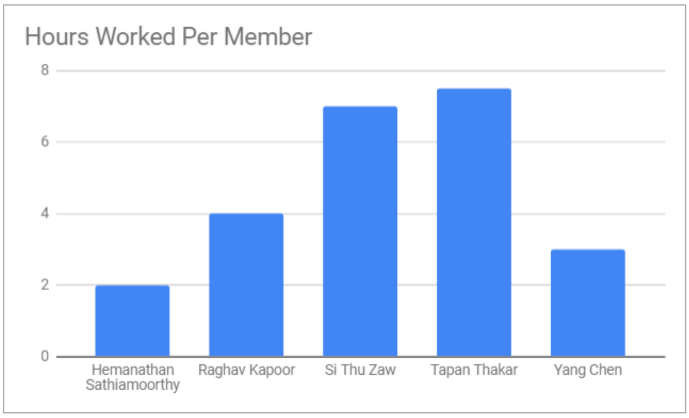
Yang Chen (T7206174)
Hemanathan S/O Sathiamoorthy (T7322656)

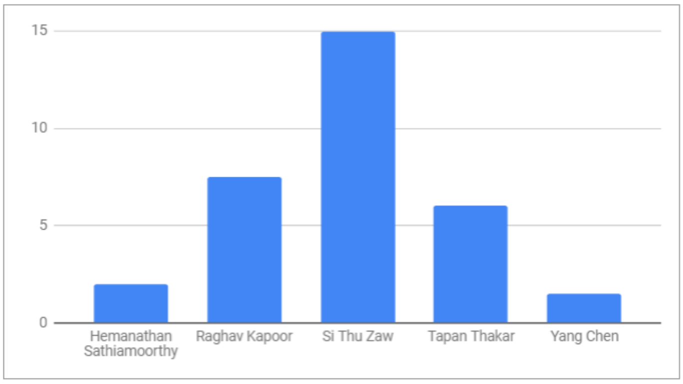
C.3 Week 4

Group A					Timeframe:		Week 4 15/10/18 - 21/10/18		
Member	**Task**	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**	**Sun**	**Total hours worked**
Hemanathan Sathiamoorthy	Project Planning Documentation	-	2	-	-	-			2
Raghav Kapoor	SimpleBooks app prototyping	0.5	1	-	0.5	-			2
Raghav Kapoor	Project Planning Documentation	-	2	-	-	-			2
Si Thu Zaw	SimpleBooks app prototyping	2	0.5	-	2	0.5			5
Si Thu Zaw	Project Planning Documentation	-	2	-	-	-			2
Tapan Thakar	Drafting Minutes of meeting document	2	3	-	0.5	-			5.5
Tapan Thakar	Project Planning Documentation	-	2	-	-	-			2
Yang Chen	Project Planning Documentation	-	3	-	-	-			3
									0
Total/ day		4.5	15.5	0	3	0.5	0	0	



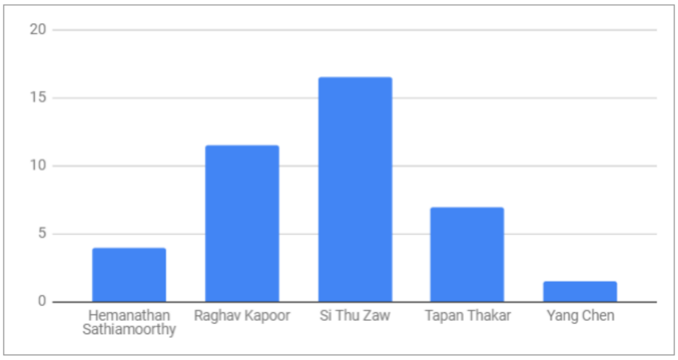
C.4 Week 5

Group A					Timeframe:		Week 5 22/10/18 - 28/10/18		
Member	**Task**	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**	**Sun**	**Total hours worked**
Hemanathan Sathiamoorthy	Drafting Group Project Plan	-	2	-	-	-	-	-	2
Raghav Kapoor	Reviewing Project Guides	-	0.5	-	0.5	-	-	-	1
Raghav Kapoor	Drafting Group Project Plan	0.5	2	0.5	-	1	-	-	4
Raghav Kapoor	Prototyping Experimental Features	0.5	0.5	0.5	0.5	0.5			2.5
Si Thu Zaw	Reviewing Project Guides	0.5	0.5	-	-	-	-	1	2
Si Thu Zaw	Project Planning	0.5	2	-	-	-	1	2	5.5
Si Thu Zaw	Researching application features	1.5	-	-	-	-	2	-	3.5
Si Thu Zaw	Application: Login Systems	-	-	-	2.5	-	1.5	-	4
Tapan Thakar	Drafting Minutes of meeting document	-	3	-	-	-	-	-	3
Tapan Thakar	Drafting Group Project Plan	-	2	-	-	1	-	-	3
Yang Chen	Homepage design			0.5					0.5
Yang Chen	Drafting Group Project Plan	-	1	-	-	-	-	-	1
Total/ day		3.5	13.5	1.5	3.5	2.5	4.5	3	32



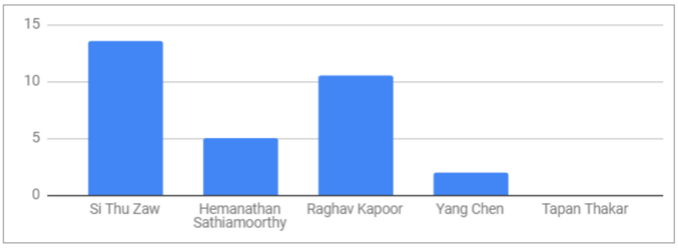
C.5 Week 6

Group A						Timeframe:	Week 6 29/10/18 - 04/11/18		
Member	**Task**	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**	**Sun**	**Total hours worked**
Hemanathan Sathiamoorthy	Researching and Writing Development Methologies	1	1	1	1	-	-	-	4
Raghav Kapoor	Designing Group Project Poster	1	0.5	1.5	1	-	-	-	4
Raghav Kapoor	Reviewing Project Guides	1	0.5	0.5	1	0.5	-	-	3.5
Raghav Kapoor	Writing Project Report	0.5	1	-	-	1.5	-	-	3
Raghav Kapoor	Prototyping Experimental Features	-	-	-	-	1	-	-	1
Si Thu Zaw	Application Development - Database	1.5	2	2	2	2	1.5	1	12
Si Thu Zaw	Assisting in Project Poster Design	0.5	1	1	1	1	-	-	4.5
Tapan Thakar	Drafting Minutes of meeting document	2	2	3	-	-	-	-	7
Yang Chen	Homepage design	1	0.5	-	-	-	-	-	1.5
	Total/ day	8.5	8.5	9	6	6	1.5	1	40.5



C.6 Week 7

Group A						Timeframe:	Week 7 05/11/18 - 11/11/18		
Member	**Task**	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**	**Sun**	**Total hours worked**
Si Thu Zaw	Application Development	1.5	0.5	2	1.5	-	-	1	6.5
Si Thu Zaw	Group Project Documents	0.5	-	-	0.5	1	1	1.5	4.5
Si Thu Zaw	System Modelling	-	-	-	-	0.5	2	-	2.5
Hemanathan Sathiamoorthy	Researching and Writing UML	1	1	1	1	1			5
Raghav Kapoor	Reviewing Project Guides	0.5	0.5	1	-	-			2
Raghav Kapoor	Writing Project Report	1	1.5	0.5	-	1			4
Raghav Kapoor	Developing Functions: Clients, Expenses	-	0.5	1.5	2	0.5			4.5
Yang Chen	Homepage design		1		1				2
Tapan Thakar	(Away on leave)	-	-	-	-	-	-	-	0
	Total/ day	4.5	5	6	6	4	3	2.5	



Si Thu Zaw (T7177793)
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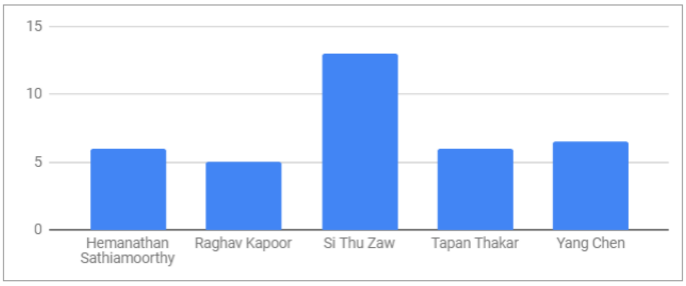
Hemanathan S/O Sathiamoorthy (T7322656)

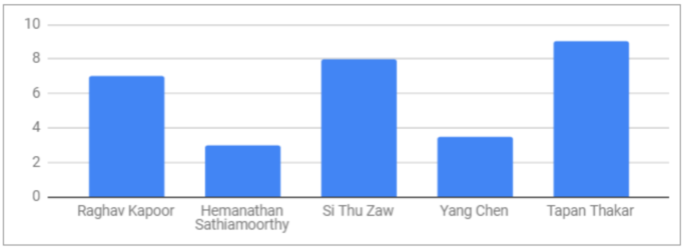
C.7 Week 8

Group A					Timeframe:		Week 8 12/11/18 - 18/11/18		
Member	**Task**	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**	**Sun**	**Total hours worked**
Hemanathan Sathiamoorthy	Reasearching and Writing Competitor Analysis	1	1	1	1	1	1		6
Raghav Kapoor	Writing User Stories	0.5	0.5	-	-	-			1
Raghav Kapoor	Writing Project Report	-	0.5	0.5	-	-			1
Raghav Kapoor	Writing Project Poster Content	1	1	1	-	-			3
Si Thu Zaw	Application Development	2	3		2.5		1.5	2.5	11.5
Si Thu Zaw	Drawing Site Map	-	-	-	-	-	-	1.5	1.5
Tapan Thakar	Drafting Minutes of meeting document	-	-	3	3	-	-	-	6
Yang Chen	Estimate Template	1	1	1	1	1	1	0.5	6.5
	Total/ day	5.5	7	6.5	7.5	2	3.5	4.5	



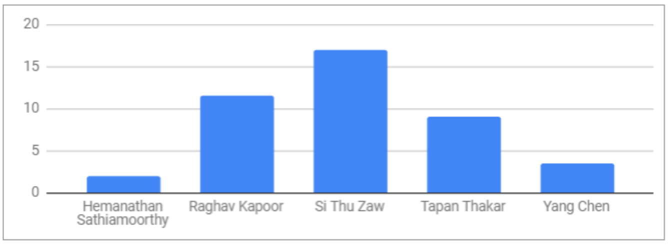
C.8 Week 9

Group A					Timeframe:		Week 9 19/11/18 - 25/11/18		
Member	**Task**	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**	**Sun**	**Total hours worked**
Raghav Kapoor	Writing Project Poster Content	1	0.5	0.5	1	-	-	-	3
Raghav Kapoor	Designing Project Poster	-	1	2	-	-	-	-	3
Raghav Kapoor	Writing Project Report	-	-	-	-	1	-	-	1
Hemanathan Sathiamoorthy	Writing Privacy Policy, Contact Us, About Us	1	-	1	-	1	-	-	3
Si Thu Zaw	SimpleBooks Application	1.5	2	-	2.5	2	-	-	8
Yang Chen	Invoice Template	1	-	2	-	0.5	-	-	3.5
Tapan Thakar	Drafting Minutes of meeting document	3	-	3	-	-	-	-	6
Tapan Thakar	Drawing Site Wireframes	1	1	-	-	1	-	-	3
	Total/ day	8.5	4.5	8.5	3.5	5.5	0	0	



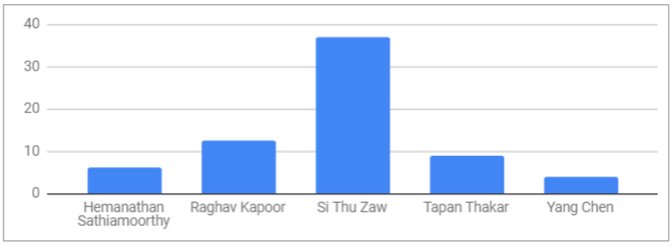
C.9 Week 10

Group A					Timeframe:		Week 10 26/11/18 - 02/12/18		
Member	**Task**	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**	**Sun**	**Total hours worked**
Hemanathan Sathiamoorthy	Creating Privacy Policy, Contact Us, About Us in app	1	-	1	-	-	-	-	2
Raghav Kapoor	Writing Project Report	2	1	1	1.5	0.5	1	-	7
Raghav Kapoor	Developing Functions: Projects, Estimates, Invoices	0.5	-	1	1	0.5	-	-	3
Raghav Kapoor	Planning Poster Presentation	-	1	0.5	-	-	-	-	1.5
Si Thu Zaw	Drawing Schema	0.5	0.5	1.5	-	1.5	-	-	4
Si Thu Zaw	Application Development	2	1	2	1	-	-	-	6
Si Thu Zaw	Writing Project Report	2	1	2	2	-	-	-	7
Tapan Thakar	Drafting Minutes of meeting document	3	-	3	-	-	-	-	6
Tapan Thakar	Drawing User Wireframes	1	1	-	1	-	-	-	3
Yang Chen	Debuging Slider And Template	1	1	-	1	-	0.5	-	3.5
	Total/ day	13	6.5	12	7.5	2.5	1.5	0	



C.10 Week 11

Group A					Timeframe:		Week 11 03/12/18 - 09/12/18		
Member	**Task**	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**	**Sun**	**Total hours worked**
Hemanathan Sathiamoorthy	Researching and Writing Project Report	1	1	1	1	1	1	-	6
Raghav Kapoor	Writing Project Report	1	1	1	1	0.5	-	1	5.5
Raghav Kapoor	Developing Function: In-App Emailing	1	1	3	1	1	-	-	7
Si Thu Zaw	Writing Project Report	2	1	1	2	2	1	2	11
Si Thu Zaw	Drawing UML Diagrams	3	3	-	1	2	-	-	9
Si Thu Zaw	Application Development	2	2	1	3	3	2	4	17
Tapan Thakar	Drafting Minutes of meeting document	3	3	-	-	-	-	-	6
Tapan Thakar	Drawing Admin Wireframes	1	1	-	-	-	-	1	3
Yang Chen	Registration wizard UI improvements	1	1	0.5	-	-	-	-	2.5
Yang Chen	Fix (debug) Template	1	0.5	-	-	-	-	-	1.5
	Total/ day	16	14.5	7.5	9	9.5	4	8	



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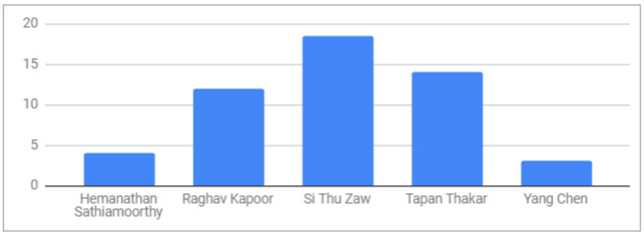
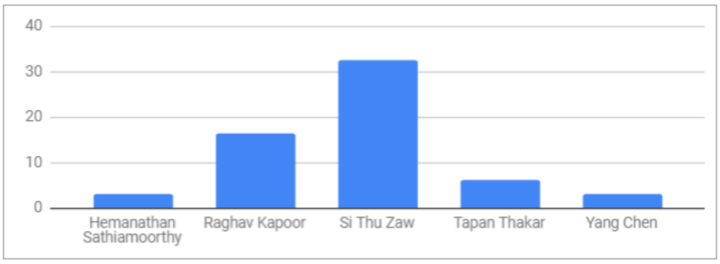
C.11 Week 12

Group A					Timeframe:	Week 12 10/12/18 - 16/12/18			
Member	**Task**	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**	**Sun**	**Total hours worked**
Hemanathan Sathiamoorthy	Writing Project Report	1	-	1	1	1	-	-	4
Raghav Kapoor	Writing Project Report	1	1.5	1.5	3	2	-	-	9
Raghav Kapoor	Developing Functions: In-App Emailing, Invoice Payments	1	-	1	-	1	-	-	3
Si Thu Zaw	Application Development - Emailing, Invoices/Estimates	2	3	-	4	2	-	-	11
Si Thu Zaw	Report Writing	2	1.5	-	2	2	-	-	7.5
Tapan Thakar	Drafting Minutes of meeting document	-	3	3	3	-	-	-	9
Tapan Thakar	Editing Micro-flows	2	1	-	-	-	-	-	3
Tapan Thakar	Mobile application UI Improvements	-	-	2	-	-	-	-	2
Yang Chen	Mobile application	1	-	1	-	1	-	-	3
Total/ day		10	10	9.5	13	9	0	0	



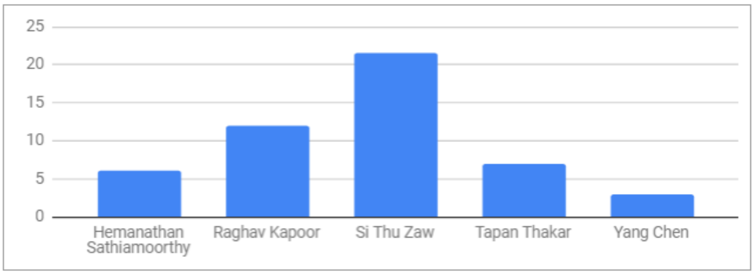
C.12 Week 13

Group A					Timeframe:	Week 13 17/12/18 - 23/12/18			
Member	**Task**	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**	**Sun**	**Total hours worked**
Hemanathan Sathiai	Writing group report	0.5	0.5	0.5	0.5	1	-	-	3
Raghav Kapoor	Writing Group Report	1	-	0.5	0.5	-	-	-	2
Raghav Kapoor	Application: Field validation	-	-	-	-	2	-	-	2
Raghav Kapoor	Planning Product Presentation	0.5	1	-	-	1.5	-	-	3
Raghav Kapoor	Application Testing	-	-	0.5	1	1.5	0.5	6	9.5
Si Thu Zaw	Writing Group Report	3.5	1	1.5	1.5	3	-	2.5	13
Si Thu Zaw	Application Development	0.5	1	2	0.5	0.5	-	0.5	5
Si Thu Zaw	Report Formatting	2	3	1	1.5	3	2	2	14.5
Tapan Thakar	Drafting Minutes of meeting document	-	3	-	-	-	-	-	3
Tapan Thakar	Mobile application UI Improvements	-	-	2	1	-	-	-	3
Yang Chen	Writing group report	-	-	2	-	-	-	-	2
Yang Chen	Preparing product presentation	-	-	-	-	1	-	-	1
Total/ day		8	9.5	10	6.5	13.5	2.5	11	



C.13 Week 14

Group A						Timeframe:	Week 14 24/12/18 - 30/12/18		
Member	Task	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Total hours worked
Hemanathan	Preparing for presenation	-	1	1	3	NA	NA	NA	5
Hemanathan	Slides for presentation	-	1	-	-	NA	NA	NA	1
Raghav Kapo	Writing Group Report	1	-	-	-	NA	NA	NA	1
Raghav Kapo	Planning Product Presentation	1.5	1.5	1.5	1.5	NA	NA	NA	6
Raghav Kapo	Drafting Minutes of meeting document	-	-	3	2	BA	TM	AN	5
Si Thu Zaw	Presentation Planning/ Script Writing	0.5	1.5	1	1	NA	NA	NA	4
Si Thu Zaw	Application Debugging and Polish	-	2.5	2	0.5	NA	NA	NA	5
Si Thu Zaw	Report formatting and polishing	4	1.5	3	4	NA	NA	NA	12.5
Tapan Thakaı	Presentation Script Writing	1	1	1	1	NA	NA	NA	4
Tapan Thakaı	Drafting Minutes of meeting document	-	-	3	-	NA	NA	NA	3
Yang Chen	Preparing product presentation	-	-	3	-	NA	NA	NA	3
Total/ day		8	10	18.5	13	0	0	0	



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Hemanathan S/O Sathiamoorthy (T7322656)

Appendix D: Minutes of Meeting

Group Formation 1/10

1st October 2018 - 03:30 pm to 06:30 pm at LT-A5003

ATTENDEES

Tapan, Raghav, George, Yang Chen, Hemanathan

AGENDA

New Business

- Formation of the group.
- Decision on the group members.

NOTES

- Unique Proposals are expected from each members.
- The application should be suitable for industrial implementation.
- Correct format for both the documents is expected from each member.

ACTION ITEMS

1. Come up with an individual proposal and a resume.

NEXT WEEK'S AGENDA

Finalise and submit the individual proposals and resumes

Si Thu Zaw (T7177793)
Raghav Kapoor (T7184782)
Tapan Thakar (T7318691)
Yang Chen (T7206174)
Hemanathan S/O Sathiamoorthy (T7322656)

Individual Proposals & Resumes Discussion 5/10

05 October 2018 - 08:30 am to 11:30 am at Bell Wing cafeteria

ATTENDEES

Tapan, Raghav, George, Yang Chen

ABSENTEES

Hemanathan

AGENDA

Last Meeting Follow-up

1. Update on all member's Individual Proposals and resumes

New Business

- Update on the format for the Individual Proposal
- Update on the timesheet

ACTION ITEMS

1. **All the proposals and resumes must be in standard format and must be submitted by the next class to the secretary.**

NEXT WEEK'S AGENDA

Decision on the final proposal and roles for each members.

Si Thu Zaw (T7177793)
Raghav Kapoor (T7184782)
Tapan Thakar (T7318691)
Yang Chen (T7206174)
Hemanathan S/O Sathiamoorthy (T7322656)

Individual Proposals & Resumes Submission 8/10

08 October 2018 - 03:30 pm to 06:30 pm at CL-D6041

ATTENDEES

Tapan, Raghav, George, Yang Chen, Hemanathan

AGENDA

Last Meeting Follow-up

- All the members have updated their proposals to the standard format as directed

New Business

- Decision is to be made on what project is to be done.

NOTES

All the members presented their proposals to the lecturer and other members

ACTION ITEMS

Decision to be made regarding what project is to be chosen

NEXT WEEK'S AGENDA

Given that group proposal is approved, discuss detailed list of features for the application.

Group Project Topic Finalisation 10/10

10 October 2018 - 12:15 pm to 03:15 pm at LR-A6011

ATTENDEES

Tapan, Raghav, George, Yang Chen, Hemanathan

AGENDA

Last Meeting Follow-up

1. Report on testing of functions for prototyped apps.

New Business

- List out pros and cons of each project
- Make final decision on which individual project proposal to work on.

NOTES

After elaborate discussions top 3 proposals were chosen as follows:

1. SimpleBooks Accounting software by George
2. VidFlix Video streaming and rental services by Raghav
3. Restaurant management system by Yang Chen

ACTION ITEMS

1. Start work on typing out the Final Proposal document.

NEXT WEEK'S AGENDA

Given that group proposal is approved, discuss detailed list of features for the application.

Si Thu Zaw (T7177793)
Raghav Kapoor (T7184782)
Tapan Thakar (T7318691)
Yang Chen (T7206174)
Hemanathan S/O Sathiamoorthy (T7322656)

SimpleBooks

Final Proposal Discussion 11/10

11 October 2018 - 02:00 pm to 05:00 pm at Bell Wing cafeteria

ATTENDEES

Raghav, George, Yang Chen, Hemanathan

APOLOGIES

Tapan

AGENDA

Last Meeting Follow-up

1. Top 3 proposals are to be reviewed.

New Business

- Final Group Topic is to be selected.
- Members are to be assigned on what documents to complete.
  - Timesheet
  - Project Activity Logs

ACTION ITEMS

1. Complete the Final Proposal and the Project specification

NEXT WEEK'S AGENDA

Final Proposal and Project Specification to be completed.

SimpleBooks

Final Proposal Finalisation 15/10

15 October 2018 - 03:30 pm to 06:30 pm at CL-D6041

ATTENDEES

Tapan, Raghav, George, Yang Chen, Hemanathan

AGENDA

Last Meeting Follow-up

1. Review of the Final Proposal and Project Specification.

New Business

- Form the development schedule of the project.

ACTION ITEMS

1. **Update the timesheet, Minutes of meeting and Project Activity Log**

NEXT WEEK'S AGENDA

Assign roles to every member and start working on the Project Plan.

Si Thu Zaw (T7177793)
Raghav Kapoor (T7184782)
Tapan Thakar (T7318691)
Yang Chen (T7206174)
Hemanathan S/O Sathiamoorthy (T7322656)

SimpleBooks

Drafting the Project Plan 23/10

23 October 2018 - 03:30 pm to 06:30 pm at CL-D6041

ATTENDEES

Tapan, Raghav, George, Yang Chen, Hemanathan

AGENDA

Last Meeting Follow-up

1. All the Documents were up to date.

New Business

- Develop the Project Plan.

NOTES

- Various templates for the project plan were considered.

ACTION ITEMS

1. Update the timesheet, Minutes of meeting and Project Activity Log
2. Roles were assigned to each members.

NEXT WEEK'S AGENDA

Draft the final Project Plan.

Si Thu Zaw (T7177793)
Raghav Kapoor (T7184782)
Tapan Thakar (T7318691)
Yang Chen (T7206174)
Hemanathan S/O Sathiamoorthy (T7322656)

SimpleBooks

Project Plan Finalisation 29/10

29 October 2018 - 03:30 pm to 06:30 pm at CL-D6041

ATTENDEES

Tapan, Raghav, George, Yang Chen, Hemanathan

AGENDA

Last Meeting Follow-up

1. Further discussions were done on the Project Plan Document.

New Business

- Start working on the application and work on the methodologies to adopt.
- Work on the enterprise project poster.

NOTES

- SCRUM methodology was finalised to be used.
- Various Designs were considered for the poster.

ACTION ITEMS

1. Update the timesheet, Minutes of meeting and Project Activity Log.
2. Review the Project Plan.

NEXT WEEK'S AGENDA

Finalise the content for the Poster

Si Thu Zaw (T7177793)
Raghav Kapoor (T7184782)
Tapan Thakar (T7318691)
Yang Chen (T7206174)
Hemanathan S/O Sathiamoorthy (T7322656)

SimpleBooks

Project Poster Discussion 31/10

31 October 2018 - 12:15 pm to 03:15 pm at CL-D6042

ATTENDEES

Raghav, George, Yang Chen, Hemanathan

APOLOGIES

Tapan

AGENDA

Last Meeting Follow-up

1. Design of a basic project poster is in progress.
2. The project plan has been finalised.

New Business

- Complete the basic poster design.
- Start work on the group report.

NOTES

- Headings were collated together for the report.
- A custom design was created for the poster.

ACTION ITEMS

1. A refined list of headings to be created for the report.

NEXT WEEK'S AGENDA

Beautify the poster design to give a better look.

Si Thu Zaw (T7177793)
Raghav Kapoor (T7184782)
Tapan Thakar (T7318691)
Yang Chen (T7206174)
Hemanathan S/O Sathiamoorthy (T7322656)

SimpleBooks

Project Report & Poster Planning 09/11

09 November 2018 - 03:15 pm to 04:00 pm at LR-C1015

ATTENDEES

Raghav, Si Thu Zaw, Yang Chen, Hemanathan

APOLOGIES

Tapan

AGENDA

Last Meeting Follow-up

1. Status report on the previous tasks assigned.
2. The headings have been condensed into an optimised format.

New Business

- Begin with writing introductory content on the report.
- Start writing content for the project poster.
- Begin writing user stories for the application.

NOTES

- **A primary set of user stories was written.**
- **Introduction section written on the report.**

ACTION ITEMS

1. **Writing "CASE Tools" section of the report** - Hemanathan
2. **Creating the front page of the application** - Yang Chen
3. **Creating the "Expenses" features of the application** - Si Thu Zaw

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Yang Chen (T7206174)
Hemanathan S/O Sathiamoorthy (T7322656)

SimpleBooks

Poster & Report Discussion 12/11

12 November 2018 - 03:30 pm to 06:30 pm at CL-D6041

ATTENDEES

Tapan, Raghav, George, Yang Chen, Hemanathan

AGENDA

Last Meeting Follow-up

1. Introduction section of the report is in progress.
2. Basic poster content is written.

New Business

- Poster content to be detailed.
- Experiment with the document generation feature.

NOTES

- Work to be done on the poster.
- Any more relevant user stories to be written.

ACTION ITEMS

1. Smoothen the written sections of the report.

NEXT WEEK'S AGENDA

Continue writing the report sections and improve on the poster content.

SimpleBooks

Project Analysis & Design Discussion 15/11

15 November 2018 - 03:30 pm to 06:30 pm at CL-D6042

ATTENDEES

Tapan, Raghav, George, Yang Chen, Hemanathan

AGENDA

Last Meeting Follow-up

1. Introduction section on report completed.
2. Content for the project poster is in progress.
3. User stories are being added for the application.

New Business

- Start creating the estimate template for the application.
- Draw a site map for the application.

NOTES

- Work was done on the estimate document template.
- A simple site map was created.

ACTION ITEMS

1. Poster content to be completed as soon as possible.
2. User stories to be inserted as per functions.

Si Thu Zaw (T7177793)
Raghav Kapoor (T7184782)
Tapan Thakar (T7318691)
Yang Chen (T7206174)
Hemanathan S/O Sathiamoorthy (T7322656)

SimpleBooks

Project Poster Design Update 19/11

19 November 2018 - 03:30 pm to 06:30 pm at CL-D6041

ATTENDEES

Tapan, Raghav, George, Yang Chen, Hemanathan

AGENDA

Last Meeting Follow-up

1. More user stories added to application.
2. Site information pages content has been inserted.
3. Invoice document template has been made.

New Business

- Create an upgraded design of the poster.
- Write analysis, design and implementation sections on the poster.

NOTES

- New poster design to be completed.
- More development-related content to be written on the poster.

ACTION ITEMS

1. Report sections of Development Methodology to be refined

NEXT WEEK'S AGENDA

Write under the Development Platform section on the report.

SimpleBooks

Project Invoice & Poster Discussion 21/11

21 November 2018 - 03:30 pm to 06:30 pm at CL-D6042

ATTENDEES

Tapan, Raghav, George, Yang Chen, Hemanathan

AGENDA

Last Meeting Follow-up

1. Development Platform section writing in progress.

New Business

- Working on formatting the invoice template.
- Creating a fresh design for the poster.

NOTES

- Revamped poster to be finished.
- Invoice document template to be smoothened.

ACTION ITEMS

1. Write the Development Platform section on the report.

NEXT WEEK'S AGENDA

Begin drawing the database schema and writing under System Analysis in the report.

SimpleBooks

Project Poster Presentation Preparation 26/11

26 November 2018 - 03:30 pm to 06:30 pm at CL-D6041

ATTENDEES

Tapan, Raghav, George, Yang Chen, Hemanathan

AGENDA

Last Meeting Follow-up

1. The final project poster is ready.

New Business

- Start preparing for the poster presentation.
- Write sections under System Analysis on the report.

NOTES

- More sections to be written on the report.
- The presentation slides for the poster to be finished.

ACTION ITEMS

1. Write user stories for new functions of the application.

NEXT WEEK'S AGENDA

Develop an e-mail system to send generated documents to clients and continue writing the report.

Si Thu Zaw (T7177793)
Raghav Kapoor (T7184782)
Tapan Thakar (T7318691)
Yang Chen (T7206174)
Hemanathan S/O Sathiamoorthy (T7322656)

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Project Analysis & Design Finalisation 28/11

28 November 2018 - 12:15 pm to 06:30 pm at CL-D6042

ATTENDEES

Tapan, Raghav, George, Yang Chen, Hemanathan

AGENDA

Last Meeting Follow-up

1. The poster presentation has been completed.

New Business

- Complete sections of System Analysis on the report.
- Begin writing System Design details on the report.
- Start the email feature on the application.

NOTES

- Continue adding content to the group report.
- E-mail feature to be completed.

ACTION ITEMS

1. Start research on a testing plan for the application.

NEXT WEEK'S AGENDA

Complete the e-mail feature and write under the System Design section on the report.

SimpleBooks

Application UI & Features Development 11/12

11 December 2018 - 09:00 am to 04:00 pm at Bell Wing cafeteria

ATTENDEES

Raghav, George

ABSENTEES

Hemanathan, Yang Chen, Tapan

AGENDA

Last Meeting Follow-up

1. The e-mail system is significantly completed.
2. Main sections under System Design are written in the report.

New Business

- Polish the user interface of the application.
- Develop payments feature on the application.

NOTES

- Research to be continued on testing plan.
- User interface to be smoothened.

ACTION ITEMS

1. Finish up with the e-mail feature.

Si Thu Zaw (T7177793)
Raghav Kapoor (T7184782)
Tapan Thakar (T7318691)
Yang Chen (T7206174)
Hemanathan S/O Sathiamoorthy (T7322656)

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Application Guides Discussion 13/12

13 December 2018 - 12:15 pm to 03:15 pm at CL-D6042

ATTENDEES

Tapan, Raghav, George, Yang Chen, Hemanathan

AGENDA

Last Meeting Follow-up

1. Payments feature development is in progress.
2. The e-mail feature is fully completed.

New Business

- Begin writing User Guides section on the report.

NOTES

- User and Admin guides to be written.

ACTION ITEMS

1. Finish the payments feature on the application.

NEXT WEEK'S AGENDA

Write the Testing Methodology section of the report and conduct application testing.

SimpleBooks

Project Finalisation and Presentation Discussion 18/12

18 December 2018 - 12:15 pm to 03:15 pm at CL-D6041

ATTENDEES

Tapan, Raghav, George, Yang Chen, Hemanathan

AGENDA

Last Meeting Follow-up

1. User Guides section on the report is in progress.
2. Payment feature in the application is completed.

New Business

- Make improvements in the mobile application UI.
- Add charts and other calculations in the application
- Complete the User Guides.
- Start working on the product presentation.

NOTES

- Final improvements are to be made to the application.

ACTION ITEMS

1. **Complete all the features for the application.**
2. **Complete the project reports.**
3. **Complete Product Testing.**

NEXT WEEK'S AGENDA

Work on the Product Presentation.

Si Thu Zaw (T7177793)
Raghav Kapoor (T7184782)
Tapan Thakar (T7318691)
Yang Chen (T7206174)
Hemanathan S/O Sathiamoorthy (T7322656)

SimpleBooks

Project Presentation Finalisation 26/12

26 December 2018 - 12:15 pm to 03:15 pm at CL-D6041

ATTENDEES

Tapan, Raghav, George, Yang Chen, Hemanathan

AGENDA

Last Meeting Follow-up

1. User guides have been completed.
2. Mobile application UI has been Updated and fixed.
3. All application Features have been added.

New Business

- Finish the Product Presentation.
- Work on Project Activity Logs.

NOTES

- Presentation should be concise.

ACTION ITEMS

1. Do rehearsals for the Product Presentation.
2. Work on PAL's and individual reports.

NEXT WEEK'S AGENDA

Complete Project Activity Logs, Critical reviews and Individual Reports for every Group Members.