Requirements Analysis and Architecture Design

for

Small Business Management Application

Version 1.0 approved

Prepared by,

Kaley Kaukinen (6278667), Dylan Souvage (6096101), Keenan Brab (5862990), Andrew Kornelsen (6401145), Ryan Montminy (6171235)

Team Fireball, Brock University

February 7, 2021

Table of Contents

Table of Contents ..... **ii**
1. Introduction **1**
1.1 Purpose 1
1.2 Document Conventions 1
2. Overall Description **1**
2.1 Product Perspective 1
2.2 Product Functions 1
2.3 Deployment Characteristics 2
2.4 Operating Environment 2
2.5 User Documentation 2
2.6 Assumptions and Dependencies 2
3. External Interface Requirements **2**
3.1 User Interfaces 2
3.2 Hardware Interfaces 3
3.3 Software Interfaces 3
3.4 Communications Interfaces 3
4. System Features **3**
4.1 Log In 3
4.2 Clientele 4
4.3 Finances 4
4.4 Statistics 4
4.5 Products/Services 5
4.6 Orders and Fulfillment 5
4.7 Documents 6
4.8 Employees 6
5. Other Nonfunctional Requirements **6**
5.1 Performance Requirements 6
5.2 Safety Requirements 7
5.3 Security Requirements 7
5.4 Software Quality Attributes 7
6. Other Requirements **8**
Appendix A: Analysis Models, Diagrams, and UI **8**
Class Diagram 9
Login Sequence Diagram 10
Registration Sequence Diagram 11
Add Client Sequence Diagram 12
Add Order Sequence Diagram 13
Use Case Diagram 14
ER Diagram 15
Deployment Diagram 16
User Interface 17

1. Introduction

1.1 Purpose

The purpose of this document is to detail the requirements and restrictions that the application will require and be constrained by. This will include any technical, procedural, or legislative requirements that must be met by the software for it to be properly used by the client base.

1.2 Document Conventions

Every requirement has its own priority. Order or category listed in this document does not denote significant importance. Priority of requirements is listed on a scale from 1-9, 1 being the lowest priority, and 9 being the highest priority. Users are assumed to be business owners using the system to keep track of their independent or small business.

2. Overall Description

2.1 Product Perspective

This product is a new self-contained product. It is not meant as a replacement or a small part of a bigger system. It is targeted towards small business owners with teams varying from one to many. The expectation of this product is to provide small business owners a tool to oversee all aspects of their workflow in one place, without the need of multiple solutions. With the utilization of web technologies, this application is available on both desktop and mobile devices, allowing the client to check on their business anywhere, anytime. Main features include, statistical reports, financial management, customer/order database, inventory tracking, and e-commerce integration.

2.2 Product Functions

This product is meant to be used as an aid for small business owners, by offering data management and tools for day to day business functions. This includes:

- Account creation for each user
- Home dashboard for displaying new items/notifications to the user
- Clientele management
- Finance Management
- Statistical analysis of sales, new clients, or revenue
- Product/Service management
- Order and Fulfillment
- Financial report generation and Document storage
- Employee management

2.3 Deployment Characteristics

The application will be hosted on the cloud via Microsoft Azure, the server, if it detects a web browser, will send a front end client to interact with the service, however it is an open endpoint and can be integrated to other applications, thus any software can use the application. The interface to the database, and the DB will be Azure SQL also hosted on Azure.

Refer to figure [1] in Appendix A for a class diagram of the product.

2.4 Operating Environment

To facilitate ease of development, the system will be developed using React as a frontend framework, with ASP .NET as the backend. These were chosen for the level of recognition with the development team, and for the level of documentation and functionality available to assist in the creation of the application.

2.5 User Documentation

The solution will include help pages and in workflow tutorials, with detailed instructions on all aspects of the application. All information will be easily accessible on the site via an always visible help redirect sitewide. Documentation will include but is not limited to; how to get started, adding customers, adding orders, running reports, and checking financials. In workflow tutorials will be designed to assist the user with initial setup only. They will recommend where to find additional information if needed.

2.6 Assumptions and Dependencies

The application will be interfaced through web browsers, examples of such include chrome, edge, Firefox, and mobile web browsers. The application will be following respective http protocols for API services. SQL connection between the Azure SQL DB and ASP.NET web application will be facilitated by the Entity Framework Core (EF Core) and SQL drivers.

3. External Interface Requirements

3.1 User Interfaces

The user interface of the product has some consistent elements across many pages. This includes:

- A side navigation bar to access each page/feature
- Logout button in the top right corner of every page
- Modals for adding custom objects to the page
- Drop down tables to select time frames for statistical analysis and financial information
- Drop down tables to sort elements by most recent, oldest
- Search bar to easily locate objects with a similar characteristic or name

Please refer to figure [8] in appendix A to see the user interface.

3.2 Hardware Interfaces

The system should not be impacted based on the hardware that the user is operating on, as the machine they are using should not be a concern for them. As such, any input peripherals they have with their current setup should perform their usual function without issue when using the application, and output peripherals should also be able to function normally. When attempting to add a scanned item or image to the system, the user will have the option to browse their machine in order to select the desired image from their directory. This image will then be stored on the file server, and the new directory stored in the database for easy access when needed.

3.3 Software Interfaces

Software dependencies on external technologies used by our system will include:

- Visual Studio 2019 and ASP.NET Core MVC
- SQL Server
- ReactJS.NET
- React Material UI
- Azure app service
- Azure SQL Database
- Azure Devops
- Git

3.4 Communications Interfaces

The application will be hosted on Azure and will be accepting REST over HTTPS. It will then internally operate on buckets and the database using REST over HTTPS, but internally.

4. System Features

4.1 Log In

4.1.1 Description and Priority

Within the system, users will be able to create and account so that they will be able to easily store and access their relevant information. This is a high priority feature with a rank of 9.

4.1.2 Stimulus/Response Sequences

When the user opens the application in their browser, they will be prompted to log in. New users will be able to create an account.

4.1.3 Functional Requirements

REQ-1: Implement OAuth in order to login with a secure email and allow our system to access relevant information
REQ-2: Prevent user from logging in with invalid or non-existent credentials.
REQ-3: Multifactor authentication to further enhance security.
REQ-4: Users must prove they are human before being able to create an account.
REQ-5: Duplicate accounts with the same username/email cannot be created.

4.2 Clientele

4.1.1 Description and Priority

This feature is for keeping track of existing clients and adding new ones to the business. It is meant to keep track of relevant client information such as names, contact information, shipping addresses, and order history. This is a high priority item with a rank of 8.

4.1.2 Stimulus/Response Sequences

The add button will prompt a modal for ability to add new clients. There will be a search bar to find clients by ID or relevant search information.

4.1.3 Functional Requirements

REQ-1: Must be able to archive information for long term storage of clients.
REQ-2: Backup recovery to ensure no client data is lost in event of crash or transaction failure.
REQ-3: Search bar for locating clients easier based on user input.
REQ-4: Encryption and security measures to ensure client data is protected in the hands of the business owner.
REQ-5: Duplicates are not allowed, each client has a unique ID.

4.3 Finances

4.1.1 Description and Priority

This feature is for aiding in expense tracking and sales, showing overall revenue on a default monthly basis. This feature will also support report generation monthly. This is a high priority item with a rank of 8.

4.1.2 Stimulus/Response Sequences

The add button will prompt a modal for ability to add new expenses. There will be a scroll bar for the user to see all transaction records of positive and negative amounts.

4.1.3 Functional Requirements

REQ-1: Terms and conditions agreement to ensure all data entered by the user is accurate.
REQ-2: Must be able to archive information for long term storage of transactions.
REQ-3: Backup recovery to ensure no financial data is lost in event of crash or transaction failure.
REQ-4: Ability to generate reports based on the users chosen month.
REQ-5: Ability to print any generated reports.

4.4 Statistics

4.1.1 Description and Priority

The statistics feature of the system is meant to show meaningful data to business owners in the form of a graphic for easy data visualization. Data from other features of the site will be projected as a graph to show monthly, yearly, or all-time stats from sales, new clients, and total revenue. This is a medium priority item with a rank of 5.

4.1.2 Stimulus/Response Sequences

Depending on the time frame and subject matter chosen by the user, a graph will be auto generated for the user to view their own business statistics over time. They will also be able to print the graph if they choose.

4.1.3 Functional Requirements

REQ-1: Proper data collection based on user selected criteria.
REQ-2: Auto generating graphs depending on chosen fields.
REQ-3: Custom graphic for each dynamically generated graph.

4.5 Products/Services

4.1.1 Description and Priority

This feature is meant for the owner to track their quantity/availability of their own products. They can add and edit custom products or services. Users can also add images to each entry. This is a high priority feature with a rank of 8.

4.1.2 Stimulus/Response Sequences

The add button will prompt a modal for ability to add new products or services. There will be a scroll bar for the user to see all existing products added by the user.

4.1.3 Functional Requirements

REQ-1: Ability to add and modify custom products.
REQ-2: Quantity is updated when an order is made, and stock is depleted.
REQ-3: Duplicates are not allowed, each product has a unique ID
REQ-4: Image handling and loading must be done efficiently.
REQ-5: Must be able to archive information for long term storage of products.
REQ-6: Backup recovery to ensure no data is lost in event of crash or transaction failure.
REQ-7: Search bar for locating products easier based on user input.
REQ-8: Filters for sorting entries by quantitative or chronological values.

4.6 Orders and Fulfillment

4.1.1 Description and Priority

This feature is for tracking open orders from clients. It is connected to many other features, Clientele, Finances, and Products/Services. It is a high priority item with a score of 8.

4.1.2 Stimulus/Response Sequences

The user will be able to add new orders, as well as update the status for existing orders to open, in progress, or complete.

4.1.3 Functional Requirements

REQ-1: Ability to add and modify custom orders.
REQ-2: Integration with virtual marketplaces the owner may primarily operate from.
REQ-3: Ability to update order status.
REQ-4: Ability to sort/filter in order of priority to the user.
REQ-5: Must be able to archive information for long term storage of products.
REQ-6: Backup recovery to ensure no data is lost in event of crash or transaction failure.
REQ-7: Data consistency across related pages.

4.7 Documents

4.1.1 Description and Priority

This feature allows users to access any generated reports to view them or reprint. Whether the user can upload their own documents or not is TBD. This is a low/medium priority item with a value of 4.

4.1.2 Stimulus/Response Sequences

Clicking documents will allow the user to download, print, or view them in PDF form. Users can filter documents or search for a specific one.

4.1.3 Functional Requirements

REQ-1: Integration with Finances to upload user generated reports.
REQ-2: Ability to print documents.
REQ-3: Ability to download documents.
REQ 4: Ability to print documents.

4.8 Employees

4.1.1 Description and Priority

This feature allows the user to keep track of any employees and their contact information. This is a low priority item with a value of 3.

4.1.2 Stimulus/Response Sequences

The user can add a new employee along with any contact information using the add button. They can search for existing employees using the search bar.

4.1.3 Functional Requirements

REQ-1: Must be able to archive information for long term storage of employees.
REQ-2: Backup recovery to ensure no client data is lost in event of crash or transaction failure.
REQ-3: Search bar for locating employees easier based on user input.
REQ-4: Encryption and security measures to ensure employee data is protected in the hands of the business owner.
REQ-5: Duplicates are not allowed, each employee has a unique ID.
REQ-6: Ability to remove existing employees.

5. Other Nonfunctional Requirements

5.1 Performance Requirements

Upon first logging into the system, there will be a short delay as the database propagates the user's default settings. From here, loading into new pages should be a quick process as there will not be any information that needs to be displayed to them at this point.

When the user chooses to add new information to the system, either manually or through an image, the information should be stored quickly without major delay to the user.

Should the user build an extensive profile, load times for the clientele section and the data display should slow down upon loading the information due to volume, but not by a significant amount.

Much of the potential issues with loading information can be resolved or mitigated through the proper aggregation of the information in a database view, and then allowing the system to retrieve and sort the information from this collection rather than attempt to perform all these actions at once during the initial load. This information collection should be done upon login so that the user will have all the necessary information at their disposal and will reload should they choose to make any additions.

5.2 Safety Requirements

The system may contain sensitive information about the business owner or their clients that can lead to serious financial and/or legal issues if the information stored within the system is misused or becomes available to unapproved third parties. Proper security measures will be in place through secure account logins to ensure that this sensitive data is not obtained through undesired means.

Since the application is to be designed and operated through a web browser, it will comply with the standards set out in the Web Content Accessibility Guidelines (WCAG) to ensure that the application meets the requirements outlined in the Accessibility Standard for Information and Communications

5.3 Security Requirements

Given the nature of holding sensitive client information, such as first and last names, and expense reports, all sensitive data must be hashed while storing on the database. We will follow typical hashing standards, MD5 (or SHA). All data must be sent using HTTPS rather than HTTP, this is because we don't want plaintext going over the network.

To access the database, e.g. be logged in and use the dashboard functionality or the API endpoint, you must login using OAUTH 2.0, which will be authenticated by Azure, we will be following Azure's recommended security guidelines. All data that is sent to the web server or the database, all database commands, will be sanitized on the client side, as well as sanitized on the server end, before being validated in the database and run.

5.4 Software Quality Attributes

Ease of Use - it should be intuitive how to use the software and should not have a high learning curve.

Simplicity - it should solve the task at hand without over complicating it.

Effectiveness - it should solve the user's needs.

Affordability - it should not be cost intensive to run, and the user should not have to pay for the software initially.

Availability - the software should be able to be used when the user needs to use it, we are using cloud for this purpose.

Maintainability - all code should be maintainable in nature, the code should have proper test coverage and have good documentation, this will help achieve affordability due to long term maintenance costs.

Interoperability - the application should be able to be used via mobile or desktop applications, if they have access to the internet, therefore this application should also have an open endpoint that other software could integrate with.

Customizability - the software should be able to be customized to fit the user need, on a web client it should be able to be changed via the front end, and if the user is a different software application, the endpoint should provide data that allows for customization.

Robustness - the software should not be able to be broke via user input or via the users end.
Scalability - the software should be able to have many users using it at once.

Evolvability - the software will likely grow and change, this will allow for further customization down the line, the software must be designed around this principle of inevitable change.

6. Other Requirements

The system will be developed as a web application that will allow the user to be able to access their account information regardless of what machine or browser they are using. The user should not experience any issues with logging into their account unless there are external issues such as a disrupted internet connection or account authentication. Loading into the application should be a relatively quick operation, and the user should never have to wait for a long period of time while they navigate between the sections of the application. The first time they login or select a new section each session there will likely be a short delay as the system collects all necessary information for that section. For some sections, such as the saving information on clientele, there may be some storage required for the server in order to correctly store saved images, or a file server created and the directories to images stored in the database instead as described in the functional requirements section.

Appendix A: Analysis Models

Figure [1]

Class Diagram of Small Business Management System

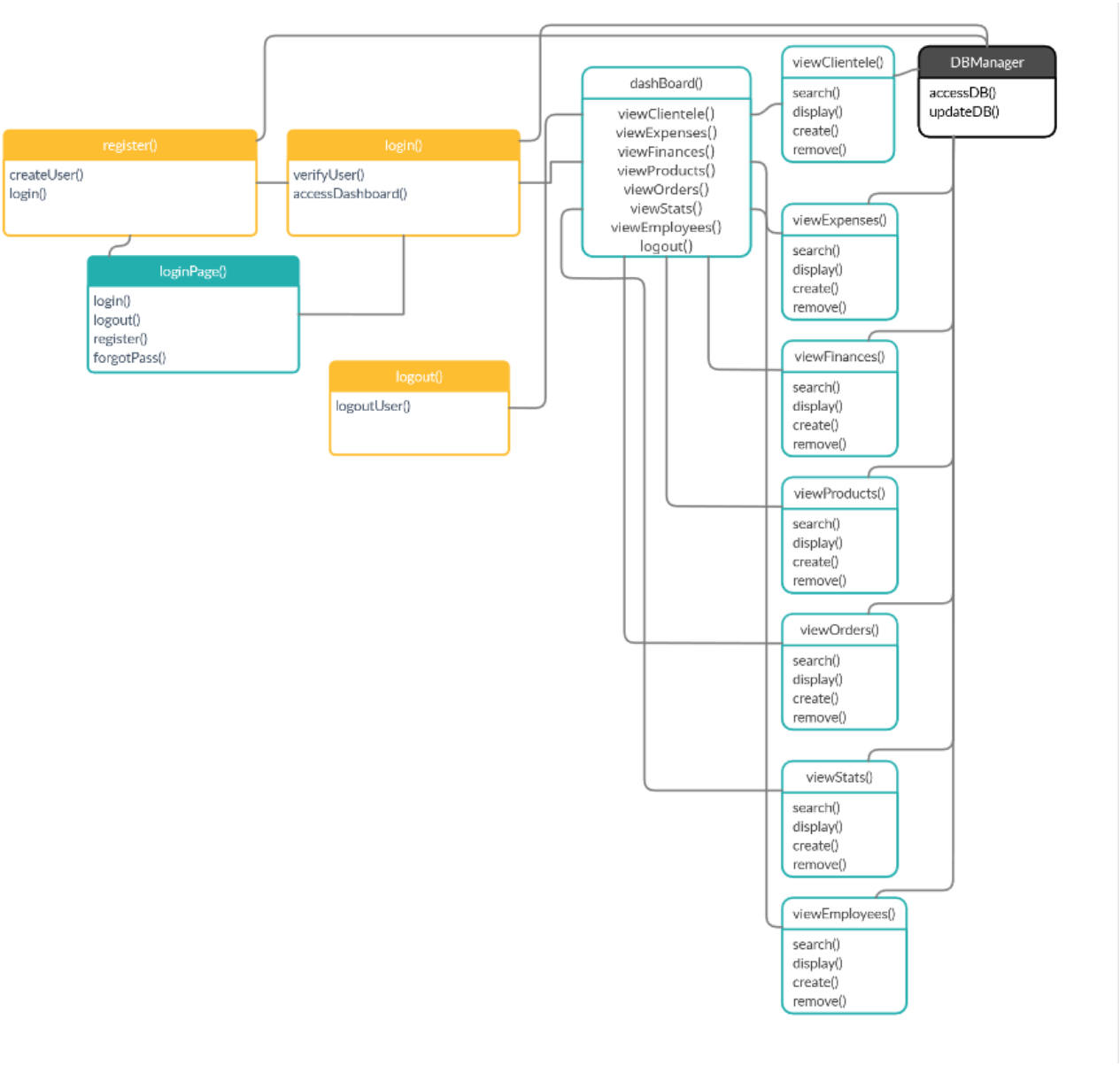
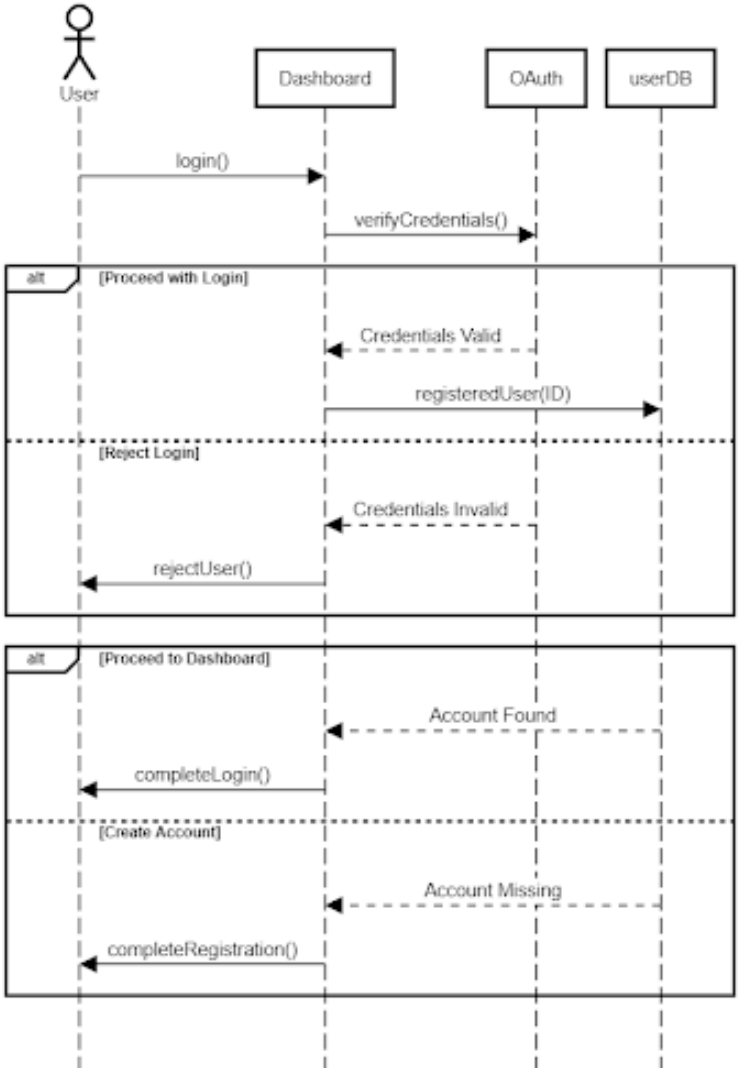


Figure [2]

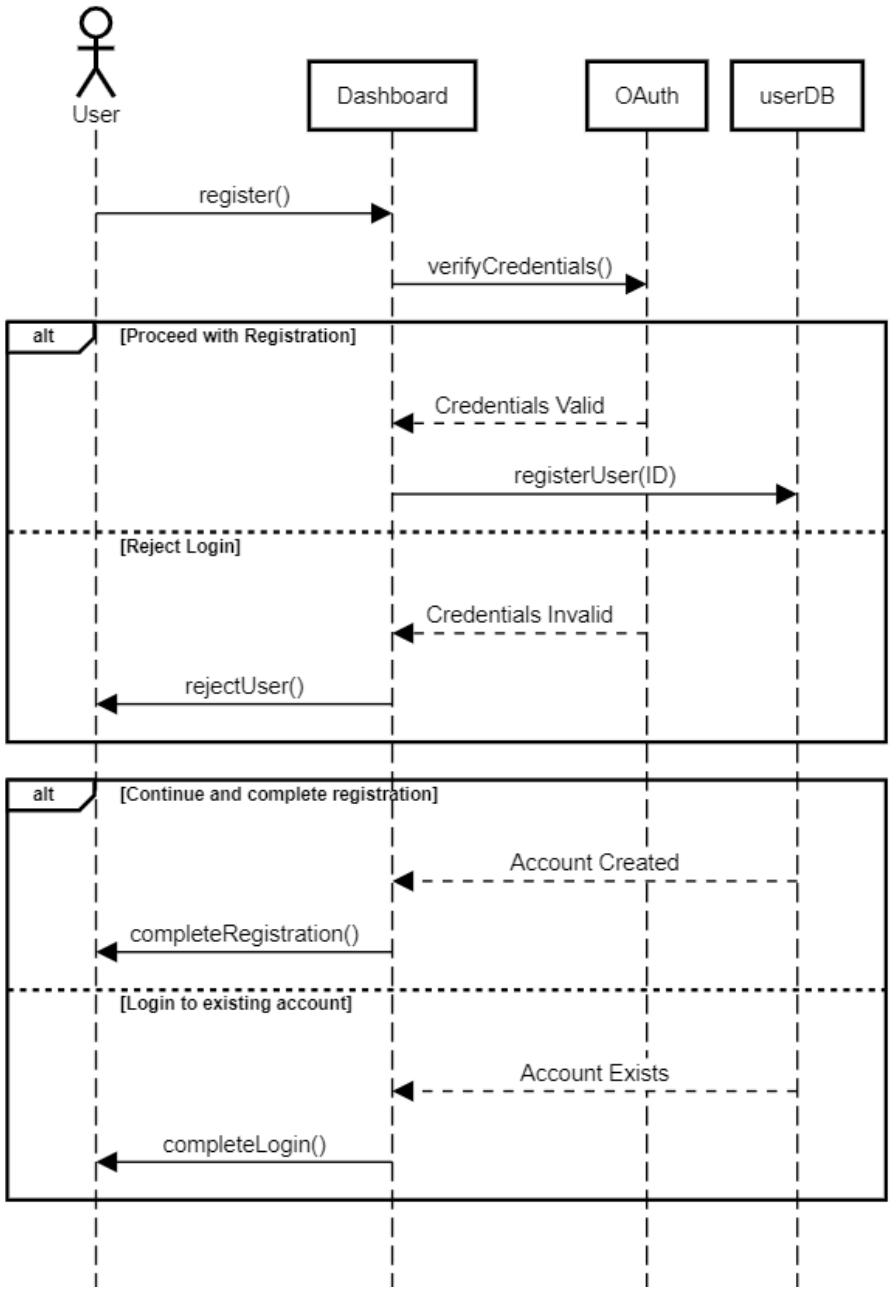
Login Sequence Diagram



Requirements to be considered during the user login process. Open Authentication simplifies the login workflow and dependencies, exceptions outlined include whether the user exists, how to proceed otherwise, or if authentication fails.

Figure [2.2]

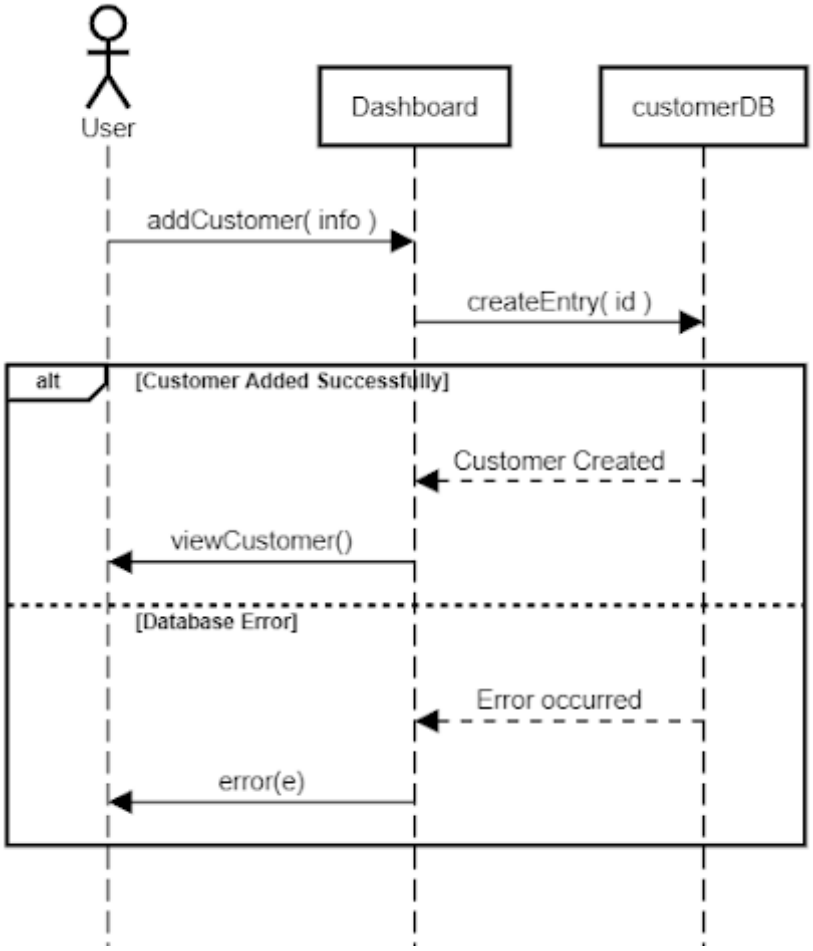
Registration Sequence Diagram



Requirements to be considered during the user registration process. Open Authentication simplifies the registration with ability to use existing accounts from popular platforms and superior security. Exceptions outlined include if the user already exists, and authentication failures.

Figure [3]

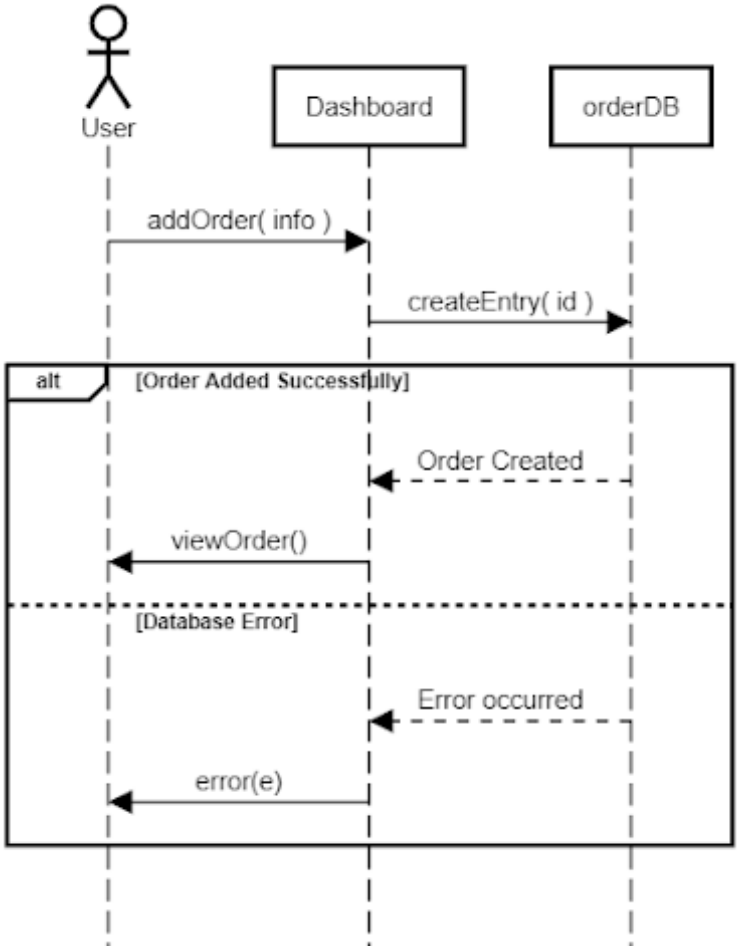
Add Client Sequence Diagram



Outlines the requirements and process involved for a user to add a new customer to the application and anticipate potential database errors.

Figure [4]

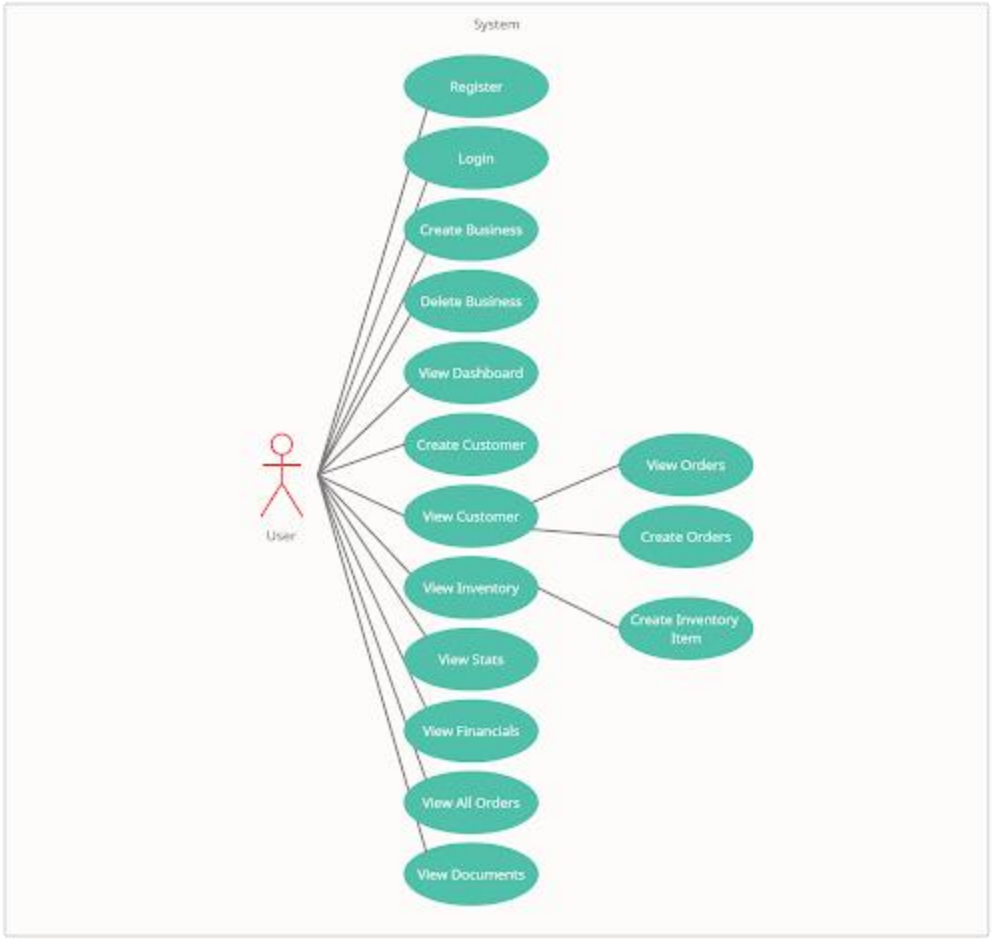
Add Order Sequence Diagram



Outlines the requirements and process involved for a user to add a new order to the application and anticipate potential database errors.

Figure [5]

Use Case Diagram



Outlines all high-level actions the user can perform. Our requirements have discovered the need for only one user at this time, leaving the only interactions being performed are individual and require no additional permissions.

Figure [6]

ER Diagram, Database Schema

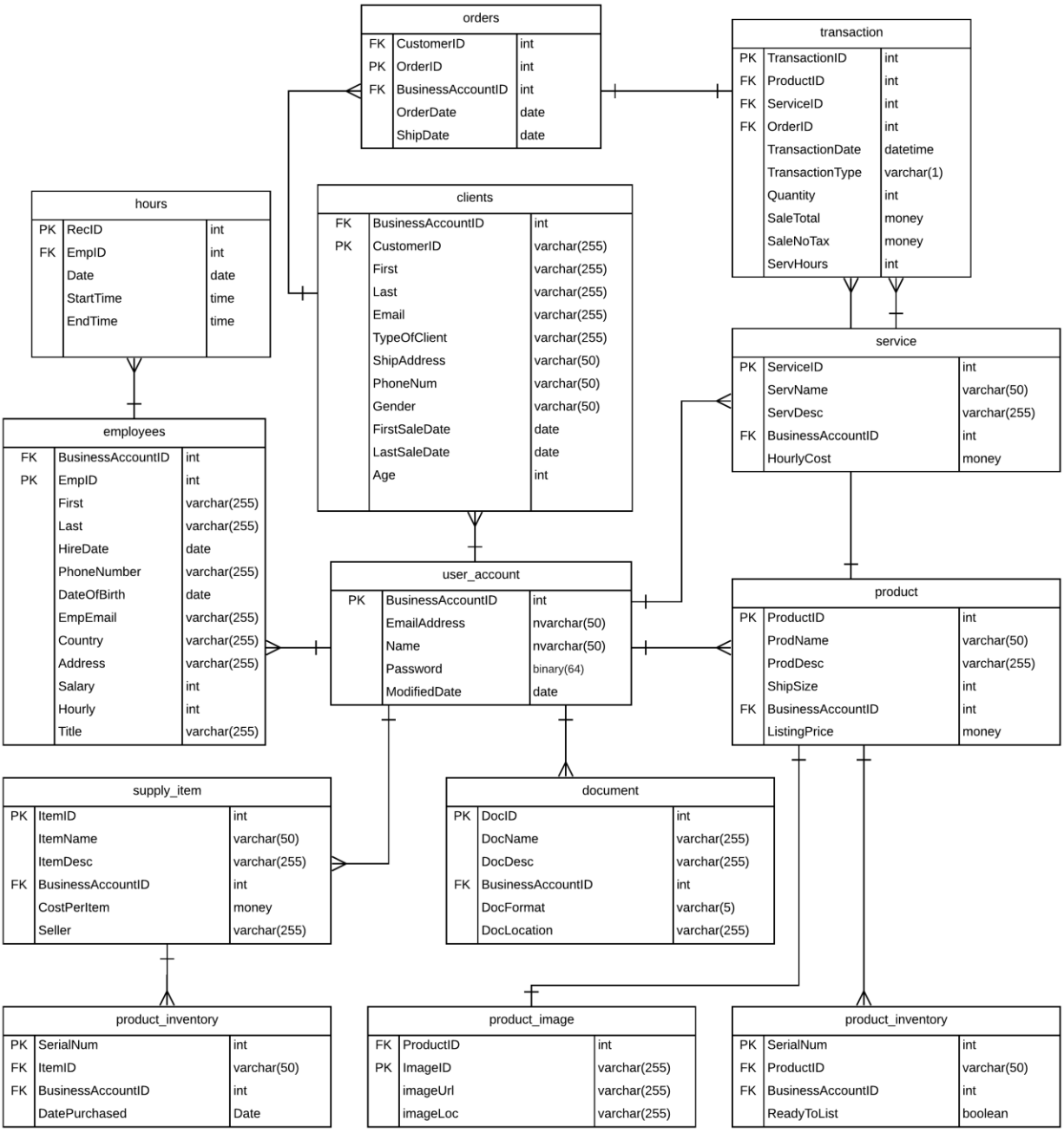


Figure [7]

Deployment Diagram

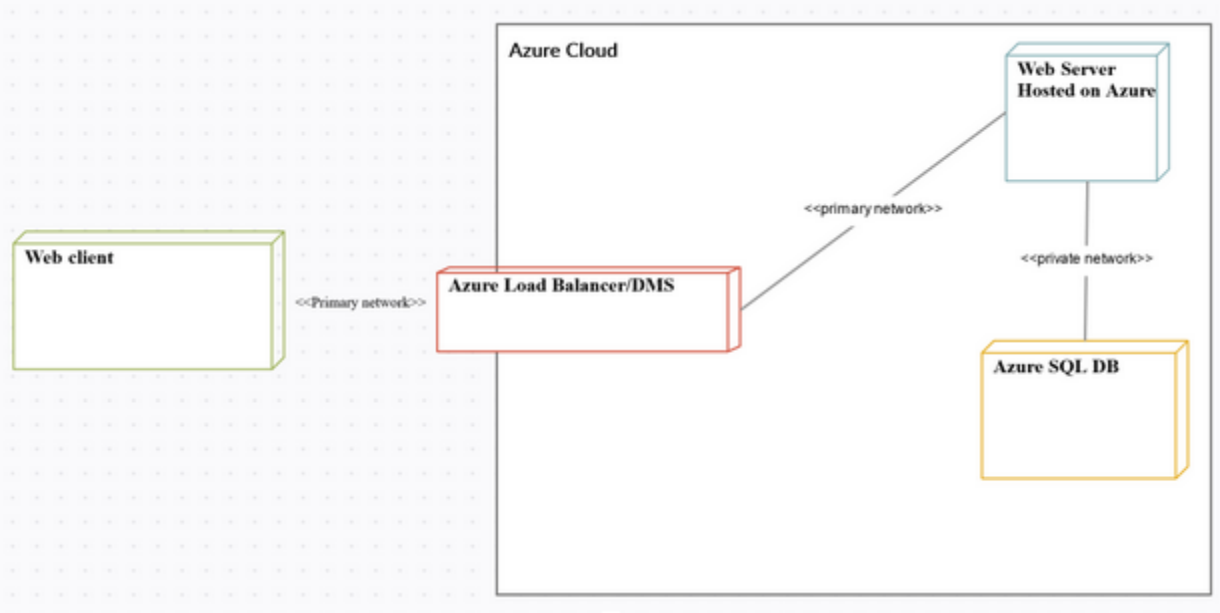
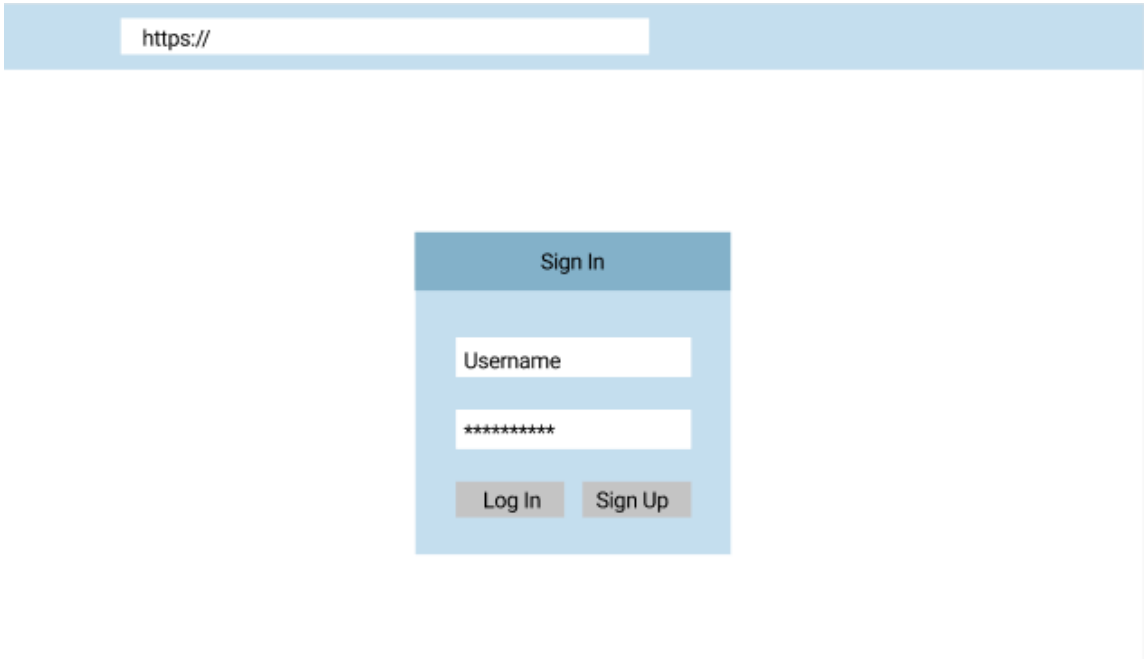
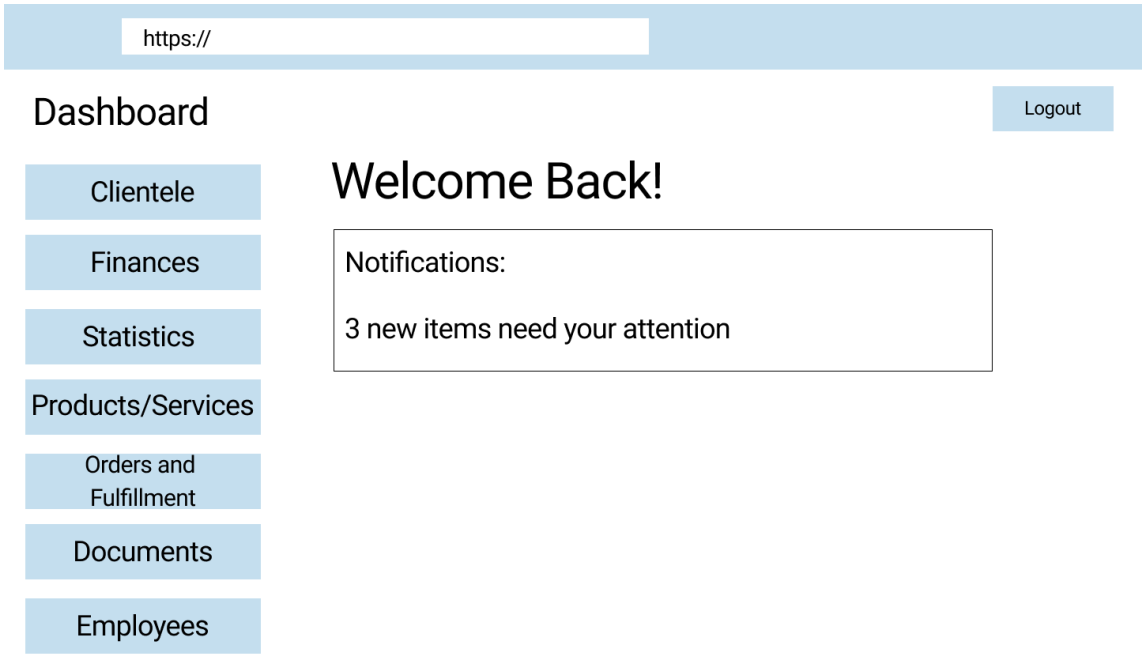


Figure [8] User Interface

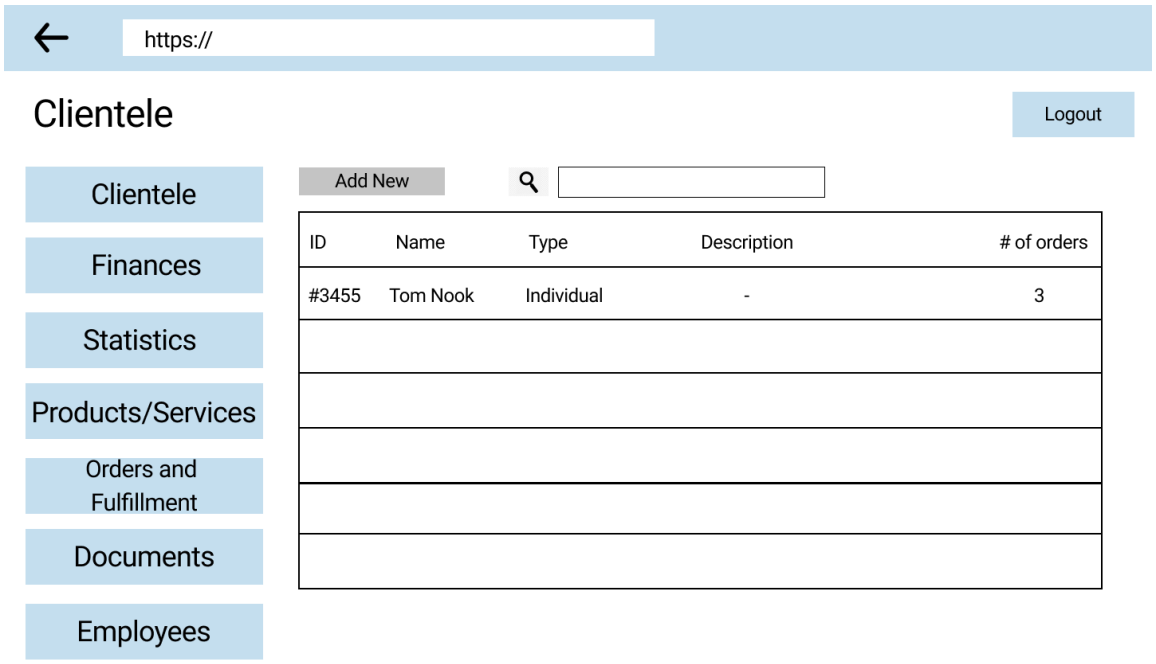
Page 1 – Sign In



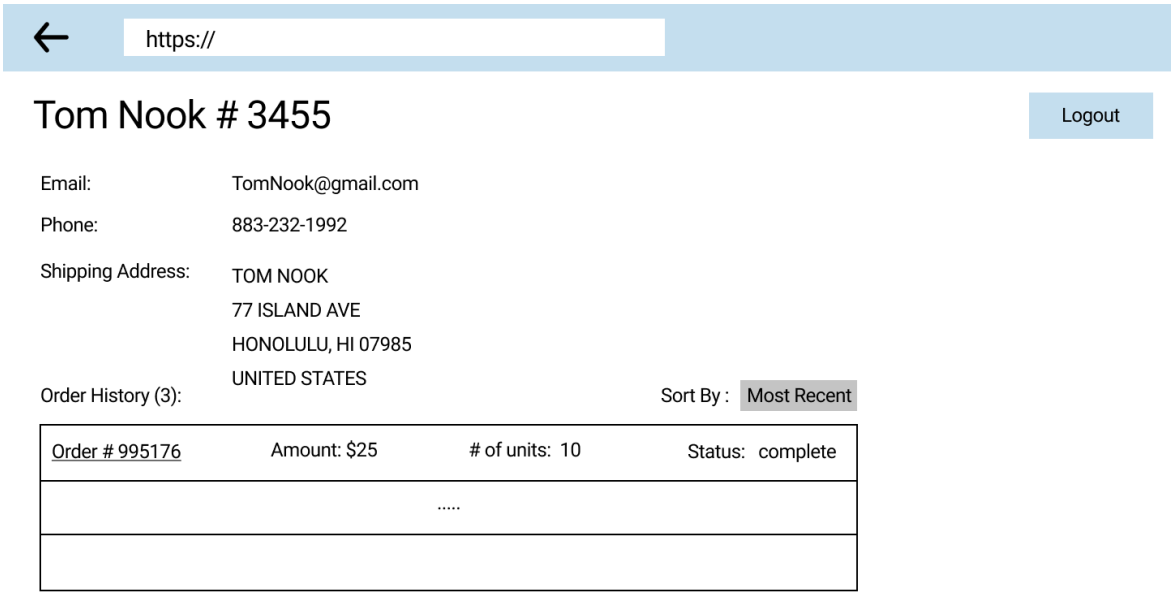
Page 2 – Dashboard



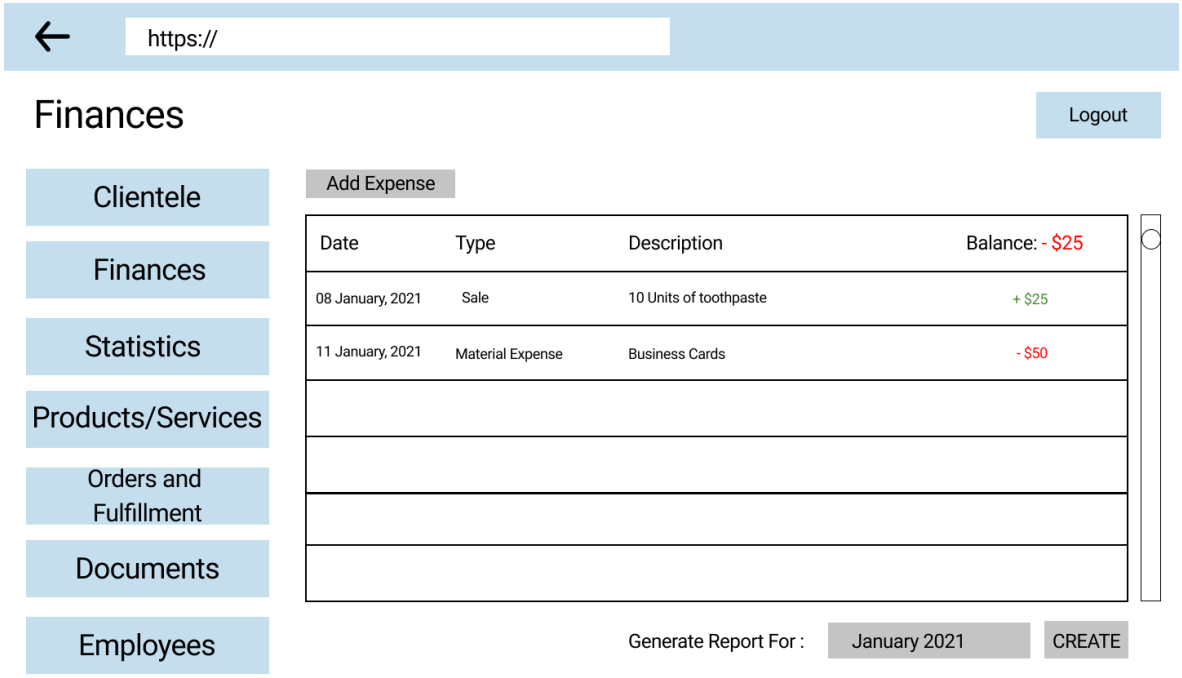
Page 3 – Clientele



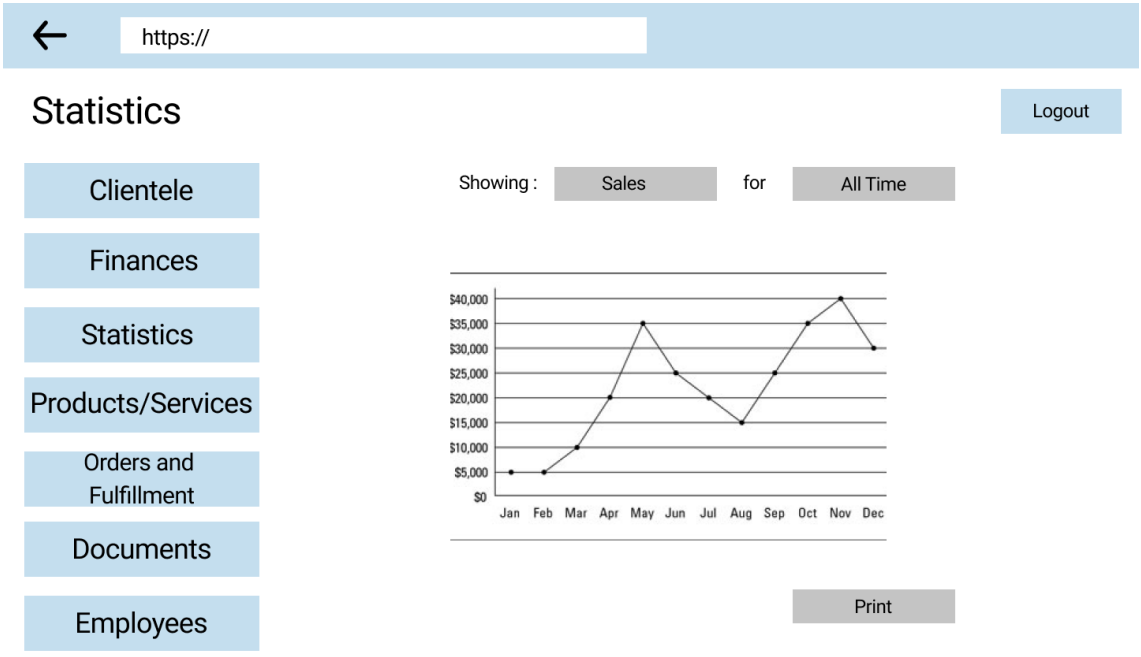
Page 3.2 – Individual Client



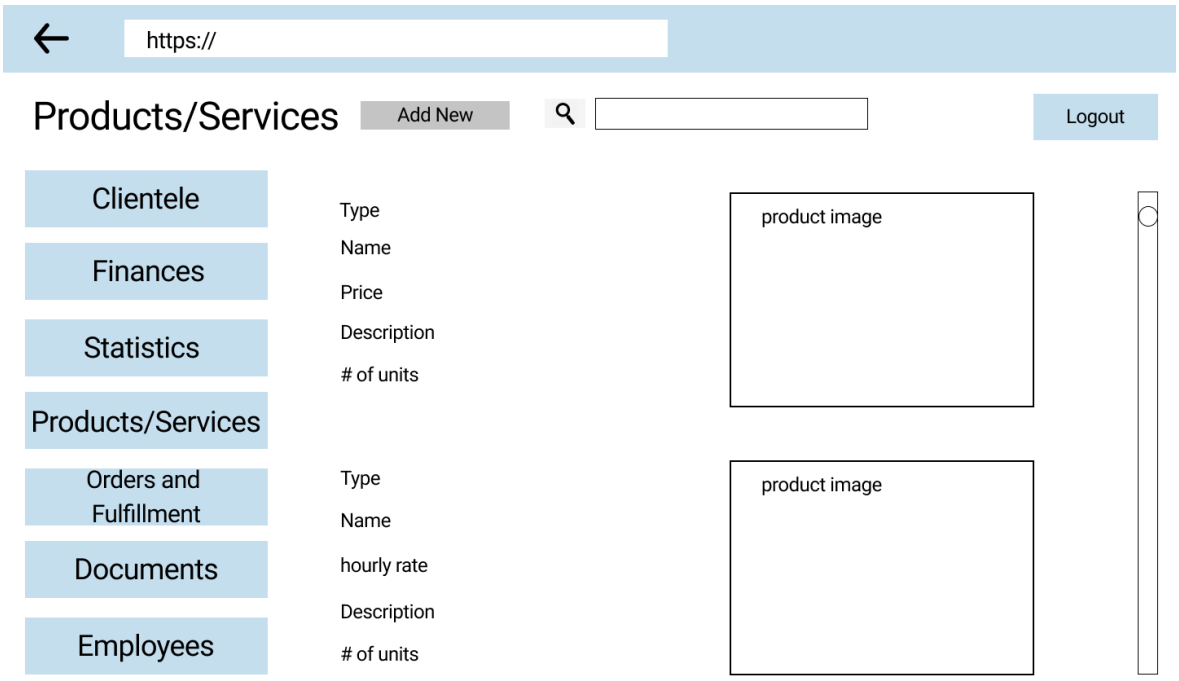
Page 4 - Finances



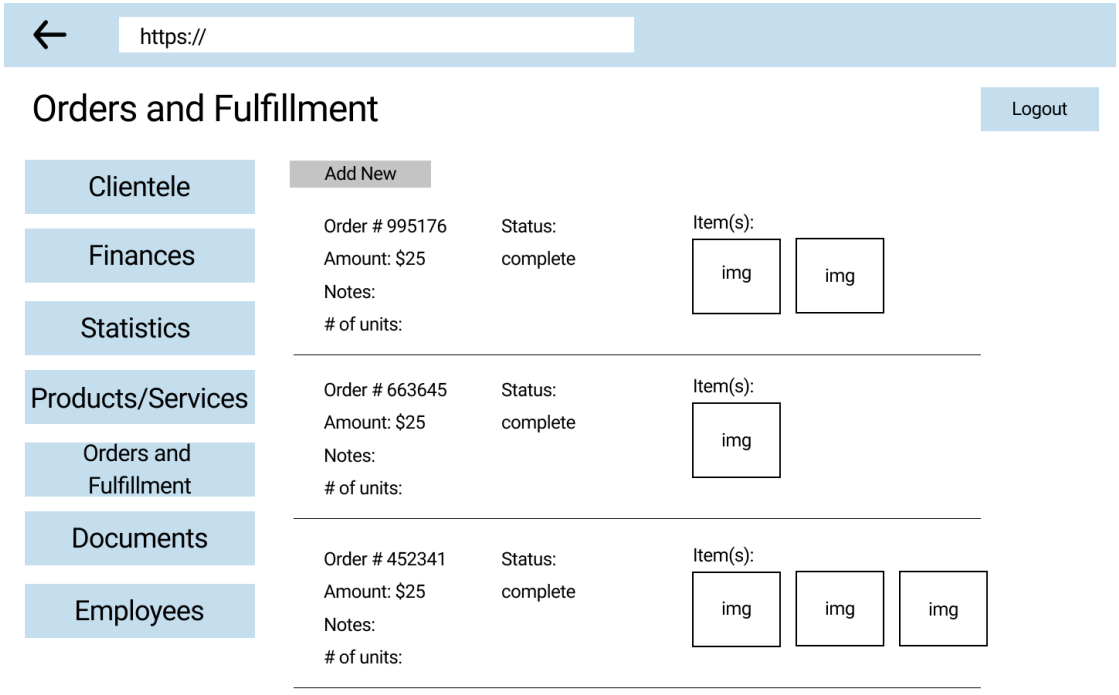
Page 5 - Statistics



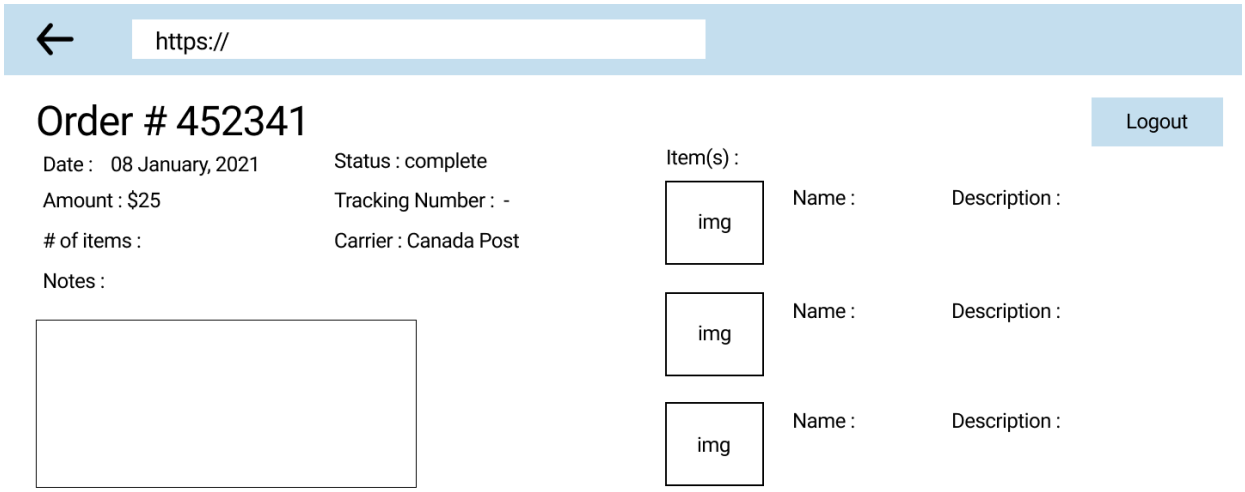
Page 6 – Products/Services



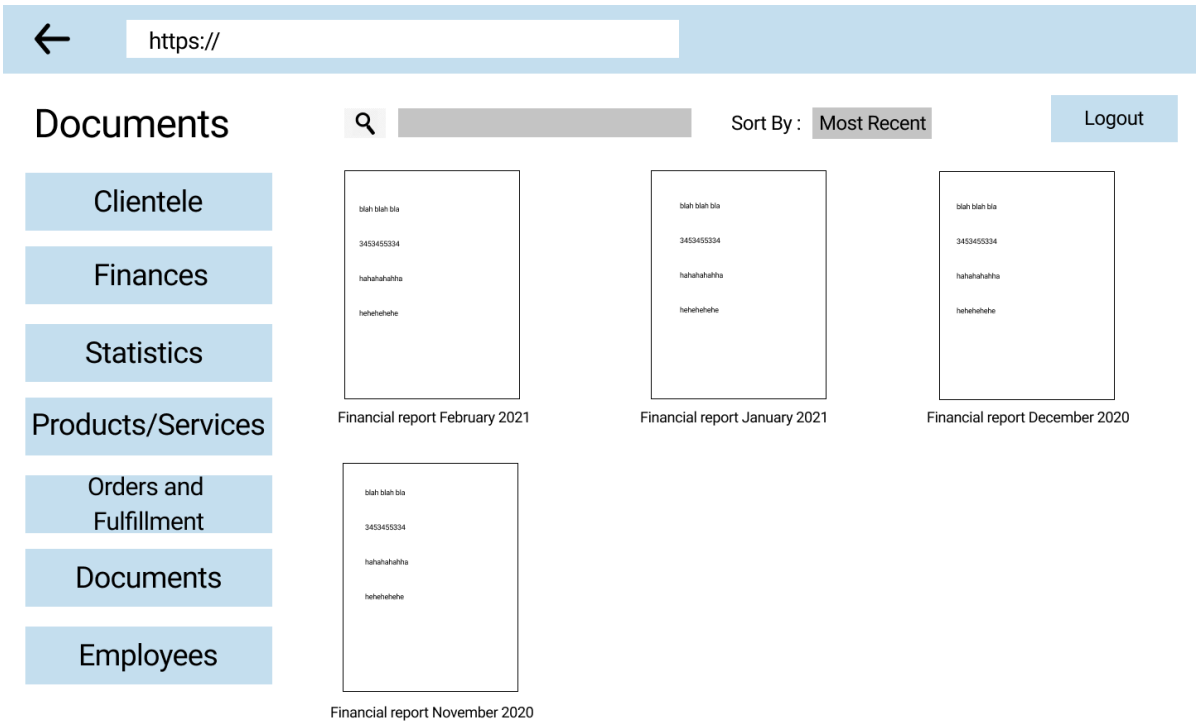
Page 7 – Orders and Fulfillment



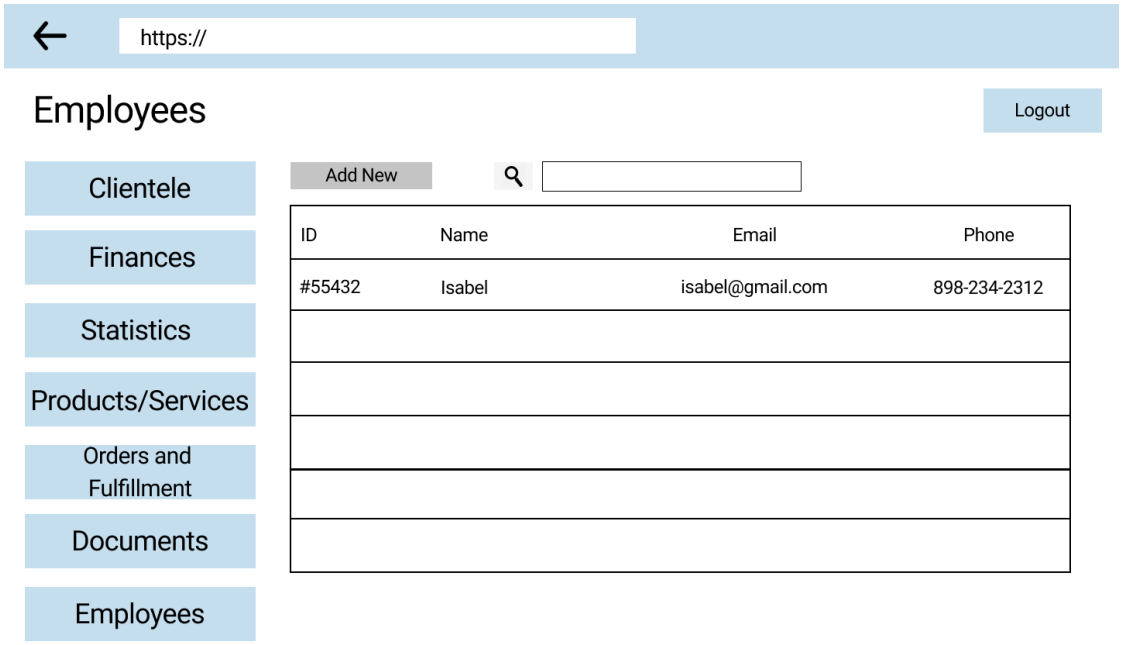
Page 7.2 – Individual order



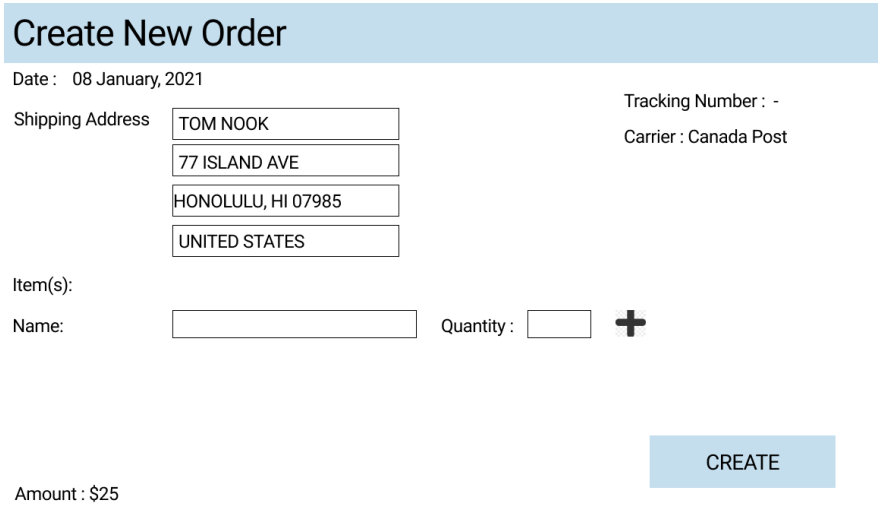
Page 8 - Documents



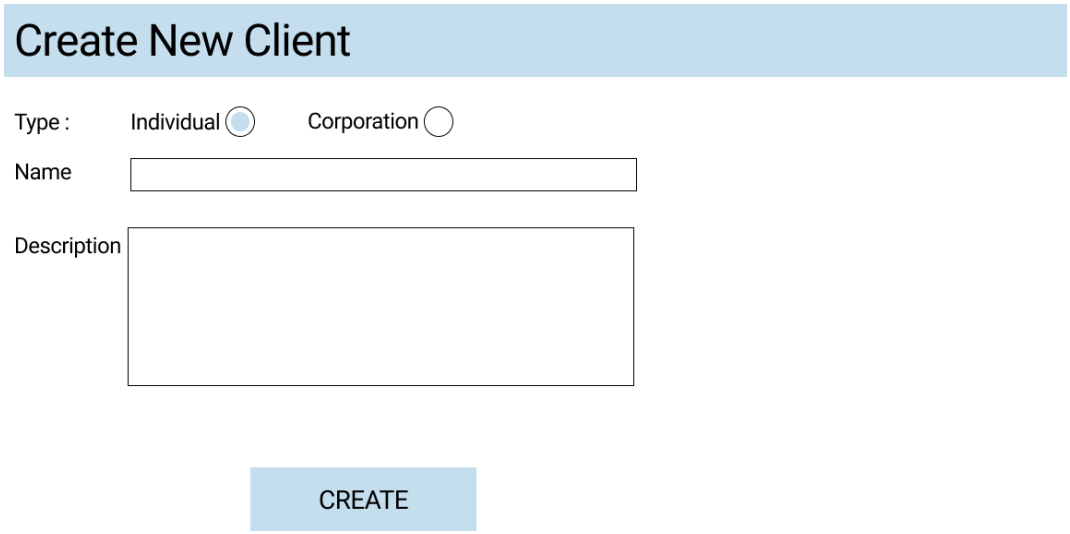
Page 9 - Employees



Modal for New Order



Modal for New Client



Modal for New Product/Service