GNG2101

Design Project User and Product Manual

Goatwise Asset Management

Submitted by:

Goatwise Asset Management 3.3

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Table 1. Acronyms

Acronym	Definition
UPM	UPM stands for User and Product Manual. This document is the UPM

1 Introduction

This User and Product Manual (UPM) provides the information necessary for users as well as admins to use the Goat-Wise asset inventory management system. It will teach the users how to effectively login as well as check items in and out. It will also teach the admins how to login, see transaction history, add, modify and delete items as well as add and delete users. The document will start with an overview of the prototype as well as any naming conventions used in this document and warnings for using the prototype. It will then provide a general walkthrough of the system and a walkthrough of each function.

2 Overview

The problem the client faces is that their current system for checking in and checking out items is too slow, taking an average of 5 minutes per item to check out. Also, the current system they use charges per asset added, making it expensive as the number of items grows. The high check out time reduces the amount of time nurses can spend taking care of the sick children. Furthermore, the money spent towards adding new assets to the system is also money that would be better spent buying better equipment to take care of the children.

The user needs to be able to quickly check in and check out items. There also needs to be admin functionality to be able to manage and track the system.

Our product supports scanner functionality, allowing users to scan a qr code on their badge and automatically login. It also minimizes the amount of time users need to check in and out items, minimizing the amount of clicks the user needs to do and allowing them to scan the item to check it in/out. It also uses cloud hosting and storage, getting rid of the need for a dedicated server; and since it's a website, the users can also use their phones to check in and out items if the scanner is currently occupied. Furthermore, for the scope of this client, the free tier of the software that is used for the database and hosting (Firebase) will be more than sufficient, meaning that this product is essentially free.

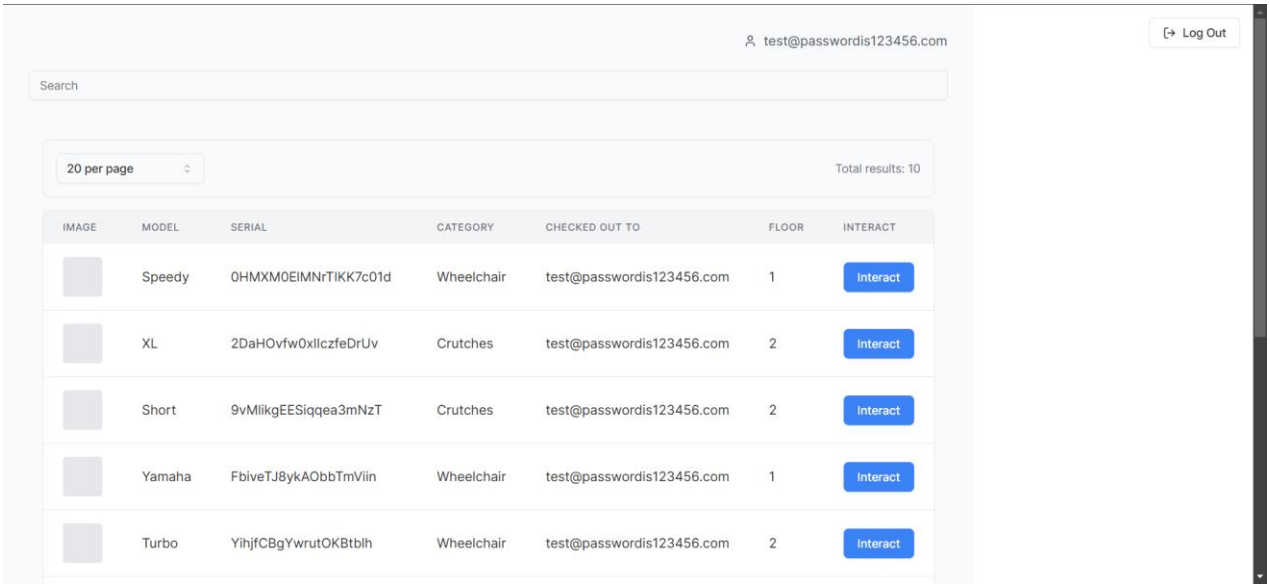

Figure 2.1 View of the check in and out page.

The user will be able to login automatically using the QR code on their badge. They will also be able to check items in and out by choosing their floor, check in or out and then scanning the item. The admins will be able to see a transaction history. They will also be able to add, modify or delete items. They can also add or remove users, however this will have to be done on the Firebase platform for reasons explained later.

Explain the architecture/construction of the system in non-technical terms (metal frame, microcontroller, web-based, etc.), the user access mode (unfold frame, GUI, button, etc.) and any special conditions.
A block diagram is a useful thing to include here too.

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3 Getting started

This section provides a detailed walkthrough of the system from setup to exit. It is designed to be straightforward, with clear instructions and visual aids to guide users, including non-technical individuals, through the process of using the prototype effectively.

3.1 Configuration Considerations

- A device capable of internet browsing (e.g., Chromebook or PC).
- A stable internet connection.
- Access credentials (QR code or username and password).

Setup Steps:

1. Scanner Setup: Plug the handheld scanner into the computer using the USB port.
2. Browser Access: Open an internet browser (e.g., Chrome or Edge).
3. System Access: Scan the provided QR code to automatically populate and access the system URL or manually input the URL into the browser's address bar.

3.2 Accessing/setting up the System

The system differentiates between users and admins:

Users can log in to check items in and out.

Admins have enhanced privileges, including modifying the database, adding items, and reviewing transaction histories.

Ensure you are using the correct credentials for your role. Admin credentials include a secure password format outlined in the admin setup section.

3.3 System Organization & Navigation

For Manual Login:

1. Open the web browser and navigate to the provided system URL.
2. On the login page, input your username and password.
3. Click the **Login** button to access the system.

For QR Code Login:

1. Use the scanner to read the QR code from your badge.
2. The scanner will automatically direct the browser to the login page and log you in.

3.4 Exiting the System

1. Navigate the mouse cursor to the “log out” button at the top right of the admin or user screen.

2. Left click on the button, the system will then return to the log in screen

3. To shut down the system, close the browser window in which the system is open

Upon logging in, users will see a homepage with two primary sections:

1. **User Dashboard** – Displays check-in and check-out options.
2. **Admin Dashboard** (for admins only) – Includes options to add, delete, or modify items, as well as review transaction logs.

Navigation is intuitive, with menus and buttons labeled for easy identification. For example, the **Check In/Out** button leads to item transaction workflows, while the **Admin Functions** tab allows for database management.

3.5 Exiting the System

For Users:

1. Complete any ongoing tasks, ensuring all checked-in/out items are updated.
2. Close the tab.
3. To allow for the next user to scan, have a new tab open

For Admins:

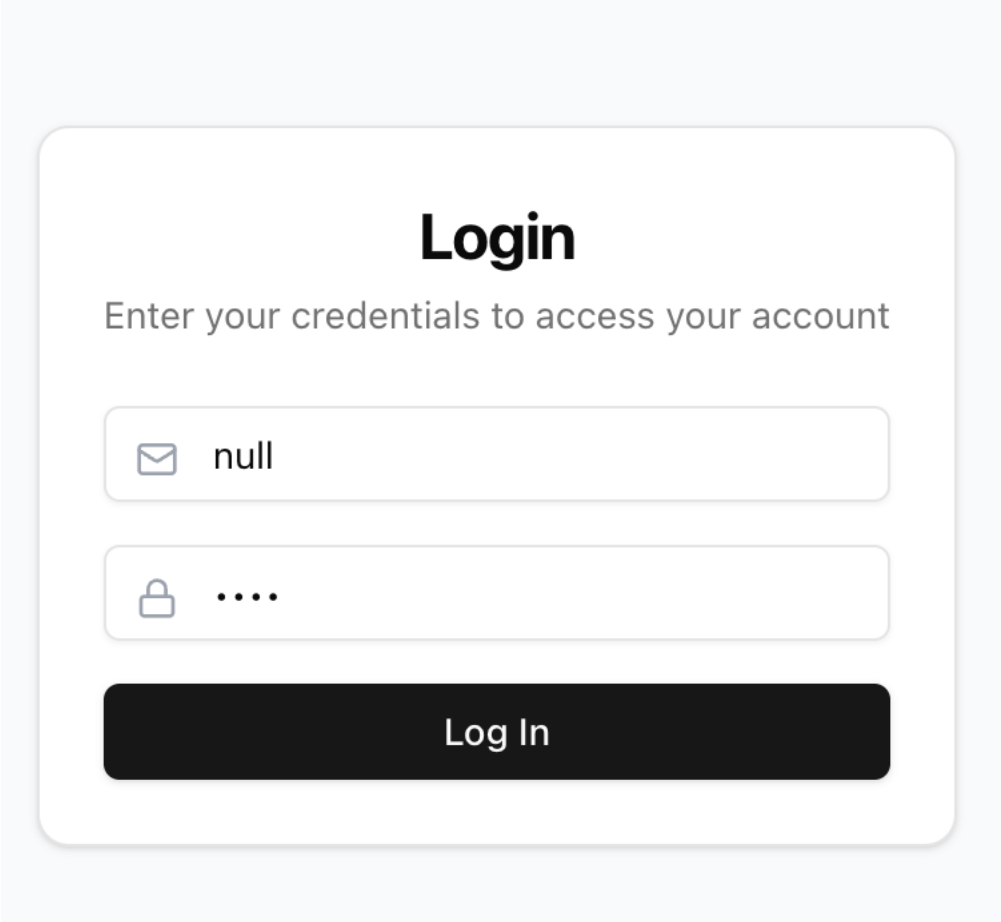
1. Ensure all database changes are saved.
2. Close the tab

4 Using the System

The system has 2 user functions, the login process, and check in and check out. The login process can be manual or automatic, the user could use the scanner to scan their badge, and it will use the information provided in the QR code to log them in automatically. The second way a user login can be by manual input, the user will search the website on a web browser. Then the user will be prompted with a login page where it will ask for your password and username. The user will provide their username and password then click the login button to login. The second feature

is the check in and check out process. The check in and check out process can be done in 2 ways; the first way is completely manual. The user will click on the product they want to check in or out and it will bring up a menu that asks what floor the user is on, then the user will select the floor they are on. The next thing that will happen is the user will be asked if they are wanting to check something in or out. Once the user has selected what they are doing they will finally be asked to provide the serial number. If the user selects the item from the list of items available it will automatically be put into the box for them, the user does have the option input it manually. The check in or out process can be streamlined using the scanner, once logged in the user can scan the item and they will be prompted again, whether they want to check in or out and what floor they are on. The serial number will be pasted automatically and then all they must do is confirm the information and its done.

3.6 Login



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provide their username and password then click the login button to login. The second feature is the check in and check out process.

3.6.1 Check in/out

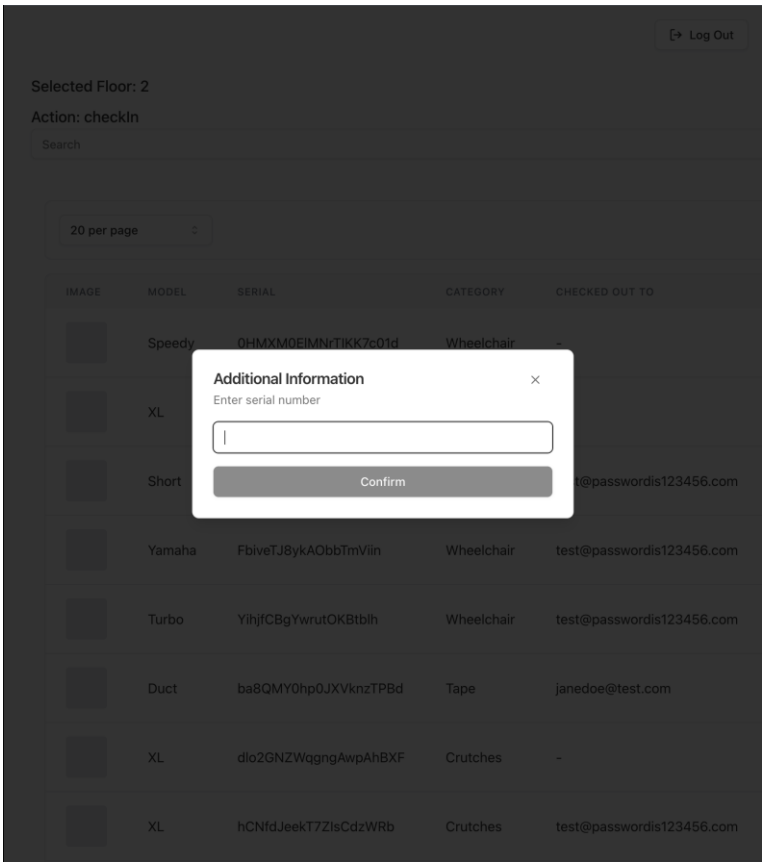


Figure 4.1.1 This is the serial number input for the item.

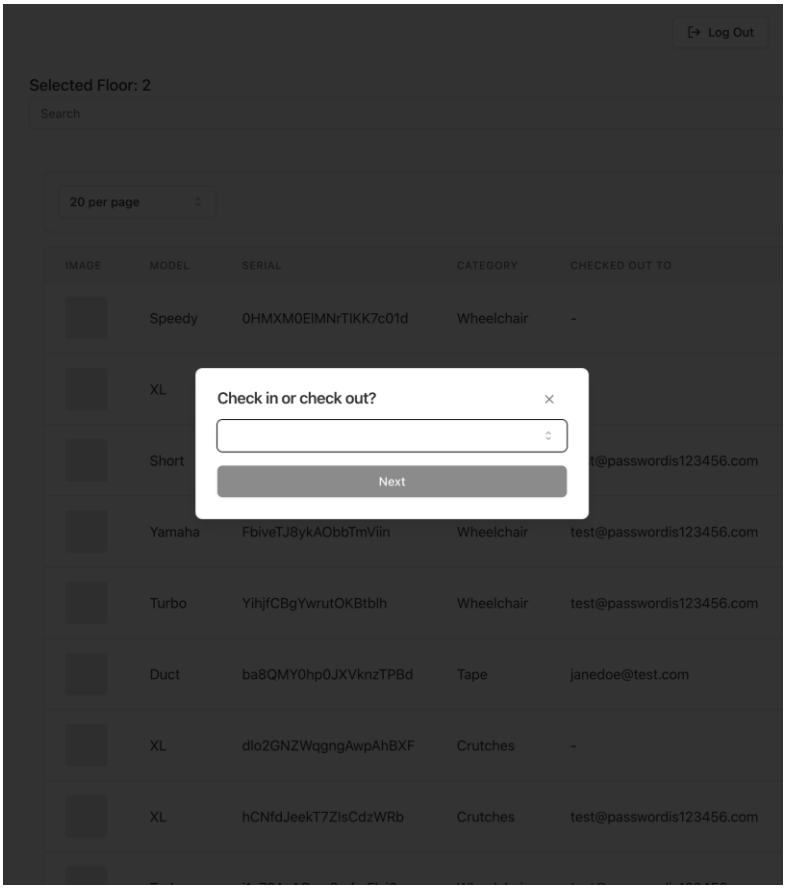


Figure 4.1.2 This is the page presented to the user when checking in or out an item.

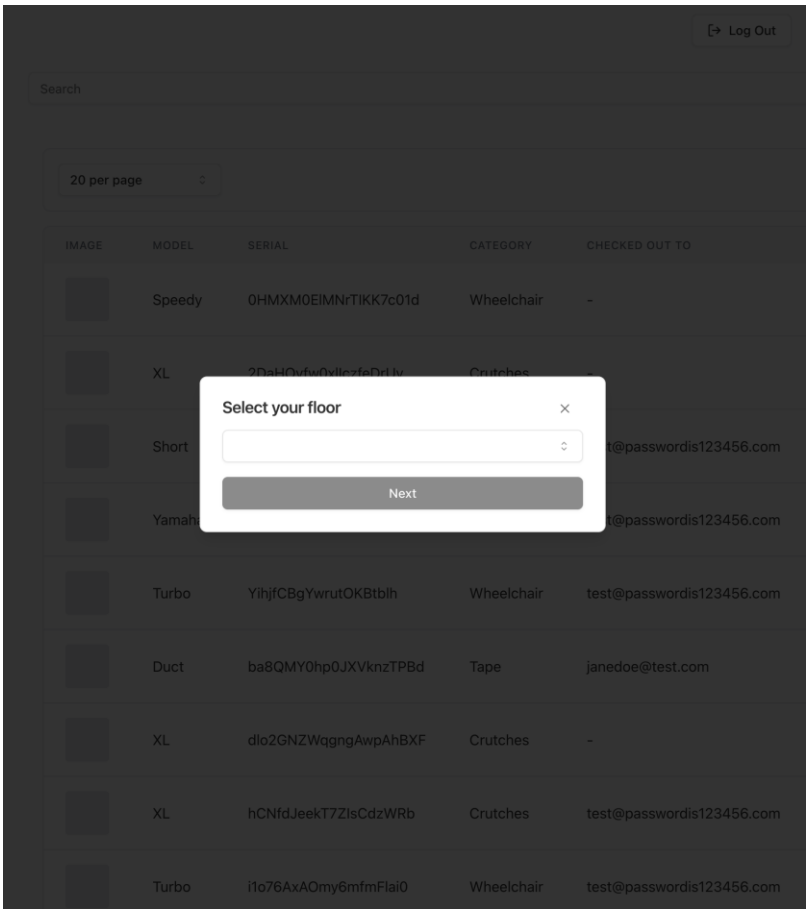


Figure 4.1.3 This is the page presented to the user when being asked what floor they are on.

The check in and check out process can be done in 2 ways; the first way is completely manual. The user will click on the product they want to check in or out and it will bring up a menu that asks what floor the user is on, then the user will select the floor they are on. The next thing that will happen is the user will be asked if they are wanting to check something in or out. Once the user has selected what they are doing they will finally be asked to provide the serial number. If the user selects the item from the list of items available it will automatically be put into the box for them, the user does have the option input it manually. The check in or out process can be

streamlined using the scanner, once logged in the user can scan the item and they will be prompted again, whether they want to check in or out and what floor they are on. The serial number will be pasted automatically and then all they must do is confirm the information and its done.

3.7 Admin Functionality

To access the admin page, access the URL https://goat-wise.web.app/. From here an email should be inputted, along with a specific admin password.

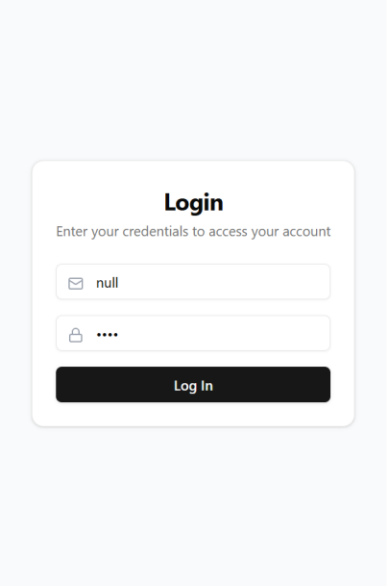
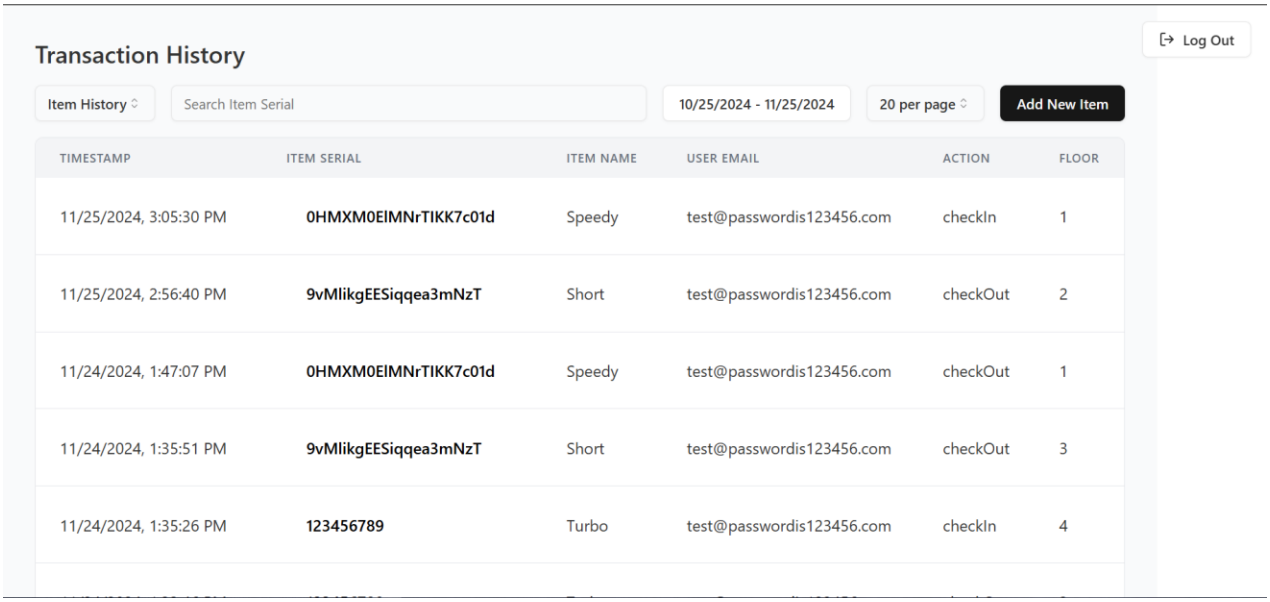


Figure 4.2.1: Login Page

If the correct information has been inputted, the admin page should be displayed.



3.7.1

Figure 4.2.2: Admin Page Adding Items

To add an item into the database, click the “Add Item” button as shown in the following figure.

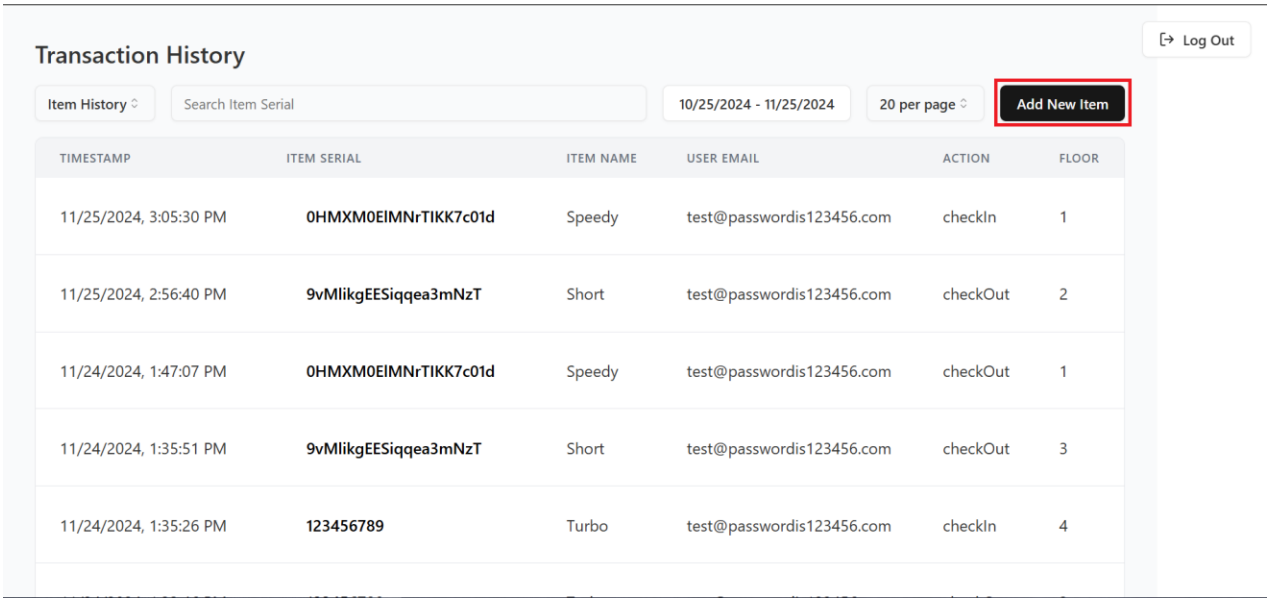


Figure 4.2.3: Add Item Button

Once the add item button has been clicked, a pp-up will appear with 3 fields, serial number, name, and category. These fields should be inputted, and the second add item button should be pressed

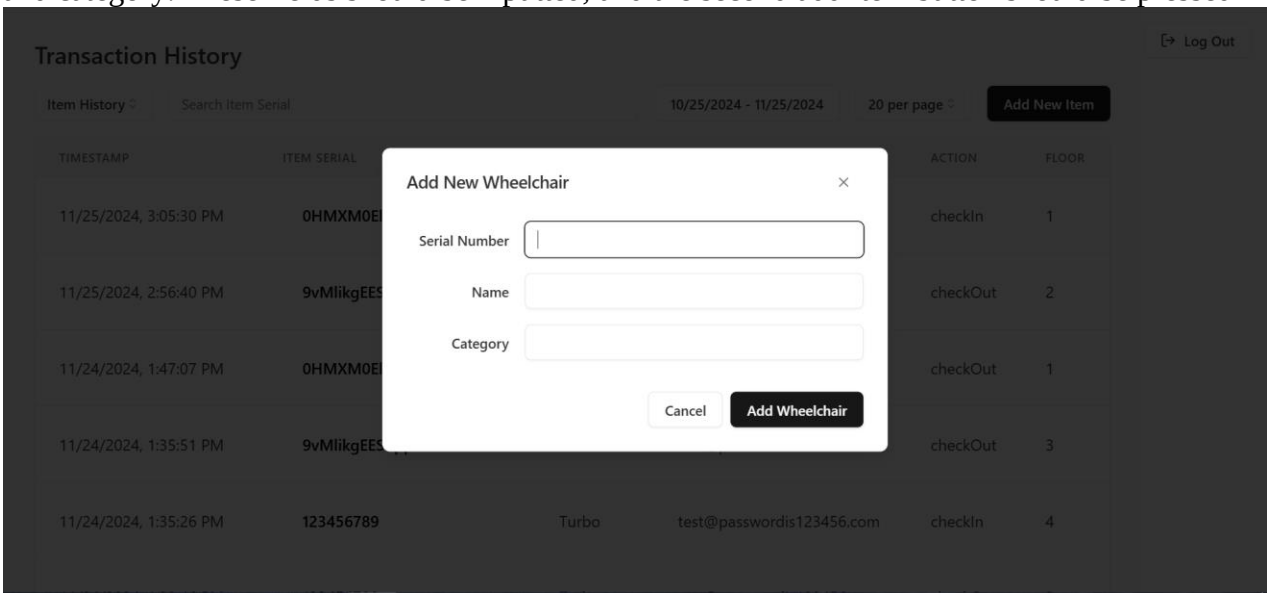


Figure 4.2.4: Item Add Field

3.7.2 Editing Items

From the admin page, to begin editing an item, click on the item serial field of the item to be edited

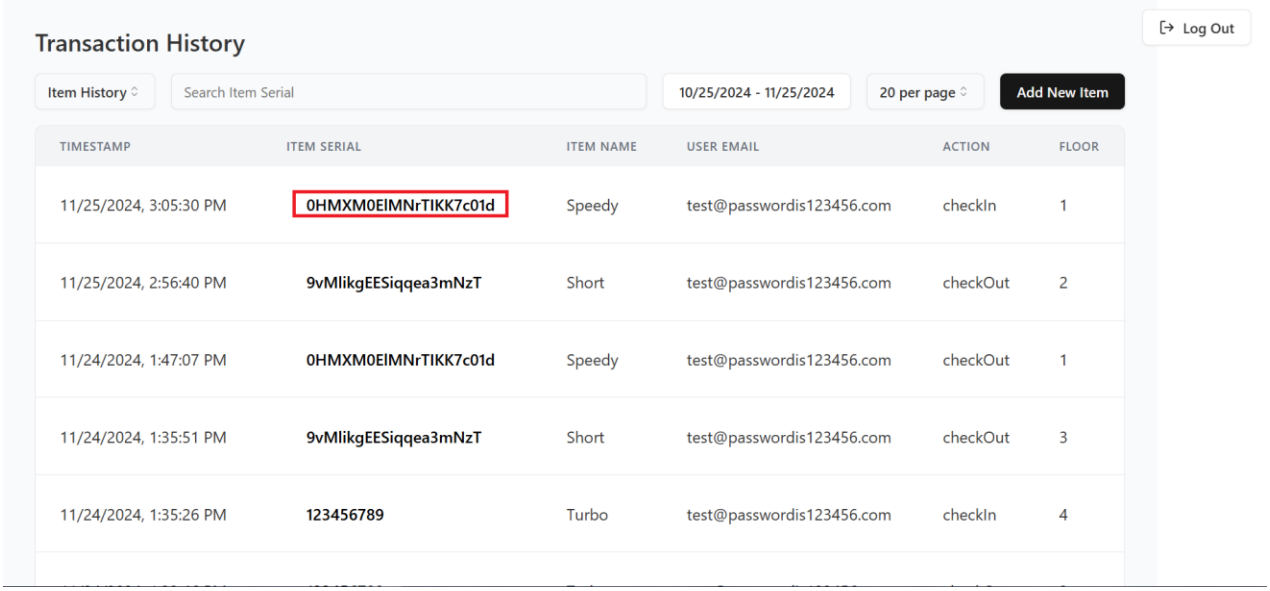


Figure 4.2.5: Item Serial Number

Once the serial number has been clicked, a field will appear with two fields, one for name adjustment, and the other for category; to edit these simply type the desired name or category into the field. To delete the item, click the “Delete Item” button in the bottom left of the field. Once the desired changes have been made, click the “Update Item” button in the bottom right.

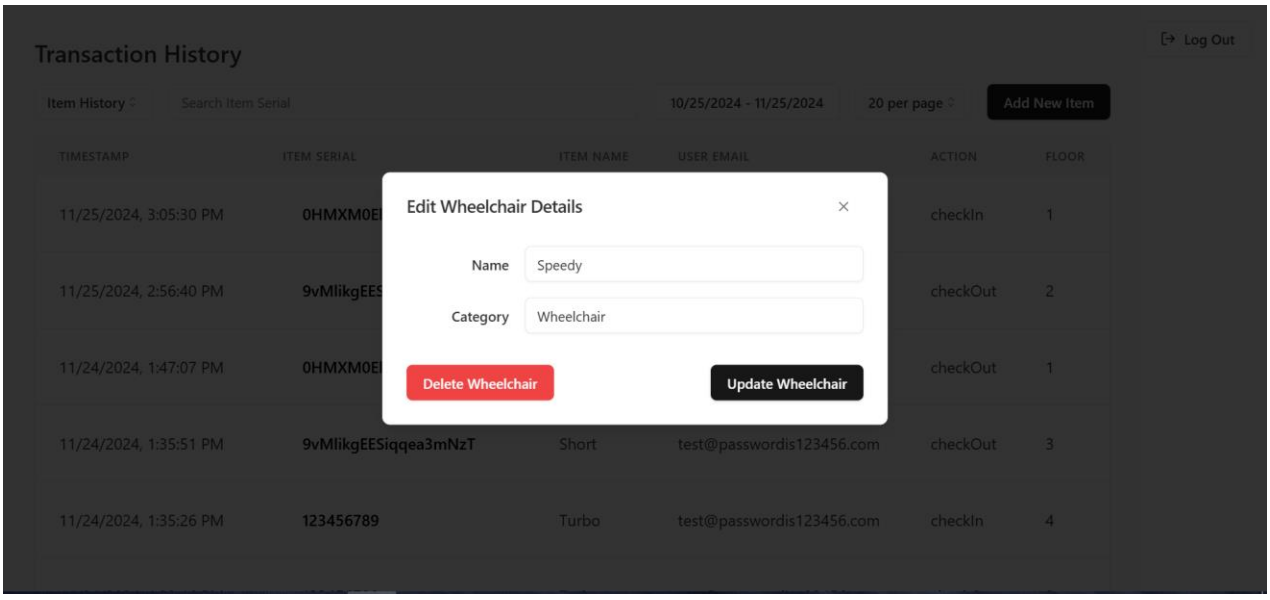


Figure 4.2.6: Edit Item Page

3.7.3 Search Items

To search for items from the admin page, use the filters at the top of the list. There is 4 filters, item serial number, user email, date, and number of items per page.

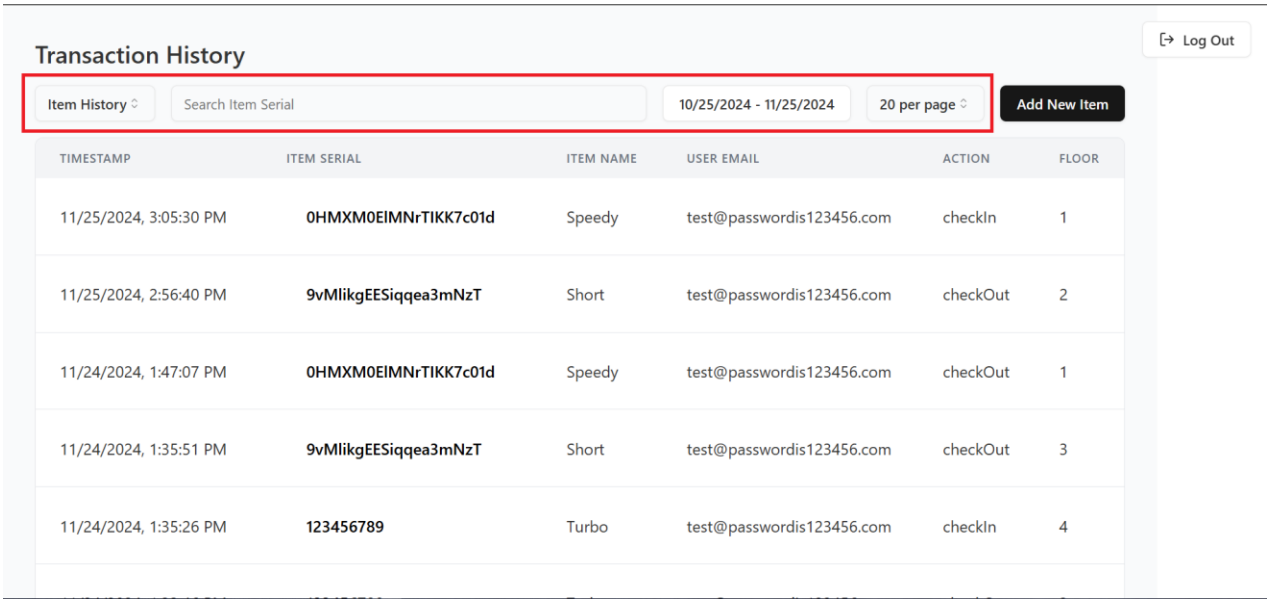


Figure 4.2.7: Filters

To search for items by serial number, select item history, then type the desired item into the search bar.

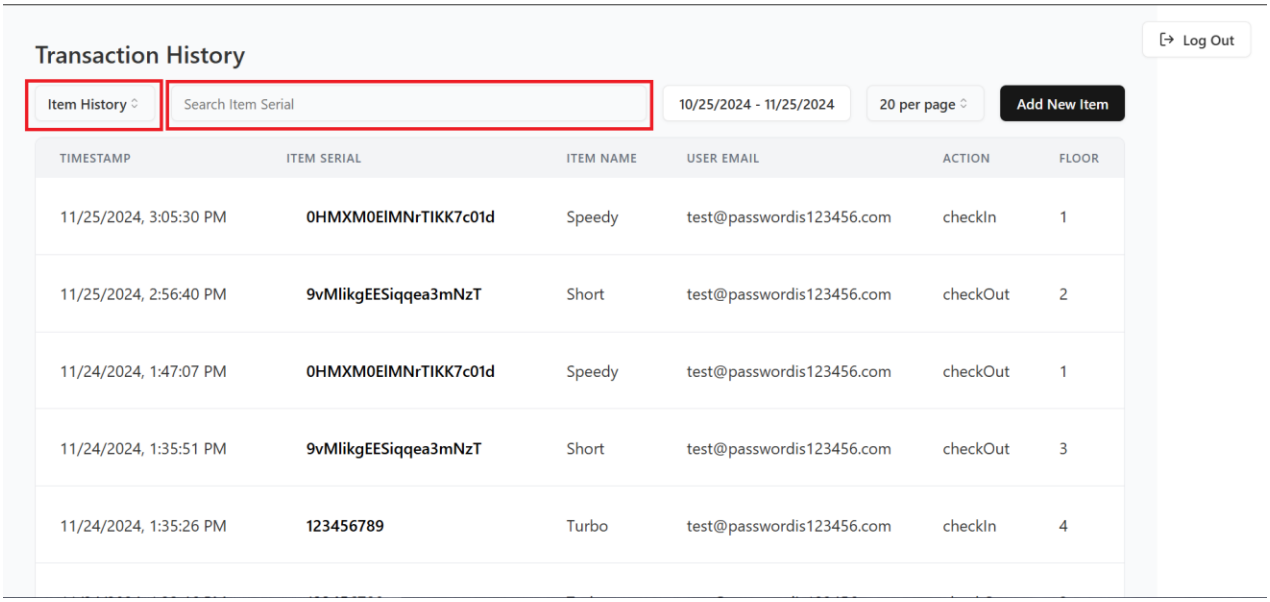


Figure 4.2.8: Search by Serial Number

To search for items by user, do the same as searching by serial number, except select the “User History” option on the drop down menu. After this, type the desired user email address into the search bar.

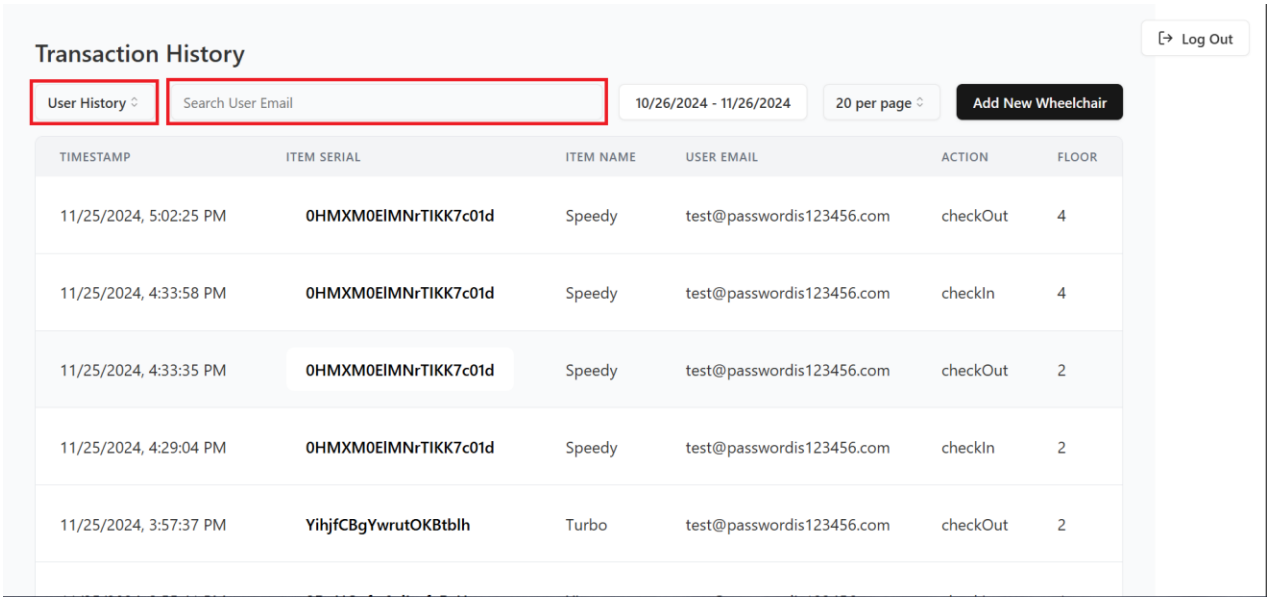
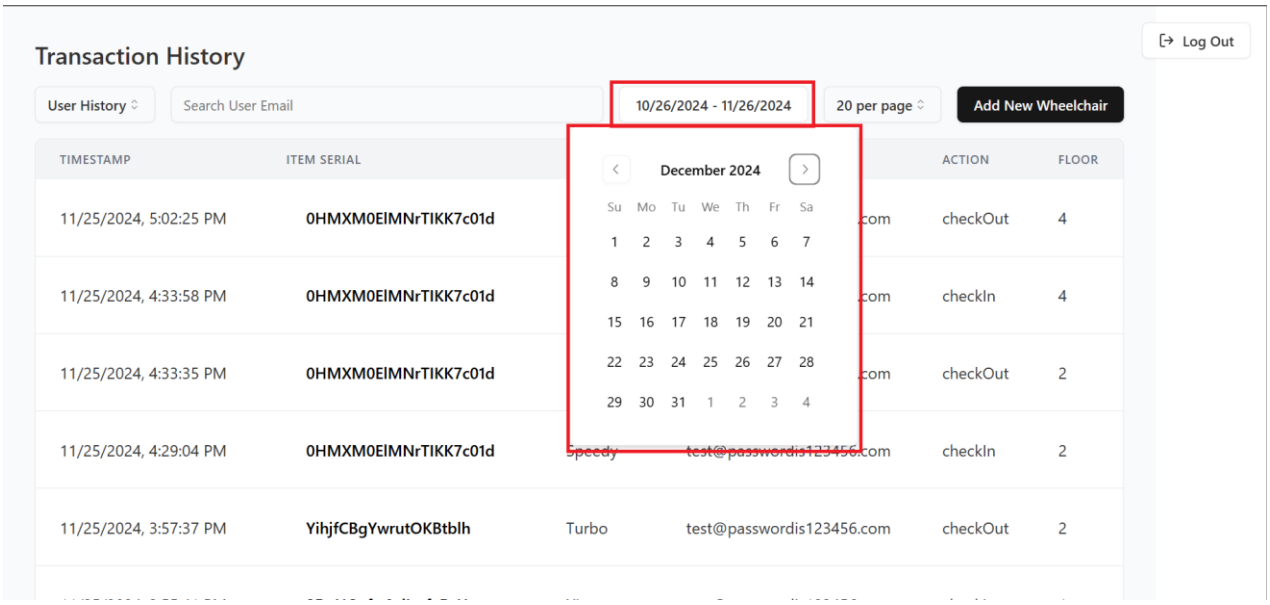


Figure 4.2.9: User History Search

To search an item by date, click on the date select button, and then select the date range you would like to search for on the calendar. To change months, click the two arrows at the top of the calendar.



4 Troubleshooting & Support

As a user, contact the IT department. As an admin, run the local build and see what errors are popping up. To see errors in the live version, open the developer tools and see the error shown.

4.1 Error Messages or Behaviors

If the code is changed and throws an error, the user will most likely see a blank page when they try to open the website. If a serial number input by a user is invalid, the webpage will say that it's an invalid serial number.

4.2 Special Considerations

If the scan-based login is not functioning as intended, ensure that the computer in use has a internet browser window open, and ensure that the URL field is currently selected. If the scanner is non-functional, a user could use their phone to scan instead.

4.3 Maintenance

The maintenance for this prototype will be minimal, the only maintenance that will be done is patches for bugs reported by the user. The user will report a bug and it will be noted by the IT team and patched as soon as possible.

4.4 Support

For support with theproduct the user can contact their IT department, they will be the first people to deal with the issue or bug.

5 Product Documentation

The IMS (Inventory Management System) was developed with a focus on software components, specifically leveraging React.js with Vite, and Firebase for hosting, authentication, and the database. This choice was driven by the project's relatively small size, which allowed the use of Firebase's free tier and its simple, scalable infrastructure to handle the asset tracking needs.

Design Considerations:

User-Friendly Interface: The system had to be simple and intuitive for staff at Bethany's Children's Hospital.

Real-Time Syncing: The asset tracking system needed real-time updates and up-to-date information across devices.

Lightweight Data Needs: The size of the project and database was small, and storage was not expected to grow rapidly, so Firebase's free tier was sufficient for this product's needs.

Secure Access: Since this system handles sensitive data, ensuring proper user authentication and secure access was a key consideration.

Frontend Development

React.js was selected because of its ability to quickly build dynamic, interactive UIs. It allows for the creation of reusable components, making it ideal for building an efficient and maintainable user interface.

Vite was used as the build tool to optimize the development process. Vite's fast development environment, quick hot-reloading, and efficient bundling made it a perfect fit for a fast-paced prototype environment.

Backend Development

Firebase Database

Given that the scope of the project was small, Firebase's free tier offered a straightforward solution with real-time syncing and automatic data storage management. Firebase's ability to delete outdated data over time also helped manage the database size.

Firebase is easily scalable, so as the hospital's needs grow, the system can be adapted to handle larger data sets. Firebase's real-time database allowed immediate updates across all devices, ensuring accurate, up-to-date asset tracking. Firebase's free tier was sufficient for the scale of this project, and the database size and query complexity were low enough that it could handle the usage without hitting query limits.

Firebase Authentication

Firebase Authentication was implemented to securely manage user logins and roles. This ensured that only authorized personnel could access or modify asset information.

Users are categorized into different roles (e.g., admin, staff) to ensure proper access control.

Asset Check-In/Check-Out Module

1. A staff member scans the barcode or QR code associated with an asset.
2. The asset's status is immediately updated in the Firebase database via an API call.
3. The UI automatically updates, showing the current status of the asset across all connected devices.

5.1 <Scanner>

The scanner is a handheld barcode reader designed to capture asset information quickly and accurately. It is lightweight, portable, and user-friendly, allowing for seamless operation in a fast-paced environment.

Specifications:

Type: Handheld barcode scanner

Connectivity: USB

Compatibility: Supports integration with the asset inventory system database

Scanning Capability: Reads standard 1D and 2D barcodes

Power Supply: Continuous chargeability through USB

<Computer – Suggested: Chromebook Laptop>

The laptop used in the asset inventory system is a Chromebook, chosen for its portability, efficiency, and seamless integration with cloud-based applications.

Specifications:

Model: Chromebook (specific model may vary)

Operating System: Chrome OS

Display: 11.6–14-inch HD screen (depending on the model)

Processor: Intel Celeron or similar

Memory: 4 GB RAM or higher

Storage: 32–64 GB eMMC

Connectivity: Wi-Fi and USB-C support

Battery Life: Up to 10 hours

5.1.1 BOM (Bill of Materials)

Bill of Materials For Childrens Hospital								
Importace (0-5 Scale)	Part #	Part Name	Description	Quantity	Cost Per Unit	Cost	Total Cost	$1,555.96
1	1	Eyoyo USB Scanner	Barcode scanner that connects via USB and work with common software and can scan all types of codes.	4	$39.99	159.96		
1	2	Chromebook Laptop	This device has a MediaTek Kompanio 520 processor, 4GB RAM, a 11.6-inch anti-glare display, and meets MIL-STD 810H durability standards with a spill-resistant keyboard.	4	$349.00	1396		
2	3	Firebase	Firebase offers backend cloud services and application development platforms under Google's umbrella.	1	$0			

5.1.2 Equipment list

For the creation of this product, the piece of equipment used was a supercomputers, as this is mainly a software project, no other equipment was used.

5.1.3 Instructions

To build the system it is extremely simple and easy, first the user will plug the scanner into the computer. Then, the user will open a web-browser and click on the URL bar. The user will scan the QR code, and it will automatically be put into the URL and searched. Finally, the user will be brought to the webpage.

5.2 Testing & Validation

Tests were performed on this system to ensure usability, speed, and error-free functionality. The system was heavily tested for the speed of the check-in/checkout process could be performed fast. This test was conducted with a control under no system stress, allowing for an average check-in check-out process of 30 seconds, under a heavy synthetic system load the average time went up to 45 seconds. Minor delays where found to occur every 2.5 minutes.

	Metrics	Instances of system delays or errors	Average time taken for check-	Number of steps requiring manual input.

			in/check-out processes.	
Control		2.5 minutes	30 seconds	2-31 step
Under Stress		5 minutes	45 seconds	2-31 step

A test was performed to ensure the accuracy of timestamps. This test was performed against an accurate online clock under no system stress, and heavy synthetic system stress. In both these cases the timestamps had an average difference of +- 1 second versus the accurate clock.

	Metrics	Instances of system delays or errors	Completion time for all 50 functions	Timestamp accuracy
Control		0	10ms	+- 1 second
Under Stress		0	496ms	+- 1 second

A test was performed to measure system response time under a synthetic load of 30 users. The response time under this synthetic load was found to increase from 1ms to 15ms under the synthetic load, and the system remained fully functional.

	Metrics	Instances of system delays or errors	Response Time under Load	The system remains fully operational	No memory leaks or performance

				with no crashes or slowdowns.	degradation over time.
Control		0	1 ms	True	True
Under Stress		0	15 ms	True	True

6 Conclusions and Recommendations for Future Work

While working valuable lessons were learned not only about theproject but about teamwork skills and organization. The improvement of the team's organization has been a very useful skill to master. Tasks are delegated at the start of the week based on the project and then are finished within the next few days. Teamwork has also been important because testing, deliverables, and planning is done a lot faster with everyones collaboration. With more time, a way for admins to be able to delete old logs would be added. Another potential future feature would be to ensure that when items are fetched from the database, that they're only fetched in small batches at a time, to minimize the loading done by the client.

APPENDICES

7 APPENDIX I: Design Files