



uOttawa

**GNG 2101 B03: Intro to Product Development and Management
for Engineers**

**Deliverable D: Detailed Design, Prototype 1, BOM, Peer Feedback and
Dynamics**

Submitted by

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Abstract

This document presents the prototypes for the library wayfinding project. The two prototypes created for this deliverable are the library wayfinding application UI and the database for the application. The UI prototype was created to better communicate the visuals and structure of the program while providing a framework for future development. The database prototype was created to test the critical backend structure for future development.

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1.0 INTRODUCTION

This document will be showing the testing and design for the first prototype. The first prototype is mainly a proof of concept and will be showing the most critical components. Various methods of testing will be used depending on the aspect of the prototype being tested. The final concept was shown to the clients and their feedback was noted. A Bill Of Material will be shown to indicate the physical parts which must be purchased in order to continue with the project. Before prototype one had been finished, the finalized concept was presented to the client and positive feedback was given.

2.0 CLIENT FEEDBACK

The client does not have a specific solution in mind for the navigation of the uOttawa library. The final concept the team came up with will be explained later on in the document. The concept of having an announcement section in the application was something of interest to the client. The client also enjoyed the option to toggle between visual navigation and visual + text to speech navigation. This feature was of interest because it broadens the library to a larger audience especially the visually impaired. A very useful bit of feedback was to think of the application as a way to orient the user in the uOttawa library. The app does not have to navigate the user to exactly where the book of interest is located, it will be mainly used to avoid major obstacles and to know what section of the library the user's desired book is. Apart from the specifics of where the app will navigate the user, there were no changes required to our proposed solution.

3.0 FINAL CONCEPT

The final concept consists of an application which will help users navigate through the uOttawa library. The app will focus on ease of use by limiting the number of screens the user has to go through in order to get to the navigation page. The figure below shows the layout of the screens.

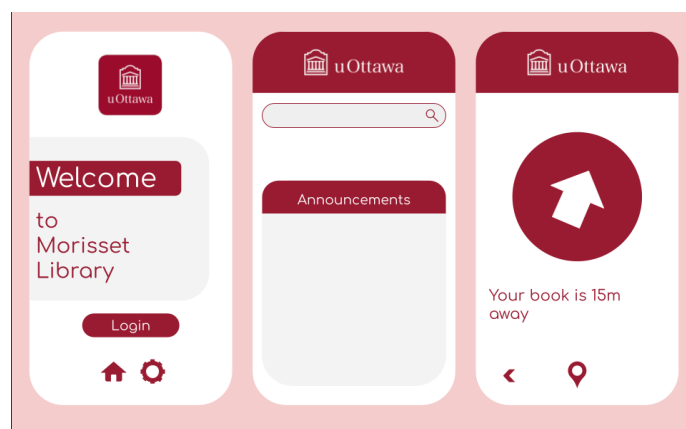


Figure 1. UI for final concept of navigation app

The figure below shows how each function is connected to the next function. The figure shows every action that can be taken starting from the home screen.

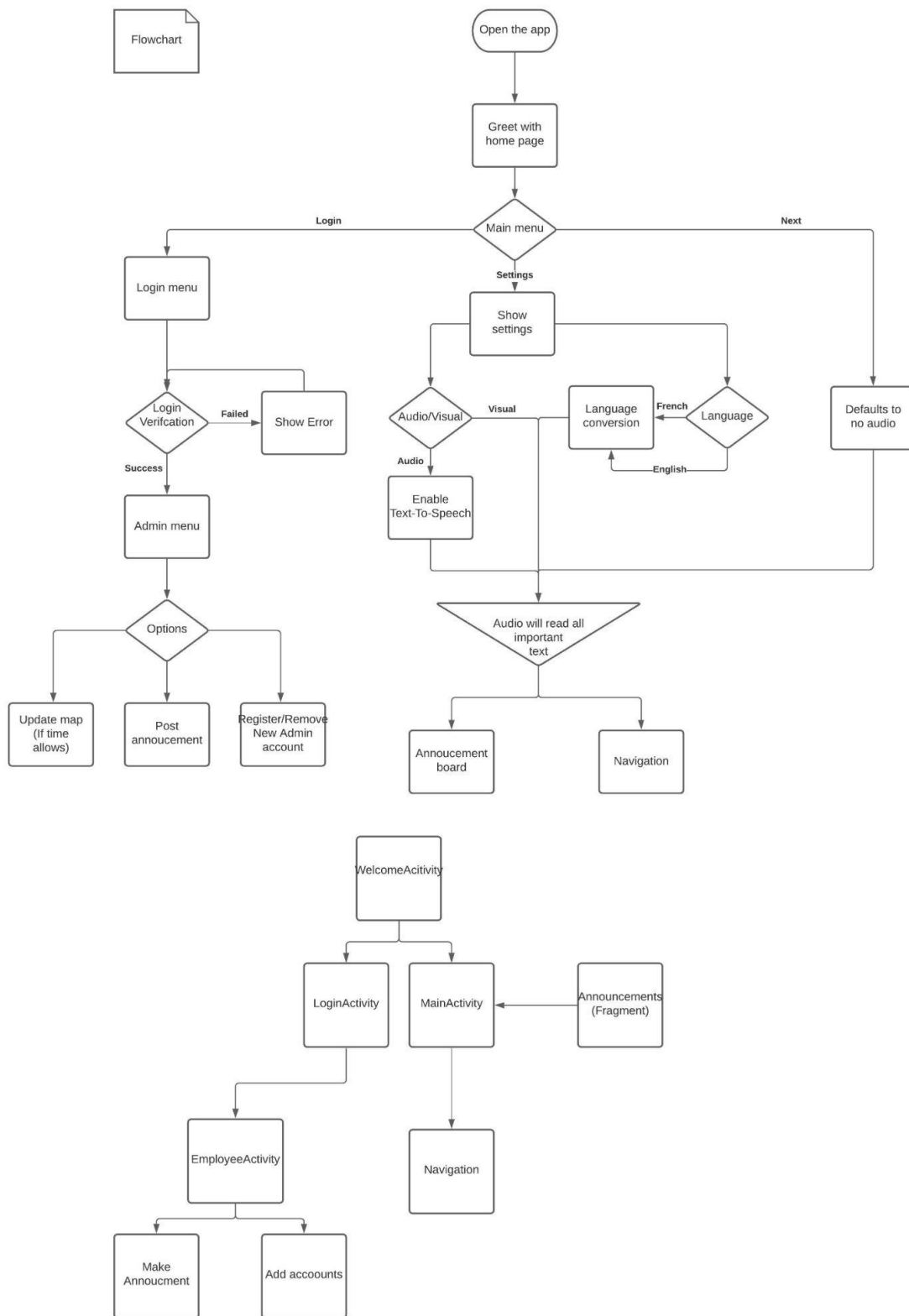


Figure 2. Flowchart of available actions

4.0 PRODUCT ASSUMPTIONS

The biggest assumption the team has made is knowing the communication with the Arduino is done and will be successful. The team is also assuming the mobile device will have enough processing power to calculate and save the pathfinding algorithm.

5.0 FIRST PROTOTYPE

5.1 Database

In order to make the login function operational, a local database is set. This database stores information about the users such as usernames and passwords. When a user enters their credentials, a program compares them to the data on the database and can either approve the connection or deny it.

The figure below shows the interface of the local database. It contains many options to manage the database, and a table with three columns which stores the user's information (username and password).

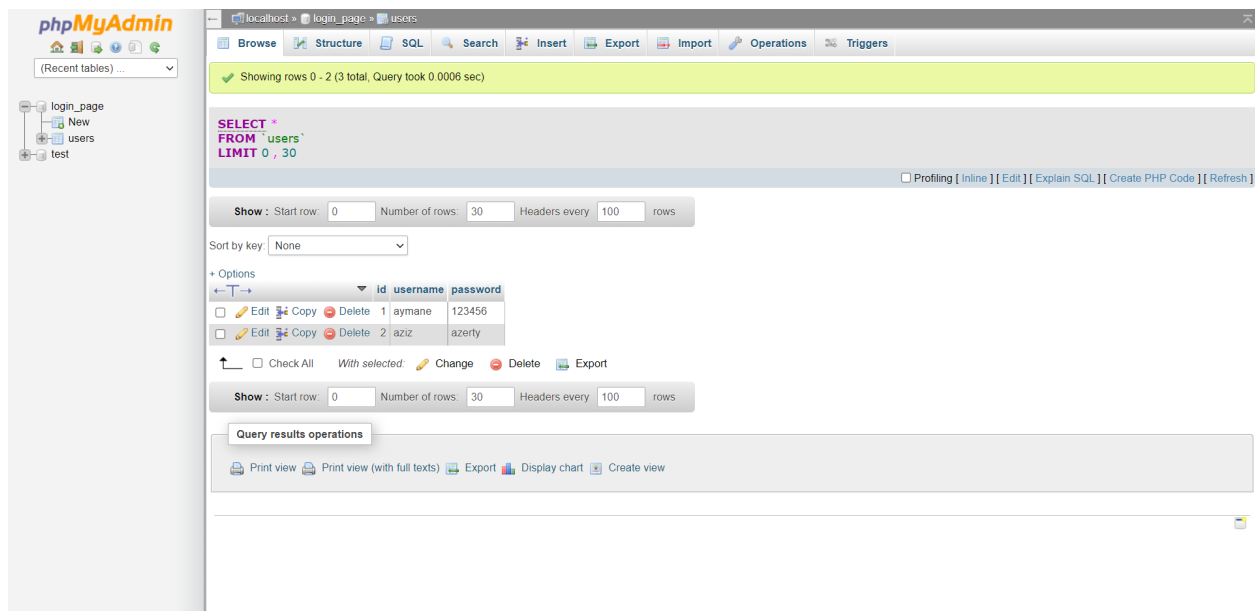


Figure 3. Interface of database

5.2 User Interface

The homescreen greets the user with the uOttawa logo and a banner saying “Welcome to Morisset Library” At the bottom of the screen there are four buttons, a home button, a speaker button, a sun button and a Sign In button. The figure below shows the positions of the buttons.

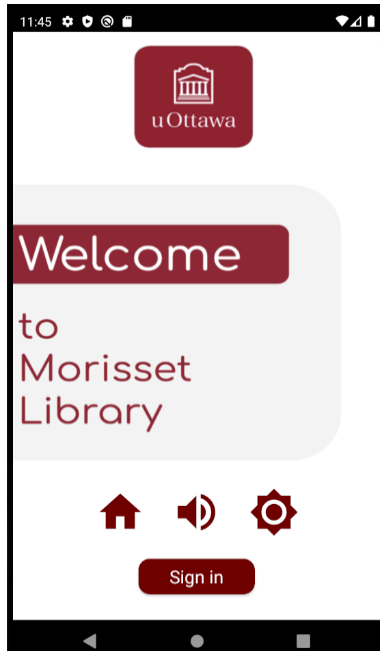


Figure 4. Homepage of application

When the admin users select the “Sign In” button, they are taken to another screen where they are prompted with their username and password. The home button takes the user to the navigational screen. The speaker button activates the text to speech feature. The sun button activates dark mode. There are only two functioning buttons which are the home button and the sign in button.

6.0 PROTOTYPE TESTING

6.1 Testing The Login Function

The login function is tested on a web browser. This choice was made because debugging is easier on a web browser than on an app, and the results are the same.

The figure below shows the login interface on a web browser. A simple interface is used because the goal of these tests is to determine whether the program is functional or not, the aesthetics don't affect the results.

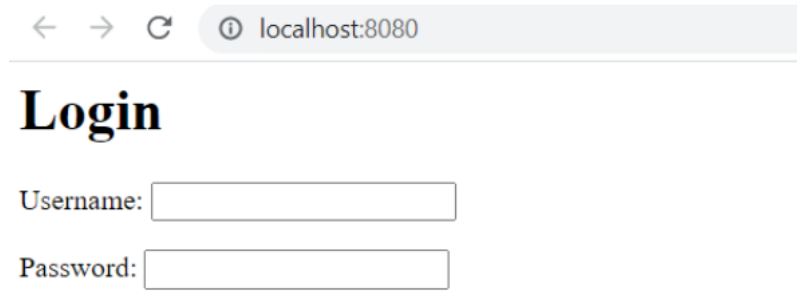


Figure 5, Login interface

6.1.1 Leaving the username and password fields empty

The figure below shows the warning given by the browser when the user leaves the fields empty and tries to login.

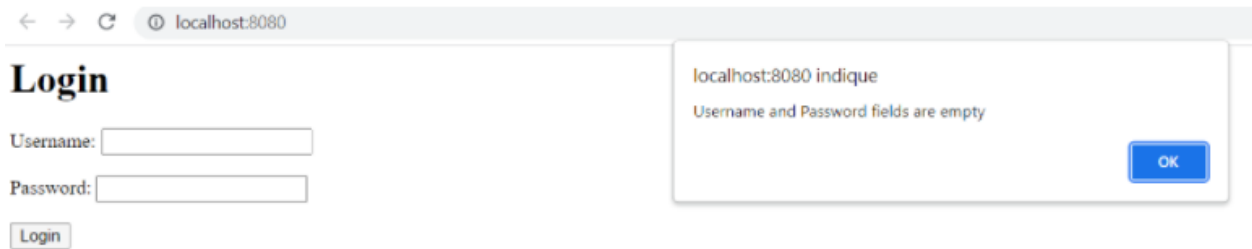


Figure 6. Empty credentials warning

The fact that a warning message is displayed proves that this first test is a success.

6.1.2 Entering the wrong login information

The figure below shows the message displayed when the user enters an incorrect username or password.



Figure 7. Incorrect credentials warning

The user is unable to login with invalid information. This second test is a success.

6.1.3 Entering the correct login information

This figure shows the message displayed when the login is successful.

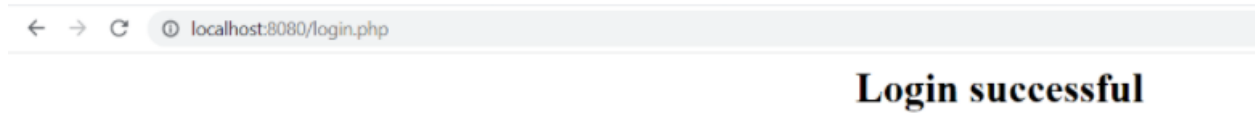


Figure 8. Successful login

The user logs in successfully when the correct username and password are used. This third test is a success.

6.1.4 Conclusion

After testing the login feature, it appears that it's operational. A message is displayed if the fields are left empty and the user can login only by using a valid username and password.

6.2 Testing The Homepage Buttons

There are only two functioning buttons at the current moment, the home button and the Sign In button. When the home button is pressed the app takes the user to the navigational screen. The figure below demonstrates what happens when the home button is pressed.

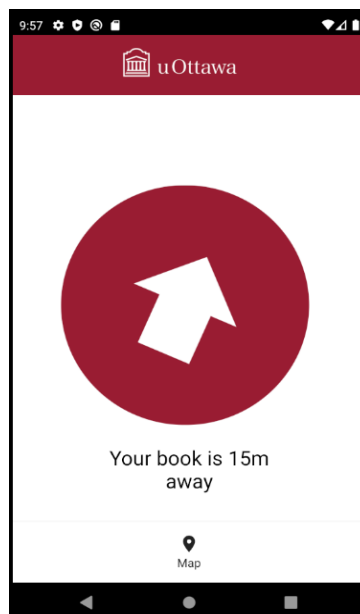


Figure 9. Navigation Screen

The test of pressing the home button was a success. The user is taken towards the navigation screen. The next functioning button is the Sign In button. The figure below shows what happens when the user presses the Sign In button.

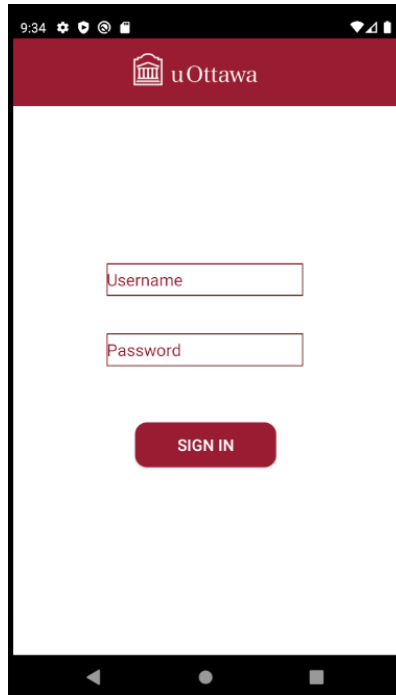


Figure 10. Sign in screen

The test of pressing the Sign In button was a success. The user is taken towards a screen where they can enter their login information.

7.0 NEXT CLIENT MEETING

The team intends to present all of which was produced within Deliverable D including the progress made with the User Interface as well as the Database. It would be beneficial to receive feedback on the current state of the interface as well as what could be improved in further iterations.

8.0 BILL OF MATERIALS

The table below shows the different items needed to build a final prototype, a description of each one of them, their costs, their use and a link to buy them.

Table 1. Bill of Materials

#	Item	Description	Cost (CAD)	Use	Link (to buy it)
1	Android studio	IDE for android application development	0.00	It is used to develop an android application which enables the user to find his way in the library.	https://developer.android.com/studio
2	Arduino Nano 33 IoT	Microcontroller board with bluetooth	\$32.99	It controls the bluetooth beacons	https://amzn.to/3iHlocA
3	2 bluetooth beacons	Hardware with bluetooth	\$32.78	It communicates with the application to give directions to the user	https://amzn.to/3iITblx

To build a final prototype 65.77\$ is needed for buying the different items.

9.0 CONCLUSION

In conclusion, the team has built the first prototype following a specific prototype plan. This helped validate some questions that arose throughout the building process as well as give the team a clearer idea of how much time is required to build a product that meets the team members' standards. This initial prototype helped the team get a better understanding of what the problem is as well as how the solution may be achieved. As the team advances towards future prototypes as well as the final product, the feedback received from users as well as more features in increasing complexities will be included.