



Department of Computer Science
COSC 4P02 - Interactive Mapping System

Final Progress Report

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1 Overview

This report covers the final product developed for our interactive map project during the Winter 2023 term, allowing insight into the aspects of the project that have completed construction and avenues of future development. This report will focus on the software specification received at the beginning of development for this project, showing the achieved successes and failures that occurred. This report focuses highly on the last month of development, as considerable changes on the map interface portion occurred, as well as the methods of testing utilized. Overall, this report is an overview of the modifications and completion of the map interface portion of the program.

1.1 Sprints Over Project Lifetime

During the entire development period, our team remained separated into sub-teams, with Connor Vriewyk and Salman Saeed working on designing and creating the user interface and mobile app portion, with members Kevin Olenic and William McCormick working on the interactive map program.

Kevin Olenic designed and developed the JavaScript for the interactive map functions present in the website and crafted the website's HTML and CSS code and the JavaScript for the database functionality. Member William McCormick researched how to apply different types of tiles to the map and contributed to this portion's completion, he also recorded the groups' interactions during meetings.

Riely Benson was initially responsible for setting up the Firebase database and determining how to host the project on Firebase or GitHub and became charged with designing and implementing the login functionality of the program and setting the admin login features of the program by using the database functions previously developed for the map.

During development, bi-weekly meetings were held, with each ending with a retrospective to determine if any changes to our meeting schedule were needed or if extra gatherings were required, during a retrospective meeting additional meetings were setup between coordinating team members to discuss development of the project and coordinate tasks to be completed, to view some of these communications [Click Here](#), with a another retrospective meeting changing the bi-weekly meetings to a weekly session during the final four weeks of development.

2 Contributions (Individual)

The below list gives the individual contributions and efforts put forth by each team member, towards completing the project over the development term. It includes the item contributed, the month they started the item, and the month they finished the item.

All contributions recorded below where submitted before the final presentation for this group on April 27th (Date of the final presentation), and all personnel sections were contributed by the individual team member.

2.1 William McCormick

- Lead each scrum (initiated conversations, initiated the calls, made sure that everyone had a chance to speak, made sure that anything of importance was recorded and waited to see if individuals updated on those items throughout the next week)
- Worked on the initial proposal
- Scraped museum data, scraped drafted blueprints
- Preliminary research into Firebase
- Contributed to final presentation
- Provided information for each progress report
- Researched and aided in the development of applying different tiles to the map

2.2 Riely Benson

- Began my role as the product owner by discussing and recorded ideas in the early stages of development
- Planned and solidified group ideas on how the project should be in the final stages
- Researched different programming languages and decided on which would work best for our project
- Began research to utilize Firebase as a database and hosting
- Began research on how to publish the project for android
- Began research on how to use Android studio and conducted preliminary testing
- Discussed ideas and issues in weekly scrum meetings with group and worked on how we can overcome obstacles
- Participated in weekly meetings (one meeting was missed due to miss-communication on the time planned) and pushed the group towards better communication
- Began experimenting with Firebase and developing local JavaScript code to learn how to use the Firebase real time database
- Created the Discord group chat for better communication within the group
- Set up GitHub hosting after deciding it would work better for our application
- Started development on the sign-in feature which involved working directly with

Firebase to store user information using Firebase's built in Sign-in feature.

- Restarted sign-in function due to a pay wall for adding Administrative privileges to users
- Developed Sign-in method using Firebase's real time database to store user information to be accessed at a later time.
- Created a work around for adding administrative features to users by having their user name stored as a cookie for later referencing when checking if a user is an admin or not.
- Performed many daily scrums and updated the Discord group chat on what I was doing and what was completed with specific details.
- Created a second Firebase Database and refactored a copy of the projects code for testing functionality of the project without impeding on current saved data
- Tested sign-in functionality extensively based on the information provided for the functionality of signing in.

2.3 Connor Vrieswyk

- Added the web view component of the mobile app to access the map program (January - April)
- Added JavaScript code to make the web version compatible with the mobile app (March - April)
- Researched integration between android applications and web based content
- Researched methods for adapting JavaScript code to function in a constrained app setting
- Tested each part of the programs functionality for compatibility with a mobile device
- Attended every scrum meeting and sought help from group members for any issues or complications
- Updated app codes to keep up to date with the latest website changes

2.4 Salman Saeed

- Designed the interface for the android mobile app and Implemented the app to be used on all android devices supporting android 10 and above(January - April)

- Tested the app regularly to ensure all features were working as intended
- Provided info for progress report and a user manual for the app (April)

2.5 Kevin Olenic

- Set up the product backlog on scrumdesk (January 26th)
- Contacted Niagara museum to get information on what the functions they want to see in an interactive map and what features they would like to see. (February 4th)
- Wrote and edited all progress reports and collected the necessary information from each team member, aided in writing of project proposal, contributed to final presentation, created several pieces of documentation to help with development process (user-stories, relationship diagrams, physical deployment graph, sequence diagrams, interaction diagrams, etc. To view [Click Here.](#)) (January - April)
- Researched, developed & implemented CSS code for website, making several modifications and bug fixes to it over the lifetime of the project (January - April 25th)
- Researched, developed & implemented JavaScript/HTML code for floor layout input (January 27th- February 20th)
- Researched, developed & implemented JavaScript/HTML for floor info input tile selector & info input (February 20th - February 14th)
- Researched, developed & implemented JavaScript/HTML for start page of map creation process where user designates the name and number of floors in the museum (February 25th - March 9th)
- Researched, developed & implemented JavaScript/HTML for map previewer and floor editor buttons (February 14th - February 24th & March 10th - March 19th)
- Researched, developed & implemented JavaScript/HTML for map viewer (March 19th- March 20th)
- Performed several modifications to the initial map creation process to fix bugs and errors present in the process (March 20th - April 3rd)
- Researched, developed & implemented JavaScript for Firebase database functionality and interactions for both real time database for map storage and image storage (April 3rd - April 3rd)
- Researched, developed & implemented JavaScript/HTML for the initial page of the map program that allows user to view the maps in the database and allows for either viewing or editing. (April 4th - April 8th)
- Researched, developed and implemented the administrative buttons that allow cre-

ating, editing and deleting a map from the database. (April 8th - April 11th)

- Researched, developed & implemented JavaScript/HTML for image selector, uploader and remover & performed several updates and modifications. (April 16th - April 26th)
- Researched, developed & implemented JavaScript/HTML tile type selector for floor layout portion of map creator (April 23rd - April 23rd)
- Performed several modifications to the Museum name and amount of floors input portion of the program (April 24th - April 27th)
- I arranged and attended all meetings and provided information on the status of my tasks, and answered all questions within my knowledge and offered feedback and suggestions to other people's work if I had constructive feedback. (January - April)
- I gave daily scrum updates on my progress and kept team members apprised about which tasks I am working on and those I have completed, as well as alerting them what pieces required completion. (January - April)
- Posted all developed code and documentations to the GitHub (January 11th - April 27th)

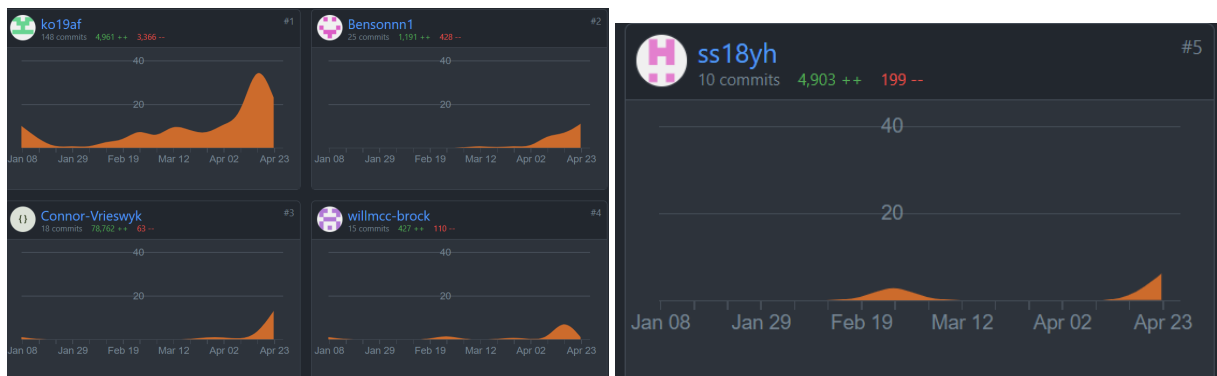


Figure 2.1: Group contributions to GitHub

3 Design

3.1 Mobile Map interface

The mobile component of our project provides a direct link from a mobile device to the website on GitHub, the app was to display the program through an interface compatible with mobile devices, but currently, it only provides a link to the website itself and provides a rating function, which a user can rate with a score out of five.

A user manual covering the mobile version of the app can be seen by [Clicking Here](#) to view the Manual.

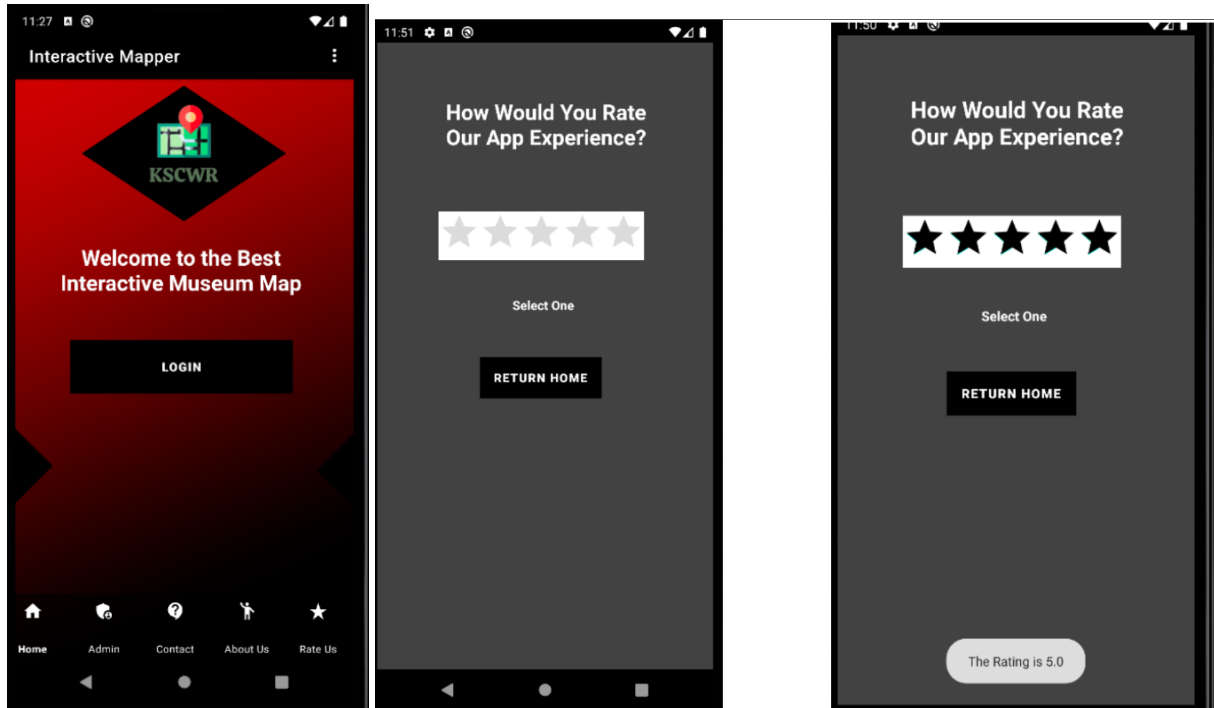


Figure 3.1: Exclusive App Pages

4 Implementation

4.1 Map Interface (Updates)

As stated in the previous report, the overall system for uploading map information was developed and implemented, since then design changes and additional features are enforced to change the appearance and functionality of the program and also restrict user actions, preventing them from performing illegal acts that could cause errors in the map uploading process. An additional stage was introduced into the process allowing an individual to upload images related to the floor designed by the user.

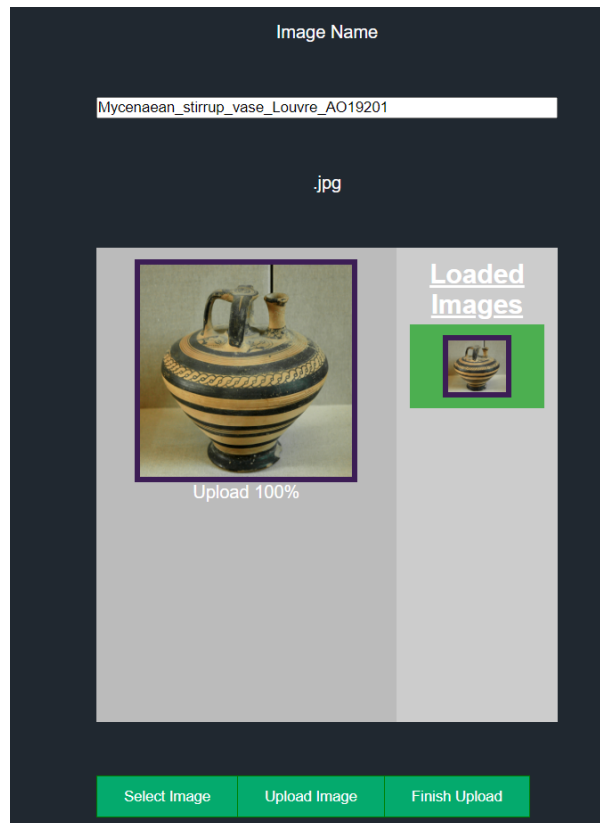


Figure 4.1: Shows portion of program uploading image to map

The picture shown in 4.1 is the latest addition to the map creation process, this stage is where a user defines the images added to this floor map interface, they select an image from their device via the browser, which is shown to them in the box of the centre of the screen and if the image is the desired one to incorporate, they will load it to the Firebase to display it with the floor.

The column on the right shows the images that have been selected and added to the floor's image data, and by clicking on the picture, the user can remove this image from the floor data.

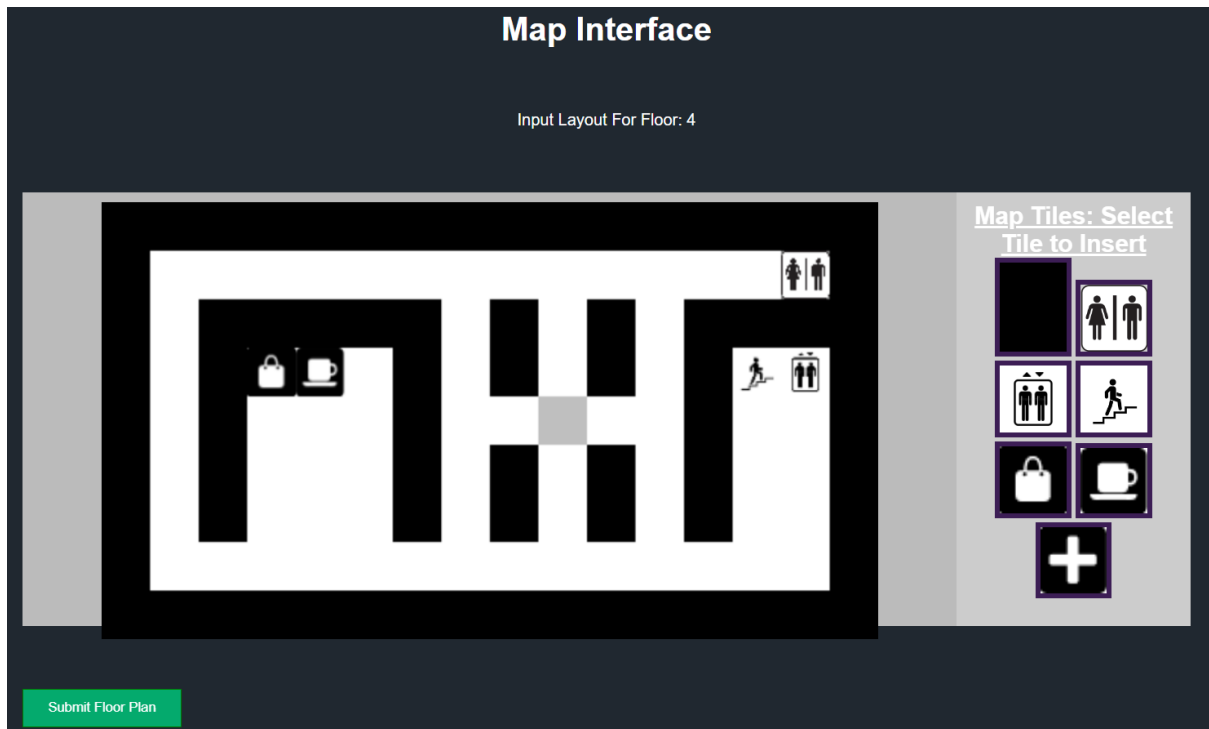


Figure 4.2: Shows floor plan with unique tiles

The pictures in 4.2 depict the fully functional floor layout portion of the map creator/editor, where a user defines which tiles will be present on this floor of the map, allowing the creation of a more detailed map as it alerts visitors to points of interest such as washrooms, elevators, stairs, first-aid stations, gift shops and cafes located within the premise of the museum and the precise floor it is on.

To view the user manual on how to operate the system developed for this project Click [Here](#)

4.2 Database

For the database, this project utilizes both Firebases Real Time Data Base for storing map and user information, while images displayed within a map or used to designate the different types of tiles in the map are stored in Firebase storage implementation. Allowing ease of access to insert, update or delete map information in real-time and storing the images used for the map in a safe location, preventing data loss concerning the pictures used.

5 Testing

For testing two styles were utilized, the first being modular testing during development, which involved taking a portion of the system, isolating it and performing various scenarios to ensure the program was performing as desired. The second form of testing was use cases, this involved taking the complete program and running through different user input scenarios to determine if the program would respond correctly. Using these test-

ing methods revealed several issues and methods of misuse, these were then successfully corrected, preventing a number of user-generated errors from being performed during the deployment of this system.

- Tested the museum name and amount of floors input in the map creation process, revealed issues where user could use name already used, leave fields blank, enter zero or negative number of floors, or enter an extremely high number of floors.
- Tested the image editing portion of the map, revealed issue where Firebase automatically deletes empty image array, test case revealed this null pointer exception problem.
- Tested ability to transfer data between pages using map data structure, revealed JavaScript is incapable of transferring this datatype between pages.

All these problems discovered during testing were successfully resolved, and all components outlined above in the described test are now functioning properly.

6 Sprints

6.1 Meetings & Communications

During the project's lifetime, meetings attendance was not complete, and attendee communication was sparse, causing a lack of clarification during meetings and development about what needed to be completed and tested for the project. The group chat established to deal with these problems was underutilized, resulting in poor coordination and communication, causing little contribution in areas of the interactive map project, causing delays and slow development throughout the project's lifetime, impacting the construction of the project.

6.2 Future Development & Outstanding Requirements

For future development, one can make several changes to the design and functionality of our map and user interfaces to make it appear more appealing and provide more instruction on how the program works. One can also incorporate features that did not make it into the final product, such as the maps legend, login functionality to prohibit access to the administrative functions and modifications to allow multiple users to upload map information without causing issues to the application, these are only a few modifications and additions that can be implemented. Development can also focus on the app portion of the map to incorporate the ability to click on the tiles and get the same response as expected on the website, and to augment the app so it creates a display more compatible with a mobile device.

6.3 Initial Backlog & Division of Items

During the project's lifetime, Scrumdesk was available for each team member to use in tracking and managing the completion of backlog and sprint backlog items, with the backlog tasks separated into the mobile app and system/website tasks for each subgroup

to complete. The plan for the division of items was that during each sprint meeting, each team member would designate the items in the backlog that they would tackle during the sprint, team members would then provide a daily update through the daily scrum on the group chat established on Discord to alert team members of their progress, and if a team member notified the group of any issues encountered and required assistance then they would receive help from another member to complete the task. These methods were underutilized during project development as not every team member consistently updated the team on their progress using the daily scrums and updating the Scrumdesk backlog throughout the project's lifetime.

6.4 Backlog Items

Below is the list of the planned Backlog items (features) completed for the sprints of this project.

- Input Map Data
- Incorporate unique tiles on map, depicting locations or points of interest
- Implement Image selector, upload & Delete functions
- Update floor layout
- Update floor information
- Update floor images
- Create & implement ability to select tiles in map and insert information
- Preview Map information page
- Display Map information page
- Map page showing museums available for viewing/editing
- Store, Retrieve, Update & remove Data from database
- Implement administrative functions (update, add & remove map data)

Below is the list of planned Backlog items (features) not completed for the sprints of this project.

- Administrative sign-in
- Map legend
- Multiple user access

7 Problems

- Members of the team did not perform their Daily Scrum
- Communication between members did not improve until final weeks of project

8 Links

GitHub: https://github.com/ko19af/COSC_4P02_Project

Discord: If access is required to our Discord chat please contact Kevin Olenic at ko19af@brocku.ca for access, or any other member of this immediate group.