Niagara On The Lake Museum Interactive Map

1. Introduction

1.1. Purpose of Document

This document provides a detailed analysis of the requirements of this web-based interactive map project including the purpose of such a system and the goals it aims to achieve. Functional and non-functional requirements, abstract system structures and a few main use-cases will also be presented to create a guideline for what the intended system should behave.

1.2. Summary

This software project is an online interactive map used for Niagara-On-The-Lake (NOTL) Museum. The map shows the structure of the NOTL Museum at the exterior and interior level. The interior level consists of points of interest such as artifacts, toilets, exits and more as well as switching between the different floors of the museum. Users may also choose to view artifacts on the map and gain brief insight into their importance. The aim of this project is to create a map to help users navigate around the museum but also provide an interactive experience that encourages curiosity and exploration.

1.3. Background

The Niagara-On-The-Lake (NOTL) Museum has operated since 1907 to preserve and promote NOTL's history through displays of its artifacts and heritage. Over time, the museum has expanded and currently has three buildings consisting of permanent and temporary exhibitions. As a result of this, the layout of things may shift around and a fixed, paper map may not be adequate to help the museum's visitors navigate around the museum. Thus, an interactive map has been proposed to allow for more flexibility in accounting for exhibit changes but also to provide users with more interactivity to make navigation easier and faster.

1.4. Purpose of Project

1.4.1. Responsibilities

Main responsibilities of the interactive map:

- Provide users with a map that allows users to view the inside of the museum
- Allow users to see the most recent version of the map
- Allow users to search for and find artifacts and other points of interest on the map as well as providing guidance on how to get there
- Allow the museum staff to edit items on the map

Additional responsibilities

- Provide accessibility features (multiple font sizes)
- Consistently maintain visual and behavioural design choices.
- Use the colours associated with the museum for the main colours

Not responsible for

- Keeping inventory of the museum although the databases may have similarities due to us not having access to their database directly.
- Providing directions to get to the museum

1.4.2. Users

Visitors/Guests

- Visitors and guests will benefit from the app by having a method to find points of interests on the map. This will come in handy if the user is under time constraints to find something like the toilet or the exit.
- They can also use the artifact details function of the map to briefly learn more about each artifact.

Staff

- The staff will be in charge of maintaining the application by updating where exhibit artifacts are placed and adding new markers if a new stall/display is installed.

Museum Owner/Admin

- The owner, and any other admins, will be in charge of managing the staff accounts (i.e., creating, deleting or editing account information). They will also have access to the same editing features as staff.

1.4.3. Location

The system shall be accessible through the internet and is thus available to anyone with an internet connection. Optionally, the NOTL museum may want to provide tablets that the user can walk around with and hold with the interactive map application loaded on it.

1.4.4. Need for system

The interactive map is able to make it easier for the visitors to gain access to information about the layout of the museum as neither a physical or digital map existed for the museum before this.

2. Functional requirement

2.1. High priority

- The system shall allow users to view the map layout, showing the location of all exhibits and facilities.
- The system shall allow users to change floors on the map
- The system shall allow users to zoom in and out on the map
- The system shall allow users to move the map around
- The system shall allow users to use filters to separate types of locations on the map (e.g., exhibits, restrooms, gift shops, and other facilities)

2.2. Medium priority

- The system shall allow users to search by keywords or categories for specific exhibits
- The system shall allow staff/admin to modify the exhibits through the application
- The system shall represent exhibits on the map as icons with a number inside showing how many items are in that exhibit “stall”.

2.3. Low priority

- The system shall allow users to filter by exhibit item category (aboriginal related, war-related, black history related, etc.)
- The system shall notify users about special (limited-time) events

- The system shall allow users to change the font size of the text by selecting from 3 pre-determined font sizes
- The system shall include a link to redirect the user to the official museum website
- The system shall allow users to input their starting location and destination and generate the shortest path as a line on the map

3. Non-Functional requirement

3.1. Reliability

- The system shall be running with all its functions performing as intended at least 90% of the time.
- The system shall also not be down for more than 5 minutes and shall not go down when the staff is making changes.

3.2. Usability.

- The user should be able to understand how to interact with the map without guidance.
- The staff should be able to understand how to control the backend data with couple minute of instruction

3.3. Performance

- The system shall support at least 100 concurrent users without crashing.
- The system should also not see any reduction in response time or loading times with 100 concurrent users.
- The mean time to load and display artifacts should not exceed 10 seconds.

3.4. Security

- The system shall provide a login system for staff and admin only and shall prevent users from creating an account.
- The system shall only allow admins to add, remove or modify staff accounts and allow staff to only view and modify their own account details.

- No users may directly interact with the database as all interactions must be done using tools provided on the application.
- The system shall securely store the log-in details and the information shall not be shared with any third-party for any reasons.

3.5. Supportability

- The system shall allow new exhibit items to be added and for exhibits to be moved around on the map without requiring major system changes.
- The system shall be accessible from any modern browser.

3.6. Interface

- The interface components should be coloured differently based on the category of the item.
- The font should be clean and legible and should be accompanied by symbols wherever relevant to aid the user's understanding.

4. System Design

4.1. Use case description

These are use case descriptions for the main features of the map program.

Use Case	Selecting an artifact on the map
Actors	Any type of user, the map, database
Description	The user can select an artifact on the map by pressing onto a marker and scrolling through the list of artifacts located at that marker. From that list, they can select the desired artifact.
Step-by-step actions	1. Select the interior view 2. Move around the map (optional) 3. Select one of the red markers on the map (see Section 4.4 for a better visual understanding) 4. Scroll through the list of artifacts shown at the bottom of the page 5. Select one artifact by clicking on it
Alternative actions	None
Stimulus	User mouse click/touch input on the map
Pre-condition	No artifact selected
Post-condition	An artifact is selected and a pop-up window will show the name of the artifact, images of it and a brief description. The users may also be given the option to find the path to that object if it is currently on display.
Comments	Each marker has a collection of artifact IDs that can be queried from the database to create a list of artifacts at that marker.

Use Case	Filter the Items on the Map
Actors	Any User, Database, Map
Description	The user can filter the items on the map through the use of the filter

	option located in the Settings
Step-by-step actions	1. Select the Settings Button 2. View the Filters in the Filters Menu 3. Check One or more of the Existing Filters 4. Confirm Selection of Filters 5. View Map to see Filtered Options
Alternative actions	Alternate 3. User can deselect currently selected filters Alternate 4. Cancel Selection of Filters
Stimulus	Selected Filters
Pre-condition	The user is able to visit the application to view the map and can open the Settings menu to view existing filters Items exist in Database to be Filtered
Post-condition	When items are found with the selected filters in their category their pins will be displayed on the Map.
Comments	Application is able to interact with the database to retrieve Items that have been filtered

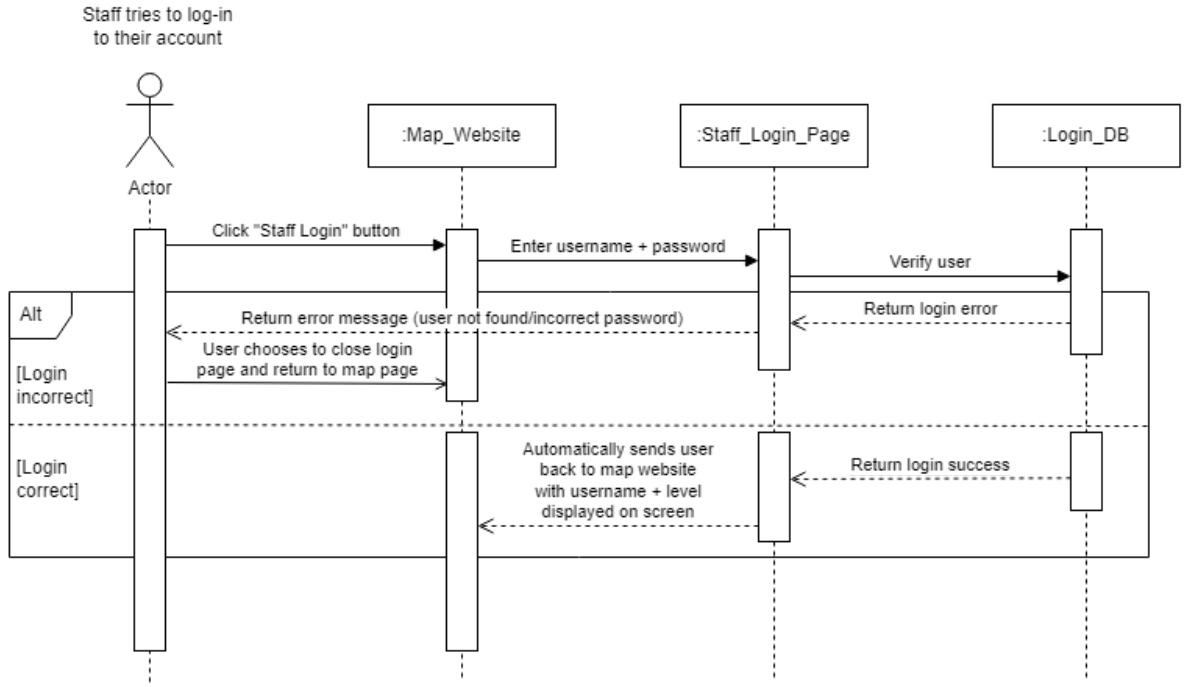
Use Case	Finding the path to an artifact
Actors	Any user, map, database
Description	The user can find the shortest path between their input location and target destination.
Step-by-step actions	1. Select the artifact that you would like to find the path to 2. Click “get directions to” on the artifact pop-up screen if available 3. Select the input location (where you are or where the starting position is if they are not the same) 4. Follow the path generated by the map system
Alternative actions	Step 1a: Select using the map Step 1b: Select using the search bar

	Step 2: if unavailable, cannot find the path. Use case ends. Step 3a: Select using map Step 3b: Select using search bar Step 3: Select using a fixed spot (e.g., front door of building)
Stimulus	User's choice of destination and starting point
Pre-condition	No path generated
Post-condition	If a path can be generated (both points are on display), the shortest path will be generated from the specified starting point to the ending point. Otherwise, an error message saying a path cannot be generated because an item is not on display will be presented and no path is generated.
Comments	A path can only be provided for items that are currently on display.

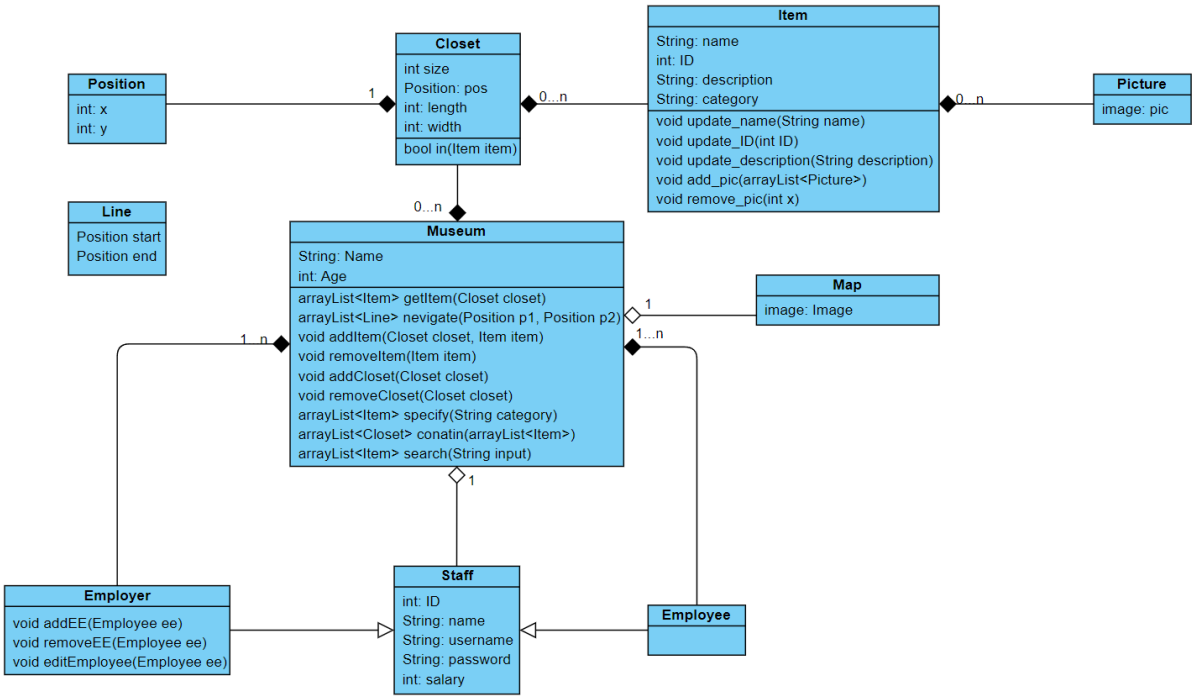
Use Case	Searching for artifact using the search bar
Actors	Any User, Database, Map
Description	The user can pinpoint the location of specified items on the map using the search bar and typing in the name (or potentially also other identifiers).
Step-by-step actions	1. User inputs item name to search bar 2. User sends search request
Alternative actions	None
Stimulus	Item Name
Pre-condition	No artifact selected
Post-condition	If an item is found with the inputted name and the map pans to its location with the item being selected, else an error message is displayed when it isn't found.
Comments	Application is able to interact with the database to retrieve Items that have been searched for

4.2. Sequence diagram

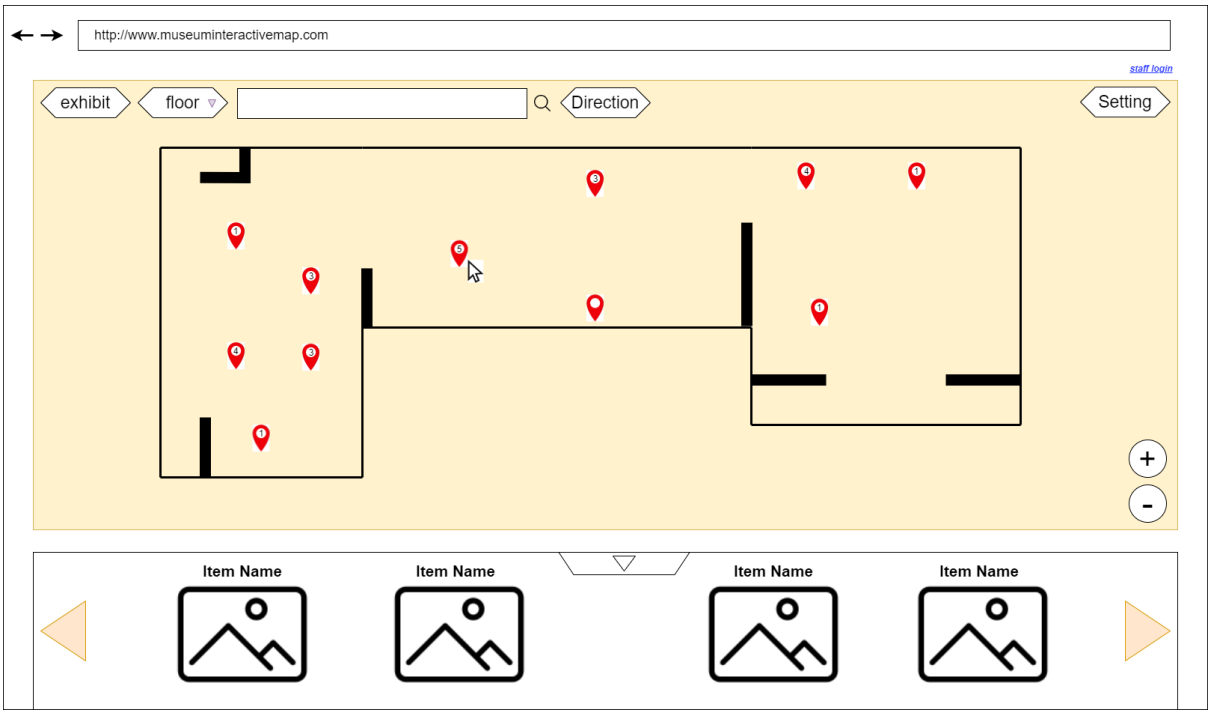
Sequence diagram for logging in:



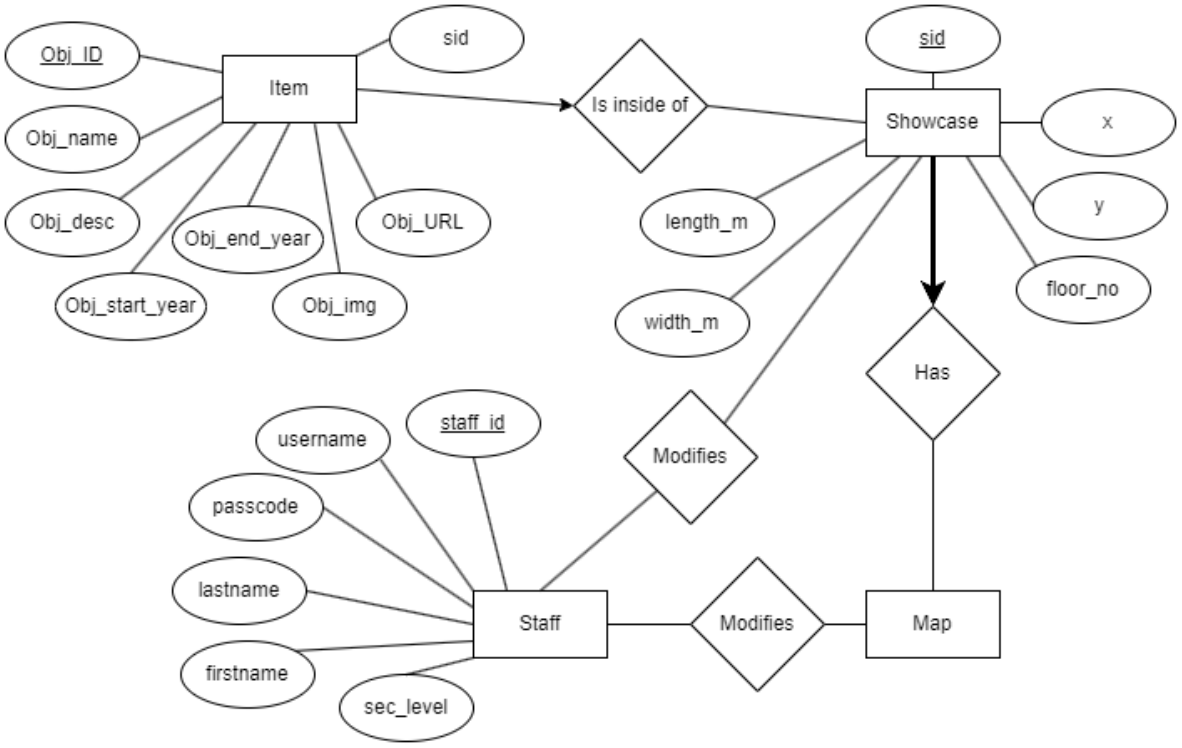
4.3. Class diagram



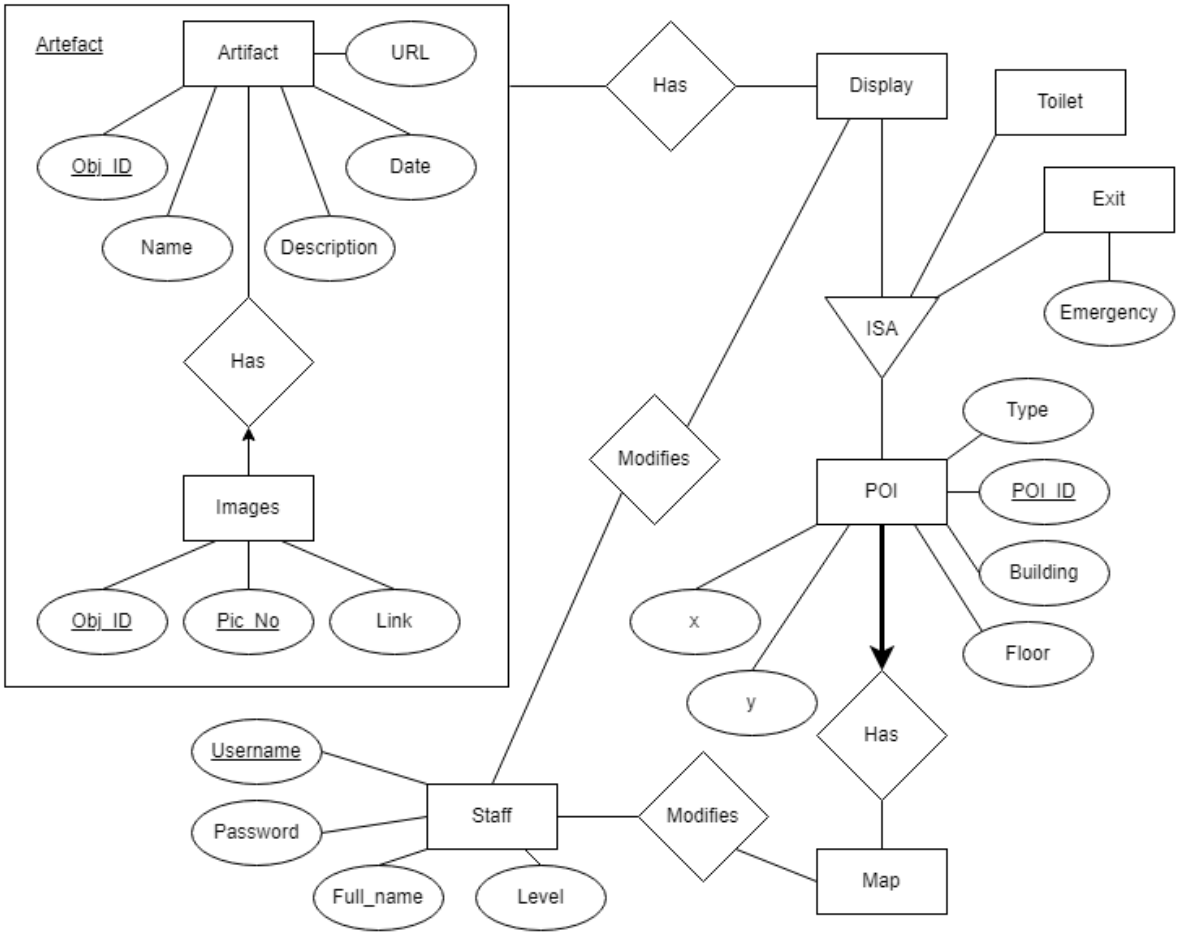
4.4. UI Design



4.5. ERD for Database (updated)



Below is the old one for reference:



- We decided to simplify the database as the excess complexity was unnecessary for the purpose of the application