

Find A Room

Design Document

CS 307

Team 13(Snoxy)

September 21, 2014

Members:

Nathan Chang

Xiaojing Ji

Zilun Mai(Owen)

Saranyu Phusit(Team Leader)

Yao Xiao

Instructor:

Professor Buster Dunsmore

Project Coordinator:

Miguel Villarreal-Vasquez

Contents

1	Purpose	3
2	Design Outline	3
2.1	Requirements	3
2.2	General Priority	3
2.3	Outline Figures	3
3	Design Issue	4
3.1	Functional Issue	4
3.1.1	Issue 1	4
3.1.2	Issue 2	4
3.2	Non-functional Issue	4
3.2.1	Issue X	4
4	Design Details	5
4.1	Components	5
4.2	Process	6
4.3	UI mockup	8

1 Purpose

A mobile application that will give directions indoors by scanning QR codes put on walls throughout a building. The app will direct them towards their destination from where they are.

2 Design Outline

2.1 Requirements

The design should meet the following requirements.

- Having a visual guide with photos for navigating me to destination.
- Navigating to the closest restrooms and water fountains and other destinations.
- Getting the current location.
- Automation adding my building map into an app and specify important destinations at ease.
- Response Time: The response time after user starts walking should not be more than 1 second

2.2 General Priority

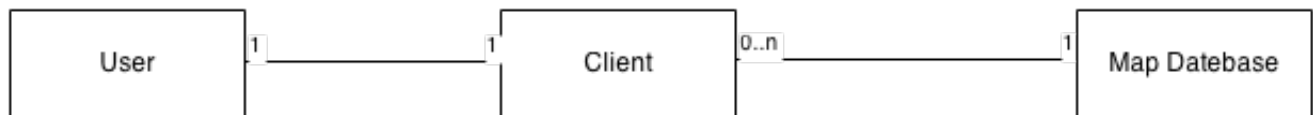
The decisions that we make in this document are based on the priorities that we have set for the project. These are (in order of importance):

- **Reliability:** The app should lead the user to the destination as quickly and precisely as possible. We take it seriously since that's the most important part of our project.
- **Scalability:** The app should work with any building with basic structure.
- **Size:** The size of the app should be small, the user should download it quickly.
- **Supportability:** The app should work without having the developers add the map and checkpoints manually. We may add it if time allows.

2.3 Outline Figures

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Aenean commodo ligula eget dolor. Aenean massa. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Donec quam felis, ultricies nec, pellentesque eu, pretium quis, sem. Nulla consequat massa quis enim. Donec pede justo, fringilla vel, aliquet nec, vulputate eget, arcu. In enim justo, rhoncus ut, imperdiet a, venenatis vitae, justo. Nullam dictum felis eu pede mollis pretium. Integer tincidunt. Cras dapibus. Vivamus elementum semper nisi. Aenean

vulputate eleifend tellus. Aenean leo ligula, porttitor eu, consequat vitae, eleifend ac, enim. Aliquam lorem ante, dapibus in, viverra quis, feugiat a, tellus. Phasellus viverra nulla ut metus varius laoreet. Quisque rutrum. Aenean imperdiet. Etiam ultricies nisi vel augue. Curabitur ullamcorper ultricies nisi. Nam eget dui. Etiam rhoncus. Maecenas tempus, tellus eget condimentum rhoncus, sem quam semper libero, sit amet adipiscing sem neque sed ipsum. Nam quam nunc, blandit vel, luctus pulvinar, hendrerit id, lorem. Maecenas nec odio et ante tincidunt tempus. Donec vitae sapien ut libero venenatis faucibus. Nullam quis ante. Etiam sit amet orci eget eros faucibus tincidunt. Duis leo. Sed fringilla mauris sit amet nibh. Donec sodales sagittis magna. Sed consequat, leo eget bibendum sodales, augue velit cursus nunc,



3 Design Issue

We run into several issues.

3.1 Functional Issue

3.1.1 Issue 1

Where to put QR Code.

Option 1: On every destination

Option 2: On the corner of the building

Although Option 1 will make the path-finding easier, we still decide to use option 2 since the user won't go through the wrong way when on an edge, and it is a waste of time to put all the QR code on the wall.

3.1.2 Issue 2

How should user get the map database?

Option 1: Download it with the app.

Option 2: Download when user wants it.

We choose Option 1 since when user needs to use it, he or she must be in a hurry of finding a classroom or bathroom so he or she may not have time to download it.

3.2 Non-functional Issue

Mobile app or Website app?

Option 1: Mobile

Option 2: Webapp

We choose option 2 since we can use XXX to transfer to a mobile program and it doesn't need native support for iOS/Android.

3.2.1 Issue X

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Aenean commodo ligula eget dolor. Aenean massa. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Donec quam felis, ultricies nec, pellentesque eu, pretium quis, sem. Nulla consequat massa quis enim. Donec pede justo, fringilla vel, aliquet nec, vulputate eget, arcu. In enim justo, rhoncus ut, imperdiet a, venenatis vitae, justo. Nullam dictum felis eu pede mollis pretium. Integer tincidunt. Cras dapibus. Vivamus elementum semper nisi. Aenean vulputate eleifend tellus. Aenean leo ligula, porttitor eu, consequat vitae, eleifend ac, enim. Aliquam lorem ante, dapibus in, viverra quis, feugiat a, tellus. Phasellus viverra nulla ut metus varius laoreet. Quisque rutrum. Aenean imperdiet. Etiam ultricies nisi vel augue. Curabitur ullamcorper ultricies nisi. Nam eget dui. Etiam rhoncus. Maecenas tempus, tellus eget condimentum rhoncus, sem quam semper libero, sit amet adipiscing sem neque sed ipsum. Nam quam nunc, blandit vel, luctus pulvinar, hendrerit id, lorem. Maecenas nec odio et ante tincidunt tempus. Donec vitae sapien ut libero venenatis faucibus. Nullam quis ante. Etiam sit amet orci eget eros faucibus tincidunt. Duis leo. Sed fringilla mauris sit amet nibh. Donec sodales sagittis magna. Sed consequat, leo eget bibendum sodales, augue velit cursus nunc,

4 Design Details

In order to achieve successful indoor navigation, the designing of this project will consider the database storing locations of lecture rooms, rest rooms and water fountain, as well as the way of locating users and navigating them to destinations inside the building. We decide to apply QR code and link each QR code to a specific location of maps. Maps has a real map images and a list of nodes and edges which represents the map abstractly. To generate graph of the map, every single node indicates a room, and every edge(with direction) means the length between two nodes. The graph is a connection of nodes and edges. The first image of following class diagram provides more details of it.

4.1 Components

QRcode: Each QR code stores its own ID. It will use QR code ID to find the corresponding map, so that users can locate themselves and obtain the floor map by simply scanning and

sending the QR code to our app

Map: Each map can be identified by its own ID named MapID. Since the real map is translated to graph, rooms and water fountains are represented by nodes, the paths between two neighborhoods are represented by edges. NodeList stores every node displayed on the map, as well as EdgeList stores every edge with direction. MapImg holds the real life map for better user visualization. The MapImg will be pumped out on the screen once the app successfully identify users location and load the corresponding map.

For ComputeMap(), once the system gets users location and destination on the map, this method helps calculate the total distance by summing up the edges(path in real life) among nodes(rooms and public facilities in real) that user will pass. The summation can be done by method addNode() and addEdge(). Thus, each single map contains multiple nodes and edges, but it can only generate one optimized path formed by those nodes and edges.

Path: Since every time user can only pick up one destination, eventually the system will provide only one path from current location to destination, this class keeps edges formed that path in a list.

Node: Each node can be distinguished by its own NodeID, IsRoom is a boolean variable to recognize whether the node is a lecture room or public facilities. PosX and PosY record the location of that node, in order to help locate each node on the map to find the optimized path.

Edge: Edges all have their own ID called EdgeID, and their starting and ending nodes. This object helps ComputePath() to find the path.

Destination: Destination is parsed from users selection on the lecture rooms list, or public facilities. Each of them can be identified by it DestinationID.

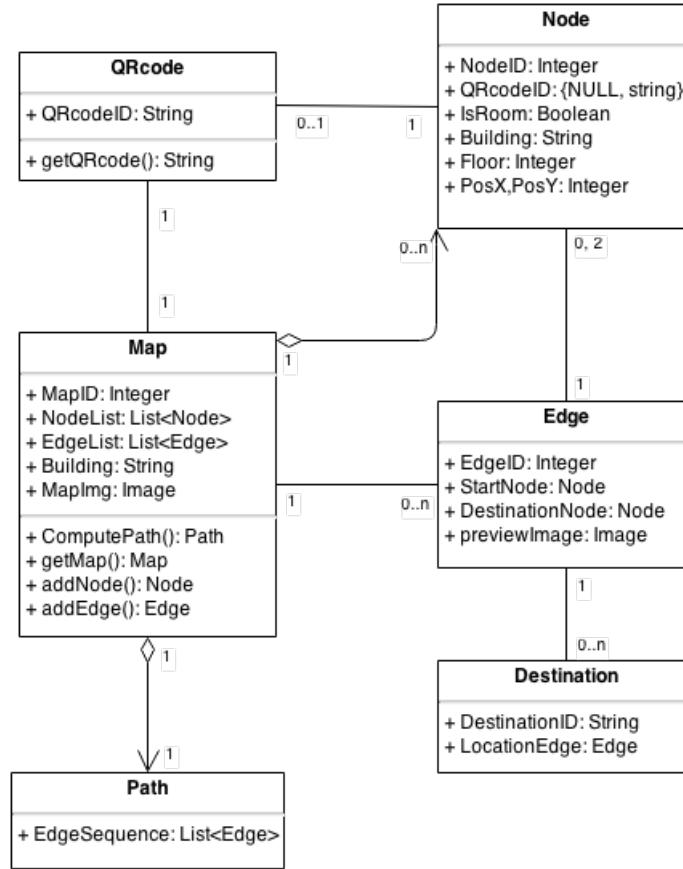
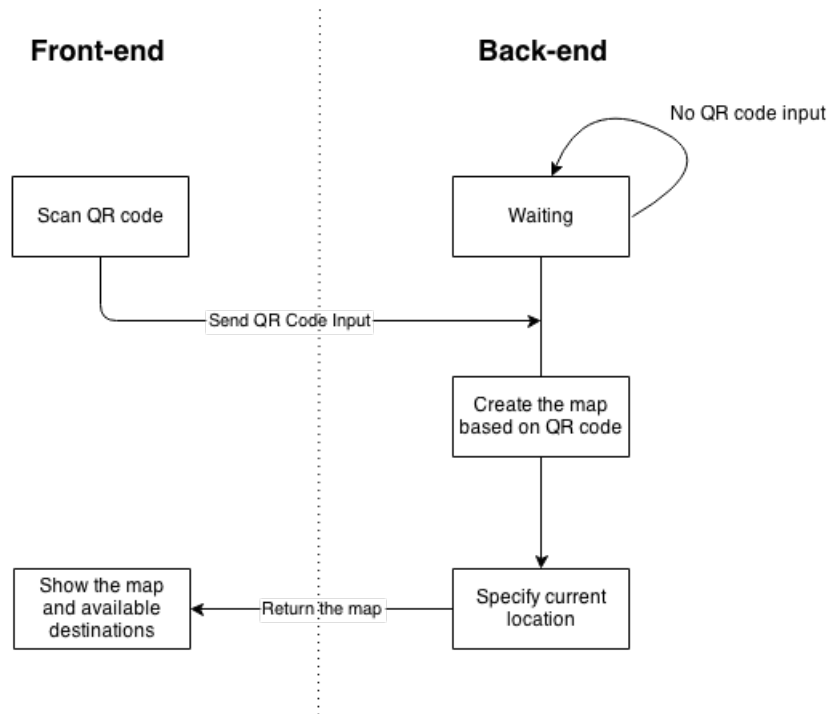


Figure 1. The Class diagram

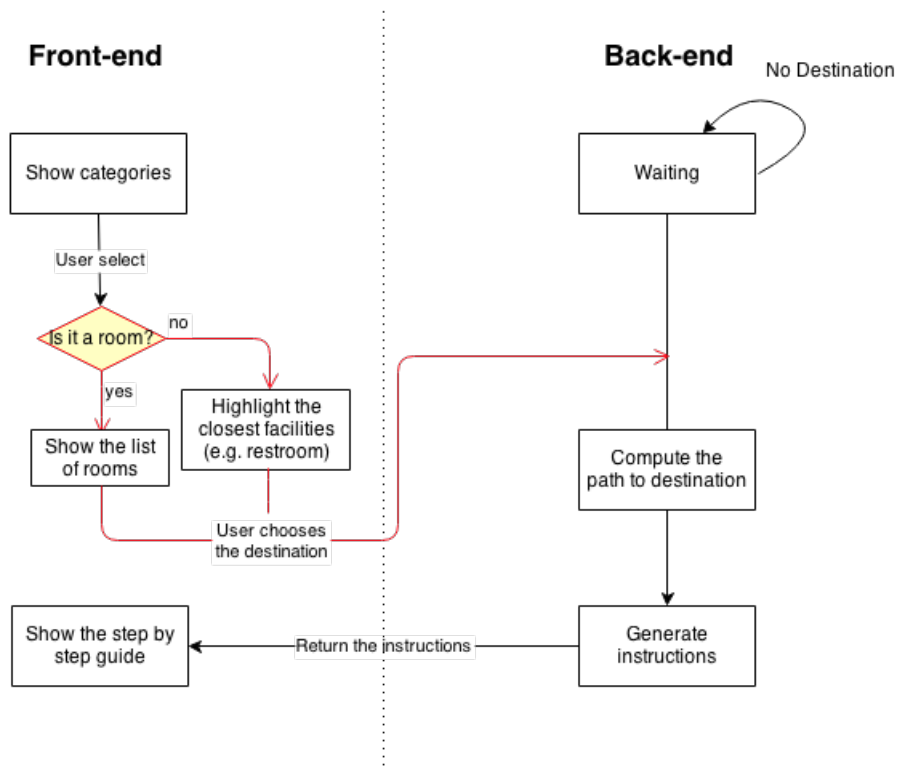
4.2 Process

We have two main process for this project. The user should scan the QR code and get the location of the current position, as well as providing the destination. The client should provide directions and showing the map of the current area.

Activity 1: Locating user locations



Activity 2: Navigating user to destination



4.3 UI mockup

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Aenean commodo ligula eget dolor. Aenean massa. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Donec quam felis, ultricies nec, pellentesque eu, pretium quis, sem. Nulla consequat massa quis enim. Donec pede justo, fringilla vel, aliquet nec, vulputate eget, arcu. In enim justo, rhoncus ut, imperdiet a, venenatis vitae, justo. Nullam dictum felis eu pede mollis pretium. Integer tincidunt. Cras dapibus. Vivamus elementum semper nisi. Aenean vulputate eleifend tellus. Aenean leo ligula, porttitor eu, consequat vitae, eleifend ac, enim. Aliquam lorem ante, dapibus in, viverra quis, feugiat a, tellus. Phasellus viverra nulla ut metus varius laoreet. Quisque rutrum. Aenean imperdiet. Etiam ultricies nisi vel augue. Curabitur ullamcorper ultricies nisi. Nam eget dui. Etiam rhoncus. Maecenas tempus, tellus eget condimentum rhoncus, sem quam semper libero, sit amet adipiscing sem neque sed ipsum. Nam quam nunc, blandit vel, luctus pulvinar, hendrerit id, lorem. Maecenas nec odio et ante tincidunt tempus. Donec vitae sapien ut libero venenatis faucibus. Nullam quis ante. Etiam sit amet orci eget eros faucibus tincidunt. Duis leo. Sed fringilla mauris sit amet nibh. Donec sodales sagittis magna. Sed consequat, leo eget bibendum sodales, augue velit cursus nunc,

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Aenean commodo ligula eget dolor. Aenean massa. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Donec quam felis, ultricies nec, pellentesque eu, pretium quis, sem. Nulla consequat massa quis enim. Donec pede justo, fringilla vel, aliquet nec, vulputate eget, arcu. In enim justo, rhoncus ut, imperdiet a, venenatis vitae, justo. Nullam dictum felis eu pede mollis pretium. Integer tincidunt. Cras dapibus. Vivamus elementum semper nisi. Aenean vulputate eleifend tellus. Aenean leo ligula, porttitor eu, consequat vitae, eleifend ac, enim. Aliquam lorem ante, dapibus in, viverra quis, feugiat a, tellus. Phasellus viverra nulla ut metus varius laoreet. Quisque rutrum. Aenean imperdiet. Etiam ultricies nisi vel augue. Curabitur ullamcorper ultricies nisi. Nam eget dui. Etiam rhoncus. Maecenas tempus, tellus eget condimentum rhoncus, sem quam semper libero, sit amet adipiscing sem neque sed ipsum. Nam quam nunc, blandit vel, luctus pulvinar, hendrerit id, lorem. Maecenas nec odio et ante tincidunt tempus. Donec vitae sapien ut libero venenatis faucibus. Nullam quis ante. Etiam sit amet orci eget eros faucibus tincidunt. Duis leo. Sed fringilla mauris sit amet nibh. Donec sodales sagittis magna. Sed consequat, leo eget bibendum sodales, augue velit cursus nunc,