G.T.G.

Goat To Go

Requirements Analysis

Joshua Pritchett - Project Manager
Neha Mahajan - HCI/UI
Jingjun Zhang - Product Owner
Yixiao Pan - Lead Developer
Libin Yang -Developer
Alyssa Herz -Developer
Jianan Li - Developer

Requirements Analysis

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1.1 Introduction

The WPI campus is large and intimidating to those that are unfamiliar with the campus. Visitors, students and faculty need a way to be able to find out how to get from one location to the next in an efficient manner. The Goat-to-Go system will do just that; provide people with a mapped out route to get from one location on campus to the next. Users will be able to select two locations on campus, be that a building or a classroom, and the system will draw a path on the map.

The scope of this project is limited to directing users to areas within the WPI campus and rooms in the following buildings

- Atwater Kent
- Boynton Hall
- Campus Center
- Gordon Library
- Higgins House & Garage
- Project Center
- Stratton Hall

The objective of the Goat-to-Go system is:

- Allow the WPI community to have an easy to use application and to aid in the navigation around campus

2.1 Proposed System

To solve the issue of navigating in a large campus the goat to go system will be a standalone java application that makes it easy for anyone to be able to get from one location to another. The user will select the start and end location, whether it be from one room to another on the same floor of a building, or somewhere on the other side of campus. This system will use Dijkstra's pathfinding algorithm to find the shortest path between the locations and will be displayed as a highlighted route on a map or a series of maps depending on the distance. The maps and their coordinates will be stored in a file to be loaded into the system. Listed below in the next two diagrams are the results of the survey:

types of users:

#	Answer	Response	%
1	Student	8	53%
2	Guest	3	20%
3	Faculty	3	20%
4	Staff	1	7%
	Total	15	100%

We then display to the user stating that we had ideas on what we should be important:

#	Answer	1	2	3	4	5	Total Responses
1	Display Areas of Interest	7	3	1	2	2	15
2	Building Description	7	5	1	0	2	15
3	Previously Searched Destinations	0	1	8	3	3	15
4	Frequently Used Destinations	0	3	4	6	2	15
5	Handicap Accessible Routes	1	3	1	4	6	15
	Total	15	15	15	15	15	-

next we allowed the user to input text and tell us ideas on what they thought would be good to implement for the application. We created the user stories out of those inputs Based on the results of a survey distributed the top priority requirements are as follows be able to view both the campus map, pick both a start and ending location and view the shortest path between those locations.

2.2 Functional Requirements

- User must be able to select and change starting and ending locations.
- User must be able to select and change starting and ending locations;
- User must be able to view both campus and floor maps;
- User must be able to manipulate and switch between maps;

- User must be able to get the total distance from start to end location;
- User must be able to get the total time from start to end location;
- User must be able to use the help button to get the user manual;
- User must be able to select floor when browsing building maps;
- User must be able to zoom in/out the map as they wish;
- User must be able to to get all the location on the map;
- User must be able to get the building information when click get building information on campus map;
- User must be able to get the specific point when click in the filter;
- User must be able to use the filter to find the different type of places;
- User must get warning message if input address is invalid or out of WPI campus;
- User must get warning message if either starting or ending location is not selected when user start calculation;
- User must get warning message if either starting or ending address is not input when user start calculation;
- User must be able to double click the building on campus map to go into the building map;
- User must be able to see the highlighted shortest path between two locations on the same map after starting and ending points are determined;
- User must be able to see the highlighted shortest path on both campus map and floor map as user switches between them, if starting and ending locations are in different floors or one is inside a building, another is outside the building;
- UI must switch main map view back to campus view once path calculation between two different buildings ends, and the path between buildings must be displayed;
- UI must switch main map view back to floor view once path calculation within a single floor ends, and the whole path must be displayed;
- UI must switch main map view back to starting floor view once path calculation between two floors within a single building ends, and the path of starting floor must be is played;
- UI must be able to use one button to switch back to campus map;
- UI mast able to show the distance and time of the shortest path;
- Administrator must be able to enter coordinates into maps;
- Administrator must be able to see all the coordinates he added;
- Administrator must could preview the map he added;
- Administrator need password and username to log in;
- Administrator must be able to change the description of the exist coordinates;
- Administrator must be able to enter all the description of the coordinates;
- Administrator must be able to add/delete a map;

- Administrator must be able to get feedback if modification of coordinates succeeds or fails;

2.3 Nonfunctional Requirements

2.3.1 Usability

- Color scheme and pattern must match WPI style (crimson and gray).
- UI must play a sound when warning message are displayed.
- Text address can be auto-completed.
- The total number of click from opening application to finding the path should be less than 8 clicks, if user uses mouse only.

2.3.2 Reliability

- Percentage of failure to calculation should be less than 1% of the time when calculating path and displaying route.

2.3.3 Performance

- The calculating time of path-finding must be less than 2 seconds.

2.3.4 Portability

- This application must not require installation;
- The size of application should be less than 50M.

2.4 Constraints

The following constraints must be implemented for the Goat To Go System:

- This application must be implemented with JAVA JDK 8;
- The map scope of this application must be within WPI campus;
- A location must be either the name of building, room number or a specific point on map.

2.5 System Models

Listed in the next section are the system models which will determine the functionality of the Goat To Go application.

2.5.1 User Scenarios

Background: Jillian is a new student on campus and wants to travel to Boynton Hall to file some paperwork, and then to the Campus Center.

case 1:
Jillian hears about an application that allows her to get walking directions to buildings of her choosing. Jillian first opens the application and notices that a campus map is displayed with all of the various buildings. She clicks around for a moment and realizes she can set her starting location on the map. She finds the Boynton Hall and clicks to set it as her starting point. The application now displays her starting point on the map. Next she finds the other building of interest. She clicks on that building and the application prompts her to either view the floors of the building or set as her end point. Jillian decides to set it as her ending point. The application displays her ending point as an icon, she clicks get directions and after a few moments the application displays a highlighted route on the campus map.

case 2:
Jillian is now in Boynton Hall that she chose for her ending point, however she does not quite know where the room she is looking for is located. So she opens her application to give her walking directions. She is displayed the campus map and clicks on Boynton Hall that she is located in she is then prompted to either display floors, set start point, or set end point. She then decides to display the floors of the building. The campus map is now gone and replaced by a grid of the various floors. She chooses the floor she is currently on. The application then displays the floor to Jillian. She then clicks on a point nearest to her location. The application prompts Jilian to set as start point or end point. She then chooses to set it as her start point. The point is now displayed as her starting point on the floor. Jillian now wants to select another room on the same floor that she is currently on. She clicks on the other floor and is prompted to set as end point. Jillian sets the room as her end point and it's now displayed as an endpoint on her map. Jillian clicks on get directions and the application displays a highlighted path on the floor map.

case 3:
Jillian now wants to leave Boynton Hall, so Jillian has the application open and chooses to clear her selection of current directions. She then decides to go back to the campus map. Now Jillian wants to go from Boynton Hall to the dining area in the Campus Center. Jillian then click on Boynton Hall and is prompted for three options: set as start point, set as end point, and display floors. Jillian decides to set as start point, the application then marks Boynton as the starting location. Jilian now clicks on the campus center, she is prompted for the same three options instead she chooses to display the floors of the

center. The application then displays the floors to Jillian in a grid. She knows the food area is on the first floor so Jilian selects the first floor. Jillian now clicks on the food area and is prompted for one option: set end point. She sets the food area as her end point. The application now marks the end point on the floor map. She clicks get directions the map takes her back to the campus view, with a highlight route from Boynton to the campus center. Once she reaches the campus center, she clicks on the campus center and displays floors. She chooses the first floor the floor then shows her from the entrance to the end point of the stairs marking the points from each view as she goes. She then chooses to display floors. Jillian then chooses the second floor, and the application loads the second floor with the starting point being the stairs and the ending point being her destination. Along with the highlighted path from the two points given for directions.

case 4:
Michael who is Jillian's father is an administrator for the school. He now wants to modify the Goat to Go application in order to set new points for areas around the school. First Michael will open the application. Next he notices in the top right there is a admin button to where he can choose to login as an admin. Michael selects the admin button, and is prompted from the application for his user name. Then his password. Michael then clicks login and he is now shown as an administrator role.

case 5:
Michael is currently logged into the application as an administrator, however he wants to now add a path to the current map he is being displayed. First Michael clicks select path which then the application prompts Michael to enter in the points he would like to create for the path. Michael proceeds to enter the points. Once, he is finished setting all the points for the path he then chooses, select neighbor(s). The application prompts Michael to select neighbor(s) for each point that he has entered on the new map. Michael proceeds to select his neighbor(s)for the points and clicks save, to save the newly created path for the map.

case 6:
Michael is currently logged into the application as an administrator, however he wants to now add a point to the current map he is being displayed. First Michael clicks create point which then the application prompts Michael to enter in the point he would like to create. Michael proceeds to enter the point. Once, he is finished setting the point he then chooses, select neighbor(s). The application prompts Michael to select neighbor(s) for each point that he has entered on the new map. Michael proceeds to select his neighbor(s) for the points and clicks save, to save the newly created path for the map.

2.5.2 User Stories

The user stories will consist of three perspectives the student, a visitor, and staff. This will cover possible users of the system.

Student:
As a student I want to know building descriptions so I know which building is right for where I need to go.
As a student I want to know areas of interest
- Library
- International House
- Parking lot
- Dining area
- Campus Center
- Business office

As a student I want to know the shortest route to class so I can get to class on time.
As a student I want to know previously searched places or frequently used routes so I don't need to search again.
As a student I want to select favorite places or destinations.
As a student I want to know where professors' offices are so I can meet with them.
As a student I want to know multiple paths so I can choose my favorite route.
As a student I want to know the time of arrival so I can arrange the time.
As a student I want to know if building has handicap accessible facilities in the building so I can use it.

Visitor:
As a visitor I want to be able to get directions without knowing where the buildings are located on campus.
As a visitor I want to be able to find parking areas around campus that are not permit required.
As a visitor I want to know which buildings hold which departments.

Staff:
As a staff member I want to be able to determine the fastest route to another building on campus in order to save time in between classes.
As a staff member I want to be able to have a building description in order to refer new students to areas of interest.
As a staff member I want to know about buildings I have never been in before.
As a staff member I want to know where exactly resources on campus are, so I can refer students to them with a visual route.
As a staff member I want to be able to calculate directions for my family and visiting loved ones before they arrive to campus.

2.5.3 Use Cases

Case 1:

Use case Name	Directions from Building to Building
Participating actors	User
Flow of events	1. User opens the GTG application 2. GTG responds by displaying the map in CampusView scale to user 3. User selects a building on the map by its display point . 4. GTG responds by highlighting the building icon, displays a sub-menu which has three options: a. Set Start Point b. Set End Point c. Display Floors 5. User chooses Set Start Point 6. GTG responds by displaying a Start Point Icon on selected building. 7. User selects another building on the map by clicking its given display icon. 8. GTG responds by highlighting the building icon, displaying a sub-menu which has two options a. Set End Point b. Display Floors 9. User chooses Set End Point 10. GTG responds by displaying a End Point Icon on selected building 11. User clicks on “Get Directions” button on the functional menu 12. GTG responds by calculating the shortest path from selected start point building to selected end point building. 13. GTG displays a highlighted path on campus view map to user.
Alternate Flow	6a. User clears current Start Point and chooses new Start Point 9a. User clears current End Point and chooses new End Point 10a. User clears both directions and starts back at step 3 13a. User cancels current directions and starts back at step 3
Exception Flow	2a. Displayed map is not available 4a. Sub-menu cannot be displayed 8a. Sub-menu cannot be displayed

	12a. Path not found 12b. Calculation timeout 13a. Display route times out
Entry condition	User selects a building as a Start Point
Exit condition	1. The shortest path has been calculated and displayed on the map 2. GTG can't find an accessible path in given directions 3. User clicks on "Clear Selection" button on the functional panel 4. User clicks on "Exit" button on the functional panel
Quality requirement	Path calculation takes less than five seconds

Case 2:

Use case Name	Searching Path from one room to another room in the same floor in the same building
Participating actors	User
Flow of events	1. User open the GTG application 2. GTG responds by displaying the map in CampusView scale to user 3. User selects a building on the map by its display point . 4. GTG responds by highlighting the building icon, displays a sub-menu which has three options: a. Set Start Point b. Set End Point c. Display Floors 5. User chooses Display Floors 6. GTG responds by refreshing the display panel and loads in the floor maps of that building, displaying all floor maps in grid form in the display panel 7. User selects one of the floor maps. 8. GTG responds by refreshing the display panel and ONLY displaying the selected floor map 9. User selects one of the rooms in the floor by clicking on the selected rooms display point on the floor map. 10. GTG responds by highlighting the building icon, displays a sub-menu which has two options:

	a. Set Start Point b. Set End Point 11. User chooses Set Start Point 12. GTG responds by displaying a StartPoint Icon on the center of selected room. 13. User selects another room on floor map 14. GTG responds by highlighting the building icon, displays a sub-menu which has one option: a. Set End Point 15. User chooses Set End Point 16. GTG responds by displaying a EndPoint Icon on the center of selected room. 17. User clicks on “Get Directions” button on the functional panel 18. GTG responds by a. Displays start room and end room b. Calculating the path from start room to the end room c. Displaying the highlighted path on floor map
Alternate Flow	3a. User clears building selection 6a. User returns to campus view returning to step 3 7a. User chooses to re-display floors 9a. User clears current End Point and chooses new End Point 16a. User cancels current directions and starts back at step 3 18a. User clears all selections and returns to step 3
Exception Flow	2a. Displayed map is not available 4a. Sub-menu cannot be displayed 6a. Displaying of floors timeout 7a. Selected floor map not available 10a. Sub-menu cannot be displayed 12a. Path not found 17b. Calculation timeout 18a. Display route times out
Entry condition	1. User has opened a map of selected floor from floor display of chosen building 2. User has selected one of the rooms in that floor map as start point
Exit condition	1. GTG has calculated the path and displayed the proper result on floor view map from start point to end point. 2. GTG can’t find an accessible path in given directions 3. User changes map scale 4. User clicks on “Clear Selection” button on the functional panel

	5. User clicks on “Campus View” 6. User clicks on “Exit” button on the functional panel
Quality requirement	1. Path calculation takes less than five seconds

Case 3:

Use case Name	Directions from one building to a room in another building
Participating actors	User
Flow of events	1. User open the GTG application 2. GTG responds by displaying the map in CampusView scale to user 3. User selects a building on the map by its display point . 4. GTG responds by highlighting the building icon, displays a sub-menu which has three options: a. Set Start Point b. Set End Point c. Display Floors 5. User chooses Set Start Point 6. GTG responds by displaying a StartPoint Icon on selected building 7. User selects another building on the map by clicking its given display point 8. GTG responds by highlighting the building icon, displays a sub-menu which has three options: a. Set Start Point b. Set End Point c. Display Floors 9. User chooses Display Floors 10. GTG responds by refreshing the display panel and

	loads in the floor maps of that building, displaying all floor maps in grid form in the display panel 11. User selects one of the floor maps. 12. GTG responds by refreshing the display panel and ONLY displaying the selected floor map 13. User selects one of the rooms in the floor by clicking on the selected rooms display point on the floor map. 14. GTG responds by highlighting the floor room icon, displaying a sub-menu which has one option a. Set End Point 15. User chooses Set End Point 16. GTG responds by displaying an end point icon at the room point 17. User clicks on “Get Directions” button on the functional panel 18. GTG responds by a. Calculates path from main entrance of start point building to main entrance of the end point building. b. Calculates the path from entrance point of the entrance floor of goal building to the entrance point of the goal floor. c. Calculating the path from entrance point of the goal floor to the endpoint room d. Refresh the display panel. Load and display the campus view map in display panel, and show the result of step 18.a on map 19. GTG responds by highlighting the building icon, displays a sub-menu which has one option: a. Display floors 20. GTG responds by refreshing the display panel and loads in the floor maps of that building, displaying all floor maps in grid form in the display panel 21. User selects one of the floor maps. 22. GTG responds by a. Displaying calculated path on floor on route to end point. 23. If user has not reached destination 24. User then chooses to “Display Floors” 25. User then chooses next floor accordingly 26. GTG responds by a. Displaying calculated path on floor on route to end point.
Alternate Flow	3a. User clears building selection 6a. User clears current Start Point and chooses new Start

	Point 10a. User clears both directions and starts back at step 3 16a. User chooses to clear end point 26a. User chooses to clear selections and start over
Exception Flow	2a. Displayed map is not available 4a. Sub-menu cannot be displayed 10a. Displaying of floors timeout 11a. Selected floor map not available 10a. Sub-menu cannot be displayed 12a. Display timeout 18a. Calculation timeout 18b. Path not found 19a. Display route times out 14a. Sub-menu cannot be displayed
Entry condition	1. User has selected a building as a start point, 2. Opened a floor map of a building.
Exit condition	1. GTG has calculated the path and displayed the proper result on campus view map from start point; and according floor maps to end point. 2. GTG can't find an accessible path in given directions 3. User clicks on "Clear Selection" button on the functional panel 4. User clicks on "Exit" button on the functional panel
Quality requirement	1. Path calculation takes less than five seconds 2. User is able to change map views to see the result of segmented maps from start point to end point.

Case 4:

Use case Name	User Login as administrator
Participating actors	User
Flow of events	1. User opens the GTG application 2. GTG responds by displaying the map in CampusView scale to user 3. User clicks the admin button in the top right 4. GTG responds by displaying administrator panel 5. GTG prompts user for username and password 6. User enters username and password 7. User clicks login 8. GTG responds by displaying CampusView administrator campus view map

Alternate Flow	5a. User re-enters username and password
Exception Flow	7a. User inputs incorrect username and password
Entry condition	1. User has clicked the admin button in basic CampusView map
Exit condition	1. User clicks “Cancel” button
Quality requirement	User name must be more than six characters long User password must have the following properties: 1. More than eight characters long 2. Inclusion of one or more numerical digits 3. Inclusion of special characters

Case 5:

Use case Name	Administrator wants to create path
Participating actors	Administrator
Flow of events	1. Administrator opens the GTG application 2. GTG responds by displaying the map in CampusView scale to user 3. User clicks the admin button in the top menu bar on the right 4. GTG responds by displaying administrator panel 5. GTG prompts user for username and password 6. Administrator enters username and password 7. Administrator clicks login 8. GTG responds by displaying recently visited map 9. Administrator selects create path from a button on the right panel 10. GTG responds by prompting the Administrator to select path points on currently displayed map 11. Administrator then inputs all of the points they would like to be set as path on map 12. GTG responds setting points as neighbors 13. Administrator then clicks the save button 14. GTG responds by saving newly created path object

Alternate Flow	5a. Administrator re-enters username and password 10a. Administrator clears points for path that is set
Exception Flow	7a. Administrator inputs incorrect username and password 10a. Points could not be selected 12a. Neighbors could not be set for points
Entry condition	1. Administrator has clicked the admin button on the right in the basic top menu bar
Exit condition	1. Administrator clicks “Cancel” button 2. Administrator clicks “Save” button
Quality requirement	1. User name must be more than six characters long 2. User password must have the following properties: 3. More than eight characters long 4. Inclusion of one or more numerical digits 5. Inclusion of special characters

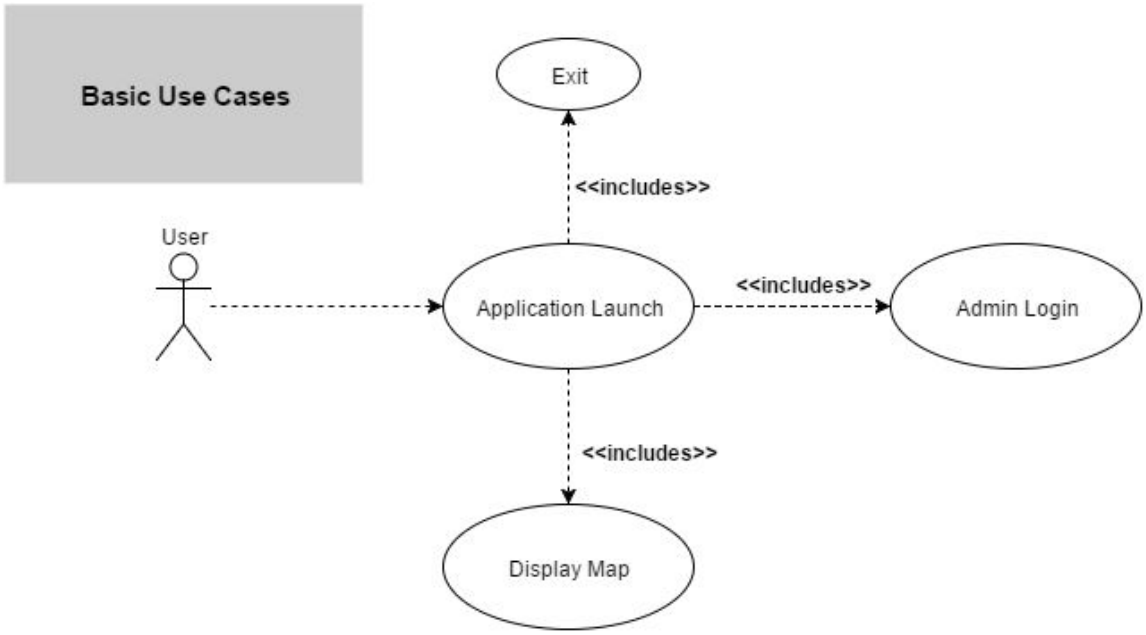
Case 6:

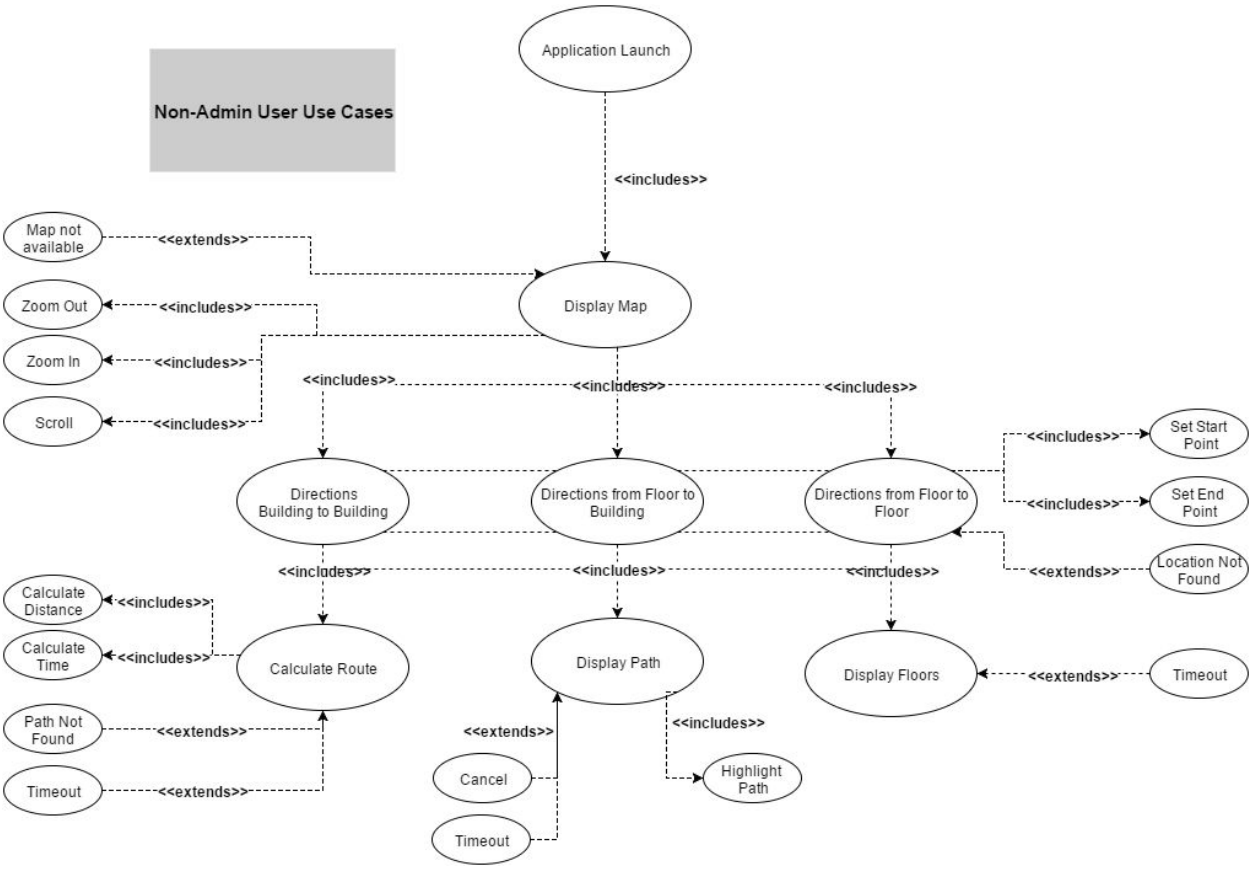
Use case Name	Administrator wants to create single point
Participating actors	Administrator
Flow of events	1. Administrator opens the GTG application 2. GTG responds by displaying the map in CampusView scale to user 3. User clicks the admin button in the top menu bar on the right 4. GTG responds by displaying administrator panel 5. GTG prompts user for username and password 6. Administrator enters username and password 7. Administrator clicks login 8. GTG responds by displaying recently visited map 9. Administrator selects create point on the right sidebar 10. GTG responds by prompting the Administrator to create a point on currently displayed map 11. Administrator then inputs the point they would like to add to the map 12. Administrator then clicks select neighbor on the right sidebar 13. GTG then prompts administrator to select neighbors for the given point 14. Administrator selects the neighbors 15. Administrator then clicks “Save” 16. GTG responds by saving newly created path object
Alternate Flow	5a. Administrator re-enters username and password

	10a. Administrator clears points for path that is set
Exception Flow	7a. Administrator inputs incorrect username and password 11a. Point could not be selected 14a. Neighbors could not be set for point
Entry condition	2. Administrator has clicked the admin button on the right in the basic top menu bar
Exit condition	3. Administrator clicks “Cancel” button 4. Administrator clicks “Save” button
Quality requirement	6. User name must be more than six characters long 7. User password must have the following properties: 8. More than eight characters long 9. Inclusion of one or more numerical digits 10. Inclusion of special characters

2.5.4 Use Case Diagram

First we will display the basic loading of the GTG application, next the non-admin use cases, and finally the admin use cases




Non-Admin User Use Cases
Application Launch
<<includes>>
Map not available
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Display Map
Zoom Out
<<includes>>
Zoom In
<<includes>>
Scroll
<<includes>>
<<includes>>
<<includes>>
<<includes>>
Directions Building to Building
Directions from Floor to Building
Directions from Floor to Floor
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Set Start Point
<<includes>>
Set End Point
<<extends>>
Location Not Found
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<<includes>>
Calculate Distance
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Calculate Time
<<includes>>
Calculate Route
Display Path
Display Floors
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Timeout
Path Not Found
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Timeout
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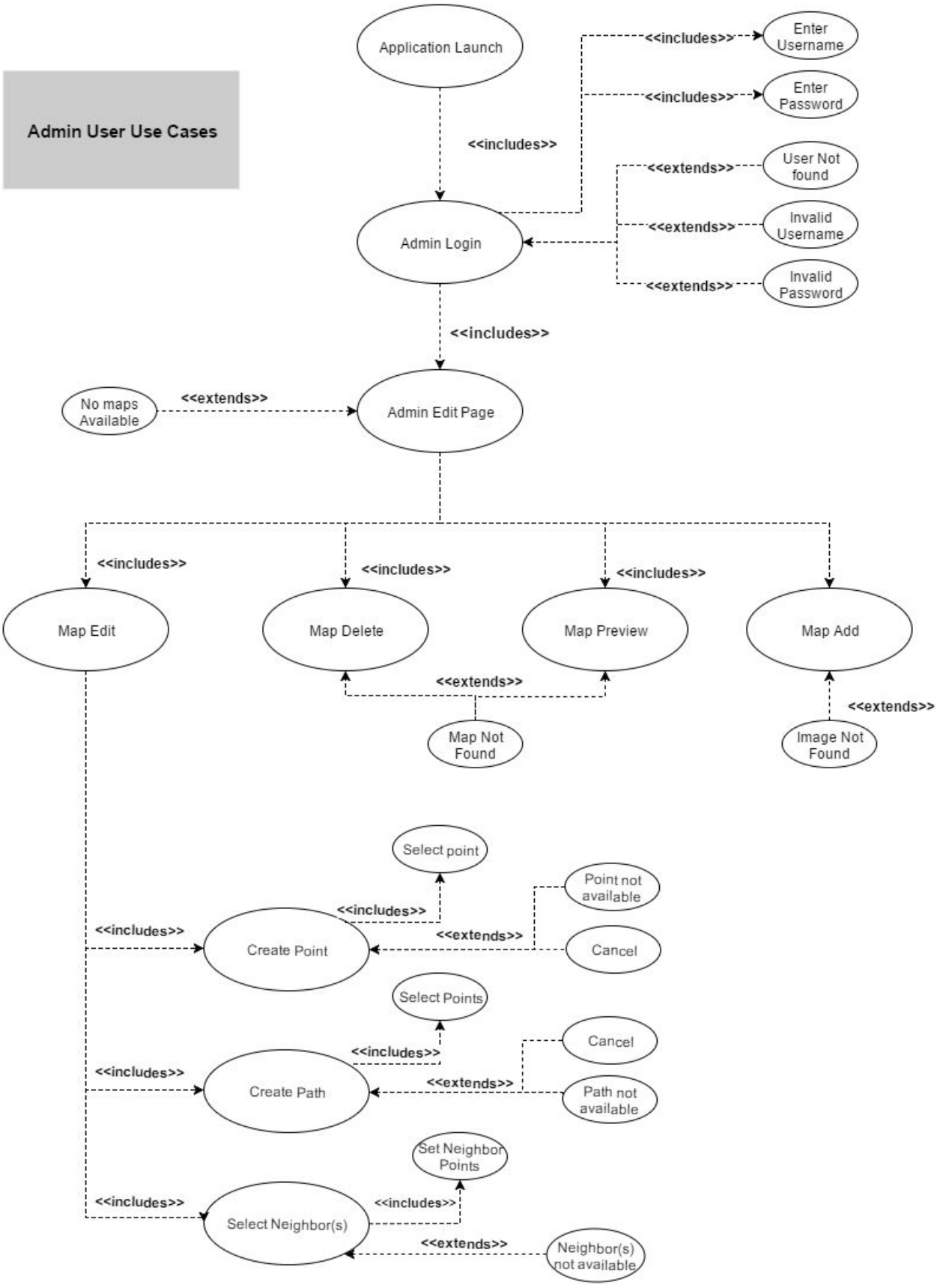
Cancel
Timeout
<<includes>>
Highlight Path


Admin User Use Cases
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Enter Password
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User Not found
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Map Add
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<<includes>>
Create Point
<<extends>>
Cancel
Select Points
Cancel
<<includes>>
<<includes>>
Create Path
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Path not available
Set Neighbor Points
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<<includes>>
Select Neighbor(s)
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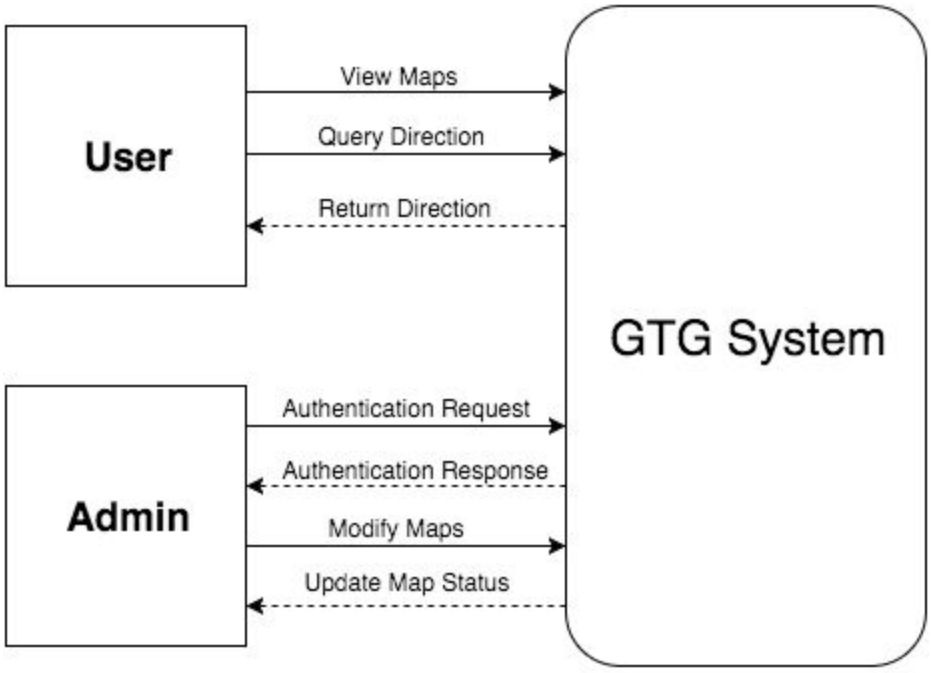
Neighbor(s) not available

2.5.5 Context Diagram



2.5.6 Object Models

Listed in the next section are the system models which will determine the functionality of the Goat To Go application.

2.5.6.1 Data Dictionary

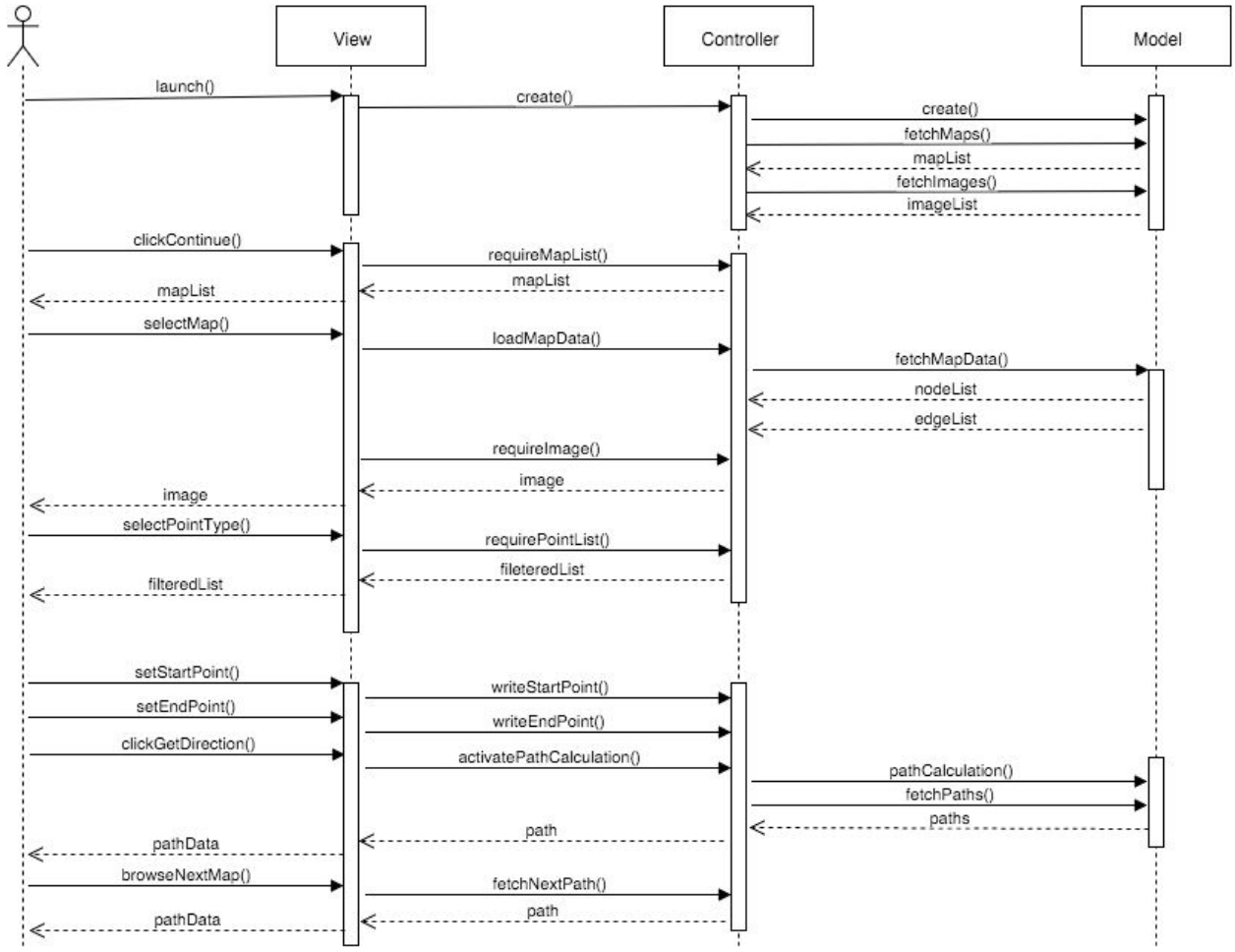
Entity Name	Type	Description
Way point X Coordinate	float	specifies the coordinate value in X direction
Way point Y Coordinate	float	specifies the coordinate value in Y direction
Node type	int	A node could be an entry point, exit point or just a normal waypoint, each type would be specified with different values
Node belong floor Name	string	Identify which floor this node belongs to, could be used to

		clarify the startpoint and endpoint property
Node belong building Name	string	Identify which building this node belongs to, could be used to clarify the startpoint and endpoint property
edgeID	int	Each edge in a coordinate graph would have a unique id, could be used in search method
edgeLength	float	Could be used to calculate the cost
Building Name	string	Could be used to display on map, and it could also be used to match with Path and Node points
Floor Name	string	Could be used to display on map, and it could also be used to match with Path and Node points
Room Name	string	Could be used to display on map.
Path belong floor Name	string	Could be used to display on a correct scale of mape
Path belong building Name	string	Could be used to display on a correct scale of mape

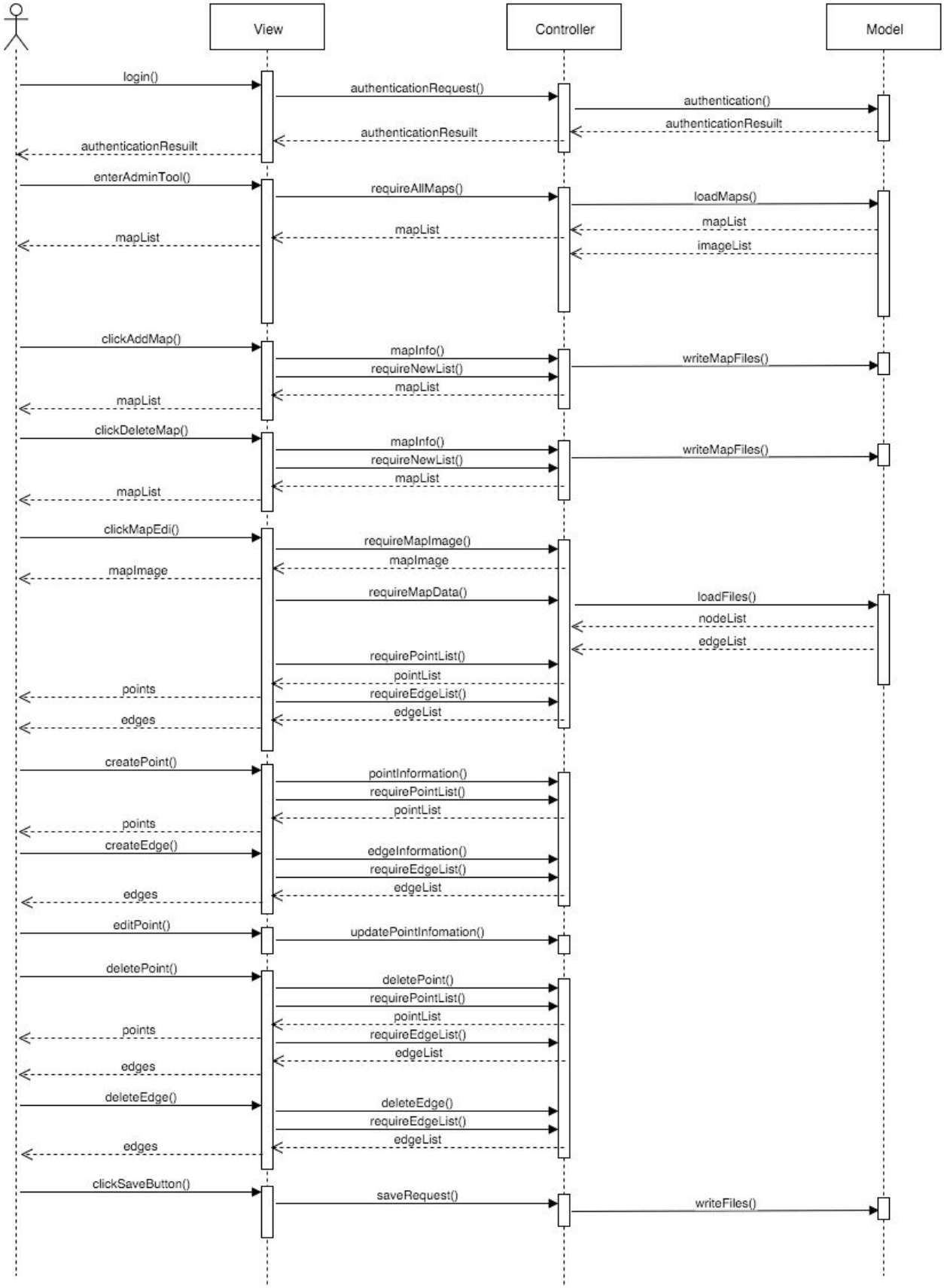
2.5.6 Dynamic Models

Listed in this section are the dynamic models used for the Goat To Go System.

2.5.6.1 Sequence Diagram

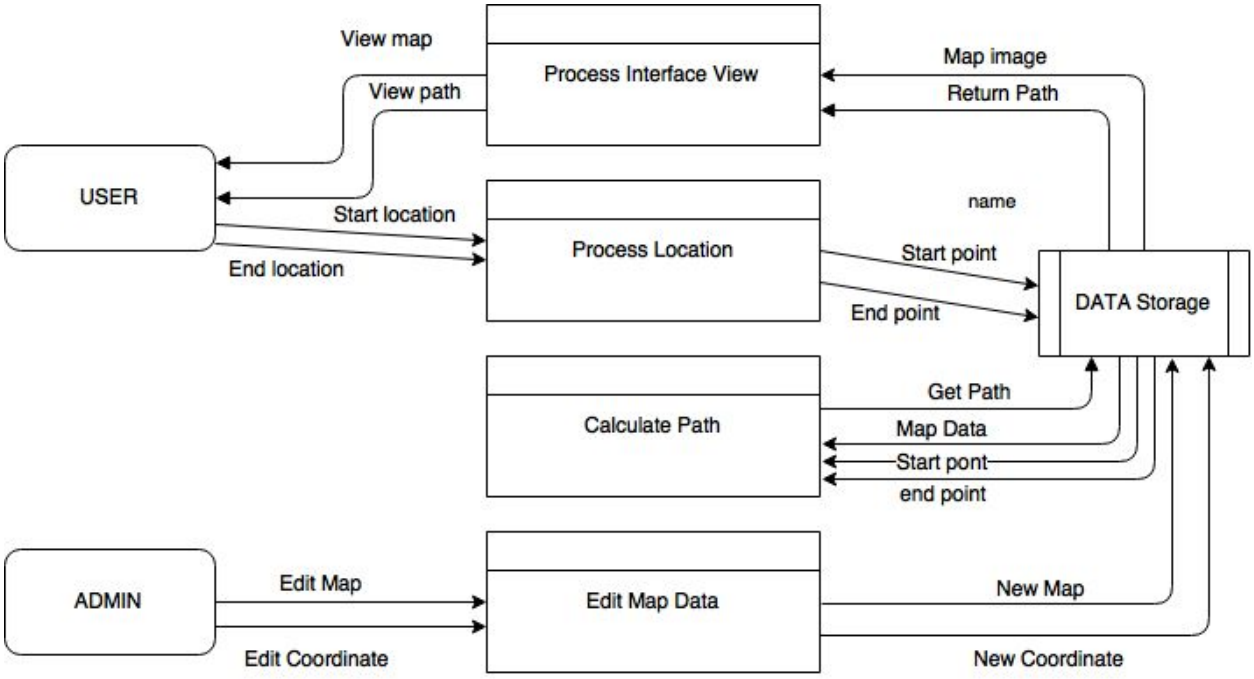


Sequence Diagram - User Mode



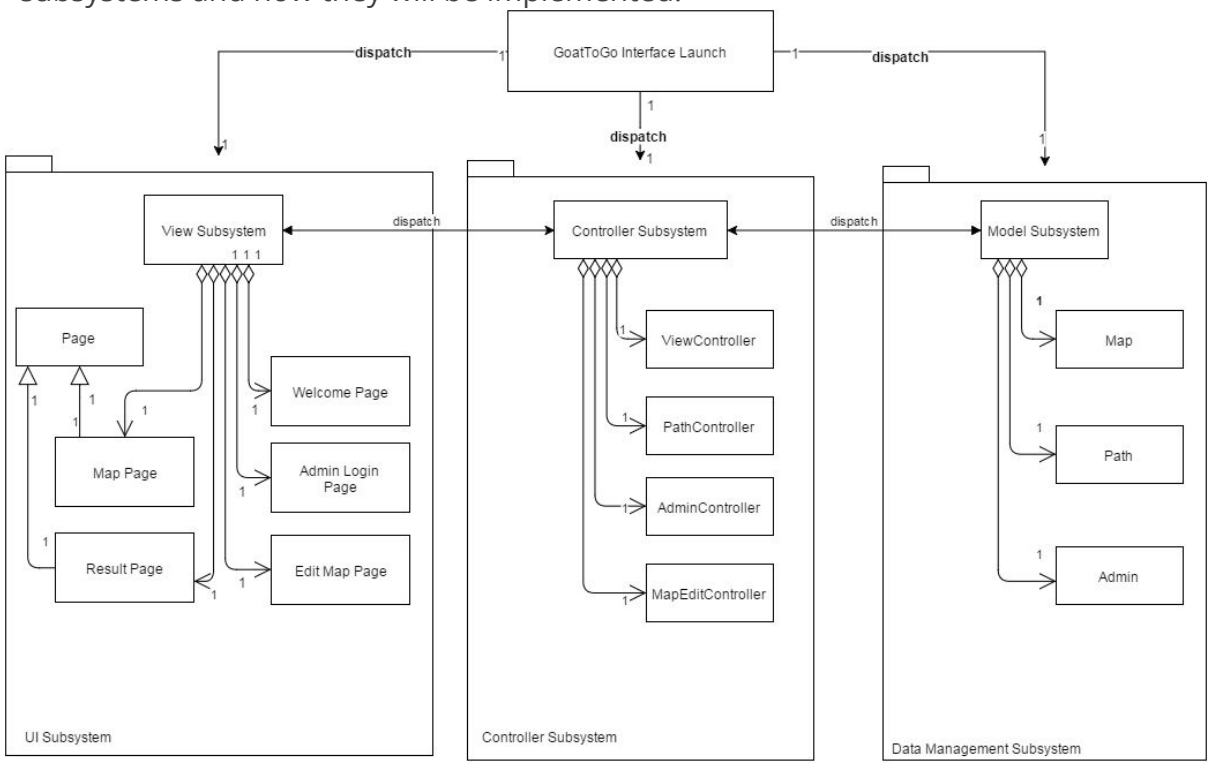
Sequence Diagram - Admin Mode

2.5.6.2 Data Flow Diagram



2.6 SystemDesign

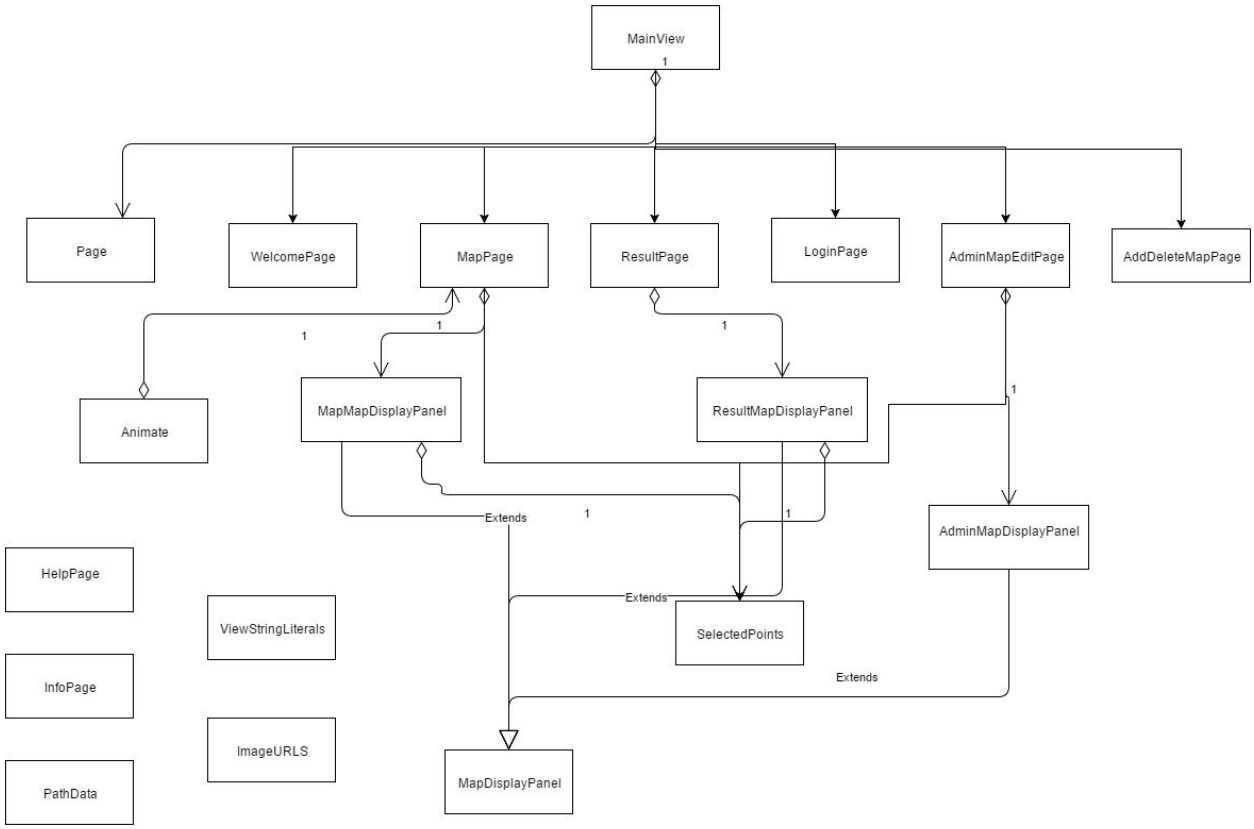
We are using the model view controller system architecture listed below are the subsystems and how they will be implemented:



2.7 Object Design

Listed in this section is the different sub systems that will be listed based on the Systems Design. It will first list the subsystems UML diagram followed by it's JavaDoc.

2.7.1 View Subsystem

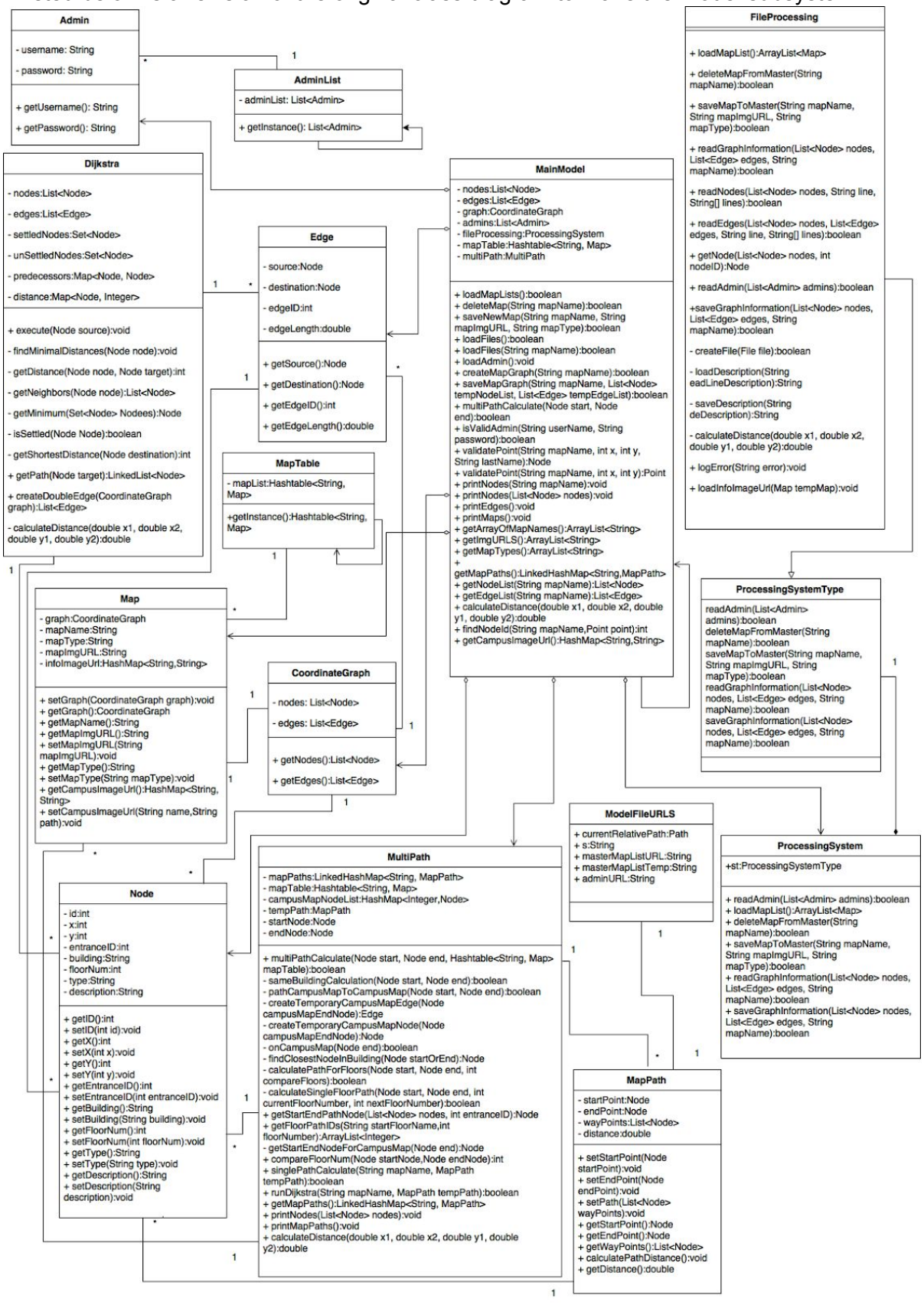


Goat To Go System(GTG)

2.7.2 Controller Subsystem

2.7.3 Model Subsystem

Listed below is a revision of the original class diagram to make the model subsystem.



2.7.4 Design Patterns

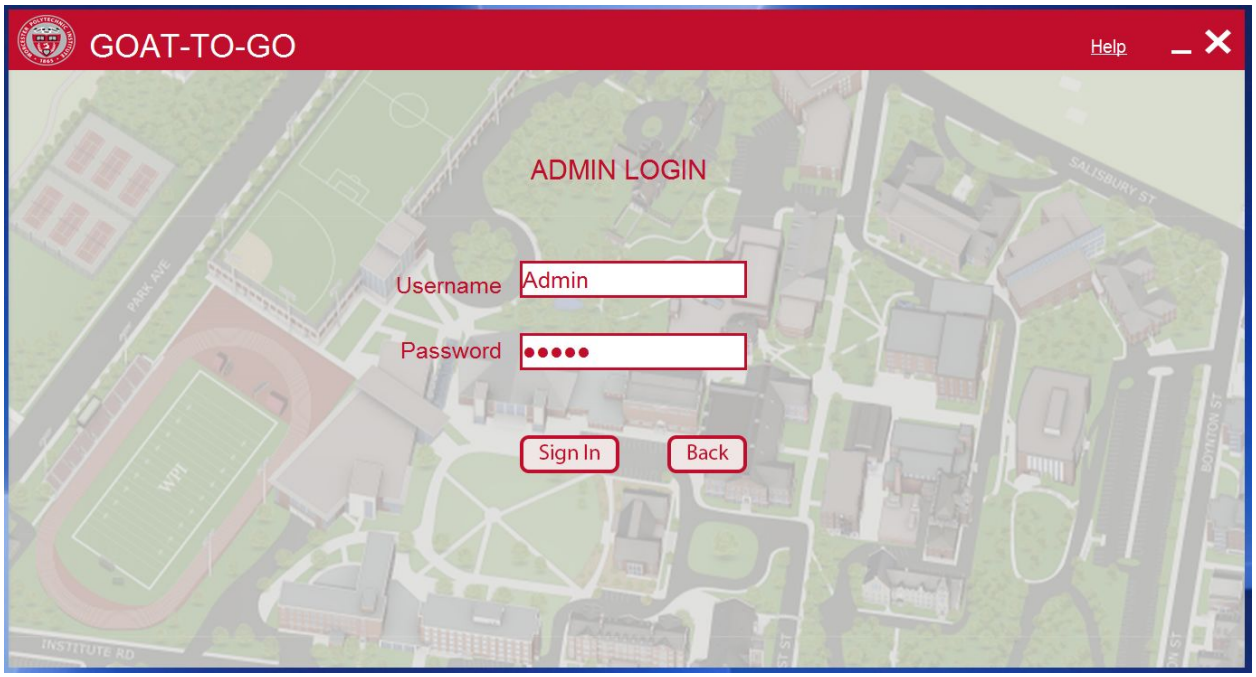
There are a few design patterns that are implemented in each of the designs at the high level of communication between the subsystems is the facade pattern. Below that each individual design pattern varies the one constant through is the composite because we have hierarchical inheritance in each subsystem.

2.5.7 User Interface

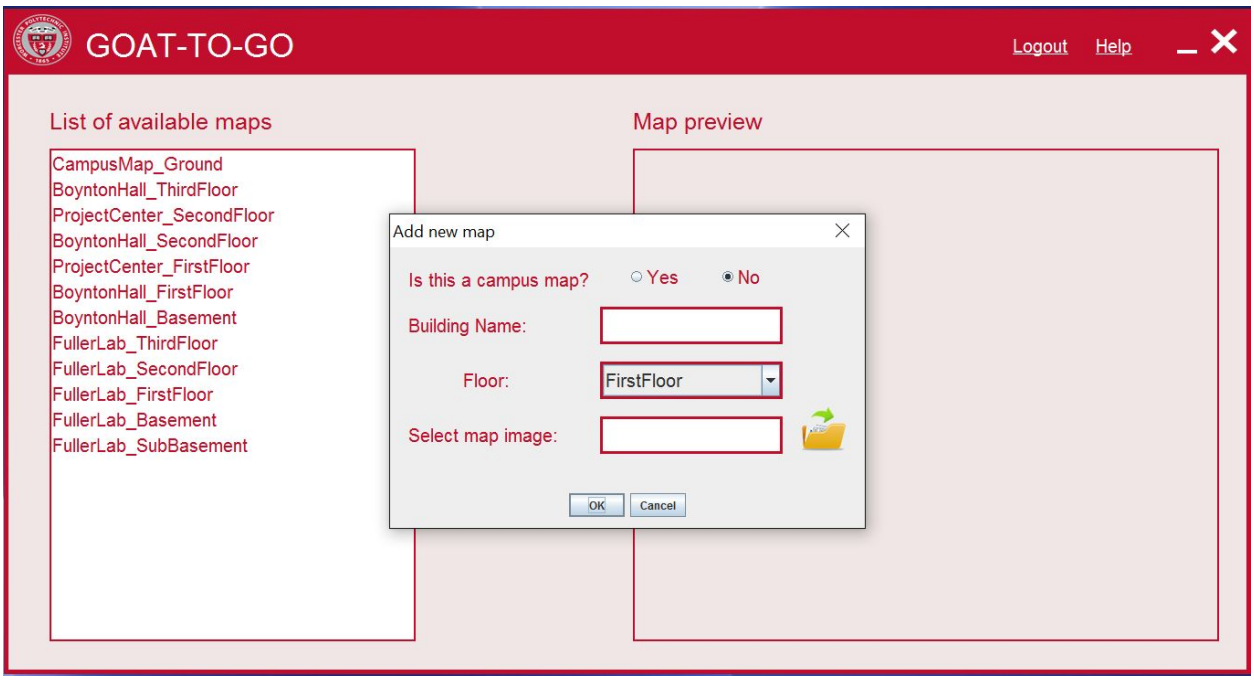
Listed in this section is the user interface components for the Goat To Go application.

Welcome Screen:

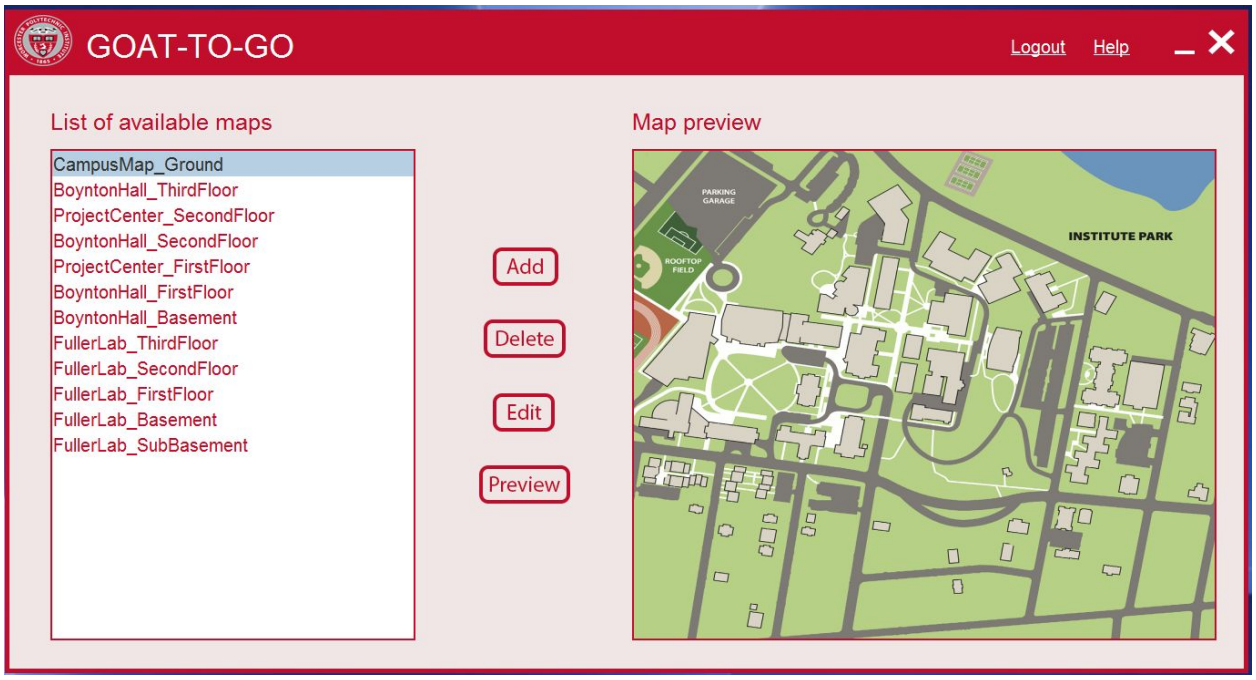
Admin Login Screen:



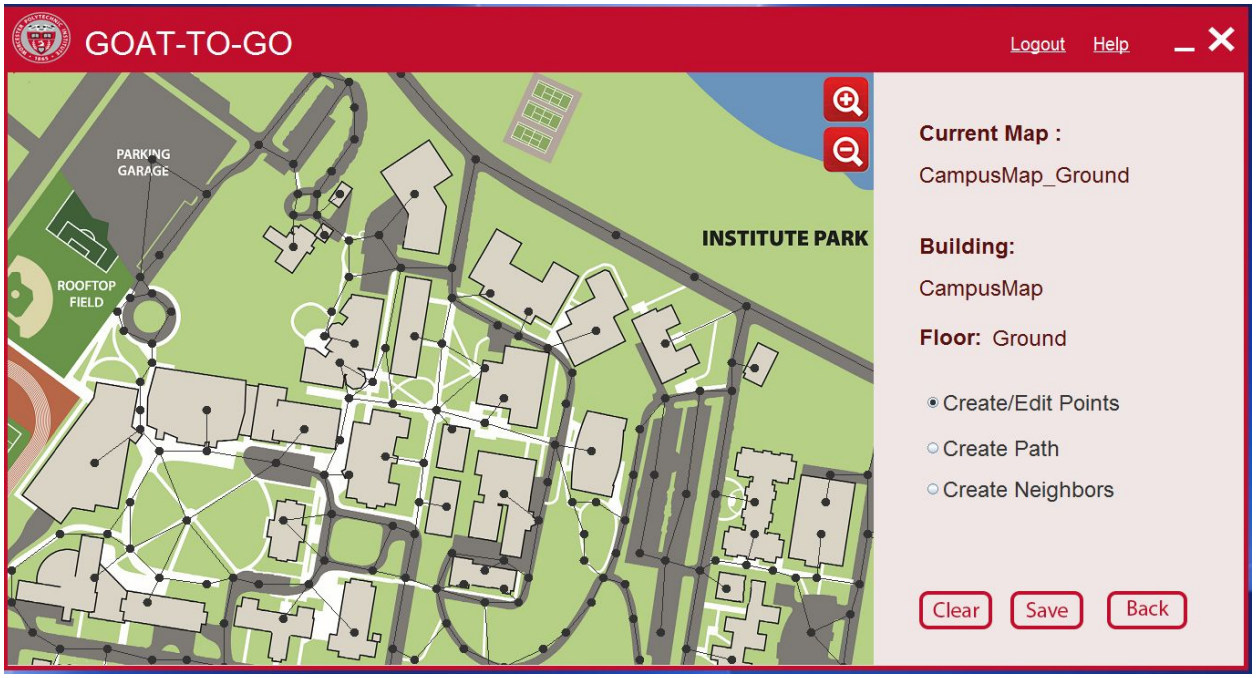
Admin Add New Map:



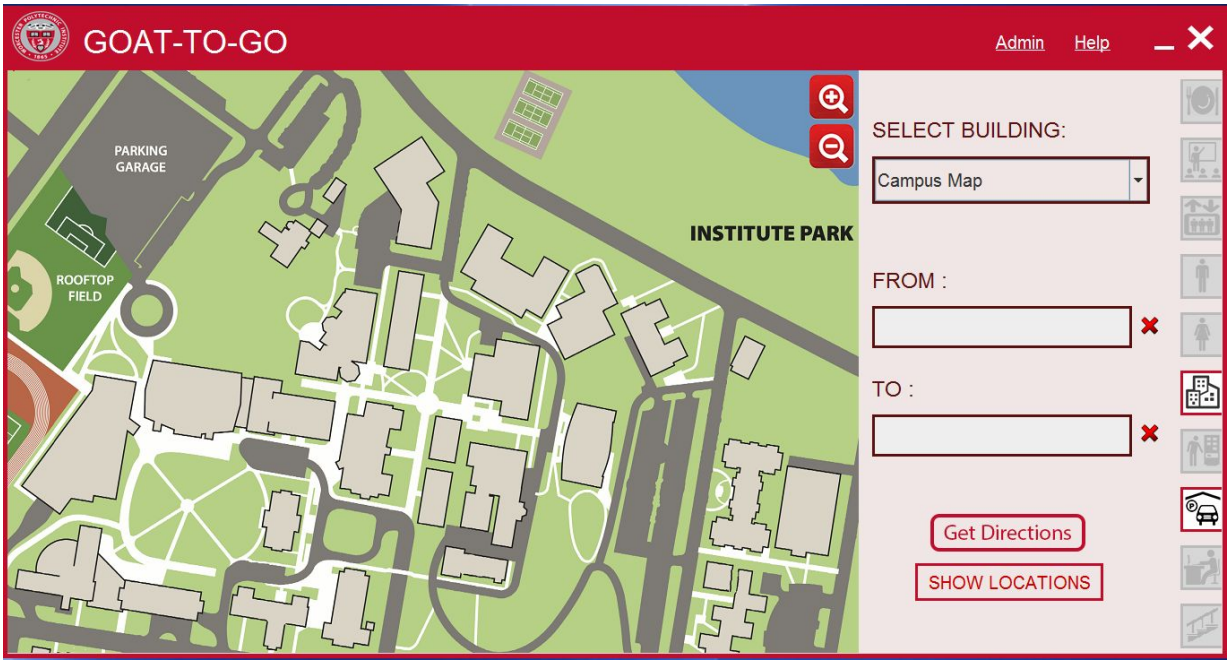
Map Preview:



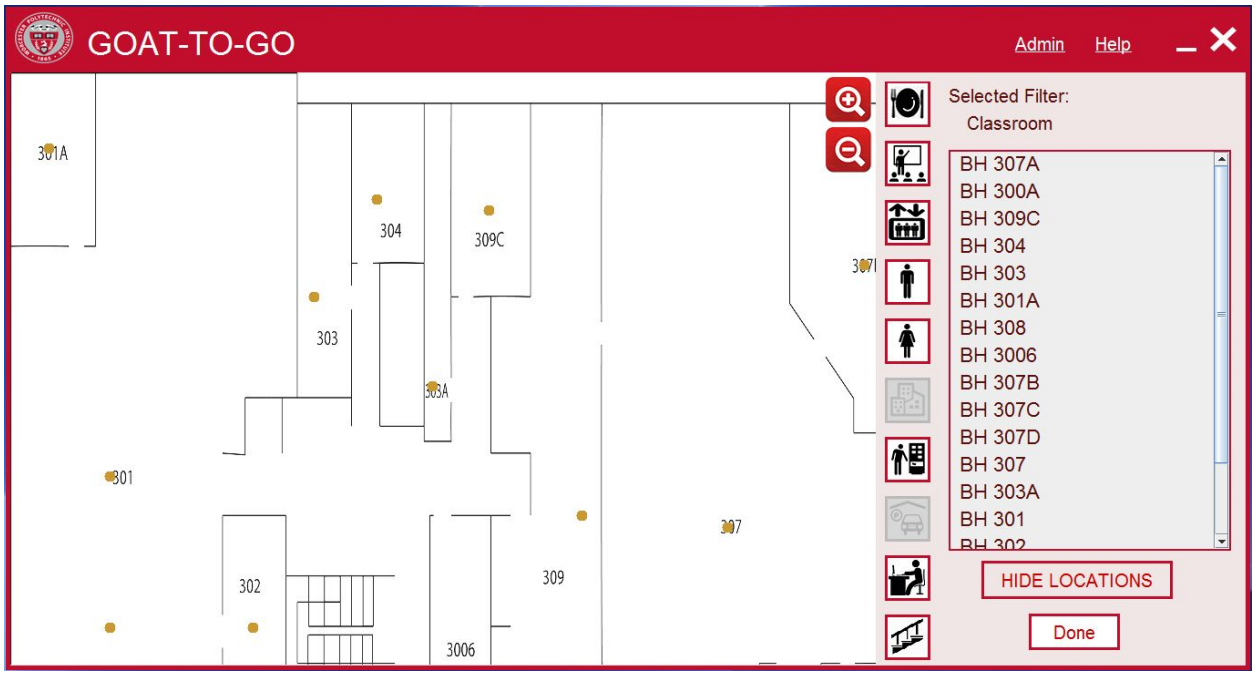
Map Edit Screen:



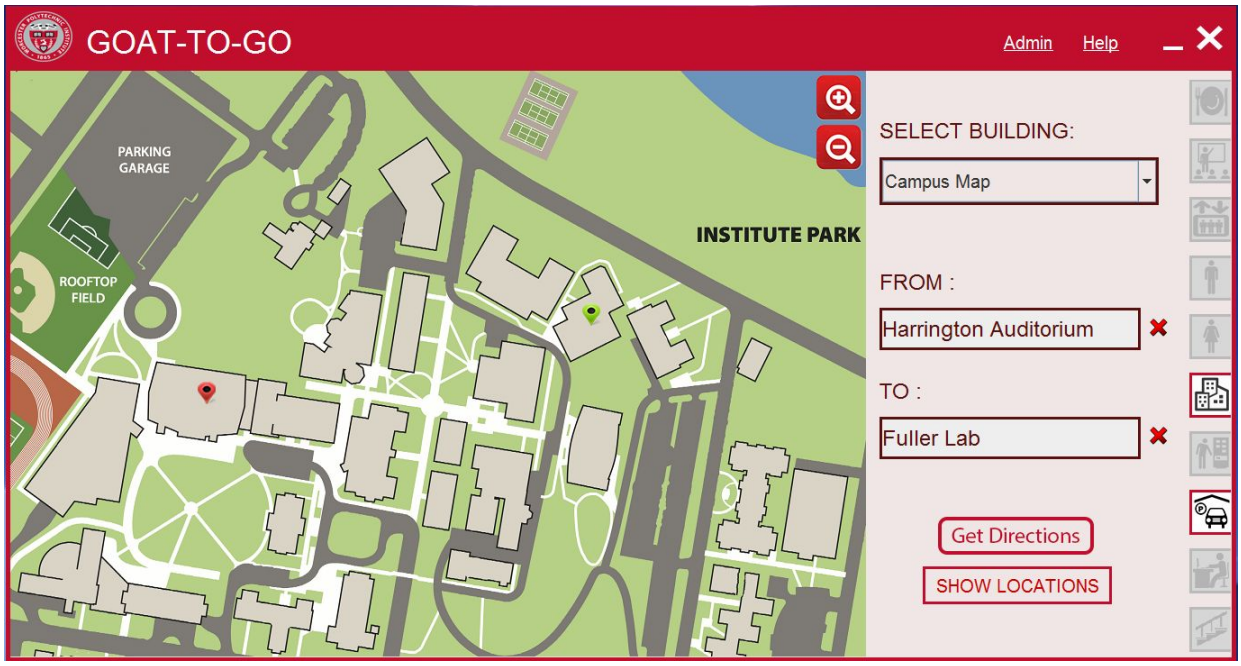
Campus Map:



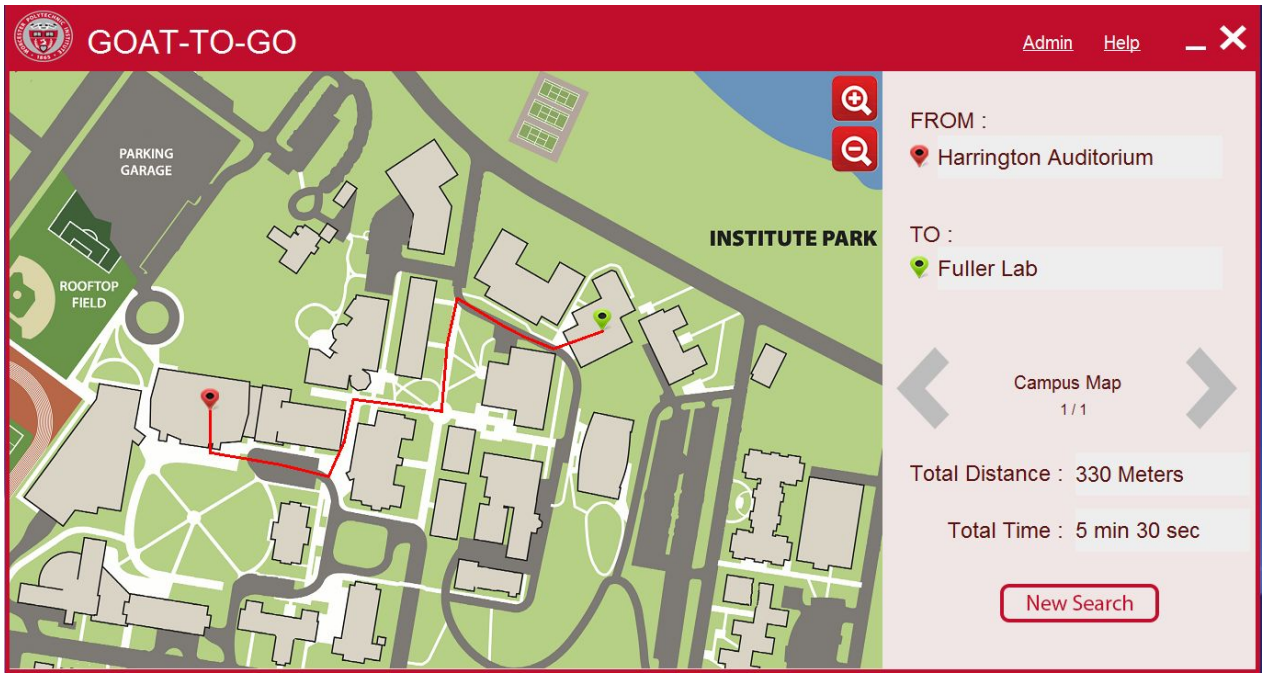
Filter Options on a map:



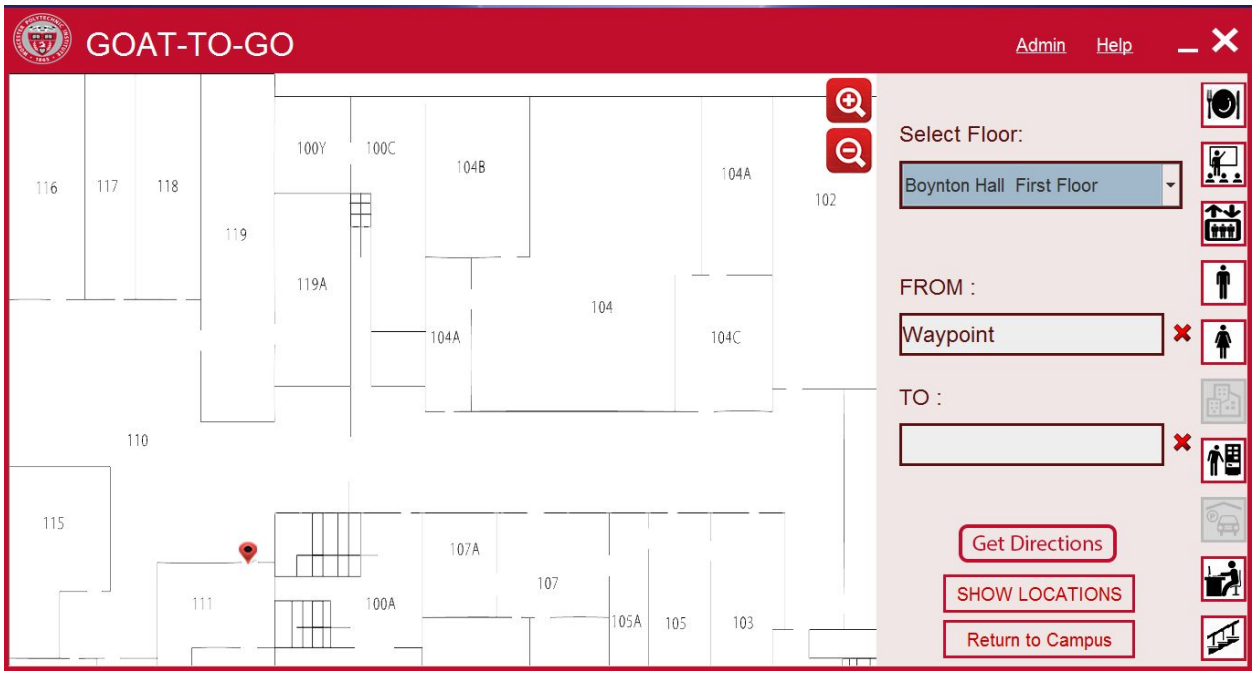
Start and End Location Selection:



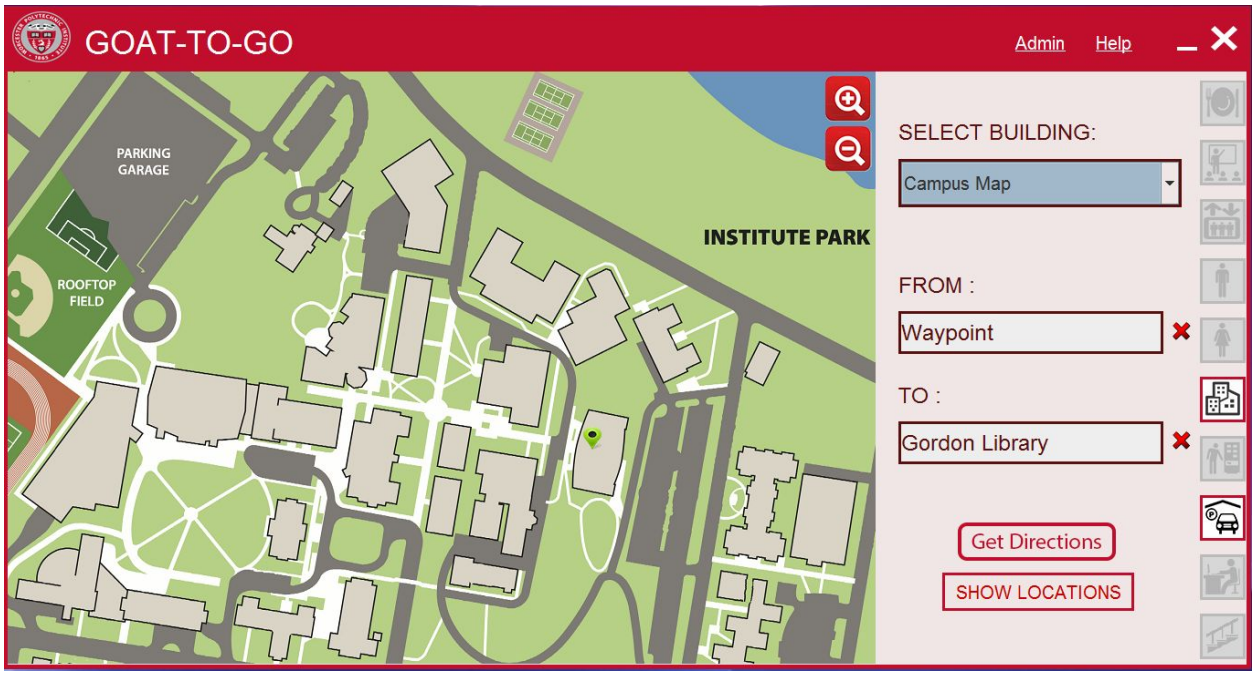
Path between start and end location on same map :



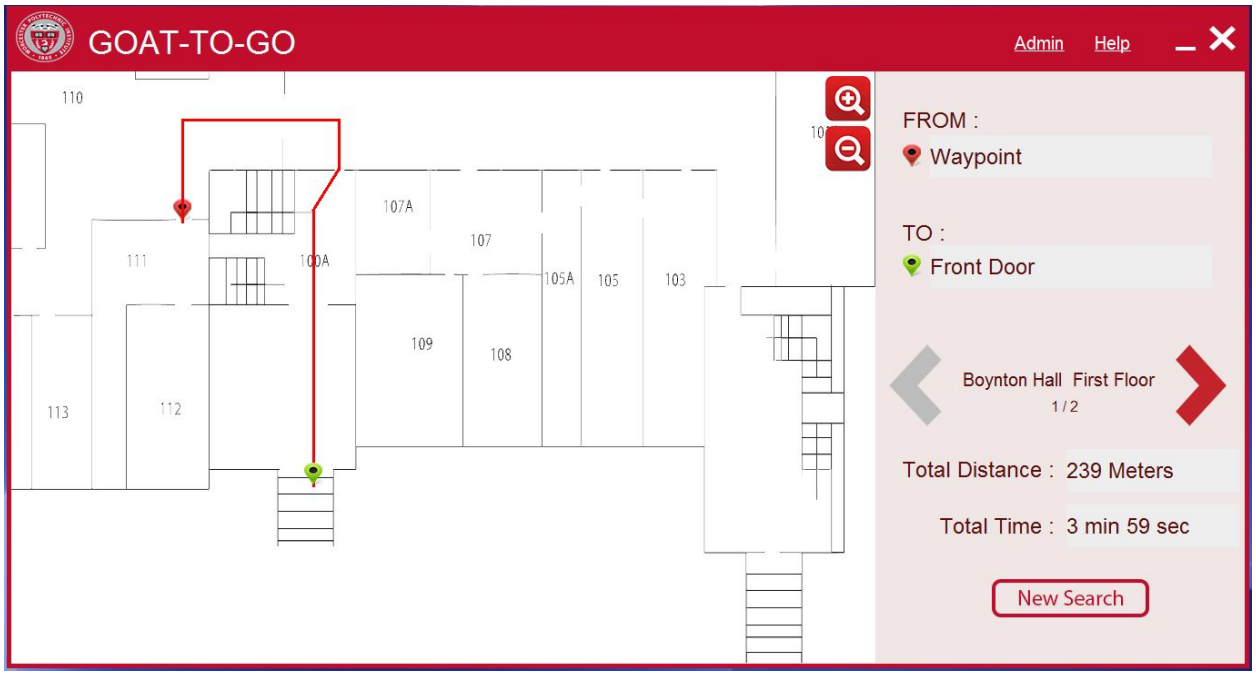
Start Location selected on one map:

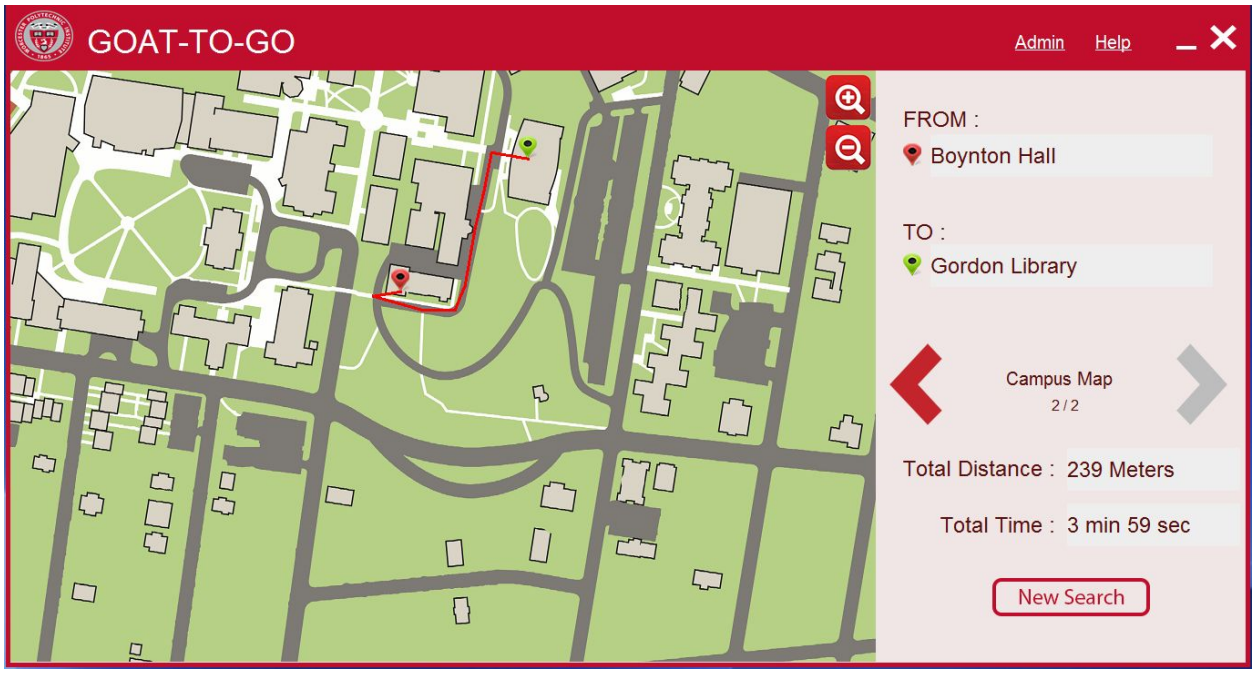


End Location selected on another map:



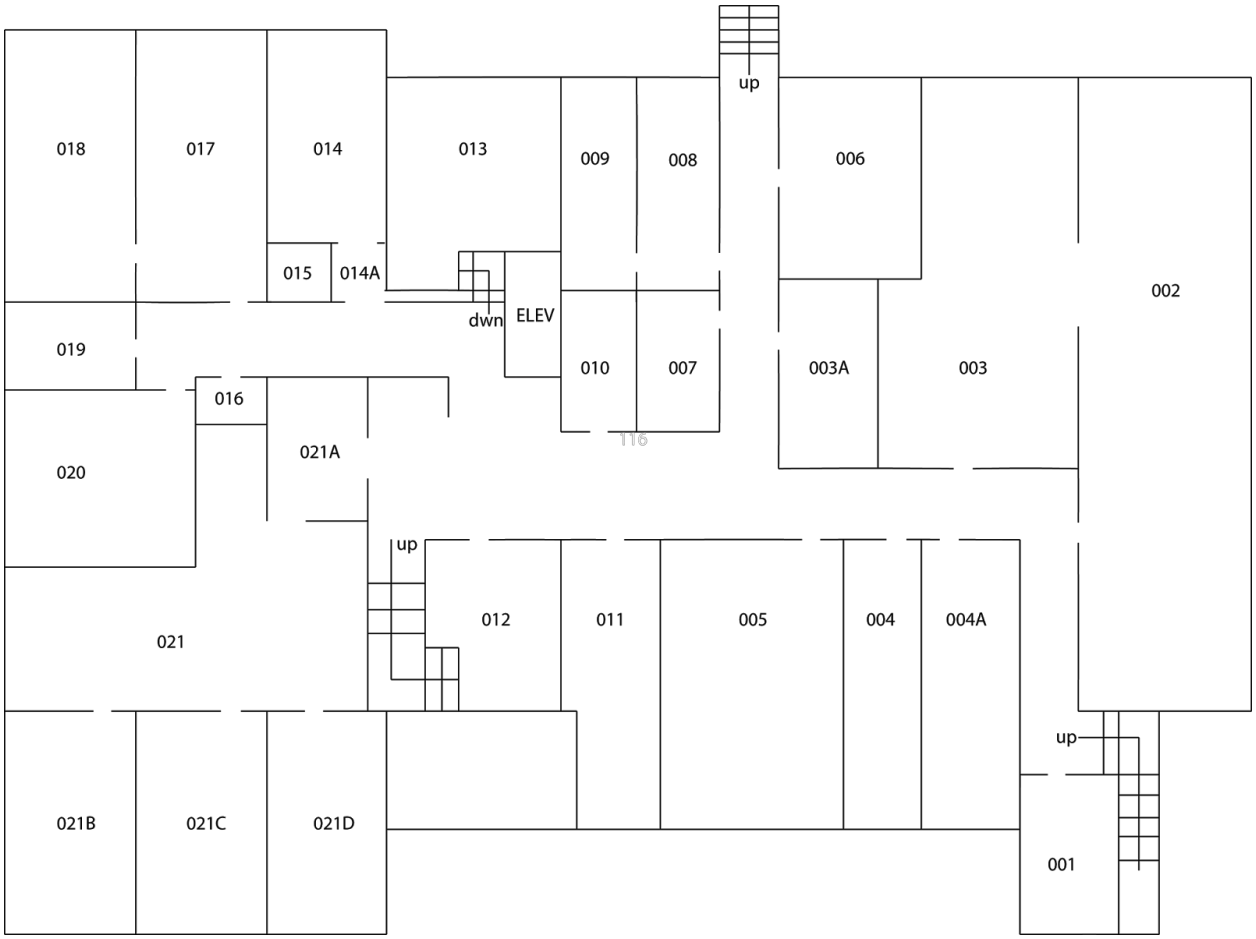
Multilayer path between start and end location on different maps:



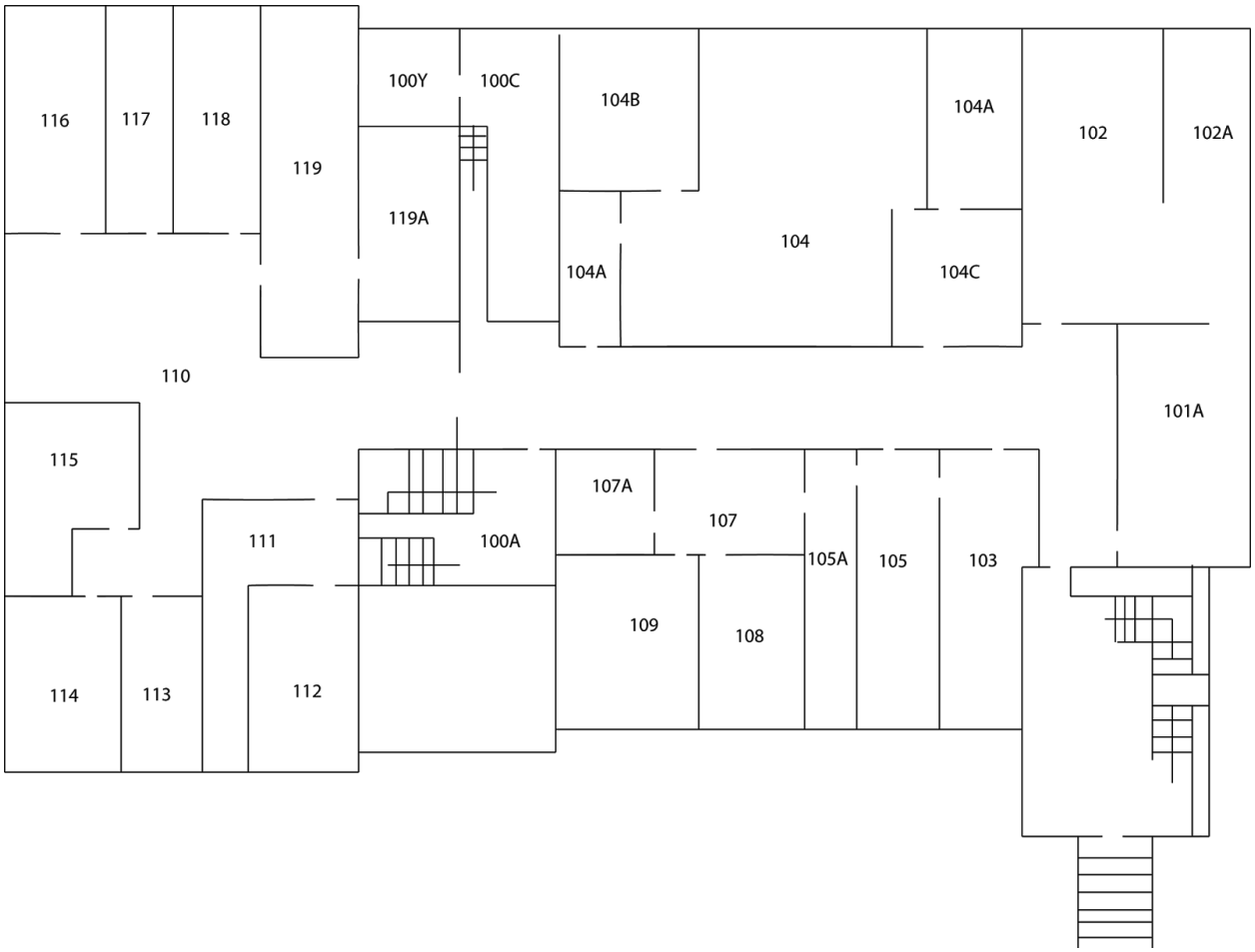


Boyton Hall Basement:

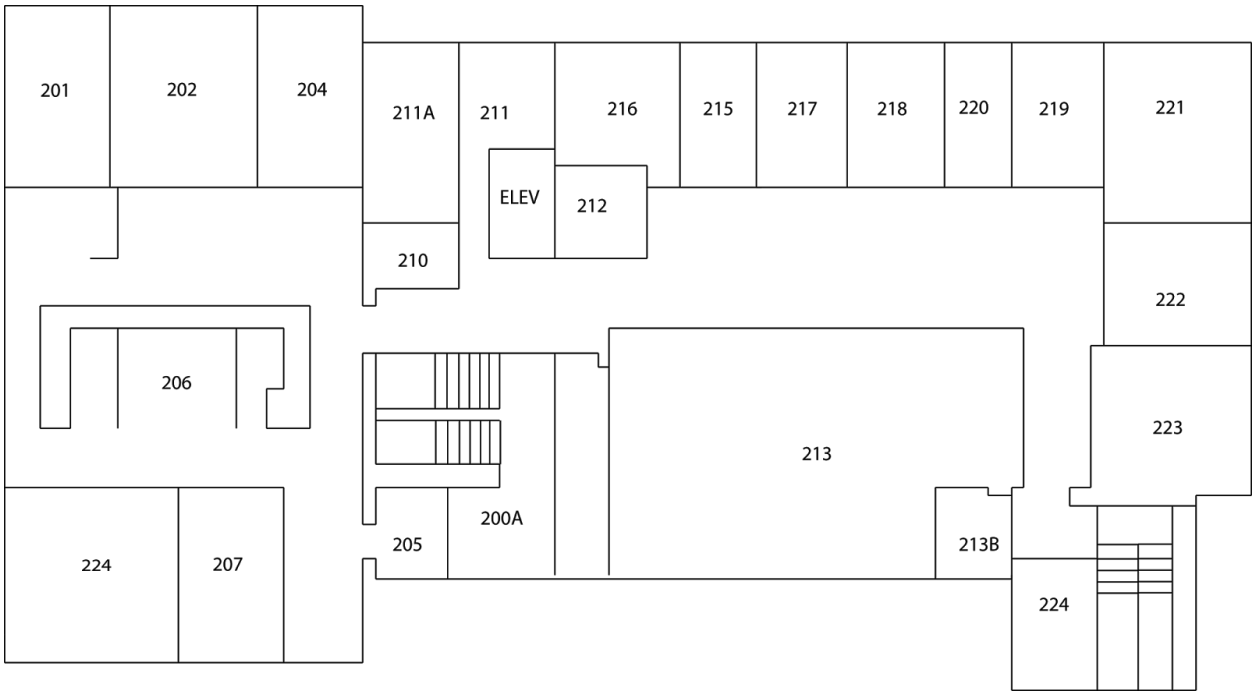
Goat To Go System(GTG)



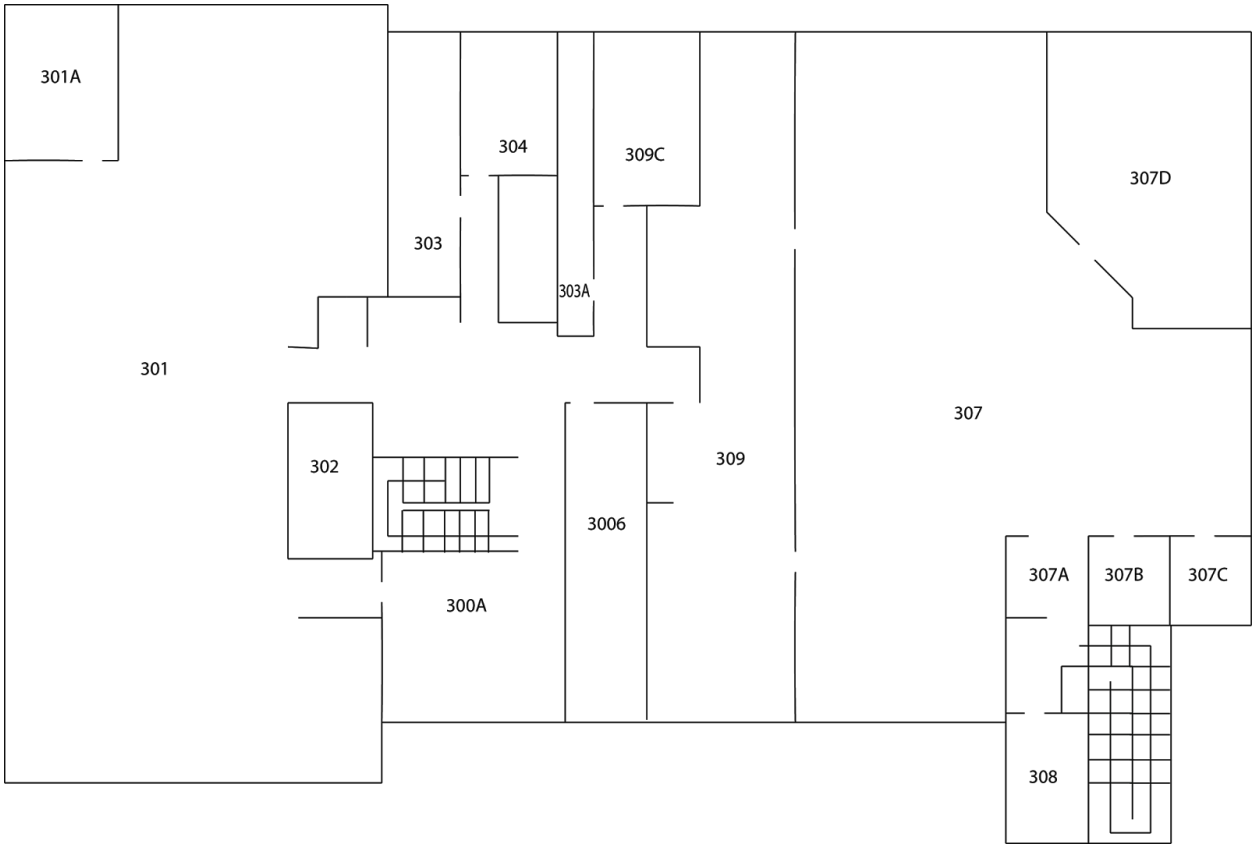
Boyton Hall First Floor:



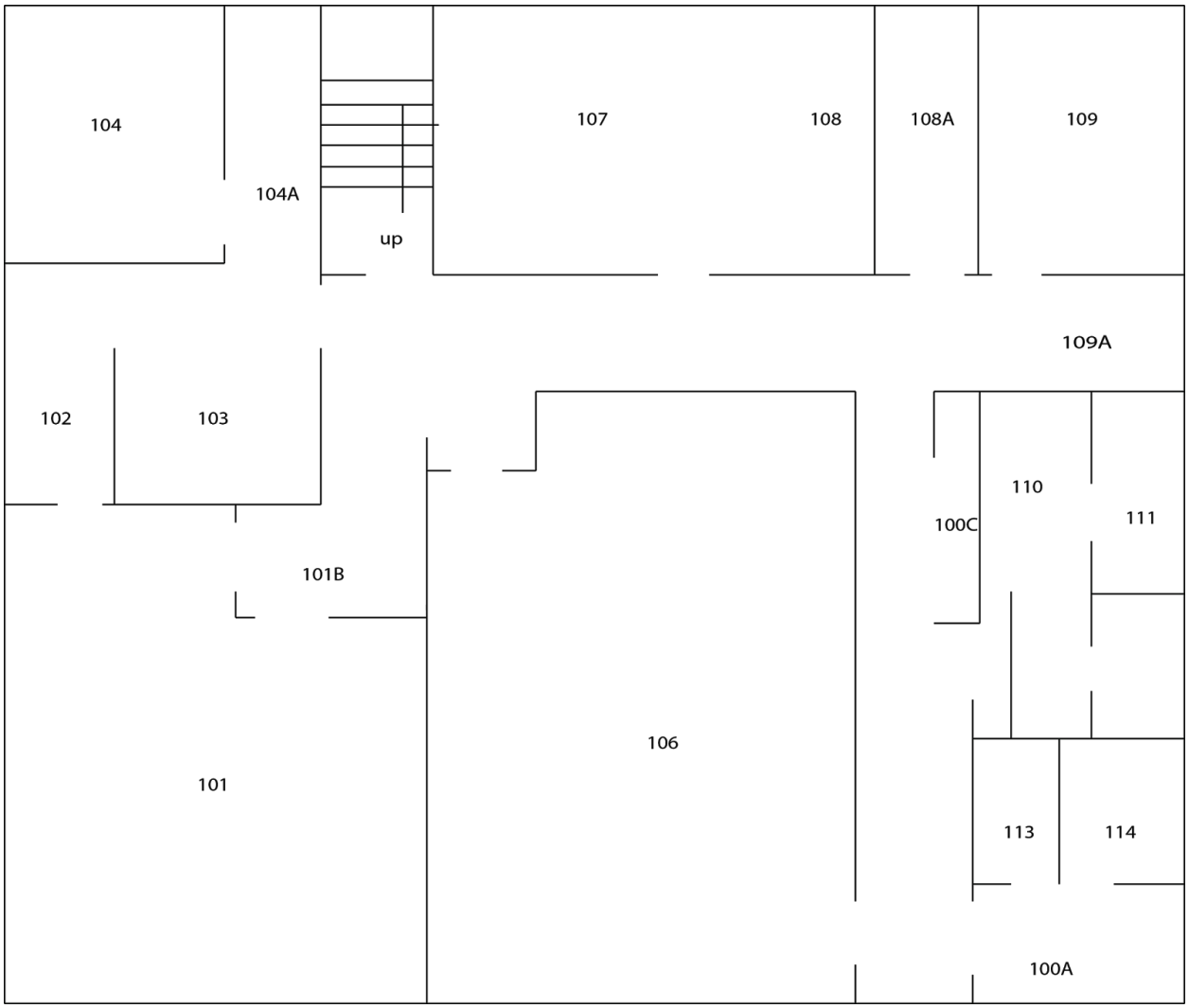
Boyton Hall Second Floor:



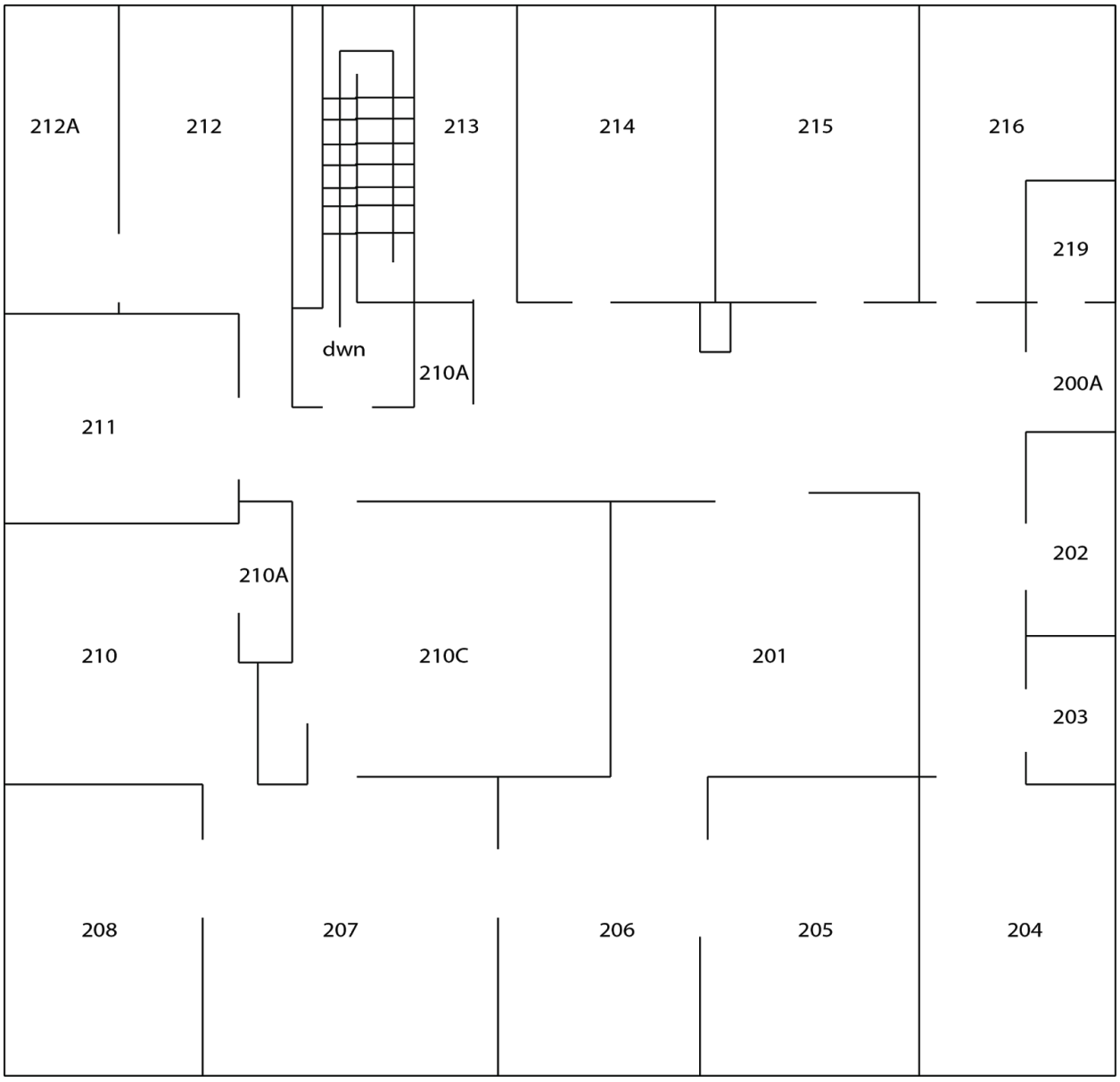
Boyton Hall Third Floor:



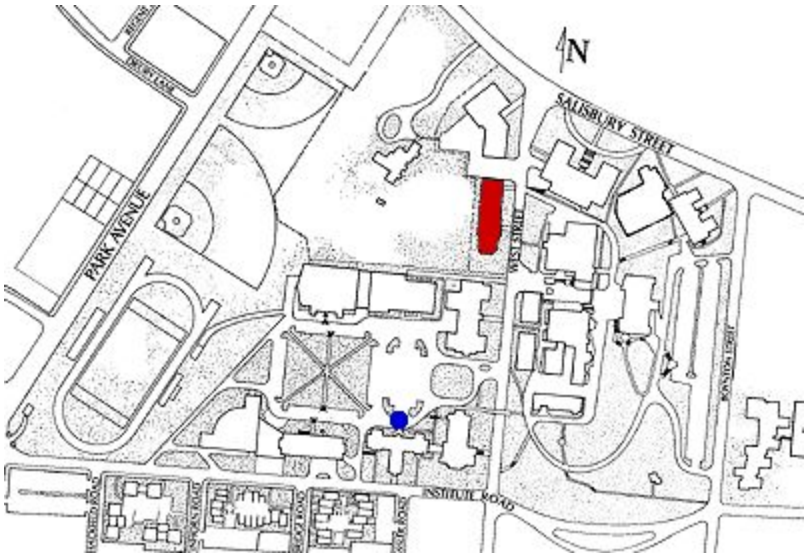
Project Center First Floor:



Project Center Second Floor:



Campus Map:



3.1 Glossary

[1] Bruegge, Bernd and Dutoit, Allen H. Object-Oriented Software Engineering: Using UML, Patterns, Java. Second Edition. Prentice-Hall. ISBN: 0-13-0471100