FlowLogic: Traffic Flow Simulator

Sprint 1 Planning

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Sprint Overview

During this sprint, we will be setting up the base level software upon which the rest of the application will be built. This includes menu systems and the basic drag and drop layout capabilities. By the end of this sprint, the user will be able to create and see their layouts.

Scrum Master: Dominic DeLuca

Meeting Plan: Tuesdays & Thursdays @ 9:00 am

Risks & Challenges

What will make this sprint tough, is that it will be hard to find ways that we can all work at the same time, since so much of this app depends on other parts. Different parts of the program will need to constantly interact with each other. Since we're all working on different parts, we need to consistently make sure that communication between the different parts of the program works without issue.

Current Sprint Details

User Story #1

As a designer, I would like to have a grid-style canvas that I can build on.

#	Description	Est. Time	Owner
1	Implement grid constructors	2 hrs	Dominic
2	Implement the front end display of the grid	3 hrs	Colin
3	Implement the grid to graph algorithm	3 hrs	Dominic
4	Implement Grid Objects interface	1 hr	Dominic
5	Unit Test grid to graph algorithm	2 hr	Dominic
6	Implement the ability to scroll around on the grid	4 hrs	Colin

Acceptance Criteria:

1. When a grid is loaded, you should be able to move your camera view around it, along with zoom in/out.
2. When a grid is loaded you should be able to see it visibly on the screen
3. When a grid has been loaded, you should be able to load a graph version (backend)

User Story #2

As a designer, I would like to drag and drop roads onto the grid.

#	Description	Est. Time	Owner
1	Draw each road type	2 hrs	Isaac
2	Implement the one lane road class	2 hrs	Isaac
3	Implement the two lane road class	1 hrs	Isaac
4	Implement the drag and drop	5 hr	Isaac

	capabilities for roads		
5	Test drag and drop using different road types	1 hr	Colin

Acceptance Criteria:

1. When the “design” menu is loaded, you should be able to pick between a one lane and a two lane road.
2. When you drag a road from the selector, and drop it on the map, it should snap into a grid spot
3. When you click on a grid spot, you should be able to select a road type to place there

User Story #3

As a designer, I would like to adjust intersection types so that I can control traffic flow.

#	Description	Est. Time	Owner
1	Draw each intersection type	2 hrs	Isaac
2	Implement the stop sign class	1 hrs	Isaac
3	Implement the stop light class	2 hrs	Isaac
4	Implement the roundabout class	4 hrs	Dylan
5	Implement the ability to change between each intersection type	2 hrs	Dylan
6	Test switching between different intersection types	1 hr	Isaac

Acceptance Criteria:

1. When the “design” menu is loaded, you should be able to create an intersection.
2. You should be able to select between various types of intersections from the drag and drop menu.

3. You should be able to drag and drop the intersection onto the grid, and it places correctly.

User Story #4

As a designer, I would like to place parking areas and buildings with different parking capacities.

#	Description	Est. Time	Owner
1	Implement building class	2 hrs	Dylan
2	Implement parking class	1 hrs	Dylan
3	Implement drag and drop placing capabilities for buildings	3 hrs	Colin
4	Draw parking pieces	2 hr	Colin
5	Test placing differently sized parking areas and buildings	1 hr	Dylan

Acceptance Criteria:

1. When you load up the build menu, you should be able to create buildings and parking lots.
2. When you drag and release a building it should snap into place on the grid.
3. When you drag and release a parking block, it should snap into place on the grid
4. After a building is placed, you should be able to click it and select the daily population of it
5. After a parking lot is placed you should be able to click it and select the capacity of it

User Story #5

As a designer, I would like to be able to edit and remove buildings.

#	Description	Est. Time	Owner
1	Implement a remove option on the screen	2 hrs	Colin

2	Implement a removal option in the backend	3 hrs	Colin
3	Implement size changing in the frontend	2 hrs	Colin
4	Implement size changing in the backend	3 hr	Dominic
5	Test visually and with unit tests the changing of size and removal of building	2 hrs	Dominic

Acceptance Criteria:

1. When you click on a building that is pre-placed on the grid, an option to "remove" should appear.
2. When you click the "remove" button, the building should disappear from the grid.
3. When you click the building on a placed grid, an option to adjust the size should appear
4. When you enter a new size, the building should change size on screen

User Story #6

As a viewer and a designer, I would like to be presented with a menu when I open the app.

#	Description	Est. Time	Owner
1	Implement a home screen	2 hrs	Colin
2	Implement a new layout screen	2 hrs	Colin
3	Implement the saved layouts screen (will be incomplete)	2 hrs	Colin
4	Implement the basic grid screen	3 hr	Colin
5	Test switching between menu screens seamlessly	1 hr	Colin

Acceptance Criteria:

1. When you launch the app, a home screen should appear, with options to make/view a design.

2. When you click “new design”, a new screen should pop up with options on setting up a new layout
3. When you click “saved designs,” you should see a menu where you will be able to see all the save files (won’t show saved files yet, though, just a blank screen)

User Story #7

As a designer, I would like an adjustable-sized map for different size layouts.

#	Description	Est. Time	Owner
1	Implement the option on the frontend to change	3 hrs	Dominic
2	Implement the ability to change the grid size in the backend	3 hrs	Dominic
3	Implement the immediate update of the grid on screen	4 hrs	Dominic
4	Unit test the size change in the backend and visually check the front end	2 hr	Isaac

Acceptance Criteria:

1. When a button is pressed on the frontend, options to change the size of the grid should appear.
2. When an option is selected, the grid size should change on both the front and backend.
3. When a grid is resized, the grid objects should remain in the same spot on the screen and in the backend

User Story #8

As a designer, I would like to be able to edit and remove roads.

#	Description	Est. Time	Owner
1	Implement road-setting options	3 hrs	Isaac

2	Implement an edit menu	3 hrs	Isaac
3	Implement road removal	4 hrs	Isaac
4	Test the removal and updating of roads back and front end	2 hrs	Dylan

Acceptance Criteria:

1. Given the edit and remove roads option is properly set up when the user clicks on a road, the edit menu appears
2. Given the edit and remove roads option is properly set up when the user makes changes to the road, the road settings are updated
3. Given the edit and remove roads option is properly set up when the user selects to remove a road, it updates the grid data and visual representation.

User Story #9

As a designer, I would like roads to automatically snap together into intersections when they meet.

#	Description	Est. Time	Owner
1	Implement detection of roads around an added road	3 hrs	Dominic
2	Implement the combination of two roads into one	2 hrs	Dominic
3	Implement intersection to connect the combined road	3 hrs	Dominic
4	Test the snapping of intersections in the front and backend	2 hrs	Dominic

Acceptance Criteria:

1. Given road connection is properly set up the road class can detect roads around it and their direction
2. Given road connection is properly set up roads connect to the road going in the same direction

3. Given road connection is properly set up intersections are placed when two roads connect in opposite direction

User Story #10

I would like to be able to save layouts to my computer.

#	Description	Est. Time	Owner
1	Design save file layout	2 hrs	Dylan
2	Implement writing to save file	2 hrs	Dylan
3	Implement reading from save file	3 hrs	Dylan
4	Implement the appearance of saving files in the frontend	2 hrs	Dylan
5	Unit test writing to and reading from save files	2 hrs	Dylan

Acceptance Criteria:

1. When I click the “save” button, a new save file should be added to the local save file directory
2. When I goto the load save file screen, I should see a list of saved files
3. When I click a saved file, I should see the grid representation of that file opened in a window.

User Story #11

I would like to be able to import saved layouts so that I can see other’s work.

#	Description	Est. Time	Owner
1	Implement “Load File” option in the front end (opening file explorer)	3 hrs	Dylan
2	Implement copying files from	3 hrs	Dylan

	location selected into save directory		
3	Implement the save file automatically being loaded onto the screen after uploading it	2 hrs	Dylan
4	Test the visual appearance and functionality of uploading files	2 hrs	Isaac

Acceptance Criteria:

1. When I click “load file” in the front end, a file explorer should open.
2. When I select a file from the file explorer, it should be copied into the local directory.
3. After loading a file into the program, it should appear on my screen in the designer.

Remaining Backlog

Functional Requirements

As a designer,

1. ~~I would like to have a grid-style canvas that I can build on~~
2. ~~I would like to drag and drop roads onto the grid~~
3. ~~I would like to adjust intersection types so that I can control traffic flow.~~
4. I would like to be able to adjust the amount of people going to each building so that I can simulate a realistic environment.
5. I would like to place parking areas with different parking capacities.
6. I would like to configure traffic light timings so that I can test different strategies.
7. I would like to be able to simulate traffic flow so that I can view how my layout would work in a real world scenario.
8. I would like to be able to import saved layouts so that I can see other's work.
9. I would like to be able to export saved layouts so that I can share my work with others.
10. I would like to see statistics from the traffic simulation so that I can perform an analysis of my layout.
11. I would like to receive suggestions on my layouts so that I can improve on them.
12. I would like to adjust speed limits on roads.
13. ~~I would like to be presented with a menu when I open the app.~~
14. I would like to be able to adjust the width (# of lanes) on roads.
15. I would like to adjust the direction from where traffic flows in the simulation.
16. ~~I would like an adjustable-sized map for different size layouts.~~

17. I would like to graphically view statistics.

~~18. I would like to be able to edit and remove roads.~~

~~19. I would like to be able to edit and remove buildings.~~

~~20. I would like roads to automatically snap together into intersections when they meet.~~

21. I would like to be able to save layouts to my computer.

22. I would like to be able to load my saved layouts to the simulation.

23. I would like to view my saved layouts all in one place

24. I would like to delete and rename saved layouts.

25. I would like to name roads and buildings within a layout, so that I can refer to them more easily.

26. I would like to assign different types of vehicles to the simulation.

27. I would like to add pedestrian walkways and crosswalks if time allows.

28. I would like to be able to add construction zones that impact traffic flow.

29. I would like to be able to add one-way streets

30. I would like to be able to simulate rush hour periods.

31. I would like to be able to compare statistics between two saved layouts if time allows.

32. I would like to be able to set accident probabilities if time allows.

33. I would like to simulate special events (concerts, games, etc) if time allows.

34. I would like to be able to add roundabouts.

35. I would like to be able to factor in emergency vehicles if time allows.

36. I would like to be able to add public transportation if time allows.

37. I would like an undo button.

As a viewer,

1. I would like to adjust the speed of the simulation so that I can run real-time or accelerated scenarios as needed.
2. I would like to be able to simulate traffic flow so that I can view how my layout would work in a real world scenario.
3. I would like to be able to import saved layouts so that I can see other's work.
4. I would like to see statistics from the traffic simulation so that I can perform an analysis of my layout.
5. ~~I would like to be presented with a menu when I open the app.~~
6. I would like to view my saved layouts all in one place
7. I would like to delete and rename saved layouts.

Non-Functional Requirements

Architecture & Performance

As a developer, I want to

1. Use the Java class system for backend development.
2. Use JavaFX for frontend development.
3. Use the Model-View-Controller Architecture, which separates the UI completely from the backend.
4. Handle a simulation of 20,000 cars in 5 minutes or less.

Usability & Accessibility

As a developer, I want to

1. ~~I want the grid objects to snap immediately to the grid when placed~~
2. Anyone to be able to learn the UI within 15 minutes
3. Run my application on any major OS (MacOS, Linux, Windows)

Security

As a developer, I want to

1. Decrease my liability for security by keeping this app offline
2. Allow the user to have full control over file sharing