CS261 Group 29 Requirement Analysis

Add your names here

January 2025

1 Given Requirements for document

Each team is required to provide a Requirements Analysis Report. This will document your teams understanding of the specification. As well as addressing the specification itself, the report should also document any decisions that have been made in terms of group management (i.e. how you have organized yourselves to meet the goals of this project, how often you will meet, how you will address decision making etc.) and provide a list of requirements that your team have decided will meet the customer's needs. A requirements analysis report should provide an outline of the features that the final solution will provide. Remember that requirements need to be detailed, justified and verifiable. Consider your validation process carefully, along with why you've chosen to include certain features. This part of your first deliverable must not exceed four sides of A4. Any appendices or other attachments will be removed.

2 Introduction

3 User Requirements Design

3.1 Requirement 1.C

Requirement 1.C: the user must be able to input the rate of traffic flow from each direction to each other direction via text fields (one per traffic flow) in the User Interface (UI).

3.2 Requirement 2.C

Requirement 2.C: the user must be able to adjust the following settings for each road entering the junction, affecting the results of the simulation: how many lanes there are (1 to 5), whether there is a left-turn lane, bus lane, cycle lane (all mutually exclusive, the latter two requiring separate traffic flow rates) or none of those three, whether there is a pedestrian crossing (requires the duration of time the crossing is active and the number of crossing requests per hour), and the traffic light sequencing priority (0 to 4, 0 meaning no priority, 4 meaning highest priority).

3.3 Requirement 3.C

After running the simulation, for each junction configuration, the user must be provided with the following three junction efficiency metrics per road entering the junction, as well as an overall score generated from the three metrics for the whole configuration: average wait time, maximum wait time, and maximum queue length.

4 System Architecture

5 System Requirements Specification

5.1 Requirement 1

5.1.1 Customer Facing

The user must be able to input the rate of traffic flow from each direction to each other direction via text fields (one per traffic flow) in the User Interface (UI).

5.1.2 Developer Facing

- The system must accept input from the text fields, parse the input to determine if each traffic flow is a valid number, and, if all traffic flows are valid, allow the simulation to be ran.
- Priority: must
- Verification: running the simulation with one set of valid traffic flow rates in the text fields, running it again with a different set in the same fields and verifying the junction efficiency metrics have changed, and then trying to run the simulation with an invalid value in at least one text field (e.g. "TEST" for Eastbound Traffic Flow Exiting West)
- Traceability: Input Parameters section in the specification

5.2 Requirement 2

5.2.1 Customer Facing

The user must be able to adjust the following settings for each road entering the junction, affecting the results of the simulation: how many lanes there are (1 to 5), whether there is a left-turn lane, bus lane, cycle lane (all mutually exclusive, the latter two requiring separate traffic flow rates) or none of those three, whether there is a pedestrian crossing (requires the duration of time the crossing is active and the number of crossing requests per hour), and the traffic light sequencing priority (0 to 4, 0 meaning no priority, 4 meaning highest priority).

5.2.2 Developer Facing

- For each junction configuration, the system must take into account its specific settings, adjusting the calculations performed by the simulation for that specific configuration
- Priority: must
- Verification: run a simulation with default parameters (2 lanes per road entering the junction, equal priority on all lights, and all other settings set to off/No) as a reference, and then run a simulation per setting with that setting adjusted, showing the results of each simulation is different from the reference.
- Traceability: Configurable Parameters section in the specification

5.3 Requirement 3

5.3.1 Customer Facing

After running the simulation, for each junction configuration, the user must be provided with the following three junction efficiency metrics per road entering the junction, as well as an overall score generated from the three metrics for the whole configuration: average wait time, maximum wait time, and maximum queue length.

5.3.2 Developer Facing

- When the simulation is ran, for each junction configuration, the system must take the configuration and the input traffic flow rates (shared across all configurations) and calculate the average wait time, maximum wait time and maximum queue length per direction entering the junction, as well as combine these metrics to calculate an overall score for the whole configuration
- Priority: must
- Verification: run the simulation once with two different configurations or twice with a single configuration and different traffic flows, and verify that there is a difference between the metrics and overall score of the configurations/simulation runs
- Traceability: Output section in the specification

5.4 Requirement 4

- The system must allow for comparison of one or more sets of input parameters against the metrics defined in section 3

5.5 Non-functional Requirements

Requirement 5

- The system will show graphical representation of the junction based on the parameters entered (left turn lanes, bus lanes etc). This makes it easier for the user to understand how exactly their settings affect the design of a junction and if they are what they intended.
- Priority: Should-have
- Verification: The representation can be generated as an image and then that image compared to a generated image that has been checked to be correct. This would be able to be unit tested but should also be used with functional testing.

6 Project Philosophy

6.1 Team Roles

As a team we have been meeting once a week on Wednesdays and will continue to do so until the end of the project. When recording the Dragon's Den video presentation we will allocate some more time as well as making sure that someone who's familiar with video editing software is able to fully focus on the video to make it as good as possible. Our team is comprised of the following members:

- Krister - Backend
- Josh - Frontend and Backend
- Antoni - Backend
- Eshan - Frontend
- Thomas - Frontend
- Ani - Video, Frontend and Backend

As a team we have decided to forgo a project manager and opt for regular meetings with a shared understanding of the goals, if anyone has any concerns about the group structue or work distribution then this can be brought up at the whole group meeting to everyone, Everyone is an equal on the team.

6.2 Development Philosophy

We will utilise a hybrid approach combining the main themes of Waterfall with a reuse oriented methodolgy for the software development part of the project. We have strict deadlines for each part of the waterfall cycle. The following are those timelines, they are spaced to allow sufficient time for each section as well as allowing for the whole team to review each stage and make any corrections we deem neccessary.

- Requirement Analysis - 22nd January
- Planning and Design - 29th January
- Implementation and testing - 19th February
- Dragon's Den Video and Final Report - 26th February

Between these stages we will be writing the deliverables as a team alongside, during the weekly meetings we will check the progress of the various documents, giving feedback about the changes and any things that should be altered to best fit the requirements and plan of the project.