

# COMP2211 Runway Redecoration

## Group 2- Deliverable 2, Increment 1

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# 1 Responses to Feedback

## 1.1 Modified Burndown Chart

The burndown chart for day 0 of Increment 1 is now more detailed, as it includes all the subtasks as colour-coded blocks, where the coding scheme is based on the prioritisation of the tasks. The subtask "UML Diagram" is not given a prioritisation as it created to aid our own understanding.

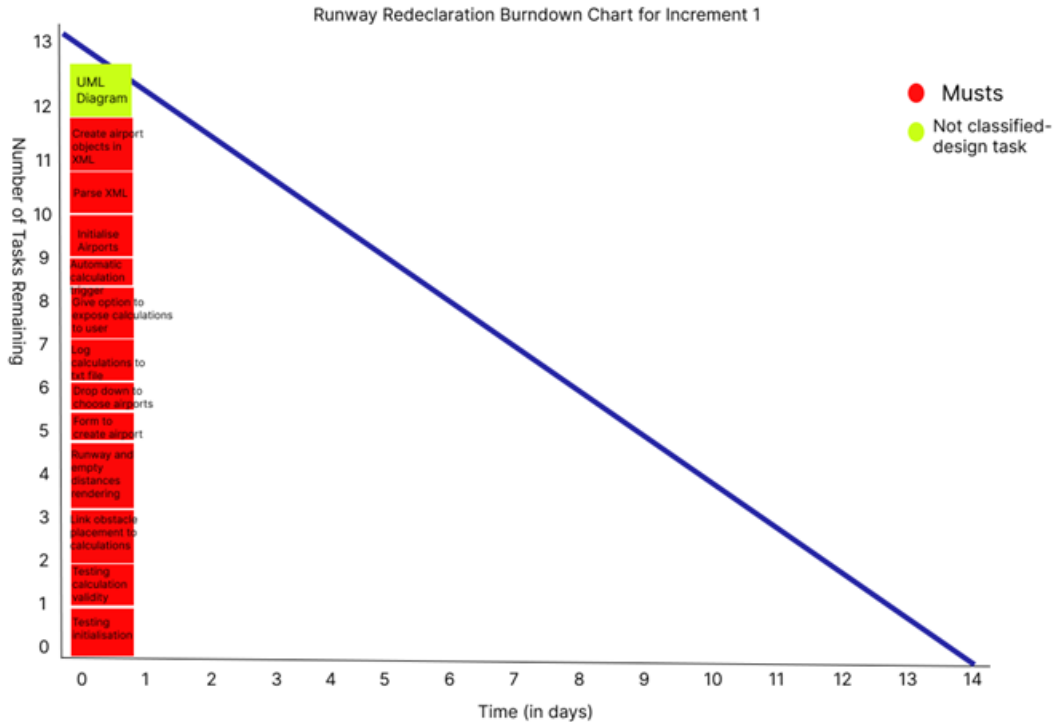


Figure 1: Chart for tracking task completion

## 1.2 T-shirt sizing and the use of term "Continuous"

Although we have not used established techniques like planning poker, our t-shirt sizes were determined based on the amount of pre-processing (how much time do we need to actually understand the task we need to do) we need to do as an addition to completing the task itself.

A proper t-shirt sizing for the task of "help documentation", such as XXL, should have been used instead of "continuous" to imply that is a very large task that will take a long time to complete.

## 1.3 Project Setup with Justifications

Due to everyone's familiarity with after last year's data management coursework, we will be using Gitlab for version control and collaborative working. Moreover, Gitlab provides useful issue tracking support. We looked at Jira as an option for scrum management but didn't think that the time it would take to learn a new software would be worth it. Expanding on the theme of familiarity, development will be done in IntelliJ using Maven for dependency management.

Communications are being handled mainly through WhatsApp as well as Microsoft Teams for file sharing and meetings. We chose these softwares because they are familiar and also practical. Teams and GitLab will also be used for task tracking during the SCRUM process. Issue tracking and commits will be used to keep track of issues and work throughout the sprint as well as to highlight any sticking points team members encounter.

# 2 Key Design Artifacts

## 2.1 UML Diagram

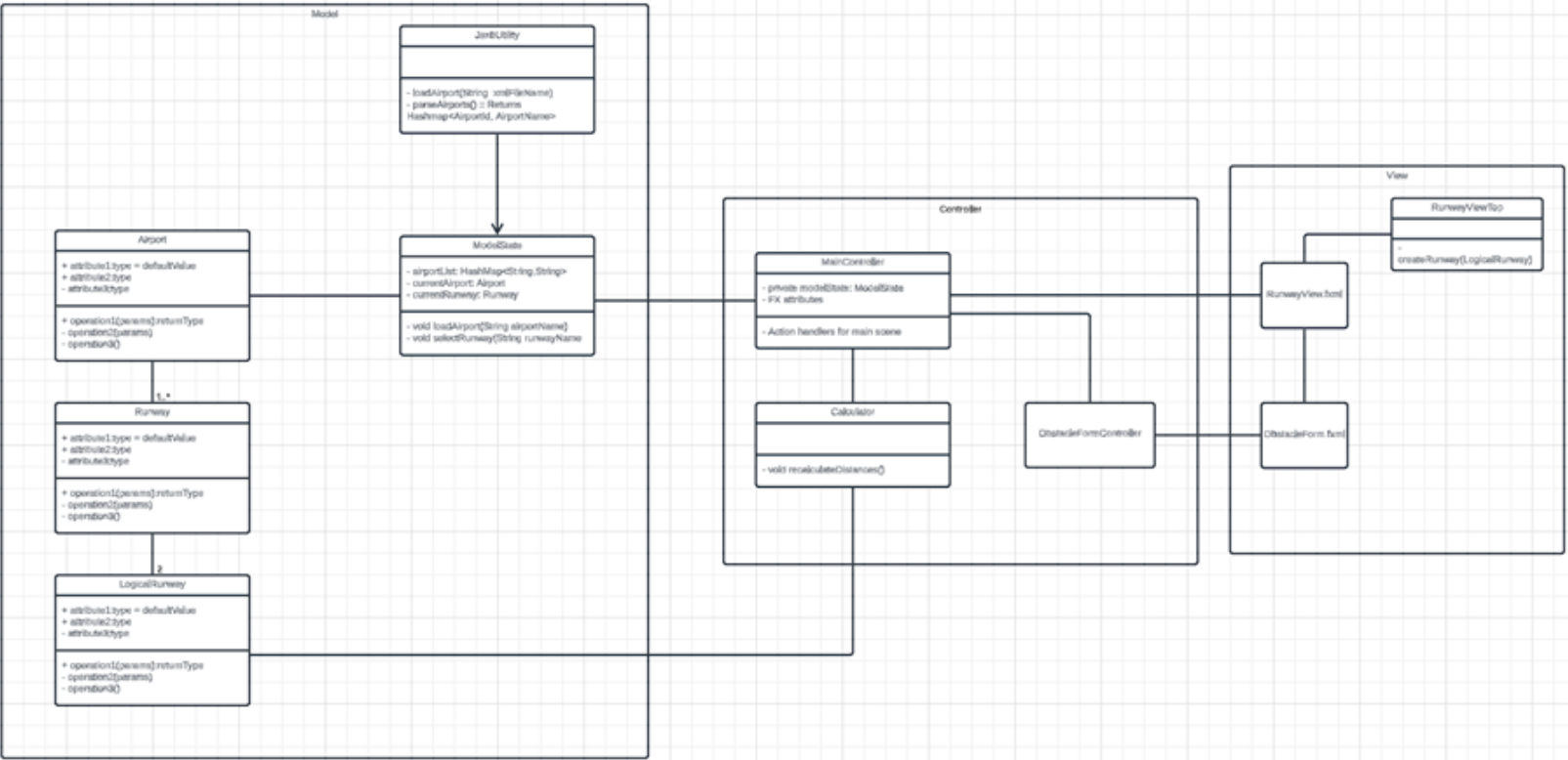


Figure 2: UML Diagram created using MVC architecture

## 2.2 Storyboards

### 2.2.1 Initialisation Page

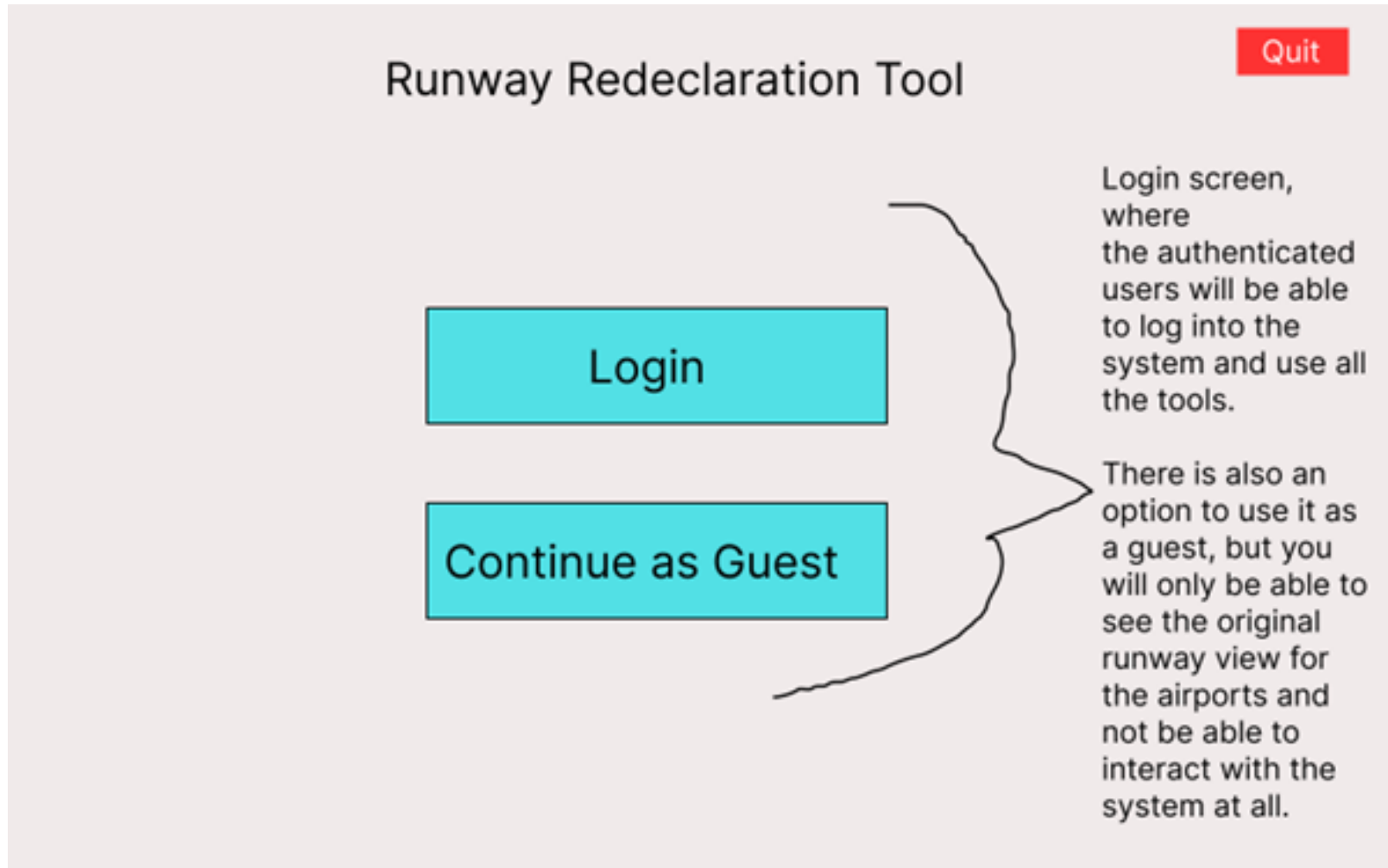
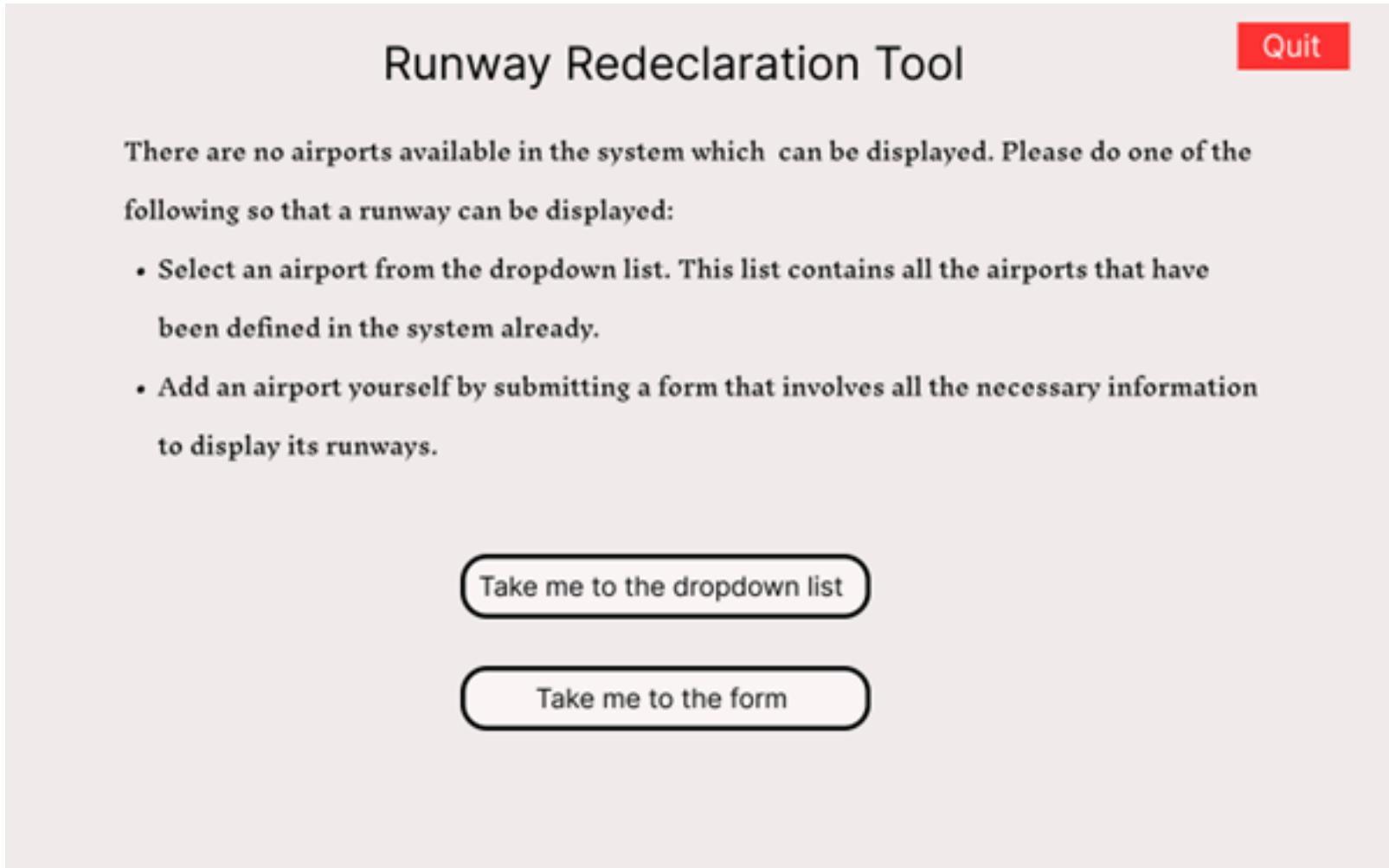


Figure 3: Screen that the users are presented with initially

### 2.2.2 Choosing Airports

If the system recognises that the user has not used the system before (could not find a runway to load from previous initialisation), it will direct the user to this screen, where they are given two options to add airports and runways.

The image shows a web interface titled "Runway Redeclaration Tool". In the top right corner, there is a red rectangular button with the word "Quit" in white. Below the title, a message states: "There are no airports available in the system which can be displayed. Please do one of the following so that a runway can be displayed:". This is followed by a bulleted list with two items: "• Select an airport from the dropdown list. This list contains all the airports that have been defined in the system already." and "• Add an airport yourself by submitting a form that involves all the necessary information to display its runways." At the bottom of the screen, there are two rounded rectangular buttons. The top button is labeled "Take me to the dropdown list" and the bottom button is labeled "Take me to the form".

**Runway Redeclaration Tool** Quit

**There are no airports available in the system which can be displayed. Please do one of the following so that a runway can be displayed:**

- **Select an airport from the dropdown list. This list contains all the airports that have been defined in the system already.**
- **Add an airport yourself by submitting a form that involves all the necessary information to display its runways.**

**Take me to the dropdown list**

**Take me to the form**

Figure 4: Authenticated user picking an airport for the first time

The dropdown list contains names of all the airports that have already been defined (have associated runway metrics) in the system. Picking one of these airports and hitting the confirm button will simply retrieve the latest status of the airport's runway(s).

Runway Redeclaration Tool

⏪Quit

You have not selected any airports to display yet.

Select an airport from the dropdown list below.

Close

Select an airport:

Select an airport

Select an airport

London Heathrow

London Stansted

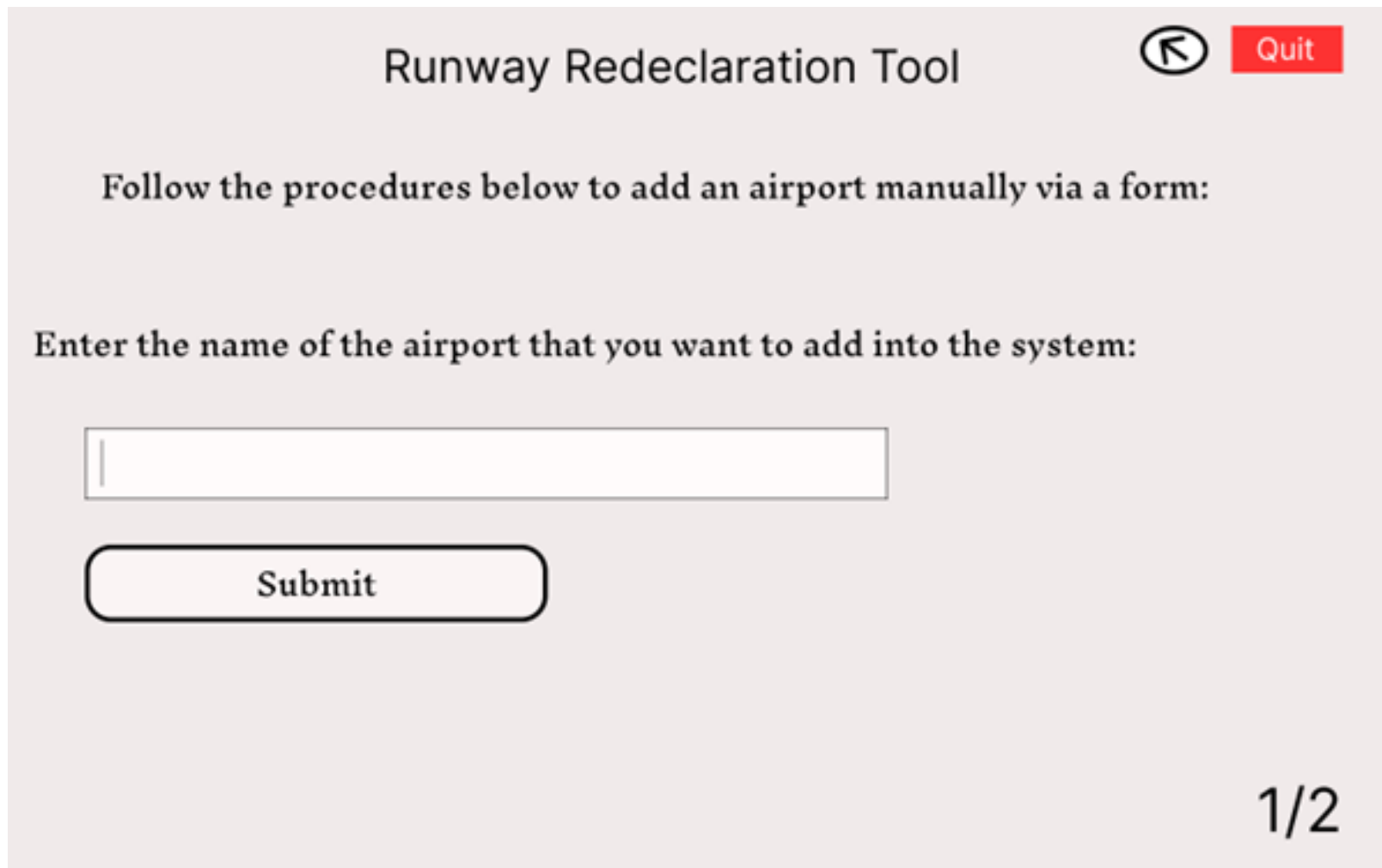
Manchester Airport

....

Confirm

Figure 5: Picking an airport from the dropdown list

### 2.2.3 Adding airport and runways via forms



The image shows a software interface titled "Runway Redeclaration Tool". In the top right corner, there is a circular icon with a left-pointing arrow and a red rectangular button labeled "Quit". The main text in the center reads "Follow the procedures below to add an airport manually via a form:". Below this, a prompt says "Enter the name of the airport that you want to add into the system:". Underneath the prompt is a long, empty rectangular text input field. Below the input field is a rounded rectangular button labeled "Submit". In the bottom right corner of the interface, the text "1/2" is displayed.

Figure 6: Adding an airport via form

Degree and Position fields are not required for the right runway as it will be calculated based on the values entered for the left runway.



# Runway Redeclaration Tool



Quit

Follow the procedures below to add a new runway. You need to provide information about both the left and the right runway:

## Left runway parameters

Degree (enter 09 for 90 degrees, 27 for 270 etc. :

Position, enter L (Left), R(right) or C(centre) (leave BLANK if the airport has a single runway):

TORA (in metres)

TODA (in metres)

ASDA (in metres)

LDA(in metres)

## Right runway parameters

TORA (in metres)

TODA (in metres)

ASDA (in metres)

LDA(in metres)

Submit

2/2

Figure 7: Inputting the required parameters to add runways

### 2.2.4 Main view of the tool

This is the main view of the tool for a member of the ground crew, James. James is able to add obstacles to the system, and not all users will be able to do that. The interface will be reflecting that if that is going to be the case.

The screenshot displays the 'Runway Redeclaration Tool' interface for user 'James'. The interface is divided into several sections:

- Airport selection:** A dropdown menu shows 'Bristol Airport' as the 'Currently selected' option. Other options include 'London Heathrow', 'London Stansted', and 'Manchester Airport'. Below the dropdown is a button 'Take me to the form'.
- Obstacles:** A section stating 'No obstacles are present on the runway. Either:
  - Pick an obstacle from the list of predefined obstacles
  - Or add an obstacle manually by inputting the required metrics.
 It includes two buttons: 'Pick an obstacle from the list' and 'Add obstacle'.
- Runway Diagram:** A central diagram of a runway labeled 'Runway 09/27'. It shows 'Landing and take-off in this direction' with arrows pointing towards the runway. The diagram includes labels for 'TODA', 'TORA, ASDA', and 'LDA'. The runway numbers '09' and '27' are visible on the sides. Below the diagram are two buttons: 'Top-down view' (highlighted in blue) and 'Side-on view'.
- Calculations:** A section titled 'Calculations' showing 'Runway distances with no obstacles (original metrics) for 09/27:'. It includes a table with columns for 'Runway 09:' and 'Runway 27:', and rows for 'TODA: ... m', 'TORA: ... m', 'ASDA: ... m', and 'LDA: ... m'. Below this is another table for 'Metrics for runway 09/27 with obstacle(s) present on the runway:'.
 

Runway 09:	Runway 27:
...	...
...	...
...	...
...	...
- Detailed Breakdown:** A section titled 'Detailed Breakdown' showing a table with columns for 'Runway 09:' and 'Runway 27:', and rows for 'TODA = num1 - num2 - num3 ... = ...', 'TORA = ...', 'ASDA = ...', and 'LDA = ...'.

Figure 8: Inputting the required parameters to add runways

## **2.3 Scenarios**

### **2.3.1 Scenario 1 - Belinda**

On a foggy morning, right after a shift change, a member of the ground crew notices a construction vehicle parked on a runway that is currently in-use. This obstacle was somehow missed by the night shift workers, who were probably less attentive due to approaching the end of their shifts. The Air Traffic Controller is informed about this emergency immediately, and they request for a recalculation of the runway parameters.

Two personnel, who are experts in this area, get on with this task immediately. However, when it came to reconciliation of the results, they realised that the results were massively incompatible with each other. The junior ATC is unsure about what to do, and asks the senior ATC to step in. The senior ATC immediately ceases all the operations on that runway and orders the team to review all the calculations immediately.

Meanwhile, pilots request updated clearance—a delay that incites unrest among passengers—while the ground crew awaits confirmation on whether to proceed with departures. The senior controller double-checks the figures before passing them on, wary of potential miscalculations but unwilling to rush the established process.

### **2.3.2 Scenario 2 - Alex**

1. Alex came to the main menu after logging into the runway redeclaration software and a notification appeared on the main menu informing him that he has not yet selected an airport.
2. He chose a predefined airport for which he works at and he can see runway visualisations he selected.
3. He received a landing request from pilot Whitney and Alex arranged the runway for 27L at 1:35 pm, but shortly thereafter he received a notice from the ground crew James that he was going to maintenance on 27L on software.
4. He selected the runway 27L and saw the obstacle James manually added, then moved to the calculation interface to recalculate the TORA, TODA, LDA, ASDA and other values of the runway 27L based on the new entered obstacle information and reported these to the pilot Whitney.
5. After James finished his assignment, Alex received a notification that the runway 27L new obstacle had been removed, and the calculation interface confirmed this by going back to displaying original distances for runway 27L.

### **2.3.3 Scenario 3 - James**

1. James was working as a ground crew as usual, and he was assigned to drive the maintenance trunk to runway 27L for an-hour minor repair operation at 2pm.
2. He immediately logged into the runway redeclaration software, selected right airport and runway 27L on the main menu.
3. James clicked the button for manually adding obstacles in the main menu, entered the relevant information of his assignment including time period, precise working area and vehicle size.
4. After finishing his work, James logged into the software again to remove the obstacle that he had manually added on the runway 27L earlier.

#### **2.3.4 Scenario 4 - Abdullah**

1. Abdullah arrives at the Heathrow Airport following an incident involving a plane not being able to land safely despite having clear room to do so.
2. Abdullah pulls his tablet up and launches the Runway Redecclaration Tool.
3. Once the tool initialises, Abdullah is presented with a dropdown list on an empty screen, where he is asked to pick an Airport so that its runways can be displayed.
4. Abdullah selects "Heathrow Airport" to be displayed, and he is presented with both of the runways that the airport has, alongside any obstacles that are present on either of the runways.
5. Abdullah is also able to see the most recent calculations that have been done for that airport on the right side of the screen.
6. Abdullah reviews all the key distance calculations by using keyword highlighting, which allows him to focus on one calculation at a time.
7. Abdullah concludes that the incident occurred due to an issue on the pilot's end, as the calculation logs reveal no discrepancy.

#### **2.3.5 Scenario 5 - Whitney**

1. Pilot Whitney complied with procedures by requesting permission to land from the tower. She was subsequently cleared to land on runway 27L by air traffic controller Alex.
2. Alex reviewed the visualisation of the runway using the Runway Redecclaration Tool and noticed an obstacle on the runway, which reduced the available landing space for Whitney.
3. The obstacle had been inputted into the tool by ground crew member James, who had confirmed its presence shortly before. He also confirmed that maintenance work was already in progress to remove the obstacle from the runway.
4. Despite the obstacle, Alex assessed that landing should still be safe on runway 27L and communicated this information to Whitney.
5. Whitney, using her experience, evaluated the situation and determined that there was still enough room to land safely.

### 3 Testing

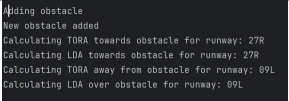
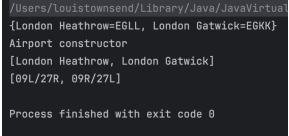

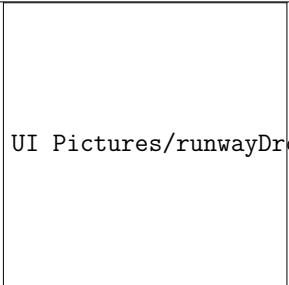
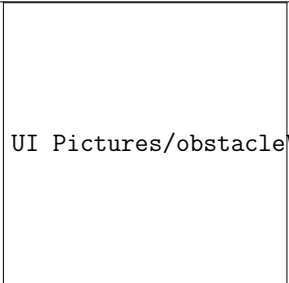
What we were testing	Method of Test	Results of Test	Evidence
Calculations output correctly	Comparing to project definition results	Matching results means Calculation done correctly	
Airports are loaded properly	Test file with logging statements	All relevant objects loaded properly	
Airport can be chosen	Selecting an airport from the drop down	The drop down works	
The runway drop down populates	Try to use the drop down	The dropdown does populate	
Distances are calculated when an obstacle is placed	Place an obstacle	The distances update	

Table 1: Test Table

# 4 Planning

## 4.1 Progress for Increment 1

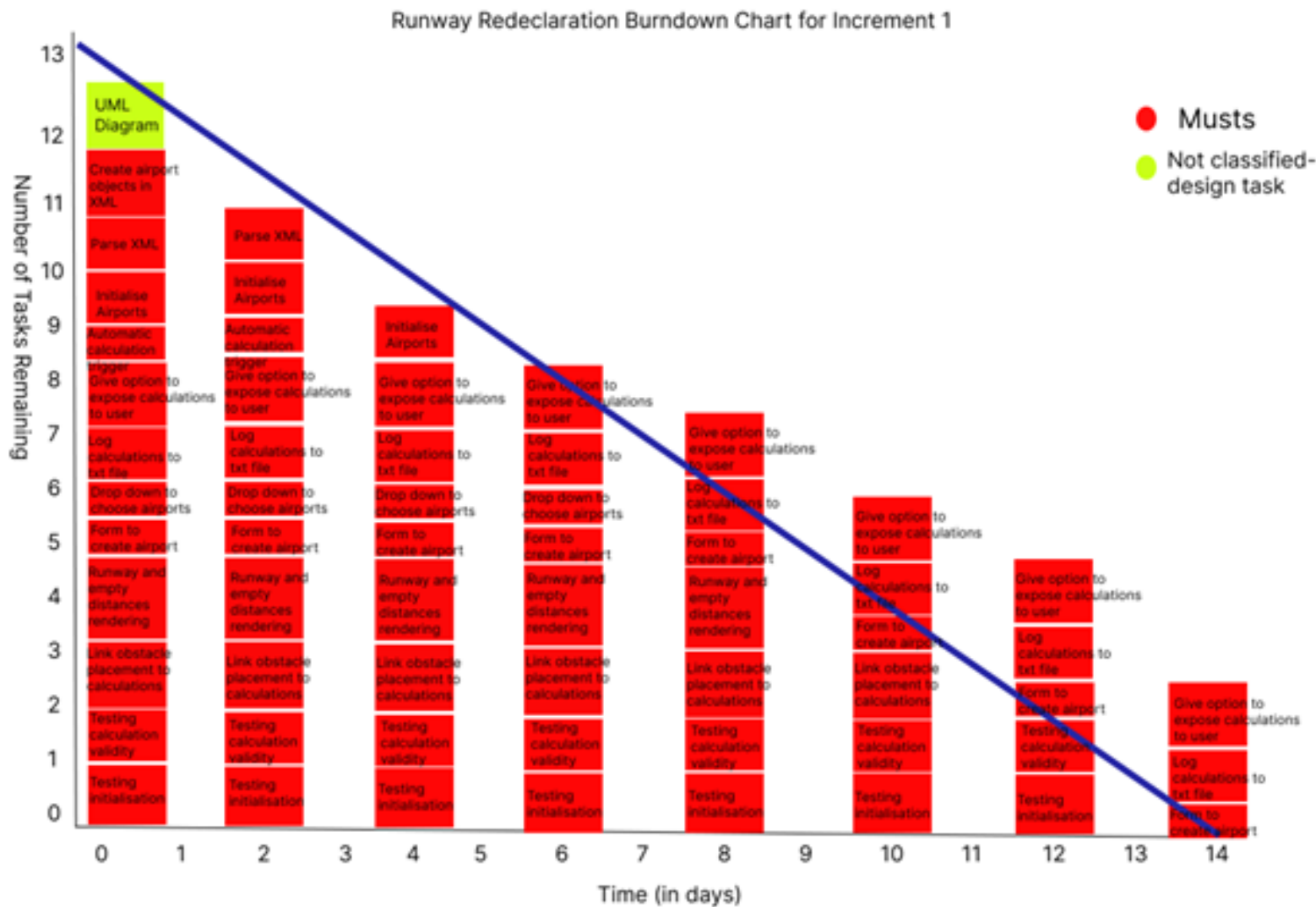


Figure 9: Task tracking for increment 1

## 4.2 Sprint 2 Plan

### 4.2.1 Retrospective on sprint 1:

On reflection, we did not see as much progress in sprint 1 as we had anticipated. The main reason for this was a gross overestimation of how many tasks we could complete in the given time frame. This is a common problem with the agile methodology and, given that we are still learning the process we are still pleased with what we managed to accomplish. Furthermore, the surprise tasks of creating design artifacts took two of our team off of program development.

We delivered *most* of the functionality we planned to deliver, getting airport selection, runway selection, GUI components and basic calculations functional. The user stories we have pushed to the next sprint were not essential to these features.

### 4.2.2 Goal

We will first start this sprint by tackling the tasks that are carried over from Sprint 1, as we over-estimated how much we could get done in Sprint 1 due to not taking the design related tasks into account. After these tasks are complete, the main aim of this sprint is going to be expanding on the basic functionality that we have implemented. At the end of this sprint, we aim to have the following features implemented at a minimum:

#### Tasks carried over:

- A section which displays the calculation breakdown each time a change on the runway(s) occur
- A form that is prompting the user to enter the relevant details so that an airport can be added to the system.
- Each time a recalculation occurs, log it into a txt file.

#### New tasks for this Sprint:

- A list of predefined obstacles so that the users do not have to define the same obstacle multiple times.
- Develop the UI further so that it turns into something pleasing to look at and informative.
  - The runway changes size relevant to the values inputted.
  - All the distances are displayed, relevant to the runway size, using line arrows.
  - Error notifications are displayed to the user when invalid values are entered.
  - Implement multi-user access

### 4.2.3 Sprint Backlog

Task	Estimation	Owner
1: Predefined obstacle list	<b>6h</b>	Abdullah
1.1: Implement obstacle dropdown	2h	
1.2: Implement obstacle placement using dropdown	4h	
2: Runway visualisation	<b>14h</b>	Louis
2.1: Render cleared and graded area	4h	
2.2: Add lines to scale for declared distances	4h	
2.3: Lines update on obstacle placement	2h	
2.4: Rendering obstacles	4h	
3: Implementing multi-user login	<b>15h</b>	Eren & Hossam
3.1: Design user database	5h	
3.2: Store users with roles (e.g. admin, viewer)	2h	
3.3: Design login page	4h	
3.4: Implement login function	4h	
4: Logging	<b>4h</b>	Hossam ( <b>Scrum Master</b> )
4.1: Logging calculations to a txt file	2h	
4.2: Debug logging	2h	
5: Notifications	<b>6h</b>	Andy
5.1: Incorrect input popup box	2h	
5.2: Invalid password popup	2h	
5.3: Invalid obstacle popup	2h	

Table 2: Task Ownership Table



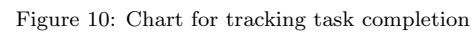


Figure 10: Chart for tracking task completion