PROJECT COMPLETION REPORT

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1. INTRODUCTION

In this project, I had to develop a WPF-based desktop application, which includes a "Report Issues" feature “Local Events and Annoucements” and now for the POE, “Service Request Status”. The application gives users with a place to report issues related to community services, view upcoming events, and search through reported issues (read from a json file). Task 3 integrates the "Minimum Spanning Tree (MST)" and other data structures like heaps, graphs, and binary trees.

This report talk about the process of completing the project, it outlines the challenges faced during Task 3, discusses the solutions to these challenges, and talks about the skills and insights gained throughout the project.

2. PROJECT OVERVIEW

The project consists of the following key components:

Service Request Management: Allows users to report issues and categorise them

Event Announcement: Displays upcoming community events, with filtering and recommendation features.

Data Structures and Algorithms: Uses data structures (e.g., Binary Search Tree, Red-Black Tree, Max Heap) and algorithms (e.g., Kruskal’s Algorithm for MST).

User Interface: WPF interface that provides navigation and functionality. Or, at least tries to, one of my overall challenges across all parts were UI.

3. TASK 3 IMPLEMENTATION AND CHALLENGES

Task 3 required the use of data structures and algorithms for the application. Specifically, my program, used the **Minimum Spanning Tree (MST)** and the use of **graphs**, **binary search trees (BST)**, **red-black trees**, and **heaps**.

CHALLENGES FACED

INTEGRATING COMPLEX DATA STRUCTURES

The biggest problem was integrating and managing multiple data structures such as **graphs**, **heaps**, and **trees**.

I don’t think that the way we were required to complete this POE, reflects the way we would actually use these data structures in real life. Most times I felt like I was just tripping over my own feet trying to incorporate so many structures into what is actually a really simple program.

Each structure had to interact with each other while keeping the integrity of the application, which was difficult, because everything I coded something new, the previous function I worked on would break.

DATA SETS

The project required handling, but where were we supposed to get this data from? It was not stipulated that the data used in the POE was related to any of the other data inserted or view in the other parts of the application. Hard coding data is frowned upon, and I hate lists and I was not sure if we were allowed to use a database.

DATA STRICTURES IN GENERAL

It was difficult. Algorithms are basically math and I am not good at math. The data structures were also very complicated to code, and they are long.

I think the biggest struggle with them was that no matter how much I read up on them or debugged the program, I still found them difficult to understand.

FRONTEND UI

As stated before, I am not a frontend developer. Not only to I find it frustrating, I also have no interest in it. I don't get it. My focus and priority is always logic and function and things looking pretty does not fall high on my priority list.

SOLUTIONS IMPLEMENTED

INTEGRATING COMPLEX DATA STRUCTURES

I read and debugged, and integrated them using my View Model which was not a place I coded for the other parts of my application.

I restructured my filing system so that I would not get confused and made sure to keep each data structure separate. I also made sure to give each structure a specific task and coded each task one by one and only added another structure once the previous was completed and working.

DATA SETS

For the POE, I wounded up incorporating a JSON file to hold the data. It was a best of both worlds. It was separated enough from the code to not feel hard coded and it could be created in the solution so there was not a risk of, when testing, that the data not be there.

For the other parts of the project, I used a list in part 1 because that was a requirement. I do not like Lists.

For part 2, that data was hard coded because I did not think of another way of doing it, and this POE was vague in where our limitations vs requirements are; so I find myself playing it safe a lot.

DATA STRICTURES IN GENERAL

I tried my best.
It's there. It worked when I tested it.

I still do not feel very confident about them.

FRONTEND UI

I looked onto South Africa municipality websites to get a feel for the look and layout, and for the main menu I followed a YouTube tutorial.

4. KEY LEARNINGS AND INSIGHTS

Throughout the course of this project, I gained valuable insights and honed my skills in both technical and problem-solving areas.

SKILLS ACQUIRED

RESEARCH:

The most important skill. Throughout this entire project I felt very out of balance because I was not sure in which direction I was meant to develop the application; because to me, the brief does not make sense. So, I had to do research.
As I've said, I went to South African municipality sites, not just for the UI but to see what functions they had to other and how they work and what was their purpose.

Finding purpose, a reason for developing, was very hard for this app.

I also did research to try and find out what type of user would even use this application. Is it someone who works in government or is it just a civilian, and why would it need to be a desktop application?

I researched the data structures and different way to store and read data sets. I read up on how to display a video for Part 1. I read a lot for this assignment.

PROBLEM-SOLVING APPROACHES

DIVIDE AND CONQUER:

Breaking everything down smaller tasks allowed me to tackle each issue separately and hopefully improve the solution. For example, in part 1, I first worked on inserting data before I worked on displaying it.

TESTING AND DEBUGGING:

I used logs for the first time in this application. I did not know Visual Studio used logs. I would just manually go through the debug process and pinpoint where the issue was coming from. I am grateful for the log though, they made debugging the data structures much easier. For example, my MST was not displaying even though the edges were being counted.

5. CONCLUSION

The completion of this project was a learning experience. Despite facing challenges, the skills and techniques I acquired throughout the process will hopefully prove beneficial for future projects.