PROG7312 - Part 3

APPLICATION PROGRAMMING 3B Project Completion Report

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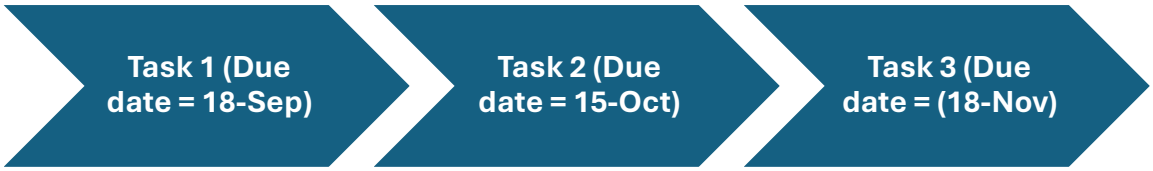
Project Completion Report

Overview of the Project Journey:

This project is part of a POE where I developed a WPF Application using C# and the .NET Framework. The application is designed for managing municipal services in South Africa, offering features that allow users to report issues, request services, view local events and announcements, and track service request statuses. The goal was to create an efficient and user-friendly platform that enhances the interaction between citizens and municipal services. Over the course of the project, significant challenges were encountered and overcome, leading to the successful delivery of a robust application



Challenges Faced and Solutions Implemented:

Task 1: Report Issues:

Challenges:

1. UI design: Ensuring that the UI is easy to use, display of reports manageable, interactive, and keeps users engaged.
2. File Upload Handling: Enabling users to upload images, videos, documents without getting errors, displaying the documents to the users as well and effectively store the files as a byte array and not a path.

Solutions:

1. Research: I did research on how to keep users engaged and created a chat feature, also updated the UI colours to be more professional.
2. Optimized File Handling: I made a media class to store the type of the media uploaded, store the array and made appropriate methods to display the media to the user based on the media type.

Task 2: Local Events and Announcements

Challenges:

1. Efficient Recommendation System: The recommendation system needed to analyse users search patterns and generate relevant suggestions without slowing down and giving wrong data.
2. Sorting and Filtering Complexity: Ensuring smooth and intuitive filtering and sorting across multiple event categories and attributes.

Solutions:

1. Priority Queues and Weighted Algorithms: I had to learn how to use a priority queues and algorithms that assign weights to user preferences every time that they search, this ensured that the recommendations were timely and accurate.
2. Filtering Using Dictionaries and Sorted sets: I made use of dictionaries and sorted sets to handle the category, date and type filters.

Task 3: Service Request Status

Challenges:

1. UI re-design: I had to redesign my UI, so that the user can efficiently navigate between pages, view and track service issues submitted. Faced challenge deciding on new layouts and displays.
2. Unfamiliar data structures: Struggled to understand trees and graph implementations and why it was necessary.
3. Visualization of Data: Had to find a way to visually represent data to the user to track statues.
4. Tree Balancing: The trees needed to be balanced and getting that to work was a challenge.

Solutions:

1. UI re-design: I done some more research and decided on making a side navbar tab where users can easily navigate, I also made the app brighter and not a dark blue that it previously was.
2. Unfamiliar data structures: I watched videos and learned how to use tree structures and the data structures that they wanted to include. I created nodes and the trees separately in classes to make it easier for me to follow and understand.
3. Visualization of Data: I found an easy way to represent the data visually and that is by using LiveCharts to generate the graphs dynamically and reflect in real time.
4. Tree Balancing: I made use of traversal algorithms and debugging to ensure that the tree stays balanced when data is being removed or added.

Key Learnings:

Advanced Data Structures:

1. General trees and binary search trees: I think I have learned a lot on how to effectively implement these trees to sort service requests.
2. Other tree data structures: I feel like the other trees structures like AVL and Red-black trees are similar, and I have learned how to use them, I just still need to learn how to use them more effectively in a bigger data set.
3. Heaps: I gained experience using heaps and Max heaps, filtering and sorting data effectively/
4. Graph Algorithms: I learned how to use graphs, what it is, when its best to use them and display charts using graph data.

Problem-Solving Techniques:

1. I gained problem solving skills when I struggled to implement the data structures, to make it work and to apply the right algorithm to it.
2. I learned to leverage debugging tool in Visual studio and solved the problems I encountered more quickly.

Programming:

1. I strengthened my C# programming skills.
2. I learned how to use MVC pattern.
3. I improved my UI in WPF design

GitHub:

1. I effectively used GitHub to backup my code and learned to commit frequently because I did lose my part 1 code 3 days before the task 1 submission

Challenges Across the Project:

1. Integrating all the data structures that the POE wanted was a major challenge, but research and effective planning helped me.
2. User Experience: Balancing the complexity of the features data structures required and the user interface was hard to do, especially visually representing the data to the user.

Summary of Project Outcomes:

The POE was fully functional with the data structures needed and user experience kept in mind throughout the development of the project