



**Faculty of Engineering
University of Ruhuna**

EE3351: Data Structures and Algorithms

Project Proposal

C++ Eco Bins

An Efficient Waste Management System

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Project Title

C++ Eco Bins: An Efficient Waste Management System

Background

Waste management is one of the most pressing issues facing the globe today due to challenges with increasing urbanization and the environment. Maintaining public health and reducing environmental effects need efficient garbage collection and disposal. Overflowing trash cans, unforeseen collections, and detrimental environmental effects can all result from ineffective waste management. As a result, we decided to introduce the C++ Eco Bin concept. We plan to present the core code for our new waste management system, which uses the latest technology to make garbage collection easier and more efficient. Our goal is to provide the idea of a user-friendly solution that connects garbage collectors and those who want to dispose of garbage, making the entire process easier and better for everyone.

Aim

Introducing a system to the society to effectively solve waste management challenges.

Objectives

1. Developing an effective e-waste management system that allows users to efficiently enter, manage, and monitor waste products and waste bins.
2. Implementing of a linked list-based waste management system that allows users to add, remove, edit, and display waste.
3. Implementing of a stack-based waste bin management system that allows users to push, pop, adjust, and display waste bins.
4. Using efficient data structures and algorithms to handle wasted items and bins, ensuring that the system can handle large numbers of items and bins.
5. Creating tasks that take user input for waste and waste bins and checking data to prevent errors and misuse.
6. Applying error handling techniques to deal with problems such as heap overflows (full waste bins) and empty stacks.

Methodology

1. To analyze and update the requirements of a waste management system in relation to user demands, constraints, and system objectives.
2. Design of system architecture as well as data structures and algorithms. Define waste management, Separation, and collection.
3. C++'s coding-defined data structures and algorithms focus on efficient use while maintaining code quality.
4. Verify that application components, data structures, and algorithms function as required.
5. Create user manuals for future reference, conduct system operation training sessions, and document code and system architecture.
6. Implement the program, monitor performance, provide user support, and maintain and develop the system in response to user feedback and change requests.

Technologies

C++ - The primary programming language for building the Waste Management System. When we implemented the code, we used the following data structures and algorithms.

Linked Lists: Utilized for managing waste items in the WasteList class. We use the below functions under this section.

- addWaste()
- removeWaste ()
- displayWaste()
- editWaste()

Stacks: Used for representing waste bins in the WasteStack class. We use the below functions under this section.

- pop()
- push()
- displayStack()
- configureBin()

The allocateWaste() function implements a basic waste allocation algorithm.

The dynamicScheduling() function, which can be expanded for more advanced.

Arrays have a fixed size, and the quantity of waste items and bins in the context of waste management may not be determined. The use of dynamic data structures such as linked lists and stacks allows for a changing number of elements, which is more suitable for this type of system. Queues follow the First-In, First-Out (FIFO) concept, which is not actually the best solution for waste management operations. Waste bins may need to be handled based on priority (LIFO behavior), which is easier with stacks. Trees and graphs are complex data structures that represent hierarchical relationships, however, due to their complexity, they may not be suitable for waste management systems. Linked lists and stacks are simple data structures, and the code strives for simplicity and clarity. They are also useful for basic waste management operations such as collecting, removing, and maintaining things and bins.

Conclusion

The "Waste Management System" project is an important project that uses data structures and algorithms to address critical environmental and waste management issues. The project aims to update waste management techniques, promote environmental sustainability, and provide important information to authorities and businesses to improve their waste management strategies by implementing creative algorithms and data structures.