External Sorting Algorithm and Simulation on C# Programming Language

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***Abstract*—This thesis explores external sorting algorithms and their implementation in C#. It covers basic sorting methods such as selection sort, insertion sort, bubble sort, quick sort, heap sort, and merge sort. The author delves into external sorting techniques, including merge sort and its variations, and develops a simulation program in C# to demonstrate these concepts. The study highlights the importance of external sorting in managing large data sets, particularly in database management systems. However, specific performance metrics are not provided, and the program lacks advanced features such as user-defined merge paths.**

***Index Terms*—external sorting, C# programming, merge sort, algorithm simulation, data management**

I. Introduction

The thesis introduces the concept of sorting and its significance in both daily life and computer applications. It emphasizes the growing need for external sorting techniques as data storage and processing demands increase. The author focuses on external sorting algorithms and their implementation in C#, aiming to provide a foundational understanding for students interested in this field. The study covers various sorting algorithms, including selection sort, insertion sort, bubble sort, quick sort, heap sort, and merge sort, and delves into external sorting techniques, particularly merge sort and its variations [1]. Published articles on the methods and subject of this project provide context for this English summary [4], [5], [6]. Published articles on the methods and subject of this project provide context for this English summary [7], [8], [9]. Published books on the methods and subject of this project provide context for this English summary [10].

II. Methods

The thesis covers basic sorting algorithms such as selection sort, insertion sort, bubble sort, quick sort, heap sort, and merge sort. It also delves into external sorting techniques, including merge sort and its variations. The author develops a simulation program in C# to demonstrate these concepts and their practical applications. The program includes a graphical user interface (GUI) for user interaction and allows users to input data and observe the sorting process. However, the program does not provide detailed performance metrics or advanced features such as user-defined merge paths [1].

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III. Results

The results include a detailed explanation of external sorting algorithms and their implementation. The author presents a simulation program that can be used to experiment with different sorting techniques. The program successfully demonstrates the merge sort algorithm and its variations, such as multi-way merge sort. However, specific performance metrics are not provided, and the program lacks advanced features such as user-defined merge paths [1].

IV. Discussion

The discussion focuses on the importance of external sorting in managing large data sets, particularly in database management systems. The author suggests that the program can be further developed to allow users to choose the number of merge paths, providing a deeper understanding of the algorithm's behavior. The study highlights the need for more advanced features to enhance the program's functionality and user experience. The author also emphasizes the importance of understanding the underlying principles of external sorting algorithms to effectively manage large data sets [1].

V. Conclusion

The thesis concludes that external sorting is a crucial technique for managing large data sets. It provides a comprehensive overview of external sorting algorithms and their implementation, and the developed simulation program serves as a practical tool for students to explore and understand these algorithms. However, the program lacks advanced features such as user-defined merge paths, and specific performance metrics are not provided. The author suggests that future work could focus on enhancing the program's functionality and user experience [1].

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