CCT College Dublin

Assessment Cover Page

Module Title:	**Algorithms and Constructs**
Assessment Title:	**System Modelling & Build**
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Date of Submission:	**10th May at 11.59pm**

Sor%ng & Searching Algorithm & Adding (Report)

Introduction :

This submission is developing an employee management system for a tech company. The solution enables administrators to easily manage employee data by providing all necessary features (sorting, searching, adding new records). Information is saved in file (as an example Applicants_Form. txt) and the system reads it by using the command line, so it is very simple to use.

Key Features & Functionality

Sorting Employees

a. The software lists full names of employees in alphabetical order, according to the merge sort algorithm.
b. Once the names have been read from the file, the program will quicksort and display the top 20 in any order entered.

Searching for Employees

c. Users are able to conduct a name-based search for employees.
d. The algorithms orders the data first and then use binary search algorithm, which has efficient search time and the most accurate results.

Adding New Records

e. Admin can add employees manual - Enter details such as first name, last name, type of manager & department.
f. New additions are effortlessly incorporated into the current employee list.

The TechCompanyService class, which contains the main functionalities (sorting, searching, adding to techcompany), and the YnshmTech class (handling UI), which presents an easy option based textual menu to the user for navigation.

Technical Implementation

- **Merge Sort for Efficient Sorting**

    - The system employs merge sort due to its optimal time complexity (O(n log n)), making it ideal for handling large datasets.
    - The algorithm works by recursively dividing the list and merging sorted segments for accurate ordering.

- **Binary Search for Quick Lookups**

    - Since binary search requires a pre-sorted list, the system first sorts data before performing searches.
    - This method dramatically reduces search time compared to linear search, especially with extensive records.

- **File Handling & Data Management**

    - The program reads employee data from Applicants_Form.txt, ensuring seamless integration with external files.
    - This eliminates the need for manual data entry and allows for automated processing.

Challenges & Solutions

1. **Input Validation Issues**

    a. In the beginning, the system was not handling invalid user inputs properly resulting in crashes.
    b. Solution: Added checks in input validation to accept only valid menu choice and entry for a record.

2. **File Handling Errors**

    a. The program would break if you didn't have the file, or if the format was incorrect.

b. Solution: Replaced bare exception with proper exception handling to deliver clear messages when dealing with files.

Conclusion & Future Enhancements*

Efficient sorting, searching and recording of information for employee management system is achieved with this structure. With *merge sort and binary search the application is *fast despite big data.

Potential Future Improvements:

1- Creating a GUI for a better user experience.
2- Applying high-form validation to increase soundness of record management.

As a whole, this project acts as a good base for a scalable and user-friendly employee managing system.

MY REPOSTORY LINKE ;

https://github.com/YnsHm12/YnshmTech.git