National University of Computer & Emerging Sciences (NUCES),
Islamabad Department of Software Engineering

CS-2001 Data Structures (Fall 2023) Assignment #01

"Employee Performance Analysis, Salary Comparisons, and Employee Ranking"

Objective:
The objective of this case study is to analyze and compare the performance and salaries of employees in a fictional company. Students will utilize the provided dataset of employee records to gain insights into employee performance metrics, evaluate salary distributions, and rank employees based on specific criteria.

Scenario 1: Initial Employee Performance Metrics (15 points)

1. Task: You are provided with a dataset in a file named “Employeedata.txt” containing employee records, including names, employee IDs, salaries, dates of joining, and designations. You are required to read the file only once and store the records in a data structure.

2. Analysis: Compute and report the following performance metrics for all employees:
   - Average salary in the company.
   - Total number of employees.
   - Average tenure (in years) of employees in the company.
   - Distribution of employees based on their designations (e.g., Software Engineer, Data Scientist, etc.).
- Search Employee with longest tenure

Scenario 2: Salary Comparisons (15 points)

1. Task: In this scenario, you are required to compare and analyze salaries within the company based on different criteria.
2. Analysis: Students should compute and report the following salary-related statistics:
   - The highest salary among all employees.
   - The lowest salary among all employees.
   - The salary range (the difference between the highest and lowest salaries).
   - The median salary.
   - The average salary for each designation category (e.g., Software Engineer, Data Scientist, etc.).
- Search Employee with highest salary

Scenario 3: Employee Tenure Analysis (15 points)

1. Task: Students are required to analyze the tenure (length of employment) of employees in the company.
2. Analysis: Students should compute and report the following tenure-related statistics:
   - The employee with the longest tenure (most years of service).
   - The employee with the shortest tenure (fewest years of service).
   - The average tenure for each designation category (e.g., Software Engineer, Data Scientist, etc.).
   - Search the highest paying designation

Scenario 4: Employee Ranking by Salary (20 points)

1. Task: Students are tasked with implementing and applying a sorting algorithm (e.g., Selection Sort, Insertion Sort, or Bubble Sort) to rank employees in ascending order based on their salaries. Once the sorting algorithm is applied, students should provide a ranked list of employees along with their respective salaries.
   After sorting, print the algorithm's execution time, the number of comparisons performed, and the number of swaps performed during sorting

Scenario 5: Employee Ranking by Tenure (15 points)

1. Task: Similar to Scenario 4, students are tasked with implementing and applying a sorting algorithm to rank employees, but this time based on their tenure (years of service). After applying the sorting algorithm, students should provide a ranked list of employees based on their tenure.
   After sorting, print the algorithm's execution time, the number of comparisons performed, and the number of swaps performed during sorting

Note:

1) USE TEMPLATES to implement all the functions and structure

2) Do not use vector, list .

Instructions (before starting the assignment):

1. Assignments are to be done individually.

2. The code you write must be your own and you must understand each part of your code. You are encouraged to get help from the course instructors through google classroom and email.

3. Apply all validations for invalid inputs.

4. Plagiarism: Plagiarism of any kind (copying from others, copying from the internet, etc.) is not allowed. If found plagiarized, you will be awarded zero marks in the assignment. Repeating such an act can lead to strict disciplinary actions and failure in the course.

5. Please start early otherwise you will struggle with the assignment.

Submission Guidelines

a. submit both .h and .cpp file Your submission must contain your name, student-id, and assignment # on the top of the file in the comments. Example the first line of assignment you should write //Maheen_Arshad_22i111. Missing this will result in 20% marks deduction in each question.

b. Move your .cpp and .h file in one folder. The folder must contain only submission.cpp and h files(no binaries, no exe files etc.,). If we are unable to download your submission due to any reason you will be awarded zero mark.

c. Run and test your program on machine before submission. If there is a syntax error, zero marks will be awarded in that specific question.

d. Rename the folder as ROLL-NUM_SECTION (e.g. 21i-0001_A) and compress the folder as a **zip file**. (e.g. 21i-0001_A.zip). Only **zip file** will be acceptable.

e. Submit the .zip file on Google Classroom within the deadline. Late submission will be marked zero. No exceptions

f. Submission other than Google classroom (e.g. email etc.) will not be accepted.

g. The student is solely responsible to check the final zip files for issues like corrupt files, viruses in the file, mistakenly exe sent. If we cannot download the file from Google classroom due to any reason it will lead to zero marks in the assignment.