Department of Information Systems and Technologies

CTIS 152 – Algorithms and Data Structures

Spring 2024 – 2025

EXTRA QUESTION # 05

A university maintains the information of students (studentID, name, surname, GPA, tuitionFee) and their scholarship details (Merit-Based Scholarship: full/half/none, Need-Based Scholarship: Y/N, Additional Discount percentage) in the text file "students.txt" and calculates their payable tuition fee according to the following scholarship criteria:

- **Merit-Based Scholarship:** Full covers 100% of tuitionFee, Half covers 50% of tuitionFee.
- **Need-Based Scholarship:** If the student is eligible ('Y'), an additional 20% discount is applied to the remaining amount after merit-based deduction.
- **Additional Discount:** A percentage-based discount is applied to the remaining amount after previous deductions.

Write a C program that reads all the information from the students.txt file into an array of structures, sorts the list according to the surname in ascending order, and displays the information of all students including their final payable tuition fee after all scholarships and discounts.

Write the following functions, deciding the parameters and return types on your own, and test them in main:

readStudentInfo, calcFinalFee, displayStudentInfo, bubbleSort

students.txt

```
101 John Smith 3.8 15000 full Y 10
102 Alice Johnson 3.2 12000 half N 5
103 Robert Brown 2.9 18000 none Y 15
104 Emily Davis 3.5 14000 half Y 10
105 Michael Wilson 3.0 16000 none N 0
106 Sarah Miller 3.9 15500 full N 5
```

Example Run:

```
ID   NAME       SURNAME    DEPARTMENT       GPA   SCHOLARSHIP MERIT THRESHOLD FINAL COVERAGE
***  *********  *********  *************    ****  **********  *****  ********  **************
103  Robert     Brown      2.9              18000.00  none        Y      15.00       10.00%
104  Emily      Davis      3.5              14000.00  half        Y      10.00       60.00%
102  Alice      Johnson    3.2              12000.00  half        N      5.00        50.00%
106  Sarah      Miller     3.9              15500.00  full        N      5.00        100.00%
101  John       Smith      3.8              15000.00  full        Y      10.00       110.00%
105  Michael    Wilson     3.0              16000.00  none        N      0.00        0.00%
```