University of Buea
Department of Computer Science
CSC301: Data Structures and Algorithms
Mini-Projects A for First Semester 2020/2021

Mini Project 1

In this project, you will write three programs to collect information on the following attributes of each of five students:

- Name (a character array)
- Student ID (an integer)
- Dept ID (an integer)
- Weight in kg (a float)
- Height in metres (a float)

For each student, you will calculate the body mass index $\frac{weight}{height^2}$

You will also compute the average height and average weight of all the students, and count the number of departments to which students belong.

- The first program should read the attribute values from the keyboard into an array (10 marks)
- The second program should read the attribute values from the keyboard into a linked list (10 marks)
- The third program should read the attribute values from a text file into a linked list (10 marks). The name and Student ID in the text file data should be separated with a special character (e.g., semicolon) to help you read the name field correctly. Each student's data is provided on a separate line. An example text file for three students is given below:

```
John Jones ; 250 10 75.8 1.6
Suzy Paula Doe ; 1243 10 82 1.7
Doe ; 324 15 69.9 1.8
```

For each program, your output should comprise a table with details for each student, followed by their average height and weight, and count of departments below the table.

Mini Project 2

In this project, you will write three programs to collect information on the following attributes of each of five employees:

- Name (a character array)
- ID (an integer)
- No of hour worked (a float)
- Hourly pay rate (an integer)

For each employee, you will calculate the wage without tax (hours worked X hourly pay rate), the tax amount (5% of wage without tax), the net wage after tax deduction.

You will also compute the following sums: Wage without tax, Tax amounts, Net wage after tax deduction.

- The first program should read the attribute values from the keyboard into an array (10 marks)
- The second program should read the attribute values from the keyboard into a linked list (10 marks)
- The third program should read the attribute values from a text file into a linked list (10 marks). The text file should have the data arranged as follows: Employee ID, No of hour worked, Hourly pay rate, Employee name (i.e., three numbers followed by a string of characters). Each employee's data is provided on a separate line. An example text file for three employees is given below:

```
250 25.5 2500 John Jones
1243 42 1500 Suzy Paula Doe
324 39 2000 Doe
```

For each program, your output should comprise a table with details (name, ID, No of hour worked, Hourly pay rate, wage without tax, tax amount, wage after tax deduction) for each employee, followed by the computed totals (Wage without tax, Tax amount, Wage after tax deduction)

Mini Project 3

In this project, you will write three programs to collect information required for the school report cards of five students. Each student does the same three subjects whose names are stored in an array as follows:

- Names of the three subjects (an array; the subjects are MAT, PHY, CSC)

The following details are collected for each student:

- Name (a character array)
- ID (an integer)
- Scores on 100 for the three subjects (an integer array)
- The letter grades of the three subjects (an array; the possible grades are A, B, C, D, E, F). For each subject, you will calculate the letter grade using the following table:

Score	80 and above	70 – 79	60 – 69	50 – 59	40 – 49	Less than 40
Letter grade	A	B	C	D	E	F

- The first program should read its data from the keyboard into an array (10 marks)
- The second program should read its data from the keyboard into a linked list (10 marks)
- The third program should read its data from a text file into a linked list (10 marks). The text file should have the data arranged as follows: Student ID, Scores for MAT, PHY, and CSC, Student name (i.e., four numbers followed by a string of characters). Each student's data is provided on a separate line. An example text file for three students is given below:

```
250 75 68 82 John Jones
1243 42 55 39 Suzy Paula Doe
324 55 43 80 Doe
```

For each program, your output should comprise the following three tables.

First table

Name	ID	MAT/100	PHY/100	CSC/100	MAT/Grade	PHY/Grade	CSC/Grade

Second table

Subject	No of A Grades	No of Pass Grades	No of F Grades
MAT			
PHY			
CSC			

Note: Pass grades are A, B, C, D, E

Third table

Student	No of A Grades	No of Pass Grades	No of F Grades
Name of 1st student			
Name of 2nd student			
Name of 3rd student			
Name of 4th student			
Name of 5th student			

Note: Pass grades are A, B, C, D, E

Mini Project 3

In this project, you will write three programs to track drinks purchased by patrons of the Buea Mountain Club. When a patron visits the club (typically with friends), we want to be able to invoice the patron based on the drinks purchased.

The names of the different drinks available, their categories (A for alcoholic drinks and N for non-alcoholic drinks), and unit costs (costs are integers) are stored in three separate arrays. The available drinks are listed below:

Name	Martini	Campari	Johnnie Walker	Tuborg	Amstel	Orange Juice	Apple Juice	Coke	Water
Category	A	A	A	A	A	N	N	N	N
Unit cost without tax	1500	1750	1500	1000	750	500	500	400	300

Alcoholic drinks are taxed at 15% and non-alcoholic drinks at 10%.

Your program will keep track of the name of each patron, his order for drinks (name, quantity, cost with and without tax), and the the total amounts spent (costs without tax, tax amounts, and cost with taxes included)

- The first program should read its data from the keyboard into an array (10 marks)
- The second program should read its data from the keyboard into a linked list (10 marks)
- The third program should read its data from a text file into a linked list (10 marks). Each patron's order is provided on a separate line. An example text file for three patrons is given below (the first line is an order for patron John James for the following drinks: 2 Martini, 0 Campari, 0 Johnnie Walker, 1 Tuborg, 0 Amstel, 1 Orange Juice, 2 Apple Juice, 0 Coke, 0 Water

```
2 0 0 1 0 1 2 0 0 John Jones
0 0 1 1 0 1 2 1 2 Suzy Paula Doe
2 2 0 1 0 1 0 2 0 Doe
```

For each program, your output should be an invoice for the drinks purchased by each patron. The invoice for John Jones for example, should comprise the following:

Invoice for Patron John Jones

No	Item	Qty	Unit cost	Cost/No tax	Tax	Cost w/ Tax
1	Martini	2	1,500	3,000	450	3,450
2	Tuborg	1	1,000	1,000	150	1,150
3	Orange Juice	1	500	500	50	550
4	Apple Juice	2	500	1,000	100	1,100
	Totals			5,500	750	6,250