ASSIGNMENTS AND PROJECT (SECJ2013)

DATA STRUCTURE AND ALGORITHMS

SEM 1, 2023/2024

TASK FOR STUDENTS

a) Form a group consisting of **3 members**. Complete your group information at the following link: https://docs.google.com/spreadsheets/d/13fCLSt7JSIuH8Ec8nu8masm5m8CDuRWb47MMsOrnEBQ/edit#gid=1661994577

b) Each group must select **1 topic (case study)** from the given list of topics (case studies). The chosen topic/ case study must **NOT be the same** as any other group.

No	Topics/ Case Studies	Descriptions
1.	Library Management System	System to manage books in a library.
2.	Airline Reservation System	System to manage flight bookings.
3.	Inventory Management System	System to manage inventory in a warehouse.
4.	Task Management System	System to manage tasks.
5.	Hospital Management System	System to manage patient records in a hospital.
6.	Banking System	System to manage banking transactions.
7.	E-commerce System	System to manage an online marketplace.
8.	Real Estate Management System	System to manage properties in a real estate agency.
9.	Hotel Booking System	System to manage room bookings in a hotel.
10.	Restaurant Management System	System to manage orders in a restaurant.
11.	Job Portal System	System to manage job postings and applications
12.	Election Management System	System to manage elections.
13.	Courier Service System	System to manage courier services.
14.	Weather Forecasting System	System to manage weather data and forecasts.

c) Each group must apply the data structure concepts in the chosen topic/ case study:

i) ***Assignment 1***: Apply data structure operations - sorting and searching.

ii) ***Assignment 2***: Apply the concept of linked lists.

iii) ***Project:*** Apply either stack, queue and/ or tree.

Note: For more information, please refer to the descriptions for each assignment and project provided in the following subtopics.

d) Assignments and Project **must** be completed in a **group**.

e) Plagiarism in any form is **prohibited**. Each group **must** submit a **Turnitin report** for each assignment and project report. The plagiarism percentage for the report **must be less than 20%**, while the **AI plagiarism percentage must be 0%**. For access to Turnitin (https://www.turnitin.com/login_page.asp), each student/ group representative must enroll

in the **Data Structure and Algorithms (Section 02)** class with the **Class ID: 41737763** and **Enrollment Key: secj2013-02**. You are allowed three resubmission attempts where the Similarity Report will generate immediately. After three attempts, you'll have to wait 24 hours before a new Similarity Report can be generated.

f) To assess student involvement in each assignment and project, **GitHub** (https://github.com/jjn7702/SECJ2013-DSA) is used to monitor each task performed by each student, whether in report production or system coding. The grading for each student's involvement will be made 100% based on this GitHub report.

g) Please ensure that all your work is placed on **GitHub** (for monitoring and evaluation purposes) and also submitted to **eLearning** (for course reporting and evaluation purposes).

ASSIGNMENT 1

a) Identify **at least one** class/struct related to your topic.

b) The class/struct must have **at least four attributes (data)**.

c) Please conduct **sorting and searching** operations on the array of objects/structs. You may use any technique/algorithm that is appropriate for sorting and searching.

d) For both operations, your program must enable users to select from a variety of possible options. For example:

```
<<< Sorting Process >>>
[1] By name
[2] By age
[3] By IC number

Option: ____
```

Note:

i) Perform sorting and searching based on certain criteria/keys.

ii) You need to provide a menu for the user.

iii) Please use files (consider them as a database) to store and retrieve data for your system.

h) The creativity and neatness of your output display will be taken into account.

i) Write a report that includes an objective, a synopsis, a design (class design in a class diagram and/or algorithm design in pseudo code/a flow chart), and a description of how data structure operations: sorting and searching are implemented.

j) The concept of data structure must be applied correctly using the **C++ language**.

k) This assignment must be submitted **before December 21, 2023, Thursday (00:00 MYT)**.

l) For submission on **e-Learning**:

i) Each group should only make **ONE** submission.

ii) The submission should include:

- Link to the Assignment 1 work on GitHub
- Plagiarism Percentage Report (in pdf format)
- Source codes (the .cpp file) and input file(s)
- Assignment 1 Report (in pdf format).

m) For submission on **GitHub**:

i) All codes and input file(s) ⇨ All coding processes must be done entirely on GitHub.

ii) All results reported in the report (in pdf format), must also be accessible and displayed on GitHub using the *.md format.

ASSIGNMENT 2

a) Identify at least **one** class/struct related to your proposed topic.

b) The class/struct **must** have at least four attributes (data). Please apply the concepts of data hiding and encapsulation.

c) Using a **linked list**, please perform the following operations:

i) Adding a new node: You **must** provide the option of inserting the new node at the beginning, middle, or end of the list.

ii) Deleting a node: You **must** provide the option to delete the first node, the node in the middle, or the node at the end of the list.

iii) Finding a node: Allow the user to enter the search key based on the attributes used in (b).

iv) Sorting the list (bonus marks will be awarded).

v) Displaying all of the nodes in the list.

d) The creativity and neatness of your output display will be taken into account.

e) Write a report that includes an objective, a synopsis, a design (class design in a class diagram and/or algorithm design in pseudo code/a flow chart), and a description of how the data structure concept: linked list is implemented.

f) The concept of data structure must be correctly applied using the **C++ language**.

g) This assignment must be submitted **before January 1, 2024, Monday (00:00 MYT)**.

h) For submission on **e-Learning**:

i) Each group should only make **ONE** submission.

ii) The submission should include:

- Link to the Assignment 2 work on GitHub
- Plagiarism Percentage Report (in pdf format)
- Source codes (the .cpp file) and input file(s)
- Assignment 2 Report (in pdf format).

g) For submission on **GitHub**:
   i) All codes and input file(s) ⇨ All coding processes must be done entirely on GitHub.
   ii) All results reported in the report (in pdf format), must also be accessible and displayed on GitHub using the *.md format.

PROJECT

a) Each group is required to develop a software application for a chosen case study or topic by implementing the appropriate data structure(s).
b) Software applications must be developed using **at least one** of the following data structure concepts: **stack, queue, and tree**. The use of more than one data structure concept is highly encouraged.
c) Write a report that includes an objective, a synopsis, a design (class design in a class diagram and/or algorithm design in pseudo code/a flow chart), and a description of how the data structure concept(s) is implemented.
d) The concept of data structure must be correctly applied using the **C++ language**.
e) This assignment must be submitted **before January 15, 2024, Monday (00:00 MYT)**.
f) For submission on **e-Learning**:
   i) Each group should only make **ONE** submission.
   ii) The submission should include:
      - Link to the Project work on GitHub
      - Plagiarism Percentage Report (in pdf format)
      - Source codes (the .cpp file) and input file(s)
      - Slide presentations (in pdf format)
      - Project Report (in pdf format):
        - *An overview of the project (problem analysis).*
        - *Design of project (UML class diagrams and/or algorithms in pseudo-code or flowcharts).*
        - *An explanation of how the selected data structure concept is implemented in the case study.*
        - *Source code demonstrating the data structure concept employed.*

- *User manual/guide: provide examples of input and output (if any) for each task.*

h) For submission on **GitHub**:

i) All codes and input file(s) ⇨ All coding processes must be done entirely on GitHub.

ii) All results reported in the report (in pdf format), must also be accessible and displayed on GitHub using the *.md format.

g) For project presentation:

i) Each group member is required to give a presentation demonstrating their contribution to the group project's execution. Presentations will be evaluated individually.

ii) The presentation will be held on **Monday, January 15, 2024 (starting at 11.00 am)**.

iii) Each student only needs to present for a **maximum of 5 minutes** (a penalty will be imposed if the student does not adhere to the time). This means each group will be given 15-20 minutes to present their work using PowerPoint slides and a system demonstration.

iv) The presentation should include the following:

- The project description
- The project designs
- The data structure concepts employed: show it in the program
- Execution of the program/ System demonstration: display the system's input and output.

h) Marks distribution:

i)	Project Report	
	- Problem analysis	10
	- Design	10
	- Data structure concept implementation	10
	- User guide	10
ii)	Presentation & Demo (+ Slide)	20
iii)	Source Code/ System Prototype	20
iv)	Group involvement	20
	TOTAL	**100**