The University of the South Pacific

School of IT, Engineering, Mathematics & Physics

CS112: Data Structures & Algorithms

Assignment 2 – Semester II, 2024

Total Marks: 15%

Due Date: as shown on Moodle

This assignment covers mostly the practical aspects of this course. The marking rubrics is heavily based on *Programming CBoK*. Rubrics have been taken from ACS-SCIMS rubrics V1.0. The focus is on Classes and LinkedList. Their understanding and usage will be tested. C++ is the only acceptable language for this assignment. Usage of other data structures or topics not yet covered will not be accepted. This assessment covers the following course learning outcomes:

CLO 1 – Demonstrate the usage of various data structures in programming.

Problem statement

An advantage of using a LinkedList of class objects is the usage of all features of object-oriented programming. Additionally, you will have an "array" which can grow and shrink dynamically. It makes your program more modular. This assignment is based on your previous assignment, where you used an array of structs. In this assignment, you are required to replace array with LinkedList and structs with classes.

Requirements:

1. **Read Data from File:**
   Create a drive file and name it *main.cpp* (MUST). Get IDs and marks from the file provided with this assignment.
2. **Data Storage:**
   Store the data in a linkedlist of class objects. Do not store the grade, as it is a dependent variable. Calculate grades using a function based on the USP Handbook 2024, which you can download from https://www.usp.ac.fj/handbookandcalendar2024/.
3. **Update Functionality:**
   Allow the user to update a student's marks by providing the student ID.
4. **Print Function (make use of relevant functions):**
   Write a function that prints the following details upon request:
   - A list of all students with their ID, marks, and grade in a well-formatted table.
   - Average marks, rounded to two decimal places.
   - Pass rate.
   - The highest scorer's full details.

Your program must conform to the standards of C++ programming that means even if your program is working fine but basic standards are not met then you will lose marks. Like whole program is written in a main, unfriendly or ugly user interface etc. Use only Visual Studio IDE for this assignment.

CBOK	Unsatisfactory (0%-49%)	Satisfactory (50% - 75%)	Good (76% - 100%)	Marks Allocated	% Marks Attained
Programming	I. Code has compile/run/logic errors. Poorly written code. II. Plagiarism III. Poor indentation, hard to read and follow the code IV. Lots of bugs and/or errors V. Program produces unexpected output VI. Inappropriate use/definition of functions. VII. Inappropriate use of variables and parameters. VIII. No input validation IX. Hard coding of data in the program. X. Program is not well structured.	I. Able to write a simple code for a well-defined problem II. Use of basic standard programming practices such as commenting, indentation etc. III. computer program produces correct output.	I. All satisfactory and demonstrate very good programming skills.	**4**	
System Development/ Acquisition	XII. Many important features do not work as expected.	XII. All the required functionalities work correctly.	XII. All the required functionalities work correctly.	**4**	
Data and Information Management	VII. Very limited or undesirable data has been collected VIII. Data is not stored and managed using inappropriate tools.	VII. Appropriate data has been collected VIII. data is store and managed using a standard tool IX. logical inference is derived from the	I. All satisfactory and III. Extensive analysis is done on the collected/given data. IV. Exceptional Inference is derived from the data.	**3**	

	IX. Poor or incorrect inference is derived from the collected/given data	collected/given data			
CBOK	Unsatisfactory (0%-49%)	Satisfactory (50% - 75%)	Good (76% - 100%)	Marks Allocated	% Marks Attained
Abstraction	V. Incorrect flowchart or UML/ERD class diagrams. VIII. Poor architecture and design makes future updates hard to incorporate.	IV. Correct flowchart or UML/ERD class diagrams using an appropriate tool VI. Appropriate choice of the architecture and design	IV. Correct flowchart or UML/ERD class diagrams using an appropriate tool VI. Appropriate choice of the architecture and design	**4**	
Teamwork concepts and issues	I. Inappropriate task distribution and/or failure in completion of tasks in a given timeframe. II. Failed leadership IV. Delay in submission of assignment V. Individual work not integrated successfully	I. Appropriate task distribution & completion on time II. Success in leadership IV. Submission of assignment on time V. Individual work integrated successfully	I. Appropriate task distribution & completion on time II. Success in leadership VI. Submission of assignment on time VII. Individual work integrated successfully	**-15**	
Sub Total & comments					

Submission instructions

1. Write a README file for detailed notes regarding the functionality of the corresponding code, and a set of instructions on how to run them.
2. It is your responsibility to ensure your software works in the lab PCs and it is ready to run without bugs/errors. NO marks will be given if the program does not execute.
3. **This assignment must be done in a group of 2 members**. Assign a group leader and submit the assignment through the group leader's moodle account. You have to submit just one zipped file of your project. The submission filename should read A1_Sxxx_Syyy.zip or A1_Sxxx_Syyy.rar where Sxxx and Syyy are student ids of the group members. For example A1_S11003232_S01004488.zip. Incorrect/late submission will result in a high penalty.
4. Completely fill Mark Allocation Sheet and submit it with your assignment. Failing to do so may result in a deduction of 50% marks.
5. Marks are allocated for standard programming, your creativity, ease of use and an error-free application.

Mark Allocation Sheet

After having discussed this as a group, we recommend the following mark allocation to each group member based on contribution or lack of it throughout the assignment.

Group Name Dev Duo

Project manager Parvish Mohan

Member ID	Percentage contribution of allocated task
S11230375	50%
S11230414	50%

Certification		
ID	Member name	Signature
S11230414	Parvish Mohan	PM
S11230375	Tanzeel Hussain	TH

Due Date – please refer to Moodle.

Assessments mapping with CBOK

Core Body of Knowledge		CS112	Assign1	Assign2	Assign3	Mid Sem Test	Online Act
	Complex Computing	B	✓	✓			
ICT Professional Knowledge	Ethics	B	✓	✓			
	Professional expectations						
	Teamwork concepts/issues	B		✓			
	Communication						
	Societal Issues/Legal issues/Privacy						
	Understanding the ICT profession						
ICT Problem Solving:	Abstraction	B		✓			
	Design						
Technology Resources	Hardware and Software Fundamentals						
	Data and Information Management	B		✓			
	Networking						
Technology Building	Human Factors						
	Programming	B	✓	✓			
	Systems Development / Acquisition	*B*	✓	✓			
ICT Management	IT Governance and organisational issues						
	IT Project management						
	Service management						
	Security management						