

# The University of the South Pacific

School of IT, Engineering, Mathematics & Physics

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## CS112: Data Structures & Algorithms

### Assignment 1 – Semester II, 2024

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*Total Marks: 10%*

*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 Structs and Arrays. 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 an array of structs is proper encapsulation, where you do not have to create several parallel arrays. It makes your program more modular. This assignment is based on your previous tutorials, where you used students' data, including marks and IDs, to calculate grades. In this assignment, you are required to meet the following requirements.

#### **Requirements:**

**1. Read Data from File:**

Get IDs and marks from the file provided with this assignment.

**2. Data Storage:**

Store the data in an array of structs. 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 Dev C++ 4.9.9 for this assignment.

<b>CBOK</b>	<b>Unsatisfactory (0%-49%)</b>	<b>Satisfactory (50% - 75%)</b>	<b>Good (76% - 100%)</b>	<b>Marks Allocated</b>	<b>% Marks Attained</b>
<b>Programming</b>	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.	<b>8</b>	
<b>System Development/ Acquisition</b>	XII. Many important features do not work as expected.	XII. All the required functionalities work correctly.	XII. All the required functionalities work correctly.	<b>2</b>	
<b>Sub Total &amp; comments</b>					

### **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. Completely fill Mark Allocation Sheet and submit it with your assignment. Failing to do so may result in a deduction of 50% marks.
4. This assignment can be submitted in groups of up to 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.
5. Marks are allocated for standard programming, your creativity, ease of use and an error-free application.

### **Mark Allocation Sheet**

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

**Group Name** \_\_\_\_\_

**Project manager** \_\_\_\_\_

Member ID	Percentage contribution of allocated task

Certification		
ID	Member name	Signature

**Due Date – please refer to Moodle.**

## Assessments mapping with CBOK

Core Body of Knowledge		CS112	Assign1	Assign2	Assign3	Test 1	Test 2
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						