**Experiment: 9**

PART A

(PART A: TO BE REFFERED BY STUDENTS)

**Aim:** **To study Structure in C++.**

**Learning Outcomes: Learner would be able to**

Demonstrate the use of structures

**Task 1:** What will be the output of the following program.

#include<iostream>

int main()

{

struct leader

{

char lead[30];

int born;

};

struct leader l1 = {"AbdulKalam", 1931};

struct leader l2 = l1;

printf("%s %d", l2.lead, l1.born);

return 0;

}

**Task 2:** Declare a structure to store the following information about a student:

a. Student code

b. Student name

c. Marks

d. Department number (1-IT, 2-COMP, 3-EXTC, 4-Data Science)

WAP to input and print information of a student.

**Task 3:** Design a structure named Employee to print the details of the employee who have 5 years or more experience and salary less than 1lac using array of structures (Name, ID , experience and salary as member)

**Task 4:** Find the output

#include <iostream>

struct staff

{

int age;

char name[40];

float salary;

};

int main()

{

staff s1;

cout<<“ The size of staff structure variable ”<< sizeof(s1);

}

**Task 5:**

Create a structure ‘student’ which stores name, roll no, marks of 3 tests (each out of 100) and grand total. Write a program to accept all the information for n records of the students, calculate their grand total and arrange them in the descending order of their grand total.

**Theory:**

Structure helps in collecting different data items together and binding them logically as one unit. It creates a new custom data type. The major difference between an array and a structure is that structure binds together different data types and array has only one data type. Every data items or members of a structure are referenced with structure variable and dot operator.

**Declaring Structures**

The general form to declare a structure is

struct struct\_name {

data\_type1 variable1;

data\_type2 variable2;

data\_type3 variable3;

.

.

};

Here struct is the keyword used in C to start a structure declaration. struct\_name is the tag name of the structure. The data items variable1, variable2, and variable3 are members of the structure. Their data types are specified respectively by data\_type1, data\_type2, and data\_type3. As you can see, the declarations of the members have to be enclosed within the opening and closing braces ({ and }) in the structure declaration, and a semicolon (;) has to be included at the end of the declaration depicting that a new custom data type is created.

The following is an example of a structure declaration:

struct automobile {

int year;

char model[8];

int engine\_power;

float weight;

};

**Defining Structure Variables**

Declaration of a structure create a new data type, but to use this data type a variable has to be defined. For instance, the following structure variables are defined with the structure data type of automobile from the previous section:

struct automobile sedan;

Here sedan is a variable which has four data members in it year, model, engine\_power, weight. So a struct depicts the common features of any automobile and struct variables would be different vehicles with unique features initialized for its own data members.

**Referencing Structure Members with the Dot Operator**

Now, to initialize each data member of sedan vehicle the dot operator is used. For instance, to access its member, year, and assign an integer to it is done as:

sedan.year = 1997;

To initialize a data member the struct variable and dot operator has to be used.

**Arrays of Structures**

In C, you can declare an array of structures by preceding the array name with the structure name. For instance, given a structure with the name of automobile, the following statement:

struct automobile four\_wheelers[8];

declares an array, called four\_wheelers, of struct automobile. The array has eight elements, each element being a single instance of struct automobile.

PART B

(PART B: TO BE COMPLETED BY STUDENTS)

Students must submit the soft copy as per following segments within two hours of the practical. The soft copy must be uploaded on the portal at the end of the practical. The filename should be **PPS\_batch\_rollno\_experimentno Example: PPS\_B2\_B001\_Exp1**

|  |  |
| --- | --- |
| **Roll No.:** | **Name:** |
| **Prog/Yr/Sem:** | **Batch:** |
| **Date of Experiment:** | **Date of Submission:** |

**Task 1:**

**Task 2:**

**Task 3:**

**Task 4:**

**Task 5:**

**Conclusion (Learning Outcomes):** Reflect on the questions answered by you jot down your learnings about the Topic: Structure and Union

**Home Work Questions:**

**1.** There are 50 computers in an office. Every computer has following information CPU type, hard disk size, keyboard type, mouse type, monitor type. WAP to store details of all 50 computers and then print details of computers having hard disk size greater than 8 GB.

2. What is Structure? What is structure variable?

3. What is nested structure?

4. For storing the following information of a student declare a structure:

1. Student code
2. Student name
3. Marks
4. Department number (1-IT, 2-COMP, 3-EXTC, 4-Data Science)

Write a menu driven program with the following features to manipulate records of n students. The menu should continue until the user selects the option quit:

1. Create a function to display the students who are getting the highest and lowest marks.
2. Create a function to display the department wise student records.