National University of Modern Language

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Department: **Computer-Science b1**

Course: **Programming Fundamentals (LAB TASKS)**

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Question 1:

Write a program that implements the assignment management system for students. There are three courses and each course is taught by only a single teacher. make structure for courses and teachers but make sure the number of courses/teachers do not exceed 3. Each teacher can give maximum 3 assignments to students. your program will store the obtained marks of each assignment in an array. the maximum marks of every assignment are exactly 10 and cannot be changed. the maximum marks of each assignment are stored in the variable named maxMarks. after having the arrays of marks, make a function where you will pass the marks of all three assignments via arrays. function will calculate the average marks of each student and will return the average marks of each student for every course.

Ans:Code

```cpp
#include <iostream>
#include <vector>
#include <string>

const int maxMarks = 10;
const int maxAssignments = 3;
const int maxCourses = 3;
const int maxTeachers = 3;

struct Assignment {
std::vector<int> marksObtained;
};

struct Teacher {
std::string name;
std::vector<Assignment> assignments;

Teacher(std::string teacherName) : name(teacherName) {
assignments.resize(maxAssignments);
}
};

struct Course {
std::string courseName;
Teacher teacher;

Course(std::string cName, Teacher t) : courseName(cName), teacher(t) {}
};

double calculateAverageMarks(std::vector<int> marks) {
int sum = 0;
for (int mark : marks) {
sum += mark;
```

```cpp
    }
    return static_cast<double>(sum) / marks.size();
}

int main() {
    // Initialize teachers
    Teacher teacher1("Teacher 1");
    Teacher teacher2("Teacher 2");
    Teacher teacher3("Teacher 3");

    // Initialize courses
    Course course1("Course 1", teacher1);
    Course course2("Course 2", teacher2);
    Course course3("Course 3", teacher3);

    // Assign marks to assignments for course 1
    course1.teacher.assignments[0].marksObtained = {9, 8, 10};
    course1.teacher.assignments[1].marksObtained = {10, 9, 9};
    course1.teacher.assignments[2].marksObtained = {8, 8, 10};

    // Assign marks to assignments for course 2
    course2.teacher.assignments[0].marksObtained = {7, 8, 9};
    course2.teacher.assignments[1].marksObtained = {10, 10, 10};
    course2.teacher.assignments[2].marksObtained = {9, 9, 9};

    // Assign marks to assignments for course 3
    course3.teacher.assignments[0].marksObtained = {6, 7, 8};
    course3.teacher.assignments[1].marksObtained = {9, 10, 9};
    course3.teacher.assignments[2].marksObtained = {8, 8, 7};

    // Calculate and display average marks for each course
    std::vector<Course> courses = {course1, course2, course3};
    for (Course course : courses) {
        std::cout << "Average marks for " << course.courseName << ":" << std::endl;
        for (int i = 0; i < maxAssignments; ++i) {
            double averageMarks = calculateAverageMarks(course.teacher.assignments[i].marksObtained);
            std::cout << "  Assignment " << (i + 1) << ": " << averageMarks << std::endl;
        }
    }

    return 0;
}
```

Question 2

Write a menu driven C++ program that implements the operations of a basic calculator. These operations are Addition, subtraction, multiplication and division. The program takes minimum 2 and maximum 3 numbers from users. These numbers can be either integers or float numbers. These arguments are then passed to their respective function to calculate and print the result.

Ans: Code

```cpp
#include <iostream>

void addition(float a, float b, float c = 0) {
    std::cout << "Result: " << a + b + c << std::endl;
}

void subtraction(float a, float b, float c = 0) {
    std::cout << "Result: " << a - b - c << std::endl;
}

void multiplication(float a, float b, float c = 1) {
    std::cout << "Result: " << a * b * c << std::endl;
}

void division(float a, float b, float c = 1) {
    if (b == 0 || c == 0) {
        std::cout << "Error: Division by zero is not allowed." << std::endl;
    } else {
        std::cout << "Result: " << a / b / c << std::endl;
    }
}

void menu() {
    std::cout << "Calculator Menu:" << std::endl;
    std::cout << "1. Addition" << std::endl;
    std::cout << "2. Subtraction" << std::endl;
    std::cout << "3. Multiplication" << std::endl;
    std::cout << "4. Division" << std::endl;
    std::cout << "5. Exit" << std::endl;
}

int main() {
    int choice;
    float num1, num2, num3;
```

```cpp
    char useThirdNumber;

    while (true) {
        menu();
        std::cout << "Enter your choice: ";
        std::cin >> choice;

        if (choice == 5) {
            std::cout << "Exiting..." << std::endl;
            break;
        }

        std::cout << "Enter first number: ";
        std::cin >> num1;
        std::cout << "Enter second number: ";
        std::cin >> num2;
        std::cout << "Do you want to enter a third number? (y/n): ";
        std::cin >> useThirdNumber;

        if (useThirdNumber == 'y' || useThirdNumber == 'Y') {
            std::cout << "Enter third number: ";
            std::cin >> num3;
        } else {
            num3 = (choice == 3) ? 1 : 0; // Default value for multiplication is 1, for others 0
        }

        switch (choice) {
            case 1:
                addition(num1, num2, num3);
                break;
            case 2:
                subtraction(num1, num2, num3);
                break;
            case 3:
                multiplication(num1, num2, num3);
                break;
            case 4:
                division(num1, num2, num3);
                break;
            default:
                std::cout << "Invalid choice. Please try again." << std::endl;
        }
    }

    return 0;
}
```

The End