C PROGRAMMING PROJECT REPORT

Title: Student Marks & Grade Management System

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GitHub Repository:
https://github.com/pritamdas7/Mensuration_Calculator.git

Basic Shape Calculator in C

Objective:

The objective of this project is to develop a C program that calculates the area and perimeter/circumference of basic geometric shapes such as Circle, Rectangle, and Triangle. The program allows the user to choose a shape and enter the required dimensions. It uses separate functions for each calculation to promote modularity and code reusability.

Tools and Technologies Used:

- **Language:** C Programming Language
- **Compiler:** GCC (GNU Compiler Collection)
- **Platform:** Windows

Source Code:

```
#include <stdio.h>
#include <math.h>

// Circle functions
float areaCircle(float r) {
    return 3.14159 * r * r;
}

float circCircle(float r) {
    return 2 * 3.14159 * r;
}

// Rectangle functions
float areaRect(float l, float w) {
    return l * w;
}

float periRect(float l, float w) {
    return 2 * (l + w);
}

// Triangle functions
int validTriangle(float a, float b, float c) {
    if ((a + b > c) && (a + c > b) && (b + c > a))
        return 1;
    else
        return 0;
}
```

```c
float areaTri(float a, float b, float c) {
    float s = (a + b + c) / 2;
    return sqrt(s * (s - a) * (s - b) * (s - c));
}

float periTri(float a, float b, float c) {
    return a + b + c;
}

int main() {
    int choice;
    float x, y, z;

    printf("Shape Calculator\n");
    printf("1. Circle\n");
    printf("2. Rectangle\n");
    printf("3. Triangle\n");
    printf("Choose a shape (1-3): ");
    scanf("%d", &choice);

    if (choice == 1) {
        printf("Enter radius: ");
        scanf("%f", &x);
        if (x <= 0) {
            printf("Radius must be positive.\n");
            return 1;
        }
        printf("Circle Area: %.2f\n", areaCircle(x));
        printf("Circle Circumference: %.2f\n", circCircle(x));

    } else if (choice == 2) {
        printf("Enter length and width: ");
        scanf("%f %f", &x, &y);
        if (x <= 0 || y <= 0) {
            printf("Length and width must be positive.\n");
            return 1;
        }
        printf("Rectangle Area: %.2f\n", areaRect(x, y));
        printf("Rectangle Perimeter: %.2f\n", periRect(x, y));

    } else if (choice == 3) {
        printf("Enter three sides: ");
        scanf("%f %f %f", &x, &y, &z);
        if (x <= 0 || y <= 0 || z <= 0) {
            printf("Sides must be positive.\n");
            return 1;
        }
        if (!validTriangle(x, y, z)) {
            printf("Invalid triangle.\n");
            return 1;
        }
        printf("Triangle Area: %.2f\n", areaTri(x, y, z));
        printf("Triangle Perimeter: %.2f\n", periTri(x, y, z));
    } else {
        printf("Invalid choice.\n");
        return 1;
    }

    return 0;
}
```

Sample Output:

Case 1: Circle

```
Shape Calculator
1. Circle
2. Rectangle
3. Triangle
Choose a shape (1-3): 1
Enter radius: 5
Circle Area: 78.54
Circle Circumference: 31.42
```

Case 2: Rectangle

```
Shape Calculator
1. Circle
2. Rectangle
3. Triangle
Choose a shape (1-3): 2
Enter length and width: 4 6
Rectangle Area: 24.00
Rectangle Perimeter: 20.00
```

Case 3: Triangle

```
Shape Calculator
1. Circle
2. Rectangle
3. Triangle
Choose a shape (1-3): 3
Enter three sides: 3 4 5
Triangle Area: 6.00
Triangle Perimeter: 12.00
```

Conclusion:

This project successfully demonstrates the use of functions, conditional logic, and input validation in C programming. It also highlights the importance of modular code design, making the program easier to understand and maintain. Through this project, the basic concepts of geometry and their implementation in code were effectively applied.