

Softwarica

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Programming

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Project Documentation: C Programming Exercises

1. Introduction

This document provides a comprehensive overview of various C programming exercises. Each section includes the purpose of the program, the code, and instructions for compiling and running the program.

2. Programs

2.1 Electricity Bill Calculation

Code:

```
1  #include <stdio.h>
2  #include <stdlib.h>
3
4  int main(){
5      int units;
6      float bill;
7      int validInput;
8
9      do
10     {
11         printf("Enter the number of units consumed: ");
12         validInput = scanf("%d", &units);
13         if (validInput != 1){
14             printf("\n\033[1;31mInvalid input. Please enter an integer.\033[0m\n\n");
15             while (getchar() != '\n')
16                 ;
17         }
18     } while (validInput != 1);
19
20     if (units <= 100)
21         bill = units * 1.50;
22     else if (units <= 200)
23         bill = 100 * 1.50 + (units - 100) * 2.00;
24
25     else
26         bill = 100 * 1.50 + 100 * 2.00 + (units - 200) * 3.00;
27
28     printf("Total bill: $%.2f\n", bill);
29     system("pause");
30     return 0;
31 }
32
```

Output:

```
C:\Users\adhik\Desktop\C Prc x + v
Enter the number of units consumed: 325
Total bill: $725.00
Press any key to continue . . . |
```

2.2 Triangle Type Determination

Code:

```
1  #include <stdio.h>
2  #include <stdlib.h>
3
4  int main() {
5      float a, b, c;
6      int validInput;
7
8      do {
9          printf("Enter the lengths of the three sides of the triangle: ");
10         validInput = scanf("%f %f %f", &a, &b, &c);
11
12         if (validInput != 3) {
13             printf("\nInvalid input. Please enter three numbers.\n");
14             while (getchar() != '\n')
15                 ;
16         }
17
18     } while (validInput != 3);
19
20     if (a == b && b == c)
21         printf("The triangle is Equilateral.\n");
22     else if (a == b || b == c || a == c)
23         printf("The triangle is Isosceles.\n");
24     else
25         printf("The triangle is Scalene.\n");
26
27     system("pause");
28     return 0;
29 }
30 }
```

Output:

```
C:\Users\adhik\Desktop\C Prc x + v
Enter the lengths of the three sides of the triangle: sd
Invalid input. Please enter three numbers.
Enter the lengths of the three sides of the triangle: 45 68 45
The triangle is Isosceles.
Press any key to continue . . . |
```

2.3 Quadratic Equation Solver

Code:

```
1
2 #include <stdio.h>
3 #include <math.h>
4 #include <stdlib.h>
5 int main()
6 {
7     int a, b, c, validInput;
8     float discriminant, root1, root2;
9
10    do
11    {
12        printf("Enter coefficients a, b, and c: ");
13        validInput = scanf("%d %d %d", &a, &b, &c);
14
15        if (validInput != 3)
16        {
17            printf("\n033[1;31mInvalid input. Please enter three integers.\033[0m\n\n");
18            while (getchar() != '\n')
19                ;
20        }
21    } while (validInput != 3);
22
23    discriminant = b * b - 4 * a * c;
24
25    if (discriminant > 0)
26    {
27        root1 = (-b + sqrt(discriminant)) / (2 * a);
28        root2 = (-b - sqrt(discriminant)) / (2 * a);
29        printf("Roots are real and different: %.2f and %.2f\n\n", root1, root2);
30    }
31    else if (discriminant == 0)
32    {
33        root1 = root2 = -b / (2 * a);
34        printf("Roots are real and the same: %.2f and %.2f\n\n", root1, root2);
35    }
36    else
37    {
38        float realPart = -b / (2 * a);
39        float imaginaryPart = sqrt(-discriminant) / (2 * a);
40        printf("Roots are complex and different: %.2f + %.2fi and %.2f - %.2fi\n\n", realPart, imaginaryPart, realPart, imaginaryPart);
41    }
42    system("pause");
43    return 0;
44 }
45 }
```

Output:

```
C:\Users\adhik\Desktop\C Prc X + v
Enter coefficients a, b, and c: 45 sd 65
Invalid input. Please enter three integers.
Enter coefficients a, b, and c: 54 58 698
Roots are complex and different: 0.00 + 3.55i and 0.00 - 3.55i
Press any key to continue . . . |
```

2.4 Menu-Driven Calculator Using switch and break

Code:

```
1 #include <stdio.h>
2 #include <stdlib.h>
3
4 int main()
5 {
6     int choice;
7     float num1, num2, result;
8     int validInput;
9
10    do{
11        printf("Menu:\n");
12        printf("1. Addition\n");
13        printf("2. Subtraction\n");
14        printf("3. Multiplication\n");
15        printf("4. Division\n");
16        printf("5. Exit\n");
17        printf("Enter your choice: ");
18        validInput = scanf("%d", &choice);
19
20        if (validInput != 1){
21            printf("\n\033[1;31mInvalid input. Please enter an integer.\033[0m\n\n");
22            while (getchar() != '\n');
23            continue;
24        }
25
26        if (choice == 5)
27            exit(0);
28
29        printf("Enter two numbers: ");
30        validInput = scanf("%f %f", &num1, &num2);
31
32        if (validInput != 2){
33            printf("\n\033[1;31mInvalid input. Please enter two numbers.\033[0m\n\n");
34            while (getchar() != '\n');
35            continue;
36        }
37
38        switch (choice){
39            case 1:
40                result = num1 + num2;
41                printf("Result: %.2f\n", result);
42                break;
43            case 2:
44                result = num1 - num2;
45                printf("Result: %.2f\n", result);
46                break;
47            case 3:
48                result = num1 * num2;
49                printf("Result: %.2f\n", result);
50                break;
51            case 4:
52                if (num2 != 0){
53                    result = num1 / num2;
54                    printf("Result: %.2f\n", result);
55                }
56                else{
57                    printf("Error: Division by zero.\n");
58                }
59                break;
60            default:
61                printf("Invalid choice.\n");
62                break;
63        }
64    } while (1);
65
66    return 0;
67 }
```

Output:

```
C:\Users\adhik\Desktop\C Prc x + v
Menu:
1. Addition
2. Subtraction
3. Multiplication
4. Division
5. Exit
Enter your choice: sd

Invalid input. Please enter an integer.

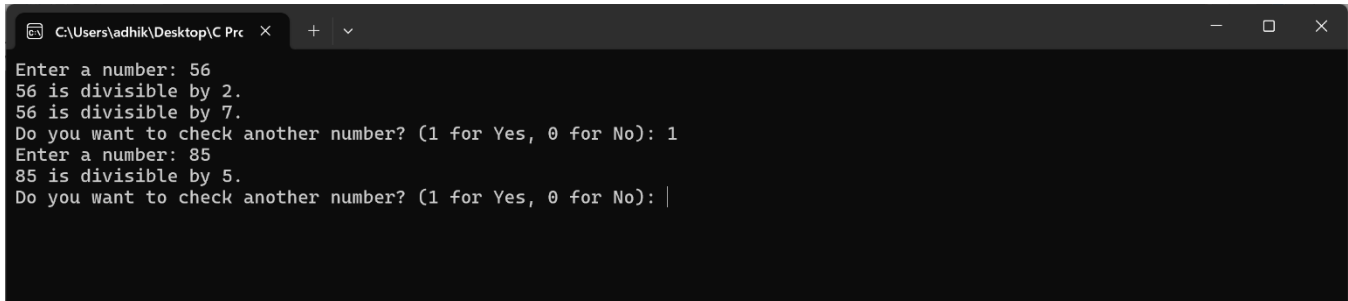
Menu:
1. Addition
2. Subtraction
3. Multiplication
4. Division
5. Exit
Enter your choice: 3
Enter two numbers: 56 87
Result: 4872.00
Menu:
1. Addition
2. Subtraction
3. Multiplication
4. Division
5. Exit
Enter your choice: |
```


2.5 Checking Divisibility Using switch, break, and continue

Code:

```
1  #include <stdio.h>
2  #include <stdlib.h>
3
4  int main() {
5      int number, choice;
6      int validInput;
7
8      do {
9          printf("Enter a number: ");
10         validInput = scanf("%d", &number);
11
12         if (validInput != 1) {
13             printf("\n\033[1;31mInvalid input. Please enter an integer.\033[0m\n\n");
14             while (getchar() != '\n')
15                 ;
16             continue;
17         }
18
19         switch (number % 2) {
20             case 0:
21                 printf("%d is divisible by 2.\n", number);
22                 break;
23             default:
24                 break;
25         }
26
27         switch (number % 3) {
28             case 0:
29                 printf("%d is divisible by 3.\n", number);
30                 break;
31             default:
32                 break;
33         }
34
35         switch (number % 5) {
36             case 0:
37                 printf("%d is divisible by 5.\n", number);
38                 break;
39             default:
40                 break;
41         }
42
43         switch (number % 7) {
44             case 0:
45                 printf("%d is divisible by 7.\n", number);
46                 break;
47             default:
48                 break;
49         }
50
51         printf("Do you want to check another number? (1 for Yes, 0 for No): ");
52         validInput = scanf("%d", &choice);
53
54         if (validInput != 1) {
55             printf("\n\033[1;31mInvalid input. Please enter 1 or 0.\033[0m\n\n");
56             while (getchar() != '\n')
57                 ;
58             choice = 1;
59         }
60
61     } while (choice == 1);
62
63     return 0;
64 }
```


Output:

A screenshot of a terminal window with a dark background. The window title bar shows the file path 'C:\Users\adhik\Desktop\C Prc' and standard window controls. The terminal displays the following text: 'Enter a number: 56', '56 is divisible by 2.', '56 is divisible by 7.', 'Do you want to check another number? (1 for Yes, 0 for No): 1', 'Enter a number: 85', '85 is divisible by 5.', and 'Do you want to check another number? (1 for Yes, 0 for No): |'.

```
C:\Users\adhik\Desktop\C Prc x + v
Enter a number: 56
56 is divisible by 2.
56 is divisible by 7.
Do you want to check another number? (1 for Yes, 0 for No): 1
Enter a number: 85
85 is divisible by 5.
Do you want to check another number? (1 for Yes, 0 for No): |
```

3. Conclusion

This document provides a detailed overview of the various C programming exercises, including explanations, code, and instructions for each program. Please refer to the screenshots provided to see the programs in action.

4. References

C Programming Language - K&R

- *Authors:* Brian W. Kernighan and Dennis M. Ritchie
- *Description:* A seminal book on C programming, providing foundational knowledge and in-depth explanations of C syntax and features.
- *Link:* [The C Programming Language](#)

GNU C Library Documentation

- *Description:* Official documentation for the GNU C Library, providing detailed information on C standard library functions and their usage.
- *Link:* [GNU C Library Documentation](#)

GeeksforGeeks: C Programming Language

- *Description:* A comprehensive collection of articles, tutorials, and coding examples for learning C programming concepts and solving problems.
- *Link:* [GeeksforGeeks C Programming](#)