

Batch: P4_1(II) Roll No.: 16010423076

Experiment / assignment / tutorial No

Grade: AA / AB / BB / BC / CC / CD / DD

Signature of the Staff In-charge with date

TITLE: Write a program in C to demonstrate use of looping control structures

AIM: Write a menu driven program for following option

- To find whether a number is palindrome or not. (e.g. 1221 is palindrome) using while loop
- To calculate the sum of the Fibonacci series up to 'n' terms(use do-while loop only)
- Write a program in C to make such a pattern like a right angle triangle with a number which will repeat a number in a row. (Pattern is given below)

Expected OUTCOME of Experiment:

Apply basic concepts of C programming for problem solving.(CO1 and CO2).

Books/ Journals/ Websites referred:

- Programming in C, second edition, Pradeep Dey and Manas Ghosh, Oxford University Press.
- Programming in ANSI C, fifth edition, E Balagurusamy, Tata McGraw Hill.
- Introduction to programming and problem solving , G. Michael Schneider ,Wiley India edition.

Problem Definition:

The program accepts a choice from the user using a switch case statement and generates output accordingly.

Choice a: The program checks whether a given number by user is palindrome or not. If a number remains same, even if we reverse its digits then the number is known as palindrome number. For example, 12321 is a palindrome number because it remains same if we reverse its digits.

Choice b: Sum of Fibonacci series up to n terms will be generated. Fibonacci series is a series in which each number is the sum of the last two preceding numbers. The first two terms of a Fibonacci series are 0 and 1.(use while loop only)

Example:

Input: $n = 5$

Output: 7

Explanation: $0 + 1 + 1 + 2 + 3 = 7$

Choice c: Write a program in C to make such a pattern like right angle triangle with a number which will repeat a number in a row.

The pattern like :

1
22
333
4444

Algorithm:

Prompt the user to select an option (a, b, or c).

Implement a switch statement to execute the code block corresponding to the user's choice.

a)Palindrome

Ask the user to input a number (ognum).

Initialize variables (revnum, rem, temp) for palindrome checking.

Use a while loop to reverse the number.

Check if the original number is equal to the reversed number and print whether it's a palindrome or not.

b)Fibonacci

Ask the user to input the number of terms (n).

Initialize variables (i, t1, t2, next, sum) for Fibonacci series calculation.

Use a while loop to calculate the sum of the Fibonacci series up to the specified number of terms.

c)Pattern Print

Ask the user to input the number of rows for the pattern (row).

Use nested for loops to print a number pattern based on the number of rows.

End of Program

Implementation details:

```
#include <stdio.h>
int main() {
    char choice;

    printf("Select an option a/b/c :\n");
    printf("Enter your choice: ");
    scanf("%c", &choice);

    switch (choice){

        case 'a':
            printf("\nProg for opt (a) : Number is palindrome or Not\n");

            int ognum, revnum = 0, rem, temp;
            printf("Enter a number: ");
            scanf("%d",&ognum);
            temp = ognum;

            // Reverse
            while (temp != 0){
                rem = temp%10;
                revnum = revnum * 10 + rem;
                temp = temp/10;
            }

            if (ognum == revnum){
                printf("It is a palindrome.\n");
            } else {
                printf("It is not a palindrome.\n");
            }
            break;

        case 'b':
            printf("\nProg for opt (b) : Calculate sum of fibonacci series upto n number\n");
            int n,i = 0,t1 = 0,t2 = 1,next,sum = 0;

            printf("\nEnter the number of terms to calculate sum : ");
            scanf("%d", &n);

            while (i<n){
                sum = sum+t1;
```

```
        next = t1+t2;
        t1 = t2;
        t2 = next;
        i++;
    }
    printf("\nSum of fibonacci series upto %d terms is %d.",n,sum);
    break;

case 'c':
    printf("\nProg for opt (c) : Print Number patter for n rows\n");
    int row;
    printf("Enter the number of rows: ");
    scanf("%d",&row);

    for (int i=1;i<=row;i++){
        for (int j=1;j<=i;j++){
            printf("%d",i);
        }
        printf("\n");
    }
    break;

}
}
```

Output(s):

```
Select an option a/b/c :  
Enter your choice: a  
  
Prog for opt (a) : Number is palindrome or Not  
Enter a number: 7885887  
It is a palindrome.
```

```
Select an option a/b/c :  
Enter your choice: b  
  
Prog for opt (b) : Calculate sum of fibonacci series upto n number  
Enter the number of terms to calculate sum : 12  
Sum of fibonacci series upto 12 terms is 232.
```

```
Select an option a/b/c :  
Enter your choice: c  
  
Prog for opt (c) : Print Number patter for n rows  
Enter the number of rows: 7  
1  
22  
333  
4444  
55555  
666666  
7777777
```

Conclusion:

This C program has been instrumental in developing my skills in constructing a menu-driven system, where users can select options (a, b, or c) and the program executes distinct functionalities based on their choice.

The palindrome checking component of the program deepened my understanding of reversing numbers and comparing them to identify palindromes.

Furthermore, the calculation of the Fibonacci series sum helped me recall my knowledge of loop structures.

The nested loop exercise for printing number patterns provided hands-on experience in pattern generation.

This program has not only increased my proficiency in handling user inputs but has also strengthened my command over conditional statements, loops and fundamental algorithmic principles of C programming.

Post Lab Descriptive Questions

- Write a program to enter numbers till the user wants. At the end it should display the count of positive, negative and zeros entered.

Code :

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

```
int main() {  
    char choice;  
    int n,pc = 0,nc = 0,zc = 0;
```

```
    for (;;) {  
        printf("Enter a number (0 to stop input): ");  
        scanf("%d",&n);
```

```
        if(n>0){  
            pc++;  
        }  
        else if(n<0){  
            nc++;  
        }  
        else{  
            zc++;  
            break;  
        }  
    }
```

```
    printf("\nPositive Numbers: %d\n",pc);
```

```
printf("\nNegative Numbers: %d\n",nc);  
printf("\nZeroes: %d\n",zc);  
}
```

Output:

```
Enter a number (0 to stop input): 7  
Enter a number (0 to stop input): 9  
Enter a number (0 to stop input): -4  
Enter a number (0 to stop input): -11  
Enter a number (0 to stop input): -17  
Enter a number (0 to stop input): 3  
Enter a number (0 to stop input): -374  
Enter a number (0 to stop input): -313  
Enter a number (0 to stop input): 1  
Enter a number (0 to stop input): 0  
  
Positive Numbers: 4  
  
Negative Numbers: 5  
  
Zeroes: 1
```

- Write a program to print all the ASCII values and their equivalent characters using a while loop. The ASCII values vary from 0 to 255.

Code :

```
#include <stdio.h>  
  
int main(){  
for(int av=0;av<=255;av++) {  
    printf("ASCII Value: %d", av);  
    printf("Character: %c\n", (char)av);  
}  
}
```

Output:


```
ASCII Value: 0Character:
ASCII Value: 1Character:
ASCII Value: 2Character:
ASCII Value: 3Character:
ASCII Value: 4Character:
ASCII Value: 5Character:
ASCII Value: 6Character:
ASCII Value: 7Character:
ASCII Value: 8Character:
ASCII Value: 9Character:
ASCII Value: 10Character:

ASCII Value: 11Character:

ASCII Value: 12Character:

ASCII Value: 13Character:
ASCII Value: 14Character:
ASCII Value: 15Character:
ASCII Value: 16Character:
ASCII Value: 17Character:
ASCII Value: 18Character:
ASCII Value: 19Character:
ASCII Value: 20Character:
ASCII Value: 21Character:
ASCII Value: 22Character:
ASCII Value: 23Character:
ASCII Value: 24Character:
ASCII Value: 25Character:
ASCII Value: 26Character:
ASCII Value: 27Character:
ASCII Value: 28Character:
ASCII Value: 29Character:
ASCII Value: 30Character:
ASCII Value: 31Character:
ASCII Value: 32Character:
ASCII Value: 33Character: !
ASCII Value: 34Character: "
```

```
ASCII Value: 35Character: #
ASCII Value: 36Character: $
ASCII Value: 37Character: %
ASCII Value: 38Character: &
ASCII Value: 39Character: '
ASCII Value: 40Character: (
ASCII Value: 41Character: )
ASCII Value: 42Character: *
ASCII Value: 43Character: +
ASCII Value: 44Character: ,
ASCII Value: 45Character: -
ASCII Value: 46Character: .
ASCII Value: 47Character: /
ASCII Value: 48Character: 0
ASCII Value: 49Character: 1
ASCII Value: 50Character: 2
ASCII Value: 51Character: 3
ASCII Value: 52Character: 4
ASCII Value: 53Character: 5
ASCII Value: 54Character: 6
ASCII Value: 55Character: 7
ASCII Value: 56Character: 8
ASCII Value: 57Character: 9
ASCII Value: 58Character: :
ASCII Value: 59Character: ;
ASCII Value: 60Character: <
ASCII Value: 61Character: =
ASCII Value: 62Character: >
ASCII Value: 63Character: ?
ASCII Value: 64Character: @
ASCII Value: 65Character: A
ASCII Value: 66Character: B
ASCII Value: 67Character: C
ASCII Value: 68Character: D
ASCII Value: 69Character: E
ASCII Value: 70Character: F
ASCII Value: 71Character: G
ASCII Value: 72Character: H
```

.
. .
. .
. .
. .

ASCII Value: 222Character: ?
ASCII Value: 223Character: ?
ASCII Value: 224Character: ?
ASCII Value: 225Character: ?
ASCII Value: 226Character: ?
ASCII Value: 227Character: ?
ASCII Value: 228Character: ?
ASCII Value: 229Character: ?
ASCII Value: 230Character: ?
ASCII Value: 231Character: ?
ASCII Value: 232Character: ?
ASCII Value: 233Character: ?
ASCII Value: 234Character: ?
ASCII Value: 235Character: ?
ASCII Value: 236Character: ?
ASCII Value: 237Character: ?
ASCII Value: 238Character: ?
ASCII Value: 239Character: ?
ASCII Value: 240Character: ?
ASCII Value: 241Character: ?
ASCII Value: 242Character: ?
ASCII Value: 243Character: ?
ASCII Value: 244Character: ?
ASCII Value: 245Character: ?
ASCII Value: 246Character: ?
ASCII Value: 247Character: ?
ASCII Value: 248Character: ?
ASCII Value: 249Character: ?
ASCII Value: 250Character: ?
ASCII Value: 251Character: ?
ASCII Value: 252Character: ?
ASCII Value: 253Character: ?
ASCII Value: 254Character: ?
ASCII Value: 255Character: ?

Date: _____

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