

Data structure & Algorithms

Assignment-3 (Structure, Dynamic Array and Recursion)

BTech

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Lab Assignment: 03

1. Write a program in C to check a given string is palindrome or not by using a dynamic array of n characters.

Sample Input:

String = MADAM

Sample Output:

Madam is a Palindrome

Code:-

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

int palindrome(char *str,int n){
    int i=0,j = n-1;
    while(j>i){
        if (str[i++] != str[j--]) return 0;
    }
    return 1;
}

void main(){
    int n,x;
    printf("Enter the size of the word:- ");
    scanf("%d",&n);
    char* s = (char *)malloc(n*sizeof(char)+1);
    printf("Enter the word:- ");
    scanf("%s",s);
    x = palindrome(s,n);
    if (x) printf("Palindrome");
    else printf("Not palindrome");
}
```

Output:-

```
Enter the size of the word:- 5
Enter the word:- aditya
Not palindrome
```

2. Write a program in C to arrange the elements of a dynamic array such that all even numbers are followed by all odd numbers

Sample Input:

arr = [1,2,2,7,5,4],

Sample Output:

arr = [2,2,4,1,7,5]

Code:-

```
#include <stdio.h>
#include <stdlib.h>
void even_odd(int* arr, int n){
    int count=0;
    for(int i=0;i<n;i++){
        if(arr[i]%2==0){
            int temp=arr[count];
            arr[count]=arr[i];
            arr[i]=temp;
            count++;
        }
    }
}
int main(){
    int n=0;
    printf("Enter the size of array: ");
    scanf("%d", &n);

    int* arr=(int*) malloc(n * sizeof(int));
    printf("Enter the Elements of Array: ");
    for(int i=0;i<n;i++){
        scanf("%d", &arr[i]);
    }

    even_odd(arr, n);

    for(int i=0;i<n;i++){
        printf("%d ", arr[i]);
    }

    free(arr);
    return 0;
}
```

Output:-

```
Enter the size of array: 5
Enter the Elements of Array: 1 2 3 4 5
2 4 3 1 5
```

3. Write a recursive program in C to print percentages from 1% to 50% of a integer number. User will ask to enter a number.

Sample Input:

N = 10

Sample Output:

10*1/100, 10* 2/100, 10*3/100, 10*50/100
0.1,0.2, 0.3, ..., 5

Code:-

```
#include<stdio.h>

void percent(int n,int i){
    if (i<=50){
        float x = n*i*0.01;
        printf("%d %.2f\n",i,x);
        percent(n,++i);
    }
}

void main(){
    int n;
    printf("Enter a number:- ");
    scanf("%d",&n);
    percent(n,1);
}
```

Output:-

```
Enter a number:- 5
1 0.05
2 0.10
3 0.15
4 0.20
5 0.25
6 0.30
7 0.35
8 0.40
9 0.45
10 0.50
11 0.55
```

```
12 0.60
13 0.65
14 0.70
15 0.75
16 0.80
17 0.85
18 0.90
19 0.95
20 1.00
40 2.00
41 2.05
42 2.10
43 2.15
44 2.20
45 2.25
46 2.30
47 2.35
48 2.40
49 2.45
50 2.50
```

4. Write a recursive program in C to find the GCD of two integer numbers.

Code:-

```
#include<stdio.h>

int hcf(int n1, int n2){
    if (n2!=0) return hcf(n2,n1%n2);
    else return n1;
}

void main(){
    int n1,n2,r;
    printf("Enter two numbers:- ");
    scanf("%d %d",&n1,&n2);
    r = hcf(n1,n2);
    printf("GCD of %d and %d is %d!!\n",n1,n2,r);
}
```

Output:-

```
Enter two numbers:- 2 4
GCD of 2 and 4 is 2!!
```