Lab Assignment 4: Function and Pointer in C Programming

CS-153 Computer Programming Lab

Autumn Semester, 2016, IIT Indore

Date: 26-08-16

Note: Write following programs in C language. Also note that this assignment will be evaluated by TA's in the upcoming labs of next week (29-08-16 onward) for each batch.

1. Write a program to calculate area and perimeter of a circle by using two different functions. Both the functions take radius as pass by value. Area function will return area. Perimeter function will return perimeter.

2. Write a static memory program for 4 students with 3 subjects. Compute the total for each student and store it into array. Input will be taken through a function. Marks calculation will be done through a separated function.

3. Compute Fibonacci(N) for given N using recursion. Print how many calls are required for obtaining this N^{th} number in the series?

4. a. Write a program to print address and value of variable.

b. Write a program to print array values and address of an array using pointers.

5. Write a dynamic memory program for N students with M subjects. Compute the total for each student and store it into array. Input will be taken through a function. Marks calculation will be done through a separated function.

6. Create a structure to specify data of students given below:

Roll number, Name, Department, Course, Year of joining

Assume that there are varying numbers of students in the institute.

(a) Write a function to print names of all students who joined in a particular year.

(b) Write a function to print the data of a student whose roll number is given.

```
#include <stdio.h>

const float PI = 3.1415927;

float area(float radius);

float circum(float radius);

#include<stdio.h>

main()
{
  float radius;

  printf("Enter radius: ");
  scanf("%f", &radius);
  printf("Area : %.3f\n", area(radius));
  printf("Circumference: %.3f\n", circum(radius));

  getch();
}

     /* return area of a circle */

float area(float radius)

{

     return PI * radius * radius;

}

/* return circumference of a circle */

float circum(float radius)

{

  return 2 * PI * radius;

}
```

```
#include<stdio.h>
#define SIZE 4

struct student {
   char name[30];
   int rollno;
   int sub[3];
};

main() {
   int i, j, max, count, total, n, a[SIZE], ni;
   struct student st[SIZE];


   printf("Enter how many students: ");
   scanf("%d", &n);

   /* for loop to read the names and roll numbers*/
   for (i = 0; i < n; i++) {
      printf("\nEnter name and roll number for student %d : ", i);
      scanf("%s", &st[i].name);
      scanf("%d", &st[i].rollno);
   }

   /* for loop to read ith student's jth subject*/
   for (i = 0; i < n; i++) {
      for (j = 0; j <= 2; j++) {
         printf("\nEnter marks of student %d for subject %d : ", i, j);
         scanf("%d", &st[i].sub[j]);
      }
   }

   /* (i) for loop to calculate total marks obtained by each student*/

   for (i = 0; i < n; i++) {
      total = 0;
      for (j = 0; j < 3; j++) {
         total = total + st[i].sub[j];
      }
      printf("\nTotal marks obtained by student %s are %d\n", st[i].name,total);
      a[i] = total;
   }

   getch();
}
```

```
#include<stdio.h>
int Fibonacci(int); //function declared
int count = 0; //global variable
int main()
{
    int n, i = 0, c;
    printf("Enter the length of the series or number of terms for Fibonacci Series\n");
  scanf("%d",&n);
  printf("Fibonacci series:\n");
  for ( c = 1 ; c <=n ; c++ )
    {
        printf("%d\n", Fibonacci(i)); //function called once
        i++;
    }
    printf("Function called count -> %d",count);
  return 0;
}

int Fibonacci(int n) //function defined
{
    count++;
    if ( n == 0 )
      {
        return 0;
      }
    else if ( n == 1 )
      {
        return 1;
      }
    else
      {
            return ( Fibonacci(n-1) + Fibonacci(n-2) ); //function called twice
      }
}
```

```
#include <stdio.h>

main()
   {
       char   a;
       int    x;
       float  p, q;

       a  = 'A';
       x  = 125;
       p  = 10.25, q = 18.76;
       printf("%c is stored at addr %u.\n", a, &a);
       printf("%d is stored at addr %u.\n", x, &x);
       printf("%f is stored at addr %u.\n", p, &p);
       printf("%f is stored at addr %u.\n", q, &q);

       getch();

   }
```

```
#include <stdio.h>

main()
{
      int a[5];int i;
      for(i = 0; i<=5; i++)
      {
            a[i]=i;
      }
      printdetail(a);
      printarr(a);
      getch();
}

printarr(int a[])
{ int i;
      for(i = 0;i<=5;i++)
      {
            printf("value in array %d\n",a[i]);
      }
}

printdetail(int a[])
{int i;
      for(i = 0;i<=5;i++)
      {
            printf("value in array %d and address is %8u\n",a[i],&a[i]);
      }
}
```

```
# include <string.h>
# include <stdio.h>
struct student
{
        char name[10];
        int m[3];
        int total;
}*p,*s;

main()
{
          int i,j,l,n;

          printf("Enter the no. of students : ");
          scanf("%d",&n);
          p=(struct student*)malloc(n*sizeof(struct student));
          s=p;

          for(i=0;i<n;i++)
          {
                 printf("Enter a name : ");
                 scanf("%s",&p->name);
                 p-> total=0;l=0;
                 for(j=0;j<3;j++)
                    {
                     one:printf("Enter Marks of %d Subject : ",j+1);
                     scanf("%d",&p->m[j]);
                     if((p->m[j])>100)
                        {
                            printf("Wrong Value Entered");
                            goto one;
                        }
                            p->total+=p->m[j];
                    }
          }

          for(i=0;i<n;i++)
              {
                    printf("\n%s\t%d",s->name,s->total);
                    s++;
              }
                    getch();
   }
```

```
#include<stdio.h>
#include<conio.h>
#define N 5

struct students {
  int rlnm;
  char name[25];
  char dept[25];  /* structure defined outside of main(); */
  char course[25];
  int year;
  };

main() {
        /* main() */

        struct students s[N];
        int i, ch;

        /* taking input of 450 students in an array of structure */
        for (i = 0; i < N; i++) {

            printf("  Enter data of student %d\t\t\t\ttotal students: %d\n", i +
1, N);
            printf("***************************\n\n");

            printf("enter rollnumber:  ");
            scanf("%d",  & s[i].rlnm);

            printf("\n\nenter name:  ");
            scanf(" %s",  & s[i].name);

            printf("\n\nenter department:  ");
            scanf("%s",  & s[i].dept);

            printf("\n\nenter course:  ");
            scanf("%s",  & s[i].course);

            printf("\n\nenter year of joining:  ");
            scanf("%d",  & s[i].year);
        }

        /* displaying a menu */
        printf("\n\tenter your choice: \n");
        printf("\t**********************\n\n");

        printf("1: enter year to search all students who took admission in
that:\n\n");
        printf("2: enter roll number to see details of that student\n\n\n");

        printf("your choice:  ");
        /* taking input of your choice */
        scanf("%d",  & ch);

        switch (ch) {

            case 1:

                dispyr( & s);
                /* function call to display names of students who joined in\
       a particular year */

                break;

            case 2:
```

```
            displ( & s);
            /* function call to display information of a student \
     whose roll number is given */

            break;

        default:

            printf("\n\nerror! wrong choice");

    }

    getch();

}

/**
 * ***************** main() ends *************
 */

dispyr(struct students *a) {   /* function for displaying names of students\
    who took admission in a particular year */

        int j, yr;

    printf("\nenter year:  ");
    scanf("%d",  & yr);

    printf("\n\nthese students joined in %d\n\n", yr);

    for (j = 0; j < N; j++) {

        if (a[j].year == yr) {

            printf("\n%s\n", a[j].name);
        }

    }
    return 0;
}

displ(struct students *a) {        /* function to print information of a\
     student whose roll number has been \
     given. */

        int k, rl;

    printf("\nenter roll number: ");
    scanf("%d",  & rl);

    for (k = 0; k < N; k++) {

        if (a[k].rlnm == rl) {

            printf("\n\n\t Details of roll number: %d\n", a[k].rlnm);
            printf("\t*************************\n\n");
            printf("           Name: %s\n", a[k].name);
            printf("     Department: %s\n", a[k].dept);
            printf("         Course: %s\n", a[k].course);
            printf("Year of joining: %d", a[k].year);

            break;
        } else {
```

```
            printf("\nRoll number you entered does not exist\n\n");

            break;
        }

    }

    return 0;
}
```