DSA Lab 2

1. Create a structure STUDENT consisting of variables of structures: i. DOB {day, month (use pointer ), year}, ii. STU\_INFO {reg\_no, name(use pointer), address}, iii. COLLEGE {college\_name (use pointer), university\_name} where structure types from i to iii are declared outside the STUDENT independently. Show how to read and display member variables of DOB type if pointer variable is created for DOB inside STUDENT and STUDENT variable is also a pointer variable. The program should read and display the values of all members of STUDENT structure. Note: You may use the following structure. struct DOB{ int day; char\* mth; int year; } struct STU\_INFO{ int reg\_no; char\* name; char[20] adrs; } struct COLLEGE{ char\* clg\_name; char[20] univ\_name; } struct STUDENT{ struct DOB dob; struct STU\_INFO stu\_info; struct COLLEGE clg; } struct STUDENT student; char[10] month; scanf(“%s”, month); student.dob.mth = (char\*) malloc (sizeof (month); strcpy(student.dob.mth, month);

Solution:

#include <stdio.h>

#include<stdlib.h>

#include<string.h>

struct DOB{

int day;

char\* mth;

int year;

};

struct STU\_INFO{

int reg\_no;

char\* name;

char adrs[20];

};

struct COLLEGE{

char\* clg\_name;

char univ\_name[20];

};

struct STUDENT{

struct DOB dob;

struct STU\_INFO stu\_info;

struct COLLEGE clg;

};

int main()

{

struct STUDENT \*sptr=(struct STUDENT\*)malloc(sizeof(struct STUDENT));

sptr->dob.mth = (char\*) malloc (sizeof(char)\*20);

sptr->stu\_info.name = (char\*) malloc (sizeof(char)\*20);

sptr->clg.clg\_name = (char\*) malloc (sizeof(char)\*20);

printf("Enter the date of birth of the student in day/month/year format ");

scanf("%d%s%d",&(sptr->dob.day),sptr->dob.mth,&(sptr->dob.year));

printf("\nEnter the student registration number, name and address respectively ");

scanf("%d%s%s",&(sptr->stu\_info.reg\_no),sptr->stu\_info.name,sptr->stu\_info.adrs);

printf("\nEnter the college name and university name respectively ");

scanf("%s%s",sptr->clg.clg\_name,sptr->clg.univ\_name);

printf("\nThe student's name is %s\n",sptr->stu\_info.name);

printf("\nThe student's dob is %d-%s-%d\n",sptr->dob.day,sptr->dob.mth,sptr->dob.year);

printf("\nThe student's reg\_no is %d\n",sptr->stu\_info.reg\_no);

printf("\nThe student's address is %s\n",sptr->stu\_info.adrs);

printf("\nThe student's college is %s\n",sptr->clg.clg\_name);

printf("\nThe student's university is %s\n",sptr->clg.univ\_name);

return 0;

}

2. Write C programs using recursion to copy one string to another using Recursion.

#include <stdio.h>

#include <stdlib.h>

#include<string.h>

void copy(char a[],char b[],int i){

b[i]=a[i];

if(a[i]=='\0')

return;

copy(a,b,++i);

}

int main()

{

char a[20],b[20];

printf("Enter the string :");

scanf("%s",a);

copy(a,b,0);

printf("String1: %s\n",a);

printf("String2: %s\n",b);

return 0;

}

3. Write C programs using recursion to check whether a given String is Palindrome or not, using Recursion.

#include <stdio.h>

#include <stdlib.h>

#include<string.h>

int palindrome(char a[],int i,int count){

if(a[i]!=a[count-1-i])

return 0;

palindrome(a,++i,count);

return 1;

}

int main()

{

char a[20],b[20];

int count=0;

printf("Enter the string ");

scanf("%s",a);

for(int i=0;a[i]!='\0';i++)

count++;

if(palindrome(a,0,count))

printf("%s is a palindrome",a);

else printf("%s is not a palindrome",a);

return 0;

}

4. Write C programs using recursion to simulate the working of Tower of Hanoi for n disks. Print the number of moves.

#include <stdio.h>

void towerOfHanoi(int n,char source,char temp,char destination){

if(n==1)

{

printf("The disk 1 is moved from %c to %c\n",source,destination);

return;

}

towerOfHanoi(n-1,source,destination,temp); // moving n-1 disks from A to B using C as auxiliary

printf("The disk %d is moved from %c to %c\n",n,source,destination);

towerOfHanoi(n-1,temp,source,destination); // moving n-1 disks from B to C using A as auxiliary

}

int main()

{

int n;

printf("Enter the value of n ");

scanf("%d",&n);

towerOfHanoi(n,'A','B','C');

return 0;

}