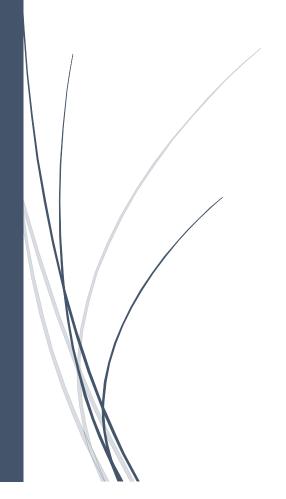10/19/2022

Programming Fundamental

Assignment 02 (Official)

Abdullah Shafiq

22K-4489

BSCS-1D

Question # 1: (10-Points)

A smart city which is equipped with the latest technologies such as self-driving cars (SD), robots, UAV, and many others is shown in Fig.1. Consider a UAV which is deployed to monitor the agriculture field and communicate with the robot, which can take an N number of different locations (A, B, C, and N) (refer Fig.1). Develop a C-script that calculates the distance between reference point R (1,3) of a UAV and robot locations A, B, C, and N number of locations. N is the (non- zero) LSD of your mobile number.
For 0 < LSD < 4 then take [N = (2 LSD) *2], and if LSD = 0, take [N = (2 LSD) *4+3]
Note: (Use For loop and While Loop to accomplish this task).

Program & Output

For loop:

```c
#include<stdio.h>
#include<math.h>
int main()
{
    int lsd,n,i;
    printf("\nEnter LSD as (0 <= LSD > 4)");
    scanf("%d",&lsd);
    if ((lsd>0)&&(lsd<4))
    {
        n=lsd*2;
        printf("\nLSD: %d",n);
    }
    else if (lsd==0)
    {
        n=(lsd*4)+3;
        printf("\nLSD: %d",n);
    }
    for (i=0;i<n;i++)
    {
        int x1=1,y1=3,x2,y2;
        float d;
        printf("\nEnter your co-ordinates(x,y): \n");
        scanf("%d %d",&x2,&y2);
        d=sqrt(pow((x2-x1),2)+pow((y2-y1),2));
        printf("\nThe distance is: %.1f",d);
    }
}
```

```
Enter LSD as (0 <= LSD > 4):1

LSD: 2
Enter your co-ordinates(x,y):
3
4

The distance is: 2.2
Enter your co-ordinates(x,y):
6
7

The distance is: 6.4
--------------------------------
```

While loop:

```c
#include<stdio.h>
#include<math.h>
int main()
{
    int lsd,n,i=0;
    printf("\nEnter LSD as (0 <= LSD > 4)");
    scanf("%d",&lsd);
    if ((lsd>0)&&(lsd<4))
    {
        n=lsd*2;
        printf("\nLSD: %d",n);
    }
    else if (lsd==0)
    {
        n=(lsd*4)+3;
        printf("\nLSD: %d",n);
    }
    while  (i<n)
    {
        int x1=1,y1=3,x2,y2;
        float d;
        printf("\nEnter your co-ordinates(x,y): \n");
        scanf("%d %d",&x2,&y2);
        d=sqrt(pow((x2-x1),2)+pow((y2-y1),2));
        printf("\nThe distance is: %.1f",d);
        i++;
    }
}
```

```
Enter LSD as (0 <= LSD > 4):1

LSD: 2
Enter your co-ordinates(x,y):
3
4

The distance is: 2.2
Enter your co-ordinates(x,y):
6
7

The distance is: 6.4
--------------------------------
```

Question # 2: (10-Points)

Covid'19 vaccination has become a mandatory requirement for many things such as traveling, bank account opening, admissions in higher educational universities, and many more. Develop a C- script that facilitates the hospital in determining which person needs to be vaccinated based on age and underlying disease. The program should run for N persons and perform the followings: (N should be taken as a user input)
I. if age is greater than or equal to 18 and person belongs to the Urban area of a city then program should display the following message: Eligible for the vaccine. Kindly proceed for the vaccination
II. if age is less than 18 and person to the Rural area of a city then program should display the following message Not Eligible for the vaccine. Kindly wait for the vaccination
III. Also list the possibilities in how many ways we can solve the problem given in Question no 02.

Program & Output

```c
#include <stdio.h>
int main()
{
    int n,i;
    printf("\nEnter a number of patients: ");// for loop
    scanf("%d",&n);
    for (i=0;i<n;i++)
    {
        printf("\n\t\t**********\n");
        int age;
        printf("\nEnter Your AGE: ");
        scanf("%d",&age);
        char area;
        printf("Enter Your AREA:\n\n \"R/r\" for RURAL Area\n \"U/u\" for URBAN Area\n ");
        scanf("\n%c",&area);
        if (age>=18&&(area=='R'||area=='r'))
        {
        printf("Eligible for the vaccine. Kindly proceed for the vaccination\n");
        }
        else if (age<18&&(area=='U'||area=='u'))
        {
        printf("Not Eligible for the vaccine. Kindly wait for the vaccination\n");
        }
        else
        {
        printf("Not Eligible for the vaccine. Kindly wait for the vaccination\n");
        }
    }
}
```

```
Enter a number of patients: 1

                ************

Enter Your AGE: 18
Enter Your AREA:

 "R/r" for RURAL Area
 "U/u" for URBAN Area
 R
Eligible for the vaccine. Kindly proceed for the vaccination

------------------------------
```

Question # 3: (10-Points)

Alice and Bob want to exchange the n- digits message on the internet, but they want to ensure the security. They went to a cyber security specialist Edwin for the solution. Edwin listened to the requirement of the clients and proposed a scheme for cryptography, which is mentioned in following points
1. The algorithm would reverse the message
2. After reverting the message, it would determine an alphabetic character against the digit. For example, for 0 it would be A, for 1 it would be B, for 2 it would be C, for Z it would be 25.
Write a code in C for the above cryptographic algorithm using loops in C for Edwin.
3. Also provide the solution for decryption the message. (System should ask user for encryption and decryption at the start of the program)

Program & Output

```c
#include <stdio.h>
int main()
{
    char ch;
    printf("\nFor \"ENCRYPTION\" type \'E/e\' :\n\nFor \"DECRYPTION\" type \'D/d\' :\n\n");
    scanf("%c",&ch);
    if ((ch=='E')||(ch=='e'))
    {
        int x,i,num,k,num1,alph;
        printf("How many numbers you want to encrypt: \n");
        scanf("%d",&num1);
        printf("\nEnter a NUMBER you want to \"ENCRYPT\" :\n ");
        scanf("%d",&num);
        for (i=0;i<num1;i++)
        {
            x=num%10;
            int alph1;
            alph=65;
            for (k=0;k<1;k++)
            {
                alph1=alph+x;
                printf(" %c",alph1);
            }
            num=num/10;
        }
    }
    else if ((ch=='D')||(ch=='d'))
    {
        int num;
        printf("Enter Number Of Alphabets you want to decrypt: ");
        scanf("%d",&num);
        char x[num];
        int i,f,alph,alph1,t;
        int num1=num-1;
        printf("\nEnter Alphabets In \'UPPER\' case: \n");
        scanf("%s",x);
        i=num-1;
        while (i>=0)
        {
            alph=65;
            alph1=x[i]-alph;
            printf("%d ",alph1);
            i--;
        }
    }
}
```

Encryption output

(1)

```
For "ENCRYPTION" type 'E/e' :

For "DECRYPTION" type 'D/d' :

E
How many numbers you want to encrypt:
4

Enter a NUMBER you want to "ENCRYPT" :
 1546
 G E F B
--------------------------------
```

(2)

```
For "ENCRYPTION" type 'E/e' :

For "DECRYPTION" type 'D/d' :

E
How many numbers you want to encrypt:
4

Enter a NUMBER you want to "ENCRYPT" :
 7777
 H H H H
--------------------------------
```

(3)

```
For "ENCRYPTION" type 'E/e' :

For "DECRYPTION" type 'D/d' :

E
How many numbers you want to encrypt:
4

Enter a NUMBER you want to "ENCRYPT" :
 5555
 F F F F
--------------------------------
```

(4)

```
For "ENCRYPTION" type 'E/e' :

For "DECRYPTION" type 'D/d' :

E
How many numbers you want to encrypt:
4

Enter a NUMBER you want to "ENCRYPT" :
 1234
 E D C B
--------------------------------
```

Decryption output

(1)

```
For "ENCRYPTION" type 'E/e' :

For "DECRYPTION" type 'D/d' :

D
Enter Number Of Alphabets you want to decrypt: 4

Enter Alphabets In 'UPPER' case:
GEFB
1 5 4 6
--------------------------------
```

(2)

```
For "ENCRYPTION" type 'E/e' :

For "DECRYPTION" type 'D/d' :

D
Enter Number Of Alphabets you want to decrypt: 4

Enter Alphabets In 'UPPER' case:
HHHH
7 7 7 7
--------------------------------
```

(3)

```
For "ENCRYPTION" type 'E/e' :

For "DECRYPTION" type 'D/d' :

D
Enter Number Of Alphabets you want to decrypt: 4

Enter Alphabets In 'UPPER' case:
FFFF
5 5 5 5
--------------------------------
```

(4)

```
For "ENCRYPTION" type 'E/e' :

For "DECRYPTION" type 'D/d' :

D
Enter Number Of Alphabets you want to decrypt: 4

Enter Alphabets In 'UPPER' case:
EDCB
1 2 3 4
--------------------------------
```

\

Question # 4: (10-Points)

A robotics and technological center offer various training and workshop sessions to the registered members. The robotics center has implemented chatbot at the main entrance for checking the membership status of the people. The chatbot is incorporated with the AI- enabling logics to check the membership status. The chatbot system displays 4-digit message randomly on the screen and after reading the message user would type the output. The main process would be: User would read the message from screen and would add (1 if he is male and, 0 if she is female) Furthermore, he/she would add age to the input. After this the user would add all the digits of the input and finally take remainder with 5 of the output.

Program & Output

```c
#include <stdio.h>
int main()
{
    int age,string,y,add=0,i,mod,ver;
    printf("\nEnter your Verification code: ");
    scanf("%d",&ver);
    printf("Enter Gender (M/F) : ");
    char gender;
    scanf("\n%c",&gender);
    switch (gender)
    {
    case 'M':
        printf("Enter your string NUMBER: ");
        scanf("%d",&string);
        printf("Enter your Age: ");
        scanf("%d",&age);
        string=string+(age+1);
        /*printf("%d",string);*/
        for (i=0; i<=string; i++)
        {
            y=string%10;
            /*printf("\n%d",y);*/
            if(y==0)
            {
                string=string+1;
            }
            else
            {
                string=string/10;
                add=add+y;
            }
        }
        /*printf("\nSum: %d",add);*/
        mod=add%5;
        /*printf("\nCode: %d",mod);*/
        if(mod==ver)
        {
            printf("\a\n\n\t*****Verification Completed*****");
        }
        else
        {
            printf("Verification Denied");
        }
    break;
```

```c
case'F':
    printf("Enter your string NUMBER: ");
    scanf("%d",&string);
    printf("Enter your Age: ");
    scanf("%d",&age);
    string=string+(age+0);
    printf("%d",string);
    for (i=0; i<=string+1; i++)
    {
        y=string%10;
        /*printf("\n%d",y);*/
        if (y==0)
        {
            string=string+1;
        }
        else
        {
            string=string/10;
            add=add+y;
        }
    }
    /*printf("\nSum: %d",add);*/
    mod=add%5;
    /*printf("\nCode: %d",mod);*/
    if(mod==ver)
    {
        printf("\a\n\n\t*****Verification Completed*****");
    }
    else
    {
        printf("\a\n\n\t*****Verification Denied*****");
    }
    }
}
```

Output for male:	Output for female:
Verification code: 4	**Verification code:** 2
Age: 40	**Age:** 15
String: 3231+40+1=3272	**String:** 1000+15+0=1015
Code: 3+2+7+2=14%5=4	**Code:** 1+0+1+5=7%5=2

```
Enter your Verification code: 4
Enter Gender (M/F) : M
Enter your string NUMBER: 3231
Enter your Age: 40


     *****Verification Completed*****
-----------------------------
```

```
Enter your Verification code: 2
Enter Gender (M/F) : F
Enter your string NUMBER: 1000
Enter your Age: 15
1015

     *****Verification Completed*****
-----------------------------
```

Question # 5: (10-Points)

Write a program for an ice-cream manufacturing company. Assuming that 50 ice-creams can be prepared each ……ice- creams that have been ordered and also whether the person required the plant to run 16hrs or 8 hrs. per day and then displays the bill for the customer that indicate the number of days and hours it will take to produce them and also the total cost of ice-creams along with their cost distribution based on plant- running time.

Program & Output

```c
#include <stdio.h>
int main()
{
    int qnt,cost,time_day,time_hour,x;
    printf("\n\t***In 1-hr 50 ice creams can be prepared(60RS/= per)");
    printf("and Machine will only be run for 8-hr per day.***\n");
    printf("\t***In one day only 400 ice creams can be made.***\n");
    printf("\t***For Machine to run 16-hr a day the Cost would be doubled i-e 120RS/=.***\n");
    printf("\nEnter a Quantity Of ICE-CREAM: \n");
    scanf("%d",&qnt);
    printf("Select Type (8/16)\n");
    int run;
    scanf("\n%d",&run);

    switch (run)
    {
        case 8:
            cost=qnt*60;
            printf("The Total cost of %d ice-creams is:%d",qnt,cost);
            time_day=qnt/400;
            x=qnt%400;
            time_hour=x/50;
            printf("\n%d Days and %d Hours are required",time_day,time_hour);
        break;
        case 16:
            cost=qnt*120;
            printf("The Total cost of %d ice-creams is:%d",qnt,cost);
            time_day=qnt/800;
            x=qnt%800;
            time_hour=x/50;
            printf("\n%d Days and %d Hours are required.",time_day,time_hour);
    }
}
```

```
   ***In 1-hr 50 ice creams can be prepared(60RS/= per)and Machine will only be run for 8-hr per day.***
   ***In one day only 400 ice creams can be made.***
   ***For Machine to run 16-hr a day the Cost would be doubled i-e 120RS/=.***
```

When Machine operates for 8 HOURS:	*When Machine operates for 16 HOURS:*

```
Enter a Quantity Of ICE-CREAM:
1200
Select Type (8/16)
8
The Total cost of 1200 ice-creams is:72000
3 Days and 0 Hours are required
------------------------------
```

```
Enter a Quantity Of ICE-CREAM:
1200
Select Type (8/16)
16
The Total cost of 1200 ice-creams is:144000
1 Days and 8 Hours are required.
------------------------------
```

Question # 6: (10-Points)

An unarmed vehicle (UAV) is operating in a smart environment where it is communicating with a mobile device and a self-driving car (refer Fig.2 Drone Alpha). The UAV is equipped with an AI facility, and it displays the pattern A when it communicates with the SD. On the other hand, it shows pattern B when it starts communication with the mobile device. Develop a C-script that is needed to be integrated into UAV, which generates pattern A (refer fig.2) for SD car and pattern B (refer fig.2) for mobile device

Program & Output

```c
#include<stdio.h>
int main()
{
    int i;
    char ch;
    printf("Communicating with SD or MOBILE(s/m)");
    scanf("%c",&ch);
    if(ch=='s')
    {
        for(i=1;i<19;i++)
        {
            if ((i==4)||(i==9)||(i==14))
            {
                printf("\n***\n");
                printf("***move straight");
            }
            printf("\nmove straight");
            if(i==18)
            {
                printf("\n***");
            }
        }
    }
    else if (ch=='m')
    {
        for(i=1;i<19;i++)
        {
            if ((i==4)||(i==9)||(i==14))
            {
                printf("\n***\n");
                printf("***Mobile is in the city zone");
            }
            printf("\nMobile is in the city zone");
            if(i==18)
            {
                printf("\n***");
            }
        }
    }
}
```

Communicating with SD:

```
Communicating with SD or MOBILE(s/m)s

move straight
move straight
move straight
***
***move straight
move straight
move straight
move straight
move straight
move straight
***
***move straight
move straight
move straight
move straight
move straight
move straight
***
***move straight
move straight
move straight
move straight
move straight
move straight
***

---------------------------------
```

Communicating with MOBILE:

```
Communicating with SD or MOBILE(s/m)m

Mobile is in the city zone
Mobile is in the city zone
Mobile is in the city zone
***
***Mobile is in the city zone
Mobile is in the city zone
Mobile is in the city zone
Mobile is in the city zone
Mobile is in the city zone
Mobile is in the city zone
***
***Mobile is in the city zone
Mobile is in the city zone
Mobile is in the city zone
Mobile is in the city zone
Mobile is in the city zone
Mobile is in the city zone
***
***Mobile is in the city zone
Mobile is in the city zone
Mobile is in the city zone
Mobile is in the city zone
Mobile is in the city zone
Mobile is in the city zone
***

---------------------------------
```

The End.