

PF ASSIGNMENT NO 02

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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 $0 < \text{LSD} < 4$ then take $[N = (2^{\text{LSD}}) * 2]$, and if $\text{LSD} = 0$, take $[N = (2^{\text{LSD}}) * 4 + 3]$

Note: (Use **For loop** and **While Loop** to accomplish this task).

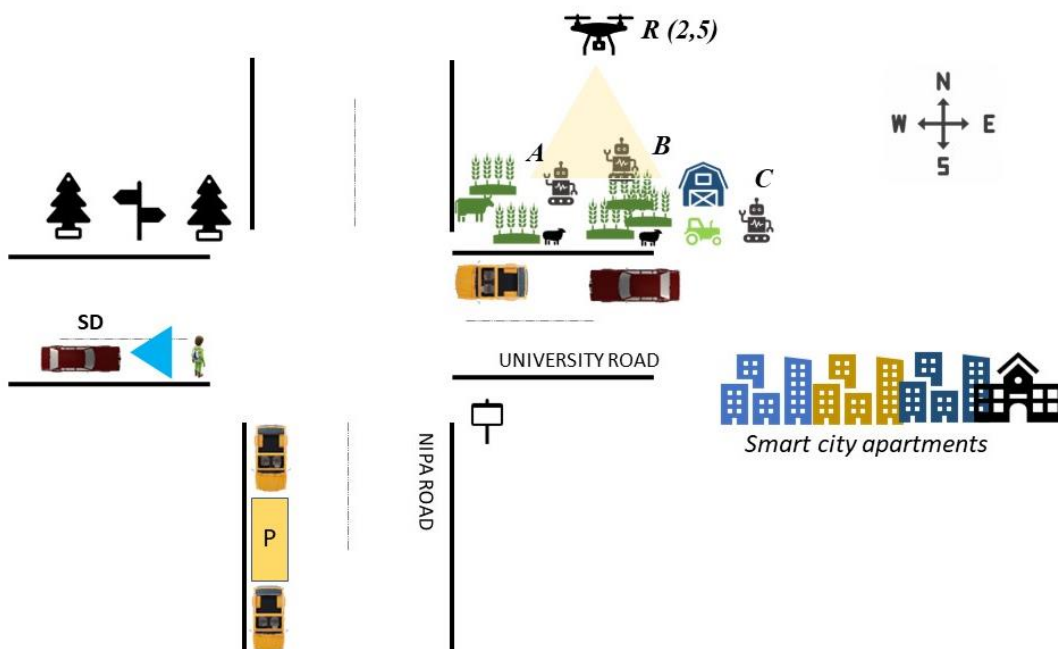


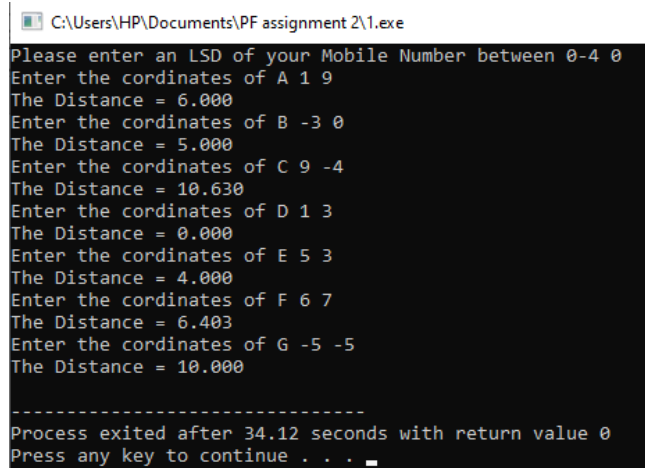
Fig.1 A smart city depiction

Program:

```
#include<stdio.h>
#include<math.h>
int main(){
    int n, lsd, i;
    int loc = 0;
    int x1,y1,x2,y2;
    x1 = 1;
    y1 = 3;
    float dist;
    do{
        printf("Please enter an LSD of your Mobile Number between 0-4 ");
        scanf("%d", &lsd);
    }
    while(lsd<0 || lsd>=4);

    if (lsd>0 && lsd<4)
    {
        n= pow(2,lsd) *2;
    }
    else if(lsd==0)
    {
        n= (pow(2,lsd) *4)+3;
    }
    for(i = 0; i < n ; i++){
        printf("Enter the cordiates of %c ",loc+65);
        loc++;
        scanf("%d %d", &x2,&y2);
        dist = sqrt(pow(y2-y1,2)+pow(x2-x1,2));
        printf("The Distance = %.3f\n",dist);
    }
}
```

Output:



```
C:\Users\HP\Documents\PF assignment 2\1.exe
Please enter an LSD of your Mobile Number between 0-4 0
Enter the cordiates of A 1 9
The Distance = 6.000
Enter the cordiates of B -3 0
The Distance = 5.000
Enter the cordiates of C 9 -4
The Distance = 10.630
Enter the cordiates of D 1 3
The Distance = 0.000
Enter the cordiates of E 5 3
The Distance = 4.000
Enter the cordiates of F 6 7
The Distance = 6.403
Enter the cordiates of G -5 -5
The Distance = 10.000

-----
Process exited after 34.12 seconds with return value 0
Press any key to continue . . .
```

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:

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

```
int main()
```

```
{
```

```
int num, age;
```

```
char area;
```

```
printf("Please Enter the number of People?");
```

```
scanf("%d", &num);
```

```
for (int i=0; i<num; i++)
```

```
{
```

```
printf("\nPlease enter Your age");
```

```
scanf(" %d", &age);
```

```
printf("Please enter the Area you belong to 'U' for Urban and 'R' for rural");
```

```
scanf(" %c", &area);
```

```
if(age>=18 && (area=='u'||area=='U'))
```

```
printf("\nEligible for the vaccine. Kindly proceed for the vaccination");
```

```
if (age<18 && (area=='r'||area=='R'))
```


```
printf("\nNot Eligible for the vaccine. Kindly wait for the vaccination");
```

```
}
```

```
/*I have made this program using using if condition within the loop, but this can also  
be done using the switch case within the loop wihtout using the logical operators*/
```

```
}
```

Output:

 C:\Users\HP\Documents\PF assignment 2\2.exe

```
Please Enter the number of People?2
```

```
Please enter Your age40
```

```
Please enter the Area you belong to 'U' for Urban and 'R' for ruralU
```

```
Eligible for the vaccine. Kindly proceed for the vaccination
```

```
Please enter Your age9
```

```
Please enter the Area you belong to 'U' for Urban and 'R' for ruralR
```

```
Not Eligible for the vaccine. Kindly wait for the vaccination
```

```
-----
```

```
Process exited after 23.89 seconds with return value 0
```

```
Press any key to continue . . . █
```

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.

The samples are like:

Input String	Cypher Text
1546	GEFB
7777	HHHH
5555	FFFF
1234	EDCB

3. Also provide the solution for decryption the message. (System should ask user for encryption and decryption at the start of the program)

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

void encrypt();
void decrypt();

int main()
{
    char choice;
    printf("Do you want to Encrypt (E) or Decrypt (D)?");
    scanf("%c", &choice);
    if (choice=='D'||choice=='d')
        decrypt();

    if (choice=='E'||choice=='e')
        encrypt();
}

void decrypt()
{
    int size;
    printf("Please enter the size of letters ");
    scanf(" %d", &size);
    int s= size;
    char dec[size];
    int k= size-1;
    char out[size-1];
```

```

    int j;

    for (j=size-1;j>=0;j--)
    {
        printf("\nPlease enter each letter ");
        scanf(" %c", &dec[j]);
        out[j]=dec[j]-65;
    }

    for (int j=0; j<s; j++)
    {
        printf("%d", out[j]);
    }
}

```

//Function

```

void encrypt()
{
    int size, decr;
    printf("Please enter the size of digits ");
    scanf(" %d", &size);
    int s =size;
    int enc[size];
    int k= size-1;
    int out[size-1];

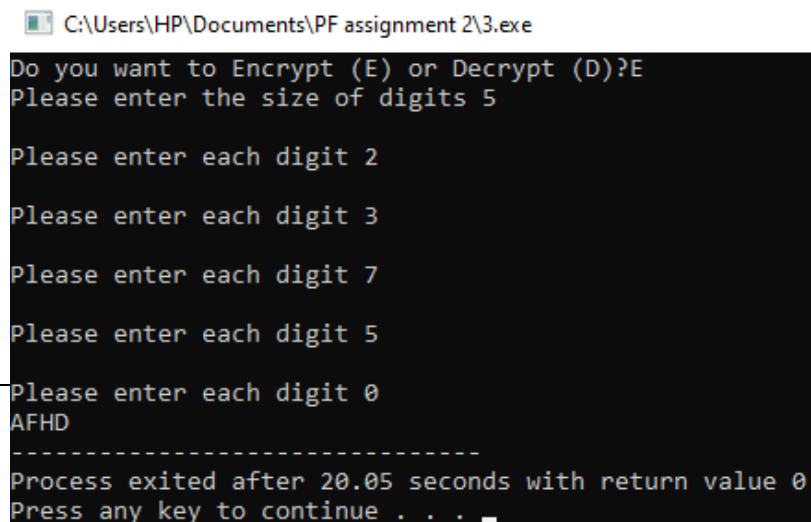
    for ( size--; size>=0; size--)
    {

        printf("\nPlease enter each digit ");
        scanf(" %d", &enc[size]);
        out[size]=enc[size]+65;

    }
    for (int j=0; j<s; j++)
    {
        printf("%c", out[j]);
    }
}

```

Output:



```

C:\Users\HP\Documents\PF assignment 2\3.exe
Do you want to Encrypt (E) or Decrypt (D)?E
Please enter the size of digits 5

Please enter each digit 2
Please enter each digit 3
Please enter each digit 7
Please enter each digit 5
Please enter each digit 0
AFHD
-----
Process exited after 20.05 seconds with return value 0
Press any key to continue . . .

```

```
C:\Users\HP\Documents\PF assignment 2\3.exe
Do you want to Encrypt (E) or Decrypt (D)?D
Please enter the size of letters 6

Please enter each letter E
Please enter each letter P
Please enter each letter A
Please enter each letter E
Please enter each letter A
Please enter each letter D
3040154
-----
Process exited after 17.27 seconds with return value 0
Press any key to continue . . .
```

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.

This process would be like this:

Case 1: The age of the user is 40, and he is male.
Input string is: 3231, he would add 41 to the string then it would become 3272. Then he would add individual digits of the string 3+2+7+2 which would generate 18, finally 18%5 is 3 so the answer would be 3.
Case 2: The age of the user is 15, and he is female.
Input string is: 1000, he would add 15 to the string then it would become 1015. Then he would add individual digits of the string 1+0+1+5 which would generate 7, finally 7%5 is 2 so the answer would be 3.

Your task is to write a C program using nested decision structures program for chatbot automatic verification of the password. At this level you need to provide the input and output of the code and match the results.

Input a 4-digit number

The user entered 1000(the computer generates the random string but in this case you can take input from user)

Input your age and gender

The user entered 15 and 0

Input the verification code

The user inputs 2

The system says correct, if the user enters other digit, the system would say incorrect

Program:

```
#include <stdio.h>
int main()
{
    int num, age, code;
    char gender;
    int mod;
    printf("Enter the 4-digit number ");
    scanf("%d", &num);

    printf("Please Enter Your Age ");
    scanf("%d", &age);

    printf("Please enter you Gender (M) or (F)");
    scanf(" %c", &gender);

    num=num+age;


    if(gender=='m'||gender=='M')
        num++;
    int sum=0;
    for(int i=0; i<4; i++)
    {
        mod = num%10;
        sum= sum+mod;
```



```
        num=num/10;
    }
    int ans= sum%5;

    printf("\nEnter the Verification Code");
    scanf("%d", &code);
    if(code==ans)
        printf("The Answer is Correct ");
    else printf("The answer is incorrect");
}
```

Output:

 C:\Users\HP\Documents\PF assignment 2\4.exe

```
Enter the 4-digit number 8384
Please Enter Your Age 89
Please enter you Gender (M) or (F)M

Enter the Verification Code 3
The Answer is  Correct
-----
Process exited after 49.65 seconds with return value 0
Press any key to continue . . . _
```

Question # 5:**(10-Points)**

Write a program for an ice-cream manufacturing company. Assuming that 50 ice-creams can be prepared each hour whereas each Ice-cream costs 60Rs. The plant operates 8hrs per day but can have operating ability of 16hrs per day. But for another 8-hrs, the cost of each ice-cream would be doubled. You have to implement a method that identifies whether you want the plant to run 8hrs or 16 hrs. per day. Each ice-cream's cost is fixed. You have to calculate how many days and hours it will take to produce any number of ice-creams and what would be the cost. Write a program that asks the user for the number of 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:

```
#include <stdio.h>
int main()
{
    int q, price=0, time, choice; //q is quantity
    printf("How many ice cream do you want? ");
    scanf("%d", &q);

    printf("How much time? 8 or 16 hours? ");
    scanf("%d", &choice);

    switch (choice)
    {
        case 8:
            price= 60*q;
            time=q/50;


            printf("\nIt will take %d day(s) and %d hours\n", time/8, time%8 );
            printf("\nThe Price of the ice creams will be %d", price);
            break;

        case 16:
            {
                time= q/50; int x=0; int div;
                for (int i=0; i<time; i++)
                {
                    if (i/8==x)
                        price= price+60*50;
                    else
                        price= price+120*50;

                    div= i/8;
                    if(i%8==0 && div%2!=0)
                        x=x+2;
                }
                printf("It will take %d day(s) and %d hours to make the ice cream\n", time/16, time%16);
                printf("The price of the icecreams will be %d", price);
                break;
            }
    }
}
```

```
    }  
}  
}
```

Output:

 C:\Users\HP\Documents\PF assignment 2\5.exe

```
How many ice cream do you want? 900  
How much time? 8 or 16 hours? 16  
It will take 1 day(s) and 2 hours to make the ice cream  
The price of the icecreams will be 78000  
-----  
Process exited after 8.796 seconds with return value 0  
Press any key to continue . . .
```

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.

Input: Iterations

s = communicating with SD

m = communicating with mobile

Output: **Pattern A** when communicating with SD

Pattern B when communicating with mobile device

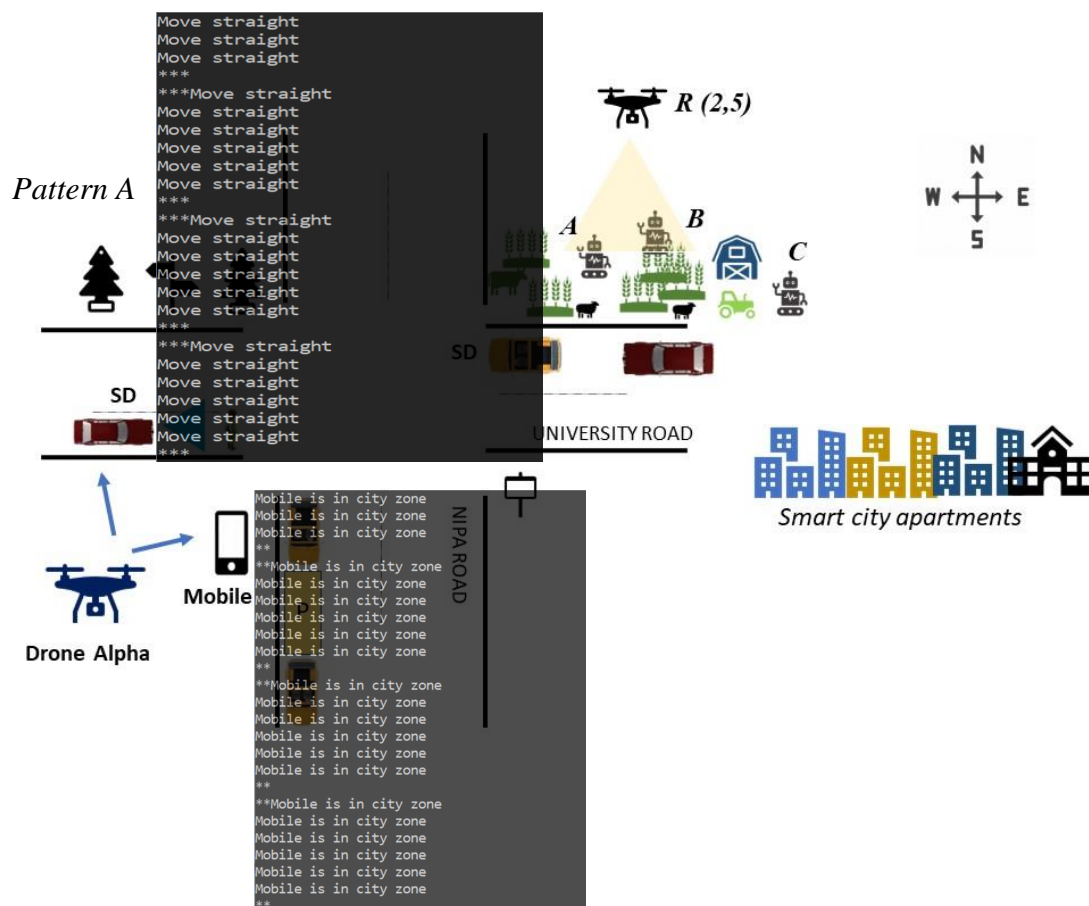


Fig.2 Smart city network in which UAV, SD and mobile device are communicating

Program:

```
#include <stdio.h>
#include <stdlib.h>
int main()
{
    char choice;
    printf("Is it communicating with SD ar (s) or mobile device (m) ");
    scanf("%c", &choice);

    switch (choice)
    {
        case 's':
        {
            for(int i=0; i<3; i++)
            {
                printf("Move straight\n");
            }

            printf("***\n");

            for (int k=0; k<3; k++)
            {
                printf("***Move straight\n");
                for (int j=0; j<5; j++)
                {
                    printf("move straight\n");
                }
                printf("***");
            }


            break;
        }
        case 'm':
        {
            for(int i=0; i<3; i++)
            {
                printf("Mobile is in city zone\n");
            }

            printf("**\n");

            for (int k=0; k<3; k++)
            {
                printf("***Mobile is in city zone\n");
                for (int j=0; j<5; j++)
                {
                    printf("Mobile is in city zone\n");
                }
                printf("***");
            }
        }
    }
}
```

```
        }  
        break;  
    }  
}
```

Output:

 C:\Users\HP\Documents\PF assignment 2\6.exe

```
Is it communicating with SD ar (s) or mobile device (m) m  
Mobile is in city zone  
Mobile is in city zone  
Mobile is in city zone  
**  
**Mobile is in city zone  
Mobile is in city zone  
Mobile is in city zone  
Mobile is in city zone  
Mobile is in city zone  
Mobile is in city zone  
****Mobile is in city zone  
Mobile is in city zone  
Mobile is in city zone  
Mobile is in city zone  
Mobile is in city zone  
Mobile is in city zone  
****Mobile is in city zone  
Mobile is in city zone  
Mobile is in city zone  
Mobile is in city zone  
Mobile is in city zone  
Mobile is in city zone  
**  
-----  
Process exited after 1.273 seconds with return value 0  
Press any key to continue . . .
```

C:\Users\HP\Documents\PF assignment 2\6.exe

Is it communicating with SD ar (s) or mobile device (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

Process exited after 1.602 seconds with return value 0

Press any key to continue . . . █