CSE3039 CN LAB

Exercise 8

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Aim: Identify the subnet mask, first and last address of given IP Address.

Code:

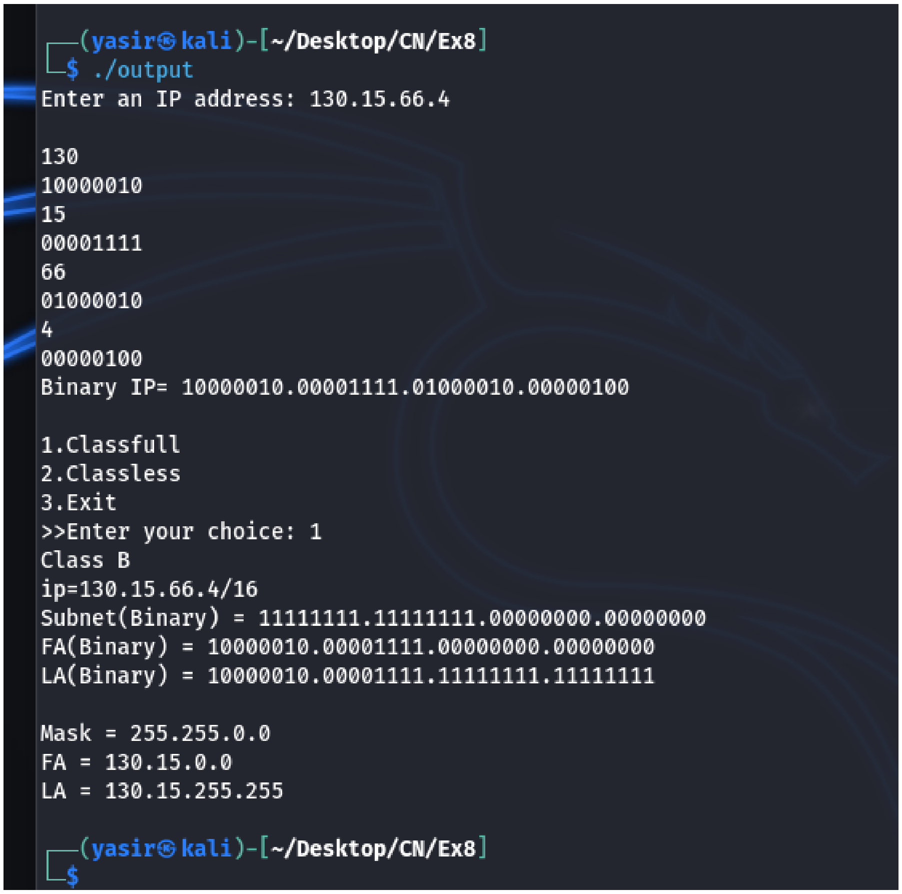
```
#include<stdio.h>

#include<stdlib.h>

#include<string.h>

#include<math.h>


int i_ip[4];

char ip[4][9] = {"00000000\0","00000000\0","00000000\0","00000000\0"};

char mask[4][9] = {"00000000\0","00000000\0","00000000\0","00000000\0"};

char FA[4][9] = {"00000000\0","00000000\0","00000000\0","00000000\0"};

char LA[4][9] = {"11111111\0","11111111\0","11111111\0","11111111\0"};

int ip_c = 0;

int i_ip_c = 0;


void calcFALA(int maskNum){

    int c = 0;

    int b = 0;

    for(int i=0;i<maskNum;i++){

        if(b==8){

            b = 0;
            c++;
        }
        FA[c][b]=ip[c][b];
        LA[c][b]=ip[c][b];
        b++;
    }

    printf("FA(Binary) = %s.%s.%s.%s\n",FA[0],FA[1],FA[2],FA[3]);
    printf("LA(Binary) = %s.%s.%s.%s\n\n",LA[0],LA[1],LA[2],LA[3]);


    printf("Mask = %d.%d.%d.%d\n",binaryToDecimal(mask[0]),binaryToDecimal(mask[1]),binaryToDecimal(mask[2]),binaryToDecimal(mask[3]));
    printf("FA = %d.%d.%d.%d\n",binaryToDecimal(FA[0]),binaryToDecimal(FA[1]),binaryToDecimal(FA[2]),binaryToDecimal(FA[3]));
    printf("LA = %d.%d.%d.%d\n",binaryToDecimal(LA[0]),binaryToDecimal(LA[1]),binaryToDecimal(LA[2]),binaryToDecimal(LA[3]));
}
void calcMask(int maskNum){
    int mask_c = 0;
    int mask_b = 0;
    for(int i=0;i<maskNum;i++){
        if(mask_b==8){
            mask_b = 0;
            mask_c++;
        }
        mask[mask_c][mask_b]='1';
        mask_b++;
    }

    printf("Subnet(Binary) = %s.%s.%s.%s\n",mask[0],mask[1],mask[2],mask[3]);
}
void decimalToBinary(int decimalNum) {
    int binaryNum[8];
    int i = 0;

    while (decimalNum > 0) {
        binaryNum[i] = decimalNum % 2;
        decimalNum = decimalNum / 2;
        i++;
    }

    // Pad with leading zeros if necessary
    while (i < 8) {
        binaryNum[i] = 0;
        i++;
    }

    for (int j = 7; j >= 0; j--) {
        printf("%d", binaryNum[j]);
        if(binaryNum[j]==1){

            ip[ip_c][7-j] = '1';
        }
        else{
            ip[ip_c][7-j] = '0';
        }
    }
    ip_c++;
}
int binaryToDecimal(char *binary) {
    int decimal = 0;
    int length = strlen(binary);
    int base = 1; // Initializing base value to 1 (2^0)

    for (int i = length - 1; i >= 0; i--) {
        if (binary[i] == '1') {
            decimal += base;
        }
        base *= 2; // Incrementing base for the next position
    }

    return decimal;
}
int main()
{
    char ip_address[16];
    char *token;

    printf("Enter an IP address: ");
    scanf("%15s", ip_address);
    token = strtok(ip_address, ".");

            while (token != NULL) {
                int digit = atoi(token);
                i_ip[i_ip_c]=digit;
                i_ip_c++;
                printf("\n%d\n", digit);

                decimalToBinary(digit);

                token = strtok(NULL, ".");
            }

            printf("\nBinary IP= %s.%s.%s.%s\n",ip[0],ip[1],ip[2],ip[3]);
    int choice;
    printf("\n1.Classfull\n2.Classless\n3.Exit\n>>Enter your choice: ");
    scanf("%d",&choice);

    switch(choice){

        case 1 :
            char Class;

            if(i_ip[0]>=1 && i_ip[0]<= 127){
                Class='A';
                printf("Class %c\n",Class);
printf("ip=%d.%d.%d.%d/%d\n",i_ip[0],i_ip[1],i_ip[2],i_ip[3],8);
                calcMask(8);
                calcFALA(8);
            }
            else if(i_ip[0]<=191){
```

```
        Class='B';
        printf("Class %c\n",Class);

printf("ip=%d.%d.%d.%d/%d\n",i_ip[0],i_ip[1],i_ip[2],i_ip[3],16);
        calcMask(16);
        calcFALA(16);
      }
      else if(i_ip[0]<=223){
        Class='C';
        printf("Class %c\n",Class);

printf("ip=%d.%d.%d.%d/%d\n",i_ip[0],i_ip[1],i_ip[2],i_ip[3],24);
        calcMask(24);
        calcFALA(24);
      }
      else if(i_ip[0]<=239){
        Class='D';
        printf("Class %c",Class);
      }
      else{
        Class='E';
        printf("Class %c",Class);
      }
      break;
    case 2 :
      int maskNum;
      printf("Enter mask number: ");
      scanf("%d",&maskNum);
      calcMask(maskNum);
```

```
            //First and Last address(and opt)(simply copy maskNum bits from IP and add zero)

            calcFALA(maskNum);
        case 3 : exit(0);
    }
    return 0;

}
```

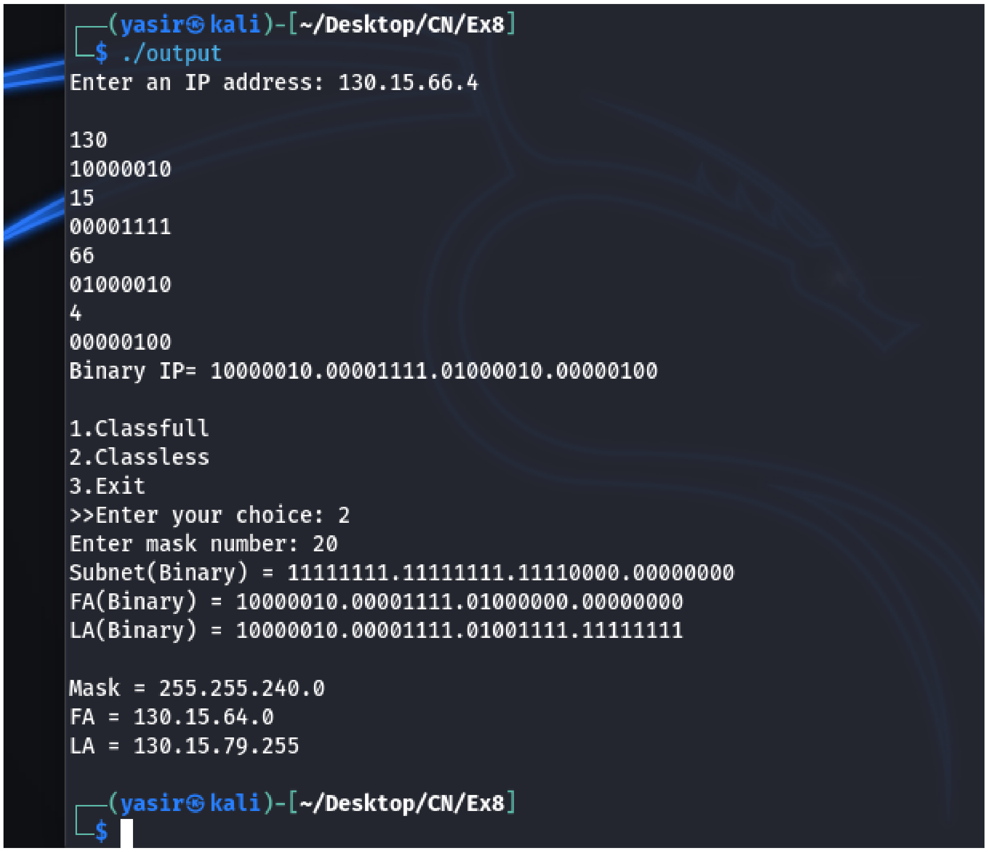
Screen Shots:

Classfull



```
┌──(yasir㉿kali)-[~/Desktop/CN/Ex8]
└─$ ./output
Enter an IP address: 130.15.66.4

130
10000010
15
00001111
66
01000010
4
00000100
Binary IP= 10000010.00001111.01000010.00000100

1.Classfull
2.Classless
3.Exit
>>Enter your choice: 1
Class B
ip=130.15.66.4/16
Subnet(Binary) = 11111111.11111111.00000000.00000000
FA(Binary) = 10000010.00001111.00000000.00000000
LA(Binary) = 10000010.00001111.11111111.11111111

Mask = 255.255.0.0
FA = 130.15.0.0
LA = 130.15.255.255

┌──(yasir㉿kali)-[~/Desktop/CN/Ex8]
└─$
```

Classless



```
┌──(yasir㉿kali)-[~/Desktop/CN/Ex8]
└─$ ./output
Enter an IP address: 130.15.66.4

130
10000010
15
00001111
66
01000010
4
00000100
Binary IP= 10000010.00001111.01000010.00000100

1.Classfull
2.Classless
3.Exit
>>Enter your choice: 2
Enter mask number: 20
Subnet(Binary) = 11111111.11111111.11110000.00000000
FA(Binary) = 10000010.00001111.01000000.00000000
LA(Binary) = 10000010.00001111.01001111.11111111

Mask = 255.255.240.0
FA = 130.15.64.0
LA = 130.15.79.255

┌──(yasir㉿kali)-[~/Desktop/CN/Ex8]
└─$ 
```