LAB ASSIGNMENT – 4

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19BCE2141

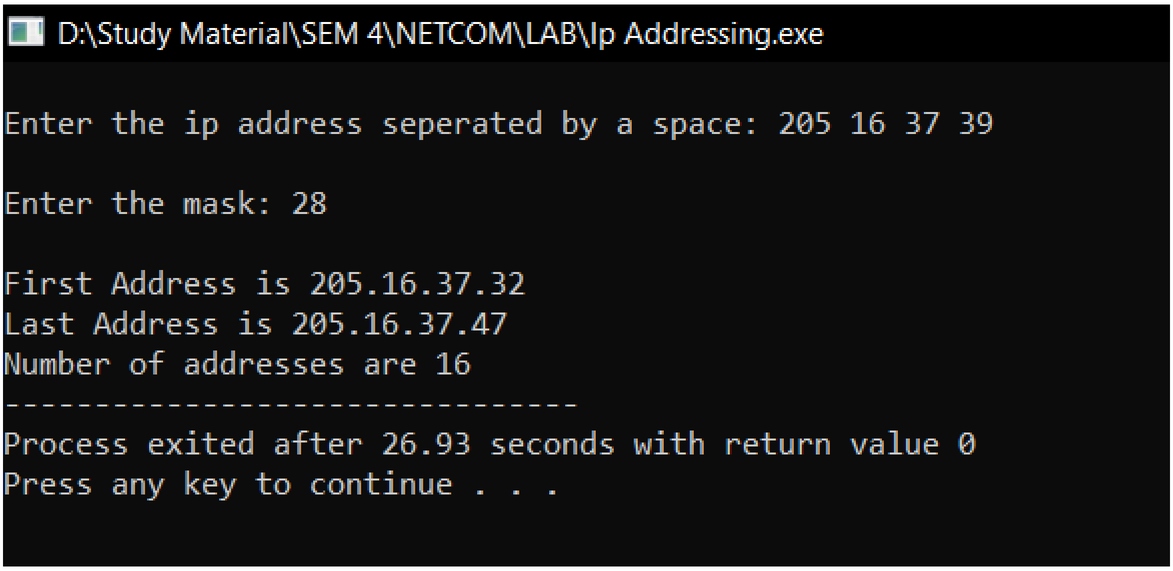
Q1. First Address and Last Address of an IP Address

Code –

```
#include <bits/stdc++.h>

using namespace std;

int binaryToDecimal(int n[])
{
   int i,num=0,base=1;
   for(i=7;i>=0;i--)
   {
         num = num + base*n[i];
         base = base * 2;
         }
         return num;
}

int main()
{
         int ip[4],n,i,num1,num2,mask;
         cout<<"\nEnter the ip address seperated by a space: ";
         for(i=0;i<4;i++)
             cin>>ip[i];
         cout<<"\nEnter the mask: ";
         cin>>mask;
         int temp1=ip[3];
         int bNum1[32];
   int start=0,end=7;
   i=0;
   for(int k=0;k<8;k++)
         {
             if(temp1>0)
             {
         bNum1[i] = temp1 % 2;
         temp1 = temp1 / 2;
         i++;
         }
         else
         {
             bNum1[i]=0;
                 i++;
             }
         }
   while (start < end)
   {
       int temp = bNum1[start];
       bNum1[start] = bNum1[end];
       bNum1[end] = temp;
       start++;
       end--;
   }
         int m = 32 - mask;
         int temp2[32],temp3[32];
         for(i=0;i<7;i++)
         {
             temp2[i]=bNum1[i];
             temp3[i]=bNum1[i];
         }
         for(i=7;i>=m;i--)
         {
             temp2[i]=0;
         }
         for(i=7;i>=m;i--)
         {
             temp3[i]=1;
         }
         num1=binaryToDecimal(temp2);
         num2=binaryToDecimal(temp3);
         cout<<"\nFirst Address is ";
         for(i=0;i<3;i++)
             cout<<ip[i]<<".";
```

```
	cout<<num1;

	cout<<"\nLast Address is ";

	for(i=0;i<3;i++)

		cout<<ip[i]<<".";

	cout<<num2;

	cout<<"\nNumber of addresses are "<<pow(2,m);

	return 0;

}
```

Output –



D:\Study Material\SEM 4\NETCOM\LAB\Ip Addressing.exe

```
Enter the ip address seperated by a space: 205 16 37 39

Enter the mask: 28

First Address is 205.16.37.32
Last Address is 205.16.37.47
Number of addresses are 16
--------------------------------
Process exited after 26.93 seconds with return value 0
Press any key to continue . . .
```

Q2. With AND operation

Code –

```
#include <bits/stdc++.h>

using namespace ::std;


string binDec = "";

string decBin = "";

string maskString = "";
```

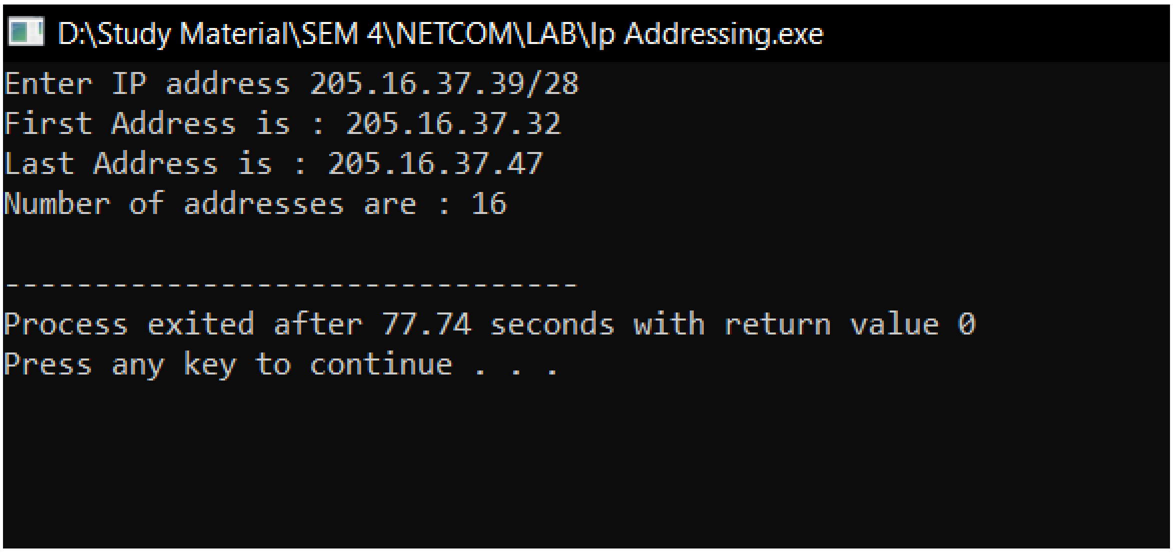
```
int convertMask(int n)
{
   int num = n;
   int dec_value = 0;
   int base = 1;

   int temp = num;
   while (temp)
   {
      int last_digit = temp % 10;
      temp = temp / 10;

      dec_value += last_digit * base;

      base = base * 2;
   }

   return dec_value;
}

string complement(string bits)
{
   for (int i = 0; i < bits.length(); i++)
   {
      if (bits[i] == '1')
```

```
        {
            bits[i] = '0';
        }
        else
        {
            bits[i] = '1';
        }
    }
    return bits;
}

void binToDecimal(string n)
{
    string num = n;
    int dec_value = 0;
    int base = 1;
    int len = num.length();
    for (int i = len - 1; i >= 0; i--)
    {
        if (num[i] == '1')
            dec_value += base;
        base = base * 2;
    }
    stringstream ss;
    ss << dec_value;
    string s;
    ss >> s;
    binDec = binDec + s + '.';
}

void FirstAddress(string bits, string mask)
{
    for (int i = 0; i < 32; i++)
    {
        if (bits[i] != mask[i])
        {
            bits[i] = '0';
        }
    }
    int j = 0;
    string block = "";
    for (int i = 0; i <= 31; i++)
    {
        block += bits[i];
        if ((i + 1) % 8 == 0)
        {
            binToDecimal(block);
            block = "";
        }
    }
    binDec[binDec.length() - 1] = ' ';
    cout << "First Address is : " << binDec << endl;
    binDec = "";
}
void LastAddress(string bits, string mask)
{
    mask = complement(mask);
    for (int i = 0; i < 32; i++)
    {
        if (bits[i] == '0' && mask[i] == '1')
        {
            bits[i] = '1';
        }
    }
    int j = 0;
    string block = "";
    for (int i = 0; i <= 31; i++)
    {
        block += bits[i];
        if ((i + 1) % 8 == 0)
        {
            binToDecimal(block);
            block = "";
        }
    }
    binDec[binDec.length() - 1] = ' ';
    cout << "Last Address is : " << binDec << endl;
    binDec = "";
```

```
}
void NoOfAddress(string bits, string mask)
{
    mask = complement(mask);
    int maskNum = atoi(mask.c_str());
    maskNum = convertMask(maskNum);
    cout << "Number of addresses are : " << maskNum + 1 << endl;
}

int decToBinary(int n)
{
    for (int i = 7; i >= 0; i--)
    {
        int k = n >> i;
        if (k & 1)
            decBin += "1";
        else
            decBin += "0";
    }
}

int main()
{
    string IP;
    cout << "Enter IP address ";
    string block = "";
    cin >> IP;
    string maskBits = "";
    maskBits = maskBits + IP[IP.length() - 2] + IP[IP.length() - 1];
    int mask = atoi(maskBits.c_str());
    for (int x = 0; x < mask; x++)
    {
        maskString += '1';
    }
    int remBits = 32 - mask;
    while (remBits)
    {
        maskString += '0';
        remBits--;
    }
    int i = 0, ctr = 0, j = 0;
    while (i < IP.length() - 3)
    {
        if (IP[i] != '.')
        {
            block += IP[i];
        }
        if (IP[i] == '.' || IP[i] == IP[IP.length() - 4])
        {
            int b = atoi(block.c_str());
            decToBinary(b);
            block = " ";
```

```
      }


      i++;
    }
        FirstAddress(decBin, maskString);
    LastAddress(decBin, maskString);
    NoOfAddress(decBin, maskString);
}
```

Output –



D:\Study Material\SEM 4\NETCOM\LAB\Ip Addressing.exe

```
Enter IP address 205.16.37.39/28
First Address is : 205.16.37.32
Last Address is : 205.16.37.47
Number of addresses are : 16

--------------------------------
Process exited after 77.74 seconds with return value 0
Press any key to continue . . .
```